13º Simpósio Internacional sobre Esquistossomose
13º International Symposium on Schistosomiasis
16 to 19 September 2012 - Belo Horizonte, MG - Brazil

Summary

13º Simpósio Internacional sobre Esquistossomose
13th International Symposium on Schistosomiasis
16 to 19 September 2012 - Belo Horizonte, MG - Brazil

President of Honor

Giovanni Gazzinelli

Organizing Committee

Guilherme Oliveira (President)

Roberta Lima Caldeira (Vice-President)

Liana K Jannotti Passos (Treasurer)

Scientific Committee

Carlos Graeff Teixeira (BRA)
Charles King (EUA)
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Guilherme Oliveira (BRA)
Liana K Jannotti Passos (BRA)
Marcelo Fantappie (BRA)
Mitermeyer Reis (BRA)
Naftale Katz (BRA)
Otavio Pieri (BRA)
Phil LoVerde (EUA)
Renata Guerra (BRA)
Roberta Lima Caldeira (BRA)
Rosiane A Pereira da Silva (BRA)
Sergio Costa Oliveira (BRA)
Silvana Thiengo (BRA)
Virginia Schall (BRA)
Tereza Favre (BRA)

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Executive Committee

Ângela Volpini
Cristiano Massara
Fernanda Ludolf
Larissa Silva
Lívia Avelar
Luiza Andrade
Mariana Magalhães
Mariana Oliveira
Marina Mourão
Ronaldo Scholte
Tereza Favre

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Welcome Message

The International Symposium on Schistosomiasis (Simpósio Internacional sobre Esquistossomose) was first held in 1987 and since then there were 12 editions. It is an event that has greatly influenced the scientific community, both nationally and internationally, as has the participation of renowned Brazilian and foreign researchers show that a quality scientific content in their presentations. The International Symposium on Schistosomiasis is the only regular event of its kind worldwide. Historically, the event involved about 350 scientists, undergraduate and graduate students, in addition to professional health services local, state and federal. This year in particular we plan for greater involvement of the international community, with a focus on colleagues from Africa and China. The program of the International Symposium on Schistosomiasis has round tables, conferences, sessions for oral and poster presentations. In addition there will be short courses on molecular biology, epidemiology and genomics.

This year, the 13th edition of the event has the theme: “Challenges in the genome era, how to make it deliver”. The event will be held in Belo Horizonte, Minas Gerais. The climate is pleasant with beautiful landscapes and eclectic architecture. The city was considered one of the best cities quality of life in Latin America and is visited by tourists, business tourists, attracted by the local infrastructure and sights in the city and nearby touristic attractions. There will be three awards. The "Pirajá da Silva" award for the best abstract, the "José Pellegrino" award for the best doctoral thesis, and the "Amaury Coutinho" award for the best master thesis defended in the last two years.

Welcome to Belo Horizonte!

Guilherme Corrêa de Oliveira/President of Organizing Committee

Symposia Been Held

	President	City	Year
1º	Mirian Tendler	Rio de Janeiro	1987
2º	Naftale Katz	Belo Horizonte	1989
3º	Amaury Coutinho	Recife	1991
4º	Mírian Tendler	Rio de Janeiro	1993
5º	Zilton Andrade	Salvador	1995
6º	Naftale Katz	Belo Horizonte	1997
7º	Mírian Tendler	Rio de Janeiro	1999
8º	Eridan de M. Coutinho	Recife	2001
9º	Mitermayer Galvão dos Reis	Salvador	2003
10º	Omar dos Santos Carvalho	Belo Horizonte	2005
11º	Mitermayer Galvão dos Reis	Salvador	2008
12º	Carlos Eduardo Grault	Rio de Janeiro	2010

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Programme Structure

Time	September 16th	September 17th	September 18th	September 19th
8:00 am		Short course 1, 2, 3	Short course 1, 2, 3	Short course 1, 2, 3
9:00 am		Conference	Conference	Conference
10:00 am		Coffee Break	Coffee Break	Coffee Break
11:00 am		Round Tables	Round Tables	Round Tables
12:00 am		Lunch	Lunch	Closing Ceremony
1:00 pm			Special Session	
2:00 pm		Free Themes	Free Themes	
3:00 pm		Coffee Break	Coffee Break	
4:00 pm		Round Tables	Round Tables	
5:00 pm				
6:00 pm	Opening Cerimony	Poster Session	Poster Session	
7:00 pm	Cocktail			

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Summary of Scientific Activities

Time	*September 17th*		
08:00 am	**Short course 1** Functional Gene Analyses by RNA	**Short course 2** Manipulating the Schistosoma Genomes	**Short course 3** Geoprocessing in Health
09:00 am	**Conference** Chair: Guilherme Oliveira / Speaker: Phil LoVerde		
10:00 am	**Coffee Break**		
10:00 am – 11:00 am	**Round Table 1** Schistosomiasis elimination 1	**Round Table 2** Schistosome epigenetics	
12:00 am – 1:00 pm	**Lunch**		
2:00 pm	**Free Themes 1** Epidemiology, Sanitation, Control, Elimination of Schistosomiasis and Intermediary Hosts	**Free Themes 2** Drug Development, Resistance and Molecular Biology	
3:00 pm	**Coffee Break**		
4:00 pm – 5:00 pm	**Round Table 3** Immunoregulation	**Round Table 4** Drug development and resistance	
6:00 pm	**Poster Session** "Epidemiology, Sanitation, Control, Elimination of Schistosomiasis and Intermediary Hosts" (Poster 1 to 90)		

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Time	*September 18th*		
8:00 am	**Short course 1** Functional Gene Analyses by RNA	**Short course 2** Manipulating the Schistosoma Genomes	**Short course 3** Geoprocessing in Health
9:00 am	**Conference:** New schistosomiasis control strategies in Brazil Chair: Naftale Katz/Speaker: Rosa Castália França Ribeiro Soares (Brazilian Ministry of Health)/Discussion: Dr. José Alexandre Menezes da Silva (SANAR Project, PE)		
10:00 am	**Coffee Break**		
11:00 am	**Round Table 5** Diagnostics	**Round Table 6** Schistosomiasis evolutionary biology	
12:00 am	**Lunch**		
1:00 pm	**Special Session** Diagnostics: different formats for different needs. Sponsored by Merck		
2:00 pm	**Free Themes 1** Biomarkers, Immunoregulation and Diagnostics	**Free Themes 2** Post Genomics, Proteomics, Epigenetics and Evolution	
3:30 pm	**Coffee Break**		
4:00 pm	**Round Table 7** Informatics and Epidemiology	**Round Table 8** Post genomics, immunomics, proteomics and biomarkers	
5:00 pm			
6:00 pm	**Poster Session** "Biomarkers, Immunoregulation and Diagnostics" "Post Genomics, Proteomics, Epigenetics and Evolution" "Drug Development, Resistance and Molecular Biology" (Poster 91 to 181)		

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Time	*September 19th*		
8:00 am	**Short course 1** Functional Gene Analyses by RNA	**Short course 2** Manipulating the Schistosoma Genomes	**Short course 3** Geoprocessing in Health
9:00 am	**Conference 3** Chair: Dan Colley Big Schisto – the large research consortia		
10:00 am	**Coffee Break**		
11:00 am	**Round Table 9** Schistosomiasis elimination 2	**Round Table 10** Intermediary hosts	
12:00 am	**Closing Ceremony**		

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Scientific Programme

September 17 th

Local: Teatro Oromar Moreira

09:00 - Conference

Chair: Guilherme Oliveira

Speaker: Phil LoVerde

Local: Teatro Oromar Moreira

10:30 - Round Table – Schistosomiasis elimination 1

Chair: David Rollinson (Natural History Museum, London)

An overview on the elimination of schistosomiasis - Lester Chitsulo (World Health Organization)

Control, schistosomiasis, chemotherapy, sanitation - Naftale Katz (Fiocruz-Minas)

The characteristics of epidemic and control of the human schistosomiasis - Jiagang Guo (WHO)

Schistosomiasis in Venezuela a neglected among the neglected diseases - Oscar Noya (Universidad Central de Venezuela)

Local: Auditório Borges da Costa

10:30 - Round Table – Schistosome epigenetics

Chair: Marcelo Fantappie (Federal University of Rio de Janeiro)

The SEtTReND project: targeting *Schistosoma mansoni* histone modifying enzymes for drug development - Raymond Pierce (Institute Pasteur, Lille)

The epigenome of *Schistosoma mansoni* and its plastic response to environmental stress - Christoph Grunau (University of Perpignan)

Unveiling the global *Schistosoma mansoni* methylome - Karl Hoffman (Aberystwyth

University)

Specific gene repositioning in interphase nuclei of the host organism *Biomphalaria glabrata* after a schistosome infection - Joanna Bridger (Brunel University)

Targeting epigenetics to control schistosomiasis - Marcelo Fantappie (Federal University of Rio de Janeiro)

Local: Teatro Oromar Moreira

02:00pm - Free Themes - Epidemiology, Sanitation, Control, Elimination of Schistosomiasis and Intermediary Hosts

Chair: Vírginia Torres Schall

Risk mapping and prediction of schistosomiasis in Brazil using Bayesian geostatistical models - Ronaldo Scholte *et al*

Susceptibility of *Biomphalaria straminea* from the São Francisco River basin, Northeast of Brazil, to infection with two strains of *S.mansoni* - Monica A Fernandez *et al*

Archetypal analysis of Schistosomiasis control in Brazil - Valdir Costa *et al*

Effectiveness of physical therapy in improving of sensory and motor conditions in Schistosomal Myeloradiculopathy: Case report - Tiago Carvalho *et al*

Evaluation of schistosomiasis control activities in the Brazilian PSF - Humberto Quites et al

Spatial and temporal-time analysis of prevalence of schistosomiasis autochthonous cases in Pernambuco, 2007 – 2011 - Onício Leal Neto *et al*

Local: Auditório Borges da Costa

02:00pm - Free Themes - Drug Development, Resistance and Molecular Biology

Chair: Glória Franco

Antischistosomal action of derivative of the thiazole heterocyclic ring LpQM/SC-45: An ultrastructural and cytotoxicity study - Edna de Farias Santiago *et al*

Molecular characterization of TNF-α Receptor homolog (SmTNFR) in *Schistosoma mansoni*: a new player in the signal transduction puzzle between host-pathogen - Katia C. Oliveira *et al*

Molecular characterization of SmMago, a *Schistosoma mansoni* Homologue of a Drosophila Gene involved in Germ Plasm Assembly - Carina Pinheiro *et al*

RNAi-mediated knockdown of protein kinases and histone modifying enzymes in the parasite *Schistosoma mansoni* - Fernanda Sales Coelho *et al*

Investigation of the oligosaccharide composition of cercariae/schistosomula in vitro secreted SmVALs (*Schistosoma mansoni* Venom Allergen-Like Protein) using a set of lectins as carbohydrate binding molecules - Rafaela Fernandes *et al*

Purine salvage pathway from *Schistosoma mansoni* – Larissa Romanello *et al*

Local: Teatro Oromar Moreira

04:00pm - Round Table – Immunoregulation

Chair: Jeffrey Bethony (George Washington University / Fiocruz-Minas).

Maria Ilma Araújo (Federal University of Bahia)

Inhibitory indirect effects of oral tolerance on granuloma formation - Cláudia Carvalho (Federal University of Minas Gerais)

Differences in risk factors to schistosomiasis in two communities from Minas Gerais State, Brazil: a follow up study - Lúcia Fraga (UNIVALE)

Macrophage Regulation of Schistosomal Bladder Pathogenesis - Michael H. Hsieh (Stanford)

Protein Arrays for *S. mansoni*: preliminary data and next steps - Jeffrey Bethony (George Washington University / Fiocruz-Minas).

Local: Auditório Borges da Costa

04:00pm - Round Table – Drug development and resistance

Chair: Conor Caffrey (University of California San Francisco)
Development of praziquantel-resistant schistosomiasis in humans, should we be concerned? - Evan Secor (CDC)

New drugs for schistosomiasis - Piero Ollario (World Health Organization) -

Mining the *Schistosoma* genome for new drug targets - Guilherme Oliveira (Fiocruz-Minas)

Developing new drugs for schistosomiasis – an uphill swim not without its rewards - Conor Caffrey (University of California San Francisco)

September 18th

Local: Teatro Oromar Moreira

09:00 Conference "New schistosomiasis control strategies in Brazil"

Chair: Naftale Katz

Speaker: Rosa Castália França Ribeiro Soares (Brazilian Ministry of Health)

Discussion: Dr. José Alexandre Menezes da Silva (SANAR Project, PE)

Local: Teatro Oromar Moreira

10:30 Round Table - Diagnostics

Chair: Ana Rabello
Moderator: Paulo Marcos Zech Coelho (FIOCRUZ-Minas)

Diagnostic requirements for schistosomiasis surveillance and confirmation of the interruption of transmission - Lester Chitsulo (WHO-TDR)

Issues with diagnosing and assessing treatment efficacy for *S. mansoni* schistosomiasis - Piero Olliaro (WHO-TDR)

Parasitological diagnosis: balancing advantages and problems - Fernando Bezerra (Federal University of Ceará)

The potential of antibody-detection methods in programmes aimed at eliminating schistosomiasis - Emily Dawson (Univ. Nottingham)

What is the place of molecular diagnosis of schistosomiasis in control programmes? - Luciana Gomes (FIOCRUZ-Minas)

Auditorio: Borges da Costa

10:30am Round Table - Schistosomiasis evolutionary biology

Chair: Laila Nahum

Mitochondrial genomes of schistosomes – tools and resources in the light of next generation sequencing - Timothy Littlewood (Natural History Museum, London)

Kinship analysis reveals strong family structure in schistosome parasite samples from humans - Michelle Steinauer (Oregon State University)

Mapping genes in *Biomphalaria glabrata* that control resistance to *S. mansoni* - Michael Blouin (Oregon State University)

Schistosoma Phylogenomics: An evolutionary framework to improve functional prediction and assess parasite biology - Laila Nahum (Fiocruz-Minas and Inforium)

Local: Teatro Oromar Moreira

12:30 - Special session - Diagnostics: different formats for different needs. Sponsored by Merck

Local: Teatro Oromar Moreira

02:00pm - Free Themes - Biomarkers, Immunoregulation and Diagnostics

Chair: Cristina Toscano

Schistosoma mansoni schistosomula tegument (smteg) induces il-10 production leading to experimental allergic asthma modulation - Sara C Souza *et al*

Hyaluronic acid (HA), YKL-40 and transforming growth factor Beta1 (TGF-β1) in the diagnosis of hepatosplenic schistosomiasis and in the evaluation of liver fibrosis intensity - Izabela Voieta *et al*

The role of adipose-derived mesenchymal stem cells (admsc) in the immunoregulation of experimental schistosomiasis - Adriana Bozzi *et al*

The *Schistosoma mansoni* 200kDa (Sm200) Tegument protein as a candidate to be used in schistosomiasis diagnosis and vaccine formulation - Gardênia B F de Carvalho *et al*

Cytokine profile in human schistosomiasis and its relationship with fibrosis and treatment - Gabriela S E Nunes *et al*

The effect of *Schistosoma mansoni* Sm29 antigen in down modulate the dendritic cells profile in cutaneous leishmaniasis - Diego M Lopes *et al*

Auditorio: Borges da Costa

02:00pm - Free Themes - Post Genomics, Proteomics, Epigenetics and Evolution

Chair: Élio Baba

Genome-wide identification of novel microRNAs and their target genes in the human parasite *Schistosoma mansoni* - Matheus de Souza Gomes *et al*

MAPK pathway is essential for *Schistosoma mansoni* reproduction and survival - Luiza Freire de Andrade *et al*

Serological-Proteome of the parasite *Schistosoma mansoni*: an approach for biomarker identification - Fernanda Ludolf *et al*

Study of the *Schistosoma mansoni* protein antigens recognition profile by the serum from individuals of a schistosomiasis endemic area - Paola Rezende Patrocínio *et al*

Protein expression profile of adult worms from *Schistosoma mansoni* in response to oxidative stress - Renato Graciano de Paula *et al*

Characterization of the trans-splicing mechanism in the post-transcriptional gene regulation of *Schistosoma mansoni* - Marina de Moraes Mourão *et al*

Cytoplasmic motor proteins and their contribution to the biogenesisnd homeostasis of the tegument of *Schistosoma mansoni* - Leigh Schulte *et al*

Local: Teatro Oromar Moreira

04:00pm Round Table - Informatics and epidemiology

Chair: David Gurarie (Case Western Reserve University)

Mathematical models for informing schistosomiasis elimination planning in the face of emerging praziquantel resistance - Edmund Seto (UC Berkeley)

Insights from mathematical modelling for monitoring and evaluation - Martin Walker (Imperial College)

Heterogeneity in helminth infections and its implications for transmission and control - David Gurarie (Case Western Reserve University)

Auditorio: Borges da Costa

04:00pm Round Table - Post genomics, immunomics, proteomics and biomarkers

Chair: Alan Wilson (University of York)

RNAi in schistosomes: functional analysis of tegumental proteins - Greice Krautz-Peterson (Tufts)

Schistosome glycomics and the application of glycan arrays for monitoring antibody responses in schistosomiasis - Hon Hokke (Leids University)

Novel organ isolation approach as a basis for tissue-specific analyses in *Schistosoma mansoni* - Thomas Quack (Giessen University)

The schistosome oesophageal gland: initiator of blood processing - Alan Wilson (University of York)

Proteomics to assist biomarker discovery in schistosomiasis: findings, challenges and perspectives - William Casto-Borges (Federal University of Ouro Preto)

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September 19th

Local: Teatro Oromar Moreira

09:00am - Conference "Big Schisto – the large research consortia"
Chair Dan Colley
Dan Colley, University of Georgia (SCORE)
Ray Pierce, Institute Pasteur, Lille (SEtTReND)
Rodrigo Corrêa-Oliveira, Fiocruz-Minas (NIH TMRC)
Ron Hokke, Leiden Unviersity (TheSchistoVAC)

Local: Teatro Oromar Moreira

10:30am Round Table -Schistosomiasis elimination 2

Chair: Naftale Katz (Fiocruz-Minas)

Schistosomiasis elimination and control - What industry can contribute? - Jutta Rienhard-Rupp (MerckSerono)

The Schistosomiasis Elimination Agenda: Ten Key Questions - David Rollinson (Natural History Museum, London)

Environmental Sanitation initiatives in the Control of Schistosomiasis - Everaldo Resende Silva (- National Health Foundation - Funasa/ Ministry of Health)

Community participation assessment of a schistosomiasis control program in a rural area of Minas Gerais State, Brazil - Dr. Helmut Kloos (University of California San Francisco)

Diagnostic methods for epidemiological surveys and for cure control - Dr. Paulo Marcos Zech Coelho (Fiocruz-Minas)

Auditorio Borges da Costa

10:30am Round Table Intermediary hosts

Chair: Coen Adema (University of New Mexico)

The assembly and improvement of the snail, *Biomphalaria glabrata*, genome - Pat Minx (Washington University Genome Institute)

Intermediate host immunity: specific versus non-specific responses evidenced by a comparative de novo sequencing study - Christine Coustau (University of Montpellier)

Database needs for the snail genome - Guilherme Oliveira (FIOCRUZ-Minas)

Exploring snail intermediate host biology at the dawn of the genomics era for *Biomphalaria glabrata* - Coen Adema (University of New Mexico)

Local: Teatro Oromar Moreira

12:00 - Closing ceremony

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Free Theme Programme

Free Themes Session "Epidemiology, Sanitation, Control, Elimination of Schistosomiasis and Intermediary Hosts"

Oromar Moreira Theater, on 17th September at 14h.

Risk mapping and prediction of schistosomiasis in Brazil using Bayesian geostatistical models Ronaldo Scholte, Laura Gosoniu, John Malone, Jürg Utzinger, Penelope Vounatsou
Susceptibility of *Biomphalaria straminea* from the São Francisco River basin, Northeast of Brazil, to infection with two strains of *Schistosoma mansoni* Monica Ammon Fernandez, Paula Thaise Bermudez dos Reis, Silvana Carvalho Thiengo
Archetypal analysis of Schistosomiasis control in Brazil Valdir Costa, Ana Maria Di Nicoló Concatto, Clélia Christina Mello-Silva
Effectiveness of physical therapy in improving of sensory and motor conditions in Schistosomal Myeloradiculopathy: Case report. Tiago Carvalho, Camilla Biana, Ingrid Freitas, Mayara Agripino, Karina Araújo
Evaluation of schistosomiasis control activities in the Brazilian Family Health Program Humberto Quites, Mery Natali Silva Abreu, Ed Wilson Rodrigues Vieira, Kellen Rosa Coelho, Thais Moreira N. Lima, Fernanda Bicalho Pereira, Andrea Gazzinelli
Spatial and temporal-time analysis of prevalence of schistosomiasis autochthonous cases in Pernambuco, 2007 – 2011 Onicio Leal Neto, Julyana Viegas, Rafael Moreira

Free Themes Session "Drug Development, Resistance and Molecular Biology"

Auditorio Borges da Costa, on 17th September at 14h.

Antischistosomal action of derivative of the thiazole heterocyclic ring LpQM/SC-45: An ultrastructural and cytotoxicity study - Edna de Farias Santiago, Gevânio Bezerra de Oliveira Filho, Andréia Ferreira de Barros, Gabriel Gazzoni Araujo Gonçalves, Valéria Rêgo Alves Pereira, Fábio André Brayner, Luíz Carlos Alves, Ana Cristina Lima Leite, Sheilla Andrade de Oliveira
Molecular characterization of TNF-α Receptor homolog (SmTNFR) in *Schistosoma mansoni*: a new player in the signal transduction puzzle between host-pathogen - Katia C. Oliveira, Mariana L. P. Carvalho, Silke Leutner, Svenja Beckmann, Christin Buro, Elizabeth Szyleyko, Christoph G Grevelding, James McKerrow, Sergio Verjovski-Almeida
Molecular characterization of SmMago, a *Schistosoma mansoni* Homologue of a Drosophila Gene involved in Germ Plasm Assembly - Carina Pinheiro, Alex Loukas, Malcolm Jones, Elida Rabelo
RNAi-mediated knockdown of protein kinases and histone modifying enzymes in the parasite *Schistosoma mansoni* - Fernanda Sales Coelho, Luiza Freire de Andrade, Juliana Assis Geraldo, Raymond Pierce, Guilherme Corrêa de Oliveira, Marina de Moraes Mourão
Investigation of the oligosaccharide composition of cercariae/schistosomula in vitro secreted SmVALs (*Schistosoma mansoni* Venom Allergen-Like Protein) using a set of lectins as carbohydrate binding molecules - Rafaela Fernandes, Leonardo Farias, Henrique Rofatto, Patricia Miyasato, Eliana Faquim-Mauro, Luciana Leite
Purine salvage pathway from *Schistosoma mansoni* - Larissa Romanello, Juliana Torini de Souza, José Brandão-Neto, Ricardo DeMarco, Humberto Pereira

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Free Themes: "Biomarkers, Immunoregulation and Diagnostics"

Oromar Moreira Theater, on 18th September at 14h.

Schistosoma mansoni schistosomula tegument (smteg) induces il-10 production leading to experimental allergic asthma modulation Sara Camila de Souza, Fabio Antonio Vitarelli Marinho, Cristina Toscano Fonseca, Sérgio Costa Oliveira, Lucila Grossi Pacífico
Hyaluronic acid (HA), YKL-40 and transforming growth factor Beta1 (TGF-β1) in the diagnosis of hepatosplenic schistosomiasis and in the evaluation of liver fibrosis intensity Izabela Voieta, Alba Otoni, Antonio Teixeira, Luciene Mota, Leonardo Queiroz, Vivian Resende, Zilton Andrade, Carlos Maurício Antunes, José Roberto Lambertucci
The role of adipose-derived mesenchymal stem cells (admsc) in the immunoregulation of experimental schistosomiasis Adriana Bozzi, Ana Thereza Chaves, Kelly Alves Bicalho, Talita Rocha Gomes, Vitor Hugo Simões Miranda, Olindo Assis Martins-Filho, Jaquelline Germano Oliveira, Alfredo Miranda Goes, Rodrigo Correa-Oliveira
The *Schistosoma mansoni* 200kDa (Sm200) TEGUMENT PROTEIN AS A CANDIDATE TO BE USED IN SCHISTOSOMIASIS DIAGNOSIS AND VACCINE FORMULATION Gardênia Braz Figueiredo de Carvalho, Deborah Laranjeira Ferreira Pimenta, Lucila Gonçalves Grossi Pacífico, Carina da Silva Pinheiro, Ricardo Toshio Fujiwara, Sergio Costa Oliveira, Cristina Toscano Fonseca
Cytokine profile in human schistosomiasis and its relationship with fibrosis and treatment Gabriela Silveira E Nunes, Lúcia Alves De Oliveira Fraga, Elaine Speziali Faria, Olindo Assis Martins-Filho, Ana Maria Caetano Faria, Rodrigo Correa-Oliveira, Andréa Gazzinelli, Andréa Teixeira Carvalho, Alda Maria Soares Silveira
The effect of *Schistosoma mansoni* Sm29 antigen in down modulate the dendritic cells profile in cutaneous leishmaniasis Diego Mota Lopes, Luciana S. Cardoso, Jamille S. Fernandes, Edgar M. Carvalho, Maria Ilma Araujo

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Free Themes Session "Post Genomics, Proteomics, Epigenetics and Evolution"

Auditorio Borges da Costa, on 18th September at 14h.

Genome-wide identification of novel microRNAs and their target genes in the human parasite *Schistosoma mansoni* - Matheus de Souza Gomes, Mohan Kumar Muniyappa, Sávio Gonçalves Carvalho, Renata Guerra-Sá, Charles Spillane
MAPK pathway is essential for *Schistosoma mansoni* reproduction and survival - Luiza Freire de Andrade, Marina de Moraes Mourão, Juliana Assis Geraldo, Fernanda Sales Coelho, Renata Heisler Neves, José Roberto Machado Silva, Rafael Pimenta, Conor Caffrey, Guilherme Oliveira
Serological-Proteome of the parasite *Schistosoma mansoni*: an approach for biomarker identification - Fernanda Ludolf, Paola Patrocínio, Andréa Gazzinelli, Franco Falcone, Rodrigo Correa-Oliveira, Rosiane Silva-Pereira, Guilherme Oliveira
Study of the *schistosoma mansoni* protein antigens recognition profile by the serum from individuals of a schistosomiasis endemic area - Paola Rezende Patrocínio, Fernanda Ludolf Ribeiro, Rodrigo Corrêa Oliveira, Guilherme Corrêa Oliveira, Rosiane Aparecida Da Silva-Pereira
Protein expression profile of adult worms from *Schistosoma mansoni* in response to oxidative stress - Renato Graciano de Paula, Alice Maria de Magalhães Ornelas, Enyara Rezende Morais, Lizandra Guidi Magalhães, Vanderlei Rodrigues
Characterization of the trans-splicing mechanism in the post-transcriptional gene regulation of *Schistosoma mansoni* - Marina de Moraes Mourão, Mainá Bitar, Francisco P. Lobo, Timothy P. Yoshino, Glória R. Franco
Cytoplasmic motor proteins and their contribution to the biogenesis=nd homeostasis of the tegument of *Schistosoma mansoni* - Leigh Schulte, Jason Mulvenna, Geoffrey Gobert, Malcolm Jones

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Poster Programme

September 17th Session Poster - *"Epidemiology, Sanitation, Control, Elimination of Schistosomiasis and Intermediary Hosts"* – 06:00 pm – Salão Multimeios Hilton Rocha

POSTER NUMBER	Title/ Authors
1	Susceptibility of *Biomphalaria glabrata* (Say,1918) of the municipalities of "Estrada Real" in the southeast of the State of Minas Gerais to infection by *Schistosoma mansoni*. Mariana Mattos, Tales Rodrigues, Mayara Silveira, Elaine Coimbra, Sthefane D´Ávila, Florence Rosa
2	Cases of Schistosomal myeloradiculopathy in inhabitants of a rural area of Jequitinhonha Valley, in Minas Gerais, Brazil. Maria José Conceição, Aline Eduardo Carlôto, Iran Mendonça da Silva, Rosalie Branco Corrêa, Eric Vinaud de Melo
3	Risk factors for allergic diseases in an endemic rural area for schistosomiasis Tércia Maria Ribeiro Lima Rezende, Izabela Rocha Dutra, Thania Aparecida Gomes da Silva Barbosa, Túlio Fonseca de Lima, Andréa Gazzinelli
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80	ADVERSE REACTIONS TO PRAZIQUANTEL IN COLLECTIVE TREATMENT PATIENTS IN PERNAMBUCO STATE, NORTHEAST BRAZIL – 2011 and 2012 Ana Virgínia Matos Sá Barreto, Vania Maria Cavalcanti, Francine Nesello, José Holanda Neto, Barbara Morgana da Silva, José Alexandre Menezes da Silva
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83	Evaluation of the effect of the association immunization/chemotherapy in mice on the efficacy of praziquantel in *Schistosoma mansoni* elimination Isabela Sena, Flávia Couto, Neusa Araújo, Ana Carolina Mattos, Carina Pinheiro, Sérgio Oliveira, Cristina Fonseca
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90	SCAN: Schistosomiasis Collection at the Natural History Museum Fiona Allan, Muriel Rabone, David Rollinson & Aidan M. Emery

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92	Schistosomaspp antigens modulate the th1 inflamatory response in vitro in htlv-1-infected individuals Luciane Lima, Silvane Santos, Aline Báfica, Luciana Cardoso, Sergio Oliveira, Alfredo Góes, Aléx Loukas, Edgar Carvalho, Maria Ilma Araújo
93	Detection of IgE subtype reactive against potato apyrase in schistosomiasis patients Anna Cecíllia Quirino Teixeira, Michélia Antônia do Nascimento Gusmão, Danielle Gomes Marconato, Wagner Faria Messias, Lucas Sales Queiroz, Paulo Marcos Zech Coelho, Eveline Gomes Vasconcelos, Priscila Faria-Pinto
94	Capturing Local Antibodies for the Discovery of Larval-Specific Vaccine Candidates Against Schistosomiasis Hamish McWilliam, Patrick Driguez, David Piedrafita, Kevin Maupin, Brian Haab, Els Meeusen
95	New approaches with different types of CCA for the diagnosis of patients with low *Schistosoma mansoni* load after intensive parasitological trial Rafaella Grenfell, Donald Harn, Smanla Tundup, Akram Da`dara, Liliane Siqueira, Paulo Marcos Coelho
96	Diagnosis of acute schistosomiasis: Standardization of an immunological method using sera from travelers recently infected in a

	new focus of *Schistosoma mansoni* Rafaella Grenfell, Watson Martins, Sandra Drummond, Carlos Maurício Antunes, Edward Oliveira, Cristina Toscano, José Roberto Lambertucci, Paulo Marcos Coelho
97	Validation of a non-commercial kit of PCR-ELISA for diagnosis of schistosomiasis mansoni Carolina Souza, Luciana Gomes, Martin Enk, Paulo Coelho, Ana Rabello
98	Clinical characterization of Schistosomal Myeloradiculopathy in patients attended at the Hospital of the Federal University of Alagoas (Alagoas- Brazil) Thiago Andre Alves Fidelis, Sandra Costa Drummond, Janira Lúcia Assumpção Couto, Rozangela Maria de Almeida Fernandes Wyszomirska
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International Symposium on Schistosomiasis
16 to 19 September 2012 - Belo Horizonte, MG - Brazil

ABSTRACTS

Free Themes Abstracts "Epidemiology, Sanitation, Control, Elimination of Schistosomiasis and Intermediary Hosts"

Risk mapping and prediction of schistosomiasis in Brazil using Bayesian geostatistical models

Ronaldo Scholte, Laura Gosoniu, John Malone, Jürg Utzinger, Penelope Vounatsou

Schistosomiasis is one of the most common parasitic diseases in tropical and subtropical areas, including Brazil. A national control programme has been instigated in Brazil in the mid-1970s and proved successful in terms of morbidity control, as the number of cases with hepato-splenic involvement has been reduced significantly. To consolidate control and move towards schistosomiasis elimination, there is a need for reliable maps on the spatial distribution of the disease, including the number of infected people, so that interventions can target communities at highest risk of infection and morbidity. The purpose of this study was to map the distribution of Schistosoma mansoni and to predict the number of infected people in Brazil. We developed Bayesian geostatistical models, which uses prevalence data of *S. mansoni* obtained from the national control programme coupled with geographical information system (GIS) and remote sensing technologies, using climatic, environmental and socioeconomic variables as predictors. Our models revealed an *S. mansoni* prevalence of 3.6% (approximately 7 million infected people). Model-based maps identified important risk factors related to the transmission of schistosomiasis and confirmed that environmental variables are closely associated with indices of poverty. Our smoothed risk map, including uncertainty, highlights priority areas for intervention, namely the northern parts of North and Southeast regions and the eastern part of Northeast region. The generated predictive risk map will be useful for prioritizing control interventions and provides a framework for novel surveillance-response mechanisms.

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Susceptibility of *Biomphalaria straminea* from the São Francisco River basin, Northeast of Brazil, to infection with two strains of *Schistosoma mansoni*

Monica Ammon Fernandez, Paula Thaise Bermudez dos Reis, Silvana Carvalho Thiengo

Introduction: Water resources projects in natural ecosystems resulting in environmental disturbances modify established niches and create conditions for new ecological aspects. The governmental Project "Integration of the São Francisco River" is one of the most important public policy on water resources, aiming to guarantee water supply for socio-economic development of the States more vulnerable to dry (Ceará, Paraíba, Rio Grande do Norte and Pernambuco). However, such projects are a matter of concern to schistosomiasis experts, as they provide excellent habitats for the snail vectors of schistosomiasis and favour close contact between people and infected water. This study aims to evaluate the susceptibility of descendants B. straminea populations from the area of the above mentioned project, after experimental infection with two Schistosoma mansoni strains (BH and EC). Methodology: Nineteen B. straminea colonies were used from five states: Bahia (municipaly: Sobradinho) Ceará (Mauriti and Pena Forte), Paraíba (Aparecida, Bonito de Santa Fé, Cajazeiras, Paulista, Pombal, São Bento and Sousa), Pernambuco (Terra Nova and Salgueiro), and Rio Grande do Norte (Açu, Caicó, Itajá, Jardim de Piranhas, Jucurutu, São Fernando and São Rafael). The snails were exposed to five *S. mansoni* miracidia and for control *B. glabrata* from Belo Horizonte (strain BH) and Pontezinha (EC strain) were used. On the 25th day after exposure to miracidia, and then every 5th day, the snails were exposed to the light of electric lamps to characterize the infection index. Results: Of the 720 exposed B. straminea specimens, 12 became infected (1.66%), including one dead specimen with sporocysts into the body tissues. For the control, the infection index from Belo Horizonte and Pontezinha snails were 51.8% and 54.5%, respectively. According to the B. straminea population or strain used, the infection index varied from 0 to 16.66%: Mauriti/CE, 10% (i.e, four out of the 40 specimens exposed to BH strain elimined cercariae) and 4.76% (EC strain); Pena Forte/CE, 9.09% (EC strain); Cajazeiras/PB, 13.33% (BH strain) and 16.66% (EC strain); Sousa/PB, 2.38% (BH strain) and 5% (EC strain). Depending on the strain, the results were as follows: of the 402 snails exposed to BH miracidia, seven became infected (1.74%) and five out of the 318 specimens exposed to EC miracidia were infected (1.57%). Conclusions: In accordance to the results of the present paper, preventive measures to prevent the increase of schistosomiasis transmission in this endemic area should be implemented, including surveillance of the snail vector.

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Archetypal analysis of Schistosomiasis control in Brazil

Valdir Costa, Ana Maria Di Nicoló Concatto, Clélia Christina Mello-Silva

Historically, schistosomiasis control programs have been guided by specific activities targeting disease control based on prevention of transmission by humans, the main host of the disease. These actions have primarily aimed at the extermination of host snails and/or treatment of patients. This work aims to describe the psychological analysis of the responsibility of humans in relation to maintenance of the transmission cycle of *S. mansoni* in nature. For the analysis of this spectrum of disease control, we used the archetypal concepts of life and death, represented by the great mother (nature-life) and predator (the villain) as described and applied by Jungian Analytical Psychology. The great mother is nature herself, represented in the cycle of schistosomiasis as the water resource. The position of man can be seen as a process of denial of responsibility: he becomes a victim of the host-parasite relationship, determining that the fault of transmission is the great mother and her constituents, is a narcissistic position of relationship and of the parasite-host concept. In this case, control actions aimed at the extermination of host snails and of the aquatic environment strengthen the snail's position as villain and place man as the victim of the process. On the basis of this perceptual level of transmission of the disease, control measures of host snails work as shadowy archetypal actions, where the great mother must serve man and environmental imbalance is a consequence of the action caused by nature. It is thus necessary to break paradigms to effectively control the disease, by emphasizing the active and decisive political role of man, infected or in risk by the disease. Control of schistosomiasis includes the process of environmental education, in a deeper and more prolonged sense, based on recognition of the process of individuation and self-importance. There is an archetypal misconception between what is truly life and death with respect to the man-snail-parasite relationship. The analytical effect rebuilt by high percept judgment would be death-life, dark glass-anima, through of the process of individuation, which could note effective signs of collective performances (collective unconscious).

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Effectiveness of physical therapy in improving of sensory and motor conditions in Schistosomal Myeloradiculopathy: Case report.

Tiago Carvalho, Camilla Biana, Ingrid Freitas, Mayara Agripino, Karina Araújo

The Schistosomal Myeloradiculopathy (SMR) is the most severe and disabling ectopic infection of Schistosoma mansoni. Spinal cord lesions preferentially involve the thoracolumbar spinal segments, conus and cauda equina. There are few published studies mentioning physical therapy intervention in the treatment of patients with SMR. This study aims at analyzing the influence of the protocol of physical therapy in improving neuromotor and sensory of a SMR patient. Methods: This study is explanatory and case report type. The study happened at the Federal University of Sergipe (UFS) with a carrier of SMR, female, 31 years old, sedentary, with a clinical diagnosis of SMR and parasite load negative. This study is a randomized A-B type, with "A" measurement at baseline (AV1) and "B" measurement that occur after the intervention (AV2). The treatment protocol consisted in 10 sessions lasting 60 minutes and frequency of five times weekly, the treatment focused on the increasing strength of the lower limbs, functional independence and improving conditions sensitive, containing functional exercises, isotonic eccentric and concentric, gait training and balance as well as sensory stimulation. For statistical analysis of muscle strength and tactile sensibility test was used ANOVA, $p < 0.05$. Results: After physical therapy intervention, the patient improved muscle strength in lower limbs ($p = 0.01$ for the right lower limb and $p = 0.04$ for the left lower limb). Ranging from 3.12 ± 0.99 to 4.37 ± 0.74 in right lower limb, and 3.00 ± 1.19 to 4.12 ± 0.83 in left lower limb. The march became more functional which can be explained by the increasing strength of the pelvic stabilizers, gluteus maximus and medium and abductors. Regarding the thermal sensibility was improved in most points assessed were the following: all right lower limb and on the outer thigh of the left lower limb, this improvement in thermal sensibility occurred primarily when evaluating the cold sensibility. Conclusion: The patient had significant improvement of neuromotor and sensory conditions, highlighting the importance of physical therapy intervention in SMR patients.

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Evaluation of schistosomiasis control activities in the Brazilian Family Health Program

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The objective of this study was to analyze the organization and quality of primary health care (PHC) services related to schistosomiasis diagnosis and treatment in the municipalities of the Regional Health Management (RHM) of Pedra Azul, Minas Gerais, Brazil. Structured questionnaires were applied to the managers responsible for coordinating the PHC and the Municipal Health Secretaries with a total of 34 professionals. Seventy four health professionals (doctors or nurses) of the Family Health Programs (FHP) were also interviewed. The Latent Variable Models were used to define the scores to assess the quality of care related to diagnosis, treatment and control of Schistosomiasis by the FHP in the PHC systems. Based on the classification used, our results showed that 40% of the FHP teams carried out their activities for the diagnosis, treatment and control of Schistosomiasis in a satisfactory or excellent way. The score by municipality showed that larger municipalities had a worse quality of control actions. Out of the 17 studied municipalities five were classified as having critically actions and four as unsatisfactory. The detected reasons were lack of training and equipment to perform their professional activities with quality despite the support of the RHM. Most FHS managers (92.4%) reported schistosomiasis as an important health problem at the municipality, but only 35.3% said that its control is a priority tor the service. Half of the interviewed professionals knew the Schistosomiasis Control Program of the Ministry of Health (SCP). About one third of the teams had a formal or informal partnership with the SCP for promoting of actions of disease control. The preventive and health education activities related to Schistosomiasis were held in 52.9% of the municipalities. Most teams in these cities operated exclusively in the urban area (51.4%) and 29.7% in rural areas. There is a lack of training of the FHP related to the prevention and control of the disease. These results indicated that the strategies for surveillance and control of schistosomiasis in this endemic area are not enough for control. There is no uniformity related to control actions and no effective integration between their professional and the SCP.There is also insufficient monitoring and evaluation activities performed in the execution of control activities.

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Spatial and temporal-time analysis of prevalence of schistosomiasis autochthonous cases in Pernambuco, 2007 – 2011

Onicio Leal Neto, Julyana Viegas, Rafael Moreira

The state of Pernambuco is known to be a representative area of schistosomiasis in the country. The "Zona da Mata" is historically endemic, where it presents municipalities with approximately 50% prevalence. The GIS has been increasingly incorporated into epidemiological studies by allowing the description of areas where the diseases occur. The present study aims to perform a spatial analysis of schistosomiasis autochthonous cases in Pernambuco state, in the period 2007 to 2011. It is an ecological study with spatial approach that analyzed the prevalence rates of schistosomiasis and rates of autochthony by municipality in Pernambuco state. For data acquisition we used the Information System for Notifiable Diseases (SINAN), and the cases collected from 2007 to 2011. We estimated the relative risk (RR) and population attributable risk (PAR) of each municipality with reference to the state average. The spatial analysis was done by constructing choropleth maps and estimation of spatial dependence by means of Moran Global Index (MGI) and the Local Moran Index, aimed at locating areas with statistical significance ($p < 0.05$) for spatial dependence. Linear regression was performed to observe the trend of the prevalence over years. In order to smooth the rates of autochthony in cities with low numbers and small population exposed, were re-estimated new fees for Local empirical Bayesian method. The average prevalence for the state in this period was 98.5 cases per 100 000 inhabitants, 23.8% (n=44) of the municipalities had an average rate of autochthony of 411 per 100 000 inhabitants. There was a decreasing trend in prevalence, with a strong coefficient of determination ($r^2 = 0.92$) and a regression coefficient ($\beta = -11.124$, $p = 0.009$). The MGI was statistically significant ($p < 0.03$) for the spatial dependence of events in all time periods. From the construction of the Moran Map, there were significant areas of risk primarily in "Zona da Mata" and the metropolitan region of the state. From what was found, schistosomiasis still poses a challenge to their control in the state. Although these data showed a decreasing trend, based on studies that show high rates of illness, evidence of inconsistencies in the information systems can be considered. The construction of epidemiological settings from the spatial analysis allows us to understand the manifestation of the disease in the territory, indicating priority areas for intervention and thereby improving the quality of life of the inhabitants of these places.

Free Themes Abstracts "Drug Development, Resistance and Molecular Biology"

Antischistosomal action of derivative of the thiazole heterocyclic ring LpQM/SC-45: An ultrastructural and cytotoxicity study

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Schistosomiasis is a cronic disease and debilitating caused by helminthes of genus Schistosoma. More than 207 million people are infected worldwide, with an estimated 700 million people at risk in 74 endemic countries. The only drug available for treating schistosomiais is praziquantel, however there are already reports of resistance to its use in treatment, making it necessary to search and develop new antischistosomal compounds (1,2). In this context, The phthalimides and derivatives of cyclic thiosemicarbazones are promising molecules, demonstrating a broad pharmacological profile and constituting an important class of compounds whose properties have been extensively studied in the medicinal chemistry (3). Objectives: Antichistosomal action, ultrastructural and cytotoxicity study in the adult Schistosoma mansoni after in vitro exposure to derivative of the thiazole heterocyclic ring LPQM/SC-45. Methodology: Swiss mice, infected with 120 cercariaes, were submitted to perfusion sixty days post infection for the recovery of worms. The parasites obtained were arranged in pairs and incubated with the compound LpQM/SC-45 (concentration range of 40-100 µg/mL) in culture dish containing complete RPMI medium at 37 °C in a humidified atmosphere containing 5% CO2 gas. For ultrastructural study, samples of Schistosoma incubated with 80 µg/mL of compound LpQM/SC-45 were analyzed by means of transmission electron microscope using method described in ref. 6. The evaluation of cytotoxicity was analyzed in spleen cells of mice using method similar to reported in ref. 5. Results: The schistosomicidal activity showed 100% mortality in the dose of 100 µg/mL, 80 µg/mL, and 40 µg/mL on the eighth day of observation. The evaluation of cytotoxicity showed that the compound LpQM/SC-45 presented nontoxic effects at 100µg/mL, whereas the praziquantel presented toxic effects at 1µg/mL. The ultrastructural study revealed alterations of the integument with the presence of vacuoles in the matrix region syncytial. In the region subtegumentar, it was observed the presence of vacuoles near circular and longitudinal musculature, well as focal location of structures similar to myelin. Conclusion: The present results suggest that the compound LpQM/SC-45 have antischistosomal activities in nontoxic concentration and provide a basis for subsequent experimental and clinical trials.

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Molecular characterization of TNF-α Receptor homolog (SmTNFR) in *Schistosoma mansoni*: a new player in the signal transduction puzzle between host-pathogen

Katia C. Oliveira, Mariana L. P. Carvalho, Silke Leutner, Svenja Beckmann, Christin Buro, Elizabeth Szyleyko, Christoph G Grevelding, James McKerrow, Sergio Verjovski-Almeida

Schistosoma mansoni is the major causative agent of schistosomiasis. During the infection process, the parasite takes advantage of many host signals (such as hormones and cytokines) to complete its development in the human body. Tumor necrosis factor-α (TNF-α) is a human cytokine involved in skin inflammatory responses, and although its effect on the adult parasite´s metabolism and egg-laying process has been previously described, a comprehensive assessment of the TNF-alpha signaling pathway and its downstream molecular effects was lacking. Recently our group described the *S. mansoni* homolog gene to TNF-alpha receptor in (SmTNFR); this gene encodes a transmembrane protein comprised of 599 amino acids and contains four cysteine-rich domains as described for TNFR members. SmTNFR highest expression level is in cercariae, 3.5 (±0.7) times higher than in adult worms. Downstream members of the known human TNF-α pathway were identified by an in silico analysis, revealing a possible TNF-α signaling pathway in the parasite (Oliveira K. C., PLoS NTD 2009, 3(12):e556). In the present work we performed a molecular characterization of SmTNFR in several aspects. We detected that the mRNA is more expressed in males than females, by qPCR. In addition, western blot experiments suggested that the receptor is glycosylated and it is organized as a trimmer, similar to TNFR in mammals. Immunostaining and in situ hybridization experiments revealed that SmTNFR is expressed at the surface of worms and the message is present in ovary, testis and vitelarium. Yeast Two Hybrid (YTH) interaction analyses were performed to verify the interaction between TNFR and TRAFs (TNF Receptor Associated Factors) and to identify other interaction partners by the screening of an YTH adult-worms cDNA library. Additionally, preliminary results showed that the reduction of SmTNFR expression level (by RNAi approach) induces morphological changes in the ovary of females. All these results expand our knowledge of signal transduction processes between host and parasite. This work is supported by grants from FAPESP and DFG (GR1549/5-1).

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Molecular characterization of SmMago, a *Schistosoma mansoni* Homologue of a Drosophila Gene involved in Germ Plasm Assembly

Carina Pinheiro, Alex Loukas, Malcolm Jones, Elida Rabelo

Mago nashi genes have been identified for a wide number of organisms, including Homo sapiens, Caenorhabditis elegans, C. briggsae, Brugia malayi, Drosophila melanogaster and the trematodes Schistosoma mansoni and Schistosoma japonicum. For D. melanogaster, Mago nashi protein is thought to be involved in germ plasm assembly and in formation of the perpendicular axes. A Mago nashi gene homologue from *S. mansoni* has been identified and partially characterized. The importance of Mago nashi protein in embryogenesis in other species, allied with the paucity of information available for this gene in *S. mansoni*, led us to further explore the biology of this molecule in *S. mansoni* (SmMago). The SmMago gene is 485 bp and encodes a 146 amino acid open reading frame protein spanning from bp 36 to 476. The deduced amino acid sequence has a calculated molecular weight of 17 kDa. The SmMago transcript is expressed in all stages of the *S. mansoni* life cycle analyzed, exhibiting the highest expression level in adult males. Using immunofluoresence, we showed that the SmMago protein is expressed throughout the whole body of the parasite. Furthermore, we showed that the SmMago recombinant protein is recognized by serum from patients presenting different immunological response patterns to *S. mansoni* infection. This finding provides important insights for understanding the molecular role of mago in *S. mansoni*

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RNAi-mediated knockdown of protein kinases and histone modifying enzymes in the parasite *Schistosoma mansoni*

Fernanda Sales Coelho, Luiza Freire de Andrade, Juliana Assis Geraldo, Raymond Pierce, Guilherme Corrêa de Oliveira, Marina de Moraes Mourão

Schistosomiasis is one of the most important parasitic diseases affecting tropical and subtropical countries. In Brazil, it is considered an endemic disease caused by the blood fluke of the specie Schistosoma mansoni. Currently, treatment for schistosomiasis is based in the use of one drug, The search for new therapeutic targets for schistosomiasis is extremely important. Since protein kinases (PKs) and histone modifying enzymes (HMEs) have an essential role in signaling pathways and epigenetic regulation of the parasite, they could be potential candidates for drug development. The objective of this study is to evaluate the functional importance of protein kinases and histone modifying enzymes of *S. mansoni* using RNA interference. In this work, double-stranded RNAs (dsRNA) were synthesized for 18 selected proteins (4 PKs (CaMK2, JNK, ERK1 and ERK2), 1 GTPase (Ras) and 13 HMEs of methyltransferases, and demethylases classes). Cercariae of *S. mansoni* were in vitro transformed in schistosomula, exposed to 100nM of dsRNAs, and kept in culture for up to 7 days. Subsequently, analysis of phenotypes and transcripts levels were evaluated by microscopy and quantitative real time PCR (q-RT-PCR). The culture was monitored daily and no phenotype could be observed when compared to controls (GFP-treated and untreated). After treatment, a gene-to-gene variation in the knockdown efficiency was observed. Changes in transcript levels varied from 84% of knockdown (JNK-after 2 days of exposure) to no change in the transcripts levels (methyltrasferase- Set 1.6). Thus, effectiveness of RNAi in *S. mansoni* seems to be target specific. Supported by: European Community's Seventh Framework Programme (SEtTReND). National Institutes of Health - NIH/Fogarty International Center. National Council for Research and Development - CNPq. Research Foundation of Minas Gerais - FAPEMIG

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Investigation of the oligosaccharide composition of cercariae/schistosomula in vitro secreted SmVALs (*Schistosoma mansoni* Venom Allergen-Like Protein) using a set of lectins as carbohydrate binding molecules

Rafaela Fernandes, Leonardo Farias, Henrique Rofatto, Patricia Miyasato, Eliana Faquim-Mauro, Luciana Leite

Introduction: Recently, using genomic, transcriptomic, phylogenetic and tertiary structure analysis, members of a gene family with similarity to venom allergens named SmVALs (Schistosoma mansoni Venom Allergen-Like Protein) were identified in schistosomes. This gene family is part of the superfamily SCP/TAPS (Sperm-coating protein/Tpx-1/Ag5/PR-1/Sc7 domain), which are structurally related and phylogenetically divided into group 1, containing proteins with features that suggests extracellular localization; and group 2, which contains proteins likely to be involved in intracellular interactions. Among the group 1 proteins, SmVAL4, 10 and 18 were identified by proteomics in the secretions of the cercariae/schistosomula transition and subsequently characterized as glycoproteins. The function of these molecules remains unknown, although its secretion during the invasion of the mammalian host ranks them as potential immunomodulators. Objectives: The objective of this study was first to describe the acetabular glands morphological dynamics of the in vitro cultivated schistosomula after cercaria transformation in a time course manner. Next, correlate the emptying of the glands with the presence of SmVALs in cercaria/schistosomula secretions. Finally, we aimed to identify a specific lectin that could bind native SmVALs glycoproteins for their posterior purification from cercaria secretions. Methods/Results: PNA (lectin from peanuts) conjugated with Alexa fluor 647 was used to label the pre and post acetabular glands of in vitro cultivated schistosomula by interacting with glycoproteins contained in these glands. This conjugated lectin was able to delimitate the pre and post acetabular glands of germballs, cercariae, and 3 hour-old schistosomula. In the 3 day-old schistosomula, there is only residual staining, and no signal in 5 and 7 day-old schistosomula, revealing the complete emptying of the glands. The tissue localization of SmVALs proteins in the acetabular glands by immunocytochemistry using anti-SmaVAL4, 10 and 18 antibodies is underway. Western Blot and ELISA assays were performed using the lectins: ConA, WGA, VAA, MBP, TPA, BPA, LPA, SNA, WFA, DSA and ECA, for the identification of the oligosaccharide composition of secreted SmVALs. However, none of the tested lectins was capable of binding the oligosaccharides present in the secreted SmVALs. Conclusion: Here, we conclude that PNA could be used to characterize the oligosaccharides components of secreted SmVALs and in a next step maybe used to purify the native proteins in the secretions of recently transformed cercariae. Our main goal in the future is to compare the immunomodulation properties of these native proteins with that from the recombinant SmVAL4, which have already been characterized.

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Purine salvage pathway from *Schistosoma mansoni*

Larissa Romanello, Juliana Torini de Souza, José Brandão-Neto, Ricardo DeMarco, Humberto Pereira

In the 70's Senft and coworkers published a series of articles demonstrating that *S. mansoni* was unable to incorporate both glycine and glucose in the purine ring indicating the lack of a “de novo” purine pathway in the parasite and highlighting its dependence on imported host's purine . Genes coding for all purine salvage enzymes were found in the *S. mansoni* genome. In *S. mansoni*, the purine salvage pathway is composed of 18 enzymes (five of them represent different isoforms of the same protein), in three different sub-pathways for conversion of adenosine to AMP or GMP. Given the importance of the purine salvage pathway for parasite metabolism, we are currently undertaking a systematic approach to investigating the structural biology and kinetics of the enzymes involved. Different approaches were used in order to obtain all the purine salvage pathway enzymes: a conventional amplification and cloning approach using standard molecular biology protocols and an automated procedure from synthetic genes using the Oxford Protein Production Facility (OPPF) in Harwell-UK, where the genes were cloned in multiples expression vectors with different tags, followed by automated protein expression, in order to check the best tag, bacterial strain and induction protocol. The expression was scaled up for the targets, and after tag cleavage and purification the proteins were subsequently concentrated and submitted to the robotic crystallization trials. The conventional expressed enzymes were also subjected to robotic crystallization trials in the IFSC-USP. As partial results, we successful cloned 18 genes, which allowed the expression of 16 soluble recombinant proteins. These purified proteins were used for crystalization and 9 crystals were obtained. Crystal structures of the following four proteins were solved: Adenosine kinase 2, purine nucleoside phosphorylase 1, Adenylate kinase 1 and methythioadenosine phosphorylase (MTAP). Kinetic parameters were obtained for 5 enzymes, some of them showing remarkable differences when compared to their human counterpart. It is expected that this knowledge will provide a more rational basis for target selection in the future. Specifically, this knowledge is necessary in order to understanding the ways in which the parasite could be selectively starved of resources, which could be used to develop new drugs and/or vaccines against this important human parasite. Supported by Fapesp and CNPq.

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Free Themes Abstracts "Biomarkers, Immunoregulation and Diagnostics"

Schistosoma mansoni schistosomula tegument (smteg) induces il-10 production leading to experimental allergic asthma modulation

Sara Camila de Souza, Fabio Antonio Vitarelli Marinho, Cristina Toscano Fonseca, Sérgio Costa Oliveira, Lucila Grossi Pacífico

Introduction: Allergic inflammations are directed by Th2 cells activation, high levels of IgE and eosinophilia. Schistosoma mansoni infection has a negative association with allergic disease in endemic areas, feature that is supported by experimental models. The schistosomulum is the first pathogen stage to keep contact with host immune system. Its tegument (Smteg) represents an important interface host-pathogen, activating antigen presenting cells. Our previous results showed that Smteg stimulated interleukin (IL)-10 production and downregulated lung pathology and CCL11 levels. Our goal is to investigate other inflammatory parameters (IgE and protein extravasation). Methods and Results: Smteg was prepared using cercariae as described by Durães F.V. et al., 2009. Balb/C mice were divided into three groups (n=6): PBS, Asthma and Smteg/Asthma. At days 0 and 14 all groups were immunized with 10µg of ovalbumin chicken egg (OVA) plus alum and at 7th day Smteg/Asthma group received 25mg of Smteg, intraperitoneally. During 21th to 25th days the Asthma and the Smteg/Asthma groups were challenged by OVA aerosol. At 26th day mice were euthanized. Blood samples were collected for IgE measurement in sera, broncho-alveolar lavage was performed to counting of eosinophils numbers and protein analysis. The lungs were collected to flow cytometetry analysis. All parameters were higher in Asthma group compared to PBS group. Importantly, the injection of Smteg (Smteg/Asthma group) reduced the number of eosinophils ($p<0.001$), protein extravasation ($p<0.01$) and specific anti-OVA IgE ($p<0.05$). Conclusion: The Smteg inoculation modulates allergic asthma reducing inflammatory characteristics such as number of eosinophils, protein extravasation and specific IgE.

Hyaluronic acid (HA), YKL-40 and transforming growth factor Beta1 (TGF-β1) in the diagnosis of hepatosplenic schistosomiasis and in the evaluation of liver fibrosis intensity

Izabela Voieta, Alba Otoni, Antonio Teixeira, Luciene Mota, Leonardo Queiroz, Vivian Resende, Zilton Andrade, Carlos Maurício Antunes, José Roberto Lambertucci

Introduction: Serum biomarkers have been used as a tool in the diagnosis and evaluation of liver fibrosis intensity in hepatosplenic schistosomiasis with variable results. Few studies have used liver biopsy in the confirmation of Symmers' fibrosis and more frequently physicians rely upon imaging techniques as gold standard in the evaluation of liver fibrosis severity. Objective: Herein we evaluated the importance of hyaluronic acid (HA), YKL-40 and transforming growth factor Beta1 (TGF-β1) in the diagnosis of hepatosplenic schistosomiasis and in the evaluation of liver fibrosis intensity using imaging techniques and surgical wedge liver biopsy. Methodology: Sixty patients with schistosomiasis mansoni were selected for this study. Thirty had hepatosplenic schistosomiasis and were attending UFMG; 23 were male in the mean age of 39.2 years. Another 30 patients had hepatointestinal schistosomiasis and came from endemic areas of Minas Gerais; 15 were male, mean age of 35.5 years. All patients were submitted to clinical examination and abdominal ultrasound; a blood sample was collected. The hepatosplenic group was submitted to: upper digestive endoscopy, abdominal magnetic resonance and surgical liver wedge biopsy. Liver fragments obtained during surgery were fixed in 10% buffered formalin and afterwards embedded in paraffin wax. Five µm slices were stained using Hematoxylin-Eosin and examined under light microscopy. Other fragments were stained with Picrosirius red and portal tracts were quantified. Results: Both hyaluronic acid and YKL40 had no value in the diagnosis of liver fibrosis (they did not separate patients with hepatosplenic from hepatointestinal schistosomiasis) when imaging techniques were used for liver fibrosis identification. Serum levels of TGF-B1 were higher in the sera of patients with hepatointestinal schistosomiasis compared to patients with the hepatosplenic form of the disease. Intensity of liver fibrosis classified by histology did not coincide with serum levels of the biomarkers evaluated in this study. There was moderate correlation between serum levels of hyaluronic acid when it was compared to histomorphometry (p=0.006). There was a good concordance between imaging techniques and liver biopsy in the classification of liver fibrosis intensity. Conclusions: Hyaluronic acid and YKL40 were not useful as a marker of liver fibrosis in our study. TGF-β1, also, was not a good marker of liver fibrosis but its serum levels were significantly higher in patients with hepatointestinal schistosomiasis as compared to hepatosplenics. Therefore, TGF-β1 may be a marker of active *S. mansoni* infection. The biomarkers used in the present study were not important in classifying schistosomiasis liver fibrosis severity.

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The role of adipose-derived mesenchymal stem cells (admsc) in the immunoregulation of experimental schistosomiasis

Adriana Bozzi, Ana Thereza Chaves, Kelly Alves Bicalho, Talita Rocha Gomes, Vitor Hugo Simões Miranda, Olindo Assis Martins-Filho, Jaquelline Germano Oliveira, Alfredo Miranda Goes, Rodrigo Correa-Oliveira

Numerous reports have been shown that mesenchymal stem cells (MSC) appear to be more important in therapeutics to regulate immune response invoked in settings such as tissue injury, transplantation, and autoimmunity. So far there are no reports for the role of MSC in parasitic disease. In this study we have investigated some immunomodulatory activities of adipose-derived mesenchymal stem cells (ADMSC) in an experimental model of Schistosoma mansoni infection. Adipose-derived mesenchymal stem cells (ADMSC) were isolated from C57BL/6 mice, expanded in vitro, and their phenotypical characterization was performed by flow cytometer. ADMSC were injected through mice tail vein 30 days after chronic schistosomiasis treated with praziquantel. Following, the splenocytes were obtained and stained by fluorochrome conjugated antibodies for the CD69, CD27, CD28, CTLA-4, CD80, CD86 e IA-IE molecules on the subpopulations of immune cells. In presence of ADMSC, frequency of TCD4+ cells expressing CD69, CD25 and CTLA-4 was significantly ($P<0.05$) decrease while the frequency of CD28 expression was increase. In the TCD8+ subset cells, was observed a significant ($P<0.05$) decrease of CTLA-4 expression and increase of CD28 molecule. Similarly, the percentage of NK and NKT cells expressing CD69 decrease significantly in the presence of ADMSC. Unlike, the B lymphocytes showing a significant increase in the frequency of IA-IE, CD27, CD80 and CD86 molecules expression in the presence of ADMSC. Taken together, these results suggest a potential of ADMSC to modulate the immune system in the chronic schistosomiasis by activation or inhibition of immunity cells. These findings emphasize the ADMSC as putative candidates for cellular therapy, including the control of parasitic diseases.

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The *Schistosoma mansoni* 200kDa (Sm200) TEGUMENT PROTEIN AS A CANDIDATE TO BE USED IN SCHISTOSOMIASIS DIAGNOSIS AND VACCINE FORMULATION

Gardênia Braz Figueiredo de Carvalho, Deborah Laranjeira Ferreira Pimenta, Lucila Gonçalves Grossi Pacífico, Carina da Silva Pinheiro, Ricardo Toshio Fujiwara, Sergio Costa Oliveira, Cristina Toscano Fonseca

Introduction: S. mansion tegument is involved in essential functions to parasite survival and represents a target for screening candidates to vaccine and diagnosis. Our group using reverse vaccinology selected six candidates among them Sm200, previously demonstrated by proteomics studies to be expressed in the parasite tegument. In this work we have cloned and expressed a recombinant form of Sm200 C-terminal (1069-1520) region. rSm200 was used in ELISA against sera from mice infected with S. mansion and others helminthes to evaluate its potential in immunodiagnosis. Also mice immunization with rSm200 was performed to evaluate protection. Methodology and results: Sm200(1069-1520) was cloned into pET28 vector and expressed using BL21 strain. Swiss mice were infected with 25 cercariae and sera were obtained in different time-points. A western blot was performed and a specific recognition of rSm200 by sera from *S. mansoni* infected mice was observed. In ELISA using sera from mice 15, 13, 45,60, 75, 90, 120 and 140 days post-infection, the reactivity to rSm200 increased with the progression of the infection and significant levels of specific IgG was observed 90, 120 and 140 days post-infection as the disease turn to a chronic phase. To verify the efficacy of a rSm200-ELISA test in the diagnosis of schistosomiasis, sera from non-infected mice, acute phase and chronic phase infected mice were tested. Additionally to sera from *S. mansoni* infected mice, sera from mice infected with other helminthes was tested to assess cross-recognition. The cut-off point of 0.125 to this rSm200-ELISA test was determine in a Roc-curve using sera from non-infected and infected animals. Although significant differences between non-infected and acutely infected ($p<0.05$) or chronically infected animals ($p<0.0001$) were observed, rSm200– ELISA test present 99% of specificity and 31% of sensibility when used in the diagnosis of the disease. No cross-recognition was observed with sera from Ascaris or hookworms infected mice. C57BL/6 mice were immunized three times with 25mg/animals of rSm200 and Freund´s adjuvant. Fifteen days after the last immunization mice were challenged with 100 cercariae and protection level was determined. rSm200 failed to induce protection against schistosomiasis. Quantification of IgG, IgG1 and IgG2a was performed by ELISA and results demonstrated a significant production of anti-Sm200 IgG and IgG1. Evaluation of the cytokine profile demonstrated that immunization induced significant IL-10 and IFN-g levels. Conclusion: Our results demonstrated that the Sm200 C-terminal region is poorly immunogenic and unable to induce protective immune response in mice.

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Cytokine profile in human schistosomiasis and its relationship with fibrosis and treatment

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Introduction: The cytokine response to *S. mansoni* antigens seems to play an important role in pathogenesis of the periportal fibrosis associated with human schistosomiasis. The aim of this study was to investigate whether the cytokine/chemokine pattern produced by peripheral blood mononuclear cells upon in vitro *S. mansoni* antigen stimulation could be used as a biomarker of periportal fibrosis in schistosomiasis patients and evaluate the impact of Praziquantel treatment in this complex cytokine network. Methods: Thirty one volunteers living in an endemic area were classified into sub-groups according to the presence or absence of fibrosis before (FIB and non-FIB) and after treatment (FIBT and non-FIBT) Cytokine/chemokine pattern (IFN-g, TNF-α, IL-4, IL-5, IL-13, IL-10, IL-17, TGF-β, CCL3/MIP-1α, CCL2/MCP-1 e RANTES) was measured in PBMC culture supernatants using Cytometric Bead Array (CBA). Cytokine/chemokine signatures were analyzed using the concept of low and high-cytokine producers. Results: Our results demonstrate that FIB presented a decreased cytokine production compared to non-FIB individuals. Furthermore, FIB produced higher proportion of fibrogenic cytokines whereas non-FIB had higher levels of IL-10 and TGF-β, in the non-stimulated cultures. Two years after treatment, a high proportion of fibrogenic cytokines in response to SEA was observed in FIBT. Those FIB participants who showed a regression of fibrosis after treatment produced high levels of TGF-β e IFN-g, while non-FIB individuals who remained without fibrosis continued producing high levels of IL-10 e TGF-β. Conclusion: These data suggest that the concomitant production of high IL-10 e TGF-β levels is associated with protection against fibrosis, and that specific treatment induces a balanced profile of fibrogenic and regulatory cytokine production in individuals with and without fibrosis. Financial Support: PAPES IV/CNPq; CPqRR; CAPES; FAPEMIG; UNIVALE

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The effect of *Schistosoma mansoni* Sm29 antigen in down modulate the dendritic cells profile in cutaneous leishmaniasis

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Schistosoma mansoni infection or their products has been associated with protection against immune-mediated diseases. The mechanisms underlying this association may involve regulatory cells and cytokines. Cutaneous leishmaniasis is endemic in more than 70 countries worldwide. The immune response to this parasite is T helper 1 type, which is important for macrophage activation and Leishmania elimination, but also is responsible for the pathogenesis of cutaneous disease, especially with regard to tissue injury. This study evaluated the potential of the *S. mansoni* antigen Sm29 in down-modulate the response of monocyte-derived dendritic cells (MoDCs) from individuals with CL stimulated in vitro with L. braziliensis soluble antigen (SLA). The expression of surface molecules such as HLA-DR, CD80 and CD86 on MoDCs and the expression of cytokines IL-10, IL-12 and TNF by these cells has been evaluated by FACS. The results were expressed as median (min.-max. values). The frequency of CD80 and CD86 were higher in cultures of MoDCs stimulated with Sm29+SLA [13.5% (3.0 – 39%) to CD80 and 95% (81 -99%) to CD86] compared to non-stimulated cells [3.9% (2.0 – 12%); $p<0.05$ to CD80 and 80% (40 – 95%); $p<0.005$ to CD86]. It was observed higher expression of IL-10 receptor in the presence of Sm29 in the culture [4.3% (3.3 – 9.8%)] compared to the cultures stimulated with SLA alone [1.9% (1.2 – 3.8%); $p<0,05$] or without stimulation [1.4% (0.2 – 3.7%); $p<0.005$]. The frequency of IL-10 was also higher in MoDCs stimulated with SLA+Sm29 [2.7% (0.8 – 4.1%)] than in those non-stimulated cultures [1.3% (0.3 – 2.3%) $p=0.054$]. We did not observe any significant difference in the frequency of IL-12 and TNF or in the Mean fluorescence intensity (MFI) of HLA-DR in the presence of Sm29 antigen. Our results indicate that the antigen Sm29 is capable of increase the in vitro expression of anti-inflammatory mediators on MoDcs of cutaneous leishmaniasis and cell activation markers, such as CD80 and CD86.

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Genome-wide identification of novel microRNAs and their target genes in the human parasite *Schistosoma mansoni*

Matheus de Souza Gomes, Mohan Kumar Muniyappa, Sávio Gonçalves Carvalho, Renata Guerra-Sá, Charles Spillane

Mature microRNAs (miRNAs) are small, non-coding regulatory RNAs which can elicit post-transcriptional repression of mRNA levels of target genes. Mature miRNAs are single-stranded RNA molecules (~22 nt) processed from a precursor molecule (pre-miRNA). To regulate protein-coding genes the mature miRNA binds with imperfect complementarity to sites in the 3' UTR leading to mRNA degradation or inhibition of translation. Several strategies have been used to identify miRNAs and their targets in a range of organisms. In this study, we used a computational approach to identify novel miRNAs and miRNA gene targets in the *S. mansoni* genome version 5.0 available in GeneDB. To identify novel miRNAs within the *S. mansoni* genome, we developed an integrated whole-genome computational approach which identified conserved and non-conserved miRNAs (including novel miRNAs) from genome and EST databases of the *S. mansoni* parasite. The *S. mansoni* genome was screened using the einverted EMBOSS and BLASTn to identify hairpin-like sequences. The secondary structure of the hairpin candidates was predicted using RNAfold and sequences retained which had MFE < -20 kcal / mol. The retained sequences were then filtered for GC content (retaining 30 to 65% CG content) and used for BLASTN against mature miRNAs In the next three steps, hairpin candidate sequences were discarded which displayed high similarity with protein-coding genes, non-coding RNA (ncRNAs), and repetitive elements. Each of these three classes of loci can form structures similar to pre-miRNA (hairpin-like sequence) and hence their removal is an essential step to avoid false positives. Finally, a machine-learning algorithm, miPred, was used to classify the putative precursor miRNA sequences based on features of miRNAs, and retained precursor miRNAs that were most likely to be real. We identified 67 mature and 42 precursor miRNAs in the parasite. The evolutionarily conserved *S. mansoni* miRNAs consisted of 26 precursor miRNAs and 35 mature miRNAs, while we identified 16 precursor miRNAs and 32 mature miRNAs that displayed no conservation. These *S. mansoni* miRNAs are located on seven autosomal chromosomes and a sex (W) chromosome. miRNA expansion through gene duplication was suggested for at least two miRNA families miR-71 and mir-2. miRNA target finding analysis identified 389 predicted mRNA targets for the identified miRNAs and suggests that the sma-mir-71 may be involved in female sexual maturation. Given the important roles of miRNAs in animals, the identification and characterisation of miRNAs in *S. mansoni* will facilitate novel approaches towards prevention and treatment of Schistosomiasis.

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MAPK pathway is essential for *Schistosoma mansoni* reproduction and survival

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There are three important Schistosoma species parasitizing humans: Schistosoma mansoni, S. japonicum and S. haematobium. Together, they chronically infect at least 200 million people and cause more than 200,000 deaths annually worldwide. In spite the numerous efforts made to control schistosomiasis, transmission has not ceased. Praziquantel is the current drug of choice against schistosomiasis but, problems of resistance have arisen and alternatives are inexistent. The study of signal transduction mechanisms are essential to elucidate Schistosoma biology, host-parasite interactions and, could be important to find new candidates for drug development. The recent in silico functional annotation of eukaryotic Protein Kinases of *S. mansoni* showed an essential role of Mitogen-activated protein kinases (MAPKs) in these parasites. MAPK proteins are important signal transducing enzymes that are involved in many aspects of cellular regulation. In this work, key proteins of the MAPK pathway (SmRas, SmERK1, SmERK2, SmJNK, and SmCaMK2) were chosen for knockdown by RNA interference, a mechanism by which gene-specific double-stranded RNA (dsRNA) triggers degradation of homologous mRNA transcripts. Schistosomulas were cultured in the presence of synthesized dsRNAs for up to 7 days. A significant reduction in the transcription level of SmERK (92%), SmJNK (86%) and SmCamK2 (67%) were observed. Mice were infected with the dsRNA-treated schistosomulas and adult worms were recovered after 35 days of infection and variation in dsRNA-mediated knockdown effects was evident in adult worms. The results demonstrate that SmJNK has an important role in transformation and survival of the parasites as low number of adult worms was observed when compared to controls and the tegument of recovered worms was damaged. Moreover, SmERK1/SmERK2 was related to egg production, as mice infected with silenced schistosomulas, showed significantly lower egg production when compared to control and the recovered female worms had underdeveloped ovaries. Furthermore, it was showed that the c-fos transcription factor was overexpressed in parasites with low expression of SmERK1, SmJNK and SmCaMK2. We conclude that MAPKs proteins, especially SmERK and SmJNK, could be a promising targets for drug development, since an inhibitor directed to these proteins could probably disrupt the life cycle of Schistosoma preventing disease progression.

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Serological-Proteome of the parasite *Schistosoma mansoni*: an approach for biomarker identification

Fernanda Ludolf, Paola Patrocínio, Andréa Gazzinelli, Franco Falcone, Rodrigo Correa-Oliveira, Rosiane Silva-Pereira, Guilherme Oliveira

Despite intensive efforts towards schistosomiasis control, the disease is still one of the most prevalent in the world. New interventions are a high priority for the elimination of schistosomiasis, since the disease control has been essentially based on the use of chemotherapy which does not prevent re-infection. The development of a long term protection and an effective diagnostic assay would be a major breakthrough for schistosomiasis control. Understanding which aspects of the immune responses are associated with infection/protection status may constitute the basis for the understanding of a successful vaccine and could also indicate new diagnostic candidates. Progress on post-genomic technologies resulted in the development of rational and global approaches for the discovery of new biomarkers. Two-dimensional electrophoresed *S. mansoni* adult worm protein extracts, total and tegumental, were probed with pooled sera of infected (INF), non-infected individuals from endemic area (NE) and of non-infected individuals from non-endemic schistosomiasis area (NI) in a two-dimensional Western-blotting experiment (2D-WB). A total of 47 immunoreactive proteins were identified by mass spectrometry. Although most of the protein spots were immunoreactive to all of the serum pools, nine reacted exclusively with the INF serum pool, and one with the NE serum pool. A total of 27 immunoreactive proteins identified by 2D-WB approach were successfully in vitro expressed and will be used in future experiments of protein microarray. Western-blotting of two 2D-WB selected recombinant proteins showed a similar serum recognition profile of the native protein. The association of two-dimensional electrophoresis and western blot had enabled a pre-screening of immuno-antigenic proteins of the parasite, while the microarray technique will refine the list of potential candidates for subsequent testing as protective or diagnostic antigens.

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Study of the *schistosoma mansoni* protein antigens recognition profile by the serum from individuals of a schistosomiasis endemic area

Paola Rezende Patrocínio, Fernanda Ludolf Ribeiro, Rodrigo Corrêa Oliveira, Guilherme Corrêa Oliveira, Rosiane Aparecida Da Silva-Pereira

Schistosomiasis is one of the most prevalent parasitic diseases in the world, caused by parasites of genus Schistosoma. Even with the attempts to control the disease and the introduction of the treatment with the Praziquantel drug in 1980, the disease persists. Although the chemotherapy has an effect on morbidity of the disease, it does not prevent the reinfection, especially of those people who live in endemic areas. In this way, the development of one long lasting protection, based in vaccine therapy, would be a great benefit for the disease control. Although some antigens potentially candidate to the schistosomiasis vaccine have been suggested, only Sm14 has shown an human protection effective level so far. Among other evidences, the high protection level achieved by the vaccination with irradiated cercariae and the existence of non infected individuals in endemic areas suggest that it is possible to develop a vaccine against schistosomiasis. In this work we aimed to study the Schistosoma mansoni protein antigens recognition profile by serum from individuals of a schistosomiasis endemic area. To achieve this, we have applied the two-dimensional Western-blotting (2D-WB) methodology using adult worms *S. mansoni* total and membrane proteins and serum from individuals of schistosomiasis endemic area, including those that are resistant to infection. As a result, we intend to select new *S. mansoni* vaccine and diagnostic candidate antigens. The adult worm *S. mansoni* protein extraction protocol has allowed us to identify tegument surface proteins, as confirmed by 2D-WB with anti-Sm29 antibody, and other different *S. mansoni* antigens, including secreted and surface proteins. We will also test the ability of previously immunoselected protein SmPM to protect mice from infectious challenge. The spot corresponding to SmPM was recognized by the pool of serum from infected and non infected individuals of endemic area. We amplified the coding region of the corresponding gene by RT-PCR and the fragment was inserted into a mammalian expression vector, pcDNA 3.1 V5/HIS B, which express C-terminal 6xHis-tagged proteins. The protein expression was certified in cultured HEK 293T cells by Western-blotting using anti-6xHis antibody. Another similar DNA construction, without the 6xHis-tag, will be used in mice DNA immunization assays. We also amplified the coding region of the same gene to be inserted into a bacterial expression vector, pQE-30, for production and purification of the N-terminal 6xHis-tagged SmPM recombinant protein. The SmPM recombinant protein will be used in the subunit vaccination strategy in mice.

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Protein expression profile of adult worms from *Schistosoma mansoni* in response to oxidative stress

Renato Graciano de Paula, Alice Maria de Magalhães Ornelas, Enyara Rezende Morais, Lizandra Guidi Magalhães, Vanderlei Rodrigues

Protein expression profile of adult worms from Schistosoma mansoni in response to oxidative stress Renato Graciano de Paula1*; Alice Maria de Magalhães Ornelas1; Enyara Rezende de Morais1; Lizandra Guidi Magalhães2; Vanderlei Rodrigues1 1School of Medicine of Ribeirão Preto, USP; 2Research Group in Natural Products, Research Center in Exacts and Technologics Sciences, UNIFRAN *renato.gracciano@gmail.com Oxidative stress may cause serious damage in the organisms and the mechanisms which cells respond to oxidative stress are diverse. The response involves the regulation of protein expression and consists in events as repair or substitution of damaged molecules, recovery of redox balance, cell cycle control and apoptosis. Schistosomes possess adequate mechanisms of detoxification since have exposed to reactive oxygen compounds through their own respiratory process and as a result of the host immune response. Many genes linked to DNA repair and DNA damage tolerance were identified in *S. mansoni* and some of them were described to be regulated upon exposure to H2O2 and others DNA damaging agents. Here, we describe the protein expression profile of adult worms *S. mansoni* submitted the oxidative stress. *S. mansoni* adult worms were cultured in RPMI 1640 medium supplemented with 10% fetal bovine serum and penicillin-streptomycin at 37ºC and 5% CO2. After 24 h of incubation, oxidative stress was induced by addition of H2O2 (hydrogen peroxide) to a final concentration of 200 µM. Afterwards, the worms were incubated for 24 h at 37ºC and 5% CO2 and then, utilized to protein extraction and bidimensional electrophoresis. Then, the differential proteins express were identified through analysis in nano-electrospray tandem mass spectrometer. We identified a total of thirty-seven express protein in the oxidative stress condition, where twenty-two were upregulated proteins. These proteins are involved with many intracellular pathways as protein folding, proteolysis, calcium ion binding, regulator proteins and stress response. The categorization of these proteins upregulated showed that thirty-two percent of them are involved with cellular processes and twenty-seven percent with metabolic processes. In addition, was possible identified that forty-one percent the proteins are cellular components and forty-seven percent are involved catalytic activities. Oxidative stress induced with H2O2 generated significative changes in the protein expression profile of adult worms suggesting many process may be regulated in this case. It is also important to emphasize that considering the obtained results others studies are necessary to understand which processes and pathways are modified and its effects in *S. mansoni*.

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Characterization of the trans-splicing mechanism in the post-transcriptional gene regulation of *Schistosoma mansoni*

Marina de Moraes Mourão, Mainá Bitar, Francisco P. Lobo, Timothy P. Yoshino, Glória R. Franco

Schistosomes posses numerous and complex transcriptional and post-transcriptional gene regulatory mechanisms to maintain its intricate life cycle. Spliced leader trans-splicing (SLTS), is one of the many types of pos-transcriptional gene regulation that has been shown to be present in *S. mansoni*. Although the best documented function of SLTS is to process polycistronic operons into monocistronic transcripts, the mechanism is believed to be involved in a variety of functions associated with the process of mRNA maturation, relying on the transference of a ncRNA (spliced leader- SL) to the 5'-end of specific mRNAs. Several other functions for SLTS have been proposed in different organisms, although no definitive evidence exists. Using the flatworm parasite Schistosoma mansoni as a case study, we have investigated the main characteristics of SLTS analyzing a set of 258 transcripts containing the SL sequence. The purpose of this study was to shed light on the function of trans-splicing in *S. mansoni* through the analysis of genes and gene categories that could be under the influence of this mechanism and the silencing of transcripts harboring the spliced leader (SL) sequence. We analyzed different life stages cDNA libraries enriched on complete SL-transcripts of *S. mansoni*. Our results show that trans-spliced transcripts do not seem to be associated to any specific gene category, subcellular localization or life stages. Even though the set of genes subject to regulation by SLTS seem to differ among organisms, several orthologs can be observed when comparing different species. Additionally, one event of alternative trans-splicing could be observed for the transcript of ubiquinol-cytochrome C reductase complex ubiquinol binding protein. Trans-splicing knockdown in the larval stage sporocyst caused a systemic reduction of 50% on the average levels of all tested trans-spliced transcripts, but surprisingly, the only phenotypic effect observed was a diminished larvae size. Further studies involving the features revealed in this work will provide new insights to the role of trans-splicing mechanism in the biology of *S. mansoni* and other organisms.

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Cytoplasmic motor proteins and their contribution to the biogenesis=nd homeostasis of the tegument of *Schistosoma mansoni* –

Leigh Schulte, Jason Mulvenna, Geoffrey Gobert, Malcolm Jones

Poster Abstracts - *"Epidemiology, Sanitation, Control, Elimination of Schistosomiasis and Intermediary Hosts"*

1 Susceptibility of *Biomphalaria glabrata* (Say,1918) of the municipalities of "Estrada Real" in the southeast of the State of Minas Gerais to infection by *Schistosoma mansoni*.

Mariana Mattos, Tales Rodrigues, Mayara Silveira, Elaine Coimbra, Sthefane D´Ávila, Florence Rosa

Introduction- In Brazil, the three *Biomphalaria* species found naturally infected by Schistosoma mansoni are: *Biomphalaria* glabrata, *Biomphalaria* tenagophila and *Biomphalaria* straminea. *B. glabrata* is of great epidemiologic importance, due to its extensive geographic distribution and high susceptible to *S. mansoni*. Moreover, its distribution is almost always associated with disease. Previous malacological survey in municipalities along the "Estrada Real" in the southeast of the State of Minas Gerais-Brazil revealed several water collections colonized by intermediate hosts of *S. mansoni*. *B. glabrata* was present in 33.3% of the municipalities studied and no infection by *S. mansoni* was decteted. Although the municipalities of Estrada Real in the southeast of the State of Minas Gerais are considered as areas of low endemicity, these regions are vulnerable to transmission of schistosomiasis. So, the aim of the current work was verify the susceptibility of *B. glabrata* from three the municipalities of "Estrada Real" to infection by *S. mansoni* de Belo Horizonte (LE strain). Materials and Methods- Study area- The municipalities of Piau, Coronel Pacheco and Goianá were selected due to the occurrence of cases of schistosomiasis. Theses municipalities are located in Southeast Minas Gerais State, Brazil. Snail populations - *B. glabrata* snails were collected from these municipalities by technicians of the GRS/JF. Specimens of *B. glabrata* from Belo Horizonte-MG have been maintained at the Laboratory of Schistosomiasis, Department of Parasitology UFMG, for more than forty years. Susceptibility experiments - A total of 120 specimens of *B. glabrata* (8-10 mm in diameter) collected from the municipalities studied were exposed to five *S. mansoni* miracidia of the LE strain. Fifty specimens of *B. glabrata* from Belo Horizonte were used as control. Susceptibility studies were performed as described by Pellegrino and Katz (1968). On the 30th day after exposure and subsequently every week, the snails were placed singly in vials with water and exposed to artificial light (28-30ºC) to induce shedding of the cercariae. Results *B. glabrata* from three the municipalities of "Estrada Real" and their offspring created in a laboratory were highly susceptible when exposed to five *S. mansoni* miracidia of the LE strain. Specimens of *B. glabrata* from Goianá, Coronel Pacheco and Piau showed susceptibility rates of 100%, 72.2% and 85.7%, respectively. The mortality rates of these groups raging from 44% to 86%. However, the control group showed infection rate of 25% and mortality rate of 28%. Financial support: FAPEMIG and UFJF

2 Cases of Schistosomal myeloradiculopathy in inhabitants of a rural area of Jequitinhonha Valley, in Minas Gerais, Brazil.

Maria José Conceição, Aline Eduardo Carlôto, Iran Mendonça da Silva, Rosalie Branco Corrêa, Eric Vinaud de Melo

INTRODUCTION: The prevalence of Schistosomal myelopathy is unknown and has been emphasized for several authors in Brazil. This study presents cases of patients with neuroschistosomiasis, an ectopic clinical form of the disease, and its evolution. MATERIAL and METHODS- this survey was carried out in a rural area of Jequitinhonha valley, in Minas Gerais. The total number of inhabitants was evaluated according to a randomic number table (Spiegel 2009): 75 homes were sampled, involving 288 individuals. The statistical analysis was based on the chi-square test with a confidence level of 95% ($p < 0.05$). Prevalence of ¨Schistosoma mansoni¨ - stool parasitological tests were based on the Kato method, as modified by Katz et al. (1972), and the intensity of infection was evaluated using the median number of eggs per gram of feces, according to the inhabitants' ages and gender. CLINICAL EXAMINATION and ULTRASONOGRAPHY were requested to determine the portal vein caliber, liver and spleen sizes, and fibrosis. The clinical classification was based on Pessoa and Barros (1953), as modified by Barbosa (1966), thus defining: type I- schistosomiasis infection, type II- hepatointestinal form and type III- hepatosplenic form. This study was approved by the Ethical Committee-Fiocruz. The statistical analysis was based on the chi-square test (confidence level of 95% - $p < 0.05$). RESULTS- a total of 288 parasitological stool tests were carried out on individuals with a prevalence rate of *S. mansoni* infection of 22.9% (33.6% in males and 14.3% in females). In relation to the clinical forms of schistosomiasis, 69.2% of the infected individuals presented the schistosomiasis infection form; 28.7%, the hepatointestinal form; and 2.1%, the hepatosplenic form, and from the last, two cases (one 12-year-old and other 13-year-old), both with confirmation of *S. mansoni* eggs and a low parasite burden, had the presuntive diagnosis of schistosomal myeloradiculopathy, based on the main symptoms: headache, limb and back pain, weakness, paresthesia and paraplegia. These patients underwent neurological examination and the venereal disease research laboratory, HIV antibody, cytomegalovirus and herpes virus, whose laboratory results were negative. Magnetic resonance imaging revealed dilatation of the medullary conus, and the likely source was indicated as schistosomal myelopathy. After treatment with praziquantel, without steroids, the symptoms regressed, with no recurrence and sequelae over a three-year follow-up period. CONCLUSION: The study highlighted cases of myeloradiculopathy with regression of symptoms after specific treatment. It should encourage researchers to try detecting new cases in the endemic areas of schistosomiasis.

3 Risk factors for allergic diseases in an endemic rural area for schistosomiasis

Tércia Maria Ribeiro Lima Rezende, Izabela Rocha Dutra, Thania Aparecida Gomes da Silva Barbosa, Túlio Fonseca de Lima, Andréa Gazzinelli

Introduction: Among the various theories proposed to explain the substantial increase in allergic diseases around the world, the "hygiene hipothesis" has gained much attraction in recent decades. This hipothesis attributes the rising incidence in allergic diseases to a reduction in childhood infections. In this context, the role of helminth infections, the most common childhood infection in developing countries, has been extensively investigated in endemic areas. However, the results are still conflicting and require new studies. Thus, this study aimed to evaluate the risk factors for allergic diseases in a rural area, endemic for schistosomiasis. Methods: A cross-sectional study was carried out in the district of São Pedro, located in the Jequitinhonha Valley, Brazil. A total of 286 children and adolescents with ages of 5 to 19 years were included in the study. Details on medical diagnosis of allergic diseases, as well as risk factors and socioeconomic data were obtained through questionnaires. Stool samples were collected to identify the presence of helminth infection. Results: Although the prevalence of *S. mansoni* was high (65.4%) among the study participants, the prevalence of allergic diseases was 12.2%. In the univariate analysis, the birth order (OR: 0.38; 95% CI: 0.16-0.90; p=0.02) and *S. mansoni* infection (OR: 0.45; 95% CI: 0.22-0.91; p=0.02) were associated with lower prevalence of allergic diseases. Income per capita (OR: 2.56; 95% CI: 1.16-5.67; p=0.02) and maternal history of allergies (OR: 2.31; 95% CI: 1.12-4.75; p=0.02) was, on the other hand, correlated with greater prevalence. In the multivariate analysis, only income per capita (OR: 2.58; 95%CI: 1.13-5.88; p=0.02) and maternal history of allergies (OR: 2.16; 95%CI: 1.02-4.56; p=0.04) remained significantly associated with risk of allergic diseases. Conclusions: Higher socioeconomic status and family history are important determinants of allergic diseases in childhood. Despite the lower prevalence observed among individuals infected with *S. mansoni* the association between infection and allergic diseases was not significant.

4 Evaluation of the molluscicidal effect of the essential oil of Rosmarinus officinalis on *Biomphalaria glabrata*

Adalberto Alves Pereira Filho, Clícia Rosane Costa França, Dorlam's da Silva Oliveira, Renato Juvino de Aragão Mendes, Andréa Vasconcelos Melo, Ivone Garros Rosa

Schistosomiasis is a parasitic disease caused by *Schistosoma mansoni* that has severe worldwide socio-economic repercussions, mainly in the state of Maranhão, Brazil. The search for substances molluscicides is one of the main measures to control this parasite since the fight against the snail *Biomphalaria* (intermediary host of schistosomiasis), promotes the disruption of the biological cycle of this parasite. Currently, essential oils extracted from plants have received attention in this field of research, because they are cheap, and often do not have a toxic effect on other organisms, like fish. This study evaluated the molluscicidal activity of essential oil extracted from the leaf of *Rosmarinus officinalis*, commonly known as rosemary, against *Biomphalaria glabrata*. The essential oil was distilled with water vapor drag in a system Clevenger extractor for four hours. The snails used in the tests were species of *B. glabrata*, resulting from collections made in peripheral neighborhoods of the city of São Luís, Maranhão, Brazil, selected after quarantine and negative for *S. mansoni*. Were divided into three groups, each consisting of ten rats were submitted in 500 ml of essential oil and Tweem 80 at concentrations of 25, 50 and 100 ppm. The control group was used dechlorinated water and a solution with surfactant Tweem 80. After a period of 24 hours exposition, the animals were removed, washed twice with distilled water, fed lettuce and observed every 24 hours for four days to assess mortality. The essential oil of *R. officinalis* at 100 ppm promoted in 24h, 70% mortality of snails, a number which increased to 93.3% and 100% after 48h and 72h, respectively. To concentrations of 50 ppm and 25 reached 100% mortality at 72h. The snails immersed in the solutions presented swelling and abnormal extension of cephalopod shell out due to disruption of osmotic balance of the shellfish and lost the ability to move, which creates the ineptitude of survival. It is necessary to recognize the components present in the essential oil of *R. officinalis*, and subsequent isolation to determine which substances are responsible for the molluscicidal effect.

5 Changes in reproductive patterns of *Biomphalaria glabrata* infected with *S. mansoni* in self-fertilization and cross-fertilization.

Anna Carla Alberto-Silva Alberto-Silva, Marta Julia Faro, Patricia IOC/ Machado Pinto, Clélia Christina Mello-Silva

The changes in the reproductive biology of *B. glabrata* infected with *S. mansoni* compose a physiological stress factor, associated indirectly to metabolic modifications and directly to parasitic spoliation of the hermaphrodite gland. The present study aimed to verify the changes in the reproductive pattern of *B. glabrata* infected and maintained in self-fertilization and cross-fertilization, associated with the parasite load. To do so, 40 snails were infected with 8 to 10 miracidia. Ten of these snails were then kept isolated and the other 30 were maintained in three groups of ten. Another 40 uninfected snails were kept as control under the same conditions. The following reproductive parameters were evaluated weekly: number of egg masses/snail, number of eggs/snail, number of eggs/egg mass and number of hatched snails. After two weeks, the number of snails hatched was counted. The cercarial emergence was observed weekly for three weeks to count the cercariae in triplicate in 0.5 ml of water. The results concerning the reproductive parameters indicated an increase of 6% in eggs/snail both among those kept in self-fertilization and cross-fertilization and 17% in the number of egg masses/snail in the isolated snails and 14% in the cross-fertilization group in the first two weeks of infection. However, after 8 weeks of infection, the snails in self-fertilization and cross-fertilization, respectively presented reductions of 30% and 36.1% in eggs/snail and 35.4% and 30.4% in number of egg masses/snail. The number of hatched snails declined by 20% in the snails kept isolated. In relation to average number of cercariae eliminated, the isolated snails eliminated 72.1% more cercariae than those kept self-fertilization. Furthermore, 88% of the snails kept in self-fertilization did not lay eggs but did eliminate cercariae, while only one such snail did not shed cercariae but continued laying eggs. It can thus be concluded that parasitic castration occurs in the oviposition period and is directly related to the parasite burden of the snails, especially when kept in self-fertilization.

6 Is *Biomphalaria tenagophila guaibensis* actually a subspecies?

Lidiane Braga, Liana K. Jannotti-Passos, Omar Carvalho, Roberta Lima Caldeira

The subspecies *Biomphalaria* tenagophila guaibensis (Paraense 1984) was classified this way because of morphological similarities with *Biomphalaria* tenagophila, especially by the presence of a vaginal pouch. This feature is the main difference that distinguishes the subspecies of *Biomphalaria* occidentalis, a species which also presents strong similarities. Information about this subspecies are scarce, there are no data crossing B. t. guaibensis with B. tenagophila and with B. occidentalis These gaps create doubts about the taxonomy classification of subspecies, since studies of phylogenetic relationship show higher affinity of B. t. guaibensis with B. occidentalis than with B. tenagophila. Studies have shown that the subspecies is not susceptible to *S. mansoni* using three different strains AL, SJ, and LE 50 and 100 miracidia/mollusc. Moreover the species B. tenagophila present variables infection rate (0-91,5%) and so it becomes important to check the susceptibility of molluscs F1 and F2 from crosses. In order to expand knowledge about this subspecies, this work aimed to investigate possible crosses between subspecies and the two cryptic species (using the character of albinism and the molecular technique of PCR-RFLP) and verify the susceptibility of molluscs F1 and F2 of possible crosses. At the crosses B. t. guaibensis X B. tenagophila albino, four albino (27%) generated pigmented F1, and the molecular profile obtained was from B. t. guaibensis, In the experiments of exposure to *S. mansoni*, the pigmented molluscs F1 and F2 of B. tenagophila albino are not infected. While B. t. guaibensis x B. occidentalis showed no evidence of interbreeding. These data have epidemiological importance, since it removes the possibility of outbreaks of schistosomiasis in areas where only this subspecies is present. Furthermore, it was demonstrated that the positioning of subspecies B. t. guaibensis as valid, since there was shown the crosses between B. t. guaibensis and the species B. tenagophila, and there is reproductive isolation between B. t. guaibensis and B. occidentalis.

7 Reduction in the susceptibility of *Biomphalaria tenagophila* collected in the stream Herivelton Martins, located in Bananal/SP after introduction of B.*tenagophila* from Taim/RS, a resistant lineage to *Schistosoma mansoni*

Daisymara Priscila de Almeida Marques, Florence Mara Rosa, Débora Aparecida Negrão-Corrêa, Engels Maciel, Horácio Manuel Santana Teles, Roberta Lima Caldeira, Liana Konovaloff Jannotti-Passos, Paulo Marcos Zech Coelho

In Brazil, *Biomphalaria* tenagophila (d´Orbigny, 1835) is the second major species in the transmission of schistosomiasis, being responsible for most autochtonous cases in the State of São Paulo. In 1979, a lineage of B. tenagophila, absolutely resistant to the parasite, was identified. Numerous experiments have been conducted and this lineage remains resistant to various geographical strains of the parasite, as well as to different variable burdens of miracidia. Genetic studies demonstrated that the resistance of this lineage would have dominant character. This population presents a molecular profile with three fragments (800, 470 and 350 pb), distinguishable from other populations of B. tenagophila in Brazil, which have only the first two bands. The third fragment also has dominant character. Previous studies have used this lineage as a biological control in the transmission of schistosomiasis in a hydrocollection situated in Bananal/SP. Eight hundred specimens of Taim, with 9 to 12 mm diameter, where physically labeled and introduced in the stream Herivelton Martins. After 4, 11 and 14 months of the introduction, the juvenile snails were collected and submitted to infection with miracidia. Part of these snails was examined by means of PCR-RFLP technique, aiming at identifying the molecular marker 350 pb. Offsprings F1 of the snails collected at different periods after introduction were individually exposed to 25 miracidia of *S. mansoni* (SJ). Positive and negative specimens were submitted to PCR-RFLP technique.The proportions of the molecular marker 350 pb (typical of Taim) detected in offsprings collected 4, 11 and 14 months post-introduction were 37.1%, 35.7% and 60%, respectively. In the first challenge, the infection rate of the descendants (before introduction) was 38.6%, and after 4 months it was reduced to 14.9%. In the second challenge, the rates were 25.5% (before introduction), 4.1% and 17% after 4 and 11 months post-introduction, respectively. In the third challenge the rates were 26.5% (before introduction), reduced to 6.8% (after 11 months) and to 2.1% (after 14 months). The proportions of the marker 350 pb detected in positive and negative snails in the first challenge were 10% and 60.9%, respectively. In the second challenge, the marker was only found in the negative descendants, collected after 4 and 11 months post-introduction, at the rates of 66.7% and 53%, respectively. The genetic heritage of the Taim lineage and its resistance character was successfully transmitted to the local population of B. tenagophila in the stream Herivelton Martins.

8 Spatial distribution of *Biomphalaria spp*., the intermediate host snails of *Schistosoma mansoni* in Brazil

Ronaldo Scholte, Omar Carvalho, John Malone, Jürg Utzinger, Penelope Vounatsou

Schistosomiasis mansoni remains an important parasitic disease of man, endemic in large parts of sub-Saharan Africa, the Middle East, South America and the Caribbean. The aetiological agent is the trematode Schistosoma mansoni, whereas aquatic snails of the genus *Biomphalaria* act as intermediate hosts in the parasite life cycle. In Brazil, the distribution of *Biomphalaria* spp. is closely associated with the occurrence of schistosomiasis. The purpose of this study was to map and predict the spatial distribution of the intermediate host snails of *S. mansoni* across Brazil. We assembled snail 'presence-only' data, which were readily available from the Laboratory of Helminthiasis and Medical Malacology (LHMM) of the René Rachou Research Center (CPqRR/Fiocruz-MG), and used a maximum entropy approach, along with climatic and environmental variables to produce predictive risk maps. We identified a series of risk factors that govern the distribution of *Biomphalaria* snails. We find that high-risk areas for *B. glabrata* are concentrated in the regions of Northeast and Southeast and the northern part of the South region. B. straminea are found in the Northeast and Southeast regions, and B. tenagophila are concentrated in the Southeast and South regions. Our findings confirm that the occurrence of schistosomiasis mansoni is correlated with the presence of the intermediate host snails. The generated risk maps of intermediate host snails might assist the national control programme for spatial targeting of control interventions and to ultimately move towards schistosomiasis elimination in Brazil.

9 Occurrence of mollusks, genus *Biomphalaria*, in parks of the city Belo Horizonte, Minas Gerais, Brazil.

Cristiano Lara Massara, Martin Enk, Roberta Caldeira, Cristiane Mendonça, Ronaldo Scholte, Omar Carvalho

Until recently schistosomiasis was considered the most prevalent endemic disease among populations in rural areas, especially in the northeastern and southeast states of Brazil, and therefore classified as "rural endemic disease." Recent studies have shown that the epidemiology of this disease is changing by occurring transmission in the outskirts of and even within large urban centers. The city of Belo Horizonte (MG) counts on 71 parks, of which 55 are open to the public. Of these 31 (43.6%) have one or more water collections. The objective of this study was to carry out a malacological survey, among the water collections in these parks of the capital of Minas Gerais. In 11 parks a total number of 551 snails of the genus *Biomphalaria*, intermediate host of Schistosoma mansoni were collected, being 79 *B. glabrata* (04 parks), 12 B. tenagophila (01) e 253 B. straminea (04). *B. glabrata* and/or B. tenagophila (207 specimens) were collected in two parks. All snails were negative for cercariae of *S. mansoni*. However, considering the possible contamination of the environmental with human feces containing *S. mansoni* eggs in combination with the presence of intermediate hosts, these findings serve as an alert for a possible installation of schistosomiasis transmission in municipal parks of the city of Belo Horizonte.

10 Community participation assessment of a schistosomiasis control program in a rural area of Minas Gerais State, Brazil

Claudia Maia, Flavia Gazzinelli, Leonardo Matoso, Nathalia Paula, Cristiano Massara, Andrea Gazzinelli, Helmut Kloos, Dener Carlos dos Reis

Community participation has been identified as an important component for infectious disease control programs. This paper reviews basic concepts of community participation (CP) in health and presents preliminary results of a schistosomiasis control study using the CP approach in São Pedro in Jequitinhonha Municipality, Minas Gerais State. Methods: We used the spidergram developed by Rifkin et al. (1988) and modified for use in São Pedro, to measure the extent of CP in the spidergram's five dimensions: 1) leadership of the researchers, community and professionals introducing the intervention, 2) planning and management partnerships between the researchers, community and professionals, 3) communication, 4) external support, and 5) monitoring and evaluation (M&E) of the participation of intended beneficiaries. The project was designed by researchers of the Nursing School -UFMG in consultation with community leaders in Sao Pedro in 2008 and is continuing. Forty-one community leaders and representatives including local health professionals, and district government managers of construction/infrastructure/transportation and municipal health offices participated in the project. The program was developed in three phases, with six meetings each, involving local and district participants and the researchers. The participants agreed to improve the water supply/sanitation and build a laboratory (district government managers), attend community meetings, and develop a local health community and community association (community representatives), and provide health education, diagnostic and schistosomiasis treatment services (researchers). Results: All designated actions except the installation of septic tanks and the construction of a laboratory and a sewage treatment system were completed by 2010. Spidergram assessment indicates that whereas CP in leadership, planning and management, and community was satisfactory, scoring 3 each on a five point scale, external support and monitoring and evaluation (M&E) lagged behind (2 points score each). Moreover, while attendance of meetings was 60% overall, it declined after initial high attendance rates and male participation was low throughout the two-year project period. Participants' knowledge of schistosomiasis transmission increased and their perception of the need for CP in environmental and infrastructure improvements became more favorable at the end of the health education intervention. Conclusion: These preliminary data indicate that the spidergram method can measure CP in schistosomiasis prevention and control. However, the program needs to strengthen community capacity to sustain the intervention, improve feedback to the community and facilitate participation in data collection and M&E. Financial support: CNPq, INCT-DT, FAPEMIG, CAPES

11 CONTROL OF PARASITIC DYNAMICS OF *Schistosoma Mansoni* (TREMATODA) IN *Biomphalaria glabrata* (PLANORBIDAE) BY EXPOSURE OF EGGS AND MIRACIDIA TO Euphorbia milli Var. Hislopii (EUPHORBIACEAE)

Ronaldo Augusto, Maria Lourdes A. Rodrigues, Maurício Vasconcellos, Clelia Mello-Silva & Claudia Portes Santos

Schistosomiasis is a chronic debilitating parasitic disease affecting some 200 million people across 74 countries within Africa, Asia, the Middle and South America. In terms of public health and socio-economic impact, it ranks second only to malaria among parasitic diseases. According to previous estimates, the disease causes the annual loss of between 1.7 and 4.5 million disability adjusted life years (DALYs). A recent meta-analysis challenges these burden estimates; they could be several-fold higher. Efforts to reduce schistosome prevalence have included combinations of sanitation, health education, snail control, better diagnosis and chemotherapy. Control of parasitemia has relied primarily on praziquantel (PZQ), an effective chemotherapeutic drug that has been in use for over 20 years. Recurrent morbidity and evidence of emerging resistance to praziquantel in endemic countries emphasizes the need for better treatment strategy. The World Health Organization has stimulated the action of PZQ combined with the compound molluscicide in water resources in areas of high endemicity to control transmission of Schistosoma mansoni. Euphorbia milii (syn. splendens) var. hislopii latex has been used experimentally for control of snails. The objective of this study was to evaluate the effect of the exposure to sublethal concentrations (LC50) of this latex on eggs and miracidia during experimental infection of *Biomphalaria* glabrata with Schistosoma mansoni. Four groups were formed with 30 replicates each, three of them using aqueous solutions of the latex at a sublethal concentration and one using distilled water as control. With the LC50 determined, four field application situations for contact of the eggs and miracidia with the latex were simulated. The survival of the snails in the control group was 45.3% higher than in group 4 (hatching and infection in latex) and 27.3% higher than in group 3 (hatching in latex). Exposure to latex increased the reproductive activity of *B. glabrata*. The elimination of cercariae per snail decreased significantly in treatments 3 and 4 compared with the control group in the third and fourth weeks of infection. The sublethal concentration (LC50) of the E. milii latex showed toxic effects on eggs and miracidia, affecting the infection process, and can be used as an important tool in controlling the parasitic dynamics of *S. mansoni*.

12 Analysis of strategies for schistosomiasis control and prevention in a community at Ouro Verde de Minas, Minas Gerais State, Brazil

Aliny Gonçalves Batista, Martin Johannes Enk, Maria Cecília Pinto Diniz

Several studies have been carried out on the control and prevention of schistosomiasis in Brazil. The results are often encouraging, although confined to the surveyed areas and their brief duration, lacking sustainability. Moreover, the lack of interaction between the treatment measures, sanitation, social changes and health educational programs implementation do not provide better living conditions and understanding of the disease in affected populations. Hence, this study aims to promote and analyze strategies for control and prevention of schistosomiasis in Quilombo de Agua Preta de Baixo community, at Ouro Verde de Minas, Minas Gerais State, Brazil, in cooperation with the Municipal Health Secretariat. This endemic community is made up of 85 families and approximately 300 people. As a baseline, the census is being performed in this area, through socioeconomic and water contact questionnaires for all citizens. A parasitological survey (Kato-Katz and HPJ), urine PCR and treatment for patients with schistosomiasis and other intestinal helminthes will be conducted. At the community's area, full of streams and small rivers, malacological studies and the description of the environment will be made. The whole community was invited to be involved in the health education process, called "problematized education" (Freire, 1979, 1989), emphasizing the transformation of people, groups and the locality. The "educator / coach" has been a facilitator, a co-manager whose action is to propose the teaching-learning situations (educative health actions) that will make possible real participation and dialogue, stimulating creativity and critical thinking, decision-making and the very action of all involved. Participants, including educators, from the beginning of the study, have been creating habits of group work, starting from practical problems and objectives, developing their critical awareness and responsibility based on the involvement. Knowledge has been socialized and demystified. The examination of our collected data uses qualitative and quantitative approaches such as univariate and multivariate analyzes in order to characterize the studied population and shows the distribution of infection by *S. mansoni* and geohelminthes in the community. For activities in health education, we will use the Content Analysis (Bardin, 1977).

13º Simpósio Internacional sobre Esquistossomose
13th International Symposium on Schistosomiasis
16 to 19 September 2012 - Belo Horizonte, MG - Brazil

13 Diferenças nas respostas das células da cultura primária da região do APO de caramujos *Biomphalaria* frente a esporocistos de *Schistossoma mansoni*

Luciene Barbosa, Ana Carolina Alves de Matos, Luciana Maria Silva, Consuelo Latorre Fortes-Dias, Paulo Marcos Zech Coelho

Schistosomiasis is caused by *Schistosoma mansoni*, which uses as intermediate host snails of the genus *Biomphalaria*. In Brazil three species have been found naturally infected (*B. glabrata*, *B. tenagophila* and *B. straminea*) and therefore considered as disease transmitters. *B. tenagophila* presents different levels of resistance to infection by *S. mansoni*. Strain of *B. tenagophila* Taim is totally resistant, while *B. tenagophila* Cabo Frio is susceptible to infection. The defense cells of molluscs (hemocytes) are produced in the region known as APO (amebocyte-producing organ). To determine possible differences in the responses of populations of *B. tenagophila* to infection, primary cultures of cells from APO were used. They were grown in culture plates of 24 wells with CMRL 1415 medium at 15° C and subsequently exposed to primary sporocysts. Cultures without addition of sporocysts were used as control. Immediately after exposure, the cells in both cultures began to agglomerate forming an extended network, which, after 24 hours, was already near the sporocysts. For *B. tenagophila* Taim was observed the formation of a dense material in gel form, involving and reducing the sporocyst mobility. After 48 hours, the sporocysts were completely immobile and presented intense morphological changes in the tegument. This was not observed in cultures of *B. tenagophila* of Cabo Frio, where sporocysts remained in motion throughout the study period, no morphological changes.

14 Evaluation of pcr-elisa and kato-katz techniques for schistosomiasis mansoni cure assessment

Liliane Maria Vidal Siqueira, Luciana Inácia Gomes, Eduardo Ribeiro Oliveira, Martin Johannes Enk, Ana Lucia Teles Rabello, Paulo Marcos Zech Coelho

Introduction: The importance of following up therapeutic intervention among individuals diagnosed with schistosomiasis is based on the fact that the expected cure rate for Praziquantel varies around 90% and that non-cured patients continue to maintain transmission in endemic settings. Methodology: The aim of the study was to evaluate parasitological and molecular biological techniques for the assessment of cure after chemotherapy. The study was carried out in a low transmission area, Pedra Preta, Montes Claros, Minas Gerais, Brazil. To establish the infection rate, a combination of parasitological exams was performed. Four stool samples from 201 inhabitants were analyzed according to the Kato-Katz method (18 slides) and a commercial test, the TF-Test®. All patients with positive parasitological exams were treated with a single dose of Praziquantel, 50 mg/kg for adults and 60 mg/kg for children. To establish the cure rate out of the 72 positive patients, 69 were followed up after 30 days, 67 after 90 days and 61 after 180 days of treatment. For the direct comparison between the Kato-Katz method and the PCR-ELISA technique, 500mg of the same stool sample of each participant was analyzed, resulting in 12 Kato-Katz slides per sample. The data analysis involved the determination of the cure rate defined by both diagnostic methods. Results: The cure rate 30 days after treatment by the Kato-Katz technique was 100% and one positive individual was detected by the PCR-ELISA (cure rate of 98.5%). Three positives individuals were detected by the PCR-ELISA 90 days after treatment (cure rate of 95.5%), not identified by analyzing 12 Kato-Katz slides. The cure rate after 180 days after treatment was 98.4% by Kato-Katz (1 out of 61) and 96.5% by PCR-ELISA (2 out of 61), with the final cure rate of 95.1% (3 out of 61). It is worth to note here that 30, 90 and 180 days after treatment the cure rate determined by 2 Kato-Katz slides was 100%. Conclusions: In situations of very low parasite load, such as after therapeutic interventions; the assessment of cure may require increased number of Kato-Katz slides or a test with higher sensitivity as PCR-ELISA.

15 SchistoSystem - Artificial Intelligence for Auto Diagnostic Imaging.

André Firmo, Allison Dantas, Julyana Viegas, Jonas Albuquerque

Introduction: The Kato-Katz method, regarded worldwide as the gold standard for diagnosis of Schistosoma mansoni eggs, unites advantages that justify its use by health services, however the ability of technicians to read slides is a limiting factor for achieving high volume of tests. This project aims to build an automated instrument able to proceed very quickly a large number of diagnoses.s. Methodology: The partnership between researchers from the Schistosomiasis Laboratory of CPqAM/Fiocruz and Informatics Dep / UFRPE devised a low-cost computing system based on artificial intelligence, integrating software and hardware for rapid detection and automatic counting of S.mansoni eggs in Kato-Katz slides. The system comprises an optical microscope, a webcam low cost and software.The inicial images were captured from slides standard and treated for minimizing noise filters that enhance the image features: contrast, brightness, saturation. In the first phase of the project 50 slides were selected as reference for the construction of the database with information to train the system. The webcam images captured 2,200 positive images (with eggs) and 1,047 of negative (no eggs) images totaling 2,500 eggs as training library incorporated into the system. The second phase incorporated data for identification of the technician responsible for the examination, the patient's name and residence, built into the system in the form of database to be shared over the Internet. The technician operating the instrument by placing the slide under a microscope with camera attached and accesses the system with your name/password and patient informations. Move the Kato-Katz slide according to standardized routines and the eggs are being recognized by the software, framed and recorded. The path of the slide lasts 10 minutes to finish and after that will be shown on the screen the total number of eggs detected. Results: The training system consists of 10 classifiers sequenced to form a s single robust classifier to identify the eggs. The average training time of the system was 47 vs. 275 seconds, without considering the optimization, and the first tests obtained a hit rate of 60%. Conclusions: A number of benefits can be aggregated with this methodology: the creation of an integrated database and georeferenced locations with positive cases, reports and monitoring results, achieving rapid screennings to select locations with the highest number of cases, improving the ergonomics of laboratory technicians and promptness in the exams.

16 Biological characteristics of *Schistosoma mansoni* Esteio strain in a experimental infection and identification of chemical elements potentially susceptible of magnetization present in the eggshell

Rafael Lucyk Maurer, Malcolm Jones, Eunice Grinan, Ivonilda Machado Rodrigues, Carolina de Marco Veríssimo, Carla Aristonara Muller, Carlos Graeff-Teixeira

The autochthonous transmission of schistosomiasis in Rio Grande do Sul was confirmed for the first time in 1998, establishing the southernmost focus in Americas. Although no morphological differences were detected in a previous study, the investigation of biological characteristics of the parasite in the current study showed some peculiarities, as low infection rates of miracidia and high unisexual infection rates by male worms, that may be relevant for a better understanding of transmission dynamics in the Esteio focus and adequacy of control measures. The epidemiological study of this focus led to the development of a diagnostic method, Helmintex, more sensitive than the traditional methods for detecting small number of eggs shed in the patients' feces. In this method eggs are isolated through magnetic interaction with paramagnetic beads. Schistosoma mansoni worms ingest large amounts of blood and requires specialized metabolic pathway for iron handling, so the interaction mechanism with magnetic field could be related to the presence of iron in the eggshell. The aim of this study was to investigate the iron presence in the *S. mansoni* eggshell by energy dispersive spectroscopy with scanning and transmission electronic microscope. The results allowed the identification of iron and small crystalline structures with high levels of oxygen and iron, probably magnetite in the eggshell. Additionally, the eggs from trematodes Fascioloides magna, Fasciola gigantica and nematodes Ascaris lumbricoides and Haemonchus contortus were analyzed to see if the compositional differences were related to difference taxonomic groups and habitat types. These findings stimulate further research on the metabolic pathway involving iron, development of new treatment modalities and diagnostic tools.

17 Evaluation of educational / informative materials on schistosomiasis produced for Brazil: a discussion of strategies and possibilities for education and health in addressing the endemic disease

Cristiano Lara Massara, Martin Enk, Ronaldo Scholte, Omar Carvalho, Murta Felipe

In the study 42 educational/informative materials, produced for Brazil over the years were evaluated. Folders (14), posters (13) and leaflets (15) were analyzed in relation to the theme schistosomiasis. These materials were prepared by World Health Organization (1), by the Ministry of Health (14), State (18), Municipality Health Departments (4) and others institutions (5), in order to convey concepts and information about this disease to several social groups, including the general population (83.34%), health professionals (4.76%), and the school community (11.90%). Inaccuracies and inadequacies were observed throughout the analysis, being the schistosomiasis transmitting mollusk incorrectly portrayed in 61.90% of the materials, with predominant use of stereotypical images and caricatures, not consistent with reality. Only 30.90% of the materials cited a stool test as method for diagnosis. In 54.76% fecal material was not represented iconographically as contaminating element, minimizing its importance for critical discussion of public policies on sanitation, and the role of man as a contaminant of the environment. Noteworthy is the reproduction of texts, images and misconceptions, revealing the lack of creativity, planning and management in the design of these materials. On the other hand, it has to be emphasized that some materials analyzed when placed into the temporal context of its publication, present innovative teaching practices and seek a rupture with the vertical model of sanitation knowledge transmission.

18 In the city of correntes, Pernambuco-Brazil: possibly eliminating schistosomiasis as a public health problem

Vânia Maria de Siqueira Cavalcante, Barbara Morgana Silva, Marcela Vieira Leite

IN THE CITY OF CORRENTES, PERNAMBUCO-BRAZIL: POSSIBLY ELIMINATING SCHISTOSOMIASIS AS A PUBLIC HEALTH PROBLEM [1]Cavalcanti, VMS; [1]Silva, BM; [1]Leite, VM;[2] Neto, JSC., [2]Silva, AM and [1]Silva, JAM Pernambuco State Health Authority – Health Surveillance Unit – SANAR[1] Correntes City Health Authority [2] Schistosomiasis, a parasitic disease, is caused by the Schistosoma mansoni trematode whose infestation presents itself clinically as light, heavy or severe enough to cause death. Schistosomiasis possesses great relevance as a public health problem due to the magnitude of its prevalence and the severity of its presentation. In August 2011, The National Ministry of Health included schistosomiasis among other endemic diseases, targeted for elimination as public health problems. Subsequently, the Pernambuco State Health Department instituted the (SANAR) Program which implemented actions to confront seven neglected endemic illnesses in the state. For schistosomiasis, SANAR include the implementation of basic preventative measures in its surveillance and control, and collective treatment in locations where prevalence is elevated. Correntes–PE, (population 17,490 (DAB, 2012)), is situated in the Interior of Pernambuco-Br, and is endemic for schistosomiasis. The present research aims to demonstrate the effects of the success of the Schistosomiasis Program (PCE) carried out in Correntes, and identified by the SANAR program. The data, furnished by (SISPCE) of Correntes, represents a decade of activities (2002 to 2012). During the 10 years, research was conducted in 114 endemic areas situated on river banks and streams on 17,143 inhabitants, representing 98.41% of the city's population. Research and treatment of positive cases were performed over a period of 2 years in 41 locations and annually in 73 localities. During the 10 years analyzed, 85.6% of the researched population was examined. The index of positivity (IP) for Schistosoma mansoni, varied between 13.18 in 2002 and 0.85 thru August 2012. Coverage of treatment was 86% of positives, varying between 76% and 100%. The results demonstrate a reduction of positive indices for Schistosoma (from 13.18% in 2002 to 0.85% through August of 2012). The data presented to and approved by SISPCE, point to the efficiency of the program, which was performed correctly and in accordance with the standards (Brazil, 2011). Despite the need for inclusion of basic sanitation measures to reduce the risks of transmission, the results of 10 years of surveillance and control of schistosomiasis in Correntes, supports the start of certification for elimination of schistosomiasis as a public health problem in the city.

19 Production of the schistosomiasis service of reference in Aggeu Magalhães Institute /FIOCRUZ, DURING 2005-2011

Constança Simões Barbosa, Julyana Viegas Campos, Wheverton Correia do Nascimento, Benigna Silva, Barnabé Tabosa, Fernando Gonçalves, Maria de Fátima Silva, Diogo Paixão

INTRODUCTION: The Schistosomiasis Reference Laboratory of Aggeu Magalhães Institute/Fiocruz has exerted its activities since 1985 with significant production of their services provided. The reference of this laboratory is resulted of their recognition as Schistosomiasis Service of Reference (SRE) for Ministry of Health through Decree 410 of 07/12/2002 in 179 Official Gazette. The SRE acts mainly in the training of health services in malacology and parasitological diagnostic techniques, providing courses for updates in epidemiology and workshops for epidemiological projects design OBJECTIVES: (1) quantify the productivity of SRE laboratory examinations during 2005-2011; (2) quantify and stratify the external demand for courses in this period. METHODS: A statistical survey was conducted to quantify and stratify total number of tests performed during between 2005-2011: parasitological, malacological, biological material supplied and malacological diagnostic by "Polymerase Chain Reaction" PCR. Demand for courses were categorized by year and type in Excel 2010: trainings in malacological and parasitological techniques, lectures on biosecurity/quality, management and schistosomiasis update on epidemiology and environment. A descriptive statistical analysis was held to identify the types of course most requested by municipalities and states in each year. RESULTS: were performed 62,983 Kato-Katz examinations and 29,530 malacological examinations between 2005-2011. In 2009 the laboratory staff started to quantify the supply of *Biomphalaria* specimens and Schistosoma mansoni cercariae totaling 154,099 supplied untill 2011. Molecular diagnostics (PCR) was included for malacological analyses in 2010 and untill 2011 were recorded 47 tests. Were ministered 25 training in malacological techniques, 28 in parasitological techniques, 05 courses on biosecurity/quality management and 38 lectures in epidemiology and environment of schsitosomiasis. In 2005 15 courses were conducted, 2006 (8), 2007 (6), 2008 (8), 2009 (13), 2010 (39) and 2011 (7). The counties that requested more trainings were: Recife with 15 requests, Vitória (8), Palmares (5), Caruaru (4) other municipalities (64) of Pernambuco and other states (Ceará, Alagoas, RG Norte e Paraná). During study period were trained 215 health professionals. From 2005 to 2011 occurred increase of production exams (tripling) and increase (50%) in demand for training. CONCLUSION: SRE plays an important role in diagnosis and training for schistosomiasis control in Northeast Brazil. Increased demand shows the need for more knowledge on the part of health care professionals. Increase of parasitological and malacological examination are related to research projects performed by the SRE that is intended to provide subsidies for environmental surveillance programs and epidemiological status.

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20 Epidemiological aspects of schistosomiasis in endemic area in agreste of Alagoas, Brazil

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Introduction: Brazil is a country where we have infected people by intestinal helminths, especially in the Northeast. The state of Alagoas has 102 cities and due to lack of sanitation and poor hygiene education 70 (68.63%) of these are considered endemic for schistosomiasis. Epidemiological surveys conducted in the city of Arapiraca show social and environmental factors that contribute to the spread of parasites and significant prevalence of infections caused by *Schistosoma mansoni*. **Objective**: To evaluate the epidemiologic profile and risk factors for infection by S. mansoni in the localities of Banana, Batingas Cangandu and, in the countryside, in the city of Arapiraca, Alagoas. **Methodology**: A population-based cross-sectional study in an endemic area for SM, from September 2009 to June 2010. After approval by the Ethics Committee in Research of UFAL No 025813/2008-19 were distributed 2280 questionnaires (sociodemographic, socioeconomic, health conditions and contact with water), but only 1502 (65.88%) individuals answered the questionnaire and underwent stool tests. The diagnosis of SM was determined by the Kato-Katz technique. The statistical analysis used the SPSS 11.5 software, the descriptive and inferential data, Chi-square test, and Fischer Odds ratio (95% - $p < 0.05$). **Results**: In coprological survey, conducted in 1502 individuals, 98 (6.52%) were positive for *S. mansoni* (Bananeiras 2.4%, 5.5% and Batingas Cangandu 9.2%). The infection intensity was mild in Bananeiras Batingas (32.00 ± 12.39 and 61.71 ± 24.39 OPG OPG, respectively) and moderate in Cangandu with 219.31 ± 65.03 OPG. In epidemiologic profile of positive individuals there was significant association ($p < 0.05$) between infection with *S. mansoni* and sanitation variables as a source of water for drinking and bathing and water contact as the reason and frequency of contact, local water collection. Comparing sociodemographic variables between groups of positive and negative individuals for *S. mansoni* we observed significant differences ($p < 0.05$) with gender, nationality and previous residence. In variable health conditions, source of water for bathing, toilet, facilities and defecation habits were also identified statistically significant differences ($p < 0.05$). The same was observed in relation to the variable contact with water, ground contact. **Conclusions**: The study highlights the importance of risk factors and health education for a bigger control and reduce the prevalence of SM in endemic areas that were analyzed to intervene in this public health problem.

21 Evaluation of the potential molluscicidal leaves, stems and fruit of Jatropha gossypiifolia in *Biomphalaria glabrata*

Adalberto Alves Pereira Filho, Clícia Rosane Costa França, Dorlams da Silva Oliveira, Renato Juvino de Aragão Mendes, Ivone Garros Rosa

Schistosomiasis is a parasitic disease caused by *Schistosoma mansoni* that has severe worldwide socio-economic repercussions, mainly in the state of Maranhão, Brazil. The search for substances molluscicides is one of the main measures to control this parasite since the fight against the snail *Biomphalaria sp.* (intermediary host of schistosomiasis), promotes the disruption of the biological cycle of this parasite. In order to obtain natural, biodegradable and low cost compounds, studies on the potential of molluscicidal products obtained from plants of the local flora have grown considerably. This work was developed with the objective of verify the molluscicidal activity of hydroalcoholic extracts of stem, leaves and fruit of *Jatropha gossypiifolia* in *Biomphalaria glabrata* and detect major classes of secondary metabolites present in the plant. For the preparation of extracts, every part of the plant was wrapped separately in glass containers and subjected to maceration with 92% alcohol for 15 days. The solvent was eliminated in a rotary evaporator, to obtain a dry residue. They were divided into three groups, consisting of ten rats each, submitted in 500 ml of dry residue of each part of vegetable dechlorinated in water at the concentrations of 25, 50, 75 and 100 ppm. For the control group, 10 snails in 500 ml of distilled water were used. After 24 hours exposition, the animals were removed, washed twice with distilled water, fed lettuce and observed every 24 hours for four days to assess mortality. The phytochemical analysis found in fruits and leaves secondary metabolic compounds considered molluscicides, including saponins and tannins. The leaf extract showed a strong molluscicidal agent, since in all concentrations (100, 75, 50 and 25 ppm), reached 100% mortality of *B. glabrata*, while for the extract of fruits there was a variation in mortality as decreased the concentration. Regarding the stem extract, none of the concentrations promoted mortality. Based on previous literature it is believed that the molluscicidal activity of leaves and fruits is due to the tannins and saponins. Future studies are needed to isolate, implementation and validation of these metabolites found in *J. gossypiifolia* snails in *B. glabrata*.

22 Evaluation of toxic activity of Morinda citrifolia L. (NONI) ON *Biomphalaria glabrata*, MOLLUSK TRANSMITTER OF SCHISTOSOMIASIS IN SÃO LUÍS, MARANHÃO, BRAZIL

Renato Mendes, Adalberto Pereira Filho, Clícia França, Dorlam's Oliveira, Josycarlla Santos, Karla Bezerra, Natale Silva, Ivone Rosa

Schistosomiasis mansoni is a parasitic disease caused by trematode *Schistosoma mansoni*, whose intermediate forms develop in aquatic gastropod snails of the genus *Biomphalaria*, and adult in man, definitive host. Millions people worldwide suffer from severe morbidity as a result of this disease. In seeking to control the disease, research on molluscicides have grown in order to interrupt the life cycle of the parasite and thus the spread of disease Molluscicides of plant origin have been widely studied in order to replace the synthetic molluscicides, causing less impact on the environment associated with the biota where snails are vectors. *Morinda citrifolia* L. (Noni) have been used in folk remedies by Polynesians for over 2000 years and it is reported a wide range of therapeutic effects, including antibacterial, antiviral, antifungal, antitumor, anthelmintic, analgesic, hypotensive, antiinflammatory, and increased immune effects. In this study, we sought to verify the molluscicidal activity of the leaves of *M. citrifolia* against snails transmitting schistosomiasis. The leaves of *M. citrifolia* were collected between 6:00 and 7:00 am at the Federal University of Maranhão - Campus Bacanga. Later they were taken to the Center for Basic and Applied Immunology - NIBA / UFMA - where they were selected and submitted to maceration for 15 days. After this period, the extract obtained was filtered, and then one part was placed in a water bath to obtain a dry residue and also for holding phytochemical analysis. To test molluscicide, which was performed in triplicate, the residue was diluted to concentrations of 100, 50 and 20 ppm. 30 *Biomphalaria glabrata* snails (10 in each glass) were placed in these solutions for 24 hours and then were removed from them, placed in dechlorinated water and fed. Every 24 took place the exchange of water and food. During the 72 hours from exposure, were analyzed biological behavior and possible mortality. In the first 24 hours, deaths were observed at the following concentrations: 11 deaths in 100 ppm, 13 (50 ppm), 15 (20 ppm) and 2 control. At the end of 72 hours, the mortality rate was 19 dead at 20 ppm, 15 in 50 ppm, 14 dead in 100 ppm, and 3 deaths in the control. While promote deaths, the hydroalcoholic extract of leaves of Noni can not be considered a good molluscicidal not kill at least 90% in 24h.

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23 Prevalence of schistosomiasis in the municipalities of Franciscópolis, Frei Gaspar, Ladainha and Ouro Verde de Minas, micro health Teófilo Otoni, Minas Gerais,Brazil, 2012

Sandra Costa Drummond, Leo Di Pietro, Olga Gerdi, Pedro Henrique Dinis Cunha, Juliana Papatella

The micro health Teófilo Otoni and municipalities have x belongs ä macroregion health Teófilo Otoni, located in the river valley Mucuri. Its economic activity in agriculture and extraction of semiprecious stones. On the Schistosomiasis Control Program (PCE) whose methodology follows the standards of the Ministry of Health, the goal of the program is to reduce the morbidity of the disease in endemic areas of high prevalence. **Objective**: To evaluate the results of prevalence for schistosomiasis obtained in census surveys conducted in the municipalities of Franciscópolis, Frei Gaspar, Ladainha e Ouro Verde de Minas . **Material and Methods**: In four counties coproscópicos census surveys were conducted by the method of Kato Katz quantitative diagnosis, a sample, a blade, by local health officials with oversight of servers assigned FUNASA ä State Department of Health of Minas Gerais, Regional Superintendent Health Teófilo Otoni. **Human** treatment was carried out with the drug oxamniquine praziquantel until 1996 and then, in both single dose according to the prevalence in the locality ie treating the entire population when the prevalence was ≥ 50% in the first survey and selective when prevalence was <50%. The first survey was called the initial survey (LI) and other valuation (AV) I, II, III. **Results**: The interval between the surveys ranged from 4 to 9 years, always census. Franciscópolis: in LI (1993) the prevalence was 30.0% in AV-I (2002) was 24.9% and Av.II (2005) 17.7%. Frei Gaspar: in LI (1995) 46.4%, AV.I (2002) 29.5% Av.II (2005) and 17.4% in AV.III (2006) 9.9%; Ladainha: LI (1993) 31.7% AV.I (2004) 29.9%; Ouro Verde de Minas: LI (1994) 37.9% Av.I (1998) 24.3% Av.II (1999) Av.III and 25.1% (2004) 20.0%. **Conclusion**: surveys reduced the prevalence of schistosomiasis **in** four municipalities with a consequent reduction in morbidity but prevalence remained high, above 20.0% except Frei Gaspar where it was less than 10%.

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24 SURVEY OF THE PREVALENCE of SCHISTOSOMIASIS SCHOOL OF 07 TO 14 YEARS IN STATE OF CEARÁ.

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The first reports of schistosomiasis in Ceará took place in 1920, when 141 were detected cearenses sailors at the Naval Hospital in Rio de Janeiro, with a positive 2.8%. In 1934 due to the diagnosis of yellow fever in Ceara biopsies were performed in 7387 where liver samples were detected positive 0.66% for Schistosoma mansoni, in Fortaleza, Juazeiro and Baturité. Later in 1938, Evandro Chagas detected positivity of grievance at Crato. The first major survey in Ceará promoted by the Ministry of Health took place in the years 1948 and 1949 were 40,462 examinations performed with a positivity of 390 cases, and a total percentage for the State of 1%. Among the municipalities that had higher rates of positivity were Pacoti (31.4%) and Redemption (62.2%). From 1964 to 2009 were conducted several studies of epidemiological interest, thus contributing to a better geographical delineation of the disease in the state of Ceará. In 2010 the Ministry of Health - MS in partnership with FIOCRUZ is conducting the National Survey of Prevalence of Schistosomiasis mansoni and other geohelmintoses in school 07 to 14 years in order to update the number of patients with worsening in the country. OBJECTIVES: To determine the prevalence of schistosomiasis and other geohelmintoses in school 07-14 years in the state of Ceará. MATERIAL AND METHODS: the parasitological diagnosis was made by Kato Katz technique where two blades were made from a single sample. The sample was drawn from four populations of endemic and non-endemic areas with smaller population of 500,000 or greater. RESULTS: The sample comprised 21 municipalities of Ceará conclude these 20 that are distributed in the metropolitan area and interior. The sample is from 8459 state tests so far conducted 6279 (70%) in municipalities. The positivity to schistosomiasis in the selected sample so far is negative for the presence of eggs of Schistosoma mansoni other geohelmintoses showed the following positive aspects: Ascariasis 282 (4.49%), trichuriasis 246 (3.91%), Hookworm 24 (0.34%) . CONCLUSION: The absence of positivity to schistosomiasis until the moment dear subsidy is not sufficient to characterize the state as an area of minor concern epidemiological, because, health conditions who are the people in rural areas.

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25 EVALUATION OF MOLLUSCICIDAL ACTIVITY OF *Psidium guajava* L. (GUAVA) IN SNAILS VECTORS OF SCHISTOSOMIASIS

Renato Mendes, Adalberto Pereira Filho, Dorlam's Oliveira, Josycarlla Santos, Karla Bezerra, Natale Silva, Ivone Rosa

Schistosomiasis is a parasitic disease caused by trematode helminths of the genus Schistosoma. According to the WHO, this parasitic disease, the second most neglected in the world, affects at least 240 million people worldwide, and more than 700 million people live in endemic areas. Schistosomiasis mansoni, only type found in Brazil, is transmitted by the snail intermediate host *Biomphalaria* genus and is considered a medical and socioeconomic seriously. Several studies have been done with the aim of discovering natural products that are able to combat the snail vector and cause less ecological impacts that the synthetic molluscicides. To this end, already knowing its proven antibacterial and antifungal activity, was chosen in this study *Psidium guajava* (Myrtaceae), popularly known as guava, to test its action molluscicide on snail *Biomphalaria glabrata*, snail main transmitter of schistosomiasis in northeastern Brazil . The leaves of *P. guajava* were collected between 6:00 and 7:00 am at the Universidade Federal do Maranhão - Campus Bacanga. Later they were taken Núcleo de Imunologia Básica e Aplicada - NIBA / UFMA - where they were selected and submitted to maceration for 15 days. After this period, the extract obtained was filtered, and then one part was placed in a water bath to obtain a dry residue and also for holding phytochemical analysis. To test molluscicide, which was performed in duplicate, the residue was diluted to concentrations of 100, 50 and 20 ppm. 20 *Biomphalaria* glabrata snails (10 in each glass) were placed in these solutions for 24 hours and then were removed and placed in dechlorinated water and and fed. Every 24h took place the exchange of water and food. During the 72 hours from exposure, were analyzed biological behavior and possible mortality. In the first 24 hours, there were no deaths from any individual in contact with the solution at all concentrations. At the end of 72h, dead individuals were observed at the following concentrations: 5 dead (100ppm), 9 dead (50ppm), four dead (20ppm) and one died in the control. It follows then that extract *P. guajava*, despite having tannins and saponins, toxic substances to snails, can't be considered a good product molluscicide, since no deaths at least one of these organisms within the 24 hour period. Phytochemical research is needed to further identify the type of saponin extract in existing and elucidation of why she had not acted on the snails in test.

26 *Schistosoma mansoni* no litoral de Pernambuco, Brasil: um modelo ecológico-probabilístico para a dinâmica de transmissão

Heitor Oliveira Duarte, Enrique Lopez Droguett, Marcio Chagas Moura, Verônica Santos Barbosa, Elainne Gomes, Constança Barbosa

INTRODUÇAO: Abordagens tradicionais para modelagem matemática da esquistossomose focam em humanos infectados; são modelos teóricos, sem parametrização e aplicação em estudo de caso; e não incorporam mudanças incertas e imprevisíveis devido a fatores ambientais aleatórios presentes na transmissão desta doença. Justifica-se assim a construção de um modelo ecológico-probabilístico cujo foco seja na abundância de Schistosoma mansoni (SM), relacionando-a a fatores ambientais da região de interesse. OBJETIVO: Servir de base para uma avaliação quantitativa de risco microbiano (QMRA), prevendo condições para persistência de SM, quantificando efeitos de mudanças climáticas na sua abundância e examinando a relação custo-eficiência no tratamento com praziquantel e/ou saneamento básico. MÉTODOS: A modelagem ecológica adotada consiste na elaboração de expressões matemáticas capazes de descrever e prever processos ou variáveis ecológicas (como a abundância populacional de SM). O modelo incorpora características realistas: população de SM estruturada por estágios de vida; tratamento dos casos humanos com praziquantel; densidade-dependência na produtividade de cercarias; variações mensais na exposição de humanos, densidade de caramujos e precipitação pluviométrica; eventos raros (antecipação do período de chuvas); qualidade do saneamento básico; aleatoriedade ambiental. Para alimentar o modelo foram coletados dados de literatura e empíricos resultantes da experiência dos pesquisadores do Lab. Esquistossomose-CPqAM/Fiocruz em municípios no litoral de Pernambuco, onde *Biomphalaria* glabrata é o vetor. O modelo foi inicialmente parametrizado para descrever e prever a abundância de SM mediante (1) pluviometria mensal do ambiente e (2) aplicação anual de praziquantel. Para uma simulação de 120 meses foi utilizado o software RAMAS Metapop v.5.0, ferramenta computacional para construção de modelos e simulação probabilística via Monte Carlo, assumindo que no mês inicial existe apenas 1 parasita fêmea adulta no ambiente. RESULTADOS PRELIMINARES: O modelo preliminar mostra resultados consistentes. A taxa de crescimento populacional dos parasitas é positiva em todos os meses da simulação e maior nos chuvosos; a abundância populacional de vermes adultos decresce drasticamente quando praziquantel é usado para tratar os casos humanos, mas cresce exponencialmente em 1 ano, tempo adotado no modelo para o re-tratamento, admitindo-se resíduo de 20% de não tratados. Ao longo de 10 anos com tratamentos anuais, o número de parasitas apresenta tendência de alta, sugerindo que praziquantel é útil para retardar momentaneamente a transmissão da esquistossomose, mas não é suficiente para seu controle a longo-prazo. Pesquisas de campo, opinião de especialistas e experimentos laboratoriais serão realizados para imprimir mais confiabilidade na parametrização deste modelo.

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27 Health education with emphasis on schistosomiasis

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Schistosomiasis mansoni is not only related to the presence of snail hosts and sick people in a certain place, but also to the people habits which might cause soil and water contamination by faeces. In Sergipe, according to the State Health Department, 65,606 cases of schistosomiasis were reported from 2002 to 2008.

The State of Sergipe presents a large dissemination of parasite diseases, mainly due to poor sanitation conditions to which population is exposed. City of Sao Cristovao faces this problem and this study implements an educational program on intestinal parasites with emphasis on schistosomiasis in a school located in the district of Rosa Elze to stimulate health promotion and prevention as well as develop educational actions for the students. By means of conferences and educational games this project intended to contribute to new prevention attitudes against parasites. A group consisting of all students in the morning shift (approximately 100 students) was selected for data collection. First condition for students to take part in the project was to deliver the Statement of Consent Form signed by their responsibles. Then, students and parents had to answer some assessment questions. This narrowed down number of participants to 48. However, only 20 of these attended third condition, which was to provide faeces for stool examination. All of these students took part in the educational activities during some morning periods. Of the 20 samples analyzed, 9 (45%) had intestinal parasite contamination. The parasites found were protozoa (*Entamoeba coli*, *Endolimax nana*, *Giardia lamblia*, *E.histolítica* / *E.dispar*) and helminth (*Schistosoma mansoni*) in a frequency of 8 (40%) and 1 (5%) respectively. Conferences and recreational activities (hunting words, crosswords, coloring pictures, memory games and videos) were prepared for the students according to age and education level. corresponding to their reality. It is expected that the health education provided has promoted long lasting and deep changes in habits. Some needed changes are not made by students and parents as they are related to socioeconomic difficulties, thus requiring more efficient public policies, especially regarding public sanitation.

28 *Biomphalaria glabrata* (Say, 1818) and *Biomphalaria straminea* (Dunker, 1848) in the Microregion Baixada Maranhense, Maranhão, Brazil.

Selma Patrícia Diniz CANTANHEDE, Monica Ammon FERNANDEZ, Otaviano GOMES, Nêuton SILVA-SOUZA, Silvana Carvalho THIENGO

The first record of *Biomphalaria* glabrata (Say, 1818) and *Biomphalaria* straminea (Dunker, 1848) for the state of Maranhão was in 1956, and most current records indicate the occurrence these two species at 30 and 40 municipalities, respectively. The presence of natural host species of Schistosoma mansoni Sambon, 1907 shows the need for preventive studies in their areas of occurrence, as well as the monitoring of these planorbids. One of the main goals of this study is to add malacological data to the government project "National Survey on Prevalence of Schistosoma mansoni and Geo-helminths" which is in progress in the Microregion Baixada Maranhense, an endemic area for schistosomiasis in Maranhão. The freshwater snails were collected from different natural biotopes of 21 municipalities (Anajatuba, Arari, Bela Vista do Maranhão, Cajari, Conceição do Lago Açu, Igarapé do Meio, Matinha, Monção, Olinda Nova, Palmeirândia, Pedro do Rosário, Penalva, Peri-Mirim, Pinheiro, Presidente Sarney, Santa Helena, São Bento, São João Batista, São Vicente Férrer, Viana and Vitória do Mearim) in November/2011, March and July/2012. The specimens were placed in aquaria containing water dechlorinated, substrate and fresh lettuce leaves. All the snails were exposed to artificial light to determine possible infection with trematode larvae. Subsequently, some specimens were anesthetized in Hypnol 0.05% solution for five hours, then killed by hot water (70° C) and fixed in Railliet-Henry solution for morphological diagnostic. Part of the specimens is being kept in aquaria for further studies. Larval forms of *S. mansoni* were not observed although other cercariae with no relevance to human health in Brazil were observed. *B. glabrata* was found in two municipalities (Peri-Mirim and São Vicente Férrer) whereas B. straminea was found in seven municipalities (Arari, Conceição do Lago Açu, Igarapé do Meio, Monção, Pedro do Rosário, Penalva and Vitória do Mearim). *B. glabrata* and B. straminea were found in syntopy in Pinheiro and São Bento. The first is the most important host species in the context of public health because it has great compatibility in natural and experimental infections. B. straminea is the most widely distributed species occurring in permanent and temporary watersheds and adapted to all varieties of climate in Brazil. Considering the important role that these species take in the epidemiology of schistosomiasis, surveillance and the search for *S. mansoni* infection is recommended. In addition to the epidemiological importance, this study, although still in progress, is the first longitudinal malacological survey performed in that region.

29 A survey of freshwater gastropods in the River Sarapui, municipality of Belford Roxo, Rio de Janeiro state, Brazil

Adriana Rodrigues Mainenti, Aline Carvalho Mattos, Monica Ammon Fernandez

Introduction: Schistosomiasis is one of the main endemic diseases associated to environmental impact due to the development of large projects. The Project for Flood Control and Environmental Restoration of the Iguaçu River Basin (Projeto Iguaçu), part of the Growth Acceleration Program (PAC) of Federal government, aims to recover areas in the municipalities of Belford Roxo, Duque de Caxias, Mesquita, Nilópolis, Nova Iguaçu and São João de Meriti, which are frequently affected by flooding. The first phase of the Projeto Iguaçu began in May 2008, performing various interventions in the tributaries of the Iguaçu River basin, including the Sarapui River. The occurrence of *Biomphalaria* tenagophila in Belford Roxo and the environmental changes proposed in this project indicated the need to increase the knowledge about the malacofauna from this region. Methodology: Streams and tributaries of the Sarapui river and a lake, between 22o45'S-43o22' W and 22o46'S-43o21' W, were analyzed. Quantitative samplings were weekly carried out in a sampling station (22o45.881' S-43o22.539 'W) from October 14, 2011 to January 29, 2012. Samples were obtained using collecting sieves and tweezers, and snails were kept in aquaria under laboratory conditions. Snail were individually placed in dechlorinated water (4 mL/snail) and exposed to artificial light to stimulate the shedding of cercariae. For specific identification, the snails were anesthetized with 0.05% sodium pentobarbital, killed in 70oC water and fixed in Railliet-Henry. Results: Six species (*Biomphalaria* tenagophila, *Biomphalaria* straminea, Drepanotrema cimex, Lymnaea columella, Physa acuta and Physa marmorata) belonging to three families (Lymnaeidae, Physidae and Planorbidae) were identified. In the quantitative study, 3622 specimens were collected, with the following specific densities: 83.27% B. straminea, 0.03% B. tenagophila (only on October 14, 2011), 14.71% P. acuta and 1.99% P. marmorata (only on January 15, 2012). Although different kinds of cercariae had been observed (Amphistome cercariae, Armatae cercariae, Brevifurcate-pharyngeate-clinostomatoide cercariae, Lophocercous-apharyngeate cercariae and Echinostome cercariae), no specimens were presented Schistosoma mansoni or Fasciola hepatica. Conclusions: This study reports the first occurrence of B. straminea and P. marmorata in the municipality of Belford Roxo. The environmental changes due to this project may enable the expansion of two vector species (B. straminea and B. tenagophila) and increase the risk of schistosomiasis occurrence in this area that reinforces the importance of the malacologic vigilance for effective control of associated zoonosis.

30 Biotransformation in *Biomphalaria glabrata* exposed to different concentrations of Xenobiotics of $CdCl_2$ and Euphorbia milii (syn. splendens) var. hislopii latex.

Hellen Leal, Ana Cecília de Oliveira, Clélia Christina Mello-Silva

The use of molluscicides is one of the measures for control of schistosomiasis and for decades lethal doses have been applied to exterminate the host species. Currently, studies of molluscicides, especially those of natural origin, have been carried out with the aim to control populations using sublethal concentrations of products that are specific to infected organisms. In this context, the latex of Euphorbia milii presents promising results for large-scale use in the control of disease transmission. On the other hand, snails are used as bioindicators and bioaccumulators in aquatic environments for studies of environmental pollution. In a study to determine the potential use of snails as a bioindicator of water pollution, it was demonstrated that the reaction of ethoxyresorufin-O-deethylase (EROD) can be induced by polycyclic aromatic hydrocarbons. As a biomarker of oxidative stress, glutathione S-transferase (GST) activity has also been investigated in different species of snails. This study aims to investigate using the digestive gland homogenate (DGH) – EROD - and the soft tissue (ST) – EROD and GST - of *Biomphalaria* glabrata the potential use of these enzyme activities as biomarkers of toxicity of aquatic organisms by environmental pollution. Furthermore, the effects of a metal contaminant, cadmium chloride (CdCl2, 0.1, 0.5, 1 and 5 mg/L), and of the sub-lethal concentrations of the latex of E. milii (0.5, 1.0 and 1.5 mg/L) on the ST GST activity have also been evaluated. Our results showed that EROD activity in *B. glabrata* does not seem suitable for use as a biomarker, since the optimization of the assay conditions, such as variations in protein and substrate concentrations, temperature and reaction time, did not provoke alterations in enzyme activities. Regarding GST activity, although the assay had been properly optimized, neither CdCl2 nor E. milli were able to provoke any alteration in the enzyme activity with the concentrations used in this study after 48 h of exposure. We therefore suggest the use of other sublethal and lethal concentrations of latex and cadmium, respectively, longer periods of snail exposure, testing of other metal contaminants, trials with infected snails, besides trying other biochemical endpoints.

31 Comet assay to evaluate the effect of *Harpagophytum procumbens* and *Allium sativum* in *Biomphalaria glabrata* infected with *Schistosoma mansoni*

Luiza Tonaco Silva, Tiago Mendes, Ana Afonso, Fernanda Anibal, Silvana Belo, Manuela Calado

Biomphalaria glabrata is one of the most efficient Schistosoma mansoni intermediate host snails. Interventions for schistosomiasis control include the use of molluscicides for snail control. However, the disadvantages of these chemicals on aquatic environment calls for the need of research of natural compounds that are intended not to eliminate the intermediate host snails, but to interrupt the development of *S. mansoni* cycle in mollusc. The goal of this comet assay was to access the effect of two plant extracts, Harpagophytum procumbens ("devil's claw") and Allium sativum ("garlic") in the biological interaction of *B. glabrata*/*S. mansoni* in the intra mollusc development phases, and to identify DNA damage in *B. glabrata* caused by exposure to the extracts..For each extract, two concentrations were tested, 1000 ppm and 1500 ppm on 30 infected snails. Positive and negative control snails were included. The snails were exposed to extracts for over 24 hours, and throughout 90 days they were monitored for the following parameters: survival, nutrition, breeding and cercariae elimination. After 90 days the snails were euthanized, hemolymph was extracted and hemocytes were isolated to determine the presence of DNA damage in these cells. Results from the comet assay technique demonstrate that exposure to plant extracts cause DNA damage in infected *B. glabrata*, the intensity of which was measured trough the extent of DNA migration. Snails exposed to 1000 ppm of the extracts showed moderate damage, while those exposed to 1500 ppm showed high level of damage. The snails from the control group showed no DNA damage Additionally, the extracts showed no molluscicide activity neither on the development of snails. However, these natural compounds seems to affect intra mollusc parasite development since cercariae were not detected at the end of the study period (90 days)... To confirm the stablishemment of *S. mansoni* infection on snails, a Nested-PCR was performed. The results also seem to reinforce the potential inhibitory activity of these compounds on of *S. mansoni* development. Preliminary data of this study indicate that comet assay is a very simple and efficient tool for identification of DNA damage in *B. glabrata* allowing to evaluate the genotoxicity effect of natural coumpounds for the parasite and their respective intermediate host snails.

32 Long-term administration of a high-fat diet influences the therapeutic effects of artesunate and statin on experimental murine schistosomiais mansoni.

Alba Cristina Miranda de Barros Alencar, Renata Heisler Neves, José Roberto Machado-Silva

There is evidence that long-term administration of a high-fat diet increases the fertility of adult worms of Schistosoma mansoni, leading to higher elimination of fecal eggs than standard diet in mice. Several lines of evidence from both experimental and clinical studies suggest that the main effect of statin is a decrease in circulating levels of LDL cholesterol. Besides their lipid-lowering effects, it has been shown that statin causes morphological changes mainly in the reproductive system of adult *S. mansoni*. The antimalarial drug artesunate possesses interesting antischistosomal properties, reducing the survival time of the worms and eggs elimination in vitro. However, the efficacy of these drugs against murine schistosomiasis with underline dyslipidemia remains to be investigated. We therefore determined whether a high-fat diet could influence the effects of artesunate and statin. Mice were fed a high-fat diet (29% fat) or a standard diet (12% lipids). Six months after diets exposure, mice were transcutaneous infected with 80 cercariae (BH strain). Nine weeks post-infection, artesunate at a single oral dose of 300 mg/kg or statin at 200 mg/ kg were given to infected mice. The animals were divided into four groups: standard diet and treatment with artesunate (ISC-A) or statin (ISC-E); high-fat diet and treatment with artesunate (IHFC-A) or statin (IHFC-E). Stool specimens were collected at 6, 7, 8, 9, 10 and 11 weeks post infection and egg counting was performed by the Kato-Katz technique. At week 11, the viability of eggs from stool was tested by the Lutz technique. Two weeks after treatment, mice were euthanized for worm recovery. High-fat diet group showed egg counting reduction earlier (IHFC-E and IHFC-A, week 9, 10 and 11) than standard diet (ISC-E 9, 10 and 11; ISC-A, week 10 and 11). Mice treated with statin showed significantly ($p < 0.0001$) lower worm recovery than standard diet. The worm burden reduction was higher to IHFC-E (40.44%) and ISC-E (12.64%) when compared to standard diet (IHFC-A, 35.35%) and ISC-A (13.79%). Taking together it appears that a high-fat diet influences the therapeutic effects of artesunate and statin on experimental murine schistosomiais mansoni. However, future studies are warranted in order to understand the exact role that high-fat diet play in schistosomiais therapeutic.

33 Schistosomiasis-related morbidity in the indigenous populations Maxakali and Xakriabá, Minas Gerais state, Brazil.

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Introduction: Information about the morbidity caused by Schistosoma mansoni infection in Brazilian indigenous populations is unavailable. This study aimed to asses and to describe the morbidity related to schistosomiasis in two indigenous populations living in endemic areas of Minas Gerais state: the Xakriabá and the Maxakali. Materials and Methods: Residents of the endemic areas in the Xakriabá (N=166) and Maxakali (N=1497; 416 men >18) indigenous lands were invited to participate. Women and children from the Maxakali population were not examined because of limitations imposed by local customs. All participants older than 5 had epidemiological, clinical, parasitological and abdominal ultrasonography (US) data registered. For children younger than 5, only stool examination was performed. Abdominal US followed the World Health Organization guidelines. TF-test® centrifugation method was used for stool examination. Those who tested positive for schistosomiasis were requested to provide one fresh sample for quantitative examination by the Kato-Katz (KK) method, and received treatment with praziquantel. Due to very low adhesion, parasitological survey was not carried out on the Maxakalis. This work was approved by the National Ethics Committee. Results: Xakriabá: 144 (86.7%) individuals participated (73 males, median age:19.8; range:0-77). 109 (75.7%) provided stool samples. 28 (19.4%) were positive for schistosomiasis, 22 (78.5%) aged below 20. Of 12 fresh samples provided, 10 (83.3%) tested positive by KK (median parasite burden:144eggs/g; range:24-384). Left liver lobe was palpable in 29 (20.1%). 40 (27.8%) had liver fibrosis by US, 13 (32%) of them aged between 11 and 20. Fibrosis was classified as mild in 35 (24.3%) and moderate in 5 (3.5%). No patient showed splenomegaly or portal hypertension. Maxakali: 137 (32.9%) individuals participated (median age: 29 range:19 - 86). 127 (92.7%) reported contact with natural waters. 20 (15.2%) had palpable liver lobes, and 2 (1.5%) had palpable spleen. US showed left liver lobe enlargement in 22 (16.7%) and spleen enlargement in 3 (2.2%). 12 (9%) had liver fibrosis by US, classified as mild in 8 (6.1%) and moderate in 4 (3%). 6 (50%) patients with fibrosis aged between 19 and 30 years. Portal hypertension was documented in one case (spleen diameter: 16.7cm; portal-vein diameter: 15mm). Main Conclusions: In the Xakriabá population, the morbidity determined by schistosomiasis is characterized by high prevalence, low parasitic burden, predominance in the younger ages and mild liver fibrosis. The documentation portal hypertension related to schistosomiasis in one Maxakali subject highlights the need of more comprehensive investigations in this population.

34 The ten year plan for expansion of energy and the risk of the occurrence of schistosomiasis in arraias, south Tocantins, Brazil

Ronaldo Augusto, Clélia Mello-Silva & Claudia Portes

Water resources development takes place in most parts of the world, in different scales and rapid pace. Over 33 000 dams are listed in the latest edition of the World Register of Dams; 3000 of them were built in the 1990s. The increased number of dams due to the current Ten Year Plan for Expansion of Energy (PDE in portuguese) is responsible for major impacts on fauna composition of the North Region and these impacts have been systematically underestimated by the government and the hydropower industry. The construction of reservoirs and dams leads to an increased of human exposure to infectious agents and caused endemic diseases, in particular those transmitted by species of freshwater snails. However, the development and management of water resources in tropical and subtropical climate zones has often resulted in transmission intensification or the introduction of diseases into previously non-endemic areas. Schistosomiasis is considered a sensitive indicator disease for monitoring ecological transformations since it is widely distributed and infection rates can change promptly. The present work was carried out in Arraias municipality and this survey gathered parasitological, malacological and spatial analysis data. From october of 2011 to february 2012, 979 specimens were collected, representing four different species: *Biomphalaria* straminea (905 specimens), Lymnaea columella (10 specimens), Physa marmorata (18 specimens) and Ancylidae sp. (46 specimens). The intermediate hosts of Schistosoma mansoni was B. straminea, found in three of eight location surveyed. No specimens were found harbouring larval forms of Schistosoma mansoni although different kinds of cercariae had been observed. Approximately 5.4% specimens of B. straminea from the point 1 (23L 0304925/8570250) were infected with larval trematodes, which were identified by Echinostoma cercariae. In conclusion, the presence of populations of B. straminea in the Arraias municipality revealed that this location has potential for transmission of schistosomiasis and other parasitic waterborne.

35 Morphometry and histopathology of splenic tissue in a metabolic programming model infected with *Schistosoma mansoni*

Adriana Cardoso Gomes, Christiane Leal Corrêa, Renata Heisler Neves, José Roberto Machado-Silva

Metabolic programming is defined as a biological phenomenon that determines the relationship between physical and chemical stimuli in critical periods of early life, such as lactation, with future functional status. The maternal low protein diet during lactation is one of the most extensively utilized models of nutritional programming. Our previous findings suggested that neonatal malnutrition of offspring during lactation affects both parasitological and liver organization in murine schistosomiasis. The aim of this study was to evaluate how splencic tissue is affected in a programming model infected with Schistosoma mansoni. Lactating mice were subjected to protein restriction (8% protein, PR group), caloric restriction (CR group) and normal food (23% protein, C group) throughout lactation period. Food intake in offspring from CR was calculated as percent of normal intake in the PR group. After weaning, mice had free access to standard diet and water. At two months of age, the mice were infected with 50 cercariae (BH strain). Infection allowed maturing for nine weeks representing the acute phase of infection, when mice were euthanized and spleens removed and weighed. For the histopathological examinations, the spleen tissues were fixed in 10 % buffered formalin and processed according to the standard histological techniques for paraffin embedding. Tissue sections of 5-µm thickness were prepared and used for conventional haematoxylin–eosin staining. Images of spleen sections were analyzed by light microscopy and an image analysis program for estimating perimeter, larger and smaller diameter of the white pulp. Infected mice had heavier spleen weight compared to their respective control. The quantitative evaluation showed that white pulp compartment was larger in infected mice fed either a caloric or protein restricted diet compared to controls. Among deficient feeding mice, the caloric-restricted group had higher morphometric parameters. Microscopic examination of splenic tissue from infected mice showed cellular infiltrates characterized by polymorfonuclear cells, however, splenic granulomas were not found. The evaluation of the white pulp of spleens from C group revealed a normal morphological appearance in contrast to the CR group and PR group showed that the white pulp disorganized and a large amount of the trabeculae in the splenic parenchyma. Despite all experimental groups showed megakaryocytes and pigments, only infected animals had higher abundance. The results of the present study suggest that there is a significant relationship between neonatal malnutrition and splenic disorganization.

36 Schistosomiasis in sugar cane cutters in Conceição da Barra, Espirito Santo, brazil: necessity for control and preventive measures

Renan Amorim, Janaina Maciel, Fabiana Ambrozim, Naizillah Albuquerque, Clarissa Almeida, Damila Venturin, Guilherme Prado, Maria Estevão, Marco Antônio Souza

Introduction. Schistosomiasis is one of the most pernicious and oldest infection of humanity, which currently affects over 200 million individuals worldwide. In Brazil, the northeastern states have the highest levels of prevalence, especially among young males. This is related to inadequate sanitation and lack of health education. Even in the last two decades there was a reduction in the number of severe illness and hospitalization in the Sistema Único de Saúde (SUS), as well as the decrease in mortality associated with schistosomiasis, many rural areas still have high prevalence of the disease. In this context, there may be the spread of Schistosoma mansoni in the municipality of Conceição da Barra, North of the Espírito Santo, through Northeastern workers, since they migrate to this region during the of sugar cane harvesting. Thus, a parasitological survey was carried out to investigate this possibility. Materials and Methods. The descriptive study was conducted among workers of an ethanol plant in Conceição da Barra, in the second half of 2011. For the collection, containers were delivered at the beginning of each week and stool samples collected by the workers were sent to households heads, always on thursdays. Then they were forwarded to the Clinical Laboratory of Centro Universitário Norte do Espírito Santo (CEUNES/UFES) for processing. A total of 287 samples were analyzed by the methods of sedimentation and Kato-Katz. Results. Of the 287 sugar cane cutters, 45 (15.68%) were contaminated with *S. mansoni*. The age group with the highest prevalence was 29 and 39 years, with 48.9% of those infected. Among those infected, only 2 subjects had a high parasite load, ie, above 400 eggs per gram of feces. Conclusions. The workers migration from endemic areas may be the starting for new foci of *S. mansoni* transmission in Conceição da Barra, since there are ecoepidemiological conditions for the maintenance of its life cycle, especially due to the presence of *Biomphalaria* snails. In this respect, the results demonstrate the necessity for adopt control and preventive measures, such as chemotherapy treatment of the people infected, improve sanitation condition, potable water supply and health education, besides constant surveillance.

37 Clinical and epidemiological evaluation in patients with Schistosomal Myeloradiculopathy in the state of Sergipe.

Ingrid Freitas, Camilla Biana, Mayara Agripino, Tiago Carvalho, Karina Araújo

The Schistosomal Myeloradiculopathy (SMR) is a form of ectopic Schistosoma mansoni infection that can cause large clinical expression variations and severe disabilities. Studies indicate that 51-77% of cases of SMR have low back pain or lower limbs pain, 12% have bladder dysfunction, 7% have lower limb strength deficits, paresthesia in 6% and impotence in 0.7 %. Therefore, the objective of this study was to evaluate the clinical (neuro-motor and sensory) and epidemiological aspects of patients with SMR in the State of Sergipe. METHODS: We conducted a descriptive study of cases series in patients with SMR. Three individuals were evaluated neurofunctional through a specific form adapted from the Ferrari's protocol of SMR. The evaluation consisted of physical tests of muscle strength in trunk and lower limbs, Mingazzini and Barre's maneuvers, dynamic balance test using the Timed Get Up and Go, gait evaluation, Functional Independence Measurement questionnaire and evaluation of superficial reflexes. We also evaluated the thermal, tactile and vibration sensibility. RESULTS: The three patients were from an endemic area of schistosomiasis, had contacts in river and lakes, hadn't sewage system, and made Valsalva maneuver before installation of the neurological symptoms. The main clinical manifestations observed were low back pain and lower limbs pain, muscular weakness and paresthesia in lower limbs. Deficit was observed in dynamic balance and the questionnaire score indicated partial dependence for the execution of their activities. Referring to the functional aspects, the greatest losses are included in the categories mobility and locomotion. There is a general reduction of tactile sensibility on the plantar surface and besides the vibration and thermal sensibility alteration, factors that may affect gait and functional activities and consequently the quality of life. CONCLUSION: The three individuals evaluated showed motor and sensory deficits. This study is important to show the importance of developing a standardized evaluation protocol for SMR, because it's a difficult disease to diagnosis and requiring different methods semiological.

38 Parasitological surveys on schistosomiasis mansoni in the municipality of Vicência, Pernambuco, Brazil.

Diego Leandro Reis Da Silva Fernandes Fernandes, Ramon Ragne Rodrigues Dos Santos Rodrigues, Constança Simões Barbosa Barbosa

Survey conducted in 2005 in all the municipalities of endemic area in Pernambuco reported rates for schistosomiasis ranging from 47.6% in the municipality of Itaquitinga to 2.6% in the municipality of Camutanga. In this occasion, schistosomiaisis prevalence for Vicencia municipality was 21.2% of infected people. This project aims to (1) estimate the current rates of this endemic disease in Vicencia using the material collected in the recent Schistosomiasis and Geohelmintoses Survey (INPEG), held in 2011 in Pernambuco state and (2) and compare current rates with those of the survey conducted in 2005 to monitor the progress of the disease in that city. The coproscopic surveys performed in Vicencia (2005 and 2011) had the same sample design, representative for the city, and were sampled and school children aged 7-14 years old. In both surveys, the samples of fecal material was collected and analyzed by the Schistosomiasis Laboratory of the Aggeu Magalhaes Research Center. The parasitological diagnosis was performed by Kato-Katz method and the data analysis used was the software Microsoft Office Excel ® 2010, distributing the positive cases by sex. For the 2011 survey were randomly selected 13 schools with a total of 901 samples collected from children (7-14) and presented the following rates: 18.3% for Schistosoma mansoni, 0.44% for Enterobius vermiculares, 0.89% for Hymenolepis nana, 14.1% for Ascaris lumbricoides, 7.77% for Trichuris trichiura and 7.33% for Ancilostomídeos. Among the 901 children sampled 295 (32.7%) had some type of helminth infection. Among the male children 19.63% were positive for any helminth infection, 16.82% for *S. mansoni* and 7.01% for the association geohelmints x *S. mansoni*. Among the female children 13.53% were positive for some helmintiais: 19.87% for *S. mansoni* and 8.25% for the association helminths x *S. mansoni*. The current prevalence of 18.3% for schistosomiasis shows that the disease keeps on the same level of endemicity in the city of Vicencia since 2005 when this percentage was 21.2%. There is not significant statistical difference between these rates. The 32.7% of children infected with helminths also indicates stability in the occurrence of these parasites among school children, considering the results of the 2005 survey, where helminths rates were 30%. Regarding Pernambuco epidemiological scenario for schistosomiasis, the city of Vicenza can be classified as medium endemicity taking into account that in 2005 the highest values found in some counties were 45% of infected children.

39 The role of Carabao in transmission of *S. japonicum* in Northern Samar, the Philippines

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Introduction Schistosoma japonicum is the causative agent of schistosomiasis in China, the Philippines and Indonesia. In the Philippines, 10 out of 16 regions (administrative divisions) have reported cases of clinical schistosomiasis, with 6.7 million people living in these endemic areas. Furthermore, within these endemic areas, 1.8 million are considered to be directly exposed to potential infection through daily lifestyle water contact activities that include farming, fishing, domestic activities (bathing and washing) and recreation. As a zoonotic disease it can infect over 40 mammalian species which can act as reservoirs of infection. In China, water buffalo have been shown to be major reservoirs of human infection however, in the Philippines, carabao have not been considered important reservoir hosts for S. japonicum due to low prevalence and intensity of infections found in previous studies. The aim of this work was to address this confusion and identify a reservoir host, if any, in the Philippines. Materials and Method To examine the role of animals, specifically bovines and dogs, in S. japonicum transmission in the Philippines we examined a number of animals and humans from a endemic barangays in Northern and Western Samar provinces, the Philippines. For both dogs and humans Kato-Katz and real-time PCR (qPCR) were used and for bovines (both carabao and cattle) the newly developed FEA-SD technique and qPCR were used. Results High prevalence of infection was found in bovines (95.5%) and humans (90.38%) from Western Samar. These results show a higher prevalence in bovines and humans than has previously been recorded. FEA-SD and qPCR were also more sensitive than Kato-Katz. From the bovine intensity data we were able to calculate the animal contamination index and found that each bovine is excreting over 40, 000 S. japonicum eggs into the environment each day when using a conservative estimate of total daily fecal excretion rates for bovines. Main Conclusions From this study we have been able to show that bovines are likely to play a larger role in transmission of S. japonicum in the Philippines than has previously been thought. As a result the introduction of an animal component, such as a vaccine or Praziquantel treatment of animals, to national control programs, currently only consisting of infrequent mass treatment, will result in a decrease in human prevalence. The FEA-SD technique has been developed for use in ruminants and is ideal for correctly identifying infections and infection intensity in these large animals.

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40 Factors that favor the transmission of *Schistosoma mansoni* in peripheral neighborhoods of Maranhão, Brazil

Dorlam's Oliveira, Clícia França, Adalberto Filho, Renato Aragão, Ivone Garros

Schistosomiasis affects most countries, especially countries in Africa, Asia and Latin America. Despite effective programs for controlling this disease, it is estimated that 200 million people are infected and 600 million are exposed to factors that contribute to the spread of this disease. In Brazil, schistosomiasis occurs in 19 states, covering an area endemic ranging from Maranhão to the Espírito Santo and Minas Gerais, with outbreaks in other states. It is estimated that about 2.5 to 8 million Brazilians are carriers of this disease, it is considered a public health problem due to its high prevalence and its association with morbidity, as well as its spread to new areas with no water supply and sanitation facilities. This situation is associated with lack of planning and sanitation that are normally found in peripheral neighborhoods of Maranhão. Thus the present study aimed to gather data on work done in peripheral neighborhoods of Barreto, Sá-Viana, Embratel and Vila Jambeiro that focus information about the presence of aspects of health, environmental and transmitters that favor the occurrence of schistosomiasis. In this proposal we selected works done in these respective districts in the study period from 2006 to 2011. It was found in the study sites, the presence of snails of the genus *Biomphalaria sp*. which is considered an intermediate host of *Schistosoma mansoni.* It was also observed in these neighborhoods unpaved roads, no health network with presence of open sewage, garbage accumulation in most streets, streams and ditches that harbor snails transmitting schistosomiasis. The data from these studies showed that during rainy periods increase the likelihood of contamination by this disease because of the breeding overflow and invade homes with contaminated water. It was concluded from these studies that the presence of deficiency health infrastructure, environmental and *Biomphalaria sp.* snails are factors that really contribute to the occurrence, expansion and maintenance of schistosomiasis in peripheral neighborhoods of Maranhão, Brazil. Therefore, there must be a mobilization of the government to ensure the sanitation and educational measures to reduce the spread of this endemic disease.

41 An epidemiological survey of schistosomiasis mansoni and risk factors in the municipality of São João Nepomuceno, Minas Gerais State, a low-endemic region

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Introduction and objectives: In Brazil, schistosomiasis is a disease of major socio-economic impact in several states, including Minas Gerais. As most of the surveys carried out in this state have focused on areas of high endemicity, the objective of this study was to investigate the epidemiology of schistosomiasis in the municipality of São João Nepomuceno, which is considered a low-endemic area of the disease and where neuroschistosomiasis has been reported. Methodology: A cross-sectional study was conducted from July to December 2011, including all individuals enrolled in the Family Health Program ("Programa de Saúde da Família"-PSF) of the District of Carlos Alves, São João Nepomuceno, MG. The parasitological survey of the sample population was performed in both urban and rural areas, as follows: one stool sample was collected from each individual and then processed using two techniques - the Kato-Katz (KK) method (two slides), and the formol-ether (FE) method (three slides). 30% of the individuals with negative KK diagnosis were randomly selected and invited to provide a second and a third stool sample. These samples were then examined using the KK method. A questionnaire was also applied to the study population. The malacological survey was carried out in the main hydric collections and the identification of the *Biomphalaria* species was done. Results and conclusions: Of the total 688 individuals registered in the PSF, 503 participated in the survey (73.11%). Despite the detection of some other infections, *S. mansoni* was the parasite most frequently found, with a prevalence of 1.6%. This disease was observed through the KK method only in the first sample of feces. Regarding the socio-demographic and economic characteristics of the study population, 50% of the individuals were male and 50% female, of which the great majority (78.8%) lived in the urban area and inhabited the house for more than 12 months (96.8%). With regard to *S. mansoni* infection, analysis showed that the prevalence was higher in males, with a 7.16 (CI95% = 1.09-325.31) times greater chance of acquiring the disease (p=0.03), and also that the contact with the hydric collection increased by 10.83 (CI95%=1.02-189.20) times the chance of acquiring the disease. *B. glabrata* and B. tenagophila were found in the region. Regardless of the absence of infected mollusks by *S. mansoni*, the occurrence of *B. glabrata* as well as of individuals with schistosomiasis increases the need for constant monitoring of this disease in the region. Financial support: Fapemig, UFJF.

42 Occurrence of planorbid intermediate hosts and prevalence of *Schistosoma mansoni* in the urban área of Belém, Pará, Northern Brasil.

Izabel Raimunda De Carvalho Rodrigues, Christiane De Oliveira Goveia, Ricardo José De Paula Souza Guimarães, Maria De Fátima Cordeiro, Stefan Michael Geiger

In Brazil, human schistosomiasis is caused by the parasite Schistosoma mansoni and there are three intermediate host species, which are important for the transmission of *S. mansoni*: *Biomphalaria* glabrata, B. tenagophila and B. straminea. The northern State of Pará is considered hypoendemic with low prevalences for schistosomiasis. However, there are existing foci with permanent and ongoing transmission. In Belém, the capital of Pará State, the intermediate host species B.glabrata and B.straminea have already been identified. The present study aimed to determine the occurrence of such planorbid intermediate hosts in different districts of Belém and determine the frequency of snails shedding infective cercaria of *S. mansoni*. A GPS system was used to mark breeding sites of *Biomphalaria* snails. Snail collections were performed in 2010, 2011, and 2012 in the districts Sacramenta, Telégrafo, Montese, and Guamá and biotic and abiotic factors, such as characteristics of the water site, vegetation, and water quality, were evaluated. Snails were individually submitted to a light source in weekly intervals during 40 days, in order to verify the shedding of cercariae. Afterwards, five snails from each collection site were fixed in Raillet-Henry solution, dissecated, and submitted to posterior morfological species identification. In 2010, a total of 499 snails were collected: with 89 samples in the district of Sacramenta, 63 in Telégrafo, 150 in Montese and 197 in Guamá. Of these, 2 snails (2,2%) were positive for *S. mansoni* in Sacramenta, 9 (14,3%) in Telégrafo, 5 (3,3%) in Montese, and 10 (5,1%) in Guamá. In 2011, a total of 384 were collected in the three districts of Telégrafo, Montese, and Guamá, with a positivity of 5.3%, 0.4%, and 0.0%, respectively. No snails were found in the district of Sacramenta. During 2012, 706 snails were collected in total: 247 in Montese, 350 in Sacramenta and 109 in Guamá, and no snails were found in Telégrafo. Of these, 37 snails (33.9%) in the district of Guamá were positive for *S. mansoni*. All collected snails were morphologically identified as *B. glabrata*. Our results indicated a prevalence of *S. mansoni* of up to 33.9% in intermediate hosts from different districts of Belém. These values are sufficient to maintain active transmission within the urban area. The research of intermediate host is important for the understanding of the epidemiology of urban schistosomiasis and for adequate interventions for control.

43 Pulmonary histopathology of mice fed high-fat diet on acute and chronic schistosomiasis mansoni infection

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INTRODUCTION: Hypercholesterolemia plays an important role in the pathogenesis of various human morbidities. Pulmonary schistosomiasis is expressed by pulmonary hypertension associated with various diffused granuloma on tissues, mainly on the chronic phase. Previous studies from our laboratory evidenced that a high-fat diet modifies the outcome of experimental schistosomiasis mansoni. However, whether a high-fat diet affects lung pathology remains to be determined. OBJECTIVE: To investigate the development of lung pathology in acute and chronically infected mice with underlying dyslipidemia, using histopathological investigation. METHODOLOGY: Forty female Swiss Webster mice were fed a high-fat chow (29% lipids) or a standard commercial chow (Nuvilab, 4% lipids). After 6 months fed on diets, mice were transcutaneous infected with ~ 50 cercariae (BH strain). Animals were divided in four groups: standard chow (SC), high-fat chow (HFC), infected standard chow (ISC) and infected high-fat chow (IHFC). At nine and seventeen weeks post-infection (acute and chronic phases, respectively), mice were euthanized and lungs were excised. The organs were fixed, embedded in paraffin, sectioned at 5 mm thickness and stained with hematoxilin and eosin. RESULTS: All uninfected mice presented normal lungs. The ISC group from acute phase presented discrete focal mononuclear cell (predominance of lymphocytes) and polymorphonuclear (predominance of neutrophil) alveolar infiltration in 10% of mice. Other 10%, presented a concentric vessel endothelium hypertrophy, known as vasculitis, caused by hypersensitiveness to schistosomula migration. Almost 50% of mice from IHFC group showed alterations in the acute phase. They presented vasculitis, discrete multifocal mononuclear cell (lymphocytes and macrophage) and polymorphonuclear (predominance of neutrophil) alveolar infiltration and another focal mononuclear cell (lymphocytes and alveolar macrophage) and polymorphonuclear (predominance of eosinophil) periovular infiltration, suggesting a granulomatous reaction. Chronically infected animal showed similar alterations, but with higher intensity. The ISC group from chronic phase presented discrete focal lymphocytes and macrophages alveolar infiltration and moderate lymphocytes perivascular infiltration in 60% of mice. Besides, 40% of them also presented lymphocytes, alveolar macrophages and eosinophil periovular infiltration, suggesting a granulomatous reaction. In regards to the IHFC group of chronic phase, 20% of mice presented intensive lymphocytes alveolar infiltration and 100% of them had moderate lymphocytes perivascular infiltration. Another 20% of those mice presented discrete vasculitis, and 40% presented eosinophil periovular infiltration, as occurred on ISC group from the same phase, but on a larger number of events. CONCLUSION: This study provides evidence that high-fat diet contributes to the lung pathology in both acute and chronic infection.

44 Malnutrition Of Offspring During Lactation Causes Hepatic Stereology Changes In *Schistosoma Mansoni*-Infected Mice

Christiane Corrêa, Raquel Santos, Renata Neves, Regina Figueiredo, José Roberto Machado-Silva

Over the last several years, experimental studies have demonstrated that host nutritional status may influence the outcome and progression of schistosomiasis infection in mice. Maternal malnutrition during the lactation period in early development may have long-term programming effects on adult offspring. Recently, we have shown that neonatal malnutrition of offspring during lactation affects the outcome of schistosomiasis in mice. This study was designed to quantify schistosomiasis hepatic alterations in a murine model of nutritional programming in which lactating mice were submitted to dietary restrictions throughout lactation, using stereology. In this model, mouse dams were fed a protein-restricted (PR, 8% protein), caloric-restricted (CR restricted quantities that were calculated according to the mean ingestion of the PR group). Neonatal malnutrition began at the time of the pup's birth and ended at weaning. Later, offspring were fed a standard diet (23% protein) until they reached 120 days of age. At two months old, SW mice were infeced with 50 *S. mansoni* cercariae each (BH strain, Brazil). After 9 weeks, the animals were euthanized and livers were removed and prepared for histopathological and stereological evaluation. Five-micrometre sections were stained with haematoxylin and eosin and Masson's trichrome and analyzed by light microscopy. The volume density of hepatocytes, sinusoids, necrosis, fibrosis and steatosis were determined by stereology. Offspring from uninfected mice showed that the volume density of hepatocytes was reduced compared to controls (RC-43% vs C, $p<0.001$; RP-27% vs C, $p<0.001$), as well as the density of sinusoids (RC-38% vs C, $p<0.01$). RC mice showed 100% of hepatic steatosis compared to control ($p<0.001$). Offspring from infected mice showed that RCI group had high density of hepatic fibrosis compared to control (RCI+184% vs CI, $p<0.001$). Conversely, RPI offspring showed higher density of necrosis volume than other group (+78% vs CI, $p<0.001$; +340% vs RCI. $p<0.001$). Neonatal malnutrition of offspring during lactation quantitatively affects the hepatic organization.

45 Susceptibility of a brazilian wild rodent isolate of *Schistosoma mansoni* to praziquantel in mice. Scanning electron microscopy findings.

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Introduction: The municipality of Sumidouro is a mountain region of the state of Rio de Janeiro, where schistosomiasis mansoni has been described in both human population and Nectomys squamipes (water rat). The existence of this species naturally infected by Schistosoma mansoni is a drawback for schistosomiasis control programs. Praziquantel is currently the most widely used drug for the treatment of infection by human schistosomiasis, since it is active against all infecting human species, present low cost and toxicity. However, reduced susceptibility to praziquantel among human strains of *S. mansoni* has been evidenced. However, the susceptibility of isolates derived from wild rodents has not been investigated. This study aims to evaluate the effect of praziquantel on a naturally wild rodent isolate of *S. mansoni* harbored in mice, by scanning electron microscopy. Methodology: Swiss Webster mice infected with 50 cercariae were divided into three groups, two of given which were given 250 or 500 mg/kg of praziquantel dissolved in 2% Cremophor EL by gastric gavage over three consecutive days (49, 50 and 51 days) after infection. Infected untreated mice remained as control group. Two weeks after treatment, mice were euthanized using a CO2 chamber. Adult worms were recovered by hepatic and mesenteric perfusion, counted and sexed in a stereomicroscope. Male worms were rinsed in a 0,9% NaCl solution, fixed in AFA (2% glacial acetic acid, 3% formaldehyde and 95% of 70° GL Alcohol), ethanol, 70%, 50%, 30%, 10%, sodium cacodylate buffer 0.1 M, pH 7.2 (3), post-fixed in 1% OsO4 and 0.8% K3Fe(CN)6, dehydrated in graded ethanol (50°-100° GL), critical point dried in CO2, mounted on stubs, coated with gold and examined under a scanning electron microscopy (SEM) in Jeol JSM 5310 scanning electron microscope. Results: Scanning electron microscopy of praziquantel-treated worms revealed that male exhibited tegumental alterations. The tegument of severely injured worms showed loss of tubercles, spines and peeling in the tegument. The tubercles were disrupted and the spines became short. With increasing of drug dosage, tegumental alterations were further aggravated with extensive erosion in inter-tubercle tegumental regions. Conclusion: Based on our present results, we conclude that praziquantel has therapeutic effects against male adult worms from a wild rodent isolate of *S. mansoni*.

46 Isolation and Characterization of immunogenic synthetic epitopes in the search for a anti-schistosomiasis vaccine.

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Introduction: Schistosomiasis is a chronic or acute infectious disease caused by the parasite Schistosoma mansoni. It represents a major health problem in endemic areas including different parts of South America, Africa, and Southeast Asia, affecting 200 million people worldwide. Current schistosomiasis control strategies are mostly based on chemotherapy, however mass treatment is insufficient to stop disease transmission, prevent reinfection or reduce parasite-induced morbidity. Therefore, a substantial strategy to control this disease is the development of a anti-schistosomiasis vaccine. With advances in molecular biology and bioinformatics, proteins of Schistosoma mansoni has been isolated and molecularly characterized in order to evaluate its immunogenicity. Objective: Evaluate, in mouse model, the immunogenicity of some S.mansoni epitopes of using sequences obtained through in silico analysis. Methodology: Hypothetical protein sequences located in plasmatic membrane in parasite was got from the public database (www.genedb.org/genedb/smansoni) and were analysed using bioinformatics programs to predict molecular weight, isoeletric point, subcelular localization, glicosilation, transmembrane helix and promicuos epitopes. The promiscuous epitopes, recognized for different HLAS, were selected using different bioinformatics programas and were sintetized and tested in a immunogenic cocktail through immunizes test to verification of worm burden after challenge infection. Results: After analysis in silico of 297 hypothetic proteins trasnmembrane and 4 proteins vaccine targert, 6 epitopes composed of 15 aminoacids were sinthetized.by solid phase method and used to imunized Black/C57 mice.. .After challenge infection it was observed that this strategy does not induzed important decreased of the load parasite in theses animals. Conclusion: S.mansoni epitopes and hypotetic proteins transmembrane has been demostred potencial to be used individually or as a proteic chimera in the developing of a anti-schistosomiasis vaccine. On the other hand, according to the imonologics tests made it was not verified important protection against the parasite. We intend, as perspective, evaluate others parameters as granuloma reduction, cytokines and antibodies profiles.
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47 Encapsulation of epitopes in liposomal systems for the production of vaccine targets against Schistosomiasis.

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Introduction: Schistosomiasis is on the list of major neglected diseases and is a cause of death worldwide. In Brazil, it is estimated that there are about 7 million people infected with schistosomiasis. The long-term protection, afforded by vaccination, would be the best way to control future contamination by Schistosoma mansoni. The liposomes have been used in this context as antigenic imunoadjuvants. Peptide or protein extracts from various sources have been encapsulated in liposomes or associated with its surface, and applied in vaccines and immunotherapy. Objectives: Encapsulate in liposomal systems, epitopes of proteins present in the tegument of Schistosoma mansoni and evaluate the ability of these systems to induce protection in experimental animals. Methods: Sequences of hypothetical proteins of the plasma membrane of the parasite were found in the database (www.genedb.org / genedb / smansoni) and analyzed using bioinformatics programs to predict the molecular weight, isoelectric point, cellular localization, glycosylation, propeller transmembrane and promiscuous epitopes. The most immunogenic epitopes as predicted in all analyzed HLAs were synthesized by the method of solid phase synthesis. We selected the epitope Sm14.2. The liposomes were obtained by the method of hydrating the lipid film, following the method described by Banghan et al. (1965), with some adaptations. Two lipid systems were evaluated, consisting of mixture of: DPPC: DPPE (1:3) and DPPC: DPPE: Cholesterol (1:3:1). The liposomal systems were evaluated separately in groups of five C57BL mice, females, and the groups inoculated with G1: Buffer + epitope, G2: liposome (DPPC: DPPE), G3: liposome (DPPC: DPPE) + epitope, G4 liposome (DPPC : DPPE: cholesterol) and G5: liposome (DPPC: DPPE: cholesterol) + epitope. The animals were subjected to three immunizations with an interval of 15 days, and the blood collected from the same in these respective intervals. The infection with 50 cercariae was carried out 45 days after the first immunization and perfusion was performed after 60 days. Results: At first, the liposomal systems were characterized by the percentage of epitope incorporating and the size of the particle. Both liposomal systems presented epitope incorporation percentage of about 90% , and particle sizes of the order of 420nm for the system DDPC: DPPE and 540nm for the system DPPC: DPPE: cholesterol. After infection, there was no significant reduction in parasite load. Conclusion: From the tests we did not observe significant protection against the parasite, being necessary to carry out more experiments. Financial Support: CNPQ and FAPEMIG

48 Quantitative and qualitative assessment of changes in splenic tissue of mice with schistosomiasis and dyslipidemic

Adriana Silva, Christiane Corrêa, Renata Neves, José Roberto Machado-Silva

Long-term feeding a high-fat diet causes overweight, dyslipidemia and liver changes in mice. To date, the effect of the changes promoted by hypercholesterolemia and experimental schistosomiasis infection on splenic architeture has remained elusive. Here, we compared spleen from acute infected mice fed either high-fat (29% lipids) and control (12% lipids). The spleen volume was assessed by liquid displacement and splenic disorganization by histopathology, morphometry and stereology. By week 9, infected mice showed higher spleen volume than in corresponding uninfected mice (Student's t-test, $P=0.004$). The white pulp compartment was reduced, red pulp and germinal center were enhanced (Student's t-test, $P<0.01$). Microscopic examination showed cellular infiltrates characterized by polymorfonuclear cells, with intensive lymphocytic mitosis and Mott cells. Hemosiderin deposits tended to be in less extent in infected mice compared with uninfected controls. The red pulp compartment showed a significantly (Student's t-test, $P=0.008$) increased average number of megakaryocytes compared with uninfected mice, which may be associated with hematopoietic reconstitution. High-fat fed mice showed larger white pulp than controls (Student's t test, $P=0.013$). Standard fed mice showed exudative-productive granuloma distributed only sparsely in the red pulp, whereas a tissue reaction characterized by a cell infiltration in high-fat fed mice was found. The results of the present study suggest that there is a significant relationship between high-fat diet intake and splenic disorganization such as a decrease in the numerical density of white pulp and, red pulp and germinal center hyperplasia. Such structural disorganization due to co-morbidites (schistosomiasis and dyslipidemia) may affect the microenvironments of the spleen that are necessary for the generation of immune responses to antigens.

49 Immunization with *Schistosoma mansoni* schistosomula tegument (Smteg) in association with CpG-ODN induces a partial protection and Th1 response.

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Introduction: In Brazil, 5,48% of the population are infected by Schistosoma mansoni. The vaccination as a prophylactic measure, administered alone in association with anti-helminthic drugs would be important for disease control. The success vaccine formulation depends on the use of immunogenic antigens together with an appropriate adjuvant able to induce the desirable immunological response. A potential antigen to compose a vaccine is the *S. mansoni* schistossomula tegument. The tegument represents the parasite-host interface and schistosomula is the first stage to become in contact with the host immune system and the most susceptible life stage. We have recently demonstrated that *S. mansoni* schistosomula tegument (Smteg) is able to activate dendritic cells up regulate CD40 and CD86 molecules and induce a partial protection in mice (43-48%) when formulated with Freund's adjuvant. In this study we evaluated the ability of Smteg + alum or Smteg + alum + CpG-ODN to induce protection in mice and the immune response induced by both vaccine formulations. Methods and Results: Female C57BL/6 mice were immunized subcutaneously with three doses of Smteg (25µg) + alum or Smteg + alum + CpG-ODN in a 15 day-interval regimen. Thirty days after the last boost, mice were challenged through percutaneous exposure of abdominal skin. Fifty days after challenge, adult worms were perfused from the portal system and the protection level was calculated. Our results demonstrate that Smteg + alum + CpG-ODN induced a partial reduction in worm burden (42.9-48.8%), reduction in the number on eggs trapped in liver, and also in the number of eggs eliminated in the feces. The cellular immune response induced by both vaccine formulations was evaluated one week after the last immunization dose in the spleen from immunized mice. Smteg/alum/CpG-ODN formulation increased the percentage of CD4+CD25+, of CD19+ cells and activated macrophage in spleen, and induced a predominant Th1 profile with increased specific production of INF-g, and TNF-a. Conclusion: Our results, demonstrate that CpG-ODN use as adjuvant together with Smteg in a vaccine formulation against schistosomiasis induces a protective immune response associated with B cell proliferation, CD4 and macrophage activation and a predominant type 1 response.

50 Biological, biochemical and histopathological features related to parasitic castration of *Biomphalaria glabrata* infected by *Schistosoma mansoni*

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This study was designed to observe the parasitic castration of *Biomphalaria* glabrata infected with Schistosoma mansoni during both the pre-patent and patent periods. The effect of infection on snail fecundity and fertility, growth rate and survival was studied during the 62 days following miracidia exposure. An integrated approach was employed that used biochemical and histological tools over the same period. To study the effect of infection on reproduction, we individually exposed 30 snails to 5 miracidia each and tracked their fertility and fecundity. For our histopathological studies, 50 snails were exposed to 20 miracidia each, and for our histochemical and biochemical studies, 50 snails were exposed to 5 miracidia each. An equal number of uninfected snails was used as a control for each group. The *B. glabrata* exposed to the BH strain of *S. mansoni* showed 50% positivity for cercarial shedding. Both the experimental and control groups showed 100% survival. The pre-patent period lasted until 39 days after exposure to miracidia. Exposed snails that showed cercarial shedding exhibited higher growth rates than either exposed snails that did not demonstrate cercarial shedding or uninfected controls. Exposed snails without cercarial shedding and uninfected controls showed no differences in the reproductive parameters evaluated during the patent period; snails experiencing cercarial shedding showed a reduction in fecundity and fertility. These snails began to lay eggs only after the 50th day post miracidia exposure. The haemolymph glucose levels showed an oscillating pattern that decreased during periods of greater mobilisation of energy by the larvae and was accompanied by a depletion of glycogen in the cephalopodal mass and digestive gland. Histopathological examination at 55 days showed that the ovotestis was highly atrophied. There was an almost complete disappearance of germ cells, and the supporting stroma formed a nearly empty net. At day 45, the infected digestive gland showed a high cylindrical epithelium with little preserved cytoplasm. The contents of the secretory granules of the albumen gland of infected animals stained with Alcian Blue (AB), pH 1.0, indicating the presence of sulphated carbohydrates. Thus, parasitic castration in the *B. glabrata-S. mansoni* model may be regulated directly and indirectly by the developmental stage of the trematode and the biochemical and histopathological alterations during the patent period of infection.

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51 Geographic Reference System and health education in schistosomiasis endemic areas in the metropolitan area of Aracaju / SE

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Schistosomiasis mansoni is associated with poverty and low economic development, which generates poor sanitation and usage of contaminated water on agriculture, domestic work and leisure. Population aged between 7 and 14 year-old are more exposed to schistosomiasis due to high water contact in recreational activities on rivers, especially in less developed areas, with fewer leisure options. Schistosomiasis is not only related to the presence of snails and sick people in a determined region, but also to people habits which might cause soil and water contamination by faeces. Data from World Health Organization (WHO) and Pan American Health Organization (PAHO) show that improvement in public water supply and appropriate public sanitation can lead to a significant reduction of up to 70% in schistomomiasis cases. In Sergipe, according to the State Health Department, 65,606 cases of schistosomiasis were reported from 2002 to 2008.

Objectives: Conduct educational activities in public schools in the metropolitan area of Aracaju showing risks, prevention and how infection occurs, in order to disseminate this knowledge through the community where they live in. Also implement a geographic reference system to map and relate the location of the intermediate host focuses to the schools in which work will be developed.

Material and methods: Six schools were selected in districts of Jabotiana, Santa Maria and Sao Cristovao where schistosomiasis is present. Some specific classes will be selected in this job. An assessment on schistosomiasis is applied to students early in the project. After development of pedagogical actions these students will be invited to disseminate the acquired knowledge to the community during the Day of Schistosomiasis in School, where other actions will help in transfering knowledge about the disease to the community. At the end of the project, the same assessment will be reapplied to evaluate learning process.

Results: implementation of a geographic reference risk map relating infection focuses to the school locations and knowledge transfer to the community on how infection occurs and disease prevention.

52 Schistosomal Myelopath: Evaluation of Cerebro Spinal Fluid and Magnetic Resonance Imagining in a Case Report

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Introduction: Schistosomal Myeloradiculopathy arises from granulomatous reaction, the main mechanism of schistosomiasis`s disease, in the Central Nervous System (CNS) affecting the spinal cord. It is presented on three findings: myeloradiculopathy, more frequent, myelopathy, and tumor-like lesion form, more rare.Objective: To describe the results of Cerebro Spinal Fluid (CSF) serology and Magnetic Resonance Imaging (MRI) in a patient with Schistosomal myelopathy.Case report: Female patient, 23 years old, from an endemic region of Minas Gerais, state of Brazil, presenting: lower limb muscles weakness, beginning by non-traumatic form, paresthesia in lower limbs, deep tendon abnormal reflex (hyperreflexia) for patellar and ankle reflections on the left lower limb, hypoaesthesia on lower abdominal region, for rigth and left side, and left lower limb. The CSF result test showed a rise in protein (51 mg/dl) and pleocytosis, with predominance of neutrophils (93%). Eosinophils were not reported. The MRI revealed evolution control of transverse myelitis, involving low-thoracic level. Examination of stools showed the presence of Schistosoma mansoni`s eggs.Discussion: Involvement of CNS in infection by *S. mansoni* may occur by embolization of the worms or eggs, from the hepatic portal system and/or mesenteric veins to the vertebral epidural Batson`s venous plexus, causing a granulomatous reaction. The CSF analysis shows high protein concentration (above 45 mg / dL), and pleocytosis with high levels of Lymphocytes (the predominant cell type) and moderate or high elevation of eosinophils. Neutrophils and other mononuclear cell types were also occasionally detected, although at much lower proportions than those recorded for the two predominant cell types. MRI of the spinal cord has been the method of choice for imaging studies. The changes consist of enlargement commonly found in the spinal cord, signal intensity in T2-weighted sequences, nodular and diffuse uptake after contrast.Conclusion: The results showed partial conformity with described in the literature. In reported case, eosinophils and lymphocytes had not expected alterations. Further studies are required to show an increase and differentiation of cellularity in the CSF of patients diagnosed with spinal cord schistosomiasis.

53 Parasitological survey of students residing in municipalities of Ceara involved in the interconnection watershed project in the septentrional northest.

Vivian da Silva Gomes, Carlos Henrique Morais Alencar, Fernando Schemelzer Morais Bezerra

In Ceará the large hydro projects emerged in order to solve the problems caused by water scarcity, because 93% of the state territory is inserted in the semiarid region. This characteristic causes a strong dependence on the intervention of man over nature, to ensure, by means of works of water infrastructure, storing water for human consumption and other productive uses. The Integration Project of the San Francisco River watersheds in the Northeast Northern provides a solution to the serious problems posed by water scarcity in the region, through the transposition of the São Francisco river waters for the State of Ceará by involving the axis north directly or indirectly 21 municipalities in Ceará. Under the health impact that the construction of large hydroelectric dams can cause the original communities and surrounding the emergence of new diseases or the spread of existing ones such as the increased prevalence of schistosomiasis around the area of reservoir dams. Because they can create environments favorable to the introduction of environmentally reservoir of Schistosoma mansoni. These factors must first be detected, since the evaluation of accumulated experience in various projects, we infer that the magnitude of impacts on the health of these populations is directly related to early detection of risks and the consequent implementation of control measures and prevention diseases in these communities. Objective: To determine the prevalence of Schistosomiasis mansoni in schoolchildren 07-14 years old from the public schools of the municipalities involved directly and indirectly in the Interconnection Project Watershed in northeastern North in the State of Ceará. Methodology: The survey was conducted by parasitological Kato Katz technique in adolescents 07-14 years of 18 municipalities that are part of the areas directly and indirectly affected by the Interconnection Project Watershed Northeastern Northern. Results: We performed 4230 tests for parasites in students of 07 to 14 years in 90 schools in 18 municipalities in Ceará. The students were positive for schistosomiasis of 2.12 with 09 cases. The percentage of positivity for other helminths were to Ascaris lumbricoides (31.91%), Trichuris trichiura (11.34%), Enterobius vermicularis (0.94%). Conclusion: Knowledge about the positivity of schistosomiasis and other helminthiasis reveal the local health situation.

54 Spatial analysis of cases of co-infection Schistosomiasis and hepatitis B and C in Santa Maria neighborhood, Aracaju, State of Sergipe.

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Schistosomiasis is a serious parasitic disease caused by infection with Schistosoma mansoni. It occurs in 74 countries with 207 million people infected and 700 million in risk areas. In Brazil, data indicate a prevalence of eight millions. The Schistosomiasis can be exacerbated when patients are carriers of the Hepatitis B Virus (HBV) and C (HCV), resulting in simultaneous evolution of both pathologies. In Brazil, the prevalence of co-infection with HBV / HCV and *S. mansoni* founded in studies ranged from 13.6% to 40% for HBV and 0.5% to 19.66% for the HCV. The aim of this study was to analyze the spatial distribution of cases of schistosomiasis co-infection and hepatitis B and C among the habitants of an endemic area for *S. mansoni* in the city of Aracaju, State of Sergipe. Data were collected of each patient by means of an investigation questionnaire. We collected serum samples from participants and analyzed to identify serological markers of hepatitis B and C: Anti-HBc, Anti-HBs, HBsAg and anti-HCV. All procedures performed using the technique of chemiluminescence immunoassay using the ARCHITECT assay. To perform the spatial analysis used the cartographic grid of Aracaju, delimiting the area of neighborhood. The analysis of the distribution of infections in the neighborhood was made by the TerraView program using Kernel intensity estimation. It was found that 16 individuals had contact with HBV (9.41%), one of these was positive for HBsAg. Only Thirty-two samples (18.82%) were positive for the marker anti-HBs. Three samples were positive for anti-HCV (1.76%), and also a positive for anti-HBc. Spatial analysis of cases of co-infection (schistosomiasis and hepatitis) allowed the visualization of high concentration areas of these infections, as well as those that are exposed to different degrees of risk of transmission. The survey results allow offering, the municipal health services, a tool to facilitate the understanding of the spatial distribution of schistosomiasis and hepatitis (B and C) in Santa Maria neighborhood. Although our values are above the estimated prevalence for the Brazilian population and the Northeast, we cannot infer that the individuals with schistosomiasis are more susceptible to infection with HBV or HCV, since the risk factors were the means of risk transmission of causative agents of hepatitis and not infected with *S. mansoni*.

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55 Schistosomal Myeloradiculopathy: Estimated prevalence by Capture-Recapture Method of Population with schistosomiasis in Sergipe State, Brazil.

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Schistosomal myeloradiculopathy is a severe and disabling evolution of schistosomiasis, one of the most common causes among non-traumatic myelopathies. This study aimed to estimate the prevalence and know the underreporting of Schistosomal myeloradiculopathy in the State of Sergipe, also describe the clinical and epidemiological characteristics of patients with this clinical form between the years 2007 to 2011 by the capture-recapture method. The data sources were SINAN, two hospitals and three references physiotherapy centers. To data analyse were used the log-linear models using the statistical software R® and the Chapman formula to estimate Schistosomal myeloradiculopathy cases, the prevalence and underreporting in the schistosomiasis population in Sergipe. Of the 34 cases identified, 64.70% were male patients with mean age of 31.58 years. Only 9.3% of cases were found in health institutions recaptured in SINAN source. Were estimated 49 cases of Schistosomal myeloradiculopathy in the state of Sergipe using the Chapman estimator and a 4% prevalence of schistosomiasis in the population. The underreporting was 84.37% and considered very high, which requires greater attention and involvement of managers and professional health about the needs for proper diagnosis and treatment for patients with Schistosomal myeloradiculopathy and also the importance of reporting in information systems for real knowledge of the health situation. The capture-recapture method proved to be an efficient and low cost to estimate the prevalence of neglected diseases such as the Schistosomal myeloradiculopathy.

56 Epidemiological and Clinical Patterns Associated with Shistosomiasis in Porto de Galinhas beach, Ipojuca, Pernambuco

Ana Lúcia Coutinho Domingues, Elainne Christine Souza Gomes, Karla Martins Leal, Onicio Batista Leal-Neto, Constança Simões Barbosa

Introduction: Schistosomiasis remains a challenge for public health system and its expansion in the coast of Pernambuco has increased, reaching touristic destinations and threatening natives and visitors. In 2001, epidemiological survey in Porto de Galinhas reported an outbreak of this disease right after the seasonal floods. In 2010, a new episode of heavy rain has given rise to enormous amount of the snails, *Biomphalaria* glabrata, in the locality. Given this background, this study aimed to develop a new epidemiological survey to diagnose the number of infected individuals, to identify the clinical forms in acute or chronic, and the evolution of the disease in that locality. Methods: To gather prevalence data, two parasitological census surveys were conducted (2000 and 2010) using the Kato-Katz technique. Results: Local residents who joined the study took stool test by kato-katz method and 434 cases were diagnosed positive for Schistosoma mansoni. Of these, 228 (52.8%) underwent anamnesis, physical and hematological examination, and upper ultrasound abdominal (Niamey protocol). Blood counts were performed in 99.6% of cases to check the eosinophil levels. Abdominal ultrasound was performed in 96% to define periportal fibrosis and classify clinical forms. Of this total, 23% (n = 52) was classified as acute and 77% (n = 176) as chronic form. The data collected were stored in spreadsheets (Microsoft Excel 2010) and analyzed with the pairing of the selected variables in Epi Info (version 3.5.2). In 2000, the proportion of acute cases (62,2%) was higher than that of chronic, and now the survey presents an inversion of this rate (23,3%), pointing to a current status of chronic disease. Local residents, diagnosed as chronic patients, had higher parasite loads (OPG=163,8) than the acute patients (OPG=84,5). Through USG, 9% (n=15) of patients were diagnosed with moderate periportal fibrosis due to disease progression. The group of 77% of individuals diagnosed with chronic form of schistosomiasis and high loads parasitic represents a biological indicator of risk for contamination of freshwater environments and maintenance of schistosomiasis in the locality, because of the proximity of *B. glabrata* breeding sites. To decrease morbidity of schistosomiasis intersectoral actions directed to individuals and environment needs to be developed: rainwater drainage, sanitation, environmental changes and mass treatment of infected individuals. All these actions intend to break the matrix of environment contamination and biological cycle of the parasitic, reducing the disease transmission.

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57 Quality of information about biological cycles of *Schistosoma mansoni* broadcasted on the world wide web – internet

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The internet is growing in the field of education, especially in the area of dissemination, research, educational support and communication. Given this background the quality of information about biological cycles of Schistosoma mansoni available on the internet was evaluated. The methodology applied was the use of the search engine Google Images®. A total of 45 different cycles were found. It was observed that there is no reliable reference about information sources in the preparation of these cycles, since the same mistakes are insistently repeated. Frequently the use of the snail's image occurred in a stereotyped or minimized way, leading to misrepresentations and pedagogically inadequate representations, avoiding the adequate recognition of the snail in the environment and thus exposing the reader to the risk of infection.

58 Histopathologic features associated with susceptibility of *Biomphalaria straminea* from Northeast of Brazil, to infection with *Schistosoma mansoni*

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Introduction: Resistance and susceptibility of *Biomphalaria* sp. to Schistosoma mansoni sporocysts occur in different degrees, in relation the species, populations, development of snails, parasites strains, among other aspects. These differences can be studied by histopathology when observed the capacity of hemocytes (amoebocytes and granulocytes) to envelope and destroy the invading organism by encapsulation. Of the three vector species, histopathological studies show that miracidia penetrate in the body snail but that some or all of the larvae were destroyed by the internal defense systems particularly in B. straminea and B. tenagophila. This study aimed to improve the knowledge of these cellular reactions occurring in populations of B. straminea from Northeast of Brazil. Methodology: The snails, descendants of specimens obtained in the area of influence of the Integration Project of the São Francisco River, were individually exposed to five miracidia from BH and EC strains. The EC *S. mansoni* strain was isolated from feces of children born in Pernambuco, differing of the BH strain what were proved from snails collected in state Minas Gerais. After the 25th day, the snails were exposed to the light of electric lamps to obtained positive snails. These specimens were fixed in Millonig`s Carson formalin, cleaved, embedded in paraffin, cut into sections of five micrometers and were stained with hematoxylin-eosin. *B. glabrata* from Belo Horizonte, exposure strain BH, were analyzed as positive control. Results: Of the exposed B. straminea from municipality Cajazeiras, Paraíba state, three snails present sporocysts (strains BH and EC), but the histopathological studies were restricted to BH strain. With the EC strain, were analyzed two specimens of the locations: Pena Forte (Ceará) and Sousa (Paraíba). The preferred site of development of the parasites was the digestive gland, where inflammatory reactions (classified as intense in snails from Cajazeiras and discrete or absent in specimens from Pena Forte e Sousa). The animals also showed parasites in the tentacle, kidney and mantle. There was no inflammatory reaction in *B. glabrata*. Conclusions: The cellular reactions analyzed suggest that the EC strain is more adapted to specimens of B. straminea these places than the BH strain. Future studies aim to confirm this observation, using a larger number of specimens and populations.

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59 Potential risk of schistosomiasis in Mosqueiro Island, Pará State, Brazil

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Schistosomiasis caused by Schistosoma mansoni is a disease conditioned to the presence of snails of aquatic habits of the genus *Biomphalaria*. Since schistosomiasis is a disease determined in space and time by environmental variables, the Geographic Information System (GIS) and Remote Sensing (RS) are techniques for the identifying factors and defining areas of possible risk to indicate a better distribution of resources and a more appropriate direction for the control of schistosomiasis. The objective of this study was evaluate the using of GIS and RS to characterize the spatial distribution of schistosomiasis in Mosqueiro Island (MI) focusing on the construction of scenarios representing potential areas for the occurrence of the disease. The MI is localized in the Belém municipality, Pará State, Brazil. A GPS receiver was used for the spatial location of the participants' residences and breeding sites of *Biomphalaria* snails. B. straminea was found in different breeding sites. The results using kernel showed two clusters of *Biomphalaria* snails. The clusters are situated in four census sectors, located in southwestern of MI. Two census sectors belong to the Maracajá locality and the others two belong to the Vila locality. Ten breeding sites were found in Maracajá and others two in Vila. Maracajá has 1,374 households with 844 residents and 73% of residents are of school age (6-15 years). Vila has 1,259 households with 503 residents and 69% of residents are of school age. Maracajá has 61.43% of resident and Vila has 39.95%. Therefore, Maracajá has about 68% of numbers residents more than Vila. Moreover, both Maracajá and Vila have about 90% of water supply obtained by general network; however, when analyzed in relation to sanitation Vila has 18.9% and Maracajá only 1.9%. The satellite image classification showed that Maracajá have a larger area and a great possibility of expanding residential. This study showed the importance of the use of GIS and RS to study the risk of schistosomiasis in the MI. Although it has not been found any infected *Biomphalaria*, there is a report of schistosomiasis infection residents, which seems to be a non-autochthonous case in the study area. Also, the results showed that Maracajá is a place with a high risk of schistosomiasis infection due to the large number of households and the high number of residents associated with the low number of houses connected to the general network of sewage.

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60 Spatial distribution of schistosomiasis in a low endemic area in Minas Gerais, Brazil

Ricardo Guimarães, Luzivalda Couto, Adilson Lima, Adalberto Mitterofhe, Izabella Pinheiro, Murilo Gonçalves, Milton Castro, Sandra Tibiriça Elaine Coimbra

In Brazil schistosomiasis is caused by a single species, Schistosoma mansoni. It is transmitted by intermediate hosts, snails of the genus *Biomphalaria*. *B. glabrata*, B. tenagophila and B. straminea have been found naturally infected by *S. mansoni*. Minas Gerais state has a higher concentration of *Biomphalaria* species, distributed irregularly in this state. Under these circumstances geoprocessing can be applied to characterize and to provide a more complete picture of disease transmission. The Geographical Information Systems (GIS) constitutes a tool that have been used in the study of schistosomiasis in Minas Gerais, but these studies have been conducted mainly in areas of high endemicity for the disease. The municipality of São João Nepomuceno is located in the region of Zona da Mata Mineira. São João Nepomuceno has been considered as area of low-endemic for schistosomiasis and where some cases of neuroschistosomiasis were reported. So, this current study was carried out in the District of Carlos Alves, municipality of São João Nepomuceno, and it intends to identify the spatial distribution of patients infected with *S. mansoni* and the breeding sites of *Biomphalaria* snails, as well as, the relationship between both by applying techniques of GIS. The geographical coordinates of the residential address of each patient and breeding sites of *Biomphalaria* snails were captured using a GPS receiver. *B. glabrata* was found in weir, spring and stream, and B. tenagophila was found only in the stream. A bandwidth of 1 km was used for estimating kernel density of egg-positive patients. The results using the kernel smoothing technique showed two clusters, one close to the egg-positive patients and another in 3 km away. All infected patients are living in a distance of 400 meters of the more near cluster. This cluster is composed of two breeding sites of *B. glabrata*, and both them flowing into the same river. The river lies to minus 200 meters from the villa of positive patients. The results show that GIS is a useful tool in the control of schistosomiasis, which can reduce costs and lead the field work, indicating areas with increased probability of disease occurrence and transmission.

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61 ESTIMATED CASES AND UNDERREPORTING OF SCHISTOSOMIASIS IN IPOJUCA, PERNAMBUCO THROUGH THE CAPTURE-RECAPTURE METHOD

Julyana Viegas Campos, Karina Conceição Araújo, Verônica Santos Barbosa, Constança Simões Barbosa

INTRODUCTION: Schistosomiasis is endemic in the forest zone of Pernambuco also occurring in isolated outbreaks on the coast. The cases registered by the municipal health services in the Information System of the Schistosomiasis Control Program (PCE-SIS) do not represent the real magnitude of the event because they are not randomized by surveys and sampling addicted. Given this, the present study aims to estimate schistosomiasis cases and underreporting in Ipojuca. OBJECTIVES: (1) collect secondary data on cases of schistosomiasis in Ipojuca between 2001 and 2011 (2) create the database with the collected information, (3) create overlay diagram for estimate underreported cases. METHODOLOGY: Will adopted the capture and recapture method for estimates the number of cases and underreporting of the disease. Calculations are made based on data collected in the sources and the estimation is performed on the degree of concurrency of cases. (1) The data were collected in 03 fonts: SINAN, SIS-PCE and records in literature. (2) The Excel database was adapted to each information source, excluding the repeated data. It was created a second bank with information relevant to the three data sources. (3) The overlap diagram was constructed with information from the bank, showing the intersection between them. The software "R" 2.15.0 and package "Rcapture" allowed estimate underreporting of cases. PRELIMINARY RESULTS: In SINAM the Ipojuca data are available for 2001 to 2008 years, with a total of 1221 cases. In SIS-PCE data are available for 2004 to 2011 years, showing 2812 cases. The research in the literature reported two surveys (2000 and 2010) in Ipojuca, in the district of Porto de Galinhas, with a total of 1,087 cases. Through clinical testing, it was shown that 465 were severe forms and 425 were chronic forms of the disease. DISCUSSION: In the SIS-PCE there is no record of the 250 chronic cases in Porto de Galinhas in 2000 and SINAN were not recorded 53 severe forms of 2010. This lack of reporting cases of schistosomiasis in Porto de Galinhas in 2000 and 2010 let the disease become invisible to managers. It also shows the lack of linkage between the systems of records of health services and means of dissemination of academic data. However, it is necessary to continue the search for conducting a more thorough examination of the results described above.

62 Analysis of the Schistosomiasis Control Program implementation in the Municipalities of the Jequitinhonha Valley in Minas Gerais

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The objective of this study was to analyze the organization as well as surveillance and control activities performed by the Schistosomiasis Control Programs (SCP) estimating their Degree of Implementation (DI). The design provided an evaluation and a normative assessment on schistosomiasis surveillance and control activities of the SCP. The study included 25 municipalities of the Regional Health Management (RHM) of Pedra Azul, Minas Gerais, Brazil. Questionnaires were used to collect information from the SCP coordinators and the Municipal Health Secretaries in a total of 50 professionals. The results showed that 50% of the municipalities programs were considered partially implemented and none have them fully implemented. Analysis of the infra structural aspects of the programs were considered satisfactory in most places, however the aspects related to processes were considered as limiting the development of the program activities. Only one third of the municipalities evaluated conducted annual surveys as recommended by the Ministry of Health, and less than half did not performed schistosomiasis control following the Schedule of Actions for Health Surveillance (SAHS). Few of the municipalities were able to cover all its territorial extension with control actions besides the fact that they often have to prioritize other health activities. There is a lack of training and equipment to perform professional activities with quality despite the support of the RHM of Pedra Azul. The financial resources available from the Ministry of Health are not sufficient and municipalities have to use their own resources to keep the activities such as fuel, staff payment and office supplies. All 25 municipalities failed to use any compensatory strategies such as health education to complement control active surveillance. Actions to improve sanitation were carried out in most municipalities but were not enough to change the scenario. These results indicate that surveillance and control of schistosomiasis at the municipal level in this RHM do not happen in a systematic, planned and integrated way, therefore compromising the quality and outcome of the population health care. This scenario associated with social, behavioral and structural problems of all municipalities favor the permanence of this endemic disease in the region.

63 Hepatitis B and C (HBV and HCV) serological markers and associated risk factors in individuals infected with *Schistosoma mansoni* in an endemic area in northeastern Brazil.

Márcio Bezerra Santos, Patrícia Pereira da Silva, Renata Dultra Torres Moura, Erlon Oliveira dos Santos, Tatiana Rodrigues Moura, Alex Vianey Callado França, Karina Conceição Gomes Machado de Araújo

In endemic areas of Schistosomiasis mansoni, the existence of transmission of viral hepatitis types B and C represents a serious public health problem. In Brazil, few studies have been conducted in order to investigate the co-infection with HBV/HCV and Schistosoma mansoni in these areas. This research is aimed at investigating the prevalence of serological markers of hepatitis B and C in individuals infected with *S. mansoni* in an endemic area in Aracaju, state of Sergipe, northeastern Brazil. A cross-sectional epidemiological study was conducted on 187 subjects, resident in a southern district of Aracaju. A questionnaire was administered to the study population to collect epidemiological variables associated with Schistosomiasis and Hepatitis. Serum samples were collected from patients for identification of anti-HBc, HBsAg, anti-HBs and anti-HCV markers. From these findings it was observed the influence of risk factors in the prevalence of serological markers. It was found that 16 individuals had contact with HBV (9.41%), in which three of those were positive for HBsAg (1.76%). Only 32 samples (18.82%) were positive for anti-HBs alone. Three samples were positive for anti-HCV (1.76%), and one also positive for anti-HBc. The main risks of HBV and HCV infection were related to parenteral routes, as well as sexual activities without condom use in the case of HBV. The values observed in this study were above the estimated prevalence for the Brazilian population. However, it can not be inferred that individuals with Schistosomiasis are more susceptible to infection with HBV or HCV, since the risk factors were the means of risk of transmission of hepatitis-causing agents and not by infection with *S. mansoni*.

64 Spatial analysis of geo-helminthiasis and Schistosomiasis cases in Aracaju neighborhoods, Sergipe

Karina Conceição Araújo, Márcio Santos, Patrícia Silva, Allan Santos, Tiago Carvalho, Cassandra Amaral, José Chagas Sobrinho

The geo-helminthiasis still represent a serious public health problem, especially in developing countries, where the most frequent are: ascariasis, trichuriasis and hookworm, with infection rates of up to 26%, 17% and 15% respectively . While Schistosomiasis, a parasitic disease considered serious and chronic disease, found in Brazil has excellent conditions for development and expansion, especially around of big cities. They are directly related to socioeconomic status and educational level of a population and are related to water and food contaminated with eggs or larval forms of parasites. The development of digital mapping technologies and particularly of environments generically called Geographic Information Systems (GIS) has opened new ways for epidemiological studies that have used many techniques to map and analyze the distribution of health-related events. Based on these discussions, this study aimed to analyze the spatial distribution of geo-helminths and Schistosomiasis cases in neighborhoods populations of Aracaju / SE. Fecal material was collected, which was analyzed at the Laboratory of Disease Control Center of Zoonosis of Aracaju. The maps were constructed and analyzed in the TerraView. The results were obtained in the form of thematic maps to estimate the prevalence of parasitic diseases. 27,344 parasitological tests were performed among residents of 21 neighborhoods in Aracaju, with an average of 1302.09 per district exams. The total number of individuals positive for some kind of worm was 2530 (9.25%), average of 120.47 positive tests by neighborhood. The frequency of positive geo-helminths was: 1401 for Ascaris lumbricoides (5.12%), 139 to Ancylostomidae (0.51%) and 02 for Taenia sp. (0.007%). It was also found that 988 (3.61%) were infected with Schistosoma mansoni. Moreover, the spatial distribution of these infections showed that the highest prevalence occurring in the neighborhoods: Santa Maria, Jabotiana, São Conrado, Novo Paraíso, Aeroporto and América. According to these results, we conclude that the prevalence of geo-helminths in Aracaju neighborhoods remains high, despite successive campaigns to fight these infections. This underscores the importance of investments in health public programs and improvement of living conditions of these populations in order to minimize the prevalence and risks factors geo-helminthiasis and schistosomiasis.

65 Epidemiological and Clinical Characteristics of Schistosomal Myeloradiculopathy in two health unit in Sergipe, Brazil.

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Introduction: The Schistosomal Myeloradiculopathy (SRM) is the most severe and disabling ectopic infection of Schistosoma mansoni. The SMR nervous system lesions are due to occurrence of inflammatory granulomatous reaction to parasite eggs deposited in the spinal cord. The epidemiological history associated with exposure of cercariae or previous infection helps the diagnosis. The aim of this study was to survey the clinical and epidemiological profile of patients in two health units in the State of Sergipe, Brasil. Methods: We conducted a retrospective study of case series from reviewing the medical records related hospital admissions in two referral hospitals in Sergipe since 2007 to 2011, where the population comprised all cases diagnosed with SMR during this period. Data collection was performed by applying Evaluation Schistosomal Myeloradiculopathy Protocol, adapted and based on the criteria of Ferrari (1997). Results: We identified 27 patients with predominance of males 59.25%. The most common signs and symptoms were low back pain, present in 68% of cases, urinary retention by 72% and fecal retention by 44%. Only 13 patients underwent imaging tests such as magnetic resonance imaging and / or computed tomography, where the lumbar and thoracolumbar spinal cord were the most affected, with five cases (18.51%) and three cases (11.11%) respectively . Because of the neurologic form of schistosomiasis haven't a specific CID-10, the records gathered from the charts of patients were related diseases where identified five different types of CID-10. Related to epidemiological aspects due to lack of information was the approach according to the records in evaluation form where only 37% showed informations about the type of water collection of contaminated water contact: lakes, ponds, rivers, charcose. 14.8% of patients were asked about the water contact and only one presented sanitation data in hometown. Conclusion: Although these data may not be representative of what happens throughout Brazil, certainly contributes to auxiliary information to the scientific community involved in the diagnosis, treatment and conducting this illness.

66 Schistosomiasis- test availability and positivity rate in endemic municipalities in pernambuco state, northeast brazil

Vânia Maria de Siqueira Cavalcante Cavalcanti, V.M.S, Polyana karla Silva Silva, P.K.F, Barbara Morgana Silva Silva, B.M

SCHISTOSOMIASIS- TEST AVAILABILITY AND POSITIVITY RATE IN ENDEMIC MUNICIPALITIES IN PERNAMBUCO STATE, NORTHEAST BRAZIL Cavalcanti, V.M.S.; Silva, P.K.F.; Silva, B.M; Barreto, A.V.M.S.; Rodrigues, F.A.; Magalhães, N.M.E; Silva, J.A.M. In 2011 the State of Pernambuco defined the priority of seven supposedly neglected diseases, including schistosomiasis. Studies of the distribution and prevalence of schistosomiasis are needed as basic inputs for increasing the efficiency of control strategies. (Barbosa et al, 2010; Farias, LMM et al, 2007; and Pierri, OS et al, 2007). To analyze the availability of tests and the levels of positivity by age group for cases of schistosomiasis recorded in 41 endemic municipalities in 2010. A descriptive epidemiological cross-sectional study based on 2010 data from both the Brazilian National Census and the Pernambuco State Database for the Schistosomiasis Control Program (SIS-PCE). Microsoft Excel version 7.0 and TabWin version 3.6b were used for the tables. In order to analyze the provision of tests and positivity rate (PR) per age group, two groups were considered: Group 1: 2-14 year-olds; and Group 2: adolescents and adults over 15. According to the 2010 Census, the 41 municipalities studied had a total population of 2,186,207 inhabitants, representing 25.59% of the total population of Pernambuco State. That year, 111,225 parasitological stool tests were carried out for the detection of Schistosoma mansoni and other worms in the above-mentioned municipalities, which represented 5.8% of the total number of tests performed in the state. In the general population of the municipalities studied, Group 1, with 560,278 inhabitants, corresponds to 25.6% and Group 2, with 1,625,929 inhabitants, 74.3%. This distribution pattern for the tests by age group was also observed by Lima-Costa, M. F. et al. (2002), in locations in Minas Gerais. In relation to the tests performed in the 41 municipalities, 30.3% were for Group 1 and 69.6% for Group 2. Concerning the PR for Schistosoma mansoni, Group 1 showed 9.1+/-8.2% against 11.2+/-7.9% for Group 2, varying between 0.91% and 30% for Group 1 and from 2.2% to 35.27% for Group 2. These results show a low availability of tests for the diagnosis of schistosomiasis in the endemic municipalities. However, the distribution by age group is representative considering the normal distribution of the population. The data also suggests that the choice of target population for carrying out surveys and collective treatment in high prevalence areas should not be focused only on children of school age.

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67 Report of *Schistosoma mansoni* transmission in Recife, Pernambuco

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INTRODUCTION: In the city of Recife, capital of Pernambuco, the first biological indicator of schistosomiasis transmission ocurred in 2008, occasion that has been diagnosed *Biomphalaria* straminea infected with Schistosoma mansoni in the Apipucos dam, neighborhood of the city. In this pond were georeferenced points with sewers dump, although this is a placeholder for fishing and leisure contemplative. OBJECTIVE: conduct a parasitological and malacological survey to identify outbreaks of vector snails and autochthonous human cases of schistosomiasis in Recife city. METHODS: The malacological survey was conducted between 2010 July – 2012 September to identify breeding sites and collection of vector snails. The positivity of *S. mansoni* snails was diagnosed by Nested PCR molecular test, to identify specific DNA of this parasite. Human cases are being identified through (1) National Survey on Prevalence of Schistosomiasis and Geo-helminths, which sampled 2,718 schoolchildren from Recife in 2011 and (2) by active search of children in schools close to outbreaks of vector snails. Was carried out clinical and ultrasonography examinations in patients diagnosed positive for *S. mansoni* and the reliability of the autochthony was investigated through interviews with children's families. Thematic geo-referenced maps shows the location of the cases, the breeding/foci with snails infected and the points with fecal contamination. PRELIMINARY RESULTS: up to date, 30 were identified in Recife 30 breeding sites with B. Straminea, with 1,057 snails colected and examined by Nested PCR molecular technique. Until now have been found 4 breeding snails with *S. mansoni* DNA in the neighborhoods of Varzea, Apipucos e San Martin. Parasitological surveys detected 13 students infected with *S. mansoni*, with parasite load between 24 and 228 eggs per gram of feces (OPG). In all these cases, clinical and ultrasonographic examinations were made which diagnosed 03 children with hepatomegaly and 01 with hepatosplenomegaly. The autochthony cases investigation excluded 10 patients because they mentioned exposure in endemic locations outside Recife. Only 03 children could be considered autochthonous cases since their families said with conviction that they had never left the vicinity of their residence. CONCLUSIONS: the diagnosis of outbreaks vector snails with *S. mansoni* DNA as well as autochthonous human cases are indications for schistosomiasis transmission of this disease in the city of Recife.

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68 THE USE OF GIS AND REMOTE SENSING TO EVALUATE SCHISTOSOMIASIS TRANSMISSION IN PORTO DE GALINHAS – PE

Elainne Christine Souza Gomes, Onicio B Leal-Neto, Jones Albuquerque, Hernande Pereira Silva, Constança Simões Barbosa

Introtuction: In Brazil, schistosomiasis mansoni infection is an endemic disease that mainly affects the country's rural populations, however, the recente process of rural migration to urban centers and the disorderly occupation of natural environments by these populations from endemic areas have favored expansion of schistosomiasis to locations that had been considered to be disease-free. Based on remote-sensing techniques and spatial analysis, the present study sought to identify environmental changes that have occurred consequent to an occupation and urbanization process in the district of Porto de Galinhas. These changes might be related to the expansion and endemisation of schistosomiasis. Methods: In this study were used datas collected in 4 localities of Porto de Galinhas – Pe (Merepe III, Salinas, Socó and Pantanal), where were carred two parasitological and malacological census surveys (2000 and 2010) in order to define human prevalence as well the density and infection rate of the vector snails. Based on these data, spatial analysis using kernel intensity estimators were done, resulting in risk maps for disease transmission. To ascertain the environmental changes that occurred at the locality, images from the QuickBird satellite were analyzed, thus resulting in land use maps. Results: The result of malacological survey showed decrease of foci numbers from 15 (2000) to 11 (2010) and infection rates of snails that decreased from 15,2 to 6,0%. However, over this 10-year period, the foci of schistosomiasis became more concentrated in Salinas (10 foci). Prevalence survey also showed a decrease of cases and prevalence rate between 2000-2010 (32,4 – 16,6%). Similar results were observed in all locations of Porto de Galinhas, except for Salinas that keep a moderated rate (20%) over these years. This area was considered to be at the greatest risk of schistosomiasis transmission and had the highest prevalence rates over this period. The risk and the land use maps showed that this was the area most affected by the environmental changes resulting from the disorderly urbanization process (increase of 36,7% in built area), occupation and reduction of natural mangrove areas (decrease of 72,9%) and a complete absence of urban infrastructure comproved also by the unpaved roads . All these conditions gave rise to unsanitary environments that favored the establishment and maintenance of foci of schistosomiasis transmission, thereby consolidating the process of expansion and endemisation of this parasitosis.

69 Differences in risk factors to schistosomiasis in two communities from minas gerais state, brazil: the importance of surveys

Erica Barbosa Magueta, Michele Mendonça, Alessandra Miranda, Rosiane Carvalho, Alda Maria Soares Silveira, Elizabeth Castro Moreno, Luc ia Alves de Oliveira Fraga

A current cross-sectional study and a panel study were designed to determine the extent of schistosomiasis and to identify the risk factors associated with it in a known endemic area during the last three decades. It was conducted in Córrego do Bernardo (CB) and Córrego do Melquíades (MQ), two districts of the municipality of Governador Valadares, northeast of Minas Gerais State, Brazil. Structured and pre-coded questionnaires were used to explore individual and household characteristics. The presence and number of parasite eggs per gram of feces were determined by the Kato-Katz technique. Available data from 1990 to 2009 were consolidated to obtain an overview of existing work and define the parameters to be used in the panel study. The cross sectional study showed that the prevalence of schistosomiasis in CB was estimated in 12.5% and 31.9% in MQ, indicating a higher prevalence of the disease in MQ. Although geographically close, CB and MQ have distinct pattern of infection with *S. mansoni*. In CB, male have more chance for infection (OR=4.6) while public water supply and family history of infection with *S. mansoni* are characteristics associated with protection (OR=0.3). In MQ the characteristics associated with the disease were co-infection with other helminthes (OR=4.3) and the use of water from cisterns (OR=2.1). The panel study showed that the prevalence of schistosomiasis was high in the first year of intervention, ranging from 67.7% (CB) in 1990 to 59.8% (MQ) in 1997/98. Over the years, significant reductions in prevalence rates have been observed at the CB site. In 1995 the prevalence dropped to 43.1% and to 12.5% in 2009, reaching a total reduction of schistosomiasis prevalence of 81.5%. The district of MQ showed a different pattern. The prevalence of 59.8% in 1997/98 decreased to 18.6% in 2001. However, in 2009 an increase up to 31.9% was notified, which represents a total reduction of 47.0%. The adjustment of prevalence rates allowed us to compare the risks of acquiring the disease in these two localities and make implications about transmission of schistosomiasis. In 1990, the relative risk (RR) and the attributable risk (AR) in CB was 1.13 and 6.8, respectively. In MQ in 2009, the relative risk (RR) was 2.9 and the attributable risk (AR) was 21.8. The increase of the prevalence and of the risks in MQ indicates active transmission of schistosomiasis in this village, maintaining cases of reinfection of the disease. Financial support: CNPq/FAPEMIG/CPqRR/FIOCRUZ.

70 Normative evaluation study of the degree of implementation of the schistosomiasis control program, sanar-ses/pe, in priority municipalities in pernambuco state, northeast Brazil in 2012.

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INTRODUCTION: In 2011 the State of Pernambuco defined the priority of seven supposedly neglected diseases, including schistosomiasis, with the aim of stepping up surveillance and control and the target of reducing the prevalence of this disease to < 10% in priority municipalities. From 2005 to 2010 73,639 positive tests for S.m were notified, with an annual average of 12,273 cases in 109 endemic municipalities. In the light of this situation, the Pernambuco State Health Authority has included schistosomiasis in the SANAR program, which proposes to reduce and/or eliminate seven persistent neglected diseases, acting chiefly through the intensification of the control routinely performed in the priority municipalities. OBJECTIVES: To perform a normative evaluation study as a tool to improve the planning and management of the SANAR Program. MATERIAL and METHODS: The degree of implementation (DI) was measured to match the scale of the routine activities proposed by the Ministry of Health and by the Pernambuco State Health Authority (SES), carried out by the 40 municipalities included in the program. The combination of primary health care initiatives with regular sending of slides for quality control served as primary data. The secondary data was the percentage of clinical samples collected, percentage of treatment of positives, compliance with the testing pact and regular submission of information on the positivity of S.m and soil-transmitted helminthiasis. Indicators were developed on the basis of the average number of actions carried out over a certain period of time, which were arranged in a judgment matrix. This permitted the classification of the DI of the actions: implemented: 90 - 100 points; partially implemented: 60 - 89 points; and not implemented: <59 points. RESULTS: After the data survey, it was found that only 6 municipalities (15%) had their DI classified as implemented; 31(77.5%) as partially implemented and 3 (7.5%) as not implemented. CONCLUSION: From this evaluation it was observed that the majority of the priority municipalities in the SANAR Program for schistosomiasis show weakness in terms of compliance with the minimum recommendations made by the Brazilian Ministry of Health for the control of the disease. The information obtained in this study may contribute to the guidelines for the SANAR Program and the reduction of schistosomiasis rates in Pernambuco State.

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71 Geomapping for predicting frequency distributions and influence of environmental risk factors of *Schistosoma mansoni* and Intestinal Parasites co-infection

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To predict the distribution of co-infections in large geographical scale is important for the design of control programs. This Cross-sectional study uses geospatial analysis to study the epidemiology of Schistosoma mansoni and intestinal parasites using as a model an endemic area of schistosomiasis, Ilha das Flores, Sergipe, Brazil. We collected individually georeferenced clinical, socioeconomic, educational, epidemiological and parasitological data from 500 subjects. We analyzed the data associated to these infections by conventional statistics and also produce risk maps by Kernel estimator. The prevalence of these infections were: Schistosoma mansoni (24.0%), Trichuris trichiura (54.8%), Ascaris lumbricoides (49.2%), Hookworm (17.6%) and Entamoeba histolytica/dispar (7.0%). Only 59/500 (11.8%) individuals did not present any infection, whereas 279/500 (55.8%) had 3 or more parasites. We observed associations between *S. mansoni* infection and male gender (65.2% males, $p = 0.003$), being a farmer ($p < 0.001$) or a fisherman ($p < 0.001$), low educational level ($p<0.001$) and low income ($p = 0.0005$), any level of contact with superficial water sources ($p < 0.001$) and drinking untreated water ($p < 0.001$). We detected associations between A. lumbricoides ($p=0.002$) and hookworm ($p=0.01$) infections with low income and between A. lumbricoides and T. trichiura infections with drinking untreated water ($p=0.02$ for both) and with open-air sewerage ($p=0.001$ and $p=0.0005$, respectively). The Kernel estimator maps show that the higher risk areas maps with the poorest regions of the villages and to inadequate sewerage system. The data call for an integrated approach to effectively control multiple parasitic infections from the perspective of public health.

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72 Schistosomiasis in Topazio district, Teofilo Otoni, Minas Gerais

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Introduction: Schistosomiasis mansoni remains an important public health problem in Minas Gerais, where its overall prevalence is as high as 5%. With 1,600 inhabitants, Topazio is a district of the municipality of Teofilo Otoni located in the northeast of Minas Gerais. The district is considered hyperendemic for schistosomiasis, but no reliable data currently exist regarding the prevalence of the disease. Objectives: to estimate the prevalence of schistosomiasis in the Topazio district and describe the clinical, laboratory and ultrasonographic characteristics of the population. Material and methods: A parasitological survey was carried out using the Kato-Katz quantitative technique. Study participants were chosen by order of arrival irrespective of Kato-Katz results and were submitted to medical interviews, physical examination, abdominal ultrasound and haematological tests (full blood count). A standardized questionnaire was used to collect demographic and epidemiological data. Results: The parasitological survey revealed a schistosomiasis prevalence of 23%. Out of the 397 study participants, 62.3% were women and 37.7%, men. Median age was 38 years. 3.0% of study participants reported gastrintestinal bleeding. On physical examination, 5.6% had a palpable spleen and 42.1% a palpable liver. Haematological analyses showed platelet counts below 150,000/mm3 in 12% of participants; leukocyte counts below 3500/mm3 in 3.4%; haemoglobin levels below 12g/dL in 14.8% of women and below 13g/dL in 23.1% of men. Abdominal ultrasound showed hepatomegaly and splenomegaly in 15% and 2.5% of participants, respectively. 60% of individuals with splenomegaly (1.5% of all study participants) had mild to severe periportal fibrosis, none of whom had a positive stool examination. Conclusions: The prevalence of schistosomiasis was estimated to be five times higher in Topazio than in the rest of Minas Gerais. The hepatosplenic form of shistosomiasis was observed in 1.5% of study participants. The clinical, ultrasonographic and laboratory profile of people from Topazio is compatible with that of populations living in regions hyperendemic for schistosomiasis.

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73 Spatio - temporal analysis of schistosomiasis transmission in porto de galinhas – Pe

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Introduction: The northeastern region of Brazil is markedly the most endemic area, and for many years, schistosomiasis was considered to be a characteristic ailment of rural areas. However, over recent decades, has increasing the incidence of cases of this disease in urban and coastal areas such as the famous beach of Porto de Galinhas - Pernambuco. In 2000, an outbreak of schistosomiasis cases was registered in this locality where along the last decade, shistosomiasis cases and outbreaks of the vector mollusc still being diagnosed. Based on spatio – temporal analysis, this study intends to show the change of schistosomiasis transmission risk areas over 10 years. Methods: To the current study was considerate the data collected in 4 localities of Porto de Galinhas – Pe (Merepe III, Salinas, Socó and Pantanal), where were carried two parasitological and malacological census surveys (2000 and 2010) in order to define human prevalence as well the density and infection rate of the vector snails. Simple regression analysis was run with prevalence data to define the odds-ratio to schistosomiasis occurrence for each area analyzed in both years. Results: The results of malacological surveys showed a reduction of foci of transmission, except for Salinas that presented an increase of 233,3% in numbers of foci. In 2000, prevalence survey point Salinas as the location with the lower rate (21,9%). Ten years later, prevalence rates went down in all location, less Salinas that keep the rate in 20,6%. Based on this data, Salinas was considerate the protection factor to schistosomiasis occurrence in 2000 (OR=0). The odds ratio for the other locations compared to Salinas were: OR=1,58 (Merepe III), OR=1,94 (Socó) and OR=3,48 (Pantanal). For 2010, Merepe became protection factor (OR=0) and the other locations showed the following rates: Pantanal (OR=3,42), Socó (OR=4,18) and Salinas (OR=5,54). From these results, becomes clear that Salinas was the most affect location in these 10 years, exposing the population of that area to a higher risk to schistosomiasis infection. Salinas is also implicated in the maintenance of unsanitary conditions that created perfect conditions to this disease, setting Porto de Galinas as a new endemic area for schistosomiasis in the coast of Pernambuco.

74 Geographic Information System – GIS, for identification of smaller water`s volume areas inhabited by snails infected with *Schistosoma mansoni*

Francinaldo Emanuel Torres, Mykaella Andrade Araujo, Thiago André Alves Fidelis, Janira Lúcia Assumpção Couto

Introduction:The presence of planorbidae *Biomphalaria* glabrata, the main trasnsmissor of schistosomiasis is often associated with the expansion of this endemic disease in Brazil's Northeast. The climate of the region, provides the condition for both presence of Schistosoma mansoni and the molluscs of the genus *Biomphalaria*. Therefore, a great diversity of aquatic habitats becomes breeding grounds for these type of mollusks. Objective:The objective of this research was to investigate the presence of snails transmitting schistosomiasis and analyze the Schistosoma mansoni's infection in Marechal Deodoro, city of Alagoas-Brazil; Collect snails in natural and artificiall breeding; Identify possible co-infections by other trematodes in snails; Classify the types of containers; Featuring sanitation; Delineate foci of schistosomiasis in the region or risk areas to infection. Methodology:The method applied is called "Capture Station" (CS), in every water's collection studied, establishing the area by Terra View`s software for mapping, been used forceps on smaller water's volume places to collect the snails . Malacological surveys were completed according to the WHO(World Health Organization). For each sample, two were separate for morphological analysis and identification of species, as established by Paraense's (1975). To investigate the infection by strains of *S. mansoni*`s was used the compression method between Petri's dishes. The infection rate was calculated according to Souza and Lima (1990). Results:In 13 CS's, 322 snails were collected. *Biomphalaria* glabrata snails were found in ditches, lakes and rivers, which had pollution, turbidity, week current and floating vegetation. The presence of *S. mansoni*'s cercariae were found in 68 snails, meaning 27,09% of rate infection. The collected species, a 100% was *Biomphalaria* glabrata's found. In 71 (28,29%) were found infection by other trematodes, not specifying the species. Conclusion:The high rate of infection in *Biomphalaria* glabrata remates to prevalence in the transmission of schistosomiasis in Alagoas. Is necessary to emphasize the sanitary engineering, and education of the population, measuring to prevent the contamination of water collections and to minimize the spread of schistosomiasis.

75 Schistosomiasis mansoni in children and youth of vila altina neighborhood, district of the municipality of marechal deodoro (Alagoas, Brazil)

Alinne Schristina Silva, Michelle Martins Silva, Francinaldo Emanuel Torres, Janira Lúcia Assumpção Couto, Elaine Cristina Silva, Mykaella Andrade Araujo, Janaina Melo Silva, Thiago Andre Fidelis

Introduction: Schistosomiasis mansoni is established as an important disease in the public health context. Its presents the highest incidence in the Northeast of Brazil. Alagoas, northeastern state, has 102 municipalities, 70 of which are endemic. Although data from the Health Secretary of State (2007) affirm a reduction in prevalence after the control program action, there are still deficiencies related to sanitation and environmental issues. In this set of imbalance between population and environment, schistosomiasis spreads indefinitely. This study investigated the occurrence of schistosomiasis in Marechal Deodoro, municipality located in the southeastern state of Alagoas. Methodology: The study was conducted between may 2010 and may 2011, with the group of children and young people aged between three and 15 years. Initially, socioeconomic factors were evaluated by means of surveys about housing, sanitation and hygiene. The parasitological analysis was performed by Lutz and Kato-Katz methods. Nutritional status was assessed by anthropometric measurements, such as height for age, weight for height and body mass index. Results: It was examined a total of 258 children and young people, with 234 (90.70%) positive cases. Among the positive cases, 105 (44.87%) had Schistosoma mansoni and 129 (55.13%) had several intestinal parasites, including protozoa and helminths. The age of highest incidence of schistosomiasis was 8 to 15 years of age (71 = 67.62%). Relative to gender, 53 (50.48%) boys and 52 (49.53%) girls were with schistosomiasis. Most houses was brick (93.33%), with sanitation system (59.05%). Nutritional assessment showed obesity cases (13.33%) and malnutrition (5.72%). The treatment of schistosomiasis and other parasites was made after the prescription of medical prescriptions. The drugs were obtained from the Health Department of the municipality. Conclusions: High levels of schistosomiasis and other intestinal parasites may indicate a hyperendemic area. Despite some improvements, such as brick houses, there are open sewers in the streets, which make the environment unhealthy. The common habit of walking barefoot facilitates infection. This results showed that is necessary urgent measures for disease control, especially in relation to sanitation.

76 Urban Transmission of Schistosomiasis and other Enteroparasitosis in Students of MarechalDeodoro (Alagoas, Brazil)

Fernanda Maria Araujo de Souza, Janaina Melo da Silva, Francinaldo Emanuel Nunes Paciência Torres, Kelly Mayara da Rocha, Ana Carolyne Oliveira Dias Melo, Rosana Gomes de Lima, Janira Lúcia Assumpção Coutro

Introducion: Schistosomiasis mansoni has important prevalence rates in Brazil, with areas of high endemicity in the Northeast. Alagoas state, located in Northeast Brazil, has 60% of its territory endemic. Although data of the Ministério da Saúde indicate a reduction in prevalence after Control Program action, there are still deficiencies relating to housing and sanitation in these cities. In this context the imbalance between population and environment, schistosomiasis spreads indefinitely. Objective: This study aimed to investigate the prevalence of schistosomiasis and other intestinal parasites in MarechalDeodoro, endemic municipality of Alagoas. Methodology: The study group consisted in 295 children of public schools in the city, aged between seven and 14 years. Preliminary investigations were conducted on the socio-economic survey: housing type, education, family income, food, hygiene, bathing in rivers. Fecal material was obtained for parasitological tests, and was analyzed in laboratory by Lutz and Kato-Katz methods. The snails transmitting schistosomiasis were collected in natural breeding sites. In the laboratory, the snails were examined to verify the presence of Schistosoma mansoni cercariae by compression technique between glass plates. Results: In 295 surveys, we found that 79% of students used the river for some kind of activity like washing dishes / clothes (23%), recreation (25%) or bathing (31%). These data were associated with knowledge (47%) or not (53%) of the snail that transmits schistosomiasis using the chi-squared ($X^2 = 3.299$, df = 3, p = 0.347). Only 95 students made parasitological examination. Among the intestinal parasites founded, schistosomiasis accounted for 4% of positive cases. This low rate may be correlated to the administration of anthelmintics, held in the entire population of the municipality, after the flooding and floods period. Also 77 snails were collected and 69 were examined, all (100%) infected with Schistosoma mansoni. Conclusion: These results showed that in urban area of Marechal Deodoro may be an important endemic area, given the environmental conditions that favor the spread of schistosomiasis.

77 Schistosomiasis and intestinal parasites in children and youth of rio largo municipality (Alagoas, Brazil)

Alinne Schristina Silva, Janira Lúcia Assumpção Couto, Michelle Martins Silva, Jaqueline Araujo Melo, Elida Millena Vasconcelos Brandão, Jeferson Ricardo Batista Lima Santos, Francinaldo Emanuel Torres

INTRODUCTION. Intestinal parasites are common diseases in developing countries of tropical climate, with higher prevalence in populations with low socioeconomic status. They are, therefore, an important level indicator of local development. They can affect people in all age groups, however, children and adolescents are more susceptible. Also in this age group the effects become more significant. Alagoas, state in the Brazil Northeast region, has a high rate of parasitic infections cases, and schistosomiasis, among residents of localities near to the Mundaú river and its tributaries. This work aims to show intestinal parasitic infections rates in children and young in a poor community in Rio Largo (Alagoas, Brazil), endemic municipality for schistosomiasis. METHODOLOGY. The study group consisted of public school students, from six to 14 years, residents in Mata do Rolo neighborhood, Rio Largo municipality. Stool samples were collected for parasitological analysis. In laboratory, the material was analyzed by Lutz and Kato-Katz methods. Speaches were given in the classroom as educational measures for the control of parasitic diseases. RESULTS. It was analyzed 66 examinations, of which 42 (63.63%) were positive. Among helminths, it was found Ascaris lumbricoides (47.61%), Trichuris trichiura (47.61%), Schistosoma mansoni (4.76%), Strongiloides stercoralis (11.9%), Ancylostomidae (16.66%) and Hymenolepis nana (2.38%). Among protozoa, Entamoeba histolytica was observed 26.19%, Giardia lamblia (21.42%), and commensals Entamoeba coli (30.95%), Endolimax nana (7.14%) and Iodamoeba butschlii (4.76 %). Among positive cases, 24 (57.14%) were female and 18 (42.85%) were boys, and among 42 positive cases, 35.71% were infected by only one helminth species. CONCLUSION. The results show the presence of various parasites in the examined group, which reveals an unhealthy environment. The cases of schistosomiasis, less expected in an endemic region, can be explained by the distance from the Mata do Rolo, in the upper town, of the Mundaú river and his tributaries.

78 Longitudinal cohort study of demographic, geographic, socioeconomic and water contact factors related to *Schistosoma mansoni* infection in an endemic area, Minas Gerais

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Objective: We evaluated longitudinally the relationship between Schistosoma mansoni infection and demographic, geographic, socioeconomic factors and water contact behavior of residents from an endemic rural area in the State of Minas Gerais, Brazil. Methods: A cohort of 127 individuals participated in the study between 2001 and 2009. Follow-up parasitological surveys using three stool samples per survey and the Kato-Katz method were carried out in 2001, 2002, 2005 and 2009. Data on demographic, geographic, socioeconomic factors and water contact behavior were collected using questionnaires. The socioeconomic variables household income and quality of house were selected to estimate changes between 2001 and 2009. Intensity of water contact was estimated from mean values of the Total Body Minutes of each activity in 2001, 2002 and 2009. The Latent Trait Model was used to determine scores for house quality. The Poisson Regression Model and the Generalized Estimating Equations (GEE) method were used to evaluate the relationship between risk factors and *S. mansoni* infection. Results: *S. mansoni* prevalence before treatment (2001) was 59% (CI 95%= 50.38- 67.72) with a geometric mean egg count (epg) of 61.05 (CI95%= 58.70 – 63.40). In 2009, prevalence was 26.8% (CI 95% = 18.96 to 34.57) but intensity of infection had significantly declined since 2001, to 8.78 epg (CI 95% = 6.45 to 11.11). Comparing housing conditions and household income between the years 2001 and 2009, the results showed a significant improvement in the quality of houses, such as bathroom and floor construction, acquisition of water tanks, showers, tanks for washing clothes and faucets. In the univariate analysis, higher risk of infection was associated with individuals residing in rural areas, poor house quality and low income, and individuals who remained poor or became poor during the eight-year study period. In the multivariate analysis, higher risk of infection was associated with younger individuals (6-14 and 15-29 years) as well as fishing and crossing stream. Conclusion: *S. mansoni* infection was associated with age and water contact behavior. The absence of associations between socioeconomic variables and infection may be due to widespread poverty in the study community and, although we observed some socioeconomic improvements, they were not sufficient to reduce the prevalence. Significant declines in mean egg counts but no changes in prevalence indicate continuing transmission after three chemotherapy treatments during the eight-year study period. Financial support: NIH Grant A145451 e Grant 1R03AI071057-01, INCT-DT, FAPEMIG, CAPES, CNPq.

79 Ankos mobile - interconnecting gis information in real-time data for schistosomiasis monitoring

Onicio Leal Neto, César Martins de Albuquerque, Jones Albuquerque, Constança Simões Barbosa

Health surveys allow to perform a scan on the situation of certain diseases in space/time. However, it demands high costs and long time-to-market for its realization, beyond human resources. Currently, the Android platform is an alternative to this because allows several programming possibilities for the construction of computerized solutions. The ANKOS Mobile is a system to collect and remote transmission of information in real time, it was built using Android to optimize the management and security data in the field using mobile devices to investigations of schistosomiasis expansion. And it uses a web server to storage and to analyze and georeferencing the remote information. It was built to be used in epidemiological surveys to conduct data collection and transmission in real time by aligning emerging technologies and their application in public health, and so, promoting safety and speed on the consolidation and storage of data. The construction of the system structure has been divided into two modules: a mobile application (APP) and the server. For the development of APP, we used the Eclipse environment (Helios) and the Software Development Kit - SDK Android, which was Java language. The chosen database was SQL lite, for better suit the hardware features of mobile devices. The web server for remote reception of the data has been divided into front-end or presentation layer (website www.ankos.com.br) and back-end or the administrator panel. Both of them were developed in HTML 4.01 and Ajax. For the georeferencing of data we has been used the Google Maps JavaScript API V3. From March 2011 until May 2012 it was built the working prototype of the ANKOS Mobile. It is composed of 03 segments: (1) registration of breeding sites of snails and environmental attributes; (2) registration of households and individuals participating in the survey; and (3) monitoring of staff collectors by tracking field. In the web server, the information collected and georeferenced in real time are available for consulting, editing and export of the database. The application has been tested in pilot projects and it proved to be a tool capable of organizing the activities and standardize data collection, facilitating the recovery of information and allowing you to interface with other systems. The proposed ANKOS-Mobile follows global trends in the use of smartphones for modeling epidemiological scenarios, being a real possibility of application in public health services, improving the work process and giving flexibility to the consolidation of information.

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80 ADVERSE REACTIONS TO PRAZIQUANTEL IN COLLECTIVE TREATMENT PATIENTS IN PERNAMBUCO STATE, NORTHEAST BRAZIL – 2011 and 2012

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Introduction: According to WHO, collective treatment (CT) should be applied in order to reduce morbidity, gravity and consequences of schistosomiasis and soil-transmitted helminthiasis in areas of high prevalence. The Pernambuco State Sanar Program has given priority to addressing these diseases, along with five other neglected diseases. The main control actions are: the effective involvement of primary health care, adaptation of the welfare referral network and CT in hyper-endemic locations for both conditions. By 2014 the program aims to reduce the prevalence of schistosomiasis to < 10% and soil-transmitted helminthiasis to < 20% in 40 municipalities. The medication used in CT was prazinquantel (PQZ) and albendazole. Objectives: To investigate adverse reactions to PQZ occurring during CT in two of the Sanar program's priority locations. Material and Methods: A descriptive and cross-sectional study was carried out on a conveniently defined sample of patients who reported AR in the Lagoa das Garças district of Jaboatão dos Guararapes (JG) and in the Nova Tiuma district of São Lourenço da Mata (SLM). In these locations, PQZ was used in combination with albendazole, except for patients with contraindications. The CT was administered by family health and endemic teams. Stool samples were collected from patients who reported AR, for studies of *S. mansoni* and other worms by the Kato-Katz method. In this survey a structured questionnaire was used. Results: CT was applied to 1,897 of around 3,000 previously treated patients in JG and SLM. Around 20% of the patients interviewed reported AR. Among 196 patients investigated: dizziness (80.1%), nausea (72.2%), drowsiness (50%) and headache (49%) were observed, and in 52.6% the symptoms disappeared in less than 12 hours. In 106 (67.1%) patients in SLM, stool samples were collected, recording 16 (15.1%) positive for helminthes, among which 8 (7.5%) *S. mansoni*, 6 (5.6%) Ascaris lumbricoides, 3 (2.8%) Trichuris and 1 (0.9%) hookworms. Among the individuals with negative stool tests for Sm, the most frequent reactions were: dizziness (77.8%), nausea (74.4%) and headache (56.7%). Among those tested positive for Sm, the main reactions were: dizziness (75%), nausea and abdominal pain (62.5%), and vomiting (37.5%). Conclusion: Adverse reactions to prazinquantel were frequent during collective treatment, although the majority were mild and transient. Further studies are considered necessary to verify the association between adverse reactions and positive testing for *S. mansoni*.

81 Malacological survey to identify risk areas for the schistosomiasis transmission of the city of Recife, Brazil

Bruno Henrique Ximenes Rodrigues, Wheverton Ricardo Correia Nascimento, Onicio Batista Leal Neto, Constança Simões Barbosa

Introduction: In Pernambuco, schistosomiasis is expanding to coastal villages of the state, where 12 foci of snails have been recorded. In 2008 it was detected for the first time, the presence of *Biomphalaria* straminea infected with Schistosoma mansoni at Apipucos, neighborhood of Recife, which justifies this research for breeding sites and foci, because until then there had been no evidence of disease transmission in this county. Objectives: (1) Identify water bodies of freshwater in Recife and set points for collection of the snail, (2) conduct malacological survey, (3) identify the species of *Biomphalaria* and determine their positive for *S. mansoni*, (4) constructing thematic maps by performing the spatial distribution of breeding sites. Methods: The official shape file of Recife water bodies, was exported to Google Earth Pro 6 for viewing on satellite image MPA Link/TeleAtlas and the points were marked where collections of epidemiological importance such as: streams, ditches, ponds and reservoirs. The malacological survey was conducted through the capture of *Biomphalaria* snails and other species of freshwater by the technical man/time/scoop. Breeding sites were georeferenced to spatial data. The snails had their examination performed at the Laboratory of Schistosomiasis CPqAM/Fiocruz, where 5% of specimens collected through the process of dissection to determine the species. The remaining specimens were exposed to light for the elimination of cercariae and those negatives, divided into batches of 50 and submitted to nested PCR molecular test to identify the DNA of *S. mansoni*. The georeferenced data were transferred to ArcGIS environment for the construction of thematic maps which can be viewed breeding sites and foci. The Kernel estimator was used for projection of schistosomiasis risk areas. Results: Preliminary results shows that were identified 26 breeding sites in the Recife city. We examined 2.401 snails B. straminea and of these, 1.025 were submitted to nested PCR technique enabled us to diagnose 03 breeding sites with DNA from *S. mansoni* in the neighborhoods: Várzea, Apipucos and San Martin. In 22 B. straminea breeding sites also were found of Drepanotrema sp, Phyza sp, Pomacea sp and Melanoides tuberculatus. Discussion and Conclusion: The breeding sites of *Biomphalaria* snails infected with *S. mansoni*, indicate the possibility of schistosomiasis transmission in Recife where parasitological survey is being conducted in search of autochthonous human cases.

82 Molluscicidal activity of the hexane extract of the leaf of Gallesia integrifolia against *Biomphalaria glabrata* (say,1818), intermediate host of *Schistosoma mansoni* (sambon, 1907).

Joames Kauffimann Freitas Leal, Jarbas Lima de Carvalho, Mariana Silva Sousa, Gabrieli da Penha Bezerra, Nirla Rodrigues Romero, Fernando Schemelzer de Moraes Bezerra

Schistosomiasis, according to World Health Organization (WHO), affects 200 million people in tropical and subtropical areas worldwide. Many studies have been done in the area control this parasitic disease; one of the measures studied is the control of populations of intermediate hosts: snails of the genus *Biomphalaria*. *B. glabrata* is the focus of these studies because is the most present specie in Brazil, the most susceptible to become infected and it is also the specie which is infected with all geographical strains of Schistossoma mansoni. The population control of this specie is performed with synthetic molluscicides, but they are expensive and cause an ecological imbalance. Researches on natural products areas are very promising in the search for new drugs in different fields. Gallesia integrifolia (Spreng.) Harms, popularly known by the name of Pau d'alho is widespread through southeastern Brazil, being found mainly in Rio de Janeiro and São Paulo states. It is used in folk medicine to treat ulcers, rheumatism and parasitic diseases. The aim of this study was to evaluate the molluscicidal activity of hexane extract of the leaves of Gallesia integrifolia, belongs to the family Phytolaccaceae, against *Biomphalaria* glabrata. We used the snails bred and kept in the Research Laboratory of Parasitology and Biology of Molluscs DACT / FFOE / UFC. To obtain the hexane extract, the leaves of G. integrifolia, after drying and grinding, were extracted with hexane at room temperature, followed by concentration under reduced pressure. Aliquots of the stock solution were added to the dechlorinated water to obtain concentrations of 1000, 100 and 10 ppm. Testing for molluscicidal activity were performed according to the standards of the WHO, 10 adult snails were used per group, with sizes between 10 to 13mm. The snails were placed in 400 ml of test solution, and the mortality assessed at 24 and 48h of exposure. After this time, the animals were removed, washed three times with distilled water and transferred to another tank where they remained for a period of recovery time equal to the exposure. The experiment was performed in duplicate. The hexane extract of the leaves of G. integrifolia caused 20% and 100% mortality at the highest concentration tested, 1000 ppm, with 24 and 48 hours of exposure, respectively. We conclude that it has molluscicidal activity against *B. glabrata* at levels 1000 ppm/48 hours, however, it is indicated a continuation of tests with various concentrations and periods.

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83 Evaluation of the effect of the association immunization/chemotherapy in mice on the efficacy of praziquantel in *Schistosoma mansoni* elimination

Isabela Sena, Flávia Couto, Neusa Araújo, Ana Carolina Mattos, Carina Pinheiro, Sérgio Oliveira, Cristina Fonseca

Introduction: Associating vaccination with chemotherapy is believed to contribute to schistosomiasis control. Due to its essential role in schistosome survival, the parasite tegument itself and its proteins are important targets to be tested in vaccine formulation. Our group has demonstrated that mice immunization with *S. mansoni* schistosomula tegument (Smteg) is able to promote a protective immune response directed toward a Th1 profile. Another tegument protein, Sm200 is a target for antibodies which act synergistically with praziquantel in parasite elimination. Thus, this study evaluated the effect of the association of immunization with Smteg or Sm200 and chemotherapy with praziquantel (PZQ) in mice infected with *S. mansoni*. Methods: C57BL/6 mice were divided in groups of 20 animals: control group, Smteg + CFA/IFA immunized group and Sm200r(1068-1497) + CFA/IFA immunized group. Both experimental groups received three immunizations of 25mg/animal in a 15 day-interval regimen, 30 days after the last immunization mice were infected with 50 cercariae. 45 days post-infection half of the mice were treated with 200 mg/kg of praziquantel. 25 days post-treatment mice were perfused to the parasite load determination. The liver and intestine were collected to determine the number of eggs/gram of organ. Feces were collected from each group on three consecutive days prior to perfusion. Throughout the experiment, blood was collected to obtain serum for ELISA. Sera from Smteg immunized mice were also used in an adult worm culture in the presence of PZQ in order to evaluate, in vitro, the effect of this association. Results: As expected Smteg immunization induced 47% reduction in adult worm ($p<0.05$), 49% and 63% decrease ($p <0.05$) in the number of eggs in the liver and in the intestine, respectively. Immunization with Sm200r(1068-1497) failed to induce protection, although both formulation induced significant production of specific antibodies. Treatment of non-immunized mice with PZQ leads to a reduction of 80% ($p<0.0001$) in worm burden. The association of immunization with Smteg or Sm200 and PZQ treatment did not increase significantly the drug efficacy. In vitro, the presence of Smteg specific antibodies abrogated the tegument damage induced in adult worm tegument by PZQ. Conclusion: Smteg or Sm200r(1068-1497) immunization associated to praziquantel treatment did not increased chemotherapy efficacy, probably to the weak immune response induce by Sm200 immunization and to a strong Smteg humoral response that may blocks PZQ interaction with its target in the parasite tegument.

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84 SPATIAL ANALYSIS OF *Biomphalaria glabrata* FOCI IN THE community santa maria, Aracaju / Se.

Allan Dantas Santos, Mayara Tavares Silva, Márcio Bezerra Santos, Patrícia Pereira Silva, Tiago Carvalho, Gilberto Sampaio, Karina Conceição Araújo

The Schistosomiasis is a severe parasitic disease, chronic, prevalent in tropical and subtropical areas, especially in communities with inadequate water supply and sanitation. In Brazil, the disease is caused by Schistosoma mansoni and data indicate that it affects about eight million people and an estimated 30 million at risk of infection by this parasite. In the Sergipe state, foci of schistosomiasis are emerging in coastal areas where human cases of acute infection have been detected. A significant number of people who are living in slums on the outskirts of the beaches in unsanitary conditions, eventually contaminating the catch basins inhabited by the snail of schistosomiasis. As a result of this type of occupation, new sites of active transmission of the disease are being found on the coast of the state. Spatial analysis and GIS are important tools used to a better understanding of their transmission and distribution. The objective of this study was to analyze the spatial distribution of foci of transmission of Schistosoma mansoni in the community of Santa Maria, the city of Aracaju / SE. We identified 56 water collections of epidemiological significance in that community. The analysis of positivity for *S. mansoni* was made by the method of exposure to light. The database was constructed using the program Excel (Windows 2007). The maps were constructed and analyzed in the TerraView. The availability of data was performed through a query system based on GIS which led to connecting all the stored data describing geographic features. The results were obtained in the form of maps. We surveyed 83 stations with snails. The total number of snails captured was 986, with an average of 16.72 per breeding snails. Of these, 14.91% were identified as the species *Biomphalaria* glabrata. The frequency of positives was 187 (19.17%). There was no identification of the species *Biomphalaria* straminea and *Biomphalaria* tenagophila. The analysis of spatial distribution of foci of transmission of schistosomiasis was related with poor infrastructure of the district surveyed. This reinforces the importance of investment in improvements in living conditions of populations living in these regions. It is essential to invest in the infrastructure of the family home, in networks of exhaustion sanitary and water supply and, above all, measures of health education in order to enlighten people about the ways of prevention of schistosomiasis and other infectious and parasitic diseases.

85 Tourism risk for schistosomiasis mansoni in Porto de Galinhas, Pernambuco, Brazil.

Amanda Talita Oliveira Frutuoso de Souza, Onicio Leal Neto, Elainne Cristine S. Gomes, Ricardo J. P. S. Guimarães, Constança Simões Barbosa

Introduction: Porto de Galinhas is the most sought tourist destination in Pernambuco where many hotels are built in remote areas without sanitation and environmental conditions. *Biomphalaria* glabrata was first introduced with river sand from other locations and now are reproducing in peridomicile contaminated with fecal material leaking from septic tanks. In 2000 and 2010 were recorded 662 and 449 cases of schistosomiasis in this location, occasions that stormwater full of snails have invaded the streets promoting the population´s infection. Objectives and Methods: (1) Determine the spatial distribution of existing hotels and inns in Merepe III, Salinas and Pantanal using Garmin eTrex GPS device to georeference these areas and local hotels. (2) Quantify the influence radius of the hotels and inns in the study area. The data collected were included in existing GIS containing spatial distribution of breeding site/foci of *B. glabrata*. Multiple rings buffers were constructed using 1,000 meters radius with 100 meters of difference between the rings. (3) Make kernel map of the breeding and foci of *B. glabrata* of the locality. Kernel estimator was used for breeding/foci adopting a radius of 150 meters and graphical output stretched to observe the continuous layer of risk. (4) Perform overlapping layers of information to highlight the risk scenario. The overlapping layers of information were done in ArcGIS software for the construction of thematic maps. Preliminary results: The georeferencing of the tourist trade of 14 inns and 01 hotel in Merepe III, superimposed on spatial data of foci/breeding sites allowed to make a kernel map whose results show that 20% and 73% of these are within distance of less than 100 meters of breeding/foci of *B. glabrata*, respectively. Conclusion: The preliminary results point to the exposure risk of tourists to *S. mansoni* infection within a radius of less than 100 meters of the breeding sites/foci of *B. glabrata* on Merepe III.

86 Protection against *Schistosoma mansoni* induced by immunization with tegument nucleotidases associated with a subcurative chemotherapy dose

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Introduction: Morbidity, transmission and infection control are different targets towards the elimination of schistosomiasis, some of which chemotherapy are not effective. An effective vaccine could help to eradicate this disease. The schistosoma's tegument is the main host-parasite interface and a potential source of antigens: three ectonucleotidases, acting on the metabolism of nucleotides, have been identified by proteomics: an alkaline phosphatase (AP), a phosphodiesterase (PhoD) and an apyrase (APY). These are proteins associated to the plasma membrane with their catalytic site directed to the extracellular area. Objective: We assessed whether mice immunized with these recombinant proteins, associated or not with a subcurative praziquantel (PZQ) treatment, are able to elicit a protective immune response against infection with *S. mansoni*. Methods: Mice were immunized subcutaneously with 3 doses in 15-day intervals of the recombinant proteins with Freund's adjuvant. Spleen cells were collected 15 d after the last immunization to assess signaling genes and cytokines expression by real time RT-PCR. For the protection assay, mice were challenged 15 d after the last dose with infective cercariae. In the subcurative PZQ protocol, the animals were treated with a subcurative dose of PZQ (150 mg/Kg) 35 d after the challenge. Blood was collected before and after infection to measure total IgG levels. Worm burden and parasite fecundity were evaluated 45 d post infection in both protocols. Results: There were no differences in the relative expression levels of Myd88, NF-kB1 and 2, IFN-g, IL-4, IL-5, IL-10, IL-12p40 or IL-13 between the treated and control groups. The splenocytes of AP-immunized mice expressed ~8 times more TNF-α, while the group immunized with PhoD expressed ~8 times more TGF-b. Both groups expressed more IL-17 when compared to the APY-immunized mice. All animals presented higher levels of IgG and only PhoD-immunized animals reduced their IgG levels after infection. PZQ treatment did not interfere in the IgG levels. Mice immunized only with the recombinant proteins did not present reduction in worm burden or parasite fecundity. However, when animals received a subcurative dose of PZQ, AP-immunized animals reduced their worm burden by ~40%. Immunization with the combined recombinant proteins did not alter their independent immune response profile, and reduced the worm burden to a similar extent as AP-immunized animals. Conclusion: The subcurative chemotherapy treatment may expose the AP protein in such a way as to allow the immune response to effectively attack the parasite. Supported by FAPESP

87 Assessment of schistomiasis in semi-arid Northeast Brazil under influence of the Project of Integration of Rio São Francisco (PIRSF)

Tereza C. Favre, Lilian C.N.H. Beck & Otávio S. Pieri

Environmental modifications due to irrigation projects are of public health importance as they may contribute to the spread of schistosomiasis and other water-borne diseases. The PIRSF is a large-scale project designed to irrigate areas of the semi-arid Northeast by connecting the São Francisco River with other rivers in the region through canals and dams. The Ministry of Health (MS) considers the PIRSF area vulnerable to schistosomiasis transmission as it harbors populations of the intermediate hosts and favors the settlement of persons from endemic areas. The MS recommends that vulnerable areas should be mapped and surveyed for snail hosts and egg-positive persons aiming to prevent the establishment of transmission. Six research groups from the IOC/Fiocruz were commissioned by the MS to assess the epidemiological situation of schistosomiasis in the municipalities along the North axis of the PIRSF. The present study assessed the occurrence of active transmission and potential risk of the disease installation through stool surveys and epidemiological investigation of schoolchildren. Five municipalities/districts were selected for having favorable conditions for transmission. Municipal health and education agents were involved in the study to provide sustainability for the surveillance activities. Two professionals from each municipality were trained to perform stool exams by the Kato-Katz method (one sample, two slides). The survey was carried out from April/2010 to December/2011 in the following municipalities/districts: Terra Nova (Pernambuco), Distrito Palestina (Ceará), Pombal and Distrito São Gonçalo (Paraíba) and Jucurutu (Rio Grande do Norte). A total of 4,770 schoolchildren were examined, with coverage ranging from 60% to 83% of the eligible population. Six of the examined children were egg-positive for Schistosoma mansoni, five of which were autochthonous as confirmed by epidemiological investigation. The autochthonous cases were from three municipalities: Terra Nova (one case: 0.07%), Distrito São Gonçalo (three cases: 0.4%) and Jucurutu (one out of two cases: 0.08%). The egg-positives were treated with praziquantel (60 mg/kg) under medical supervision. Due to the relatively low sensitivity of the Kato-Katz method in low transmission areas, it is possible that egg-positivity (and hence autochthony) in the PIRSF area was underestimated. The occurrence of autochthonous cases as well as the presence of *Biomphalaria* straminea in the water bodies frequented by the local population strongly indicates the existence of active transmission in the PIRSF area. It is thus recommended that the health managers, both at the local and regional level, are made aware of the situation and take the required surveillance actions. Support: SVS/MS and IOC/Fiocruz

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88 RATIO OF POSITIVITY TO *Schistosoma mansoni* BETWEEN TRADITIONAL AND ALTERNATIVE HOSTS: MOLLUSCS, HUMANS AND RODENTS IN THE MUNICIPALITY OF SÃO BENTO, MA.

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In the city of São Bento, precisely in the Western Lowland of Maranhão, in addition to the traditional cycle of the snail *Biomphalaria* glabrata and man, it was possible to detect the presence of an alternative cycle between snail and rodent species Holochilus brasiliensis, a factor that contributes further to the spread of schistosomiasis in the micro. In July the snails in the study were collected in the area of the marshland in the neighborhood called Outra Banda resulting in two breeding. To collect shells were used to capture and appropriate metal clamps. The snails collected were stored in plastic bags, labeled and taken to the laboratory. All breeding collection were georeferenced, with the following coordinates a) breeding I: S0 2° 41'40.2 "HO 44° 49'23, 1" b) breeding II: SO 2° 41'40.2 "HO 44° 49'22, 8". Invertebrates were counted a total of 270 copies in the container I, and 83 in the container II, they were kept in aquarium glass with dechlorinated water, and 0.5 L for each specimen. Were adequately fed with lettuce and the aquarium were cleaned twice a week. In the laboratory the snails were submitted to a specific procedure for the cercariae, that the results were negative for both breeding. In the capture of rodents, we used Tomahawk traps placed in areas near the breeding places of snails at night with bait and observing from a distance of 10 meters of each other, but it was realized that there are no conditions in the neighborhood for the survival of these rodents, factor by the absence thereof. To collect human faeces were distributed universal collectors for the residents living at a distance of 50 meters of the natural breeding of molluscs, a total of 15 houses, distributed according to the number of family members. The next day they were collected 31 collectors in total homes in the neighborhood Outra Banda. The material analysis was performed in the laboratory of Human Parasitology UEMA using the Kato-Katz. So far of 100%, 25% were found positive. The results were given to patients in the following month, and in positive cases, they were advised to seek adequate medical care. Therefore, at least this month there was no positive relationship between the traditional hosts, because the snails were found negative for *S. mansoni*, while there were people infected with the disease, suggesting a strong independence of the hosts.

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89 Comparation of the bioactivity of methanol extract and broth of ginger (Zingiber officinale) against *Schistosoma mansoni*.

Aline Pereira, Débora Alves, Aline Rodrigues, Laila Amorim,Raquel Martins-Souza

Abstract: The development of such resistance has drawn the attention of ma=y authors to alternative drugs. The present work aimed to compare antisch=stosomal activity of crude methanol extract and broth of ginger (Zingiber=fficinale) against Schistosoma mansoni. In vitro tests methanol extract =nd broth of ginger was able to interrupt the oviposition and maturation o= *S. mansoni* eggs, which remained at the 1st or 2nd stages. The total num=er of morphologically dead eggs found in culture of worms exposed to meth=nol extract and broth of ginger was significantly higher than the number =f viable eggs in control group. The worms exposed to methanol extract and=roth of ginger, did not show any morphological change under observation =sing an inverted microscope, using 100X magnification. The tegument was f=und to be apparently complete, and the worm motion similar to that of the=ontrol group.

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90 SCAN: Schistosomiasis Collection at the Natural History Museum

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SCAN, the Schistosomiasis Collection at the Natural History Museum (NHM), is creating a repository of schistosome-related specimens and data to support field studies and future research projects. At present, working in support of the Schistosomiasis Consortium for Operational Research and Evaluation (SCORE), SCAN has deposited over XX larval schistosome specimens in the last 12 months from Niger, Zanzibar and Tanzania, and has a growing snail collection. Bringing museum collection management practices into field-sampling regimes is beneficial in considering the handling of samples and data from the outset, and the creation of a well managed collection with accompanying context data will create an accessible resource for longitudinal surveys and comparisons beyond the scope of the original research programme. NHM has an excellent track record for collections management and their long-term maintenance. With projects such as SCAN and the NHM's new molecular collections facility, the museum is developing this infrastructure to enable collections management support for field-based research projects. Part-funded by the Wellcome Trust until 2015, SCAN is available to act in support of ongoing and new field schistosomiasis sampling projects additional to the SCOREprogramme. For further information see http://www.nhm.ac.uk/research-curation/collections/curation-groups/scan/index.html

Abstracts Poster - *"Biomarkers, Immunoregulation and Diagnostics"*

91 Lymphoproliferation and il-10 production by mononuclear cells from mice adult offspring of schistosomotic mothers in response to ovalbumin

Gabriela Holanda, Maria Conceição Silva, Cassia Nobrega, Iana Sales, Patricia Santos, Erica Fernandes, Monica Albuquerque, Vláudia Costa, Valdenia Souza

Infecções esquistossomóticas maternas são comuns em áreas endêmicas. A exposição aos componentes parasitários in utero e através da amamentação modula a resposta imune a antígenos homólogos. Com relação aos antígenos heterólogos, experimentalmente, observou-se que os descendentes adultos previamente amamentados em mães esquistossomóticas apresentaram uma potencialização da produção de anticorpos anti-OVA e maior produção de IL-2, enquanto a gestação levou a diminuição dos níveis de anticorpos e maior produção de IL-10. Aqui, objetivou-se investigar a produção de IL-10 pelas células T e macrófagos e a expressão de moléculas ligadas à proliferação celular (CD71) nos descendentes. Para tanto, foram utilizados camundongos Swiss webster fêmeas não-infectados (30 dias) ou infectados (20 cercárias *S. mansoni*), após 60 dias, tiveram seus estros sincronizados e foram acasalados. Logo após o nascimento, procedeu-se amamentação adotiva e formaram-se quatro grupos experimentais (n=10 imunizados e 5 não imunizados): 1) Animais apenas amamentados em mães infectadas (AI); 2) Nascidos e amamentados em mães infectadas (MIAI); 3) Apenas nascidos de mães infectadas (MI) 4) Nascidos e amamentados em mães não-infectadas (CONTROLE). Animais dos diferentes grupos de estudo foram imunizados com Ovalbumina(OVA), em Adjuvante, no 45º dia de vida. Oito dias pós-imunização, os camundongos tiveram seus baços retirados e as células esplênicas foram cultivadas com OVA e submetidas à marcação com anticorpos anti-CD3, anti-CD14, anti-CD71 e anti-IL-10 marcados com substâncias fluorescentes e posterior leitura em FACS. Os animais imunizados AI e MIAI apresentaram frequência três vezes maior (3% e 3,5%) de células CD3+CD71+ (proliferação) quando comparados aos animais AI e MIAI não imunizados (1%), e aos do grupo MI (1,8%) e Controle (1,7%). Após a imunização, a presença de IL-10 em células CD3+ foi em torno de 0,3 vezes menor para todos os grupos imunizados quando comparados com os animais não imunizados, sendo ainda menor no grupo MIAI imunizado (0,33%) em relação ao mesmo não imunizado (1,43%). Uma frequência maior de células CD14+IL-10+ foi observada no grupo MI não imunizados (11,3%) do que nos outros grupos experimentais não imunes (AI=4,7%; MIAI=1,5%; Controle=7,8%). Quando imunizados as frequências de células CD14+IL-10+ foram semelhantes (cerca de 6,4%). Então, a amamentação em mães esquistossomóticas promove uma proliferação de linfócitos T anti-OVA e dimunui a síntese de IL-10, enquanto que o ambiente uterino favoreceu a presença de macrófagos produtores de IL-10 nos descendente adultos. Estes resultados corroboram o caratês estimulador da resposta imune da amamentação em mães infectadas pelo *S. mansoni*.

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92 Schistosoma spp antigens modulate the th1 inflamatory response in vitro in htlv-1-infected individuals

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Introduction- HTLV-1 is the causal agent of Adult T cell Leukemia/lymphoma (ATLL) and HTLV-1-associated Myelopathy/Tropical Spastic Paraparesis (HAM/TSP). While the immune response to HTLV-1 infection is polarized to the Th1-type, chronic helminth infections drive the Th2 and Treg-type of immune response, and are able to down-regulate the inflammatory response involved in some auto-immune diseases. Our hypothesis is that Schistosoma spp. antigens alter the in vitro cytokine response in HTLV-1- infection. Methods- The Schistosoma antigens Sm29, ShTSP2 and PIII were added to the cultures of PBMC from HTLV-1- infected individuals and the levels of IFN-g and IL-10 in the supernatants were measured using ELISA sandwich method. Results- Compared to the levels of cytokine in non-stimulated PBMC cultures, the levels of IFN-g was reduced by the presence of Sm29 in 50% of patients ($p<0.05$; mean reduction 59%). In 69% of them there was a decrease in the levels of this cytokine by the presence of ShTsp2 (mean reduction 47%) and the addition of PIII resulted in a decrease in the levels of IFN-γ in 50% of patients (mean reduction 35%). On the other hand, the levels of IL-10 increased by the addition of Sm29, ShTSP2 and PIII in 74%, 62%, and 44% of individuals, respectively ($p<0.05$). The mean increases were 327%, 573% and 35%, respectively. The down-regulation of IFN-γ production in the presence of the Schistosoma antigens in the cultures was observed mainly in subjects who had lower basal levels of this cytokine. Conclusion- Schistosoma spp. antigens are able to down-modulate IFN-γ production in vitro, by PBMC of HTLV-1-infected individuals; mainly in those who had lower basal levels of this cytokine. It may be associated to the increased levels of IL-10 induced by the antigens. Financial support- CNPQ (Universal 479417/2008 3), NIH (R01AI079238A).

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93 Detection of IgE subtype reactive against potato apyrase in schistosomiasis patients

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Introduction: There are a number of reports that show resistance to *S. mansoni* re-infection following chemotherapeutic cure of endemic populations correlated with older age and elevated IgE titers against worm antigens. There are few antigens identified in *S. mansoni* extracts capable to promote an IgE response. Most of these antigens are located on the parasite surface. Previously, high percentage of structural identity and cross-immunoreactivity were described between potato apyrase and specific ATP diphosphohydrolase isoforms from *S. mansoni*, suggesting the existence of both conserved domains and epitopes particularly shared between the vegetable and parasite proteins. Material and methods: Aliquots (100 mg of total protein) of SWAP were electrophoresed in 10% SDS-PAGE, electroblotted onto nitrocellulose membrane, and the Western blots were developed with pooled sera (diluted 1:20) obtained of schistosomiasis patients. As positive controls, the Western blots were also developed with rabbit polyclonal anti-potato apyrase antibodies diluted 1:1000. The membranes were revealed by chemiluminescence using specific secondary antibody coupled to horseradish peroxidase and luminol as substrate (ECL kit) and exposed to X-ray film. The IgE antibody reactivity of serum samples diluted 1:20 from healthy individuals (control; n= 8) or schistosomiasis patients (n= 20) with potato apyrase (5 mg/well) bound to ELISA plates was quantified using peroxidase-conjugated antibody isotype-specific and OPD/H2O2 as substrate. Results: As observed by Western blots, the polypeptides identified as ATP diphosphohydrolase isoforms by immune serum anti-potato apyrase were also recognized by IgE antibodies from pooled sera of schistosomiasis patients. By ELISA, and after depletion of IgG antibody, specific IgE antibody reactivity with potato apyrase was elevated in patients with schistosomiasis, significantly ($p < 0.001$) higher than that found in serum samples from healthy individuals. Fifteen (75%) of the 20 patients with schistosomiasis had specific IgE seropositivity with this vegetable protein. Conclusion: The results suggested that *S. mansoni* ATP diphosphohydrolase isoforms, previously identified in soluble egg (SEA) and adult worms (SWAP), have epitopes able stimulating the IgE antibody production during schistosome infection. Financial Support: FAPEMIG, CNPq, UFJF.

94 Capturing Local Antibodies for the Discovery of Larval-Specific Vaccine Candidates Against Schistosomiasis

Hamish McWilliam, Patrick Driguez, David Piedrafita, Kevin Maupin, Brian Haab, Els Meeusen

Schistosomiasis is one of the most common helminth infections, and there is no vaccine currently available. Many vaccine candidates have been tested; however none have reached the high level of immunity induced by the radiation-attenuated larval vaccine, a model which implicates larval antigens as having high protective potential. In this study we employed a novel strategy for the discovery of larval-specific Schistosoma japonicum vaccine antigens which captures the antibodies induced by the migrating larvae as they infect the skin and lungs of rats. Cells from lymph nodes (LN) draining these tissues, and the spleens and liver-LN where adults reside, were cultured to allow the in vivo induced antibody secreting cells (ASC) to release antibody into the media. The antibody-containing supernatants (ASC-probes) differed significantly at each infection site in the amount of antibody at different time periods, corresponding with the migration path of the schistosome larvae, with the peak in antibody at 5 and 9 days post-infection in the skin and lungs, respectively. In addition, the isotypes induced were significantly different in each tissue compartment. Skin- and lung-LN, but not liver-LN, ASC-probes recognised the surface of the infective stage larvae, indicating unique surface antigens are expressed by the larvae before they mature in the liver, in agreement with western blots revealing different protein recognition profiles and stage-specific antigens with the different ASC-probes. Use of a schistosome-specific protein array identified a novel antigen, recognised by skin and lung antibodies, and was found to be highly up-regulated in larval stages by real-time PCR. Additionally, screening of a glycan array also detected different carbohydrate specificities recognized by serum and ASC-probes. Through capturing the local antibody response with ASC-probes, the present study has revealed dramatic differences in the quality and specificity of the immune response at different tissue sites. In addition, it has identified a stage-specific protein and indicated the presence of larval-specific carbohydrate antigens. This method provides a valuable tool for the isolation of novel vaccine targets against the larval stages of schistosomes.

95 New approaches with different types of CCA for the diagnosis of patients with low *Schistosoma mansoni* load after intensive parasitological trial

Rafaella Grenfell, Donald Harn, Smanla Tundup, Akram Da`dara, Liliane Siqueira, Paulo Marcos Coelho

Schistosomiasis mansoni is a serious debilitating and sometimes fatal disease. Accurate diagnosis plays a key role in patient management and infection control. However, currently available diagnostic methods are not ideal. Therefore, the selection of target diagnostic antigen candidates has turned out to be a promising tool for the development of new, more sensitive diagnostic methods. In previous investigations, crude antigens were tested and presented some advantages, though false-positive results were frequent. Recently, we turned our focus to developing innovative methodologies that employ highly purified Schistosoma mansoni antigens. Specifically, we focused on purified Circulating Cathodic Antigen (CCA) glycoprotein, a recombinant CCA protein and two individual CCA peptides. These schistosome proteins/peptides were tested in a new diagnostic method employing Immunomagnetic separation based on the improvement of antigen-antibody binding. Use of recombinant CCA as a diagnostic antigen allowed us to develop a diagnostic assay with high sensitivity and specificity with no false-negative results. Interestingly, purified CCA worked as a better diagnostic antigen to demonstrate cure after praziquantel treatment to eliminate schistosomes. Lastly, our new diagnostic method was superior to Enzyme-linked Immunosorbent Assay (ELISA) in discriminating positive and negative cases, even for low endemicity patients.

96 Diagnosis of acute schistosomiasis: Standardization of an immunological method using sera from travelers recently infected in a new focus of *Schistosoma mansoni*

Rafaella Grenfell, Watson Martins, Sandra Drummond, Carlos Maurício Antunes, Edward Oliveira, Cristina Toscano, José Roberto Lambertucci, Paulo Marcos Coelho

Background: The diagnosis of schistosomiasis mansoni on early stages of infection is important to prevent late morbidity. A simple, cheap, sensitive and specific assay for routine diagnosis of schistosome infection based on the detection of specific IgG for schistosomula tegument antigen was developed by our group (ELISA-SmTeg). Methodology/Principal Findings: We describe here an acute outbreak involving a travel group of 80 individuals from a non-endemic area of the State of Minas Gerais, Brazil. These individuals were in contact with a freshwater pool where *Biomphalaria* glabrata was found. Results obtained from our new methodology were compared to IgG antibody titers against adult worm antigens (SWAP) by ELISA and, also to parasitological examination, ultrasonography and clinical findings. ELISA-SmTeg was capable of detecting 64 positive cases among the 80 individuals participating at the survey with a positivity ratio of 80% and a higher sensitivity than ELISA-SWAP that was only sensitive for 56% of positive cases. Besides, a significant correlation was found for the severity of the infection and the specific IgG titers against SmTeg. Conclusions/significance: Our data showed that ELISA-SmTeg might serve as the initial diagnostic tool for acute stages of the infection in community-based helminth control programs or for non-endemic patients' surveillance.

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97 Validation of a non-commercial kit of PCR-ELISA for diagnosis of schistosomiasis mansoni

Carolina Souza, Luciana Gomes, Martin Enk, Paulo Coelho, Ana Rabello

The PCR-enzyme-linked immunosorbent assay (PCR-ELISA) combines an immunological method to detect the PCR product directly after immobilization of biotinylated DNA on a microplate, allowing large-scale screening analysis. A non-commercial kit of PCR-ELISA for diagnosis of schistosomiasis mansoni was developed and validated using 206 fecal samples (500 mg) from inhabitants of Pedra Preta, Minas Gerais, an endemic area in Brazil. The new assay presented an analytical sensitivity of 3 fg of Schistosoma mansoni DNA and a satisfactory repeatability (coefficient of variation: 0.82-7.68%). The performance was assessed by comparison with the parasitologic Kato-Katz technique (twelve slides examined, corresponding to 500 mg of feces) and a commercial PCR-ELISA kit, previously used in the same population. The sensitivity was 97.37 % (95% confidence interval [CI], 86.50%-99.53%) and the specificity was 88.69 (95% CI, 83.01%-92.64%), taking the Kato-Katz results as the reference method for comparison. From samples with discordant results between Kato-Katz analysis and the Schistosoma PCR-ELISA, 8 out of 19 (42%) were positive in subsequent Kato-Katz examinations of additional samples. The Kappa index of 0.929 (95% CI, 0.793-1.065) indicates excellent agreement between the commercial and non-commercial PCR-ELISA methods evaluated in the same group of study. In conclusion, the non-commercial PCR–ELISA developed constitutes a robust tool for the diagnostics of *S. mansoni* infections. It should be validated in a multicenter trial to be transferred from the expert laboratory to reference laboratorial settings in Brazil. Financial support: PDTIS/Fiocruz, CNPq

98 Clinical characterization of Schistosomal Myeloradiculopathy in patients attended at the Hospital of the Federal University of Alagoas (Alagoas- Brazil)

Thiago Andre Alves Fidelis, Sandra Costa Drummond, Janira Lúcia Assumpção Couto, Rozangela Maria de Almeida Fernandes Wyszomirska

Introduction: The prevalence of Schistosomal Myeloradiculopathy (SMR) in endemic areas is unknown. As the number of reported cases is increasing, admits the occurrence of failure on notification of new cases and the morbidity of this ectopic lesion has been underestimated. Objective: The objective of this study is to describe the clinical profile of 13 patients with SMR reported from Academic Hospital (Federal University of Alagoas), evaluated in Maceio (Alagoas-Brazil). Methodology: This is a retrospective study, collecting data from medical records of patients diagnosed with SMR, in a period of seven years (2005-2011). The data were stored in a software Epi Info™ 3.5.2 database's and was applied simple descriptive statistics to quantitatively analysis. Results: Analysis was performed on medical records of 13 patients with a positive diagnosis for SMR, one patient was admitted to the hospital services in 2005, 2 cases of hospitalization in 2006, 1 case in 2007, 6 in 2010 and 3 in 2011. Considering 13 patients, there was predominance of males (69,2%), the youngest found was 8 years old the oldest 75, and the median age was 37 years. The clinical manifestations presents lumbar pain in 84,6%, lower limbs pain 38,5%, low-toracic pain in 30,8%, fever in 15,4%, paresthesia in lower limbs 53,8%, lower limb muscles weakness in 76,9%, 30,8% (4) was unable to walk, intestinal constipation in 69,2%, bladder retention in 38,5%, bladder loose in 53,8% and, 2 men presented sexual impotence. The spinal cord level most affected was between T10 to T12 with 76,9% (10 patients) detected. Conclusions: The results show consistency with reported in other studies, referring to the clinical findings described. There are no clear indication on literature, regarding the sign of fever, hypo or hyperactivity of the bladder with Schistosomal Myeloradiculopathy patients. It is necessary more studies to reveal the presence of such signs.

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99 EOSINOFILIA TOTAL E IMUNOGLOBULINA E/ IgE EM UMA POPULAÇÃO INFECTADA POR *SCHISTOSOMA MANSONI* E HELMINTOS INTESTINAIS.

Danielle Gama, Celina Lacet, Maria Santos, Maria Alves, Darlan Oliveira, D'narte Bastos, Rozangela Wyszomirska

Introdução: A esquistossomose masônica (EM) é doença endêmica, parasitária, representando grave problema de saúde pública, podendo evoluir para forma grave hepatoesplênica. Apresentando maior prevalência na região nordeste, comprometendo 68,63% municípios do estado de Alagoas. A fibrose hepática apresenta relação direta com imunoglobulinas. Níveis elevados de eosinófilos e imunoglobulinas são característicos de infecções helmínticas e condições de hipersensibilidade. Os estudos sobre níveis séricos de IgE na esquistossomose mansoni são escassos. Objetivos: Determinar a freqüência de EM em zona endêmica e verificar níveis séricos de eosinófilos e IgE total em portadores de *S. mansoni* e geohelmintos, comparando com grupo controle. Correlacionar carga parasitária de *S. mansoni* com eosinófilos e IgE total. Metodologia: Estudo de corte transversal de base populacional em área endêmica para esquistossomose, de novembro de 2007 a agosto de 2008. Após aprovação no Comitê de Ética em Pesquisa da UNCISAL, nº 014831/2006-11, foram analisados 3030 indivíduos, incluídos 547, de 02 a 70 anos (25,44) com 53,93% feminino. Diagnóstico de EM, enteroparasitoses e gravidade da infecção foram determinados pela técnica de Kato-Katz. Hemograma para níveis de eosinófilos e sistema de quimioluminescência automatizado para quantificação de IgE total. Os pacientes foram divididos em grupos: G1 21,02% (115) *S. mansoni*/geohelmintos; G2 23,22% (127) *S. mansoni*; G3 27,24% (149) geohelmintos e G4 28,52%(56) grupo controle, com parasitológico negativo para helmintos. A análise estatística utilizou o software SPSS 11.5, parte descritiva e inferência dos dados, teste t, ANOVA, qui-quadrado e teste exato de fisher. Resultados: Inquérito coprológico realizado em 3030 indivíduos, em 1209 (39,90%) houve positividade para *S. mansoni* e geohelmintos, com prevalência de *S. mansoni* em 242 (20%). A média de eosinófilos absolutos no G1 foi 920,33±1011,32; G2 817±724,46; G3 755,72±795,97; G4 391,26±507,43. Comparando G1 com G2 e G1 com G3 sem diferenças significantes ($p>0,05$). Houve diferença significante ($p<0,05$) na comparação dos grupos parasitados e G4. Os níveis de IgE total foram mais elevados no G1(2802,08±2749,17), verificando diferença significante ($p<0,05$) em relação aos demais grupos. A carga parasitária de *S. mansoni* (G1 e G2) variou de 24 a 4080 OPG (moderada). Observou-se correlação significante entre carga parasitária de *S. mansoni* , eosinófilos e níveis de IgE. Conclusão: A prevalência de 20% de EM está relacionada às precárias condições socioeconômicas. Os eosinófilos tiveram importância complementar no diagnóstico para a EM e helmintíases e os níveis de IgE foram significantes apenas em pacientes poliparasitados.

100 Evaluation of the effect of breast milk of mice with schistossomiasis in the activation and proliferation of lymphocytes

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Gestantes cronicamente infectadas pelo Schistosoma mansoni são comuns em áreas endêmicas. A exposição aos componentes parasitários in utero e através da amamentação modula a resposta imune a antígenos homólogos. Com relação aos antígenos heterólogos, experimentalmente, observamos que os descendentes adultos previamente amamentados em mães esquistossomóticas apresentaram uma maior estimulação da resposta imune anti-OVA, observada pela potencialização da produção de anticorpos anti-OVA e maior produção de IL-2. Nesse contexto, um açúcar presente no leite materno humano, o Lacto-N-Fucopentose III (LNFP-III), também está presente nos ovos do *S. mansoni* e promove a linfoproliferação. Assim, é possível que devido à esquistossomose materna, o leite contendo anticorpos (anti-SEA) e açúcares imunomodulatórios (LNFP-III), além de citocinas, podem atuar nos linfócitos e nas células apresentadoras de antígenos esplênicas imaturas e, como consequência, favorecer uma maior estimulação da resposta imune nos descendentes quando na vida adulta. Este estudo teve como objetivo avaliar a proliferação de linfócitos esplênicos, imaturos e funcionais, cultivados na presença de leite materno de mães infectadas e mães não infectadas, acrescido ou não de SEA. Para isto, foram utilizados camundongos Swiss webster fêmeas não-infectados (30 dias). Após 60 dias, as fêmeas tiveram seus estros sincronizados e foram acasalados. Os filhotes que não tiveram contato com o parasita, tiveram seus baços retirados com 7 dias e 6 semanas de vida e foi obtida a suspensão de células esplênicas, que foram cultivadas na presença de diferentes estímulos: meio de cultura, leite de mães infectadas pelo *S. mansoni*, leite de mães não infectadas acrescido ou não de SEA. Após 24hs de cultivo, as células foram coletadas, lavadas e submetidas às marcações com anticorpos monoclonais para medir a proliferação e ativação dos linfócitos T. Em relação à porcentagem de linfócitos T que expressavam a molécula de proliferação CD71, não foram observadas diferenças estatísticas seja nas células esplênicas imaturas ou funcionais, quando comparados ao basal (meio) ou entre os estímulos. Contudo, para os linfócitos T que expressavam a molécula CD28, nas células imaturas, foi verificada uma menor porcentagem dessa dupla marcação, apenas em resposta ao leite de mães infectadas. Essa menor expressão, foi revertida quando as células atingiram sua funcionalidade (células adultas). É interessante observar que para o leite de mães infectadas pelo *S. mansoni* ou leite de mães não infectadas, porém, acrescido de SEA, a expressão de CD28 em Linfócitos T foi maior apenas nas células funcionais.

101 Correlation of hepatic fibrosis patterns and quantification of regulatory T cells in patients with hepatitis C, schistosomiasis or co-infection

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Introduction: Hepatitis C and schistosomiasis are some of the major public health problems in Brazil as well as worldwide. The main target of these two diseases is the liver tissue, and injuries tend to evolve to chronicity. When these diseases occur in association, may lead the patients to develop cirrhosis and hepatocellular carcinoma more quickly. It is believed that regulatory reg T cells are responsible to protect liver tissue damage caused by the strong cellular immune response. Therefore, our objective was to correlate the degree of fibrosis found in patients with hepatitis C, hepatosplenic schistosomiasis (HSS) and in the co-infection with the amount of Treg cells (natural, induced and total). Material and Methods: Patients with HSS, hepatitis C or co-infection, both sexes, aged up 18 to 65 years old, were selected from Clinical Hospital, Federal University of Pernambuco and a blood sample was collected for PBMCs separation (Ficoll-Hypaque Method). The cytometry technique was procedure through labeled cells with anti-CD4+-APC, anti-CD25+-FITC and anti-FOXP3+-PE antibodies (BD-Biosciences) and the fluorescence samples were detected by BD FACScalibur flow cytometer. The analysis was performed by the CellQuest PRO software and the statistical methods utilized to compare the liver fibrosis patterns and the quantities of Treg cells in the groups were Student t test and ANOVA, with p value < 0.05. Results: Consistent with the immunological point of view, T reg cells are present in large amounts in diseases with less morbidity, as was observed in the group with HSS when comparing the relative amount of Treg cells among the three groups of patients ($p < 0.05$), which may indicate a protective effect of these cells in liver tissue. No differences was found when was compared the relative amount of Treg cells and the degree of hepatic fibrosis between the groups with hepatitis C and co-infected patients ($p > 0.05$). However, when was evaluated for the pattern of fibrosis, was observed a higher relative amount of induced Treg cells in the group with advanced HSS in comparison with co-infected group, with $p < 0.05$. Conclusion: These results show that the higher quantities of Treg cells appear to be associated with less liver damage. However, further studies should be developed to elucidate the role of these cells in front of these two diseases, separately or when occur together and if their presence may indicate a protective effect against liver tissue injuries observed in both pathologies.

102 Haemostatic alterations in hepatosplenic schistosomiasis associated to chronic B or C Hepatitis

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Background: In endemic areas for schistosomiasis is frequent the association of the hepatosplenic (HS) form with chronic hepatitis B or C principally after episodes of digestive bleeding. The aims of this study were to evaluate the functional activity of haemostatic proteins in both groups of schistosomiasis patients (pure and combined with chronic B or C hepatitis virus) Methods: All patients were submitted to clinical examination, abdominal ultrasound (US) and digestive endoscopy at Gastroenterology service, UFPE. Coagulation screening using prothrombin (PT), thrombin (TT), and partial thromboplastin time (PTT) was carried out on 55 HS schistosomiasis (group I) and on 29 schistosomiasis with concomitant chronic viral hepatitis B or C, mixed disease (group II). Moreover, the functional activity of factors (II, VII, VIII, IX and X), protein C (PC), antithrombin IIa (ATIIa), human tissue plasminogen activator (t-PA), plasminogen activator inhibitor 1 (PAI-1), and D-dimer (DD) were measured by immunoturbidimetry, chromogenic methods and enzyme linked immunosorbent assays. Patients with alcoholism, steatosis, systemic disease and in use of anticoagulants drugs were carefully excluded. The group I presented in the US periportal fibrosis and the group II besides the periportal fibrosis there were a fine pattern of fibrosis in the hepatic parenchyma. Results: There was no significant difference when analyzed parameters such as age, sex and periportal fibrosis. When analyzed the routine liver tests, the group II were showed lower albumin levels and higher AST, ALT than group I, [3.4x4.0 g/dL (p=0.0003)/65x39 U/L (p=0.001) and 52x31 U/L(p=0.01). The other hepatic tests didn't show any alterations. It was observed that the group II exhibited lower PLT and prolongation of PT when compared to group I (78.000/mm3x101.000/mm3, p=0,003 and 19.7x18.8 seconds, p = 0.04). In relation to the coagulation blood factors it was shown that the group II presented lower average activity of factors VII (41.5x49.9%, p=0.02) and II (52.8x65.1%, p<0.0001), when compared to group I. Besides, the levels of PC in patients with mixed disease was lower than in HS patients (50.2x63.8% p=0.004), ATIIa (69.2x91.0% p<0.0001) and the value of DD and tPA in patients with mixed disease was higher than that in HS patients (469x210 ng/dL, p <0.001) and (141.4x57.1 ng/mL p=0.05). Conclusions: The present study shows that the chronic B and C hepatitis present decrease of coagulation factors, reduction in PC and ATIIa activity and high levels of fibrinolytic markers showing that the liver function and blood coagulation in schistosomiasis disease is aggravated.

103 Atopy and allergic disease distribution on Schistomiasis endemic areas.

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Since the description of the hygiene hypothesis by Strachan in 1989, several studies have been directed to the understanding of the relationship between allergic diseases and helminthic infections. Studies developed in Latin American and African countries suggest that geohelminth and Schistossoma species confer protection against allergic disorders. Based on these observations the present work aimed to investigate the relationship between allergic diseases and helminth infection. A cohort study in two localities that have undergone dramatic changes in the levels of helminth infection was performed. Individuals of different ages living in two helminth endemic localities in the north of Minas Gerais state, Brazil, were recruited. A retrospective study was performed with data and sera collected in the years 2007 and 2010 in one village and 2004 and 2006 in the second. They were assessed for clinical allergic diseases using the International Study of Asthma and Allergies in Childhood questionnaire. Their serum allergen-specific IgE for the common aeroallergen Dermatophagoides pteronyssinus and for the Ascaris lumbricoides were measured by ELISA. Fecal exams were performed for the analysis of the presence of helminth infections. A total of 293 (mean age 29,6 years old) individuals were recruited from village 1 and 233 (mean age 27,9 years old) from village 2. At the beginning of the study the majority of helminth infections were related mainly to *S. mansoni* dropping to half after treatment (39,6% to 17,1%, 38% to 26% in village 1 and 2 respectively). In contrast to the other age groups evaluated, the age group from 7 to 29 years old maintained a higher percentage of infected individuals. In the first year of investigation, 8,2% of the individuals were atopic decreasing to 6,1% in the second year. The incidence of allergic disease was 7,5% in the rural area evaluated. The higher levels of IgE anti-ascaris and IgE anti-derp-1 were observed on individuals on the age group from 7 to 29 years and anti-derp-1 IgE level decreased drastically on the age group from 30 to 49 years. The differences of IgE anti-derp-1 level between allergic and non allergic and IgE anti-derp-1 and helminth infection were not statistically significant in the years researched (p=0,927 and p= 0,338/ p= 0,173 and p= 0,098 respectively). Also, a relationship between helminth infection and allergic disease was not observed. In our study, helminthic infections were not significantly associated with anti-mite allergen or with risk of allergic disease.

104 Potato apyrase induces production of IgE antibodies reactive with *Schistosoma mansoni* antigens.

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Introduction: The effector mechanisms of the immune response in multiple helminthes infections are due to the size and diversity of parasites antigens. The susceptibility to infection by Schistosoma mansoni may be related to elevated levels of IgM and the early induction of blocking antibodies IgG2 and IgG4 which interfere with the function of protective antibodies as IgE, IgG1 and IgG3, blocking the phagocytic activity stimulated by these antibodies. Thus, molecules able inducing protective antibodies and regulatory cytokines are important targets for developing vaccines and therapies for schistosomiasis. The potato apyrase shares epitopes with *S. mansoni* ATP diphosphohydrolase isoforms, which were involved in immune responses during schistosomiasis. Material and methods: Polyclonal antiserum anti-potato apyrase was obtained from seven-week old Swiss mice that were Inoculated by the peritoneal route with two injections of potato apyrase (10 mg), the first injection emulsified in Freund's complete adjuvant and the other, in Freund's incomplete adjuvant, and delivered in 15-day interval. Fifteen days after the last inoculation, animals were infected with 50 cercariae of *S. mansoni* LE/BH strain. The IgE antibodies reactivity was quantified using pooled samples of the pre-immune serum (control, n= 4) or immune serum (n= 6), before and after the infection. The IgE antibody bound to ELISA plates coated with potato apyrase (5 mg/well) or SEA (10 mg/well) was quantified using serum sample diluted 1:20 and peroxidase-conjugated antibody isotype-specific and OPD/H2O2 as substrate. Results: The serum samples were depleted of excessive IgG antibody. The IgE reactivity level in serum samples of animals pre-immunized with potato apyrase (0.344 ± 0.100) was higher than that found in control serum samples (0.176 ± 0.018). When the capture antigen was SEA, IgE reactivity of the immunized animals (0.703 ± 0.602) remained significantly elevated. After infection, the specific IgE antibody level against potato apyrase remained elevated and similar among animals previously immunized (1.015 ± 0.975) and controls (0.493 ± 0.289). This same pattern of antibody reactivity was observed for SEA. Conclusion: Immunization with potato apyrase induces production of IgE antibodies, which react with shared epitopes from ATP diphosphohydrolase isoforms, proteins previously described in SEA preparation. In addition, the results suggest that epitopes within *S. mansoni* ATP diphosphohydrolase isoforms are capable to induce IgE production in animal models. Financial Support: FAPEMIG, CNPq, UFJF.

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105 SURFACE MARKERS, INTRACELLULAR CYTOKINE AND ANTIBODY RESPONSES IN RESIDENTS IN ENDEMIC AREA FOR SCHISTOSOMIASIS: A FOLLOW UP STUDY.

Alessandra Rocha Miranda, Rosiane Araujo de Souza, Stephen Davies, Conor Caffrey, Alda maria Soares Silveira, Elaine Speziali de Faria, Elizabeth Castro Moreno, Lucia Alves de Oliveira Fraga

Expression of surface markers and cytokines by leukocytes from S.mansoni-resistant and-susceptible Brazilian subjects were evaluated. Subjects from two villages (Corrego do Bernardo and Corrego do Melquiades, Minas Gerais State) were categorized based on the results of stool examinations in follow-up studies. Who tested negative for *S. mansoni* eggs in all examinations were classified as persistent negative (PNEG). Those who tested positive in at least 2 examinations were classified as oscillating (OSC) due to a state of infection and reinfection. The OSC group was further divided in two categories, positive (OSC+) and negative (OSC-), according to the presence of infection at the time of blood collection. Of 71 individuals tested, 38 were persistently negative for eggs (PNEG) and 33 displayed oscillating results (OSC), of which 11 belonged to group OSC- and 22 to group OSC+. The frequencies of CD3+ T cells producing intracellular cytokines (IL-4, IL-10 and IFN-γ) after in vitro stimulation were evaluated. After age adjustment (<40 and ≥ 40 years of age), the OSC+ subjects showed a higher frequency of CD3+ IL-4+ and IFN-γ+ cells, in the <40 year old group, after SWAP stimulation. There was a significantly higher frequency of CD3+ IFN-γ+ cells in the OSC+ compared to PNEG group, but only between individuals <40 years old. It was found a significantly higher IFN-γ/IL-10 ratio in the PNEG group in less than 40 years old individuals. Sera obtained from those individuals were assayed for IgE, IgG4, IgG1 and IgM responses to SEA, SWAP and SmCB1. Financial support:CNPq/FAPEMIG/USUHS/UCSF.

106 Purinergic signaling in mesenteric endothelial cells and peritoneal macrophages from *Schistosoma mansoni*-infected mice

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Introduction: Schistosomiasis is an intravascular disease related with physiological vascular alterations. The objective of this study was to evaluate the immunomodulation of the purinergic signaling in mesenteric endothelial cells (MECs) and macrophages from *S. mansoni*-infected mice. Methods: *S. mansoni*-infected mice were used to obtain macrophages and MECs. P2X7 function of macrophages and MECs was evaluated using ATP (0.1 - 3 mM) in the presence of 2.5 µM ethidium bromide (BE) and analyzed by flow cytometry. Immunocytochemistry and western blotting analysis were used to observe the P2X7 expression. MECs, loaded with 2.5 µM DAF-FM, were used to nitric oxide (NO) measure stimulated with 100 µM BzATP, in presence or not of the P2X7 antagonists. In MECs, the ectonucleotidases activity was measure using 50 µM ATP plus 32P-ATP and the radioactivity was quantified by liquid scintillation. MECs were treated with a P2Y1 agonist (30 µM 2metilSATP; 4 h) and then mononuclear cells from both groups were placed on MECs (30 min). The leukocyte adhesion was evaluated using Microscope Olympus IX71. Results and Discussion: P2X7 expression in MECs and macrophages were reduced in infected than control mice. MECs from infected mice when stimulated with 3 mM ATP showed a lower BE uptake than the controls (25 ± 2%; 43 ± 1%, n=8-10, respectively $P<0.05$). BzATP induced a higher NO synthesis in control than infected MECs (22 ± 2% and 5 ± 2%, n=15, respectively $P<0.05$) and P2X7 antagonists reduced BzATP effect to one similar of the NO synthesis produced in MECs from mice P2X7-/- (6 ± 1%, n=15). In MECs from infected-mice, the P2X7-reduced function was accompanied by the increase of the ectonucleotidases activity (7 ± 1 and 17 ± 3 pmol Pi/µg of protein $P<0.05$, n=16-14, control and infected, respectively), which could lead the increase of ADP, an agonist of P2Y1 receptor related with the increase of leukocyte adhesion in endothelial cells. However, no difference was observed in adhesion induced in MECs between the groups. Similarly, BE uptake in response to 1 mM ATP in macrophages from infected was smaller than control mice (95 ± 2%; 54 ± 6%; respectively, n=12, $P<0.05$, Student´s t test). Altogether, our data indicate that macrophages and MECs from *S. mansoni*-infected mice exhibit a reduced response mediated by the P2X7 receptor accompanied by the increase of the ectonucleotidases function in MECs, what could limiting the vascular inflammation in function of the infection. Financial support: CNPq, FAPERJ-PRONEX, FAPERJ

107 Memory cd4+t cells profile in schistosomiasis patiens with periportal fibrosis

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Introduction: Approximately 5 % of individuals infected with *S. mansoni* progress to periportal fibrosis. The mechanism underlying this pathology is still not well understood. Memory T cells are able to mount a recall response to antigens and may be involved in the pathology of schistosomiasis. The aim of this study was to evaluate the memory profile of T lymphocytes in schistosomiasis patients with different degrees of periportal fibrosis. Methods: Twenty-seven patients have been enrolled in the study to date. Periportal fibrosis was classified using abdominal USG according to the WHO criteria. The Lymphocytes were obtained from PBMC and classified into central memory T cells (TCM) (CD4+CCR7+CD45RA-), effector memory T cells (TEM) (CD4+CCR7-CD45RA-) and naïve T cells (CD4+CCR7+CD45RA+) using flow cytometry. Cytokine expression in T cells was also evaluating using this methodology. The results were expressed as median (min.-max. values). Results: The frequency of TCM cells in the group of individuals without fibrosis [40 % (38 – 54.6 %)] was higher than in the group with moderate to severe fibrosis [34 % (27.2 - 49 %; p=0.03)]. The frequency of TEM cells was also higher in individuals without fibrosis [11 % (5.6 - 13.4 %)] than in those with moderate to severe form of the disease (7.4 % [4.0 – 10.3 %]; p=0.05) and those with incipient fibrosis [5.1 (2.8 – 8.5 %); p=0.005]. Moreover, there was a positive correlation between the frequency of TEM cells and T cells expressing TNF in the group with moderate to severe fibrosis (r=0.9, p=0.012). The frequency of T cells expressing TGF-β was positively correlated with TEM cells from individuals with incipient fibrosis (r=0.7; p=0.04). Conclusion: In individuals without periportal fibrosis a high frequency of TCM and TEM cells was observed. It suggests that these cells may be protective. On the other hand, the positive correlation between the frequency of TEM cells and T cells expressing TNF and TGF-β is controversial, and indicates that as an important source of inflammatory and wound healing-related cytokines, the TEM cells could be associated to periportal fibrosis development.

108 Production of monoclonal antibodies for human immunoglobulin g conjugated to peroxidase for use in diagnostic tests

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Introduction: Schistosomiasis remains a major health problem in many tropical areas. It is currently estimated that over 200 million people are infected and nearly 800 million others are at risk of infection. Although it causes more than 280,000 deaths annually, disease control is based mainly on the chemotherapy and diagnostic. Monoclonal antibodies (mAbs) have high specificity for the recognition of a single epitope having a better performance to polyclonal antibodies. Currently, their efficiency in diagnostic kits has gained attention for allowing the use of low concentrations of a specific material. Laboratories in Brazil still lack independence in producing mAbs and routinely import these expensive products from developed countries. The objective of this work is to produce by means of in vitro methodology, murine anti-human IgG mAbs and to conjugate these mAbs to horseradish peroxidase (HRP), aiming its application on several immunological assays for schistosomiasis diagnostic. Methods: Sera samples from BALB/c immunized mice were collected and screened by ELISA. Sensitized mice were sacrificed and B lymphocytes were obtained from spleen. These cells were fused to sp2/0-Ag14 myeloma cells. Hybridomas were selected by ELISA and then cloned in order to induce mAbs production. mAbs were purified by ammonium sulfate and affinity chromatography. SDS-PAGE and western blotting were performed for purity analysis. Further steps will allow the conjugation of mAbs to HRP and, finally, its application on schistosomiasis mansoni diagnostic assays for kit validation using endemic area positive patients from Pedra Preta, Minas Gerais, as positive samples. Results: Immunized mice presented high absorbance at 450 nm. One hybridoma (lot P2A1b6) was selected (absorbance 0.560 + 0.04) with the highest titer of IgG1 anti-human IgG mAbs secreted. Conclusion: Anti-human IgG mAbs conjugated to HRP will be used on a wide range of immunological assays, including the diagnosis of several infections as parasitic, viral and/or bacterial diseases. Therefore, our kit will allow the independent production of specific antibodies providing a good alternative for the development, standardization and validation of assays on research projects.

109 CYTOKINE PROFILE IN THE MONOCYTES SUBSETS FROM PATIENTS WITH PERIPORTAL FIBROSIS SECONDARY TO SCHISTOSOMIASIS

Jamille S. Fernandes, Maria Ilma Araujo, Diego M. Lopes, Edgar M. Carva lho, Luciana S. Cardoso

Introduction: Schistosomiasis affects over 200 million people worldwide and it is estimated that about 700 million people live in areas at risk of infection. In individuals infected with Schistosoma mansoni, about 5-10% progress to periportal fibrosis. This pathology is predominantly caused by the host immune response to parasite egg antigens, however the mechanisms is still not well understood. The aim of this study was to characterize the cytokine profile of monocytes subsets in schistosomiasis patients with different degrees of periportal fibrosis. Methods: Thirty-three patients have been enrolled in the study to date. Periportal fibrosis was classified using abdominal USG according to the WHO criteria. Monocytes were obtained from PBMC and classified into classical (CD14++CD16-), intermediate (CD14++CD16+) and non-classical (CD14+CD16++). Surface cells markers and cytokine expression were evaluated using flow cytometry. The results were expressed as median (min.-max. values). Results: The frequency of classical monocytes was higher than the other subsets. The expression of TNF was higher in classical [MIF= 321 (52-386)] and intermediate [MIF= 368 (73.1-413)] monocytes from patients with moderate to severe fibrosis, compared to patients without fibrosis [MIF= 40 (5.32-89.9) and 83.4 (17.4-129) to classical and intermediate, respectively]. Moreover, there was a higher expression of IL-6 in monocytes [MIF= 79.8 (28-98.6) in classical, 145 (38.4-217) in intermediate and 99.15 (18.5-172) in non-classical] from patients with moderate to severe fibrosis in comparison to those without fibrosis [MIF= 12.85 (9.75-36), 16.9 (12.6-55.5) and 8.17 (7.23-32.2), in classical, intermediate and non-classical, respectively]. There was also a higher expression of TGF-β in all subsets of monocytes in patients with periportal fibrosis in relation to patients without fibrosis. Unexpectedly, the expression of IL-10 was higher in all monocytes [MIF= 103 (43.7-147) in classical, 175 (71.9-209) in intermediate and 95.5 (38.3-121) in non-classical] from patients with moderate to severe fibrosis, compared to patients without fibrosis [MIF= 39.3 (31.3-137), 54.1 (36.6-145) and 32.2 (24.5-68.7) in classical, intermediate and non-classical monocytes, respectively]. Conclusion: In schistosomiasis patients with moderate to severe periportal fibrosis, different subsets of monocytes are characterized by a high expression of proinflammatory and profibrotic cytokines such as TNF, IL-6 and TGF-β, despite the elevated expression of the regulatory molecule IL-10 in these monocytes.

110 Evaluation of the parasitological, pathological and in situ immunological parameters associated to *Schistosoma mansoni* infection and reinfection in two murine strains.

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Introduction: Murine schistosomiasis is a useful model for several studies about biology, immunology and pathogenesis triggered by Schistosoma infection. However, many aspects of disease can be influenced by genetic background or by the number or intensity of infection. To generate new knowledge on host-parasite interaction, in this study we assessed the parasitological, pathological and immunological aspects resulting from infection and reinfection of two murine strains commonly used in laboratories: BALB/c and C57BL/6. Methods: Mice were infected with 30 Schistosoma mansoni cercariae and 45 days post-infection part of the animals were treated with a single dose of 400 mg/Kg Praziquantel. Treated animals were reinfected 30 days post-treatment. To determine worm burden, eight weeks post-infection/reinfection, animals were perfused. The number of eggs present in stool or in tissues (liver and intestine) was assessed. Liver sections were used to determine the granulomas area. Liver and intestine were also used for cytokine quantification. IL-10 production was determined in spleen cells culture supernatant. Results: Any differences in worm burden recovered from BALB/c and C57BL-6 mice were observed between strains or between infection and reinfection. Furthermore, no difference in eggs/gram of liver or feces was observed. However, the number of eggs in the intestine of infected animals was significantly higher compared to reinfected mice from both strains. Liver granuloma area was significantly greater in the BALB/c and C57BL/6 infected mice compared to reinfected animals. Also, granuloma of BALB/c infected mice was larger than those from C57BL/6 infected animals. An increased production of IL-10 in response to egg antigen preparation was observed in C57BL/6 strain in comparison to BALB/c strain. In the liver, no differences were detected in the production of IFN-γ and IL-2, however IL-4 production was higher in C57BL/6 infected mice than in BALB/c infected group and C57BL/6 reinfected animals. In the intestine, significant levels of IL-4, IL-5 and IL-2 were detected in both strains after infection in comparison to reinfected mice. Significant production of IFN-γ was observed in BALB/c infected group compared to reinfected mice from the same strain, whereas TNF-α production was higher in C57BL/6 infected mice compared to reinfected animals. Conclusion: Our results indicate that although the difference in the genetic background did not influence the parasite burden, it leads to differences in pathology and in the immunological profile. Additionally, an absence of inflammatory cytokines was observed after reinfection in the gut from both strains that might have influenced in egg migration.

111 Histopathological changes observed in the small intestine of mice infected with *schistosoma mansoni*, during acute and chronic phases of infection

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Introduction: Schistosomiasis mansoni is a human parasitic disease of the largest worldwide distribution showing approximately 200 million people infected and 700 million under-infection risk. In Brazil, this is one of the major public health problems. Therefore, it is of great importance understanding the pathogenesis of schistosomiasis in the small intestine, associated with the development of the granulomatous response and consequent fibrosis. Objective: To evaluate the intestinal histopathological changes during the acute and chronic phases of infection by Schistosoma mansoni in mice. Methods: Females C57BL6 mice, 8 weeks of age were infected with 20 cercariae of LE strain and euthanized 70 days (acute phase) and 120 days (chronic phase) after infection. Animals from control group (uninfected) were euthanized on the same period, for subsequent histopathological analysis of the small intestine. Results: We found that infection induced the increased cellularity in the mucosa and muscular layer of the intestine of infected mice euthanized 70 days and 120 days compared to controls, at the same period. The group of infected mice euthanized at 120 days showed granulomas smaller than that ones of mice euthanized at 70 days. Furthermore, was observed an increasing collagen deposition in the tissue of the infected mice killed 70 days and 120 days comparing to tissues of uninfected animals euthanized at the same time. We also observed an increase in collagen deposition within the granulomas from intestine of infected animals euthanized at 120 days compared to those of infected animals euthanized at 70 days. The muscle layer thickness and height of the crypts of the intestine of infected mice and killed at 70 days and 120 days showed to be higher when compared to the same parameters measured in the control group. Conclusion: The proposed study suggests that infection by the parasite *S. mansoni* is able to induce histopathological changes, represented by the development and modulation of the granulomatous tissue inflammation, collagen deposition and histological changes in the architecture of the small intestine of infected mice, similar to those observed in liver tissue. These data indicated that the pathogenesis of schistosomiasis occurs in an organ - independent way.

112 Immunomodulatory potential of the potato apyrase on the granulomatous response

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Introduction: Potato apyrase (PA) and soluble ATP diphosphohydrolase isoform (ATPDase 2) from the *S. mansoni* egg have cross-immunoreactivity. During the acute phase of experimental schistosomiasis, high levels of total IgG antibody, and IgG1 and IgG2a subtypes cross-reactive with PA were detected. Inoculation of PA in healthy mice induced high IgG antibody level, which recognizes this parasite protein in soluble egg antigen (SEA) preparation. Objective: Evaluation of immunomodulatory potential of the PA in experimental schistosomiasis. Methods: Eight-week-old male Swiss mice (API; n=15) were pre-inoculated by a peritoneal route with two injections of PA (10 µg) emulsified in Freund's complete and incomplete adjuvant, and delivered in 15-day intervals. The control group (C; n=15) was inoculated with both Freund adjuvants in the absence of PA. Both the mice groups were challenged with 50 cercariae of *S. mansoni*. The antibody levels (serum diluted 1:200) were evaluated after immunization and 60 days after challenge, using PA (5 µg/well) or SEA (10 µg/well) as coating antigen in ELISA. The experiment protocols were approved by the ethics committee (UFJF; 017/2009). Results: The number of worms or eggs recovered by perfusion was similar in both the mice groups. Before challenge, the total IgG (C, 0.204±0.045; API, 0.380±0.054; $p<0.01$) or IgG1 (C, 0.209±0.081; API, 0.270±0.142; $p<0.05$) antibody reactivity against PA was elevated, and significantly higher than the control. Against SEA, the API group had significantly higher IgG antibody (C, 0.153±0,076; API, 0.397±0.144; $p<0,001$), while no significant difference was detected for IgG1 or IgG2a. Sixty days after infection, higher ($p<0.001$) IgG (C, 0.054±0.011; API, 0.137±0.055), IgG1 (C, 0.080±0.038; API, 1.362±0.903) or IgG2a (C, 0.024±0.010; API, 0.103±0.092) reactivity was detected against PA and, also, higher ($p<0.01$) IgG (C, 0.540±0.133; API, 0.785±0.287) reactivity against SEA. In addition, differences in the granulomatous areas were also analyzed, and significant reduction was observed in API group. Conclusions: The pre-immunization with PA did not induce protection against cercariae challenge. However, it is capable to increase the antibody reactivity against SEA and seemingly induces significant changes in the hepatic granuloma, suggesting a potential immunomodulatory. These analyses are currently being carried out in our laboratory. Financial support: FAPEMIG, CNPq, CAPES, CPqRR/FIOCRUZ and UFJF.

113 D-dimer as a biomarker of pulmonary hypertension in schistosomotic patients

Rita de Cassia dos Santos Ferreira, Ana Lucia Coutinho Domingues, Luiz Arthur Calheiros Leite, Angela Pontes Bandeira, Clara de Almeida Pereira, Silvia Maria Lucena Montenegro, Izabelle Oliveira

Thrombotic lesions have been demonstrated in patients with pulmonary arterial hypertension (PAH) independently of the etiology. The risk of thrombosis may increases in patients submitted to splenectomy, used to prevention of upper digestive hemorrhage from esophageal varices in patients with hepatosplenic schistosomiasis (HSS). The aim of this study was to evaluate the d-dimer dosage in patients with HSS with and without PAH as biomarker of thrombosis and biomarker of PAH. Methods: the control group comprised 106 patients without pulmonary hypertension by echocardiography and with HSS, some of them already splenectomized. from the schistosomiasis outpatient clinic of the Hospital of the UFPE. The case group consisted of 40 patients attended in the PAH centre of the Pronto Socorro Cardiológico de Pernambuco, with PAH confirmed by right heart catheterisation and with HSS, splenectomized or not. Patients were excluded if they had evidence of other causes of PAH. Written informed consent was obtained and this study was approved by the Ethics Committee of the UFPE's Centre of Health Sciences. A 5ml sample of venous blood was collected from each patient and deposited in a tube containing 3,8% citrated propylene in a 1:9 ratio of anticoagulant to blood, and centrifuged at 1500 x g for 15 minutes. TriniLIA D-Dimer kit was used (agglutination assay) in accordance to the manufacter's instruction. D-dimer dosage was treated as a quantitative variable, expressed as median and percentils, and as a categorical variable: positive if higher than 147ng/ml. For statistical analysis Student's t-tests, Mann-Whitney test and Pearson correlation coefficient were used. A p value < 0,05 was considered statistically significant. Results: there was no difference between groups with and without PAH considering age (48,0±13,4 versus 50,2±11,5, p=0,336) and sex (male 38,4% versus 39,6, p=0,608). There were less splenectomized patients analysed in the group with PAH in relation to the group without PAH (22,5% versus 39,6%, p=0.05). Significant differences were observed in the d-dimer level,quantitative and categoric.The median of D-dimer was 243(157;458.5) in the group with PAH and 197.5 (103;386) in the group without PAH (p=0.015). 76.3% of patients with PAH had positive D-dimer levels compared with 56.6% of the patients without PAH (p=0.032). Conclusions: these results suggest that thromboembolic mechanisms may be involved in the pathogenesis of PAH in patients with schistosomiasis. But, studies involving more patients are necessary to determine the levels of this possible biomarker that could suggest the presence of PAH.

114 Computed Tomography in Pulmonary Arterial Hypertension caused by Schistosomiasis

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The objective of this study was to describe aspects in thoracic computed tomography of patients with pulmonary arterial hypertension (PAH) caused by schistosomiasis and evaluate the concomitant occurrence of venous thromboembolism (VTE). Methods: the study included 44 patients of the Pronto-Socorro Cardiológico de Pernambuco, Brazil, with PAH hemodinamically confirmed and schistosomal liver fibrosis by ultrasound scan. The study protocol was approved by the Ethics Committee of the UFPE's Centre of Health Sciences. They were excluded if presented evidence of other causative disease of PAH. The schistosomal disease was classified as hepatointestinal (HI), hepatosplenic (HE) and splenectomized . The patients underwent 10-channel multidetector computed tomography of the thorax, on a Philips scanner, with contrast media, thickness of 1mm, 120 kV and MAS 200. The parameters: evidence of VTE, diameters of the pulmonary trunk (PT),right pulmonary artery (RPA), left pulmonary artery(LPA), ratio of pulmonary trunk to ascending aorta (PT/Ao), dilatation of right cardiac chambers (RA/RV), alteration of interventricular septum, dilatation of peripheral vessels, segmental artery-to-bronchus ratio, presence of nodules and mosaic pattern. Results: mean age was 50.9± 14.3, 72,7% patients were women. 25% patients were splenectomized, 61.4% had HE disease and 13.6% HI disease. Collateral circulation was present in 31.6% of patients by ultrasound. The median pulmonary arterial pressure by cardiac catheterization was 55.35±18.81mmHg. The diameter of PT= 4.31±1.16cm (2.2 -7.8cm) and was increased in 42 patients (95.4%). 37 patients (92,50%) had PT/Ao ratio increased. The mean diameter of the RPA was 3.21±0.79cm (1.9 to 4.2cm), and LPA was 2.97±0.73cm (1.6 -5.4cm), 82.8% had cardiomegaly on MDCT, 87.1% had increased RA and 82.1% had increased RV. The interventricular septa was left deviated or straightened in 72.2% patients, the peripheral pulmonary arteries were dilatated in 54.6% of the patients, the segmental artery-to-bronchus ratio was increased in 61.5% patients. 60% of the patients presented mosaic pattern. There were calcified nodules in 29.5%, indetermined nodules in 15.9%, both types in 13.6% of patients and 40.9% had no type of nodules. On MDCT, CC was seen in 58.06%. Five patients (11.6%) had evidence of VET on MDCT. Conclusion: the majority of patients presented alterations on MDCT suggestive of PAH. The best indicators of the presence of PAH were diameter of the PT and the increased PT/Ao ratio. Schistosomiasis may be a important cause of pulmonary nodules in endemic regions. In some patients VET may confound the etiology, or act synergistically in the pathogenesis of the disease.

115 Clinical and hemodynamic characteristics of patients with schistosomal pulmonary arterial hypertension attended in PROCAPE – Recife, Brazil

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This study describes the clinical, echocardiographic and hemodynamic characteristics of patients with pulmonary arterial hypertension (PAH) caused by schistosomiasis, attended in a reference centre of pulmonary hypertension in Recife, Brazil, from 2009 to July 2012. Methods: patients pulmonary hypertension by right heart catheterisation and periportal fibrosis by abdominal ultrasound were evaluated. They were excluded if they have other causes of pulmonary hypertension. The presence of pulmonary embolism diagnosed by thorax computed tomography was recorded when present. Results: 94 patients were enrolled, 66 (70,2%) were women, mean age 51,05±14,99 years. Nineteen (19%) patients had systemic arterial hypertension, 13,8% diabetics, 3% mild COPD, 3% hematologic disease and 2% thyroid disease. In relation to functional class: 18% NYHA 1, 30,8% NYHA 2, 22% NYHA III e 28,7% NYHA IV. More than half (46) were using sildenafil or tadalafil and two were taking bosentan at the moment of enrollment. Twenty six patients (27,6%) had hepatointestinal schistosomiasis, 46(48,9%) hepatosplenic form and 22(23,4%) were splenectomized. All the patients periportal fibrosis on ultrasound: 3% without pattern of fibrosis defined, 5,3% C pattern, 39,4% D pattern, 46,8% E pattern and 5,3% F pattern (Niamey classification). On echocardiogram, the estimated pulmonary arterial systolic pressure was 82,31±25,84mmHg (39-185mmHg), 5 (5,3%) had pericardial effusion and increased right chambers were present in all patients but one. The hemodinamics variables were: pulmonary arterial systolic pressure= 92,51±29,05mmHg (36-154mmHg), mean pulmonary arterial pressure= 54,97±17,2mmHg,right atrial pressure= 11,93±5,79mmHg. 15 (15,9%) patients had left ventricle end-diastolic pressure higher than 15mmHg, suggesting postcapilary pulmonary hypertension. Pulmonary vascular resistance was 1072,13±773,45dyn.s/cm^3/cm^2. Only seven (7,4%) presented vasoreactivity to nitric oxide. Eleven (11,7%) patients died during the study period. 65 patients had their computed tomography films available to analyses and 10 (15,4%) of these had evidence of pulmonary embolism. Conclusions: more than half of patients with schistosomal pulmonary hypertension have severe disease and need specific therapy (phosphodiesterase type 5 inhibitors, endothelin receptor antagonists). A small number of these patients demonstrated a favourable response to acute vasodilators test and could have any benefit to calcium channel blockers. In 15% of the patients different pathogenic mechanisms may operate. Almost 30% of the patients have the hepatointestinal form of schistosomiasis, suggesting that pulmonary embolism of worms or eggs through porto-sistemic anastomoses is not a pre-requisite for the development of the disease. Venous thromboembolism was diagnosed in 15% of these patients and could represent the cause or acts synergistically to the expression of the disease.

116 IL13 and TGF-β dosage in schistosomal pulmonary hypertension

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Genetic mutations in members of the TGF-β is described in pulmonary arterial hypertension (PAH) and has been associated with pulmonary vascular changes. Animals studies suggested that interleukin 13 acts in conjunction with the TGF system, and it is found an increase of its activity in animals with PAH. The objective of this study was to dosage of TGF-β and interleukin 13 in schistosomotic patients with and without pulmonary hypertension. Methods: 34 patients without PAH by echocardiography and with hepatosplenic form of schistosomiais from the outpatient clinic of Universidade Federal de Pernambuco's hospital and 34 patients attended in the pulmonary hypertension centre of the Pronto Socorro Cardiológico de Pernambuco, with PAH confirmed by right heart catheterisation and with schistosomal periportal fibrosis were recruted. Written informed consent was obtained and this study was approved by the Ethics Committee of the UFPE's Centre of Health Sciences. A 5ml sample of venous blood was collected from patients and centrifuged at 3000 rpm for 5 minutes and stored at -80°C. Serum concentrations of TGF-β and interleukin 13 were obtained using Qunatikine®kit (R&D systems) following the manufacturer's instructions. Results were expressed as median and percentils. For statistical analysis Student's t-tests, Mann-Whitney test for non normal data and Pearson correlation coefficient were used when appropriate. A p value < 0.05 was considered statistically significant. The software used was Stata. Results: there was no difference between groups with and without PAH considering age (49,8±13,2 versus 49,8±12,8, p=0,759) and sex (male 35,3% versus 38,2%, p=0,612). Significant differences were observed in median of TGF-β: 22496,9 (15936,7;32087,8) versus 13629,9(10192,2;22193,8)pg/ml in the groups with and without PAH (p=0,006). The median of interleukin 13 was 152,3(103,7;177,8) pg/ml in the group with PAH and 131,8 (100,2;162,5) pg/ml in the group without PAH. There was a trend towards higher levels in the group with PAH, but this difference was not statistically significant. Conclusion: these results suggest a possible role of TGF-β in the pathogenesis of PAH in schistosomotic patients, as observed in animal models and point to a possible target of therapy in the near future and that TGF-β could be used as a biomarker of the disease. These findings must be confirmed in larger studies. Maybe, a more significant difference of interleukin 13 could be found in patients with PAH in a larger population or the problem could more precisely involve the IL 13 receptors, like is suggested in studies of liver fibrosis.

117 Evaluation of uric acid as a potential biomarker of pulmonary arterial hypertension in schistosomiasis

Ana Lucia Coutinho Domingues, Rita de Cassia dos Santos Ferreira, Angela Pontes Bandeira

Pulmonary arterial hypertension (PAH) is defined hemodinamically as an increase in mean pulmonary arterial hypertension≥25mmHg with a pulmonary wegde pressure < 15mmHg. The main cause of PAH in Brazil is schistosomiasis. Non-invasive markers of the disease are very desirable in the screening, diagnosis, prognosis and follow-up of these patients. It has been demonstrated that uric acid is elevated in patients with idiopathic PAH and that has been directly related to mortality. The objective of this study was to compare the level of uric acid in patients in shistosomiasis with and without PAH. Methods: 62 patients with hepatosplenic form of schistosomiasis mansoni without pulmonary hypertension by echocardiography from the schistosomiasis outpatient clinic of the Hospital of the Universidade Federal de Pernambuco and 30 patients attended in the pulmonary hypertension centre of Pronto Socorro Cardiológico de Pernambuco, Recife, Brazil with PAH confirmed by right heart catheterisation and with schistosomal periportal fibrosis were recruted. Patients were excluded if they had evidence of other causes of pulmonary hypertension. Written informed consent was obtained and this study was approved by the Ethics Committee of the UFPE's Centre of Health Sciences. A 5ml sample of venous blood was colleted from each patient, deposited in a dry tube .and centrifuged at 1500 rpm for 10 minutes and the dosage of uric acid was performed using uricase-peroxidase method. Results were expressed as mean ±standard deviation. Statistical analyses were performed by Student t test and Pearson correlation coefficient. A p value < 0,05 was considered statistically significant. Results: There was no difference between groups with PAH and without PAH considering age (51,1±15,7 versus 50,3±11, p=0,8) and sex (40% men in PAH group versus 43,5% in the group without PAH, p=0,747). The normal values of uric acid in men were 3,4-7,0mg/dl and in women 2,4-5,7mg/dl. The levels were increased in 23% of patients with PAH versus 6% of patients without PAH. There was a trend to higher levels in patients with higher mean pulmonary arterial pressure. Compared with patients without PAH, uric acid levels were significantly more elevated in PAH patients: 5,15±1,97 versus 4,22±1,38 mg/dl, p=0,010. Conclusion: these results suggest that the levels of uric acid can are more elevated in schisosomotic patients with PAH and seems to be a biomarker of severity. Larger studies are necessary to determine the best cut off of this substance to suggest the presence of PAH. Uric acid is simple test, largely available.

118 Genetic analysis by RAPD-PCR of *Schistosoma mansoni* strains from different definitive hosts

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Introduction: The transforming growth factor-β and invariant natural killer T cells (iNKT) play important roles in schistosomiasis infection. Knockdown receptor for TGF-β- and iNKT cell deficient- mice models where used to analyze changes in Schistosoma mansoni genetic profiles using RAPD-PCR. Objective: To analyze the genetic polymorphic profiles of *S. mansoni* from definitive hosts with different susceptibility to infection using RAPD-PCR Materials and Methods: C57BL/6J, Jα18-/-, TGFβRIIdn mice were infected with *S. mansoni* (strain BH). Worms were collected and genomic DNA was extracted from each corresponding mice strain. Ten, 10-mer random oligonucleotide primers were used for genetic profiling, by RAPD analysis. Results 40% (4/10) of the RAPD-PCR primers used presented different genetic profiles. For *S. mansoni* infecting C57BL/6J mice the RAPD-PCR profile showed three different bands from the *S. mansoni* infecting CD1 mice profile. For *S. mansoni* infecting Jα18−/− mice the RAPD-PCR profile showed four different bands from the *S. mansoni* infecting CD1 mice profile. For *S. mansoni* infecting TGFβRIIdn mice the RAPD-PCR profile showed six different bands from the *S. mansoni* infecting CD1 mice profile. The genetic similarity analysis demonstrate the existence of three distinct clusters, one with *S. mansoni* infecting TGFβRIIdn mice, the other with *S. mansoni* infecting Jα18−/− mice and C57BL/6J mice and the third one with *S. mansoni* infecting CD1 mice. Conclusions RAPD-PCR analyzes showed to be a very useful toll in genetic profiling *S. mansoni* infecting hosts with different genetic backgrounds. Polymorphic profiles identified in this study suggest that the host immune system induce a selective pressure on the parasite genetic profile.

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119 “Say No to Schistosoma” project

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Keywords: Schistosomiasis; World Community Grid; Computer-Aided Drug Design;Virtual High-Throughput Screening;virtual supercomputer
Abstract:
Schistosomiasis – a tropical disease caused by the parasitic worms transmitted by freshwater snails – affects more than 200 million people each year, killing 200,000 of them. Schistosomiasis is second only to malaria in its devastating effects on the world’s population. To find a treatment for this deadly disease, researchers at Inforium University in Belo Horizonte and Fiocruz Minas, Brazil are using World Community Grid to run computer simulations that map the interactions of millions of chemical compounds with selected target proteins. Powered by the unused computing capacity of more than two million World Community Grid member computers, Brazil’s “Say No to Schistosoma” project is leading the charge to wipe out this deadly disease. The “Say No to Schistosoma” project is using bioinformatics tools to engineer new drug therapies to fight schistomiasis. The process is arduous, and requires multiple protocols, including:

- Detecting the molecular bases of the disease
- Evaluating and refining promising compounds to combat it
- Employing drug design techniques to create more effective compounds
- Determining Quantitative Structure Activity Relationships to evaluate the effectiveness of the compounds
- Studying the solubility of the drug molecule
- Testing the drug

Instead of performing expensive and time-consuming laboratory experiments, computer simulations of millions of experiments can accelerate the search for effective drug therapies. But each step of Computer-Aided Drug Design (CADD) – from Virtual High-Throughput Screening (vHTS) to Sequence Analysis to Homology Modeling – requires a massive amount of computing power that typically is unavailable to humanitarian researchers. By using the “virtual supercomputer” of World Community Grid, our team will slash our testing and evaluation time from more than 30 years to less than one year. Table 1, shows the overall statistics of the deployment.
The Fiocruz Minas team is planning on conducting additional laboratory work to develop better drugs to fight schistosomiasis – using the best candidate compounds identified by the computer simulations.
Table 1. Overall statistics concerning the deployment.

Number of Results	8.6 million
Number of Jobs	more than 50,000,000
Total Number of completed	200,000,000
Estimated duration on 1 CPU	5,555 years
Duration of the experiment	2.5 years
Average throughput	1,000,000 dockings per day
Number of used computing elements	202,888
Average duration of a job	1 hour per job
Volume of output results	8.6 million results
Estimated grid success rate	98%.

120 Correlation of Serum Hyaluronic Acid with Ultrasonographic Patterns of Schistosomal Periportal Fibrosis in Kemise, North East Ethiopia

Filimon Mitiku Haile

Among parasitic infections, Schistosoma mansoni induced infection is the most prevalent infection worldwide with a significant public health and economic outcome. Morbidity and mortality associated with *S. mansoni* is mainly the result of periportal fibrosis (PPF) which can be diagnosed using ultrasonography. As ultrasound equipment are not readily available in *S. mansoni* endemic areas, serum markers like hyaluronic acid (HA) have been used as an alternative means of diagnosing PPF. A cross sectional study was conducted from November 15-25, 2011, with the aim of determining the importance of serum HA as a marker for schistosomal PPF in patients found in *S. mansoni* endemic areas. The study involved 55 individuals from Kemise town and surrounding *S. mansoni* endemic villages, and 20 controls from *S. mansoni* non-endemic area (Addis Ababa). PPF was determined using portable ultrasound equipment and graded according to the 'Niamey protocol'. Serum HA concentration was determined using commercially available ELISA kit. Statistical analysis was done using STATA, version 11 software. The mean concentration of HA in the sera of the cases was significantly higher than the controls ($p<0.001$). The concentration of HA also increased significantly as the pattern of PPF became severe while serum HA concentration positively correlated with PPF scores ($\rho=0.6438$, $p<0.001$). An HA concentration of 27.9 µg/liter of serum differentiated moderate cases of PPF from advanced cases with a sensitivity, specificity, positive predictive value and negative predictive value of 85.71%, 75.61%, 60.5 %, 93.9%, respectively ($p<0.001$). In conclusion, serum HA concentrations could be used as a potential marker for schistosomal PPF and to assess its severity in patients found in *S. mansoni* endemic areas.

121 COMPARATIVE STUDY OF THE PREVALENCE OF S.mansoni ANTIBODIES BY INDIRECT IMMUNOFLUORESCENCE ASSAY (IFA-IGM) AND CIRCUMOVAL PRECIPITIN TEST (COPT) IN PERIPHERAL AREAS OF BARRA MANSA, RIO DE JANEIRO, BRAZIL.

Maria Cristina Espírito-Santo, Mónica Alvarado-Mora, Pedro Luiz Pinto, Cybele Gargioni, João Renato Pinho, Expedito Luna, Sílvia Chiodelli, Flair Carrilho, Ronaldo Gryschek

INTRODUCTION: Schistosomiasis constitutes a major public health problem with 200 million people infected and 700 million living in areas at risk of infection. In Brazil, this endemic disease affects 19 federal units. The city of Barra Mansa, Rio de Janeiro, Brazil, is an area of low endemicity for schistosomiasis with an estimated prevalence of 1%. Parasitological diagnostic methods lack sensitivity, especially in areas like that. The Indirect Immunofluorescence Assay (IFA-IgM) has been proposed to detect antibodies anti- S.mansoni from the guts of worm and Circumoval Precipitin Test (COPT) to detect antibodies anti- *S. mansoni* from miracidium excretion. Although its use is limited to individual diagnosis, it is applicable to epidemiological studies of prevalence analysis. OBJECTIVE: The objective of this study was to determine systematically the prevalence of *S. mansoni* infection in peripheral areas of Barra Mansa: Nova Esperança, Siderlândia, Cantagalo, Santa Clara and São Luiz using antibody detection by IFA- IgM and COPT. PATIENTS AND METHODS: This is a cross-sectional study, conducted from March 2011 to February 2012. The sample was selected randomly, with systematic selection of households and random selection of individuals to be included in each household. We collected 638 serum samples from 638 individuals who freely agreed to participate. Indirect Immunofluorescence Assay (IFA- IgM) and Circumoval Precipitin Test were used for the detection of antibodies anti-*S. mansoni*. RESULTS: From all patients studied, 15.83% (n = 101) had IFA-IgM positive reactions and 5.79% (n = 37) had COPT reactions. The agreement between tests was 87.77% (n = 560), and 4.70% (n = 30) serum samples were positive for both tests. CONCLUSIONS: The higher positivity of IFA-IgM test corroborates the results reported by other authors that the test may be a useful tool in epidemiological studies, especially in areas of low endemicity for schistosomiasis mansoni. On the other hand, considering that COPT reactivity is correlated with egg laying, its lower positivity for IFA-IgM may express a more realistic prevalence rate in areas of low endemicity. Comparison with other diagnostic tools will confirm our findings.

122 CCL3 signalling through CCR5 receptors modulate cellular activation on liver granuloma induced by *Schistosoma mansoni* chronically infected mice

Jailza R. Lima, Emilia S. Araújo, Paula D. Eschenazi, Adriana Fernandes, Deborah Negrao-Correa

Schistosomiasis is a chronicle and debilitating disease that affects over 200 million people worldwide. Most of the morbidity related to chronicle schistosomiasis is associated with the hepatic and intestinal granulomatous inflammation and fibrosis induced by the parasite eggs that get trapped in these tissues. Therefore, factors that influence the induction and/or modulation of the immune response against parasite egg antigens would be determinant in the process. Data from our research group demonstrated that the production of CCL3/MIP-1α is associated with larger cell recruitment and collagen deposition into liver granuloma of chronically infected mice and severe pathology in naturally infected human population. In contrast, mice deficient in CCR5, one of the CCL3 receptors, developed larger granuloma, with intense cellular infiltration and collagen deposition that resulted in high level of mortality during the chronicle phase of the schistosomiasis. Moreover, granuloma from CCR5 deficient mice showed fewer Treg cells, suggesting that CCL3 activation through CCR5 receptor has modulatory effect on Schistosoma-induced granuloma. At this stage we intent to comparatively evaluate the cellular composition and activation in liver granuloma of chronically infected mice genetically deficient in CCL3 (CCL3-/-) or CCR5 (CCR5-/-) production. For this propose, C57Bl/6 CCR5-/- or C57Bl/6 CCL3-/- mice and non-deficient C57Bl/6 (WT) mice were infected subcutaneously with 25 cercariae/mice and liver granuloma of each infected animal was isolated at 12-14 weeks of the experimental infection. Isolated granuloma or the granuloma-cells isolated after collagenase incubation and Percoll gradient separation from each experimental group were used to identify the cellular composition and quantified local production of IL-4, IL-13, IL-5, IL-10, IL-17, TNF-α and IFN-γ cytokines using ELISA-assay commercially available. Preliminary data showed that homogenate from isolated liver granuloma or stimulated granuloma cells from CCR5 -/- chronically infected had significantly higher levels of IL-4, IL-10, IL-13, IL-17 and TNF-α compared to granulomas or cells from WT mice at the same time of the infection. In contrast, granuloma homogenate or the stimulated cells from CCL3 -/- mice chronically infected with *S. mansoni* showed significantly lower levels of IL-13 and IL-17 and higher production of IFN-γ compared to WT. Moreover, isolated granulomas from infected CCL3-/- mice had higher N-acetylglucosaminidase (NAG) activity, suggesting macrophage participation in the process. The cellular composition in liver granuloma is under investigation. The results indicated CCL3/CCR5 activation participate on modulation of *S.mansoni*-induced liver granulomas.

123 T cell and monocyte phenotypes in response to *S. mansoni* antigens in cutaneous leishmaniasis in vitro

Aline Michelle Bafica, Luciana S. Cardoso, Sérgio C. Oliveira, Alex Loukas, Alfredo Góes, Ricardo R. Oliveira, Edgar M. Carvalho, Maria Ilma Araujo

We evaluated the effects of these antigens on lymphocyte and monocyte phenotype activation status in response to the soluble Leishmania braziliensis antigen (SLA) in cells of CL patients. Methods: The study included the first 30 individuals living in the endemic area in tegumentar leishmaniasis Corte de Pedra, Bahia, Brazil. PBMC of CL patients were stained with fluorochrome conjugated antibodies to CD4, CD8, CD25, CD28, CTLA-4 and Foxp3 in T lymphocytes and CD14, CD16, HLA-DR, CD80 and CD86 in monocytes. The Ethical Committee of the Maternidade Climério de Oliveira, Federal University of Bahia approved the present study, and an informed consent was obtained from all study participants or their legal guardians. Results:The addition of rSm29 antigen to the cultures stimulated with SLA enhanced the frequency of TCD4+ cells (from 34.8 ± 2.8 to 40.8 ± 2.8%), being this antigen able to enhance the expression of CD28+ in TCD4+ and TCD8+ cells (from 85 ± 17 to 113 ± 22 MFI and from 85 ± 14 to 91 ± 14 MFI, respectively). SmTSP-2 and PIII antigen were able to increase the expression of CTLA-4 (from 49.6 ± 4 to 58 ± 5 MFI and from 49.6 ± 4 to 53 ± 4.6 MFI, respectively) in TCD4+ cells. The addition of rSm29 and SmTSP-2 to the cultures led to an increase in the frequency of CD4+CD25+ cells expressing Foxp3 (from 7.5 ± 1.7 to 10.2 ± 2.1% and from 7.5 ± 1.7 to 10.4 ± 2.3%, respectively). We also evaluated the frequency of monocyte subtypes (classical, intermediate and non-classical) expressing costimulatory molecules. The addition of the Sm29 and PIII to the cultures expanded the frequency of non-classical monocytes (CD14+CD16++) moreover these cells expressed lower levels of HLA-DR in the presence of rSm29 (from 718 ± 188.4 to 547 ± 140.5 MFI). The addition of SmTSP-2 to the cultures lead to a decrease in the expression of CD86 in intermediate monocytes (CD14++CD16+) (from to 562 ± 149.7 to 447.8 ± 112.5 MFI). Conclusions: The addition of rSm29, rSmTSP-2 and PIII to the PBMC culture stimulated with SLA up-regulated the frequency of Treg cells and expression of CTLA-4 by TCD4+ cells. These antigens also alter in a lesser extent the expression of costimulatory molecules in different subtypes of monocytes.

124 Increased resistance to *Strongyloides venezuelensis* infection in mice co-infected with *Schistosoma mansoni*: Possible involvement of antibodies in control larvae.

Michelle Rezende, Deborah Negrão-Correia

Co-infection by different helminth species is common in the human population, but their consequences in protection or pathology of these parasitoses are not well understood. The main objective of this experimental work is to evaluate the influence of different stages of *S. mansoni* infection in the development of S. venezuelensis infection in mice. For this, female Swiss mice were infected with S. venezuelensis simultaneously with *S. mansoni*, at 2 weeks after *S. mansoni* infection (pre-posture phase), at 4 weeks (post-posture), and at 14 weeks (chronic-posture). For each experiment, we comparatively evaluated the parasite burden (number of worms and eggs) and humoral response (parasite reactive IgM, IgG1 and IgG2a) in groups of mice infected only with *S. mansoni*, infected only with S. venezuelensis, co-infected with both parasite and no-infected. The number of S. venezuelensis worms and eggs eliminated in feces of mice simultaneously infected with S. venezuelensis and *S. mansoni* was not statistically different from the number recovered from single infected animals. In contrast, in mice infected with S. venezuelensis infection after 2, 4 or 14 weeks of *S. mansoni* infection the number of S. venezuelensis larvae recovered in lung and worms from small intestine was significantly lower than in single infected mice. Nematodes control in co-infected mice occurred mainly during the process of migration of the larvae of S. venezuelensis. However, in co-infected mice after post-postural phase of *S. mansoni* was also observed reduction of adult worms of S. venezuelensis. The infection with *S. mansoni* induces the production of high levels of SWAP-reactive antibodies, especially IgM and IgG1, during the acute phase of the infection. The level of IgG1 anti-SWAP is modulated during the chronicle phase of the infection. In S. venezulensis-infected or in simultaneously co-infected mice we detected IgM or IgG1 anti-L3 after 2 days of the infection, but in the others co-infected groups antibodies anti-L3 was detected early in the infection. Moreover, antibodies from mice only infected with *S. mansoni* were capable of recognizing antigen from S. venezuelensis larvae, and this cross-reactivity could participate in the early destruction of the nematode larvae in co-infected mice.

125 Proteomic and histopathological analyses of the hepatic tissue in the murine model of schistosomiasis

Leandro Xavier Neves, Jonatan Marques Campos, Nívea Carolina Nogueira de Paiva, Lizandra Guidi Magalhães, Lívia Maria de Oliveira Gomes, Elio Hideo Babá, Neuza Araújo, Cláudia Martins Carneiro, William Castro-Borges

The characterization of the Schistosoma mansoni genome and transcriptome has allowed the use of proteomic techniques providing a deeper understanding of the parasite's biology throughout its life cycle stages. Nevertheless, a few proteomic studies have addressed the host-parasite relationship. Understanding the *S. mansoni* parasitism is of paramount importance for the proposal of novel diagnostic methods, evaluation of prognosis and treatment of the disease. The present work focused on the liver soluble proteome-associated alterations in the murine model of experimental schistosomiasis. In this study, 30 day's old isogenic BALB/c mice, weighting approximately 20 grams, were divided in two groups. The experimental period comprised of 5 (onset of ovoposition) and 7 weeks (chronic phase), for group 1 and 2, respectively. Both groups were composed of 6 control and 10 infected mice. Mice from infected group were exposed to 200 cercariae for 30 minutes after abdominal shaving. Animals from the control group were submitted to similar conditions using tap water. The crude soluble homogenate was firstly precipitated using TCA/acetone and 200 µg of liver proteins separated through 2D-PAGE, using pH ranges 3-10 and 4-7 for the first dimension 7 cm gels. Changes in protein expression levels comparing gels from control and infected animals were assessed through the software Phoretix 2D Evolution. Protein spots exhibiting significant changes in expression were excised, trypsinized and submitted to LC-MS/MS analysis for identification. The comparative two dimensional gel electrophoresis demonstrated changes in the expression profile for molecules involved in several cellular processes such as stress response, urea cycle and glycolytic pathway. Various chaperonins including GRP-78, HSP-71 and PDI exhibited increased expression in the liver of infected mice. Up-regulation of the latter molecules were detected at the 5th week of infection and increased significantly with the establishment of the chronic phase. In contrast, carbamoyl phosphate synthetase I, albumin, indoethyllamine N-methyltransferase, peroxiredoxin 6 and carbonic anhydrase III were detected at lower levels upon *S. mansoni* infection. The liver proteomic profile for the infected animal correlated with the histological analysis of the organ in which an intense cellular immune response was observed. Collectively, our results demonstrated that the employed proteomic approach allowed the identification of tissue markers induced by the *S. mansoni* infection. Future experiments will establish whether the observed tissue alterations promoted by the *S. mansoni* parasitism significantly alter the plasma proteome to highlight novel biomarkers of schistosomiasis. Financial Support: FAPEMIG, CAPES.

126 Proteomic and histopathological analyses of the splenic tissue in the murine model of schistosomiasis

Jonatan Marques Campos, Nívea Carolina Nogueira de Paiva, Leandro Xavier Neves, Raianne Baleeiro, Lizandra Guidi Magalhães, Elio Hideo Babá, Neuza Araújo, Cláudia Martins Carneiro, William Castro-Borges

The characterization of the Schistosoma mansoni genome and transcriptome has allowed the use of proteomic techniques providing a deeper understanding of the parasite's biology throughout its life cycle stages. Nevertheless, a few proteomic studies have addressed the host-parasite relationship. Understanding the *S. mansoni* parasitism is of paramount importance for the proposal of novel diagnostic methods, evaluation of prognosis and treatment of the disease. The present work focused on the spleen soluble proteome-associated alterations in the murine model of experimental schistosomiasis. In this study, 30 day's old isogenic BALB/c mice, weighting approximately 20 grams, were divided in two groups. The experimental period comprised of 5 (onset of ovoposition) and 7 weeks (chronic phase), for group 1 and 2, respectively. Both groups were composed of 6 control and 10 infected mice. Mice from infected group were exposed to 200 cercariae for 30 minutes after abdominal shaving. Animals from the control group were submitted to similar conditions using tap water. The crude soluble homogenate was firstly precipitated using TCA/acetone and 200 µg of spleen proteins separated through 2D-PAGE, using pH range 3-10 for the first dimension 7 cm gels. Changes in protein expression levels comparing gels from control and infected animals were assessed through the software Phoretix 2D Evolution. Protein spots exhibiting significant changes in expression were excised, trypsinized and submitted to LC-MS/MS analysis for identification. The comparative two dimensional gel electrophoresis demonstrated changes in the expression profile for molecules mostly involved in protein synthesis and glycolytic pathway. Among the identified proteins were calreticulin, phosphoglycerate kinase I, fructose-biphosphate aldolase A, glyceraldehyde-3-phosphate dehydrogenase, EF-Tu (elongation fator – Tu) and aspartate aminotransferase. Overall, the proteins differentially expressed in the spleen of infected animals displayed up regulation, evidencing a molecular profile suitable to provide the demand in energy production and protein synthesis. These two cellular processes are of great relevance to maintain the intense cellular proliferation observed in the organ. Collectively, our results demonstrated that the employed proteomic approach allowed the identification of tissue markers induced by the *S. mansoni* infection. Future experiments will establish whether the observed tissue alterations promoted by the *S. mansoni* parasitism significantly alter the plasma proteome to highlight novel biomarkers of schistosomiasis. Financial Support: FAPEMIG, CAPES.

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127 Survey of the prevalence of schistosomiasis school of 07 to 14 years in state of ceará

Authors: Vivian da Silva Gomes, Asevedo Quirino de Sousa, Manoel Dias da Fonseca Neto

The first reports of schistosomiasis in Ceará took place in 1920, when 141 were detected in sailors from Ceará at the Naval Hospital in Rio de Janeiro, with a positivity of 2.8%. In 1934 due to the diagnosis of yellow fever in Ceara biopsies were performed in 7387 liver samples from which 0.66% were detected positive for Schistosoma mansoni, in Fortaleza, Juazeiro and Baturité. Later in 1938, Evandro Chagas detected positivity of grievance at Crato. The first major survey in Ceará promoted by the Ministry of Health took place in the years 1948 and 1949. 40,462 examinations were performed with a positivity of 390 cases, and a total percentage for the State of 1%. Among the municipalities that had higher rates of positivity were Pacoti (31.4%) and Redenção (62.2%). From 1964 to 2009, several studies of epidemiological interest were conducted in several municipalities, thus contributing to a better geographical delineation of the disease in the state of Ceará. In 2010 the Ministry of Health - MS in partnership with FIOCRUZ conducted the National Survey of Prevalence of Schistosomiasis mansoni and other geohelmintoses in school students from 07 to 14 years old in order to update the number of patients with the disease in the country. OBJECTIVE: To determine the prevalence of schistosomiasis and other geohelmintoses in school students from 07-14 years old in the state of Ceará. MATERIAL AND METHODS: parasitological diagnosis was made by Kato Katz technique where two blades were made from a single sample. The sample was drawn from four populations of endemic and non-endemic areas with smaller population than 500,000, or greater. RESULTS: The sample comprised 21 municipalities of Ceará, whereas 20 were concluded. They are distributed in the metropolitan area and countryside. 8,459 exams were made in the State and up to now 6,279 (70%) in the municipalities in the countryside. The positivity to schistosomiasis in the selected sample so far is negative for the presence of eggs of Schistosoma mansoni and other geohelmintoses showed the following positive aspects: Ascariasis 282 (4.49%), trichuriasis 246 (3.91%), Hookworm 24 (0.34%) .

128 Hepatopulmonary Syndrome in Patients with Hepatosplenic schistosomiasis

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Introduction: Hepatopulmonary syndrome is defined as the occurrence of pulmonary vascular dilations associated with an increase in the alveolar-arterial oxygen difference, in the presence of chronic liver disease. Unlike observations made on cirrhotic patients, reports in the literature about the syndrome, in patients with portal hypertension due to hepatosplenic schistosomiasis are rare. Objectives: To determine the frequency of hepatopulmonary syndrome in patients with hepatosplenic schistosomiasis and its association with clinical and laboratory variables and ultrasound and endoscopic signs of portal hypertension. Methods: An evaluation was made of 69 patients with hepatosplenic schistosomiasis who presented Symmers' fibrosis diagnosed by ultrasonography, and esophageal varices, diagnosed by endoscopy. The diagnostic criteria for hepatopulmonary syndrome were the presence of pulmonary vascular dilations diagnosed by transthoracic echocardiography with contrast (in the absence of intracardiac shunt), associated with the alveolar-arterial oxygen difference ≥ 15 mmHg or PaO2 <80 mmHg. Patients with severe cardiopulmonary disease were excluded. Statistical analysis was performed using STATA V9.0, associations being tested by the chi-square and Fisher's test. Results: Of the 69 patients, 42 (61%) were female and the mean age was 55. In 58% of the patients, gastrointestinal bleeding was reported and in 62% of them, esophageal varices of medium and large diameter were observed. The E and F patterns of periportal fibrosis were observed in 74% of cases, the portal and splenic vein being enlarged in 49% and 62% of the patients, respectively and in 57.5% for collateral vessels. Hepatopulmonary syndrome occurred in 18 patients (26%) and was more frequent in those with high ALT (OR: 3.85 CI: 1.16 to 12.7, p = 0.027), widened INR (OR: 88.9; CI: 1.67 to 4715, p = 0.027) and at higher levels of total bilirubin (p = 0.018) and direct bilirubin (p = 0.006); as well as in those with fibrosis of the E and F pattern, larger diameter of the portal vein, the presence of collaterals, esophageal varices of medium and large diameter and with gastropathy of portal hypertension, but there were no significant differences. In the multivariate analysis, high ALT and raised INR constituted independent risk factors for the occurrence of the syndrome. Conclusion: Hepatopulmonary syndrome was diagnosed in one quarter of the schistosomiasis hepatosplenic patients, this being associated with impairment of the liver function.

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129 Understanding the Immune Response and Clinical Stages of *Schistosoma mansoni* Infection using a Mathematical Approach

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Background: Schistosomiasis mansoni is an endemic parasitic disease and an important public health problem in Brazil. Inside the mesenteric veins each pair of parasites produce approximately 300 eggs per day and the eggs which get trapped in the liver elicited a strong immune reaction. Clinically after the primary infection and the acute response, the chronic stage of the disease may have different outcomes depending on the particularities of each individual immune response. In endemic areas only 5-7% of infected people develop severe illness, 15-20% present only hepatic fibrosis and the rest develop a light form of disease. One of the greatest challenges nowadays when studying biological systems is to integrate different levels, as for instance to understand different clinical outcomes from the cell interactions during the development of immune responses in infectious diseases. Objective: A mathematical approach is suggested to make the connection between cellular interactions occurring on immune responses to Schistosoma mansoni during chronic infection and the different clinical stages. Methods: A network of interactions describing activation, production and suppression between different immune cells and cytokines that participate on the immune response to *S. mansoni* infection on the chronic phase in humans was built. The information used to mount the network was extracted from the literature. A Boolean approach was used to analyze this network and identified the attractors of the dynamics in the disease chronic stage. By attractors we mean the network states to which any one of the possible states will converge following the dynamical interactions described by this network Results: The three attractors obtained from this present study reproduce the different stages of the chronic phase of the disease observed in humans. According to this approach the number of states converging to each attractor corresponding to the prevalence of each clinical stage in a given population is also in agreement with what is observed in the Brazilian population and murine models. The attractor states are also validated by the cytokine profiles observed in both human and murine data. Conclusion: Using the Boolean approach we were able to understand the different clinical outcomes of the disease when mounting the immune response to the egg. Moreover using this mathematical model we correlate the results obtained for humans and murine models. Furthermore we suggest that further investigation should reassure this correlation, therefore indicating that despite the intrinsic differences, murine model is a good model to understand the human schistosomiasis.

130 HUMANSCHISTOSOMAL GLOMERULOPATHY: URINE AND SERUM CHEMOKINE PROFILE

Alba Otoni, Izabella Voieta, Carlos Maurício Antunes

Introduction: Renal involvement has been described in 15% of patients with hepatosplenic schistosomiasis mansoni. There have been no studies on the profile of chemokines in the serum and in the urine of patients with schistosomal glomerulopathy. Objective: We investigated serum and urine levels of chemokines in patients with hepatosplenic schistosomiasis, with and without renal disease, aiming at defining a profile of chemokines in patients with kidney injury. Methodology: This is a cross-sectional study developed at the Outpatient Clinic of the Universidade Federal de Minas Gerais, Belo Horizonte, in Brazil, between October 2008 and July 2010. After informed consent, 160 volunteers with a median age of 40 years were enrolled in the study and divided into five groups: 1) sixty eight patients had hepatosplenic schistosomiasis mansoni without renal disease; 2) twelve had hepatosplenic schistosomiasis with renal disease; 3) twenty seven had hepatointestinal schistosomiasis; 4) twenty two had glomerulopathy of varied causes, without schistosomiasis; and 5) thirty one were apparently healthy. All participants were submitted to clinical examination. Those with microalbuminuria above 30mg in 24 hours were considered as having renal disease. In eight patients with microalbuminuria and schistosomiais the presence of glomerulopathy was confirmed by renal biopsy. Diagnosis of hepatosplenic schistosomiasis was established by the association of epidemiological, clinical, parasitological and ultrasound data. From all participants, sera samples and a small quantity of urine (taken from the 24 hour urine collected) were obtained and stored at -80oC. The sera and urine chemokines MCP-1/CCL2, MIP-1α/CCL3, IL-8/CXCL8, eotaxin/CCL11 and RANTES/CCL5 were measured using an ELISA test and commercial kits. Information obtained was transferred to a data bank (EpiData 3.1) and analyzed in the SPSS software. Results: In patients with hepatosplenic schistosomiasis and renal disease the following chemokine profile was found: MIP-1α in the urine >14.3pg/ml, sera MIP-1α >61.9pg/ml, IL-8 in the sera <1,030pg/ml, eotaxin in the urine >26.7pg/ml and sera MCP-1 >634pg/ml. A similar profile was observed in the group of patients with glomerulopathy caused by other diseases (without schistosomiasis), except for serum MCP-1 that was <634pg/ml. Patients with hepatosplenic schistosomiasis without renal disease presented the following profile: MIP-1α in the urine <14.3pg/ml, serum MCP-1 <490pg/ml and RANTES <11,509pg/ml. The other groups presented different profiles. Conclusion: In hepatosplenic schistosomiasis patients with serum MCP-1>634pg/ml the diagnosis of schistosomal glomerulopathy should be considered.

131 Newly established monoclonal antibody diagnostic assays for *Schistosoma mansoni* CCA detection in areas of low endemicity

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Background: Current available methods for schistosomiasis mansoni lack sufficient sensitivity, especially in areas with low endemicity, leading to underreporting cases. Methods: We developed three, novel diagnostic methodologies for the directly detection of schistosome infection in sera samples. These three new methods were evaluated with positive patients from a low endemicity area in southeast Brazil. The basis for these new assays was the production of a monoclonal antibody to the protein portion of highly purified CCA glycoprotein. This anti-CCA mAb was selected having no specificity for the Lewis x epitope. Three diagnostic methodologies were developed and validated, (1) Immunomagnetic Separation based on improved incubation steps of non-diluted sera, (2) Direct Enzyme-linked Immunosorbent Assay and (3) Fluorescent Microscopy Analysis as a qualitative assay. Results and Conclusions: The two first quantitative methods presented a high sensitivity (94% and 92%, respectively) and specificity (100%) showing a significant correlation for determination of cure. The Immunomagnetic Separation technique showed excellent correlation with parasite burden. The third method was significant when a single sera sample was analyzed with 3 separate slides via an easy-to-do method capable of discriminating positive from negative cases, even for patients with low parasite burdens.

132 Macrophage-derived Hedgehog Ligands Promotes Alternative Activation of Macrophages, Fibrogenesis and Vascular Remodeling in Human Schistosomiasis Mansoni

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Background Schistosomiasis mansoni is a major cause of portal fibrosis and portal hypertension. The Hedgehog pathway regulates fibrogenic repair in some types of liver injury and there is growing evidence that it also regulates angiogenesis and vascular remodeling. Aims To verify if Hedgehog-pathway activation occurs during fibrosis progression in schistosomiasis and to determine if macrophage-related mechanisms are involved . Methods Immunohistochemistry was used to characterize the cells that generate and respond to Hedgehog ligands in 28 liver biopsies from patients with different grades of schistosomiasis fibrosis staged by ultrasound (WHO protocol; pattern A=3 patients, D=5, Dc=2, Ec=17, F=1) diagnosed at University Hospital of Universidade Federal de Minas Gerais. Fragments of three donor livers that were used for split liver transplantation at Duke Hospital were also included as controls. The number of positive cells were counted in ten 400x fields per patient (Gli2, Gli2/CD31, Gli2/αSMA) or quantified using morphometry (Patched). This project was approved by the Ethics Comitee of UFMG and Duke University Ethical Board (204-06). Cultured macrophages (RAW264.7 and primary rat Kupffer cells) and primary rat liver sinusoidal endothelial cells (LSEC) were treated with schistosome egg antigen (SEA) and evaluated by qRT-PCR. Inhibition of the Hedgehog-pathway with Cyclopamine or GDC-0449 was used to investigate its role in alternative activation of macrophages (M2) and activation, proliferation and vascular tube formation of LSECs. Results Patients with schistosomiasis expressed more ligands (Shh and Ihh) and target genes (Patched and Gli2) than healthy individuals and the number of hedgehog responsive cells correlates with fibrosis ($p<0.00$; $r=0.64$ for Ptch and $r=0.83$ for Gli2). Activated LSEC and myofibroblasts were Hedgehog-responsive (Gli2(+)) and correlated with fibrosis stage by ultrasound ($p<0.001$; $r=0.97$ and $r=0.77$, respectivelly). Double immunohistochemistry for Ihh/CD68 showed that Ihh(+) cells were macrophages. In vitro studies demonstrated that SEA stimulated macrophages to express Ihh and Shh mRNA ($p<0.05$). Conditioned media from such macrophages induced luciferase production by Shh-LightII cells ($p<0.001$) and Hedgehog inhibitors blocked this effect ($p<0.001$). SEA-treated macrophages also up-regulated their own expression of M2 markers (Chi3l3, Arg1, Fizz1), and Hh-pathway inhibitors abrogated this response ($p<0.01$). Inhibition of the Hedgehog pathway in LSEC blocked SEA-induced migration and vascular tube formation (angiogenesis assay;) ($p<0.01$). Conclusion SEA stimulates liver macrophages to produce Hh-ligands, which promote alternative activation of macrophages, fibrogenesis, and vascular remodeling in human schistosomiasis mansoni. Financial Support NIH, CAPES, CNPq.

133 Immune profile evaluation in individuals pbcm living in *Schistosoma mansoni* endemic area: proliferation, activation status, cytokines pattern, erk1/2 and akt phosphorylation.

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Introduction: Schistosomiasis is a helminthic disease with a wide geographical distribution especially among poor countries populations. The chronic infection is mainly characterized by modulation of granulomatous reaction. PBMC (peripheral blood mononuclear cells) from patients in the chronic intestinal form express less responsiveness to SEA but continue to express substantial response to SWAP.Granuloma modulation and low responsiveness may be associated. Objective: SEA (soluble egg antigen) influence on activation status, cellular proliferation, cytokine production, ERK1/2 and Akt phosphorylation in infected individuals (XTO) PBMC and egg-negative (NI) living in the same endemic area were evaluated. Methods: The activation status was evaluated by cell immunophenotypic staining (cytometry). The cell proliferation assay was by CFSE method. Cytokine detection assay (Th1 and Th2) was by Cytometric Bead and Array phosphorylation status was by ELISA. Results: The data was compared to blood donors (BD) who reported having had no prior contact to the parasite. The results are presented as median ($P<0.05$).The ex vivo analysis shows that HLA-DR+ expression on CD8+ was higher in PBMC from XTO (n=62) (4.0%) and NI (n=50) (3.2%) groups than BD (n=32) (1.4%) group. XTO (32.0%) and NI (39.3%) groups presented decreased CD8+CD28+/CD8+ ratios compared against (73.4%) group. CD4+ T lymphocytes proliferation was lower in XTO (n=44) group (7.33%) than BD (13.6%) after SEA stimulation. The CD8+ T lymphocytes proliferation was lower in XTO group after SEA (4.6%) or SWAP (soluble adult worm antigen) (4.6%) stimulation and in unstimulated cultures (3.5%) than BD group (12.3%). Cytokine milieu analysis in culture supernatant stimulated with SEA or SWAP showed a balanced Th1 and Th2 cytokine pattern in XTO (n=27) and NI (n=21) groups. The ERK1/2 and Akt phosphorylation was as low as in BD (n=4), NI (n=5) and XTO (n=5) groups after stimulation with SEA, SWAP or in unstimulated cultures. Only SWAP stimulation induced ERK1/2 phosphorylation decrease in XTO group PBMC (495 pg/mL) in comparison with SEA stimulation (650 pg/mL). Conclusions: The data seem to indicate that SEA-stimulated CD4+ T cell from infected patients have a lower proliferation rate than NI group. Furthermore, we observed that SWAP influence on ERK1/2 phosphorylation in XTO group.

134 Liver pathology and production of cytokines IFN- gamma, IL-4, and IL-13 in mice malnourished chronically infected with *Schistosoma mansoni*.

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Nutritional status seems to be an important co-factor in aggravating schistosome infection. So, the characteristics of the cellular immune response in inbred C57BL/6 undernourished mice infected with Schistosoma mansoni were investigated and compared to those seen in well-nourished infected animals of the same lineage. This investigation aimed at determining the production of cytokines IFN-γ, IL-4 and IL-13 in supernatant of cultured spleen cells at 60, 90 and 150 days post-infection; host nutritional status; parasite burden; liver and spleen morphology; morphometric measurement of hepatic circumoval granulomas; biochemical and morphometric determinations of hepatic collagens. The percentage relationship of the liver and spleen weights as related to body weight were higher for infected well-nourished mice, when compared to non-infected ones. Liver histopathology showed a greater number of enlarged granulomas in well-nourished mice. In both undernourished and well-nourished animals, a marked inflammatory response was detected in portal spaces, with intensive infiltration of polymorphonuclear eosinophils at 60 and 90 time-points. Forty percent of chronically infected (150 days post-infection) wellnourished mice developed the histologic pattern of murine periportal fibrosis. However, infected undernourished animals were unable to develop this lesion. Morphometric measurements of hepatic circumoval granulomas and of liver collagen gave similar results for undernourished and well-nourished groups of mice, under the conditions of the present trial. In well-nourished mice, cellular immune response in the acute phase of schistosomiasis was characterized by higher levels of IL-13 than of IFN-γ (Th2 profile), these levels declining to the end of the experiment (intermediary and chronic phases of infection). So, the kinetics of the above cytokines in well-nourished mice is according to previous reports. In undernourished infected mice, however, higher leves of IFN-γ than of IL-13 were detected in the acute phase of murine schistosomiasis (Th1 profile). In the intermediary phase, the Th1 component was reduced and high levels of IL-13 and IL-4 (Th2 profile) were detected, declining progressively. One could speculate that undernutrition could induce some changes in the production of fibrogenic cytokines, by altering the synthesis and deposition of extracelular mathrix. This could at least partly explain why undernourished mice do not develop murine periportal fibrosis even 150 days post-infection as well-nourished animals do.

135 Assessment of tubular and glomerular renal function in patients with schistosomiasis mansoni in low endemic area in Ceara, Brazil.

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The disease caused by *S. mansoni* may affect the kidneys and this kidney involvement is rarely described. It can be characterized mainly by glomerular alterations often asymptomatic. The objective of this study was to evaluate the glomerular and tubular renal function in patients with schistosomiasis, in the group pre-treatment and in the group post-treatment in the intestinal form of the disease, coming from an area of low endemicity in Maranguape, Ceara, Brazil. This is a cross-sectional study, including 85 individuals diagnosed with parasitological method (Kato-Katz) for selection of each group. The subjects were divided into three groups: G- I - control group of 24 uninfected individuals; G-II - a group of 30 individuals infected with *S. mansoni* and G-III - group with 31 individuals infected with *S. mansoni* which were treated and evaluated after treatment. The glomerular and tubular renal function were assessed through measurements of urinary pH, fractional excretion of calcium, magnesium, phosphorus, sodium and potassium, estimated glomerular filtration rate (eGRF) and urinary albumin. There was no difference among the three groups regarding age and sex. All group had a mean age of 23.2 years. In the analysis of tubular renal function, both the urinary pH (UHP = 5.94 ± 0.43 vs. 5.91 ± 0.44 and 6.02 ± 0.51) as the fractional excretion calcium (FECA + = 1.15 ± 0.63 vs. 1.35 ± 2.89 and 1.43 ± 0.98), magnesium (FEMg = 5.44 ± 6.30 vs. 3.72 ± 4.073 and 51 ± 4.55), phosphorus (FEPI = 15.66 ± 11.84 vs. 16.94 ± 18.72 and 14.91 ± 12.86), sodium (FENa + = 0.73 ± 0.51 vs. 0.82 ± 0.29 and 0.83 ± 0.48) and potassium (FEK + = 3.04 ± 1.71 vs. 3.54 ± 2.86 and 4.98 ± 5.02) did not differ between groups uninfected, infected and post-treatment. Regarding markers of glomerular renal function was not also observed differences in eGFR = 121.94 ± 28.44 vs. 124.35 ± 26.26 and 113.21 ± 18.16 ml / min / 1.73 m2) and urinary albumin (7.20 ± 7.6 vs. 5.3 ± 5.41 and 5.34 ± 5.31 mg / dl) among the three groups. Therefore, it is concluded that using the markers analyzed, we could not find glomerular and tubular kidney alterations, however, these lesions are mild or moderate character, and possibly the use of a more specific and sensitive marker, like biomarkers, would work best for the detection of kidney inflammation in these individuals.

136 Longitudinal analysis of antigen-specific response in individuals with *S. mansoni* infection in endemic area of Minas Gerais

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The humoral immune response of Schistosoma mansoni infected individuals in endemic areas has as one of its characteristics by high IgE and IgG4 levels. Imunoepidemiologic studies have established a clear relationship between these antibodies and factors such as age, resistance to infection, susceptibility and predictive power of infection. It is believed that the response of IgE and IgG4 soluble egg antigen (SEA) can be used as a biomarker capable of facilitating the monitoring of infection by *S. mansoni*. Objective: To evaluate if IgE and IgG4 anti-SEA reactivity can be useful as biomarker to assist monitoring of the infection with *S. mansoni* in endemic area in Brazil. Methods: 127 individuals residing in Virgem das Graças endemic area in the municipality of Ponto dos Volantes, Minas Gerais were included in the study. Parasitological and serological analyzes were performed in all subjects in 2001, 2002, 2005 and 2009. The serum collected was used to assess IgE and IgG4 antibodies levels against SEA. Results: The prevalence for *S. mansoni* infection before treatment (2001) was 59% (CI 95%= 50.38-67.72) with the geometric mean egg count (epg) of 61.05 (CI95%= 58.70 – 63.40). One year after treatment (2002), prevalence and intensity of infection reduced significantly to 16.5% (CI 95%= 9.98 – 23.08) and 40.6 epg (CI 95%= 37.80 – 43.42), respectively. In 2005, the prevalence increased to 27.6% (CI 95% = 19.68 to 35.43), but the intensity of infection remained similar to that of 2002 with 39.81 epg (CI 95% = 37.27 - 42.35). In the last year of evaluation (2009), the prevalence remained at 26.8% (CI 95% = 18.96 to 34.57) but the intensity of infection reduced significantly to 8.78 epg (CI 95% = 6.45 to 11.11) when compared to previous years. Longitudinal analysis of IgE anti-SEA showed an increase over time for both the infected and uninfected individuals. The IgG4 anti-SEA reactivity in infected individuals was significantly higher than uninfected in all investigated periods. Analysis of ROC area showed that the IgG4 anti-SEA antibodies were able to predict infection by *S. mansoni* in every study year. The ratio IgG4/IgE was not a good immunological biomarker. Conclusions: The IgG4anti-SEA reactivity can be used as a biomarker of immune monitoring to predict infection with *S. mansoni* in endemic areas. Financial support: FAPEMIG, NIH Grant A145451 e 1R03AI071057-01, INCT-DT, CAPES, CNPq.

137 Ocurrence of schistosomiasis mansoni in female population of a community in the jaraguá neighborhood (Maceió, Alagoas, Brazil)

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Introduction: Schistosomiasis mansoni, caused by the trematode Schistosoma mansoni, is predominant in tropical climate, with populations in lown conditions of hygiene and education. The Brazil Northeast region has an important endemic. Alagoas, northeastern state, presents schistosomiasis in urban and rural areas, with several water collections where live the transmitters, *Biomphalaria* snails. Objective: This study aimed to determine the occurrence of schistosomiasis mansoni in women from a poor community in an urban area and to identify epidemiological aspects that may favor the parasites. Methodology: The study was conducted in a humble fishing community in the Jaraguá neighborhood, located near the port of Maceio (Alagoas state, Brazil). The study group comprised 204 women aged between 15 and 45 years. An epidemiological investigation was conducted through questionnaires to assess the population socioeconomic profile. There were distributed collectors for obtaining fecal material. The material analysis was performed in laboratory by the Lutz method. It was observed the presence of *Biomphalaria* snails in water collections close to the community, despite the sea proximity. They were examined in the laboratory for identification of the *S. mansoni* cercariae. Results: There were interviewed 204 women and 155 examinations were performed. Tests showed that 8 (3%) cases were positive for schistosomiasis. The surveys showed low education applied: 92% had primary and secondary education, 8% had never school. The community have immigrants (45%) from other cities and / or states. The houses have bathrooms (82%), external and collective bathrooms (13%), and 5% have no toilet (5%). The wastes are open (57%), in septic tank (29%) and sewage (14%). There were collected 210 snails. By the compression method between two glass plates, it was found that 24 were contaminated with *S. mansoni* cercariae. Conclusion: Environmental conditions where the population lives and the presence of the snail transmitter are a strong indication for the schistosomiasis spread f in the community. The presence of *Biomphalaria* next to the beach can mean adapting to waters with salinity. It is emphasized the need for an effective program for the control of schistosomiasis, such as sanitary engineering measures and health education.

138 Epidemiological aspects of schistosomiasis in Alagoas and evaluation of diagnostic methods used

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Introduction: In Brazil, the endemic schistosomiasis affects mainly the Northeast states, with parasitized people in coastal around. In Alagoas state, according to Fundação Nacional de Saúde, 60% of the territory is endemic, with 72 municipalities in "risk range". Objectives: The objective of this study was to describe epidemiological aspects of schistosomiasis in two Alagoas municipalities and to verify the applicability of two diagnostics methods. Methodology: The study was conducted in endemic municipalities of Santana Mundaú and Capela, located in the Mundaú and Paraíba rivers basins, respectively. The study group consisted of 690 students from public school, aged between seven and fifteen. After their responsible consent, a socio-economic surveys and collected fecal samples were perfomed. In laboratory, the samples were analyzed by parasitological methods, Kato-Katz and Lutz. Positive cases were treated after orientation to those responsible. Results: In 690 children studied, 481 (69.7%) showed intestinal parasites. Schistosoma mansoni appeared in 172 (24.9%) children, in which, 60 (34.8%) were only affected by him. In the other was an association between the trematode and helminth or protozoan. There was a higher occurrence of Schistosoma mansoni / Trichuris trichiura (p = 0.03) and Schistosoma mansoni / protozoans (p = 0.04). The mean parasite load was 151.4 eggs per gram of feces, higher in Santana Mundaú (187.9 epg) than in Capela (83.2 epg). Both municipalities showed high rates of infection by *S. mansoni*, with 60 (20.9%) in Capela and 112 (27.7%) in Santana do Mundaú. The concordance analysis between Lutz and Kato methods showed disagreement in 54.2%, with higher sensitivity to Lutz (76.4%). The survey showed that 50% of students with schistosomiasis live in brick houses, the wastes are disposed in public sanitation (44%), there are public garbage collection in 90.2% of cases and that the drinking water comes from the public water supply (76.9%). Most children (53.5%) know the snails transmitters, but claims not to attend the river. Conclusion: The World Health Organization (WHO) considers a high prevalence of schistosomiasis above 5%. Also a high prevalence observed in this study was two times higher than that presented by the Programa de Controle da Esquistossomose. Therefore, it can be suppose that Capela and Santana do Mundaú municipalities are hyperendemic areas.

139 Haemostastic Abnormalities in Hepatosplenic Shistosomiasis Patients

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Introduction: The schistosomiasis is endemic parasitic disease in which the patients who develop the hepatosplenic form (HS) present some clinical alterations like periportal fibrosis splenom egaly, cytopenias and upper digestive bleeding. However, the liver routine tests tend to be normal even with prolonged protrombin time. The aims of this study were to analyze the hematological features in patients with HS schistosomiasis and associated with ultrasound findings. Methods: Fifty-five HE patients (group I) and twenty-eight health individuals (group II) were studied and screened by clinical and ultrasound on the Gastroenterology service, UFPE. Blood samples were used for routine hepatic tests, blood counts and for prothrombin (PT), thrombin (TT). Furthermore, blood coagulation factors (II and VII), protein C (PC), plasminogen activator inhibitor 1 (PAI-1) and D-dimer (DD) were made by immunoturbidimetry, chromogenic methods and enzyme linked immunosorbent assays (ELISA). For analysis of DD was used the cut-off of 483 ng/dL to estimate the status of hyperfibrinolysis associated with measurements of PAI-1 levels. Patients with alcoholism, viral hepatitis B and C, systemic disease and in use of anticoagulants drugs were carefully excluded. Results: The mean age of HS patients was 54 years and in the control group was 38 years. Through ultrasound tools the pattern of periportal fibrosis in HS patients was E (63.6%), D (25.2%) and F (10.9%) and the longitudinal spleen diameter was 16.4 cm. The mean of the platelets counts (PLT) was lower in group I (101.000x257.800/mm3) than that group II, $p<0.0001$. Moreover, the HS patients also exhibited leukopenia (47.2%), anemia (34.5%), bicytopenia (38.1%) and pancytopenia (10.9%). The group I also presented lower levels of albumin (3.8x4.3 g/dL, $p<0.0001$) and increase of the other liver tests (AST, ALT, GGT and ALP). For coagulation factors, it was observed that group I presented an enlargement of PT (19.5x13.8 seconds) and TT (13.7x11.9 seconds), $p<0.001$. The coagulation factors showed lower activity when compared to group II: Factor II (66.6x92.6%), VII (49.9x84.7%) and PC (65.6x95.0%), $p<0.001$. Furthermore, the group I also showed decrease of PAI-1 (51.9x273.7 ng/mL) and higher levels of DD (210x96 ng/dL) than group II, $p<0.001$. In addition, HE patients had 27.2% of the DD levels above the cut-off. Conclusions: This study suggests that both hematological and haemostatic alterations are associated with numerous factors such as liver dysfunction, splenomegaly/ hypersplenism, and portal hypertension and that HS patients exhibit hyperfibrinolysis status, which is another factor that may predisposes the upper digestive hemorrhage.

140 Influence of portal hypertension in haemostastic abnormalities in schistosomiasis mansoni.

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Background and aims: The schistosomiasis mansoni is a parasitic disease in which the patients who develop the hepatosplenic form (HS) present clinical manifestations like periportal fibrosis, splenomegaly and upper digestive bleeding. However, the liver routine tests tend to be normal even with prolonged protrombin time in some patients. The aims of this study were to analyze the blood clotting in patients with HS schistosomiasis compared to HS patients which had the spleen removed for the treatment of portal hypertension. Methods: 100 patients with schistosomiasis were selected: 55 HS form (group I) and 45 splenectomized (group II). All patients were submitted to clinical examination, abdominal ultrasound and digestive endoscopy at gastroenterology service, UFPE. Blood samples were used for routine hepatic tests and for prothrombin (PT), thrombin (TT), fibrinogen and partial thromboplastin time (PTT) tests. Furthermore, the vitamin K dependent blood coagulation factors (II, VII, IX and X), factor VIII, antithrombin IIa (ATIIa), protein C (PC), human tissue plasminogen activator (t-PA), plasminogen activator inhibitor 1 (PAI-1), Thrombin-activatable fibrinolysis inhibitor (TAFI), and D-dimer were made by immunoturbidimetry, chromogenic methods and enzyme linked immunosorbent assays. Patients with alcoholism, viral hepatitis B and C, systemic disease and in use of anticoagulants drugs were carefully excluded. Results: There was no significant difference when analyzed parameters such as age, sex and periportal fibrosis. The HS patients showed the mean diameter of the portal vein significantly higher than the splenectomized patients (1.28cm x 0.96cm), p=0.001. It was also observed that the HS patients exhibited lower PLT and prolongation of PT when compared to group II (101.000 x 245.000/mm3 and 19.3 x 16.0 seconds), p=0,001. In relation to coagulation blood factors it was shown that patients with HS schistosomiasis presented lower average activity of the factor VII (49.9x66.6%) and the factor II (65.1x71.6%) when compared to splenectomized patients, (p<0.001). Besides that, the enzymatic activity of PC in HS patients was lower than in splenectomized group (63.8x77.7%), p <0.001, and the value of PAI-1 in HE patients was lower than the splenectomized group (51.9 x221.5 ng/dL), p <0.001. There weren't any alterations in the hepatic tests between the two groups. Conclusions: The present study shows that in the patients who have had the spleen removed had a significant improvement in haemostatic parameters, probably due to the reduction of portal hypertension.

141 Lymphocyte phenotypic evaluation in schistosomiasis patiens with different degrees of periportal fibrosis

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Introduction: Approximately 5-10% of individuals infected with *S. mansoni* progress to hepatoesplenic form, characterized by periportal fibrosis. The aim of this study was to evaluate the phenotype and the activation status of T lymphocytes in schistosomiasis patients with periportal fibrosis, specifically the frequency of TCD4+, TCD8+ and the expression of CD25, CD69 and CD28 on these lymphocytes ex vivo. Methods: So far, 24 patients were enrolled in the study, being ten without fibrosis, six with incipient fibrosis and eight with moderate to severe fibrosis. Specific antibodies were used to identify the profiles of lymphocytes using flow cytometry. Results: The median (min.-max.) frequencies of CD4+T cells in the groups without fibrosis, fibrosis incipient and moderate to severe fibrosis, were 40.55% (30.1- 47%), 41.35% (25.9 - 46.3%) and 47.25% (32.5 - 59.4%), respectively. The frequency of CD8+T cells also did not differ between groups. The frequency of TCD4+CD28+ cells, was lower, 56.5% (48.8 - 95.4%) in patients with incipient fibrosis than what was found in patients with moderate to severe fibrosis 95.65 % (91.2 - 98.5 %; $p<0.05$). The frequencies of TCD4+CD69+ other marker of cellular activation, were 0.7% (0.3 - 1.9%), 0.6% (0.1 - 1.23 %) and 0.3 % (0.1 -1.2%), respectively. The frequency of TCD4+CD25- cells did not differ between groups being 88.95% (86 - 91.5%), 87.7% (83.4 - 91.5%), and 91.9 % (87.8% - 95.2%), in patients without fibrosis, incipient fibrosis and moderate to severe fibrosis, respectively. The frequency of activated CD4+T cells (CD4+ CD25low) also did not differ between groups, being 7.85% (6.5 -11.5%), 7.8% (4.6 -13.1%), and 6% (4.0 - 8.3%), respectively. However, analyzing the T cells with regulatory profile (CD4+ CD25high), we observed a higher frequency of these cells in individuals without fibrosis [2% (1.1 -2.9%)] than patients with moderate to severe fibrosis [1% (0.7 – 1.35%)] or patients with incipient fibrosis [(1.8 (0.8 – 3.5%); p=0.02]. Conclusion: These data indicate that lymphocytes from individuals with incipient fibrosis and moderate to severe fibrosis are more activated than those from patients without fibrosis, and in these individuals, the lymphocytes showed a regulatory profile.

142 Study of risk areas for schistosomiasis in areas no endemic in south of Minas Gerais, Brazil.

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This paper presents the spacial distribution of schistosomiasis through geotecnology, to better characterize the distribution of prevalence of the disease and intermediate hosts. The study was realized at municipalities of Guaranésia and Arceburgo- MG, situated in the south of Minas Gerais, an area considered no endemic for schistosomiasis, but that deserves attention by the presence of intermediate hosts, and to import labor from workers in endemic areas, which results in foccus risk for establishing transmission. The procedures consisted primarily of the execution of three steps: i) field campaigns in search of snails, ii) examinations in workers and iii) spatial analysis of data from geotecnology. In the field campaign conducted in 2012 found six foccus of vector B.tenagophila, totaling 681 snails. We found no infected snails. The examinations were performed using two methods for diagnosis, Kato-Katz and Lutz / HPJ. The overall prevalence of intestinal parasites to Arceburgo/ Guaranésia was approximately 13.5% of a total of 480 examinations performed with the workers from “Agricultural Monções” and residents of Arceburgo. In 13.5%, 32.3% were infected with *S. mansoni*. With respect to spacial analysis, images were used from 03/27/2011 Landsat-5/TM and digital elevation models (DEM) derived from Shuttle Radar Topography Mission (SRTM). The images were obtained from the image catalog of the National Institute for Space Research (INPE), available at electronics www.dgi.inpe.br, and the University of Maryland (available at: http://glcf.umiacs.umd. edu / index.shtml). The DEM was obtained from the catalog of the National Aeronautics and Space Administration (NASA), the electronic address http://www2.jpl.nasa.gov/srtm/. With the digital elevation method was made a map topographically to characterize the study of area. The preparation of the statement and other drainage water was obtained with the vectorization of these elements based on the DEM and Landsat images. Also carried out the preparation of map of land use and soil. The places where they were found infected people and snails were plotted spacially on the map and it used the kernel intensity estimator to generate their representations of density. The result of this analysis indicates the existence of a strong spacial trend in the risk of transmission in the city of Arceburgo MG. In this place, there was a meeting of all foccus of snails. With regard to human cases, there was an area located in a rural area with clusters of higher intensity.

143 Evaluation of *Schistosoma mansoni* transrenal DNA (trDNA) clearance in urine samples using the murine model

Martin Enk, Guilherme Oliveira e Silva, Nilton Rodrigues

Introduction: Schistosomiasis mansoni is an endemic parasitic disease of worldwide importance, and ranges only behind malaria in relation to socio-economic impact and public health importance. Currently, there are different methodologies available for diagnosis of this disease; however, only a few of them show sufficient sensitivity, specificity especially for early detection of infection and control of cure. Recently a PCR assay directed to transrenal DNA in urine samples of patients from an endemic area was capable of detecting infection in cases with low worm burden. In thecurrent study, we applied this methodology, using the murine model, as an approach to evaluate appearance trDNA after infection and control of cure after treatment. Methods: In order to explore the appearance and clearance of trDNA after infection, 30 Swiss mice were infected with 25 cercariae each and separated into two groups of 15 animals each. Another 15 uninfected animals served as a negative control group. Urine samples of each infected and uninfected animals were collected daily until the 10th day after infection. One of the infected groups was treated orally with a single dose of praziquantel (400 mg/kg) plus oxaminiquine (200 mg/kg), 45 days post-infection and urine samples were collected up to 38 days post-treatment. The untreated infected mice were submitted to perfusion 58 days post-infection. DNA from the urine samples was extracted using a salting out and resin methodology and amplified using primers targeting the 121bp tandem repeat DNA sequence of *S. mansoni*, previously designed by Pontes. Results: Between 2-6 days post-infection, PCR presented positive results for all the animals pertaining to both infected groups. None of the uninfected animals of the control group showed a positive result for schistosomiasis. Between 4-8 days post-treatment all 15 animal from the treated group presented negative results in the PCR. The untreated mice were perfused 58 days post-infection, and all of them showed eggs and worms. Conclusion: As the results clearly show, the PCR assay directed to trDNA in urine samples of mice is capable of detecting infection during a very early stage and low infection intensity and also serves to clarify time limits of the *S. mansoni* trDNA clearance after treatment. The animal model using Swiss mice is a well known and valuable tool for the study of the host-parasite relationship and it has been widely used to answer fundamental questions on the dynamics of *S. mansoni* infections, including issues related to diagnosis and cure.

144 *Schistosoma mansoni* aquaporin as a potential vaccine target

Bárbara Figueiredo, Vicente Martins, Carina Pinheiro, Natan Assis, Suellen Moraes, Sérgio Oliveira

The Schistosoma mansoni aquaporin (SmAQP) is one small tegumental membrane protein that transports water and other small solute like glycerol. Besides being expressed in all developmental stages of the parasite, this protein is of crucial importance for osmoregulation and drug uptake. Previous studies have shown that SmAQP is vital for schistosome survival, since the inability to control water movement impairs the parasite biochemistry leading to increased mortality. The present study aims to predict the SmQP epitopes using bioinformatics tools and to design a chimeric soluble protein containing the main epitopes for murine immunization tests. Using the online program BepiPred 1.0 we performed the prediction of linear epitopes and found ten potential epitopes in the native structure of SmAQP. Nine of them are located in the protein loops and only one is inside the transmembrane domain. So, we designed a chimeric protein using only the protein loops fused with a histidine tag, and cloned it in a plasmid for its expression in bacteria. This chimera is predicted to be a soluble 18kDa protein and bioinformatics analysis showed that seven of the original epitopes were maintained. We were able to express this protein in Escherichia coli and to purify it with niquel column chromatography. Mice were immunized with three shots of the purified protein and Freund adjuvant generating a Th1 response, leading to high levels of anti-aquaporin IgG2a antibody and the increase of cytokines like TNF-α, IFN-ɣ. By western blot analysis using mouse polyclonal antibodies raised against this chimeric protein, we demonstrated the presence of one bands around 32kDa, the predicted size for native SmAQP. Moreover, in western blot assays performed with sera from mouse immunized with whole schistosome tegument, this chimera was recognized due to presence of SmAQP epitopes. Bioinformatics studies point SmAQP as an immunogenic protein, and a chimeric protein with its main epitopes generate a Th1 response in mice. Taken together, these results elicit SmAQP as a potential vaccine target.

Poster Abstracts - *"Post Genomics, Proteomics, Epigenetics and Evolution*

145 Active site mutations could the explain preference for alternative substrate of the Methylthioadenosine Phosphorylase (MTAP) enzyme from *Schistosoma mansoni*.

Juliana Roberta Torini de Souza, Ricardo De Marco, Richard Charles Garratt, Jose Brandão-Neto, Humberto D'Muniz Pereira

The schistosomiasis is a chronic parasitic illness, caused by the parasite Schistosoma mansoni that affects approximately 207 million people worldwide with approximately 6 million in Brazil. The parasitic illness are the leading cause of deaths in developing countries, and receives little or no attention from drug companies to develop therapies. The Schistosoma mansoni parasite does not posses the de novo pathway for purine bases biosynthesis and depends entirely on salvage pathways for its purine requirement. The MTAP enzyme (EC 2.4.2.28) is a member of the nucleoside phosphorylase family, catalyzing their natural substrate 5'-deoxy-5'-methylthioadenosine (MTA) but in some cases, it can use the adenosine as alternative substrate producing adenine. The adenosine conversion to adenine makes this enzyme in a key component of the pathway, in opposition to the Human enzyme which is unable to make this conversion. The MTAP was heterologously expressed using E. coli BL21-CodonPlus (DE3) and purified in nickel column. The protein was submitted to kinetic assays for MTA and adenosine substrates. A coupled system was used for indirectly measure adenine through of the 2,8-dihydroxyadenine formation at 305nm, it is produced by adenine oxidation, this reaction is catalyzed by xanthine oxidase (XO). The protein was crystallized in 100mM Bis-tris or MES pH 6.1-6.5 and 14-18% PEG 3350. The crystals were submitted to X-ray diffraction on the Diamond Light Source (DLS). The MTAP complexes structure with sulfate and tubercidin was obtained at 2,1Å of resolution in the space group P21 with a=81.06Å, b=82.68Å, c=150.56Å cell dimensions. The catalytic constants for MTA substrates were KM = 3,12 ± 0,16 µM and Kcat = 32,56 ± 0,55 s-1. Adenosine substrate was KM = 1,94 ± 0,08 µM and Kcat = 22,40 ± 0,33 s-1. The KM for adenosine is about hundredfold the KM for adenosine from Human MTAP. This results indicate a high preference for alternative substrate adenosine showing huge importance of MTAP in the salvage pathways from *S. mansoni*. Active sit analysis shows three important mutation in active site. One in ribose binding site and two in phosphate binding site, that could explain the huge preference for adenosine in comparison to the Human enzyme.

146 DNA methylation status, and epigenetic and genetic diversity of *Biomphalaria glabrata*

Sara FNEICH, Céline Cosseau, Hanine Haidar, Nathalie Arancibia, Michael Reichelt, Guillaume Mitta, Christoph Grunau

In parasite-host interactions, parasites exert selective pressures on their hosts and vice versa, leading to a genuine arms race between both partners. To adapt, each partner must evolve the capacity to express new phenotypic variants. We propose that epigenetic variations play an important role in the genesis of phenotypic variability without changing the nucleotide sequence. Schistosoma mansoni is characterized by high capacity for adaptation. Our previous work has demonstrated that epigenetic changes in *S. mansoni* increase its phenotypic variability. In the same context of interactions, we suggest an interdependence of epigenomes during the schistosome / snail interaction. DNA methylation is a carrier of epigenetic information in many, but not all species. We used MS-AFLP, LC-MS and bisulfite sequencing to characterize DNA methylation in two laboratory strains of the South-American intermediate host *Biomphalaria* glabrata. We show that 2% of cytosines are methylated in the genome of this species. Our data indicate that the epigenome of *B. glabrata* belongs the “echinoderm-type” containing both high-methylated and low-methylated genes. Bisulfite sequencing technique was used to determine precisely the 5-methylcytosine (5-mC) positions at candidate regions. Concomitantly our AFLP analysis showed high genetic diversity of *B. glabrata* despite their breeding in the laboratory for over thirty years. Our works aims to better understand the mechanisms of host / parasite coevolution.

147 EVOLUTIONARY GENOMICS OF SCHISTOSOME TEGUMENTAL-ALLERGEN-LIKE (TAL) PROTEINS

Larissa Silva, Laila Nahum, Guilherme Oliveira

The tegument of schistosomes is pointed as an ideal target for drug and vaccine development against schistosomiasis, since it is a very dynamic host-interactive layer involved key biological functions. These include parasite nutrition, excretion, osmoregulation, sensory reception, signal transduction, and immune evasion. Tegumental-Allergen-Like (TAL) proteins are strongly associated with the tegument and seem to occur solely in Platyhelminthes. In schistosome infections, TAL family members induce human IgE response that has been associated with resistance against parasite reinfection. The present study aimed at analyzing the Schistosoma mansoni, S. haematobium and S. japonicum predicted proteomes in order to identify the TAL proteins through combined computational approaches and to reconstruct the evolutionary history of these proteins and their homologs in other Platyhelminthes. Selected taxa included: Clonorchis sinensis, Echinococcus multiloculares, Faciola gigantica, F. hepatica, Hymenolepis microstoma, Taenia solium, S. bovis, and *S. mansoni*. Potential SmTAL homologs where retrieved from public databases by sequence similarity searches using BLAST. Additional sequences were identified from complete proteomes through HMMs (Hidden Markov Models). Whole amino acid sequences containing concomitant two conserved domains, EF-hand (IPR011992) and Dynein Light Chain (IPR001372), were aligned by MAFFT. Sequence alignments were further used in phylogenetic analysis using the maximum likelihood method as implemented in PhyML. The total number of TAL family members in the three Schistosoma species ranged from five (S. japonicum) to thirteen (*S. mansoni*). All *S. mansoni* TAL proteins have homologs in S. haematobium, with the exception of the putative dynein light chain 1 (cytoplasmic) protein (Smp_072620.1). Our findings suggest that TAL proteins originated from successive gene duplication events in the Platyhelminthes lineage after its diversification from other metazoans. In conclusion, this work provides an evolutionary view of TAL proteins allowing a deeper understanding of lineage specific adaptations potentially related to the Platyhelminthes parasitic lifestyle.

148 Histone deacetylase inhibitors in *Schistosoma mansoni*: effect on histone acetylation and gene expression profiles

Letícia Anderson, Marina de Moraes Mourão, Luíza Freire de Andrade, Guilherme de Oliveira, Raymond Pierce, Sergio Verjovski-Almeida

Histone deacetylases (HDACs) are enzymes involved in remodeling of chromatin, and have a key role in the epigenetic regulation of gene expression. Treatment of Schistosoma mansoni (schistosomula) with Trichostatin A (TSA; a HDAC inhibitor) induces apoptosis and the mortality increases after 3 days. In order to characterize gene expression changes caused by *S. mansoni* treatment with TSA, microarray experiments were performed. Total RNA of two biological replicates was extracted from the larval stage treated for 12, 24, 48 and 72 h either with 1µM TSA or with ethanol (vehicle) as a control. Samples were labeled with either Cy3 or Cy5 and hybridized to custom-designed 4x180k oligoarrays. Gene expression analyses showed 3710 (12 h), 3324 (24 h), 3099 (48 h) and 1737 (72 h) genes with statistically significant differential expression (q-value<0.05). Ingenuity Pathway Analysis software (IPA) showed significantly enriched gene networks with repressed genes after 12 h treatment related to post-transcriptional modification of RNA, cellular organization, and DNA replication and repair. After 72 h, there was inhibition of genes related to protein synthesis and nucleic acids metabolism, and all these processes could be related to apoptosis induction. Moreover, after 12 h and 24 h treatment there was upregulation of calcium channel genes, possibly leading to influx of calcium from sarcoplasmatic reticulum to cytosol. Another upregulated gene was mitochondrial calcium uniporter, which could increase Ca+ level in the intermembrane space inducing apoptosis. We observed by quantitative western blotting that treatment of adult worms with 1µM TSA caused 2.5-fold hyperacetylation of H4-Lys5, corroborating that regulation of gene transcription is effected by inhibition of *S. mansoni* HDACs. Acetylation at H2A-Lys5, H2B-Lys12, H3-Lys9 was also detected. Taken together, these data provide important information about parasite response to hyperacetylation of histones and consequently regulation of gene transcription leading to apoptosis. Acknowledgments: Supported by FAPESP, CNPq and European Commission Seventh Framework Programme.

149 Functional characterization of Schistosoma spp. histone modifying enzymes

Marina de Moraes Mourão, Luiza Freire Andrade, Laila Alves Nahum, Juliana Assis Geraldo, Fernanda Sales Coelho, Raymond J. Pierce, Guilherme Oliveira

Histone modifying enzymes (HMEs) are important in the regulation of chromatin modifications. HMEs are targets for human disease treatments while associated with aberrant epigenetic states. To date, the genomic data of three Schistosoma species are available, providing an opportunity to identify new drug targets against these parasites. Our main goals were to identify enzymes implicated in histone acetylation and methylation in S. haematobium, S. japonicum, and *S. mansoni* and, in addition, validate the HMEs of *S. mansoni* as potential drug candidates. These enzymes include histone acetyltransferases (HATs), histone deacetylases (HDACs), histone methyltranferases (HMTs), and histone demethylases (HDM). In order to identify the HMEs through computational approaches, Hidden Markov Models (HMM) were used to analyze the predicted proteomes of the three selected species. Here, we observed small variation in the total number of the identified HMEs in the three analyzed Schistosoma species; S. haematobium (60), S. japonicum (62) and *S. mansoni* (61). In order to test whether the identified HMEs could work as therapeutic targets, 17 genes were individually knocked down using RNA interference in cultured schistosomula of *S. mansoni*. After 30 days of dsRNA exposure, parasites treated with dsRNA targeting KDM1 and KDM2 (two demethylases) presented a subtle loss in motility. To assess the role of some HMEs under in vivo conditions, four HMEs (HDAC8- histone deacetylase, PRMT3- histone methyltransferase, and KDM1 and KDM2- histone demethylases) were chosen for testing in vivo due to the high levels of transcription repression observed. A significant reduction of worm burden (50%) was observed in mice infected with knockdown parasites for HDAC8 when compared to the unspecific control. Finally, egg count was significantly reduced in mice livers for all tested HMEs. In conclusion, our work improved the functional annotation of over 20% of *S. mansoni* HAT and HDAC proteins. Parasites treated with dsRNA targeting HDAC8, PRMT3 and KDM1/KDM2, seem to decrease oviposition and their ability to survive (at least for HDAC8) in the vertebrate host, indicating that these enzymes could be good target candidates for drug development. Gene function tested by RNAi demonstrated that these enzymes play important roles in parasite biology; therefore, the respective enzymes could be potentially used as candidates for drug design against schistosomiasis. Supported by: European Community's Seventh Framework Programme (SEtTReND). National Institutes of Health - NIH/Fogarty International Center. National Council for Research and Development - CNPq. Research Foundation of Minas Gerais - FAPEMIG

150 Making next generation sequencing a routine tool for epigenome, genome and transcriptome studies: challenges and solutions

David ROQUIS, Julie Lepesant, Julie Clement, Céline Cosseau, Rémi Emans, Guillaume Mitta, Christoph Grunau

Until recently, during the Sanger sequencing era, experiments involving DNA sequencing were limited to a handful of candidate genes or regions. The whole-genome scale was out off reach. This is not the case anymore, with the development of next generation sequencing (NGS), able to produce several millions of short reads, spread through the entire genome, at a relatively affordable cost. The bottleneck is now downstream, during the bioinformatics treatment of the huge amount of data. Multiple tools are available to treat NGS data, but selecting and configuring the most appropriated ones for a specific experiment is a challenging task in itself and must be carefully thought. Today's biology is often based on small heterogeneous workgroups, sometimes spread over continents, with and without bioinformatics support. Therefore, another challenge is to provide biologists who have often little or no bioinformatics experience, with a user-friendly interface to (i) chose the right tools (ii) perform the analysis, if necessary remotely, and (ii) interpret their outputs. Finally, data must be delivered in a format that can easily be integrated into existing resources such as SchistoDB. Our laboratory uses NGS data to explore the genome, epigenome and trancriptome of Schistosoma mansoni. We pioneered the use of chromatin immunoprecipitation followed by sequencing (ChIP-Seq) to investigate the chromatin structure of *S. mansoni*. Here we show how to link the differences found in the chromatin structure with gene expression differences (RNA-Seq) for cercaria that developed in two strains of *Biomphalaria* glabrata. We also used NGS to perform population sequencing of genomic DNA of *S. mansoni*, and analyzed the distribution of SNPs to identify genes under selective pressure. These projects allowed us to develop guidelines for testing and adjusting several tools for the various steps of the analysis, and to integrate them into an easy to use web interface. We show that it is instrumental to provide a graphical representation of the analysis results to profit from the experience of parasitologists with little bioinformatics background. Our work provides some insights into how to choose tools for each type of experiments, detect artifact and integrate the tools in a web based, user-friendly application.

151 Recognition of schistosome tegument proteins using a high throughput protein microarray

Soraya Gaze, Patrick Driguez, Jeffrey Bethony, Fernanda Cardoso, Rodrigo Correa-Oliveira, Donald McManus, Denise Doolan, Philip Felgner, Alex Loukas

Schistosomiasis is a neglected tropical disease that affects more than 207 million people worldwide, with an estimated 700 million people at risk in 74 endemic countries. Praziquantel (PZQ) is the only available treatment against all forms of schistosomiasis, and long term control of the disease with PZQ alone is unrealistic. Immunoepidemiological investigations have shown that a very small percentage of exposed populations in Brazil are naturally resistant to schistosomiasis despite never being treated with PZQ. We propose to evaluate the humoral response of schistosomisis endemic area individuals to schistosome tegument antigens spotted onto a protein microarray to understand the mechanisms involved and the antigens targeted by these individuals. To identify *S. mansoni* antigens that are uniquely/preferentially recognized by resistant compared with susceptible individuals, we constructed a protein microarray consisting of 60 *S. mansoni* (Sm) and 180 S. japonicum (Sj) proteins, predominantly those found in the tegument. We screened the array with sera from individuals from Minas Gerais, Brasil, who were putatively resistant (PR- n=20) to schistosomiasis mansoni, chronically infected with low eggs counts per gram of feces(epg) (CI-light n=29), medium epg (CI-Med n=18) and high epg (CI-heavy n=17) or unexposed to the parasite controls (n=24). We evaluated IgG subclass and IgE responses to the proteins in the array and compared their recognition profiles. One-way ANOVA followed by Dunn's test were used to evaluate significance between the groups ($p<0.05$). PR and CI groups recognised many of the proteins on the array. There was extensive cross-reactivity between *S. mansoni* and S. japonicum antigens. In general, we observed proteins that had multiple antibody subtypes response and some that only had a unique subtype response. We also had similar response to recombinant proteins as showed previously by our group using ELISA tests. High throughput protein array is an excellent tool for protein discovery in helminthiasis. In schistosomiasis, it proved to identify the immune response in PR individuals compared to CI individuals independent of the epg status. The search for pre-existing IgE response to a vaccine antigen is crucial as IgE can promote an allergic response at vaccination, and those vaccine targets should be excluded to further investigations. This report describes the construction and screening of a schistosome protein array with human sera, and the results presented will be valuable in the up- and down-selection of antigens for development of a subunit vaccine for human schistosomiasis.

152 Why are Saposin-like proteins so ubiquitous, what is their function?

Charlene Willis, Andreas Hofmann, Conor Caffrey, Alex Loukas, Malcolm Jones

Saposin-like proteins (SAPLIPs) are a diverse family of proteins with common roles in lipid perturbation. SAPLIPs are defined by the Sap domain, a compact alpha-helical domain that derives its stability from a network of disulfide bonds formed by six conserved cysteine residues. Despite their similar structures, these proteins have adapted to carry out a number of different functions at biological membranes. SAPLIPs, both within and between species, have little sequence identity and few of the many newly identified SAPLIPs from genome studies have been assigned a definitive function. From the limited structural studies of SAPLIPs, the mechanisms of action vary widely, and include positively charged patches, which act to allow membrane docking, scissoring actions for lysis of membranes and pore-formation. Multiple SAPLIPs have been identified in numerous invasive parasites including *S. mansoni*. Published investigations of a SAPLIP found in Fasciola hepatica using both protein and DNA vaccine constructs have had promising success in experimental infections. We searched databases containing *S. mansoni* sequences using a comprehensive algorithm and identified 15 proteins which were confirmed as SAPLIPs by InterProScan. Quantitative real-time PCR (qPCR) was used on specific life cycle stages to determine gene expression from eggs to mature adults. RNA interference (RNAi) was employed against schistosomula and adult life cycle stages to investigate the effects of gene knock-down on general well being and digestion. Of the 15 SAPLIPs, 13 contain a predicted signal sequence suggesting they are secreted. Data derived from studies of the gastrodermis tissue, obtained by using laser microdisection microscopy suggested that at least 10 of the proteins are expressed in but not limited to, the gut. It has been suggested that SAPLIPs may play a role as the haemolysin in blood-feeding helminths. We are using recombinant protein technologies and RNAi to characterise SAPLIPs. Solving the 3D-structure is currently underway. Here we present data on expression patterns, sites of expression and functional characterization of these schistosome SAPLIPs.

153 Identification of transcripts processed by Spliced Leader Trans Splicing in *Schistosoma mansoni*

André Luiz Reis, Mariana Boroni, Marina Mourão, Carlos Renato Machado, Andrea Macedo, Glória Franco

Some WHO estimations indicate that there are around 207 million people affected by schistosomiasis throughout the world. This alarming data reinforces the importance of studying the causative agent of this disease, which in Brazil is the Schistosoma mansoni. The parasite has a complex life cycle involving its survival in different environments. This great adaptability reflects the drastic morphological changes that occur during the transformation from one stage to another in the cycle. A molecular mechanism still poor understood but potentially important for the control of gene expression in this parasite is the Spliced Leader Transplicing. In this process, a sequence identified as spliced leader (SL) is donated from the 5' end of a specialized RNA (SL-RNA) to some receptor pre-mRNAs, leading to the formation of a common 5' end in the mature mRNAs. The main objective of this work is to identify transcripts that undergo transplicing in an attempt to understand biological functions and processes that are affected by this mechanism in the parasite. To that end, mRNA was extracted from different stages of *S. mansoni* life cycle (miracidia, schistosomula, cercariae and adult worms) and was used to construct specific cDNA libraries enriched in transcripts containing the SL sequence. By now, a miracidia cDNA library was successfully constructed and 58 clones were selected to be analyzed, in order to verify the library quality and to generate Expressed Sequence Tags (ESTs). The sequences were edited in silico to remove low quality bases, vector sequences and Poly(A) tail using DNA Baser and SeqClean softwares. Then, a similarity search was performed against both nucleotide and protein databases using BLASTn and BLASTx programs. As expected, the sequences showed great similarity to *S. mansoni* sequences deposited in public databases and also carried the SL sequence. Other clones in the library will be sequenced and analyzed and new libraries will also be constructed. A prospective study such as this can enlighten aspects of the regulation of gene expression in this organism.

154 *Schistosoma mansoni* sirtuins as drug targets

Julien Lancelot, Stéphanie Caby, Florence Dubois, Jacques Trolet, Martin Marek, Wolfgang Sippl, Christophe Romier, Manfred Jung, Raymond Pierce

Sirtuins are protein deacetylases that are involved in a wide variety of cellular processes including the regulation of transcription and apoptosis. They are actively investigated as drug targets, particularly in cancer, and in the context of the SEtTReND project financed by the EC, we are investigating the use of sirtuin inhibitors as candidate drugs against schistosomiasis. Five sirtuins, orthologues of mammalian sirtuins (Sirt) 1, 2, 5, 6 and 7, are encoded in the *S. mansoni* genome and we have cloned and characterized their coding sequences. Quantitative RT-PCR shows that all five are expressed at all parasite life-cycle stages tested. Inhibitors of human Sirt1 and 2 induce apoptosis in schistosomula and the separation of adult worm pairs maintained in culture. The production of recombinant *S. mansoni* (Sm)Sirt1, 2 and 6 has been initiated with the aims of obtaining 3D crystal structures and their use in high-throughput inhibitor screening. In order to determine the biological roles of SmSirt1 we are screening for potential protein partners using a yeast two-hybrid library.

155 *Schistosoma mansoni*: the role of epigenetics in female fertility

Vitor Carneiro, Isabel Caetano da Silva, Raymond Pierce, Manfred Jung, Marcelo Fantappié

The eggs produced by mature female Schistosoma mansoni are responsible for the pathogenesis of schistosomiasis. Therefore, studies on schistosome reproduction and oogenesis may define important therapeutic targets. The eggshell precursor gene p14 is highly and exclusively expressed in the vitelline cells of mature female worms. Thus, considering the importance of the p14 protein for egg viability, we have studied the molecular mechanisms of p14 gene regulation. We have previously reported that a Hormone Response Element occurs in the p14 promoter (p14-HRE). By EMSA and GST-pull down analysis we have shown that two S. mansoni nuclear receptors (SmRXR1 and SmNR1) specifically bound to the p14-HRE as a heterodimer, complexed with histone acetyltransferase (HAT) and histone methyltransferase (HMT) coactivators. In the present study, by luciferase reporter assays, we showed that SmRXR1/SmNR1 were able to activate p14 transcription in mammalian cells. Cell co-transfections with the HATs or HMTs enhanced transcription of the p14-reporter gene. Transcription enhancement was also observed when we used the HDAC inhibitors, TSA or NaB. Importantly, novel HAT and PRMT inhibitors negatively affected p14-driven transcription. Our data suggest that transcription of the p14 gene is regulated by S. mansoni nuclear receptors in a mechanism that depends on chromatin remodeling.

156 *Schistosoma mansoni* venom allergen-like proteins: immunological cross reactivity is linked to phylogenetic relationships, stage-specific transcription and tissue localization

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Introduction: The Schistosoma mansoni venom-allergen-like proteins (SmVALs) are members of a diverse protein superfamily containing a highly conserved SCP/TAPS (Sperm-coating protein/ Tpx-1/Ag5/PR-1/Sc7) domain. SCP/TAPS proteins may be important in key biological processes including host-pathogen interactions and defense mechanisms. Objectives: Investigate whether the immunological cross reactivity is linked to phylogenetic relationships, stage-specific transcription and tissue localization. Methods: Phylogenetic analyses were performed using MrBayes software and the WAG protein substitution model. Real-time RT-PCR analysis of the entire *S. mansoni* VAL-complement (SmVAL1-29) was carried out across parasite life stages. Additionally, imunnoproteomics and nano LC-MS/MS technologies were exploited to examine the cross reactivity properties of the SmVAL members using antibodies raised against recombinant SmVAL4 and SmVAL5. To determine the tissue localization of cross reacting members we have used whole-mount in situ hybridization (WISH). Results/Discussion: Phylogenetic analysis provides evidence for the partitioning of the SmVAL family into two major groups (group 1/goup 2). Additionally, group 1 could be further segregated into group 1a, 1b, 1c and 1d. The members of these subgroups shared common patterns of gene expression as revealed by Real-time RT-PCR. The cross reactivity and immunoproteomics data revealed antibody cross-reactivity just within phylogenetically-related SmVALs, for example anti-SmVAL5 recognition of SmVALs 26/28, 27, and 9/29. Furthermore, whole mount in situ hybridization demonstrated that phylogenetically-related SmVALs transcripts, for example SmVAL1, 10 and 18, were localized to the same structure, in this case acetabular glands. Our results suggest that immunological cross reactivity is linked to phylogenetic relationships, stage-specific transcription and tissue localization. These results are crucial in the design of immune targets against schistosomiasis. Financial support: FAPESP, Fundação Butantan, CNPq and Wellcome Trust.

Poster Abstracts - "Drug Development, Resistance and Molecular Biology"

157 Adenosine kinase from *Schistosoma mansoni*: structural basis for the differential incorporation of nucleoside analogues

Larissa Romanello, José Fernando Ruggiero Bachega, Alexandre Cassago, José Brandão-Neto, Ricardo DeMarco, Richard Charles Garratt, Humberto D´Muniz Pereira

Schistosoma mansoni the parasite responsible for schistosomiasis, affects about 207 million people worldwide. The *S. mansoni* does not have the purine “de novo” pathway depending entirely on the purine salvage pathway to supply it's huge demands on purines. The purine salvage pathway has been reported as a potential target for developing new drugs against schistosomiasis. The enzyme Adenosine Kinase (AK) (E.C2.7.1.20) is key component of this pathway, catalyzes reaction adenine + ATP -> AMP +ADP. Crystal structure of five complexes of *S. mansoni* adenosine kinase were determined: two for adenosine and one for: adenosine and AMP; tubercidin and 2-fluoroadenosine-2. The complexes for tubercidin and 2-fluoroadenosine were described obtained for the first time for monomeric AKs. Sequence and structural comparison between Schistosoma and human AK revels that the ATP binding site possesses 5 mutations in adenosine binding site: I38Q, A65S, V123C, M134L, T136A. In the first mutation (I38Q), the side chain of the I38 residue presents four different conformations in SmAK structures, acting as a filter for tolerable substituents groups at base position N7. Indeed the side chain of the residues I38 and T136 reduces the size of the tolerable substituent groups at N7 position, preventing the binding of nucleosides with bulky groups at this position. Additionally the presence of the T136 provides extra H-bond donator/acceptor in the ABS, acts synergistic with I38 to select permitted nucleosides. The activity for adenosine, tubercidin and 2-flouroadenosine were determinate and also the kinetic parameters for ATP. The activity for tubercidin is 47% higher than to adenosine, in the other hand the activity for 2FA is 52% lower than to adenosine value. The modifications observed within the adenosine binding site suggest that there could be scope for elaborating specific inhibitors in the future.

158 Partial sequencing of mitochondrial DNA of *Biomphalaria straminea* and comparative analysis with *Biomphalaria glabrata* and *Biomphalaria tenagophila*

Christiane de Oliveira Goveia, Liana Konovaloff Jannotti-Passos, Jeronimo Conceição Ruiz, Omar dos Santos Carvalho, Roberta Lima Caldeira

In Brazil, there are three intermediate host species of Schistosoma mansoni: *Biomphalaria* glabrata, B. tenagophila and B. straminea. The development of the technique for automatic sequencing of nucleotides has enabled a considerable increase of information about the genome of several organisms, including the mitochondrial DNA (mtDNA) of molluscs whose studies have been increasing in recent years. *B. glabrata* and B. tenagophila species present totally sequenced mitochondrial genomes and contained 22 transfer RNAs, 2 ribossomal RNAs and 13 messenger RNAs. In this work, the mtDNA of B. straminea was partially sequenced and compared to those of *B. glabrata* and B. tenagophila. In order to sequence the mtDNA for B. straminea, the total DNA was extracted from cephalopodal region of the mollusc. First the regions of 16S, cytochrome c oxidase subunit I (COI), 12S, cytochrome c oxidase subunit III (COIII) an ND1 were partially amplified and sequenced. The obtained sequences enabled the drawing of specific primers for amplification of four larger mtDNA fragments of B. straminea: 12S-COIII, COIII-COI, COI-16S and 16S-ND1, which were cloned and sequenced. For the amplification of these fragments, there were utilized primers directed to the long PCR technique and drawing of primer walking. In this study, were sequenced 7,764 nucleotides, with a total of 2,588 amino acids related to genes COI, COIII, ND1 (partial), ND2, ND3, ND4, ND5 and ND6. There were comparisons of amino acid sequences, start and stop codons between B. straminea, B. tenagophila and *B. glabrata*, with differences in gene size and composition. B. straminea gene order was identical to B. tenagophila and *B. glabrata*. The nucleotide sequence of the COI gene was analyzed due to its potential in species separation, based on the DNA Barcode approach. This analysis enabled the differentiation from B. straminea from other two species that transmit schistosomiasis in Brazil. The work is in progress in order to get all the mtDNA of B. straminea.

159 Development of Statin-based peptidomimetic inhibitors of *Schistosoma mansoni* Aspartyl proteases (SmAPs)

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Hemoglobin catabolizing enzymes are interesting molecular targets for designing schistosomicidal agents and an aspartyl protease, SmCD1, is essential for Schistosoma viability and reproduction. Previously, our group disclosed two other aspartyl protease genes sharing only 30-40% sequence identity to SmCD1, named SmCD2 and SmCD3, which are expressed throughout all parasite's life cycle stages. Hence, development of new antischistosomal drugs targeting *S. mansoni* aspartyl proteases (SmAP's) must take into account this complex gene family. The purpose of this work was to determine the inhibitory potency of new statin-based peptidomimetic compounds on SmAP's combined activity. As a source of SmAP's, aqueous extract of adult worms (10 µg) treated with E-64 (5 µM) was used in the enzymatic assays performed at 37oC in 100 mM sodium acetate buffer, 100 mM NaCl, pH 3.5 Searching for a sensitive assay, we screened a panel of thirteen internally-quenched fluorescent peptides, Abz-A-I-(A/K)-X-X-S-(R/L)-Q-EDDnp, where X are natural amino acids. The sequence AIAFFSRQ was selected for further kinetic characterization and showed apparent Km = 34±11 µM. The library of statine-derived peptidomimetic compounds was designed on the basis of a known cleavage site for SmCD1 on the beta-chain of human Hb. Ac-T-Q-R-ACHPA-E-S-F-NH2 was employed as the prototype and systematic variations on the central statin moiety (P1-P1'), P2 and P3' positions of this peptide were tested. IC50 values for the compounds were calculated from inhibition data at varying inhibitor concentration using sigmaplot software. IC50 values (µM) for inhibitors containing cyclohexane (0.326), isobutyl (0.05) and phenyl (0.94) statine moieties were obtained. Five inhibitors with I, T, S, G and Y residues on P2 position were tested and presented the following IC50 values (µM): 0.039, 0.56, 9.43, 94.3 and 3.97, respectively. The inhibitors with variable P3' residues (R, I, D, E, Y) presented IC50 values between 5-10 µM. Our results showed that statine-derived peptides synthesized by our group inhibit SmAP's with variable efficiencies. An inhibitor series with varying amino acid residues at other positions in these peptidomimetic molecules are under investigation. Moreover, experiments evaluating the effect of these peptidomimetic compounds on mammalian aspartyl proteases (pepsin and cathepsin D) and on schistosome viability are being performed by our group. This data will provide the basis for designing potent and selective SmAP inhibitors.

160 Imatinib activity on *Schistosoma mansoni*

Naftale Katz, Flávia Fernanda Búbula Couto, Neusa Araujo

Imatinib, a drug used for the treatment of human chronic myeloid leukemia due to its activity against protein tyrosine kinases, has been evaluated on Schistosoma mansoni worms in vitro and in vivo in mice experimentally infected with *S. mansoni*. The in vitro activity of imatinib was found at 25, 50 and 100µM. The first activity found with the lower dose was the stop of egg laying and with the higher dosages, death of the worms. In mice infected with *S. mansoni* no activity was found even with 1000, 500 mg/kg/day, single oral dose or when administered for 3 consecutive days. This is another example of the dissociation of results when in vivo and in vitro methods are used in trials on *S. mansoni*. When imatinib (500mg/kg, single oral dose) was administered associated with praziquantel 200mg/kg single oral dose (sub curative dose), an increase of activity of this last drug was observed, showing an additive action of imatinib.

161 Imidazolidine derivative LPSF/PT-09 in the treatment of mice acutely infected with *Schistosoma mansoni*

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Introduction: Schistosomiasis is a chronic disease that affects over 200 million people worldwide. Praziquantel (PZQ) still remains the drug of choice in treating this disease. In vitro studies with adult worms of Schistosoma mansoni performed by Neves and collaborators, imidazolidine derivative LPSF/PT-09 showed high efficacy and demonstrated to be less cytotoxic than PZQ. Thus, in vivo studies were needed to evaluate the therapeutic efficacy of that compound. Objectives: Evaluation of the therapeutic efficacy of the imidazolidine derivative LPSF/PT-09 in mice acutely infected with Schistosoma mansoni. Methodology: Swiss mice (weighting 20 g on average), infected with 80 *S. mansoni* cercariae (Belo Horizonte strain), by subcutaneous route. Sixty days after exposure, the animals were randomly divided into two experimental groups: Group I (LPSF/PT-09/250mg/Kg); group II (LPSF/PT-09/200mg/Kg) and three control groups: Group III (PZQ/250mg/Kg); group IV (PZQ/200mg/Kg) and group V (without compound). Two weeks after treatment, mice were euthanized and perfused. The body cavity, liver, and mesenteric veins were examined for worms after perfusion, to ensure all parasites were removed. The efficacy of treatment was measured as the percentage of reduction of worm burden based on worm counting. For oogram studies, two 1cm fragments of intestine (terminal ileum) were obtained. In each fragment, all the different egg stages were evaluated. Results: The imidazolidine derivative LPSF/PT-09 tested in vivo showed a moderate result with a 30%-60% reduction in the number of the adult Schistosoma mansoni worms as compared to 100% in praziquantel groups and decrease of some evolutionary stages in the parasites' eggs. Conclusion: Although imidazolidine derivative LPSF/PT-09 has shown a promising result in vitro studies, in these tests, this compound did not show a better efficacy than as praziquantel. Further studies about parasite fecundity and other aspects are still needed.

162 Iron is an important modulator to *Schistosoma mansoni* infection

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The schistosomiasis is a tropical parasitic complex disease, caused by blood-dwelling worms of the genus Schistosoma. One of the main human species is *S. mansoni*, whose infection leads to various consequences such as tissue damage in liver and intestines, fibrosis, cancer and death. Due to intrinsic relationship between iron availability and fibrosis or carcinogenesis this work aimed to analyze the effect of iron reduction or overload in the survival of mice with *S. mansoni* chronic infection. Also egg retention in tissues, miracidea viability, granulomatous modulation in the liver and intestines and gene expression in the host were evaluated. To this purpose, iron chelator (Deferoxamine) or iron supplement (Ferrous Sulfate) was administered in the infected animals. Unexpectedly, both treatments increased survival in the infected animals. Iron reduction treatment (DFO) generated loose granulomas in the liver while the intestine had some vegetative lesions predominantly oriented to peritoneal cavity and not to lumen. It was also shown reduced miracidea viability descendant from faeces of DFO animal group. Iron overload increased the levels of collagens type I and II deposited on hepatic granulomas reassuring the iron role in fibrogenesis. Gene expression of p53, p16 and p21 was decreased on both treatments in hepatic tissue and was increased in intestinal tissue, telomerase showed a particular behavior, with an observed down-regulation in hepatic tissues when animals were treated with DFO. Other analyses are still required to understand the role of iron metabolism, especially for DFO treated animals, which holds prospects in the disease therapeutics.

163 HETEROLOGOUS COMPLEMENTATION OF *Schistosoma mansoni* PROTEIN KINASES USING Caenorhabditis elegans AS A MODEL

Sandra Grossi Gava, Riva de Paula Oliveira, Guilherme Corrêa Oliveira

The identification and characterization of mechanisms and molecules involved in cell signaling are essential to the understanding of the Schistosoma mansoni parasite's biology. Protein kinases play key roles in signaling pathways and have been proposed as potential targets for the development of new anti-schistosome drugs. Since functional characterization in *S. mansoni* is hampered by limitations in methods for genetic transformation of schistosomes, the present study proposes to use Caenorhabditis elegans as a model for heterologous complementation of *S. mansoni* genes coding for protein kinases. *S. mansoni* protein kinase coding genes homologous to those identified in C. elegans were selected from the parasite's proteome by our group using a phylogenomic approach. Initially, we selected proteins that participate in the MAP kinases sinaling pathway to perform the experimental analyses: four protein kinases belonging to the CMGC group (ERK-1, ERK-2, JNK and p38) and one small GTPase (Ras). Specific primers were designed to amplify promoter regions of the corresponding genes in C. elegans as well as the protein coding regions (CDS) in both organisms. Promoter regions were amplified from adult nematode's DNA. Total RNA was extracted from schistosomula and mature C. elegans. CDS were amplified from synthetized cDNA and the resulting DNA fragments were cloned in E. coli DH5a. The construction obtained was digested with selected restriction enzymes aiming to linearize the vector containing the promoter region and recover the CDS. Subsequently, subcloning was performed by ligation of C. elegans and *S. mansoni* CDS with their respective constructs containing the promoter region. C. elegans mutants for each gene that encode the target proteins will receive the final constructions through microinjections. The transformed strain will be selected and maintained. Tests for rescue of the phenotype and checking downstream regulation by quantitative PCR will be performed to check if the genes of *S. mansoni* complement the function of their homologues in C. elegans. Although this is the first use of heterologous complementation in C. elegans to investigate gene functions in *S. mansoni*, it has been used successfully for nematode parasites and can become an alternative approach to functional studies in other parasites. Finacial support: CNPq, INCT-DT and CPqRR.

164 New perspectives on *Schistosoma mansoni* male-female interaction: effect of the physical contact and gene expression profiles

Giulliana Tessarin e Almeida, Sergio Verjovski-Almeida

The survival of *S. mansoni* couples and the maintenance of their complete life cycle seem to be dependent on the existence of a permanent association between sexes. It is well known that stimuli of the male schistosomes are necessary for female worms to initiate and complete physical and reproductive development and also to maintain her reproductive activity and egg production. Here we identify by large-scale gene expression measurements with microarrays a set of genes that is correlated to physical contact and genes that are regulated by the possible diffusion of proteins and/or hormones in the medium. Males and females from mixed infections were recovered by perfusion and three groups of adult worms were maintained at in vitro culture under 4 different conditions (paired, separated, remated, and females kept just in the presence of male without physical contact) during 13 days. A statistical multiclass analysis of data from the four groups of females identifies 1010 genes differentially expressed (FDR = 0.01%). This analysis revealed that direct female-male contact is needed to keep the female reproductive activity and that remating for 6 days can restore gene expression profile of separate females to the profile of paired females. Furthermore, we observed that females in the presence of male, but without physical contact show a different gene expression from separated females. We also investigated if such regulation occurred in adult male worms. A statistical multiclass analysis of data from three groups of males (paired, female-separated and remated) identifies 277 genes differentially expressed (FDR 1%). This analysis revealed that direct contact is also required for the male to maintain its functional activity and that remating separated males for 6 days leads to a gene expression profile similar to the gene expression profile of paired males. These results provide strong evidence for the influence of physical contact on gene expression of male and female adult worms and also show that some genes are regulated by the diffusion of proteins and/or hormones in the medium, for which the change in their level of expression does not depend of the contact between male and female. Supported by FAPESP.

165 Schistosomicidal effects in vitro of new thiazolidine derivatives

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Introduction: The treatment of schistosomiasis is mainly based on chemotherapy, where the drug of choice employed is praziquantel. The search for new therapies has been of prime importance, since it has been observed resistance to these drugs both in experimental studies, as with humans. In this context, the thiazolidines emerged as a promising class of molecules because they are bioisosteres of the imidazolidines which holds an antischistosomal activity. Objectives: Evaluate the in vitro efficacy of some thiazolidine derivatives on Schistosoma mansoni adult worms. Methodology: Male Swiss mice (Mus musculus) were submitted to percutaneous infection with 120 recently shed Schistosoma mansoni cercariae obtained from laboratory- raised *Biomphalaria* glabrata snails (Belo Horizonte strain). After 60 days of infection, worms were removed from the mesenteric and portal veins and kept in RPMI medium at 37ºC in a humid 5% CO2 atmosphere. For in vitro tests thiazolidine derivates LPSF/GQ-199, LPSF/GQ-238, LPSF/GQ-241 and LPSF/GQ-242 and control drug praziquantel (3 µg/mL) were used in different concentrations (100µg/mL, 80µg/mL, 40µg/mL, 20µg/mL, 10µg/mL and 5µg/mL). Results obtained are the average of duplicate samples for each concentration. Parasites were kept for 6 days and watched in a 24h cycle to evaluate their general conditions (motor activity and mortality rate). Results: LPSF/GQ-238 and LPSF/GQ-242 compounds showed activity in vitro, with a mortality rate of adult worms of 100% at 100µg/mL, 80µg/mL, 40µg/mL and 20µg/mL concentrations. However, the other compounds did not showed significant results. Conclusion: Our results showed that thiazolidine derivatives LPSF/GQ-238 and LPSF/GQ-242 can be a future candidate as schistosomicide drugs. However, studies must be performed in vivo for a better evaluation of therapeutic potential of these compounds.

166 Genes related to biogenesis of miRNAs and assembly into RISC complex are over regulated in *Schistosoma mansoni* miracidium

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miRNAs constitute an extensive class of non coding small RNAs with approximately 22-nt in length. They play an essential role in multiple biological and metabolic processes, including developmental timing, signal transduction, cell maintenance and differentiation. Previous results from our group demonstrated that the central genes of miRNA biogenesis is over expressed in cercariae and schistossomula when compared to adult worms, leading to the hypothesis that mechanisms involving in parasite adaptation, immediately post-infection in mammalian host and their proteome can be regulated by miRNA. To extend the investigation of the miRNA pathway in *S. mansoni*, we analyze the expression profile of genes related to miRNA biogenesis and RISC complex in miracidium, a biological stage of *S. mansoni* that is involved in snails infections. Freshly hatched miracidium were obtained from eggs, recovered from infected Swiss–Webster mouse livers 7–8 weeks post-infection and used for RNA extraction. The transcript levels of SmDICER, SmDrosha1/2 (RNAse III), SmPartner-Drosha (RNA binding partner of Drosha), SmPartner-Dicer (RNA binding partner of Dicer), SmExportin-5.1/2 (Exportin-5), SmFmr1-4 (RISC Component), SmTudor-SN (RISC Component) and SmAgo1-4 (RISC Component) were measured by qRT-PCR. Our data revealed that all genes analyzed were expressed in miracidium. Furthermore, our results showed a similar expression profile for genes related to miRNA biogenesis and RISC complex between miracidium and cercariae and a significantly higher in mRNA transcription levels in miracidium compared to adult worms. The biological significance of the over expression of miRNA biogenesis in miracidium may be directly related to the establishment and maintenance of a successful larval infection within the snail host.

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167 Evaluation of 7-epiclusianone schistosomicidal potential in isolation and plus praziquantel

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Keywords: Schistosomiasis treatment, Shistossoma mansoni, *S. mansoni*, 7-Ep=clusianone,Garcina brasiliensis, PZQ, Praziquantel

According to the World Health Organization, Praziquantel (PZQ) is the gold standard drug for schistosomiasis treatment, because it presents a wide spectrum of action on *S. mansoni*. However, several (strains ou i=olates) of parasite present resistance to PZQ. So the present study evalueted the potential schistosomicidal effect of 7-Epiclusianone (7-EPI), a substance isolated from Garcina brasiliensis, either administered alone =r in combination with praziquantel (PZQ) in the ex vivo context

168 SEARCH FOR A NEW NATURAL ORGANIC COMPOUNDS WITH POTENTIAL SCHISTOSOMICIDAL

Aline Pereira, Marcos José Marques, Raquel Lopes Martins Souza, Santos Marcelo Henrique dos Santos, Naira Ferreira Anchieta

Introduction and Goal: For the World Health Organization the praziquantel is the drug of choice for the treatment of individuals parasitized, because it presents a broad spectrum of action on *S. mansoni*. However, some studies describe various parasite strains that are resistant to PZQ and with that is necessary for studies of new drugs that can be used in treating schistosomiasis to reduce the incidence of this disease. In this sense, the present study evaluated the potential effect of the antischistosomal ethanolic extract of epicarp G. brasiliensis (EEE) and its fractions obtained by partition: hexância fraction (HF), ethyl acetate fraction (EAF) and aqueous fraction (AF) further more the compounds 7-epiclusianone (7-epi) and Fukugetin (Fuk), were tested to its schistosomicidal potential effects. Materials and Methods: Ten mice were infected with 100 cercariae of *S. mansoni*, and 45 days after infection were euthanized and submitted to manual perfusion murine for the recovery of adult worms. Worms were cultured RPMI-1640 medium supplemented with 5% fetal bovine serum 100µg/ml penicillin / streptomycin in culture dishes of 6 wells (4 pairs per well) which different concentrations of the substanceswere added. The analysis of tests were conducted after 2, 24, 48, 72, 96, 120, 144, 168 hours to determine the concentrations that had schistosomicidal effect. The parameters used in the analysis were the number of coupled worms, movement, contraction / shortening, morphology, tegument detachment of the adult worms and the eggs stage, breeding and egg stage. The probes resorufim and Hoechst 33258 were used to determine to the excretory system and damage the coat, respectively. Results and Conclusions: The results showed that both the EEE as HF, EAF showed activity around 50.0, 25.0 and 75.0 ug / ml, respectively, but theA F and the isolated molecule Fuk showed no activity in 150 ug / ml, which was the highest dose tested. As regards the isolated molecule. 7-Epi, the schistosomicidal demonstred significant the concentration of 14.0 ug / ml being able to kill 100% of the worms, with 24 hours of incubation. At a dose of 14.0 ug / ml 7-Epi, damage to the membrane and excretory system of adult worms of *S. mansoni*, were observed by fluorescence According to the information above can be calculated that ED50 which was 8.3 ug / ml. Our results are promising, but in vivo tests are needed to evaluate the efficacy of these substances. Financing: CAPES, CNPq, FAPEMIG, FINEP,Unifal-MG.

169 Functional tracing of the p38 MAPK signaling pathway of *Schistosoma mansoni* by RNA interference

Lívia Avelar, Mercedes Silva, Marina Mourão, Rosiane Pereira, Laila Nahum, Guilherme Oliveira

Molecular tools have been developed for use in Schistosoma species in order to increase our understanding about the biology of these parasites. Among the more promising reverse genetic methods is RNA interference (RNAi), a mechanism by which gene-specific double-stranded RNA (dsRNA) triggers degradation of homologous mRNA transcripts. This approach currently represents the only available method for experimentally manipulating the expression of targeted endogenous schistosome genes, providing traits on putative gene function. Two main questions drive this work: 1. Is knockdown of p38 MAPK associated with morphologic changes and lethality of *S. mansoni*? 2. Is the expression of p38 MAPK downstream targets altered after gene knockdown? RNAi was employed to knock down gene expression in the p38 MAPK signaling pathway focused on the p38 mitogen-activated protein kinase (p38 MAPK) gene. Two different dsRNAs targeting different regions of the *S. mansoni* p38 MAPK mRNA and a control dsRNA, mCherry (unrelated *S. mansoni*), were generated by in vitro transcription and transfected into schistosomula by soaking. During seven days, the parasites were monitored for phenotypic changes including motility loss, altered growth, and death. Only one phenotype was consistently detected, a reduction in schistosomula size based on measurements of parasite area. After two, four, and seven days of dsRNA exposure, the transcript level of the *S. mansoni* p38 MAPK was determined by quantitative real-time PCR (q-RT-PCR). qRT-PCR analysis confirmed successful gene suppression at all evaluated time-points compared to the dsRNA-mCherry control treatment. Further, we found that different dsRNA sequences had different levels of effectiveness. Gene expression downstream of the *S. mansoni* p38 MAPK signaling pathway, including the glutamate-cysteine ligase (GCL) mRNA, also was measured by qRT-PCR. In schistosomula exposed to both p38 MAPK-dsRNAs for seven days, a significant increase in GCL expression was observed, suggesting the participation of other signaling pathways in the transcriptional control of the phase II detoxification genes. In conclusion, our work provides a insights into the biological role of *S. mansoni* p38 MAPK signaling pathway, which is relevant in the scenario of functional genomics.

170 Genetic profiles of *Schistosoma mansoni* sensitive and resistant strains to Praziquantel using RAPD-PCR

Tiago Mendes, Manuela Calado, Silvana Belo, Ana Afonso

Praziquantel (PZQ) is the drug of choice in the treatment of schistosomiasis, showing high cure rates and no significant side effects. Very little is known of the natural parasite variability of susceptibility to PZQ. Recently, more and more cases of drug resistance or increased tolerance have been reported, this is not surprising in countries like Egypt where the drug has been used aggressively for more than 10 years. In our laboratory we have been able to select a line of Schistosoma mansoni, through constant drug pressure throughout several cycles, which has shown resistance to roughly 120 mg/Kg b.w. of PZQ, this strain was derived from a drug sensitive strain of *S. mansoni* BH kept in a continuous life cycle for several years. The rodent model of *S. mansoni* was used and divided into two groups. The first group was infected with *S. mansoni* sensitive to PZQ and the second group was infected with *S. mansoni* resistant to 120 mg/kg of PZQ. Negative and positive controls were included(?) The worms were recovered and DNA was extracted from sensitive and resistant *S. mansoni* adult worms and analysed using DNA amplification by random amplified polymorphic DNA-polymerase chain reaction (RAPD-PCR). The RAPD-PCR methodology represents an adequate approach for the analysis of genetic polymorphisms between sensitive and resistant parasites. We selected 10 primers, previously useful to detect polymorphisms in *S. mansoni*. The results showed polymorphisms with 7 primers. The identification of polymorphic bands was based on the comparison of the band patterns on the same gel for the two strains, and only those detected in all individuals of the same strain and in the pool were considered polymorphic. Once the polymorphic differences were observed for resistant and sensitive parasites, a Dice's coefficient was calculated. Although resistant and susceptible strains were studied, we could expect a Dice's coefficient close to one, since laboratory strains are submitted to much less intense selective pressures than in natural conditions . The understanding of the genetic polymorphisms associated to resistance may contribute to the future identification of genomic sequences related to the resistance/ tolerance of *S. mansoni* to PZQ treatment, to the identification of resistant parasites in the field and to the development of new strategies for the control of schistosomiasis.

171 Functional characterization of MAPK signaling pathways in *Schistosoma mansoni*

Juliana Assis Geraldo, Luiza Freire de Andrade, Marina Moraes Mourão, Fernanda Sales Coelho, Guilherme Corrêa de Oliveira

Schistosomiasis is a chronic, parasitic disease caused by blood flukes of the genus Schistosoma. The control of this disease represents a major challenge for public health issue. MAPK proteins are expressed in all eukaryotic cells and are activated by diverse stimuli, thus this pathway might be capable of regulating transcription factors such as Serum Response Factor (SRF) and Serum Response Element-Binding Transcription Factor (c-Fos) and may participate in different aspects of development. In the nematode C. elegans, the MAPK pathway acts in vulval development and regulates worm reproduction. Therefore, in order to identify and validate potential drug candidates against schistosomiasis and elucidade mechanisms of the MAPK pathway in Schistosoma mansoni, 5 target genes (SmJNK, SmERK1, SmERK2, SmCamk2 and, SmRas, a GTPase related to the MAPK pathway) associated in the MAPK signaling pathway were selected for gene knockdown by RNA interference (RNAi). After treatment of schistosomula cultures for 2, 4 and 7 days, knockdown by long dsRNAs (500pb) for the 5 genes were confirmed. Subsequently, total RNA of the parasites was extracted and cDNA synthesized. Homologous to the transcription factors SRF and c-Fos were identified in the predicted proteome of *S. mansoni* by searches using hidden Markov models (HMMs). Specific primers for *S. mansoni*, SRF (SmSRF) and c-Fos(Smc-Fos) transcripts were constructed and the transcript levels were assessed in the samples of parasites knockdown for SmJNK, SmERK1, SmCamK2 and SmRas genes using real-time quantitative PCR (q-RT-PCR). It was observed that samples treated with dsRNA for SmERK and SmJNK presented no alteration in the normal basal level of the transcriptional factor SmSRF, however, Smc-Fos was overexpressed in all assessed times. We concluded that, likewise in C. elegans, the MAPK proteins SmERK1 and SmJNK are involved in the regulation of the SmSRF and Smc-Fos genes. In addition, it is possible that MAPK proteins are important targets for drug development and schistosomiasis treatment, since there is evidence indicating the involvement of the ePKs SmERK and/or SmJNK with oviposition mechanism and survival of parasites. Supported by: European Community's Seventh Framework Programme (SEtTReND). National Institutes of Health - NIH/Fogarty International Center. National Council for Research and Development - CNPq. Research Foundation of the State of Minas Gerais - FAPEMIG

172 Cytokines polymorphism in Schistosomiasis-derived Pulmonary Arterial Hypertension Patients

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Schistosomiasis-derived Pulmonary Arterial Hypertension (Sch-PAH) is a rare disease that can be developed by people with chronic schistosomiasis, especially in the hepatosplenic form. Because it is a degenerative inflammatory disease it is possible that genetic factors are aggravating factors for the disease. Proteins such as Tumor Necrosis Factor alpha (TNFα) and interleukin 10 (IL10) act in apoptotic mechanisms and may be associated with molecular pathophysiology of Sch-PAH. The aim of this study was to investigate promoter region polymorphisms of TNFα and IL10 genes and verify the possible association of these with the severity of Sch-PAH. Patients were selected from the database maintained by the Sch-PAH research group, from the Pulmonary Hypertension Clinic in Pronto Socorro Cardiológico de Pernambuco. The biological material was obtained through collection of peripheral blood followed by DNA extraction and amplification of promoter regions for the TNF-G308A and IL10-G1082A by PCR-RFLP and AS-PCR, respectively. The results of the amplification products were visualized on agarose gel stained with ethidium bromide. We evaluated 56 patients, 13 deaths, diagnosed with Sch-PAH between 2001 and 2012, 22 patients for functional classes I and II and 34 patients for functional classes III and IV. The population is in Hardy-Weinberg equilibrium in the TNF gene, but not on IL10 gene. G test was used to assess the association of genotypes with functional classes, where no association was observed for the genotypes of both genes ($p > 0.05$). The results of this study indicate no association of genotypes with functional classes of Sch-PAH. It is necessary to evaluate a large number of cases in the different functional classes to confirm these results.

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173 DETECTION OF *SCHISTOSOMA MANSONI* INFECTION BY REAL TIME PCR IN A HAMSTER MODEL.

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Introduction: The goal of the Brazilian Ministry of Health has been to reduce the prevalence and the occurrence of the severe forms of schistosomiasis, and to decrease the risk of geographic expansion of the infection. The improvement and evaluation of diagnostic techniques for early detection of schistosomiasis is still necessary in view of the difficulties to evaluate infection patterns and to control the disease. Specifically, in low transmission areas, the prevalence of infection is underestimated among individuals with low parasite load, due to the low sensitivity of diagnostic approaches based on the detection of eggs in the feces. Thus, the development of techniques more sensitive than the search for eggs in feces is necessary. The aim of the present study was to compare the detection of S.mansoni DNA in serum and feces samples of hamsters infected with S.mansoni during the pre- patent and patent stages of infection. Material and Methods: Twenty-four hamsters were infected with 150 cercariae and as a control group eight hamsters non inoculated were used. To assess the levels of infection in the pre-patent and patent stages, three animals were sacrificed under anesthesia weekly from day 7 after infection to the 56th day (7, 14, 21, 28, 35, 42, 56 days after infection). During this period, a serum sample and a pool of feces were collected for each animal. The presence of schistosome eggs in feces samples was evaluated by Kato-Katz method and in the gut of animals by histopathological method. DNA extraction was carried out from 200µL of serum and from 500mg of feces using the acid guanidinium thiocyanate/phenol/chloroform method and the DNA purification was performed with Instagene Matrix (Biorad). Detection of S.mansoni DNA was performed in triplicates by TaqMan real-time PCR system. A TaqMan Exogenous Internal Positive Control (IPC) was used during the amplification. Results: The results showed that the first detection of eggs in feces by Kato-Katz method was at 56th day and on the gut at 28 post-infection. The same result was found by Real-Time PCR amplification. However, S.mansoni DNA was detected in the serum samples after the 14th day post- infection. Main Conclusions: DNA detection in serum sample by real time PCR suggests that this technique is a valuable and sensitive method for the early diagnosis of pre-patent S.mansoni infection.

174 *Schistosoma mansoni* CD59-like proteins: Functional investigation of the inhibition of complement deposition

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Introduction: Completion of the Schistosoma mansoni transcriptome and genome sequencing projects enabled the identification of new immune intervention targets, such as the CD59-like proteins, which are important inhibitors of the membrane attack complex (MAC) by complement system. In *S. mansoni* there are six CD59-like proteins (SmCD59.1-SmCD59.6) with 25-30% of identity to human homologs. They belong to the uPAR/Ly6 superfamily and most of them show increased gene expression in schistossomulum stage as determined by real time RT-PCR. Additionally, two of these schistosome genes (SmCD59.1 and SmCD59.5) were identified in the fraction of the most accessible components of the tegument by molecular shaving. Objective: Investigate the inhibition of complement hemolytic activity by the recombinant proteins and validate the potential function through sequence alignment and 3D modelling. Methodology: We first investigated the inhibition of complement hemolytic activity by SmCD59.1 and SmCD59.2 recombinant proteins. Several bioinformatic analysis were performed to interrogate the conservation of CD59 function in these schistosome genes. For instance, we compared the distribution/conservation of cysteine residues and we carried out 3D structural comparison of the crystallographic model of human CD59 (hCD59) with homology models of schistosome CD59-like proteins. Results/Discussion: Recombinant SmCD59.1 and SmCD59.5 did not inhibit the lysis of either rabbit erythrocytes or sensitized sheep erythrocytes by human complement, suggesting that the proteins are not involved in inhibition of complement deposition by the classical or alternative pathway. Detailed bioinformatic analysis revealed that these genes might actually not be primarily related to hCD59, despite they still have the uPAR/Ly6 domain as their main feature. Multiple sequence alignment analysis revealed a divergent position for the cysteines regarding human homologous sequences, raising the question of a different evolutive path for these proteins within the superfamily. Preliminary 3D structure modelling was not successful and more analysis is underway to help elucidating if the structural changes imposed by the different cysteines positions may affect the potential functionality assigned to this group of proteins. In conclusion, we believe that the involvement of SmCD59.1 and SmCD59.5 in complement inhibition is dubious and deserves further experimental investigation.

175 Identification and silencing of transcripts processed by spliced leader trans-splicing in *Schistosoma mansoni*

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The schistosomiasis is one of the most important parasitic diseases caused by the parasite Schistosoma mansoni. This disease represents one of the most serious public health problems in Brazil and is endemic in 76 countries. The *S. mansoni* has a complex life cycle involving alternate accommodation into different environments such as water and its mollusk and mammalian hosts, thus numerous mechanisms in the regulation of gene expression must occur in this parasite. The trans-splicing mechanism may be an important form of gene regulation and a potential target for drug development. The trans-splicing occurs by the addition of a spliced leader (SL) sequence to specific pre-mRNAs receptors, forming the 5' end exon of mature mRNAs. In this work, we aim to identify transcripts processed by trans-splicing in *S. mansoni* through the construction of enriched cDNA libraries. For the construction of one library, the mRNAs of schistosomula were captured through the poly-A tail by magnetic beads and the transcripts processed by trans-splicing were amplified by PCR using the spliced leader sequence as primer. The library containing complete transcripts processed by trans-splicing were sequenced and 81 cDNA clones were identified. Although, few sequences were obtained so far, the enrichment of the library was confirmed through identification of transcripts previously described in the literature. In order to assess the importance of the trans-splicing mechanism and its biological functions in the organism, the spliced leader sequence was targeted in schistosomula by RNA interference employing two different siRNAs. After exposure to two distincts siRNAs to the spliced leader sequence, the resulting phenotypes were assessed and alteration in schistosomula area when compared to the control group was observed. The efficiency of trans-splicing knockdown was analyzed at the transcripts levels by quantitative PCR and a decrease in the level of transcripts processed by trans-splicing was observed (enolase (35%), ATPase inhibitor (36%), thioredoxin (30%)). The mechanism of trans-splicing seems be important for the development of the parasite, once several transcripts for enzymes involved in central processes of metabolism of *S. mansoni* were identified in our survey. In addition, the new sequences identified will be of great value for improving the annotation of the predicted proteome of *S. mansoni*. Supported by: National Council for Research and Development - CNPq. Research Foundation of the State of Minas Gerais - FAPEMIG

176 Identification and cloning of the *Schistosoma mansoni* gelsolin gene for evaluation of its immunoprotective potential

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Schistosoma mansoni is one of the major infectious agents of schistosomiasis, a neglected tropical disease responsible for the highest levels of morbidity in the world, affecting approximately 210 million people in 74 countries. Praziquantel treatment reduces the morbidity caused by the disease in endemic areas, but does not prevent re-infection. Thus it is of utmost importance the schistosomiasis vaccine development for effective and lasting control. The aim of the present study is to identify immunogenic proteins as potential diagnostic and vaccine candidates. Using two-dimensional Western-blotting (2D-WB) with *S. mansoni* adult worm total proteins and serum from individuals of schistosomiasis endemic area, including those that are resistant to infection, we identified a spot protein corresponding to gelsolin. The gelsolin spot immunoreacted with the sera from *S. mansoni* infected and non-infected individuals from endemic area. According to SchistoDB, the predicted amino acid sequence of gelsolin consists of 364 amino acids encoded by a 1095 pb coding region gene. The main function of gelsolin is to regulate the distribution and the organization of the actin cytoskeleton pH-, lipid- and calcium-dependent in vertebrate cells, lower eukaryotes and plants, being associated with cell membranes. Our hypothesis is that after the occurrence of damage on the parasite tegument, gelsolin can become accessible to the host immune system. Thus, we selected this protein to be used in mice protection assays. Initially, primers were designed to amplify the coding region of the gelsolin gene by RT-PCR using cDNAs synthesized from *S. mansoni* adult worms total RNA. Two reverse primers were designed: one that maintains the stop codon of gelsolin gene and another one that replaces the stop codon enabling 6xHis-tagged protein expression in its C-terminal portion. The amplified fragments were co-digested with the restriction enzymes BamHI and HindIII and then inserted into a mammalian expression vector, pcDNA3.1/V5-His B, also digested with the same restriction enzymes mentioned above. Four positive clones, two of each construction, are being analysed by DNA sequencing. The DNA construction containing the 6xHis-tag will be used to certify the protein expression in cultured HEK 293T cells by Western-blotting with anti-6xHis antibody and the other similar construction, without the 6xHis-tag, to DNA immunization of mice. We also amplified the coding region of the gelsolin gene to be inserted into a bacterial expression vector, pQE-30, in order to produce and purify the N-terminal 6xHis-tag fused recombinant protein.

177 Evaluation of Garcinia brasiliensis-derived activity "in vitro" in adult worms of *Schistosoma mansoni*

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Introduction and Objective: According to OMS, chemotherapy is the main used for the treatment of schistosomiasis, taking Praziquantel (PZQ) as the gold standard medication. However because of the appearance of resistant strains of Schistosoma mansoni to PZQ, it is necessary discoveries of new therapies for the treatment of schistosomiasis. This study examined the antischistosomal activity "in vitro" of Garcinia brasiliensis-derived, as well as the isolated molecule guttiferona (GUT). Materials and Methods: Swiss mice (about 20g on average) were infected with ±100 cercariae subcutaneously in Renè Rachou Research Center, Institute Oswaldo Cruz, Belo Horizonte MG. After 45 days of infection, mice were subjected to a manual infusion, which were recovered adult worms of Schistosoma mansoni. Adult worms were maintained in culture medium containing RPMI-1640 + 5% fetal bovine serum + penicillin / streptomycin 100µg/ml in culture plates of 6 wells, 4 pairs of worms per well. After 30 minutes of preparation of the plates made by treatment with derivatives of Garcinia brasiliensis in different concentrations in the wells. The analyzis were performed 2, 24 and 48 hours after treatment with derivatives. Readings taken after 48 hours were not significant. The analysis criteria were the number of worms were mated, movement, contraction / shortening, morphology, shedding of tegument and oviposition, visualized by microscopy. Results and discussion: The analysis of the ethanol extract of epicarp showed activity related to the IC90 of approximately 50 µg/ ml. The fractions with hexane and ethyl acetate showed the activity at 25 µg/ ml and 75 µg/ ml, respectively, while the aqueous fraction showed no such activity at concentrations below 150 µg/ ml. The isolated molecule guttiferona showed schistosomicidal activity with IC90 of 18 µg/ ml, which led to death all the worms at 24 h of incubation. From 18 µg/ ml guttiferona, the worms had bubbles in the tegument. This indication of lesions may be proven later using fluorescent probes. Conclusion: New tests should be made mediants these preliminary results. The derivatives of Garcinia brasiliensis proved very promising in the pursuit of new therapeutic strategies for schistosomiasis.

178 Schistosomiasis vaccine: Immunological evaluation of synthetic epitopes.

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Introduction: Schistosomiasis is a disease caused by Schistosoma mansoni, a parasite that has in man its definitive host, but that needs freshwater snails as intermediate hosts to develop their life cycle. Transmission occurs through the active penetration Shistosoma larvae in the human skin or mucosa, which is the definitive host. Despite current treatment to be effective, there is still a high index of reinfection, which makes developing a vaccine an important tool in disease control in endemic regions. Bioinformatics and advances in molecular biology have been important tools for the possible development of the vaccine. Objectives: Evaluate and characterize the immune response induced by Shistosoma mansoni epitopes previously selected. Methodology: Sequences of hypothetical membrane proteins of the parasite were obtained database (www.genedb.org / genedb / smansoni) and analyzed using bioinformatics programs to predict the molecular weight, isoelectric point, cellular localization, glycosylation, and transmembrane helix promiscuous epitopes. The most immunogenic epitopes were predicted using SYFPEITHI programs using HLA DRB1-(0101,0301,0401, 0701, 1101, 1501). In this study were selected three epitopes, namely: Sm28 (a know vaccine target), Sm119220 and Sm194960 and its were synthesized, by solid phase method. Were conducted assays to verify the protection and pathology stimulated for them The animals were immunized with three doses in an interval of 15 days between them and four blood samples were collected with an interval of 15 days each. Infection with 50 cercariae was performed 45 days after the first immunization and perfusion and counting the worms 60 days after the first immunization. Results: After challenge infection, it was found that this vaccine targets was not effective in protection against Schistosomiasis, since it was not verified a reduction of the parasite burden in the group of mice vaccinated with the cocktail. Conclusion: From the immunological tests performed was not observed significant protection against the parasite, being necessary to conduct more tests. Financial Support: CNPQ and FAPEMIG

179 In vitro activity of piplartine analogs in *Schistosoma mansoni*

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Schistosomiasis is a helminth infection caused by worms of the genus Schistosoma. The disease affects around 200 million people in 74 countries remaining a serious public health problem. Currently, praziquantel is the only drug recommended by WHO for the treatment of schistosomiasis; however, occurrence of resistance to praziquantel has been reported. In this context, searching for new active and safe schistosomicides is needed. In our screening on extracts and pure compounds from plants of Piperaceae family, the amide piplartine showed a potent in vitro schistosomal activity, causing their immobility at the concentration 9.5 µM. with the purpose of determining the regions of piplartine responsible for the biological activity, several analogs of piplartine were obtained in order to determine structural requirements for schistosomal activity. For the in vitro assays, analogs were pre-dissolved in 3% DMSO before dilution in RPMI medium. Five worm pairs were exposed to 50 and 100 µg/mL of each analog in 24-well culture plates and incubated for 120 hours. Positive control group was exposed to 3 µg/mL praziquantel and negative control to 0.003% DMSO. We assessed the motility of the schitosomas 120 horas period, the worms motionless were removed and considered dead. Among 25 tested analogs, 3 exhibited activity in both concentrations. There was no difference in sensitivity between male and female worms. The substitution of 5,6-dihydropyridin-2(1H)-one ring of piplartine completely eliminated biological activity, and compared to piplartine, a decrease in the activity was observed with the addition of 1,3-dicyclohexylurea group. The lowest concentration of piplartine for killing 100% of the parasites was in the range of 9.5 µM while for the analogues the lowest concentration were 79.8µM; 103.63 µM; 223.29 µM respectively. Major changes in functional groups, mainly in the 5,6-dihydropyridin-2(1H)-one ring of piplartine reduces or inhibits the schistosomal activity. Additionally, the reduction in biological activity was also observed with the modification of 1,2,3-trimethoxyphenyl ring as well as after the removal of double bond. Acknowledgments: FAPESP, CNPQ, CAPES.

180 CHARACTERIZATION OF GENE EXPRESSION OF VIP36 IN THE DEVELOPMENT STAGES AND ITS POSSIBLE ROLE IN OOGENESIS OF *Schistosoma mansoni*

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For decades, research with schistosomiasis has focused on understanding the developmental biology of the parasite, in the composition of the tegument and the excreted/secreted products by eggs and larvae in order to develop new drugs or vaccines. The vesicular integral-membrane protein 36 kDa (VIP36) is a protein described as L-type lectin in animals and it is responsible for intracellular transport of secretory pathway of glycoproteins and it has been also localized on plasma membrane of cells studied. Furthermore, it is known that Schistosoma mansoni shows an intense transport of proteins by vesicles to the parasite surface. Once these proteins and the excreted/secreted products by the larvae or eggs are exposed to the host immune system, the study of the gene coding for VIP36 protein becomes important. In this way, we propose to characterize the VIP36 gene expression in the life cycle of *S. mansoni* to understand their role in parasite/host relationship. Initially, we performed the in silico analysis of VIP36 that revealed the conservation of predicted amino acid sequence relative its orthologs in other representing organisms and the presence of one domain of lectin L-like, confirming its lectin character. Phylogenetic analysis highlighted the conservation of VIP36 and showed that VIP36 is phylogenetically close to other parasites such as S. japonicum and Ascaris suum, even as Homo sapiens. When the levels of expression of this gene in the life cycle was analyzed, we observed a significant increase in the female adult worm, egg and newly transformed schistosomula stage, suggesting its participation in intense secretory activity of envelope proteins of the egg and tegument and its possible role in oogenesis. To test this hypothesis, adult worms was cultivated in vitro in the presence of IBMX, described by our group as an oviposition inhibitor in *S. mansoni*. After 24h and 48h of treatment at a concentration of 80 μM, the level of gene expression of VIP36 were significantly reduced, suggesting the possible involvement of this gene in the oogenesis of schistosomiasis.

181 Análise histopatológica do efeito de molécula isolada do extrato de *Garcinia brasiliensis* na esquistossomose murina experimental.

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A esquistossomose é uma doença infecto parasitária que acomete mais de 200 milhões de pessoas no mundo. O Praziquantel é o medicamento de escolha para o seu tratamento, mas relatos na literatura apontam para a resistência a esta droga, o que motiva a tentativa de desenvolvimento de novas drogas. Relatos da ação anti-inflamatória da Garcinia brasiliensis motivaram o seu estudo. Foi objetivo desse trabalho, avaliar os efeitos da 7-epiclusianona, molécula isolada desta planta, sobre a infecção murina experimental pelo Schistosoma mansoni. Foram estudados 27 camundongos albinos, fêmeas, com cerca de 20 gramas, infectados por via subcutânea com 100 cercárias de *S. mansoni*. Após 60 dias de infecção os animais foram separados em grupos de 6 animais cada, sendo um deles sem tratamento e os demais, tratados em dose única, via oral, com Praziquantel (200 mg/Kg), 7-epiclusianona (500 mg/Kg) ou veículo da 7-epiclusianona. Três animais serviram de controle sem infecção. Os animais foram sacrificados 15 dias após os tratamentos para comparar a ação da 7-epiclusianona sobre a infecção com a já conhecida do Praziquantel. Foram coletados fragmentos de fígado, baço, pulmões, coração, esôfago, estômago, intestinos delgado e grosso, linfonodo mesentérico e rins, para fixação em formol tamponado a 10%, processamento e inclusão em parafina. Cortes histológicos de 5µ de espessura, corados por hematoxilina e eosina foram obtidos para a análise descritiva geral. Para análise do tecido conjuntivo e da medida da área dos granulomas foi usado o tricrômico de Masson. O aspecto morfológico não diferiu de maneira significativa entre os grupos infectados, sendo freqüentes os múltiplos e confluentes granulomas hepáticos, associados ou não a necrose; alargamento de sinusóides; aumento das células de Kupffer; proliferação ductal; focos de esteatose; vermes adultos na luz da veia porta, com exceção dos animais tratados com Praziquantel; pneumonite, brocopneumonite e vasculite pulmonar; congestão esplênica com confluência de polpa branca e granulomas; miocardite; linfonodos mesentéricos e pulmonares reativos, com granulomas; intestino delgado e grosso com ovos e granulomas na mucosa, submucosa e muscular; inflamação perivenular renal; e pancreatite esquistossomótica. O teste não-paramétrico de Kruskal-Wallis (5% de significância) não mostrou diferença quanto ao número total de granulomas (p-valor = 0,4861) ou quanto ao número de granulomas com ovos (p-valor = 0,8312). Não houve diferença nas médias da área de granulomas com ovos (análise de variância segundo um delineamento inteiramente casualizado, a 5% de significância). Dentro das condições do estudo, a 7-epiclusianona não interferiu na evolução das lesões esquistossomóticas.

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182 Conservation and developmentally expression of ubiquitin C-terminal hydrolases in *Schistosoma mansoni*

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The addition of ubiquitin (Ub) to proteins a process denominate ubiquitination serves to modulate function and is a key step in protein degradation, epigenetic modification and intracellular localization. Previous results of our group have shown that ubiquitin-proteasome pathway is essential to Schistosoma mansoni larval development and several genes related of this pathway, like proteasome subunits, conjugation enzymes was differentially expressed in *S. mansoni* life cycle. Despite deubiquitinating enzymes (DUBs) are negative regulators of protein ubiquitination and play an important role in ubiquitin-dependent processes, little is known about their role in regulating of the ubiquitin proteasome pathway in *S. mansoni*. Here we analyze the ubiquitin C-terminal hydrolases (UCHs) proteins that comprise a family of small ubiquitin-specific proteases. In silico analysis identified 3 different UCH family members in the *S. mansoni* genome: UCH-L3, UCH-L5 and BAP-1. Phylogenetic analysis of these proteins confirmed the evolutionary conservation and essential amino acid related to enzymatic activity. We performed quantitative RT-PCR (qPCR) and showed a differential profile of expression for all genes when compared cercariae and adult worms. This result was corroborate by the low rates of Z-Arg-Leu-Arg-Gly-Gly-AMC hydrolysis in crude extract obtained from cercariae and a high ubiquitin conjugates levels presents in the same extracts, suggesting that the large amount of ubiquitined conjugated is due at least in part by the low activity of SmUCH-L3. Taken together, these results support the hypothesis that UCHs can be involved in ubiquitin-proteasome pathway regulation in *S. mansoni*.