Workshop 2: Strongyloidiasis in endemic countries and in Europe

General overview and prevalence in immigrants and in endemic countries, with a particular focus on Latin America

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Strongyloidiasis – the most neglected of the neglected tropical diseases?

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Strongyloidiasis is an infection caused by *Strongyloides stercoralis* (and rarely *S. fuelleborni*), a helminth present mainly in tropical and subtropical regions but also in temperate climates. Some 30–100 million people are estimated to be infected worldwide (probably an underestimate)
Immune suppression

Dissemination/hyperinfection

Case fatality rate in disseminated strongyloidiasis: 50-86%

1. Eggs deposited in intestinal mucosa, hatch, and migrate to lumen.
2. Rhabditiform larvae in the intestine are excreted in stool.
3. Eggs are produced by fertilized female worms.
4. Rhabditiform larvae hatch from embryonated eggs.
5. The rhabditiform larvae develop into infective filariform.
6. Infective filariform larvae penetrate the intact skin initiating the infection.
7. The filariform larvae enter the circulatory system, are transported to the lungs, and penetrate the alveolar spaces. They are carried to the trachea and pharynx, swallowed, and reach the small intestine where they become adults.
8. Adult female worm in the intestine.
9. Autoinfection: Rhabditiform larvae in large intestine, become filariform larvae, penetrate intestinal mucosa or perianal skin, and follow the normal infective cycle.

i = Infective Stage
d = Diagnostic Stage

CDC
http://www.dpd.cdc.gov/dpdx
Transmission in brief:
5th National Workshop on Strongyloidiasis –
National Strongyloides Working Group
Prevalence of strongyloidiasis in Latin America - Review

- Websearch: PubMed, Scielo, BVS.
- Grey literature
- Papers published since 1991 to 2011
- Spanish, English, Italian, French and Portuguese
PREVALENCE IN LATIN AMERICA

Population analyzed

General population 31%
Children 12%
HIV+ patients 5%
Psychiatric patients 8%
Hospitalized patients 3%
Outpatients 5%
Symptomatic patients 3%
Prevalence

- < 5%
- 5-10%
- 10-20%
- > 20%
Large variability in prevalence in different areas within a country

< 5%  
> 20%

Direct methods

Serology
For many countries there’s lack of reliable data

Heterogeneity of studies for diagnostic methods, population

More data needed

Need of standardized methods to perform the surveys (study design, population, diagnostic tools)
Migrants

Canada 2001
216,975

USA
Up 1989: 2,459,000
90s: legal 7,036,000
Up 2005: legal 7,200,493

Spain 2005
>1 million
Legal 640,000

Europe 1985-1992
250,000

Japan 1990
150,000
Japan 1994
250,000

Australia 1990
80,000
Australia 2005/2006
65,707

Undocumented
2000: 5.6 million
2006: 8.9 million

14,000,000
300,000 - 999,000
100,000 - 300,000
20,000 - 99,000
Menos de 20,000
Eggs are produced by fertilized female worms. (3)

Rhabditiform larvae hatch from embryonated eggs. (4)

Development into free-living adult worms. (2)

Rhabditiform larvae in the intestine are excreted in stool. (1)

Eggs deposited in intestinal mucosa, hatch, and migrate to lumen. (9)

Autoinfection: Rhabditiform larvae in large intestine, become filariform larvae, penetrate intestinal mucosa or perianal skin, and follow the normal infective cycle. (10)

Adult female worm in the intestine. (8)

The filariform larvae enter the circulatory system, are transported to the lungs, and penetrate the alveolar spaces. They are carried to the trachea and pharynx, swallowed, and reach the small intestine where they become adults. (7)

The rhabditiform larvae develop into infective filariform. (5)

Infective filariform larvae penetrate the intact skin, initiating the infection. (6)

CDC

http://www.dpd.cdc.gov/dpdx
Methods.

We searched MEDLINE using the following search strategy: (strongyloid* AND (Humans[Mesh] AND "last 10 years"[PDat])) AND ((travel*) OR (imported) OR (migrant*) OR (immigrant*)).
<table>
<thead>
<tr>
<th>Paper</th>
<th>Country</th>
<th>Population</th>
<th>Diagnostic method</th>
<th>Positive/tested subjects. N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gualdieri 2011</td>
<td>Italy</td>
<td>Immigrants</td>
<td>Microscopy</td>
<td>2/514 (0.4%)</td>
</tr>
<tr>
<td>Hochberg 2011</td>
<td>USA</td>
<td>Immigrants HIV+</td>
<td>Microscopy and serology</td>
<td>Microscopy:0/128; serology:33/128 (26%)</td>
</tr>
<tr>
<td>Posey 2007</td>
<td>USA</td>
<td>Refugees</td>
<td>Serology</td>
<td>214/462 Sudanese (46%); 23/100 Somali Bantu (23%)</td>
</tr>
<tr>
<td>Caruana 2006</td>
<td>Australia</td>
<td>Immigrants and refugees</td>
<td>Microscopy and serology</td>
<td>Microscopy:10/321 Serology:84/354</td>
</tr>
</tbody>
</table>
Retrospective study on refugees - Canada

Refugees screened with serology from 2000 to 2004:

231

40 positive (17%)

At logistic regression: no association with the continent of origin

All positive patients were ASYMPTOMATIC
Only one had eosinophilia
Donor-Derived *Strongyloides stercoralis* Infections in Renal Transplant Recipients

Keith W. Hamilton,¹,¹² Peter L. Abt,² Misha A. Rosenbach,³ Melissa B. Bleicher,⁴ Marc S. Levine,⁵ Jimish Mehta,⁶ Susan P. Montgomery,⁷ Richard D. Hasz,⁸ Bartholomew R. Bono,⁹ Michael T. Tetzlaff,¹⁰ Shirly Mildiner-Eary,¹¹ Camille E. Introcaso,³ and Emily A. Blumberg¹

*Strongyloides stercoralis* Hyperinfection Transmitted by Liver Allograft in a Transplant Recipient

M. J. Rodriguez-Hernandez⁸,* M. Ruiz-Perez-Pipanb, E. Cañas⁸, C. Bernalc and F. Gaviland
Take-home messages

• Infection potentially **fatal**

• Worldwide **prevalence** high… probably underestimated

…A proper diagnostic tool for diagnosis and screening is essential