

# Evaluation of a *Strongyloides* IgG ELISA with *S.papillosus* antigen

Marie-Thérèse Ruf<sup>1,2</sup>, Hanspeter Marti<sup>1,2</sup> and Beatrice Nickel<sup>1,2</sup>

<sup>1</sup>Swiss Tropical and Public Health Institute, Socinstrasse 57, P.O. Box, CH-4002 Basel, Switzerland; <sup>2</sup>University of Basel, Basel, Switzerland;

Therese.Ruf@swisstph.ch

Beatrice.Nickel@swisstph.ch

## Background

Infections with the nematode *Strongyloides stercoralis* can either lead to asymptomatic chronic carriage or to life-threatening severe disease. Especially in immunocompromised patients undetected infections can lead to hyperinfection with fatal outcome. Diagnosis and treatment of strongyloidiasis is crucial for prevention of life-threatening complications. Stool analysis including larval concentration and agar cultivation exhibit low sensitivity due to the low and infrequent excretion of larvae. Sensitivity of molecular tests also depends on larval shedding. Serological tests are more sensitive and usually are applied in combination with stool analysis. However, available tests using soluble antigens from larvae of *S. ratti* are prone to cross-reactivity with antibodies of other helminthic infections. We have evaluated a new IgG ELISA from Euroimmun AG which applies antigens from *S. papillosus* larvae and compared the results to our in-house routinely used ELISA with antigens of *S. ratti* larvae.

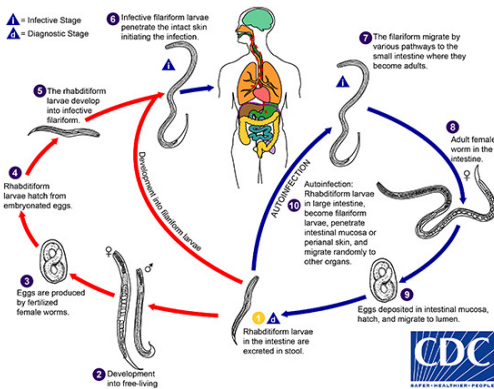
## Specificity

Specificity was determined by using blood donor sera (n= 20). Euroimmun Anti- Strongyloides ELISA, as well as the in-house ELISA had a specificity of 100% .

N= 20		Swiss TPH Routine ELISA		
		positive	borderline	negative
Euroimmun Anti-Strongyloides ELISA	positive	0	0	0
	borderline	0	0	0
	negative	0	0	20

Cross reactivity was determined by using sera (n= 189) from patients with 11 other helminthic and four protozoan infections. Part of the sera were cross-reactive with strongyloides antigens in the in-house ELISA, others were only single positive for corresponding antigens and showed no cross-reactivity with strongyloides antigens. Overall specificity for the Euroimmun ELISA was 76% versus 61% for the in-house ELISA.

## *S. Stercoralis* Life Cycle



Life Cycle of *S. stercoralis* (source: CDC).

## Method

The new IgG ELISA was evaluated with a panel of positive sera as well as negative blood donor sera. The *S. stercoralis* positive sera were selected by means of larval detection and/or sera which were only anti-*Strongyloides* IgG positive in the routine in-house ELISA applying *S. ratti* antigen. In addition a serum-panel of other helminth infections as well as protozoan infections was tested on both ELISAs for detection of cross-reactivity. Sensitivity and specificity were calculated for both test systems.

## Sensitivity

Sensitivity was determined by using 40 parasitologically confirmed positive strongyloides sera (Koga and/or Baerman) (n= 40) and 21 in-house ELISA single positive strongyloides sera (n= 21). Total n= 61. Euroimmun Anti-Strongyloides ELISA showed a sensitivity of 85% compared to the in-house ELISA which had a sensitivity of 82% (borderline counted as negative) respectively 85% (borderline counted as positive).

N= 61		Swiss TPH Routine ELISA		
		positive	borderline	negative
Euroimmun Anti-Strongyloides ELISA	positive	46	2	4
	borderline	0	0	0
	negative	4	0	5

Antibodies against	Total n	Euroimmun Anti-Strongyloides ELISA		Routine Swiss TPH ELISA	
		false positive (n)	Specificity	false positive (n)	Specificity
<i>Fasciola</i> spp.	13	1	92%	6	84%
<i>Echinococcus</i> spp.	14	2	86%	6	57%
<i>Filaria</i>	13	2	85%	5	54%
<i>Angiostrongylus</i> spp.	12	3	75%	5	58%
<i>Neurocysticercosis</i>	15	6	60%	6	60%
<i>Toxocara</i> spp.	31	16	48%	14	53%
<i>Schistosoma</i> spp.	33	7	79%	17	49%
<i>Trichinella</i> spp.	14	3	79%	3	79%
<i>Anisakis</i> spp.	10	0	100%	2	80%
<i>Gnathosotoma</i> spp.	9	2	78%	2	78%
<i>Ascaris / Hookworm</i>	8	3	63%	4	50%
<i>E. histolytica</i>	5	0	100%	0	100%
<i>Leishmania</i> spp.	4	0	100%	0	100%
<i>Plasmodium</i> spp.	5	1	80%	1	80%
<i>T. cruzi</i>	3	0	100%	1	67%
<b>Total helminths</b>	<b>172</b>	<b>45</b>	<b>74%</b>	<b>71</b>	<b>58%</b>
<b>Total protozoa</b>	<b>17</b>	<b>1</b>	<b>94%</b>	<b>2</b>	<b>88%</b>
<b>Overall</b>	<b>189</b>	<b>46</b>	<b>76%</b>	<b>74</b>	<b>61%</b>

## Conclusions

- Overall sensitivity of the Euroimmun Anti-Strongyloides ELISA is 85% and comparable to our in-house routine Swiss TPH ELISA.
- Specificity with sera of blood donors (n= 20) is 100% in both assays.
- Specificity with sera from patients with different helminthic and protozoan infections is higher in the Euroimmun ELISA (76%) compared to our in-house routine Swiss TPH ELISA (61%).
- Euroimmun Anti-Strongyloides ELISA is easy to perform and suitable as screening- and/or confirmation test.

## Acknowledgements

We would like to thank Karin Stoll Rudin and Yvette Endriss from the Swiss TPH for expert technical assistance and for maintenance of the life cycle and Dr. Christoph Schaefer from Euroimmun Schweiz AG a PerkinElmer Company, for providing the Anti-Strongyloides ELISA kits to perform this study.