

DCVMN Annual General Meeting

Buenos Aires, Argentina

24th - 27th October 2016

Advances in Hookworm & Schistosomiasis Vaccines

Session - Future Vaccines and
Bioproducts

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http://issuu.com/sabinvaccineinstitute/docs/f_sabin10013_sabcaseforinvestment-p?e=6271595/11351895





Working to save lives and prevent suffering from infectious and neglected diseases

➤ Vaccine development

- Developing and testing first-of-their-kind vaccines

➤ Introduction of new and under-utilized vaccines

- Providing technical support, guidance and facilitating knowledge exchange between countries

➤ Education and training

- Establishing teams to conduct field-based clinical trials and research training programs to build regional preclinical capacity

➤ Advocacy

- Advancing cutting-edge vaccine science and policy by advocating for greater awareness, funding and support



VACCINE DEVELOPMENT



Leading the
development and
introduction of low-
cost, effective vaccines



DEVELOPING NEW VACCINES

Product Development Partnership (PDP) Model

Partners in the academic, public and private sectors to leverage expertise

Promotes open-source research that focuses on capacity building, infrastructure development and knowledge-sharing

COMMITTED TO:

- Disease-endemic country ownership
- Self-reliance and sustainability
- Greater health outcomes in the most cost-effective manner possible





1 in 6 people
worldwide
suffer from
diseases you've
never heard of.

**+ 16 YEARS
EXPERIENCE**
Founded in 2000

**20,000 sqft STATE
OF THE ART
LABORATORIES**

**10 VACCINE
PROGRAMS**
R&D to Phase 1

> \$25 M extramural grants

FOCUS

**NTDs and
Emerging
Infections**

**4 CLINICAL
SITES**

USA, Brazil, Gabon

**+ 50 SCIENTISTS
& STAFF**

**+ 40 GLOBAL
PARTNERSHIPS**

**HEALTH SCIENCES
UNIVERSITY
BCM and TCH**

LOCATION
**Texas Medical
Center, Houston
Texas**



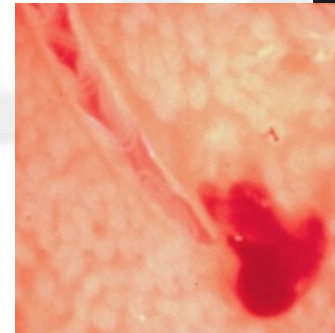
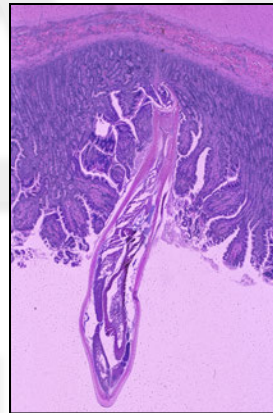
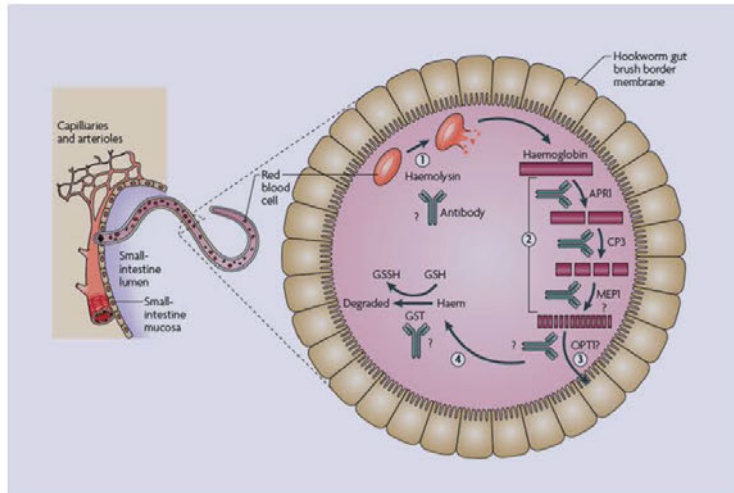
HUMAN HOOKWORM DISEASE

- Highly prevalent neglected tropical disease – Infects more than 440 million people
- A leading cause of anemia, malnutrition, physical and developmental delays
- Prevalent in Africa, Asia, the Middle East, Latin America and the Caribbean
- Contracted through contaminated soil
- Current treatment: small molecule drug, variable efficacy, does not prevent re-infection

The Human Hookworm Vaccine



Through a network of global partners, the Sabin Vaccine Institute Product Development Partnership (Sabin PDP) is spearheading the development of the first preventative vaccine for human hookworm disease



Act as a catalyst, a coalescing force and a champion

- Advancing toward large scale efficacy studies in Brazilian & African endemic areas
- European SMEs a critical component and integral part of adding private sector know-how and scientific expertise
- Inspire to become more involved in public/private vaccine product development for neglected infectious diseases
- Fuel a follow-up programme for further development of the vaccine towards a licensed product

The HOOKVAC Consortium: Photo from kickoff symposium, Amsterdam, November 2013.



➤ **2 Recombinant Protein Vaccine Candidates in Phase 1 Trials**

- Additional candidates undergoing expression and preclinical feasibility studies
- Developing controlled human hookworm infection (CHHI) model

➤ **Initial Target Population**

- Children in hookworm-endemic countries



Necator americanus - Glutathione S-transferase -1 (*Na-GST-1*)



Target: *Necator americanus*

Expression platform: Yeast technology (*Pichia pastoris*)

Insert: FL-wild type; no tags; amino acids: 1-206



Vaccine technology: Recombinant *Na-GST-1* on Alum +/- immunostimulant - GLA-AF (Lot 12C001) and CpG 10104 (Lot 14C002)



Clinical Trials: United States, Brazil, Gabon

- ✓ SVI-10-01: GST-1/GLA Phase 1 Brazil - COMPLETE
- ✓ SVI-11-01: GST-1/GLA Phase 1 USA - COMPLETE
- ✓ SVI-GST-03: GST/CpG Phase 1 USA - ONGOING
- ✓ **To date safety/immunogenicity shown in 160 healthy adult volunteers**
- ✓ HV-003: GST (lot 1982)/CpG Phase 1 Gabon – PLANNING



Necator americanus - Aspartic Protease -1 M74 (*Na*-APR-1(M74))



Target: *Necator americanus*

Expression platform: tobacco plant technology (*N. benthamiana*)



✓ Bacterial platform technology under development by Qbiologicals, Belgium

Insert: Double mutant; His-tagged; amino acids: 74-446



Vaccine technology: Recombinant *Na*-APR-1(M74) on Alum +/- immunostimulant - GLA-AF (Lot 12C001)

Clinical Trials: United States

✓ SVI-12-01: APR-1 Phase 1 USA - COMPLETE

✓ To date safety/immunogenicity shown in 40 healthy adult volunteers



Vaccine Co-Administration Trials

Clinical Trials: Africa, Brazil



✓ HV-001 – Phase 1 Gabon GLA-AF (Lot 12C001) – COMPLETE



✓ SVI-DBL-01 – Phase 1 Brazil GLA-AF (Lot 12C001 & 16C001) – ONGOING



✓ To date safety/immunogenicity shown in 92 healthy adult volunteers



✓ HV-002 – Phase 1 Pediatric Gabon GLA-AF (Lot 16C001) – PLANNING STAGE



Controlled Human Hookworm Infection (CHHI) Model Feasibility Study

Clinical Trial: USA

- **Status:** Ongoing
 - ✓ Infective Larvae: single application 25, 50, and 75
 - ✓ First 2 cohorts complete
- **Number of Volunteers:** 30 healthy adults age 18-45 years
- **Results to Date:**
 - ✓ Safety and tolerability shown up to 50 L3
 - ✓ Ability to induce infections of reproducible intensity, as measured by fecal egg counts
 - ✓ Two volunteers from 2nd cohort agreed to be donors



Expanding HOOKVAC's international partnerships

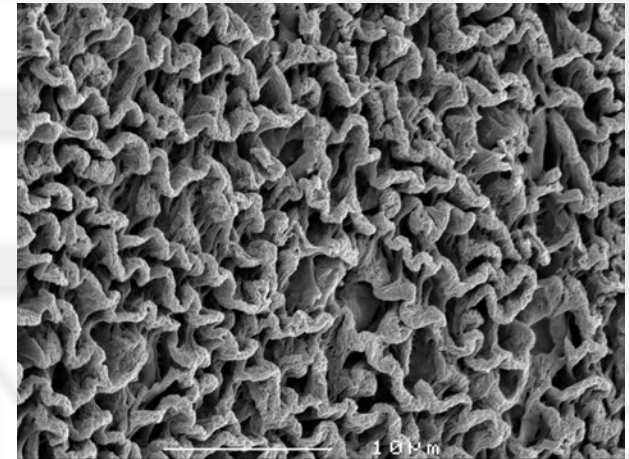
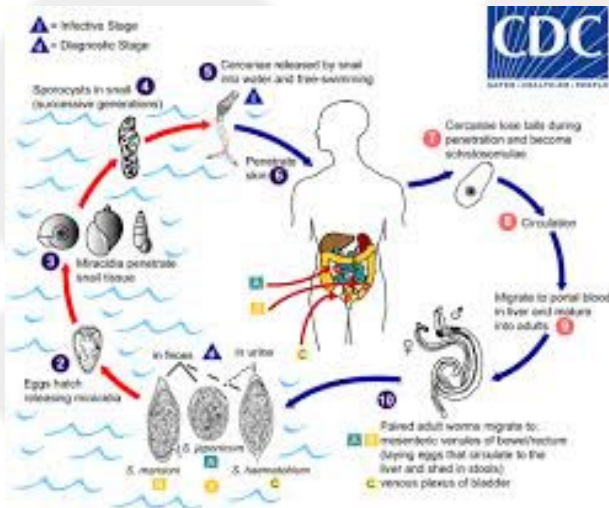
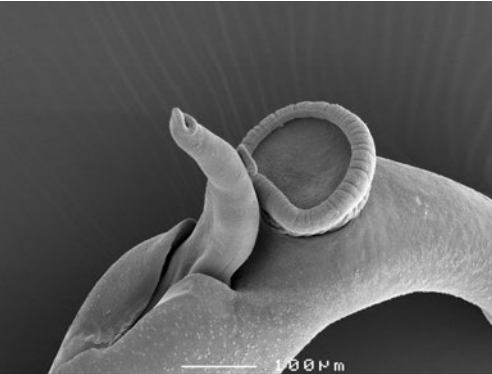
EU-India research and innovation partnership on vaccine development for hookworm and other neglected tropical diseases

- Establish an EU-India academic, cluster partnership
- Facilitate long-term manufacturing partnership models
- Establish creative environments for joined development models
- Set-up individual mobility schemes for researchers and innovators
- Support and encourage visibility, awareness for low-cost vaccine development for NTDs via meetings and workshops.



SCHISTOSOMIASIS DISEASE

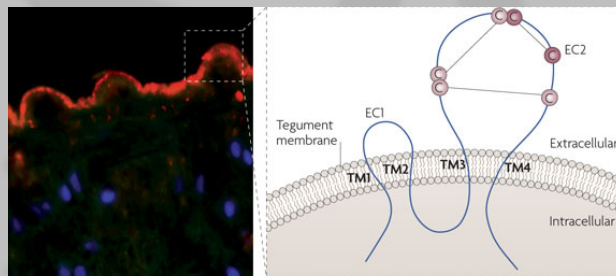
- Infects more than 290 million people worldwide
- Second deadliest parasitic disease; kills an estimated 280,000 people each year in Africa
- Carried by freshwater snails
- Women with genital schistosomiasis 3-4 times as likely to contract HIV
- Can lead to kidney disease, liver disease, anemia, malnutrition and even death
- Current treatment: small molecule drug, less effective against larvae than adult worms, high reinfection rates



➤ Recombinant Protein Vaccine Candidate in Phase 1 Trials

➤ Initial Target Population

Children in Latin America and Sub-Saharan Africa



Schistosoma mansoni -Tetraspanin Protein-2 (Sm -TSP-2)

Target: *Schistosoma mansoni*



- ✓ Potential to elicit protection against *S. haematobium*

Expression platform: yeast technology (*Pichia pink*)

Insert: wild type fragment; no tags; amino acids: 107-184



Vaccine technology: Recombinant Sm-TSP-2 on Alum +/- immunostimulant - GLA-AF (Lot 12C001) and GLA-AF (Lot 16C001)



Clinical Trials: United States, Brazil

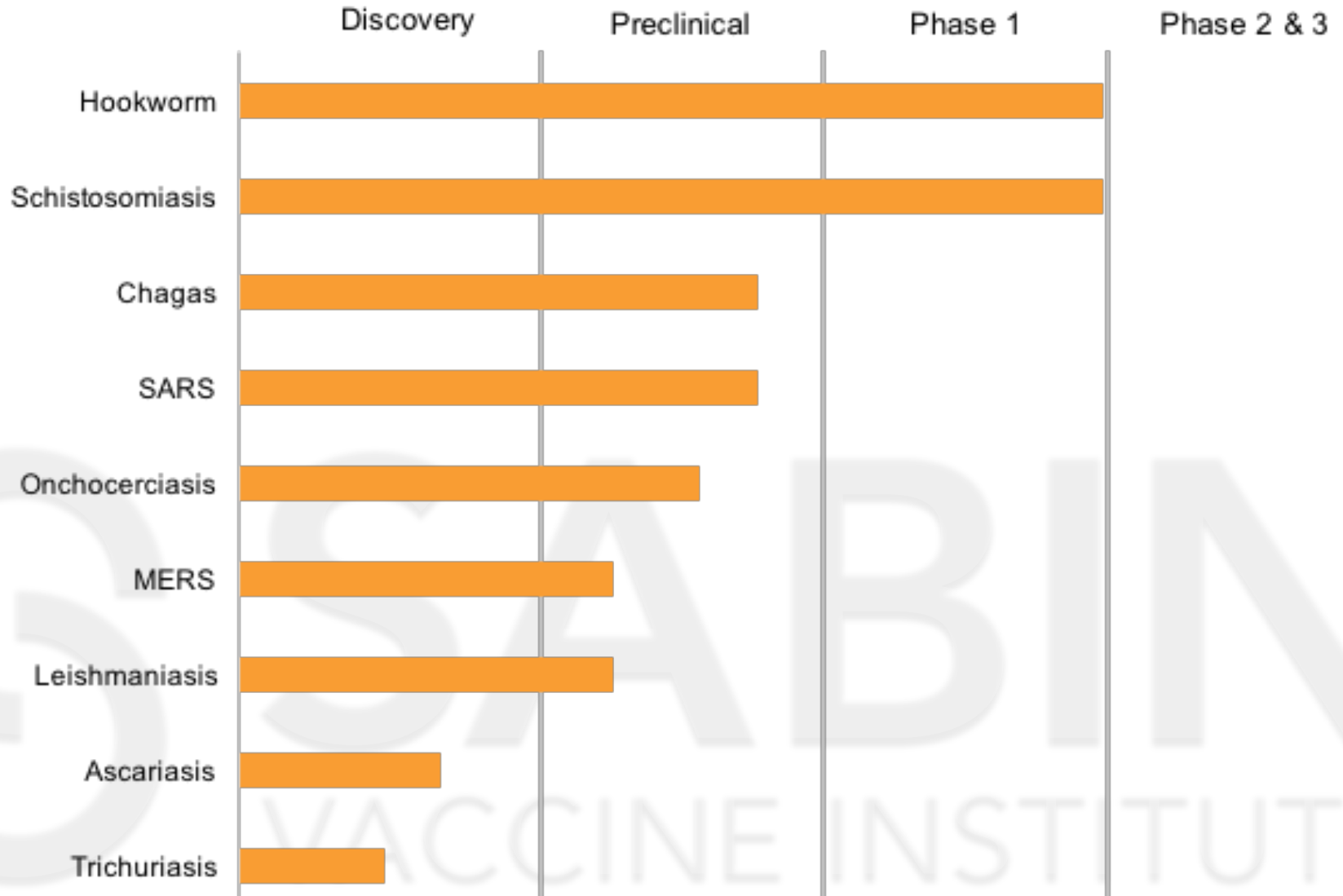
- ✓ DMID/NIAD 13-0009: TSP-2 (Lot 11-69F-003)/GLA (Lot 12C001) Phase 1 USA - COMPLETED



- ✓ **To date safety shown in 72 healthy adult volunteers**
- ✓ DMID/NIAD 14-0100: TSP-2 (Lot1975)/GLA (Lot 16C001) Phase 1 Brazil - PLANNING



VACCINE DEVELOPMENT PIPELINE



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