

Updates on Integrated Surveillance Tools for Schistosomiasis and Other Diseases

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Center for Global Health

Division of Parasitic Diseases and Malaria





- Different countries/regions at different steps in progression Different phases use different diagnostics and interventions
- Need better understanding of transition points WHA 65.21 calls for elimination in some countries Countries in Caribbean, Mediterranean and Middle East mostly at elimination or verification stages

Challenges

- As countries approach elimination, the cost per infection diagnosed/treated becomes much greater while the relative public health importance decreases
- Control/elimination program funds may be needed for higher priority health concerns
- Economic development is largely responsible for suspected cessation of transmission (vs. program)
- Verification of elimination still needed
- Remaining presence of appropriate intermediate snail hosts presents a risk of resurgence of infection

Detection of Schistosome Infections

- Kato-Katz is not sufficiently sensitive (but is useful for measuring soil transmitted helminth infections)
- Currently available antigen detection methods (CCA cassette) may not be sufficiently specific
- Antibodies (Ab) to currently available antigens not useful to distinguish current from former infections
- However, absence of Ab in young children can be useful to verify cessation of transmission
- Ab multiplex approach can also be used to integrate programs and share sample collection costs (2/3)

Luminex-based Serologic Assays

Bead-based

- 100 microsphere bead types that fluoresce at different wave lengths (2 dye mixture)
- Cross link surveillance antigen of interest to specific bead



Principles of Multiplexing



All run in a single well (up to 100 beads)

Principles of Multiplexing



Current Luminex Panels

 Neglected Tropical Diseases/ Vectorborne
Schistosomiasis, lymphatic filariasis, Strongyloides, onchocerciasis, trachoma, cysticercosis, yaws, ascaris, Plasmodium, dengue, Chikungunya, Rift Valley fever

Waterborne/Foodborne Disease
Cryptosporidium, Giardia, Toxoplasma, ETEC,
Salmonella LPS Group B and D, norovirus, rotavirus,
E. histolytica, Vibrio cholerae, Campylobacter

Vaccines
Measles, tetanus, diphtheria, rotavirus, hepatitis B

Potential antigens in development
Chagas, leishmania, hookworn, toxocara, scabies, leprosy, pertussis

Sample Collection



TropBio filter disk





Whatman filter paper

Cost/person

# antigens tested	Total cost	Cost/test
Single plex	\$2.07	\$2.07
2-plex	\$2.23	\$1.12
5-plex	\$2.71	\$0.54
10-plex	\$3.51	\$0.35
20-plex	\$5.11	\$0.26
30-plex	\$6.72	\$0.22

Costs for sample collection can be shared between programs

If sample shipment is required, costs to send filter papers at ambient temperature is much less than sending frozen sera

Multiplex Assays as a Surveillance Platform

- Snapshot of the epidemiologic context—what interventions are needed where
- Opportunities to measure change and trends over time
- Partnerships between groups to collect multiprogram data
- Opportunities to address cross-cutting issues, such as effects of coinfections, that are difficult with 'siloed' programs
- Insights into vaccination/infection interactions

Other Considerations

- Not as easy to establish as ELISA—more appropriate for regional labs
- Alternatively, MagPix is portable version of technology
- Greater dynamic range than ELISA, may be able to distinguish current and former infections, defined antigens
- IRB issues important—what will be tested, will samples be stored, exported
- Stool-based multiplex PCR also available for schistosomiasis and STHs

Take Home Messages

- Integrated serosurveys are feasible, will generate useful data and have the potential to save money and human resources
- Surveys in children generate valuable information about recent transmission
- Efforts are needed to:
 - Validate additional antigens
 - Standardize assays to guarantee that data can be compared across laboratories

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The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

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