Field-based molecular diagnostics: supporting the move towards test-and-treat scenarios in the elimination of urogenital schistosomiasis setting of Zanzibar

Find out more:

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What is the research?

Molecular diagnostics can be highly sensitive and specific but most cannot be used at the point-of-care due to their high resource requirements. Recombinase polymerase amplification (RPA) is an isothermal DNA amplification technology offering several advantages in terms of its application in the endemic field setting.

This research is focused on the development of an RPA assay for *Schistosoma haematobium*, the cause of human urogential schistosomiasis, which can facilitate test-and-treat scenarios in the elimination setting of Zanzibar, Tanzania. The laboratory development of the assay proved its high sensitivity and specificity, with pilot testing on clinical samples showing a lower limit of detection of 1 egg/10ml of urine. Reactions are run at 40°C in small portable battery powered tube scanner devices and take just 10 minutes. Additionally, the development of crude sample preparations facilitate the assay's feasibility in the endemic setting. Further research is ongoing to deploy this simple, portable, sensitive and specific technology to enable the testing and treating of the few individuals acting as reservoirs of infection Zanzibar.

Why is it important?

Schistosomiasis is endemic in 74 developing countries, with over 240 million people infected and over 750 million at risk with 90% of those infected living in low or middle income countries in Africa. Efforts to control schistosomiasis are gathering momentum with ambitious goals to eliminate schistosomiasis announced by the World Health Organization and the London Declaration on NTDs.

In endemic areas, appropriate diagnostic tools are required that can be readily adapted at different stages of a control programme. Mass Drug Administration (MDA) with praziquantel, behavioural change, education and snail control are having a major impact on schistosomiasis transmission, bringing down prevalence and intensities. Sensitive and specific diagnostic tests, to prevent false negative diagnosis, are critical for the development and success of schistosomiasis control and elimination programmes. Additionally, diagnosis needs to be performed at the point-of-care/need so that infected individuals can be treated on the spot. Preventing false negative diagnosis and implementing test-and-treat methodologies will not only support the move towards elimination, but will also restrain transmission resurgence, a real risk for schistosomiasis due to the replicative biology of schistosomes within their snail hosts.

What will its impact be?

Currently the diagnosis of urogenital schistosomiasis relies on the detection of eggs in urine, a test not sensitive enough to detect low intensity infections, meaning that true prevalence is probably underestimated. Moreover, there is a critical need within elimination programmes to implement test-and-treat scenarios so that the few individuals that are maintaining transmission are treated. With the provision of highly sensitive and specific diagnostic tests that can be performed at the point-of-need/care, such as our RPA assay, we can reduce the prevalence of urogenital schistosomiasis in Zanzibar, reach and maintain elimination and prevent resurgence. This research also has implications elsewhere, providing better estimates of prevalence so that treatment strategies can be optimised. Additionally, this research is being adapted for the difficult diagnosis of related pathologies, such a Female Genital Schistosomiasis (FGS), with an aim to empower women to seek appropriate support.

Prolific water contact at a water body on Pemba Island, Zanzibar. Test and treating in this elimination setting could help find the few individuals maintaining transmission. Photo credit: Bonnie Webster