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Validation of innovative digital microscopes for the diagnosis of schistosomiasis and other helminthiases

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Stellingen behorende bij het proefschrift getiteld:
**validation of innovative digital microscopes for the diagnosis of
schistosomiasis and other helminthiasis**

1. Artificial intelligence-based digital detection systems hold the future of health systems for all settings, especially in low- and middle-income countries [this thesis].
2. Artificial intelligence-based digital diagnostics for detection of parasite morphology (*e.g.* eggs) will not outperform human experts if the current limitations to hardware and software technology are not overcome [this thesis].
3. There is no one-size-fits-all diagnostic test for schistosomiasis and soil-transmitted helminthiasis [this thesis].
4. Current digital diagnostics are well suited and developed for case management as well as mass drug administration assessment in settings with efforts to control schistosomiasis and soil transmitted helminthiasis and advance towards elimination [this thesis].
5. The challenge of implementing multiple sampling (which improves sensitivity) experienced with conventional microscopy (increased labour) could be overcome with fully automated digital diagnostics making such a tool an attractive alternative in settings approaching elimination with limited access to more sensitive diagnostics [Mohammed et al., PLoS One. 2022 and this thesis].
6. Artificial intelligence-based digital diagnostic performance for detecting low infection intensities on Kato-Katz slides is superior to conventional microscopy and challenges the role of expert manual microscopy as the recommended/reference method for soil transmitted helminths detection [Lundin et al., PLoS Negl Trop Dis. 2024].
7. Artificial intelligence-based digital diagnostic devices enable safer sample processing and reduce risk of sample contamination compared to existing/previous methods [Feng et al., Trends in Parasitology 2024].
8. Digital diagnostic devices embedded with an open source Artificial intelligence solution may offer a more affordable approach to improving diagnostic performance and wide field application in endemic settings [Feng et al., Trends in Parasitology 2024].
9. False positives of Artificial intelligence-based digital diagnostic results can be tackled by including an expert manual review of the results of the digital image analysis (sub-group of positive digital images classified by the AI) [Holmström et al., Glob Health Action. 2017 and this thesis].
10. For anyone who believes they have faced challenges in their career development, I propose they consider analyzing hundreds of stool samples daily for many years—a perspective that might redefine what a rough time truly entails.

11. If you get offered a car ride, dance to the tune of their music [my mum].
12. All PhD students have their respective challenges. Moreover, being an international PhD student (from LIMCs) working across different international institutions introduces additional complexities that further renders the research process challenging and therefore require more effective support and consideration.
13. Just as focusing solely on winning a tennis match distracts from executing each point [Patrick Mouratoglou], prioritizing only the end goal in research can undermine the critical attention needed for each step. The success in diagnostics development relies on concentrating on each phase of experimentation. By refining focus on every detail, meaningful progress toward impactful outcomes can be achieved.

Brice Meulah T.
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