ABSTRACT

Yearly infectious diseases cause untold mortalities, morbidities and economic losses worldwide. While the existing curative measures could alleviate the situation, inadequacies of available diagnostics prevent early case detection. Technological advancement brought diagnostics that have high performance but these tests are laboratory-based, require skilled personnel, time consuming and costly. Altogether these diagnostics are inaccessible by rural dwellers where infectious diseases are highly prevalent. Delayed diagnosis causes mild infections to progress resulting in death, disability and transmissions. Moreover, the absence of effective tests prevents early detection of drug resistant parasites and persistent infection ascribed to counterfeit drugs.

Technology for transforming complex immunodiagnostics into point-of-care test (POCT) is well established. These POCTs detect antigen through monoclonal antibodies (MAbs) that are printed on solid support or infection-induced host antibodies through an antigen printed likewise. Antigen detection reliably reveals ongoing infection unlike antibody detection whose specificities are compromised by persistence of antibodies even after clearance of infections. While antigen detecting POCTs would suffice in rural settings, efforts to develop are thwarted by inability of the tests' MAbs to outperform infection-induced host antibodies which compete for the same epitopes on antigen thereby affecting sensitivity. The recombinant variable portion of camelid heavy chain antibody (Nanobody) is able to overcome this challenge. Nanobody (Nb) has pronounced CDR3 reaching cryptic epitopes inaccessible by short CDRs of the conventional antibodies evading the competition.

This study explored the development of Nb-based antigen detection assay for African Animal Trypanosomosis (AAT) a rural disease severely affecting livestock industry in sub-Saharan Africa. Using *T. congolense* as a model system, Nb-ELISA targeting glycosomal Fructose-1,6-bisphosphate aldolase was developed as a step towards POCT for AAT.