Selection of immunogenic targets for the development of serological tests applied in the simultaneous diagnosis of Soil-transmitted Helminths

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Infections caused by Soil-transmitted Helminths (STH) are associated with high morbidity worldwide. The World Health Organization (WHO) in 2021 established new goals for the control and elimination of Geohelminthiasis for the year 2030, which includes the implementation of new strategies that go beyond the mass drug administration. There is an urgent need for diagnostics that perform better and allow screening of large numbers of individuals to guide interventions and monitor the success of STH control programs. So far, the diagnosis is based on fecal parasitological techniques. However, despite the high specificity, these techniques become unfeasible in large population studies, due to the demand for time, specialized labor and loss of sensitivity at low parasite loads. A potential alternative method is serology. Therefore, the objective of this study is to select new immunogenic targets for the development of serological point of care testing applied in the detection of the most prevalent geohelminths: Hookworms (*Ancylostoma duodenale* and *Necator americanos*), *Ascaris* sp., *Trichuris trichiura* and *Strongyloides stercoralis*. The beginning of the searches for these targets was carried out *in silico* using the Immunorank *software* (*in preparation*) that allows the prediction of protein regions with a high degree of recognition by B cells. The selected protein regions were synthesized in membrane and remained for the Immunoblotting screening test, the most promising targets were synthesized in soluble form and selected for the Enzyme Linked Immunosorbent Assay (ELISA) for detection of Immunoglobulins (IgG) circulating in serum. For serological tests, human samples infected with the species of interest, confirmed by parasitological techniques, were used. The *in silico* research resulted in 1160 antigenic peptides with the size of 15 amino acids that were evaluated for the degree of conservation and similarity between species. Observing several regions with a high degree of similarity in the proteome of the geohelminths of interest, which supports the hypothesis of formulating a new rapid screening test that allowed the simultaneous diagnosis of geohelminths. The 10 most promising peptides in Immunoblotting were confirmed by ELISA. Evaluating the results of the ELISA for IgG in the infected sera, all 10 pathogenic peptides reactivity for at least one species, with results of sensitivity (S) between 56% to 100% and specificity (E) between 85% to 100%, being for Hookworms (S= 70% to 100% and E= 85%), *Ascaris* sp. (S=56% to 76% and E=85%), *T. trichuria* (S=58% to 77% and E=85% to 100%) and *S. stercoralis* (S=60% to 75% and E= 85%). These results indicate that the junction of the 10 tested epitopes will allow the development of a screening test with greater precision, to be used in the simultaneous diagnosis of geohelminths, facilitating the diagnosis in large population studies, allowing the targeting of treated areas, reducing time, labor and costs with mass drug administration. This work opens doors for exploring new epitopes that may become part of the diagnostic tool options for STH.

Afiliações

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