

Use of a Chagas Urine Nanoparticle Test (Chunap) to Correlate with Parasitemia Levels in *T. cruzi*/HIV Co-Infected Patients

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Abstract : Early diagnosis of reactivation of Chagas disease in HIV patients could be lifesaving; however, in Latin American the diagnosis is performed by detection of parasitemia by microscopy which lacks sensitivity. To evaluate if levels of *T. cruzi* antigens in urine determined by Chunap (Chagas urine nanoparticle test) are correlated with parasitemia levels in *T. cruzi*/HIV co-infected patients. *T. cruzi* antigens in urine of HIV patients (N=55: 31 *T. cruzi* infected and 24 *T. cruzi* serology negative) were concentrated using hydrogel particles and quantified by Western Blot and a calibration curve. The percentage of Chagas positive patients determined by Chunap compared to blood microscopy, qPCR, and ELISA was 100% (6/6), 95% (18/19) and 74% (23/31), respectively. Chunap specificity was 91.7%. Linear regression analysis demonstrated a direct relationship between parasitemia levels (determined by qPCR) and urine *T. cruzi* antigen concentrations ($p < 0.001$). A cut-off of > 105 pg was chosen to determine patients with reactivation of Chagas disease (6/6). Urine antigen concentration was significantly higher among patients with CD4+ lymphocyte counts below 200/mL ($p = 0.045$). Chunap shows potential for early detection of reactivation and with appropriate adaptation can be used for monitoring Chagas disease status in *T. cruzi*/HIV co-infected patients.

Keywords : antigenuria, Chagas disease, Chunap, nanoparticles, parasitemia, poly N-isopropylacrylamide (NIPAm)/trypan blue particles (polyNIPAm/TB), reactivation of Chagas disease.

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