Accuracy of chimeric proteins in the serological diagnosis ofchronic Chagas disease using latent class analysis

Fred L. N. Santos1; Ana Clara P. Campos2; Leila D. A. F. Amorim3; Paola A. F. Celedon4; Nilson I. T. Zanchin5; Marco A. Krieger4,5; Yara M. Gomes6

1Gonçalo Moniz Institute (Fiocruz-BA), 40296-710 Salvador, BA, Brazil. 2Postgraduate Program in Epidemiology (UFBA), 40110-040 Salvador, BA, Brazil. 3Department of Statistics (UFBA), 40170110 Salvador, BA, Brazil. 4Molecular Biology Institute of Paraná (IBMP), 81350-010 Curitiba, PR, Brazil. 5Carlos Chagas Institute (Fiocruz-PR), 81350-010 Curitiba, PR, Brazil. 6Aggeu Magalhães Institute (Fiocruz-PE), 50670-420 Recife, PE, Brazil. Email: fred.santos@bahia.fiocruz.br.

The performance of current serologic tests for diagnosing chronic Chagas disease (CD) is highly variable and depends on the type and quality of the antigen preparations that are used. Since no reference standard is available for CD, WHO and Brazilian Health Ministry recommend the use of two tests in parallel. In this circumstance, the accuracy of new methodologies cannot be predicted without bias by comparing the results against an imperfect reference standard. A strategy to circumvent this limitation comprises the use latent class model, which assumes that the real disease condition is not directly unobservable, but that the available methods of observation approximate the actual state in some way. Our group assessed the adoption of synthetic chimeras comprised of repetitive fragments of antigenic proteins of the parasite for the detection of specific anti-T. cruzi antibodies by using distinct immunoassays (EIA, immune chromatography, and liquid microarray). Although two commercial tests were previously established as the reference standard, the diagnostic performance of the chimeras could be biased due to the failure of these commercial tests produce 100% accurate results. In this scenario, we assessed whether the latent class analysis (LCA) could reduce uncertainty regarding IBMP chimeras performance to diagnose Chagas disease. Using latent variables as the gold standard, tests assayed with IBMP-8.1, -8.2, -8.3, and -8.4 chimeras achieved a sensitivity of 96.4%, 93.8%, 96.8%, and 99.7%, respectively. Specificity values were 99.2%, 99.6%, 99.6%, and 100%, respectively. These findings confirm that IBMP chimeras are highly accurate to diagnose Chagas disease and they can potentially replace antigens currently used in commercially available assay kits. Moreover, the use of multiplex platforms, like liquid microarray or immunochromatography assays employing 2 or more IBMP antigens, would abrogate the need for two different testing techniques when diagnosing CD.

Keywords: Chagas disease, laboratory diagnosis, chimeric protein, latent class analysis.

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