

Performance of a novel serological test for Chagas disease

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BACKGROUND

- Chagas disease (CD) is caused by infection of the protozoan parasite, Trypanosoma cruzi, most commonly transmitted through an arthropod vector (triatomine bug).
- Transmission is endemic throughout Latin America and is estimated to affect approximately 300,000 people in the U.S.; most of which are Latin American immigrants.
- End stage disease manifestations include dilated cardiomyopathy and toxic megacolon.
- Diagnosis requires multi-step confirmatory testing, but the options and available data on currently available tests are limited.
- In 2019, our group evaluated the InBios Chagas Detect Plus lateral flow immunoassay (LFA) in 800 American Red Cross (ARC) Blood Donor Specimens.
- In 2022, InBios developed three additional LFA prototypes with different antigens and conjugate antibodies to improve upon lower specificity of the assay seen in our study.

AIM: The aim of this study is to evaluate three prototypes of the next-generation InBios LFA (CDPv2) for improved test performance from its predecessor.

METHODS

- The original 800 ARC specimens were tested once each on each of the three prototypes.
- Tests were rated as positive or negative for *T. Cruzi* antibodies by study participants using a band intensity scale (Figure 1).
- Results were imported into an Excel spreadsheet to generate comparative data, including sensitivity and specificity
- This research was approved by ARC and UCSF Institutional Review Boards.

RESULTS

- The original assay from 2019 had a higher sensitivity than all three prototypes, but the lowest sensitivity.
- Of the three prototypes from 2022, Prototype D had the highest specificity, but lowest sensitivity
- Prototype C had the best balance of sensitivity and specificity.
- Donor samples from South America had the highest mean band intensity across all four models (Figure 3), likely representing regional traits of host-pathogen biology.

Our findings reveal a viable two-step mechanism for the diagnosis of chronic *T. Cruzi* infection

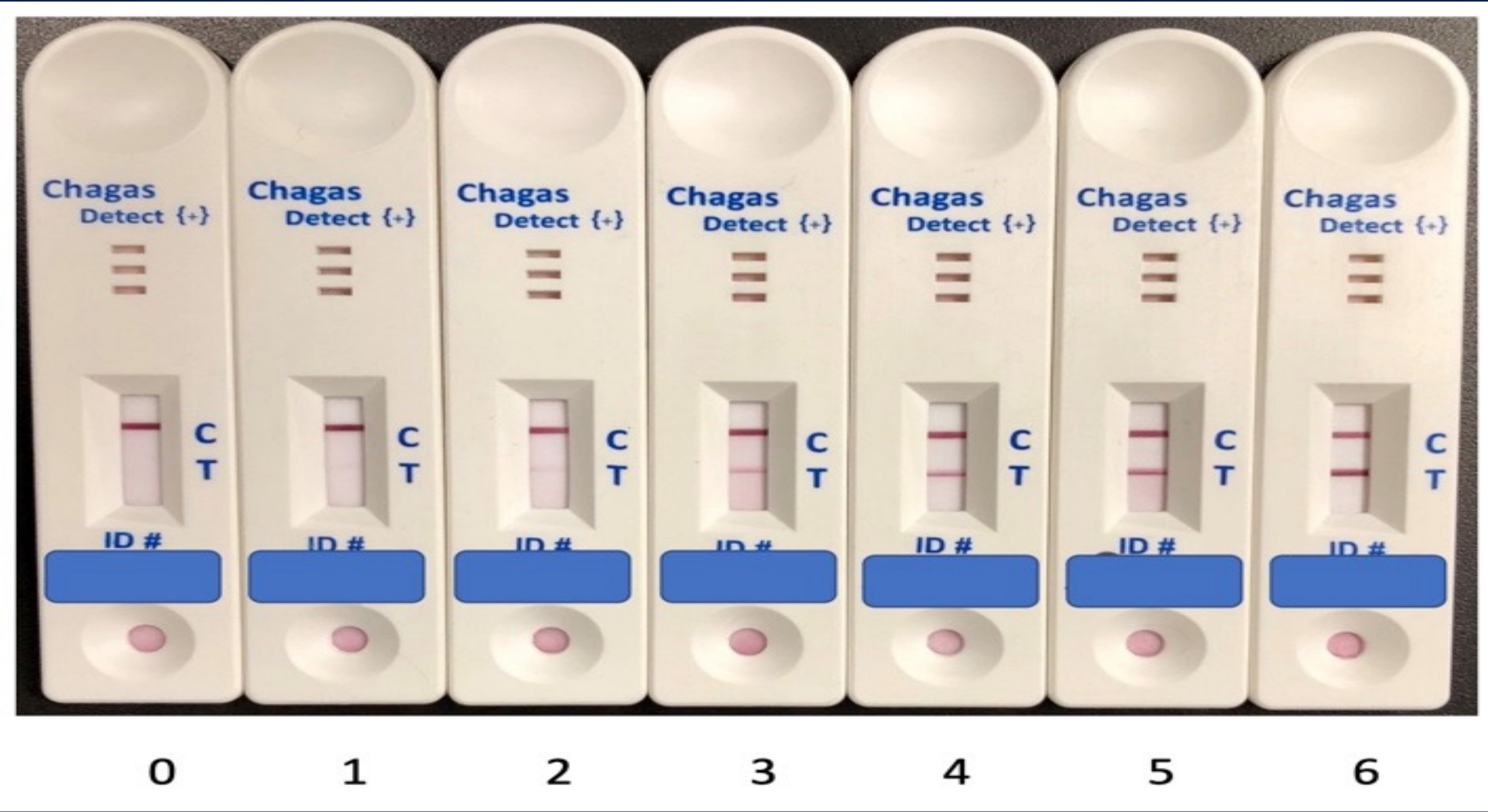


Figure 1: The band intensity scale used by study participants. Anything >0 was considered a positive result.

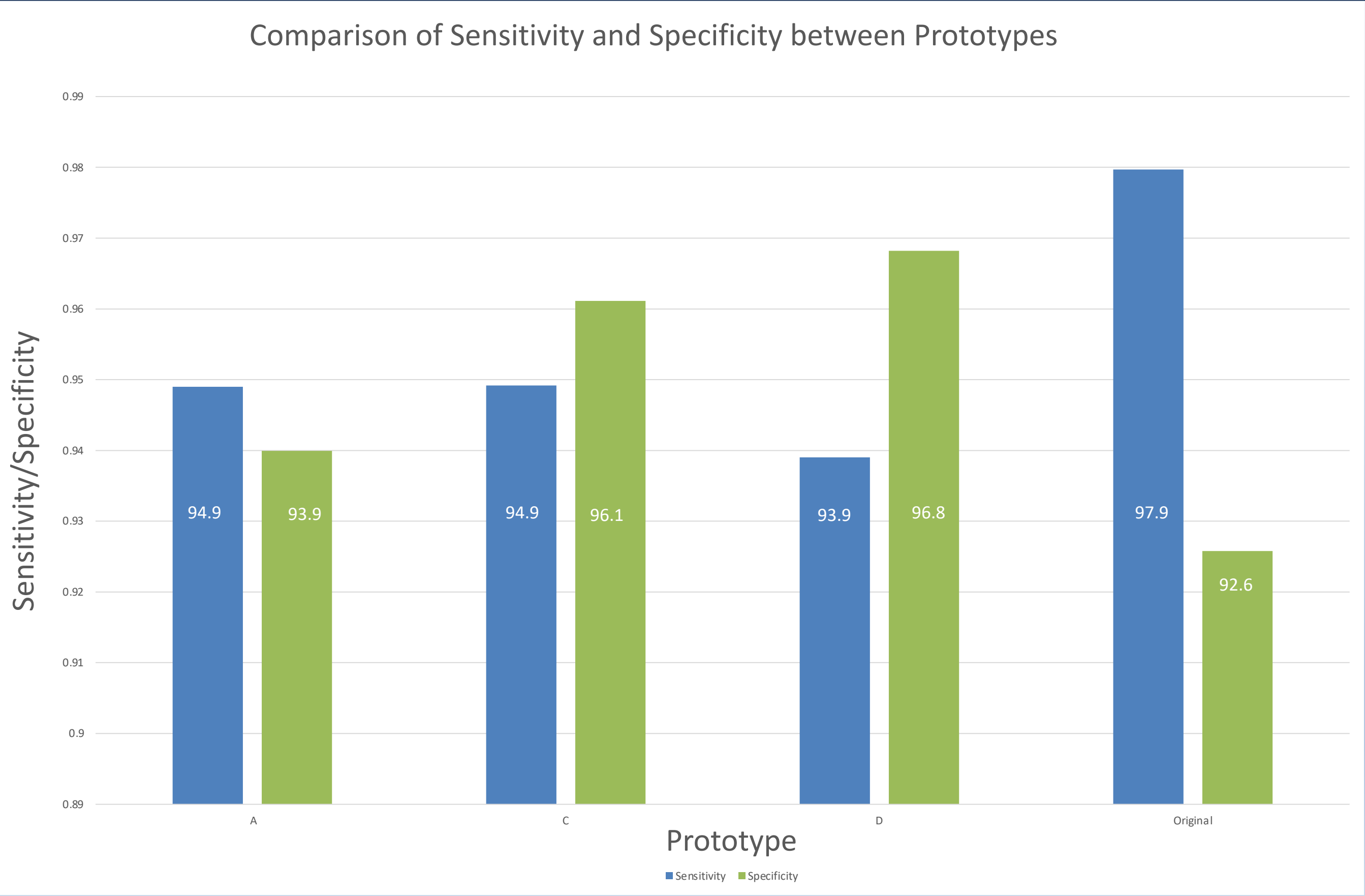


Figure 2: The 2019 model had the highest sensitivity of all four models. All three of the 2022 prototypes had a higher specificity than the 2019 model, with prototype D having the highest.



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DISCUSSION

Chagas disease testing requires high sensitivity to appropriately screen individuals in the asymptomatic chronic phase, as well as high specificity to ensure that there is not an undue burden of false positives and over diagnosis. No single test has adequate sensitivity and specificity alone to test one time given the lower prevalence of Chagas disease in the US, which has necessitated multi-step testing algorithms that focus on high sensitivity up front (with adequate specificity) and confirmation with a high specificity test (with adequate sensitivity).

The new CDPv2 prototypes demonstrate improved specificity over its predecessor while maintaining a high sensitivity, albeit slightly lower than the original.

These tests could fit well into individual community screening or point-of-care testing, as well as confirmatory testing for individuals screened by other assays. Further studies are planned for prototypes C and D in prospective clinical studies for a better assessment of real-world test performance

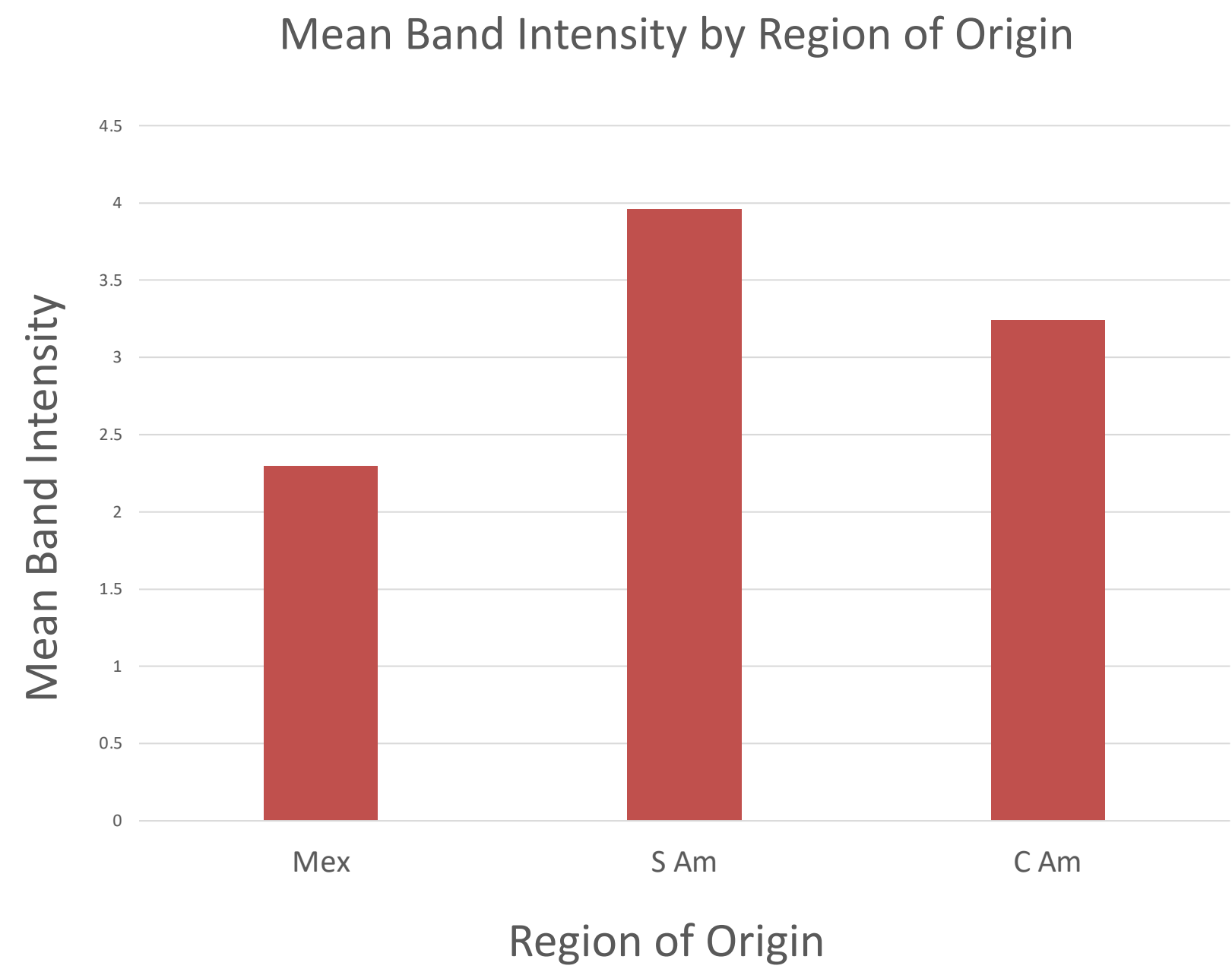


Figure 3: Mean band intensity by region of origin.

FUNDING AND CONFLICT OF INTEREST

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