

Integrated digital and rapid diagnostic platform for Chagas vector surveillance

Concept fact sheet | Early-stage development | Seeking complementary research and technology partners

INSTITUTIONAL FOUNDATION

Fundação Ezequiel Dias (FUNED), through its public health laboratory network and national reference role in Chagas disease diagnosis, combines diagnostic expertise with entomoepidemiological surveillance data. This experience informs a proposed field-oriented platform linking rapid testing of triatomines, AI-assisted insect identification, and georeferenced digital reporting.

WHY THIS PROJECT MATTERS: EVIDENCE FROM SURVEILLANCE

FUNED's long-standing work in Chagas disease diagnosis and entomological surveillance provides a strong foundation for this project. A recent institutional technical report, drawing on 15 years of laboratory and surveillance data from Minas Gerais, documents substantial vector infection, wide geographic distribution, and evidence connecting infected triatomines with domestic environments and human exposure. The findings reinforce the value of integrating vector, biological, and territorial information to support timely, targeted public health decisions.

Policy relevance: The report's findings helped inform guidance reflected in Joint Technical Notes No. 240/2025 (Brazilian Ministry of Health) and No. 1/2026 (SES-MG and FUNED/LACEN-MG).

THE PROPOSED PLATFORM

01 | RAPID FIELD TEST

A lateral-flow test under development to detect evidence of human blood and *T. cruzi* in triatomines. Current work is at the monoclonal antibody development stage; assay development and validation remain ahead.

02 | AI-ASSISTED IDENTIFICATION

Initial studies toward an application using AI-based image analysis to support triatomine identification, georeferencing, and structured recording of field observations.

03 | QR-ENABLED DIGITAL LINK

The envisioned workflow uses a QR code on the cassette to connect field testing with the application, linking test records, insect identification, location, and surveillance data, subject to development and validation.

WHY A DECENTRALIZED APPROACH?

Decentralized screening could shorten the time between vector collection and public health action. Within this initiative, qPCR supports research and confirmatory investigation but depends on specialized, costly infrastructure. A more affordable rapid test could enable broader routine implementation, helping surveillance teams prioritize samples and direct potentially exposed individuals to earlier clinical diagnosis - when treatment offers a greater chance of cure. It would complement, not replace, qPCR and established diagnostic procedures.

POTENTIAL BRAZIL–SWEDEN COLLABORATION

DIAGNOSTIC BIOTECHNOLOGY

Monoclonal antibodies, lateral-flow engineering, assay optimization and analytical validation.

AI & COMPUTER VISION

Image-based identification, model development, performance evaluation and data curation.

DIGITAL HEALTH & GEOSPATIAL ANALYTICS

Georeferencing, spatial analysis and interoperable surveillance records.

PROTOTYPE-TO-FIELD DEVELOPMENT

System integration, field evaluation, implementation research and technology transfer.

CURRENT STATUS & NEXT STEPS

Current status: Monoclonal antibody development for the rapid test; initial studies for the AI-assisted application are being initiated. Integration and analytical/field validation remain future steps.

Proposed collaboration: identify complementary partners, define joint technical work packages, develop proof-of-concept prototypes, and plan validation studies and funding opportunities.

LET'S BUILD THE NEXT GENERATION OF VECTOR SURVEILLANCE

Research group: Serviço de Pesquisa em Doenças Infecciosas (SPDI) Fundação Ezequiel Dias (FUNED), Minas Gerais, Brazil | Contact details available upon request

Key reference: FUNED. Doença de Chagas no Século XXI: Análise Integrada de 15 Anos (2009–2024) sobre Desempenho Diagnóstico, Padrões Epidemiológicos e Vigilância Entomológica em um Laboratório de Referência Nacional. Relatório Técnico n.º DPD-DCI-SPDI-RELT-0005. Belo Horizonte: FUNED, 2026, 58 p. Available at: <https://agiminas.mg.gov.br/images/stories/Relt0005.pdf>

Sérgio Caldas
Coordinator, Infectious Diseases Research Service (SPDI)
Fundação Ezequiel Dias (FUNED), Minas Gerais, Brazil
Email: sergio.caldas@funed.mg.gov.br