Chagas disease (ChD) or American trypanosomiasis is caused by the protozoan parasite Trypanosoma cruzi. The parasite is mainly transmitted by the infected faeces of blood-sucking triatomine bugs which become infected with T. cruzi parasites when taking blood meals from host mammals. Other routes of transmission include blood transfusion, organ transplantation, transplacental transmission and ingestion of food contaminated with faeces from triatomine bugs.

The disease is widespread in Latin America where it is a public health problem in many countries. Though its control has improved dramatically over the past 20 years, it is estimated that between 6 and 8 million people are infected, and that more than 70 million people remain at risk of infection. In non-endemic countries of North America, Europe and Asia, an increase in cases of ChD, mainly due to migration of people, is currently driving the development of global strategies for its detection, treatment, prevention and care.
The best time for parasitological or molecular diagnosis of congenital ChD is during the first few weeks after birth when parasitaemia is often high. This is difficult at present due to limitations in infrastructure and resources. Children born from infected mothers can first be tested by serology ten months after birth (serological tests are only useful after maternal antibodies have waned). As a result, many children are lost to follow-up during this waiting period.

A point-of-care test for congenital ChD that enables testing of newborns to confirm the infection at the site of birth would ensure early detection and safer treatment of infected patients.

A test for early assessment of treatment response, preferably a rapid diagnostic test (RDT), is also urgently needed, since treatment of chronic cases is not always successful and serological tests require long durations to confirm cure (patients are followed up for years until they are serologically negative).

INNOVATIVE DIAGNOSTIC SOLUTIONS FOR ChD

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DETECTION OF PARASITE DNA
Detection of *Trypanosoma cruzi* DNA in blood of patients would be a significant improvement to parasitological examination. In 2014, FIND expanded its partnership with Eiken Chemical Co., Japan, developers of the loop-mediated isothermal amplification (LAMP) technology, to include a test to detect *T. cruzi*. LAMP detects pathogen DNA with very high sensitivity and specificity. The reagents for LAMP are dried on the inside of the cap of the reaction tube, and unlike most other molecular tests, target DNA is amplified at a constant temperature. The results are read visually using LED light, meaning that the test can be carried out with less laboratory equipment than other DNA detection tests.

CURRENT STATUS
FIND and Eiken, in collaboration with INGEBI/CONICET, Argentina, the Hospital for Tropical Diseases, UK and the Pontificia Universidad Javeriana and Colombia have developed a prototype LAMP assay that detects all strains of *T. cruzi*, to be used for diagnosis of acute ChD. Further validation and evaluation at INGEBI/CONICET and Instituto de Salud Carlos III, Spain has shown that the LAMP test has a diagnostic performance equivalent to PCR and real-time PCR and that it can be used to diagnose acute ChD, including congenital ChD cases.

1 Analytical sensitivity and specificity of a loop-mediated isothermal amplification (LAMP) kit prototype for detection of *Trypanosoma cruzi* DNA in human blood samples. Besuschio SA et al, PLOS NTD July 2017 https://doi.org/10.1371/journal.pntd.0005779

BUILDING STRONGER PARTNERSHIPS
FIND is committed to partnering with endemic countries in South America to fight Chagas disease. We also have partnerships with existing networks and organizations in non-endemic countries, as well as with test development companies.

CHAGAS DISEASE
*FIND 2015 – 2020 priorities and intervention*

**Development & policy priorities for new tools:**
- Molecular test for congenital ChD
- Point-of-care test to diagnose ChD and monitor treatment efficacy

**Enabling interventions:**
- Generate evidence to support new testing strategies
- Support countries to scale up new tools and strategies to improve diagnosis and treatment
- Partner with advocacy organizations to raise awareness of congenital ChD