CATALYSING SUCCESS THROUGH PARTNERSHIPS

NEW DIAGNOSTIC SOLUTIONS FOR NEGLECTED TROPICAL DISEASES

> SLEEPING SICKNESS

ABOUT HUMAN AFRICAN TRYPANOSOMIASIS (HAT)

HAT – commonly known as sleeping sickness – is transmitted by the bite of a tsetse fly. The disease presents in two distinct forms, both of which can be fatal if left undiagnosed and untreated.

• A chronic west and central African *(gambiense)* form, which accounts for over 95% of all cases and generally lasts for months to several years without showing major signs or symptoms

• An acute eastern African *(rhodesiense)* form, that lasts from a few weeks to several months.

The challenge with sleeping sickness lies in its complexity: there are no clinical signs that are specific for the disease, which makes it difficult to diagnose.

Diagnosis and staging (a procedure to determine whether parasites have invaded the brain) guide the choice of treatment. The drugs used for the first stage cannot be used for second stage disease. Conversely, the ones used for the second stage disease are associated with adverse reactions and are therefore not >

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recommended for treatment of the first stage. Currently, more than **60 million** people live in geographic areas that present risk of exposure to HAT; almost two-thirds of them live in the Democratic Republic of the Congo, which accounted for **86%** of total cases in **2015.** Despite the fact that the World Health Organization's (WHO) mapping of the disease's trajectory shows a significant reduction in new cases over the past two decades (30,000 in 1995 versus fewer than 3,000 in 2016), determining the true burden ›

of the disease is problematic. Populations in remote areas that have little or no access to health care are extremely difficult to screen. Accelerated control of the disease is only possible through effective diagnosis – a daunting challenge in the context of the difficulty at-risk populations have in reaching health facilities. The prevalence of the disease varies from one village to the next across endemic areas of Africa. For every case detected, there are, on average, four cases missed due to poor coverage by health services or inadequate diagnostic methods. ∎

THE ROAD TO ELIMINATION

In 2012, a consortium of partners, including governments, humanitarian organizations and pharmaceutical companies, came together and signed the London Declaration on Neglected Tropical Diseases, endorsing the WHO roadmap on 10 Neglected Tropical Diseases (NTDs).

The Declaration underscored the need for an integrated and comprehensive approach towards the control, elimination or eradication of the 10 NTDs, including sleeping sickness. Approximately two-thirds of all NTD-endemic countries have developed national NTD plans to help guide their control and elimination efforts.

Diagnosis is central to any elimination strategy. Disease control and elimination require effective diagnostics to identify outbreaks, target interventions and monitor progress.

We believe that, **through continued efforts with our partners,** we shall make a significant contribution to WHO's goal of eliminating sleeping sickness as a public health problem by 2020.

FIND and partners are developing and implementing tests for early and accurate diagnosis of HAT patients in order to ensure effective treatment. ∎

PRIORITIES 2015-2020

From 2015 to 2020, FIND is supporting WHO's goal of eliminating sleeping sickness as a public health problem, with a focus on implementation of new tools. Together with safer, easier to administer drugs, this work has allowed the move to new approaches that are accelerating and sustaining elimination.

FIND'S STRATEGY FOR HAT FOCUSES ON TWO OBJECTIVES:

1. Increasing detection of HAT through **improved screening strategies**

2. Facilitating faster, less-burdensome confirmation of HAT through better access to **improved tools**

DEVELOPMENT & POLICY PRIORITIES FOR NEW TOOLS:

› A second-generation rapid test

› A combined rapid test for HAT and malaria

› A low-cost tool for confirmation

ENABLING INTERVENTIONS:

› Provide specimens for product development

› Conduct implementation research to support roll-out of new rapid tests and other diagnostics

› Support countries in designing implemention strategies to scale-up new / existing tools

› Demonstrate feasibility and impact of next-generation rapid tests in a "test and treat" approach, once suitable drugs are available

ACCELERATING ACCESS TO BETTER DIAGNOSTICS FOR HAT:

MILESTONES

FIND and Alere/Standard Diagnostics (SD) have developed **a first generation rapid diagnostic test** (RDT) to screen for *gambiense* HAT that is cheap and easy to use.

Our priority has been to develop a method for accurate screening of HAT among populations at risk. Working with many partners, among them the Institute of Tropical Medicine in Belgium and SD in the Republic of Korea, a prototype RDT was developed and evaluated on more than 14,000 participants in Angola, the Democratic Republic of the Congo (DRC) and the Central African Republic.

The test is accurate and provides results in 15 minutes. It requires no electricity, only minimal training of health care workers, and can be used in resource-poor health facilities. The test was launched in 2012, breaking new ground in the fight against HAT. Communities with limited access to health services can easily be screened for sleeping sickness at the village health centre – something that was unthinkable just a few years ago.

The superior sensitivity of the RDT compared to existing tools in both active and passive population screening was demonstrated in the DRC in 2013 by screening 16,350 individuals.

> Currently in development, in partnership with SD and Universities of Dundee and Cambridge, **a second generation RDT** is expected to be available in 2017. The second generation RDT uses recombinant antigens, which are cheaper to produce and easier to standardize than the native antigens used for the first-generation test.

> Since all settings where HAT is found are also endemic for malaria, an RDT for **combined testing of HAT and malaria** is in development to further improve surveillance and detection of cases and to prevent re-emergence. The test will also be important for surveillance to sustain elimination.

> Working in collaboration with Carl Zeiss GmbH, FIND has introduced a dual-purpose, LED-based fluorescence microscope. It provides improved accuracy and speed in microscopy. The **LED microscope light source can last for over 10,000 hours,** uses very little power and can be run on a battery or solar energy.

> Originally developed for tuberculosis testing, **loop-mediated isothermal amplification (LAMP) of DNA** is a sensitive molecular tool for detecting HAT. FIND and Eiken Chemical Co. Ltd. have developed a LAMP kit for HAT that was evaluated in the DRC and Uganda, and is now included in projects in nine countries. This test is attractive because it can also be performed on blood samples dried on filter paper and **takes less than one hour to give results.** ■

THE WAY FORWARD

Today, the novel tools that FIND and partners have developed are contributing to the diagnosis of sleeping sickness all across Africa – Guinea, Ghana, Togo, Benin, Côte d'Ivoire, Cameroon, DRC, Uganda, Chad, Nigeria, South Sudan, Congo, Angola, Malawi, Burkina Faso, Equatorial Guinea, Gabon and Mali. Many of these countries are using the HAT RDT, LED fluorescence microscopy and LAMP to screen for and confirm the presence of sleeping sickness.

The impact of FIND's accomplishments to date, combined with on-going research and development, ensure that revolutionary approaches to diagnostics lead the way in disease elimination.

Linking with industry, academia, international health agencies, donors and governments, we are helping to forge a critical path towards the goal of eliminating sleeping sickness as a public health problem by 2020. ∎

FAST FACTS:
HUMAN AFRICAN TRYPANOSOMIASIS (HAT)

~60 MILLION
Estimated number of people at risk of HAT infection

<10,000
Current estimated cases

2,804
Reported cases in 2015

36
Number of endemic countries in sub-Saharan Africa

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