Human African trypanosomiasis (HAT), also known as sleeping sickness, is a neglected tropical disease transmitted by tsetse flies. The goal of the World Health Organization (WHO) is to eliminate the chronic form of the disease, caused by Trypanosoma brucei gambiense, by 2020.

Gambiense HAT is widely distributed in the southern and southwestern parts of South Sudan, near the borders with Uganda, the Democratic Republic of the Congo (DRC) and the Central African Republic (CAR). According to the WHO, South Sudan was reporting the fourth largest number of HAT cases in Africa by 2010, behind the DRC, CAR and Chad.

Control of HAT in South Sudan has been a challenge for a number of reasons: the country has witnessed long periods of conflict, and it only gained independence in 2011, so the national HAT control programme is in its infancy.

Limited control efforts, supported by international organizations, have resulted in a decline in the number of reported HAT cases, from 317 in 2012 to only 45 in 2015. However, the number of reported cases underestimates the true burden because only a small proportion of the population at risk has access to screening services.

In 2014, the government of South Sudan partnered with FIND, Malteser International, WHO and others, to intensify screening for HAT. The programme is integrating new diagnostic tools, such as rapid diagnostic tests (RDTs), LED fluorescence microscopy and molecular tests, into the primary health-care system. Malteser International and the Ministry of Health are the lead implementing partners, supported by other government ministries.

By June 2016, 106 health facilities near the border with Uganda and DRC were screening patients for HAT using RDTs, 11 were confirming disease by microscopy, and three were performing the molecular test known as LAMP.
PROBLEM

Before 2015, screening for HAT at village health facilities was hampered by the electricity requirements of the card agglutination test for trypanosomiasis (CATT), the only test that was available. As a result, only six health facilities in the country conducted HAT testing, meaning people had to travel long distances for diagnosis.

Active screening, in which teams of up to 12 people travel from village to village in a four-wheel drive vehicle to test people, was rarely done due to lack of resources and the poor road infrastructure.

HAT patients were often misdiagnosed and treated for other diseases at local clinics or by traditional healers. By the time such patients went to HAT diagnostic centres, the disease was already in the advanced neurological form. At this stage, treatment is difficult and involves drugs that can cause severe side effects.

SOLUTION

Accelerated and sustainable control of HAT in South Sudan requires screening tests that are simple to use, and easy to integrate in the primary health-care system. Three diagnostic tests for sleeping sickness have been developed in collaborations between FIND, and academic, industrial and endemic country partners:

SD BIOLINE HAT rapid diagnostic test (RDT)  
(Alere/Standard Diagnostics)
✓ Simple to use and store (can be stored at 40°C for 2 years)
✓ Inexpensive (50 US cents)
✓ Very sensitive
x Imperfect specificity: some people not having HAT test positive, so they must be confirmed by other tests

The RDT can be performed by staff at the smallest health-care facilities as well as by mobile teams.

Primo Star iLED fluorescence microscope (LED FM)  
(Carl Zeiss MicroImaging)
✓ Low power requirements and long-lasting light sources
✓ Slides are quick and easy to stain
✓ Versatile – can also be used for malaria and TB
✓ Does not require a dark room
x Low sensitivity – LED FM misses many cases

With the option for bright field microscopy, the LED FM can be used to perform all parasitological confirmation tests for HAT. It can be powered from solar panels.

Loop-mediated isothermal amplification (LAMP) of DNA  
(Eiken Chemical Co.)
✓ Highly sensitive
✓ Identifies HAT suspects missed by microscopy
✓ Also works on blood samples dried on filter paper
x Requires reliable power and a reasonably well equipped lab

LAMP can be performed by technicians with no training in molecular biology and can be deployed at district- or microscopy level laboratories.
STRATEGY

In 2014, initial programme activities were started in Yei River and Maridi counties. These activities included:

- Mapping locations and capacities of all 61 public health facilities
- Introducing RDTs in the 61 health facilities
- Upgrading eight facilities with the capacity to confirm HAT by parasitology, including by LED FM, which involved refurbishing laboratories and installing solar equipment in some cases
- Upgrading three of the facilities to perform both parasitology and LAMP
- Training workers in upgraded health facilities in the diagnosis of HAT using new tools

Screening process

Following these activities, a new screening process designed to dramatically increase access to HAT diagnosis was integrated into the primary health-care system:

1. Patients suspected of having HAT are screened in health facilities using HAT RDTs
2. Patients found positive by RDT are referred to microscopy (LED FM) centres for confirmatory testing, which requires demonstration of parasites
3. If positive by microscopy, patients are referred for treatment. If negative by microscopy, a blood sample is dried on filter paper and sent to a LAMP centre for further analysis
4. Patients found positive by LAMP are considered highly likely to have HAT and undergo further tests by microscopy for confirmation

CURRENT STATUS

Screening for HAT was initiated in Maridi and Yei River counties in May 2015. In Maridi county, however, full implementation of the strategy was limited by insecurity. A cross-sectional social survey was carried out in Yei River county, involving key informant interviews and focus group discussions to elicit communal as well as individual knowledge, attitudes and practices on HAT. This information is being used to develop a HAT communication strategy.

In 2016, the programme was expanded to all counties (Morobo, Lainya, Kajo-Keji and Magwi) on the South Sudanese side of the border with Uganda, which is implementing a similar programme. The number of facilities screening for HAT in this region was increased from 3 in May 2015 to 106 by June 2016. During the same period, 10,609 patients were screened for HAT and 16 cases were identified and successfully treated.
HIGHLIGHTS

- Project initiated in Yei River and Maridi in 2015, then expanded to Morobo, Lainya, Kajo Keji and Magwi counties.
- Goal: to improve access to HAT diagnostics by integrating screening and case confirmation in the primary health-care system.
- Intensified screening for HAT on both sides of the border between South Sudan and Uganda has made elimination of the disease in the region feasible.

CHALLENGES & OPPORTUNITIES

- The national HAT control programme’s ability to coordinate surveillance and control of the disease has been low, but it is being strengthened through this partnership.
- There is low awareness that HAT screening in endemic regions is now possible at local health facilities. A significant proportion of RDT positive patients also fail to go for confirmatory diagnosis. This has led to prioritization of community sensitization.
- As most health facilities were not screening for HAT before the project started, a quality assurance programme will be implemented by the National Reference Laboratory in Juba in 2017, to ensure accuracy of diagnosis and management of HAT cases.
- The HAT endemic regions are difficult to access, especially during the rainy season, a challenge for patient travel and sample transport. An eHealth system will be implemented to improve data transfer and monitoring.
- Security concerns in the country remain a challenge for programme implementation. However, as of July 2016, clinics in HAT-endemic areas remained open and screening for HAT continues.

KEY RESULTS

- 10,609 patients screened for HAT from May 2015 to June 2016.
- 314 of screened patients tested positive for HAT and were referred for confirmatory diagnosis by parasitology.
- 106 facilities carrying out intensified passive screening using simple HAT RDTs, including 2 private clinics.
- 13 facilities able to confirm HAT by microscopy.
- 16 HAT cases detected from May 2015 to June 2016.
- 3 facilities performing LAMP molecular testing of patients who were RDT-positive but negative by microscopy.

FUNDING FOR INTENSIFIED GAMBIENSE HAT CONTROL IN SOUTH SUDAN

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FURTHER INFORMATION

Information regarding diagnosis of HAT:
http://www.finddx.org/ntd/#hat