

Building Capacity for Laboratory Diagnosis of Visceral Leishmaniasis (Kala-azar)

Experience from Shire* Hospital in Northwest Ethiopia

Background

Visceral leishmaniasis, or “kala-azar,” is the most severe form of a common parasitic disease carried from animals to people, or between people, through the bite of a parasitic fly. Generally, kala-azar causes fever, swelling of the spleen and liver, and anemia. Still, symptoms vary widely between patients, and without proper laboratory tests, it can be difficult to make an accurate diagnosis. The infection is very common among people living with HIV, who often have weakened immune systems and are therefore more susceptible. It can also be harder to diagnose and treat the infection in this population.

In Ethiopia, except for the significant contributions of kala-azar treatment centers operated by Doctors Without Borders, limited laboratory capacity at hospitals and health centers has hindered the proper diagnosis of the disease in many communities. Now, with support from I-TECH, laboratory professionals in some regions have new capacity to diagnose the infection, giving people earlier access to potentially lifesaving treatment.

About Kala-azar

Kala-azar is transmitted by members of a subfamily of blood-feeding sand flies, *Phlebotomus martini*. When a fly bites a human being, it transmits the parasite into his or her bloodstream, where it multiplies. Infection can cause symptoms that vary in severity and duration, depending on the health of the infected person and the particular strain of the parasite. In East Africa, most cases of kala-azar are caused by a parasite called *Leishmania donovani*; in Ethiopia, this parasite is most often transmitted by a sand fly called *Phlebotomus orientalis*.¹

Kala-azar is endemic in some regions in the northwestern lowlands and southern Ethiopia. In these regions, it is transmitted by the sand fly from one human to another; usually in the period before Ethiopia’s yearly major rainy season. To date, there is no effective vaccine in routine use against the infection.² In Ethiopia, in 2008, a national kala-azar task force was initiated, with the aim of eliminating kala-azar from the country by 2015.

Kala-azar and HIV

Throughout Africa, but particularly in Ethiopia and Sudan, it is estimated that 70% of adults with kala-azar also have HIV infection. In Ethiopia, people with kala-azar have up to a 30% co-infection rate with HIV, particularly in the northwestern parts of the country.³

The two infections coexist in a deadly synergy. Atypical clinical presentations of kala-azar in people with HIV pose a considerable diagnostic challenge. The co-infection of HIV with kala-azar complicates the clinical manifestation, diagnosis, and treatment of kala-azar.

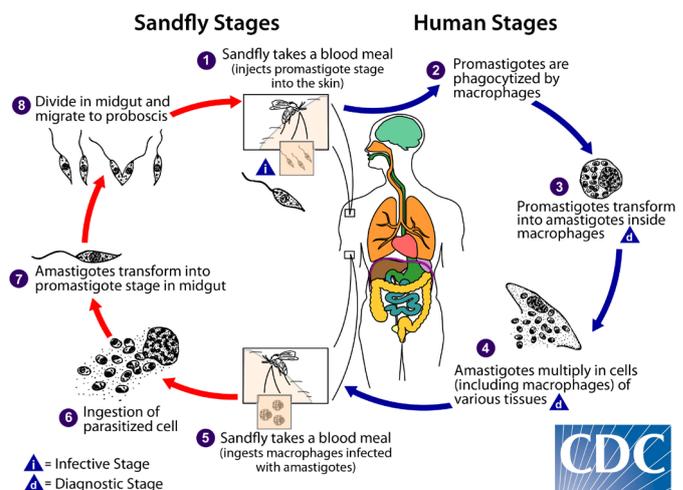


Figure 1. Lifecycle of Leishmania

Source: US Centers for Disease Control and Prevention/Alexander J. da Silva, PhD/Blaine Mathiso

A Need for Better Diagnostic Capacity

Although kala-azar has been endemic in northwestern Ethiopia for some time, laboratory diagnosis has not been available at the zonal hospitals that serve the majority of the population. At Shire hospital in the Tigray region, for example, which serves a population of over one million people (many of them referred from 12 health centers in the region), health care workers, relying on clinical symptoms alone, have had to refer patients to the distant Axum zonal hospital for laboratory tests.

Referrals to distant health care centers often create a gap in patient care and treatment: patients who are referred to a hospital many kilometers away may never actually go. Many find it difficult to travel the long distance; others are hindered by limited resources, childcare needs, and travel expenses. For this reason, stronger laboratory facilities capable of diagnosing patients “closer to home” are needed to bring better care to more Ethiopians.

* Shire hospital is also officially called Sehel hospital

Building Laboratory Capacity to Diagnose Kala-azar

Building the capacity of public laboratories to diagnose kala-azar in the northwestern Ethiopian regions, where the parasite is endemic, is critical.[†] Therefore, I-TECH has committed resources to establish testing in the zonal hospitals of the northwestern region. As a first step, I-TECH provided standard trainings on laboratory diagnosis of kala-azar to laboratory professionals practicing in northwestern Tigray (Shire, Humera, and Dansha), Adwa, Abi-Adi and Mekelle, and the northwestern Amhara hospitals and regional laboratories (Gondar, Debark, Metema, Felege Hiwot Hospital, and Bahir Dar Regional Health Research Laboratory).

Better Diagnostics, Better Care: Experience at Shire Hospital

I-TECH Ethiopia's work with Shire hospital provides a good example of the beneficial effect laboratory training can have on patient diagnosis and care. In March 2010, I-TECH provided training on laboratory diagnosis of kala-azar for 20 laboratory professionals from Tigray and Amhara regions, including laboratory professionals from Shire hospital.[‡] Participants were trained to use two accepted methods for diagnosing *visceral leishmaniasis*: the gold standard, visualization of amastigotes (a morphologic stage in the development of leishmania) on blood or aspirates from bone marrow, spleen, lymph nodes or skin lesions; and the rK39 (an antibody test). Before the trainings, Shire hospital had never practiced laboratory diagnosis of kala-azar; health care workers referred patients to other hospitals based on clinical symptoms alone.

Following the training, the test was established as a continued service at the hospital. As a result, in the next four months, laboratory diagnosis identified 97 patients as infected with *visceral leishmaniasis*.[§] All were linked to recommended treatments.

Table 1: Patients tested for kala-azar in Shire hospital before and after I-TECH trainings

	Type of test for kala-azar	
	rK39	Spleen aspirates
Patients tested for kala-azar before I-TECH training *	None	None
Patients tested positive for kala-azar after I-TECH training **	59	38

* I-TECH provided training on laboratory diagnosis of kala-azar for 20 laboratory professionals on 15 March 2010

** Data is from the four months following (March-June 2010)

† Since 1998, Doctors Without Borders (Medecins Sans Frontieres, or MSF) has been providing significant care and treatment of kala-azar to the population by establishing treatment centers in different regions of Ethiopia, including Konso, Mycadra, Abdurafi, Metema and Humera. Thousands of Ethiopians have been diagnosed and treated for kala-azar through MSF-run centers. In 2009, the organization transitioned the Humera kala-azar programme to the Ethiopian Ministry of Health. I-TECH work builds upon such efforts by supporting Ethiopia's public-sector laboratories to perform needed services.

‡ Patients with the clinical case definition for kala-azar (history of fever for >2 weeks with splenomegaly and/or lymphadenopathy, BT and PT elevated, hypermagglobulinemia, pancytopenia, white, red blood cells, platelets) were tested for detection of *visceral leishmaniasis* through serology (rK39 rapid diagnostic test) and parasitology including splenic aspirate.⁴

§ Identified using the rK39 and spleen aspirate testing techniques.

Conclusion

I-TECH's successful work to upgrade laboratory diagnosis of kala-azar at Shire hospital provides a direct example of how upgraded laboratories can have a positive impact on the health of the community, particularly in decentralized settings. In Ethiopia, where patients often must travel miles for a diagnosis and sometimes fall out of care, better testing can be lifesaving, particularly for people living with HIV.

For more information on I-TECH's laboratory diagnostic trainings on kala-azar, please contact Dr. Wubshet Mamo, Clinical Laboratory Director, I-TECH Ethiopia, at <wubshetm@itech-ethiopia.org>.

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About the I-TECH Ethiopia Laboratory Team

Strong laboratories contribute not only to improved care and treatment for people living with HIV and AIDS but to improved diagnosis, care, and treatment for all disease. I-TECH Ethiopia's laboratory support program is committed to partnering with government and local authorities to strengthen the national laboratory system. I-TECH works primarily in the Afar, Amhara, and Tigray regions to upgrade laboratory infrastructure and support quality service delivery. One of I-TECH's key strategies in this work is building and upgrading the skills of laboratory professionals. This includes providing them with the updated and standard clinical laboratory diagnosis techniques and methods they need to provide high quality diagnostic services.

References

1. Berman J. *Visceral leishmaniasis* in the New World & Africa. *Indian J Med Res.* 2006; 123:289-294.
2. Handman E. Leishmaniasis: current status of vaccine development. *Clin Microbiol Rev.* 2001; 14:229-243.
3. P. Ngure, A. Kimutai, W. Tonui & Z. Ng'ang'a : A Review of Leishmaniasis in Eastern Africa. *The Internet Journal of Parasitic Diseases.* 2009;4(1).
4. Chulay JD, Bryceson AD, 1983. Quantitation of amastigotes of *Leishmania donovani* in smears of splenic aspirates from patients with visceral leishmaniasis. *Am J Trop Med Hyg.* 32: 475-479.



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