**Cutaneous Leishmaniasis: The truth about the ‘flesh-eating disease’ in Syria**

Karina Mondragon-Shem1\* and Alvaro Acosta-Serrano1,2\*

1Department of Parasitology and 2Department of Vector Biology, Liverpool School of Tropical Medicine, England, UK.

**\*Correspondence:** Karina.MondragonShem@lstmed.ac.uk; alvaro.acosta-serrano@lstmed.ac.uk

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**Abstract**

Recent news headlines claimed that corpses thrown into Syrian streets are causing cutaneous leishmaniasis (CL) outbreaks. However, leishmaniasis is only transmitted by blood-feeding sandflies, not through human remains. High CL prevalence in Syria may instead be attributed to the absence of disease control programs due to disruption of health services.

Leishmaniasis is caused by parasites of the genus *Leishmania*, and not by bacteria or viruses. Infection and consequent disease can only be acquired through the bite of female sandflies infected with this parasite (Figure 1). Sandflies are small insects half the size of a mosquito but with a more painful bite; females require the blood of living animals to develop their eggs. They do not feed on human remains. Different sandfly species act as vectors for Old World CL, depending on whether transmission is anthroponotic (humans as reservoirs; caused by *L. tropica*) or zoonotic (other mammals as reservoirs; caused by *L. major*) (Figure 2).

During the biting process, parasites from infected female sandflies are injected into the skin where depending on the species of *Leishmania*, either a lesion starts to develop (cutaneous leishmaniasis), or the parasites invade organs such as the liver and spleen (visceral leishmaniasis). Since these obligate intracellular parasites require living hosts to multiply, the disease cannot be spread through corpses; as with many other pathogens, *Leishmania* would not survive long in the human body after death [1].

The cutaneous form of the disease (CL) causes over 1.5 million new cases every year – severely underestimated figures by some accounts [2]. It has remained on the neglected tropical diseases list for a long time, so unfortunately few people are aware of it. However, as the world news focuses on the Middle East in the midst of its devastating wars, civil unrest and the consequent refugee crisis [3,4], recent news headlines have claimed that corpses thrown into the streets of Syrian towns are causing CL outbreaks in the region. This is an example of ill- informed, sensationalised journalism, which is not only grossly distorted and inaccurate but could have been easily checked through reference to any search engine to ascertain the basic biology of a common tropical parasitic infection.

As a consequence of the ongoing tragedy, CL is a particularly severe problem in the Middle East, infecting and stigmatising hundreds of thousands of people [5, 6]. It is primarily noticed during severe outbreaks due to the large, unsightly lesions that typically develop on the face and limbs. Interestingly, CL lesions caused by *L. major* are usually self-healing, although there is a risk of severe scarring and disfigurement [7], especially with *L. tropica* infections. Once healed from CL, a person is usually protected from further lesions. Although treatment is available, resistance to current drugs has already been reported in some countries [8]. Furthermore, there is currently no acceptable vaccine to prevent CL. In some countries ‘leishmanization’ –the deliberate infection of children with parasites in areas of the body where lesions are less conspicuous, in order to avoid visible sequela [9]– is still practiced, although more studies are needed to determine its efficacy.

In CL, a slow incubation period of weeks to months gives rise to one or multiple painless (unless secondary infections occur) lesions that grow gradually [7]. It is due to these lesions that leishmaniasis is referred to as a ‘flesh-eating’disease. However, this term more commonly refers to a rare infection known as necrotizing fasciitis, in which certain pathogenic bacteria (e.g. *Staphylococcus aureus*), quickly spread throughout the body destroying soft tissues such as muscles, nerves and blood vessels [10]. Necrotizing fasciitis symptoms include extreme pain, ulcers, blisters and black spots on the skin, all of which are classic signs of necrosis.

Historically known as the ‘Aleppo Evil’ or the ‘Aleppo boil’, leishmaniasis has always maintained a high incidence in Syria, with an average of 23,000 cases in the years leading up to 2008 [5]. Syria’s national CL control programme consisted of a combination of passive and active case detection through primary health care centres and schools, with treatment provided at no cost; vector control relied on insecticide residual spraying twice a year [2]. However, in 2012 the government lost control of part of Aleppo, the largest city in Syria, leading to the interruption of CL control programmes [3,5]. The situation has since worsened in different parts of the country, and the government, NGOs or other institutions continue to face considerable difficulties in terms of access and security due to the ongoing conflict (<http://www.doctorswithoutborders.org/country-region/syria>). The high prevalence of cases is likely due to the interruption of disease control programmes. The Syrian Ministry of Health reported 53,000 cases in 2012, which rose to 41,000 cases for the first part of 2013 alone [5]; severe underreporting is common in these situations. Syria’s collapsed healthcare system is (understandably) struggling to cope with overwhelming case numbers, as priorities in these settings are greatly shifted, and resources focus on more immediate health concerns.

Another commonly cited fear from those unfamiliar with this disease is that migrants from leishmaniasis-endemic areas may import the disease into other countries. Importantly, CL transmission cannot occur without the sandfly vector. In many European countries sandflies are anticipated to be absent; however, some species such as *Ph. papatasi* (vector of *L. major*), *Ph. sergenti* and *Ph. similis* (vectors of *L. tropica*), are present in some parts of Southern Europe [11]. *Phlebotomus pernicious* (vector of *L. infantum*), a permissive vector that can allow the development of other *Leishmania* species [12], is also found in these regions. There is a risk associated with the migration of populations affected with leishmaniasis, particularly those with *L. tropica* (anthroponosis). Up to 2012 [2] most European countries did not have leishmaniasis or sandfly control programmes in place. Open-access and real-time sharing of leishmaniasis data from both the Middle East and Europe will serve to demystify any effects of migration on disease incidence, and help joint efforts of active case detection and vector surveillance, essential for continued leishmaniasis control.

Increased global awareness of a neglected disease such as CL is welcome. However, media coverage that severely distorts the facts surrounding disease risk and transmission only serves to confuse and further stigmatise those remaining in disease-endemic areas. Misreporting distracts from any real health implications of openly decomposing bodies, which are also commonly exaggerated by the media. Any temporary risks are restricted mainly to those handling the bodies, and depend on previous infections (e.g. tuberculosis, gastrointestinal infections, etc.) the victims may have had [1]. Perhaps equally worrying is how often the *flesh-eating* story has been shared in social media without the accuracy of the news content having been confirmed. The importance of responsible online media cannot be overstated: “*the World Wide Web is a fruitful environment for the massive diffusion of unverified rumours*” [13].

We (as scientists and science communicators) have a responsibility to advise the public on the evidence that supports these news stories. This also includes encouraging the general public to verify the facts themselves before believing what has been reported.

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**Figure legends**

**Figure 1. *Leishmania* transmission by a female sandfly.** Amastigotes are ingested when the sandfly feeds from an infected host (1), and then taken into the midgut with the bloodmeal (2). There, they transform into the next life stages [12], divide and escape from the peritrophic matrix (discontinuous line), a non-cellular tissue that compartmentalizes the bloodmeal (3). Metacyclic promastigotes (infectious stage) (4), together with released parasite virulence factors and sandfly saliva, are transmitted to a susceptible host when the sandfly feeds again (5).

Background image: *Phlebotomus papatasi* female sandfly taking a bloodmeal. Taken from CDC/ Frank Collins. Centers for Disease Control and Prevention's Public Health Image Library.

**Figure 2. Illustration of Old World Cutaneous Leishmaniasis Transmission Cycles.** In the anthroponotic cycle, *Phlebotomus sergenti* is the main sandfly species able to transmit *Leishmania tropica* (green), with humans acting as reservoirs for the parasite. In the zoonotic cycle, the sandfly *Phlebotomus papatasi* transmits *L. major* (yellow) and other mammals act as reservoirs, including some species of rodents. *Leishmania* parasites are shown in both stages: amastigote (rounded, mammalian form) and metacyclic promastigote (flagellated, infectious bite form).