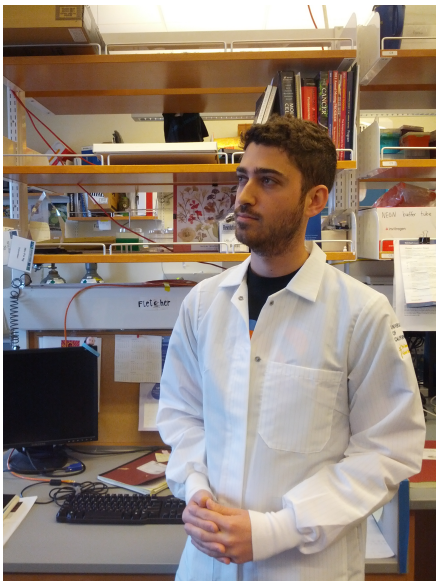
2014 Kathleen L. Miller Fellow



Matthew Bakalar, UC Berkeley PhD Candidate in Bioengineering, Fletcher Lab

Matthew Bakalar is a graduate student in Dr. Daniel Fletcher's lab, where he is studying the physical principles that guide protein organization at the membrane-membrane interface. In addition, he is developing an automated cell-phone based video microscope for quantifying Loa loa microfilariae in whole blood at the point-of-care. Matthew received his bachelor of science degree in computer engineering and bachelor of arts degree in philosophy from the University of Maryland.

Fellowship Proposal

Diseases caused by the parasitic helminths *Loa loa* and *Onchocerca volvulus* are responsible for public health and socio-economic problems in Central and West Africa. *Loa loa*, the causative agent of loasis ("African eye worm") is endemic in Cameroon, Gabon, Republic of Congo and Democratic Republic of Congo. Although symptoms of loiasis are often subclinical or relatively muted, loasis has also been associated with renal, cardiac, and neurologic syndromes. Onchocerciasis, caused by *Onchocerca volvulus*, can result in blindness and a disfiguring skin disease.

Since the mid-1990s, it has been recognized that ivermectin (IVM), the drug used as the mainstay of onchocerciasis control in Africa, can induce serious adverse events (SAEs) in individuals with high circulating levels of Loa microfilariae (mf). When levels exceed 30,000 mf per mL of blood, a potentially fatal encephalopathy can occur 2-3 days after IVM administration. Loa-associated SAEs have led to the suspension of mass drug administration (MDA) programs for onchocerciasis in areas highly endemic for coincident *Loa loa* infection, representing a major setback for onchocerciasis elimination campaigns.

A potential solution to prevent Loa-associated SAEs is to identify those Loa infected individuals at highest risk SAEs (>30,000 mf/mL) prior to treatment and to exclude them from IVM-based MDA programs. This strategy, termed "Test and (Not) Treat" (TNT), requires a quantitative test for *Loa loa* microfilariae that is rapid, inexpensive, and can be performed accurately at the community level in Africa.

Matthew and his colleagues in the Fletch Lab have developed a method to diagnose *Loa loa* at the point of care using a mobile phone. With the support of the Miller fellowship, Matthew will develop software to manage data collected using the mobile phone diagnostic and travel to Yaounde, Cameroon to conduct a field test of the new device.