Many countries around the world are wounded with conflict, poverty, and political corruption, pushing disease prevention aside for more critical and pressing issues. *Leishmania* is one of many endemic diseases that are handled with animosity and complacency, yet little is being done to further treatment and prevention options.

*Leishmania*, transmitted by sandflies, manifests itself in various ways in the human body from mucosal and skin lesions to internal organ failure, depending on the species of the disease. Africa, southern Europe, southern Mexico, South America, and Asia are all faced with the devastating toll of this persistent and resilient parasite. Dr. Kai Zhang, Associate Professor of Biological Sciences, focuses his research on preventing and treating *Leishmania* using genetic manipulation of the lipid metabolism.

Cutaneous leishmaniasis, commonly referred to as CL, infects an estimated 1.3 million people worldwide annually in over 80 countries and is the most common form of the disease. Skin lesions from CL are not contagious but CL can recur at the site of previously healed lesions. Dr. Zhang studies the growth rate of skin lesions stating, “the faster the lesion grows, the more virulent the infection.” By growing *Leishmania* parasites in cultures, Dr. Zhang uses genetic manipulation of the lipid metabolism to look “for genes, proteins, and factors from the animal host and can follow up with new treatments, vaccines, and drugs for
Leishmania. Genetic manipulation can include disruption of virulence by using gene deletion mutants in some strains of Leishmania. The parasite uses lipids to perform essential life functions in order to survive within its host. Dr. Zhang, with the help of laboratory rodents, seeks to understand how modifying the genetic framework can affect the survival and virulence of Leishmania. The knowledge can then be used to develop new and better therapy options.

Treatment for Leishmania is caustic and there is currently no reliable vaccine to prevent the rapid spread of this disease in humans. By using a carefully selected strain of mice, Dr. Zhang is able to search for new approaches to “enhance the efficacy of certain lipid inhibitors.” For example, heat treatment is suggested to accelerate the healing process of skin lesions by reducing medication resistance and disrupting the parasite life cycle. Local heat treatment processes may also reduce the amount of toxicity in the body caused by high doses of medication.

Live vaccines, the most common form of vaccine for Leishmania, has been removed from general use due to the overwhelming side effects of immune-suppression and, in some cases, non-healing skin lesions. Additionally, Leishmania is becoming more drug resistant and other treatment and preventative measures must be taken into consideration such as genetic manipulation of the lipid metabolism to reduce the virulence of Leishmania. On March 19, 2014 the FDA approved Miltefosine for cutaneous and mucosal infections of Leishmania. Miltefosine is currently the only oral treatment for Leishmania, but is not yet available as a global scale elimination program option. Medication and the use of live vaccines are no longer as effective due to adaptation and viability of the parasite within the host.

Leishmania is a globally wide spread disease that crosses international borders and currently does not have an effective means of treatment or prevention. Only with the further help of carefully directed research, such as Dr. Zhang’s, will a possible solution be reached to contain, disrupt, and overcome this parasite.