Tracking the Maturation of *Plasmodium yoelii* Sporozoites for Infectivity and Longevity

John McPherson, Jeralee Yang, Dr. Anna Groat-Carmona

Malaria is caused by *Plasmodium spp.* parasites and the disease has killed roughly half of all humans that have ever lived. A crucial part of the parasitic life cycle is when sporozoites mature within the midgut of infected *Anopheles* mosquitoes before traveling to the salivary glands so that they can be transferred to a mammalian host. Sporozoites become highly infectious after entering the salivary glands but it is unclear whether the trigger for sporozoites to develop infectious attributes is age-dependent or tissue-specific. Our hypothesis was that sporozoites held from advancing to the salivary glands will express infectious genes, partly linking infectious gene expression to time-dependent factors. The protein egress cysteine protease 1 (ECP-1) allows parasites to break out of oocysts so that they can travel from the midgut to the salivary glands. Knocking-out ECP-1 traps the sporozoites in the midgut, preventing the travel to the salivary glands. Sporozoites typically break out of the oocyst 14 days post infection. We analyzed sporozoites in the midguts and salivary glands of both ECP-1 knockouts and wild-type sporozoites over time periods of 8, 11, 14, 18, 24, 30, 40, 50 days post infectious blood meal. Using the ECP-1 knockout, we will be able to artificially-age the sporozoites within oocysts to determine if the protein expression profile of infectious salivary gland-derived sporozoites determined in a time-dependent manner or if it is environmentally linked to invading the salivary glands. We examined the expression profiles for the wild type and ECP-1 KO sporozoites, hoping to see that UIS genes are upregulated in oocyst sporozoites in the ECP-1 KO because this would indicate the same expression profile as sporozoites that progressed to the salivary glands. This research provides valuable insight into the mechanisms of sporozoite infectivity which will provide information for the development of future creation of sporozoite-centered vaccinations.