

EMBO Workshop

Molecular and Population Biology of Mosquitoes and Other Disease Vectors

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My laboratory conducts basic and applied research on mosquitoes and mosquito-borne diseases. Our research includes 1) Understanding RNAi-based innate immunity in mosquitoes against arboviruses. 2) Developing mosquito-cidal vaccines and drugs to prevent disease transmission. 3) Exploring the etiology of ONNV transmission by *Anopheles* mosquitoes. 4) Exploring the interactions of trypanosomes and arboviruses in vector mosquitoes.

Abstract

Killing the Messenger:

Generating Mosquitocidal Immunity to Prevent Disease Transmission.

Malaria transmission in sub-Saharan Africa and dengue transmission around the world is driven by the enormous vectorial capacities of their mosquito vectors, *Anopheles gambiae s.l.* and *Aedes aegypti* respectively. I will show how various models demonstrate that mosquito-cidal immunity could seriously curb disease transmission with only modest levels of effective vaccine coverage. My lab is working on the discovery and development of antigens from these mosquitoes so that they can be targeted immunologically to kill feeding mosquitoes. We are employing a two-pronged approach to identify these antigens. First we are employing the data from the genome projects of these two mosquitoes to selectively target, clone, and immunize certain mosquito cDNAs using DNA vaccine technology. Ultimately, we are quantifying survival of mosquitoes following bloodmeals on immunized mice. Further biochemical, immunological and microscopic characterizations are

also performed to characterize mosquito pathology and mouse immune responses. Secondly, we are targeting some of these same clones for silencing using RNAi to understand their function and importance in mosquito physiology. We have refined our methods so that we can begin immunizing mice within 3 weeks of selecting a target gene, and so that we can easily replicate our results. We have already discovered 4 mosquitocidal-immune generating antigens in both *An. gambiae* and *Ae. aegypti* after screening only 15 individual genes. Our data shows promise for the identification of many mosquitocidal immunity-generating antigens that could be incorporated into developing anti-malaria/dengue vaccines or that could be targeted by next generation insecticides.