WRAIR’s team of entomologists support Force Readiness and global health by developing and testing products to reduce the risk of vector-borne diseases.

To accomplish this, they conduct basic and applied research on the interactions between insect vectors and parasites by rearing and supplying insects for the Institute. The research, products and knowledge generated by the team directly protect U.S. Service Members through the development of new vaccines, drugs and pest management products.

**Resources and Capabilities**

- Produce up to 10,000 mosquitoes weekly in support of clinical and preclinical malaria research
- Lead on-site controlled human malaria infection models and consult for off-site trials
- First and only in the world to work on in-vitro sporozoite production that bypasses the mosquito in favor of sporozoite production in a flask

**WRAIR’s Insectary**

WRAIR’s Insectary plays a critical role in WRAIR’s ability to respond to infectious diseases impacting Force Readiness. Most recently, the WRAIR Insectary was instrumental in the response to the global Zika epidemic.

- Maintain and breed *Anopheles* and *Aedes* species
- Examine transmission dynamics at the mosquito bite site that can influence infection outcome
- Support development of animal models and vaccine development
- Ramp up product development efforts that enhance bite protection to protect against all vector-borne pathogens

WRAIR hosts and maintains the largest sand fly repository in the world with about 15 colonies, available to researchers through NIH-funded repository.

**Informing Countermeasure Development**

WRAIR’s Insectary is critical to WRAIR’s ability to respond to infectious diseases. Most recently, the WRAIR Insectary was instrumental in the response to the global Zika epidemic.
Malaria Challenge Model

WRAIR's Insectary notably developed the world's first controlled human malaria infection (CHMI) model in 1985. Referred to as the malaria challenge model, CHMI supports new vaccine and drug candidate evaluations during early stages of development through small, well controlled clinical trials in humans. The model proved remarkably safe and effective and provided a major turning point in malaria research. WRAIR performed 105 challenges over the past 30 years.

Preparing infected Anopheles mosquitoes for a challenge is a task that forces a complex and tenuous biological interaction into a manufacturing style operation system of precision and predictability. Volunteers receive five infectious bites by malaria-infected mosquitoes. The challenge process continues with scientists immediately dissecting the mosquitoes, determining if they fed and infectivity, confirmed by blood in the midgut, and presence of sufficient amount of sporozoites in their salivary glands. Clinicians begin evaluating volunteers one week after the challenge, checking their blood twice daily for malaria infection or possible protection from the parasite.

Future Challenges, Interventions, and Infection Models

The CHMI model is exceptionally standardized and reliable. WRAIR’s CHMI model supported 2,200 volunteer mosquito exposures in 76 challenges conducted in the WRAIR Insectary and 29 off-site challenges, both domestically and overseas.

The next generation of planned WRAIR challenges involves the following variations:

- Parasite strains originating from new geographical areas
- Different species challenges
- Transmission blocking interventions
- Dengue human infection model

For more information, including how to partner with WRAIR, call 301-319-9471 or email debra.l.yourick.civ@mail.mil

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