

Methods and compositions for the identification of insect repellent compounds

Value Proposition

Insect vector-borne infectious diseases are a major public health threat to both developing and industrialized nations. Though many insects may transmit disease, mosquitoes of the *Aedes* and *Anopheles* genus are particularly known for their transmission of many infectious agents. These include *Plasmodium* sp., the causative agents of malaria, as well as numerous viruses including West Nile Virus, Zika Virus, and the causative agents of yellow fever and dengue fever. Most of these infectious agents do not have effective vaccines or treatments, therefore prevention is focused on reducing the exposure of people to the mosquitoes which carry such microorganisms. One of the most effective methods of reducing exposure involves using chemical insect repellants, such as DEET, which trigger sensory pathways in insects which cause them to avoid objects or people coated in said repellant. However, due to health concerns, DEET is often passed over by consumers in favor of less-effective alternatives. This technology provides a novel platform for the development of new insect repellant chemicals by enabling the direct assessment of receptor-stimulatory activity in insect cells, thereby allowing the development of more effective and safe alternatives to current insect repellants.

Technology

The inventors of this technology have identified a member of the Transient Receptor Potential Channel (TRP) superfamily of proteins which is responsible for the insect repellant activity of DEET in *Drosophila* flies. When this receptor is genetically ablated, flies become insensitive to DEET activity. Importantly, homologous forms of this receptor have been identified in *Aedes* and *Anopheles* mosquitoes. This technology enables exogenous expression of mosquito (or other insect) TRP-family proteins in cell lines and subsequent detection of TRP-dependent signaling induced by candidate compounds, which is indicative of putative insect repellant activity.

Other applications

This technology may also be useful for screening compounds with repellant activity against arachnids, or against other insects relevant to agricultural interests, rather than public health. Additionally, by comparing repellant activity against homologous receptors from two species, this technology may be used to develop species-selective insect repellants.

Advantages

- Current alternatives to DEET insect repellants are considerably less effective, however, consumer health concerns often lead to the purchase of these alternatives.
- This technology enables the identification of novel alternatives through screening using an insect receptor directly responsible for DEET sensitivity.

 Duke File (IDF) #

T-002914

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