

James & Esther King Biomedical Research Program

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*Chemistry
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*2010 Program
New Investigator Research
(3-year project)*

Project Title: Alpha-Conotoxins as Subtype-specific Nicotinic Acetylcholine Receptor Antagonists for Studying Tobacco Addiction

Project Summary: Tobacco addiction and nicotine dependence are major health issues that can lead to many associated illnesses. While there are several options available to treat tobacco addiction, a more thorough understanding of the mechanisms of nicotine dependence in the brain is required to develop more effective, safer smoking cessation treatments with fewer side effects. Nicotine acts on the nervous system by activating nicotinic acetylcholine receptors, which leads to a release of dopamine that causes the pleasurable effects of smoking. There are many different types of nicotinic acetylcholine receptors, and each one plays a different role in nicotine addiction. As such, blocking certain types of these receptors may help reduce cravings in smokers. However, a major problem for researchers lies in identifying the specific role for each type of nicotinic acetylcholine receptor in the nervous system. Toxins that originate from venomous marine cone snails may hold the key for discovering new research tools to better understand tobacco addiction. One class of cone snail toxins, the α -conotoxins, can distinguish between different types of nicotinic acetylcholine receptors. Our goal is to use α -conotoxins to develop potent compounds that block specific types of nicotinic acetylcholine receptors involved in tobacco addiction. An important outcome will be the development of new research tools and drug leads for treating nicotine dependence.