

NANOCARRIERS FOR TRANSCUTANEOUS VACCINE DELIVERY

Mentor: Vijay John

Chemical and Biomolecular Engineering Department

Tulane University

329 Lindy Boggs Center

New Orleans, LA 70118

(504) 865-5883

E-mail: vijay.john@tulane.edu

The project is a collaboration between researchers in Chemical and Biomolecular Engineering and researchers at the Department of Microbiology and Immunology. The objective of the research is to find ways to deliver vaccines through the skin. Traditionally, vaccines are injected into the musculature. While effective, the procedure needs to be done in a health care facility. In an emergency such as a bioterrorism threat, if there is a large population that needs to be vaccinated quickly, needle vaccination through a health care facility becomes virtually impossible. But far more important is the fact that in less developed countries, needle vaccinations for routine childhood diseases is not always feasible because of non-hygienic conditions. Hundreds of thousands of a children die because of the lack of proper vaccines and vaccine delivery.

Our vision is to design a crème like vaccine delivery system that can be stored in something as simple as a toothpaste tube. When needed, the vaccine formulation can be simply rubbed on to the skin over a little patch. But this is a grand challenge problem. Vaccine antigens are proteins and, in contrast to smaller molecules (like nicotine for the nicotine patch), it is difficult to get vaccine antigens to penetrate through the skin. So we are working on new methods using nanotechnology to camouflage the vaccine antigen and get it to penetrate the skin.

The student will get a superb research experience in nanotechnology for vaccine delivery. There will be training in sophisticated instrumental methods such as cryo electron microscopy and confocal microscopy.