

## Nanoparticles as oral vaccine delivery systems

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We, at the Nanotechnology Laboratory at Mercer University, Atlanta, have developed a platform technology using nanoparticles and microparticles to deliver vaccines by the oral route of administration. This formulation technology enables us to prepare the vaccine particles containing vaccine antigens, without loss of their biological activity during the formulation process. We can also encapsulate multiple antigens, targeting ligands and adjuvants within in the same particle. Using our novel method, the vaccine prepared exists in a dry and stable form. When administered orally, these particles are designed to withstand the acidic environment of the stomach and are targeted to the Peyer's patches and the gut associated mucosal immune system. Since these vaccines are particulate in nature, they are readily taken up by phagocytic antigen presenting cells (APC's), such as M cells, dendritic cells and macrophages in the Peyer's patches of the intestines, resulting in a strong immune response and antibody production. Of particular interest in this formulation is the fact that the particles release the antigen in a slow and sustained manner over a prolonged time period, intracellularly into APC's, resulting in strong mucosal and systemic immunity after oral administration, without the need for added adjuvants that are typically present in current vaccine preparations. Since no needles are required, for oral vaccines, this method of vaccine delivery is inexpensive and suitable for mass vaccination in the developing world as well as for the developed world. Preliminary studies conducted in our laboratory with infectious disease vaccines such as TB, typhoid, influenza, pneumonia, meningitis and hepatitis B vaccine antigens suggest that this delivery system is highly suitable for antigens to be used for protective immunity. This method of vaccine delivery enables us to address a wide spectrum of vaccines for prophylactic and therapeutic use. Recently, we have been evaluating oral vaccines for cancer such as HPV, melanoma, ovarian, breast and prostate with encouraging results.

### Biography

Dr. D'Souza's is a Professor in the department of Pharmaceutical sciences at Mercer University in Atlanta. He is the Director of the Vaccine nanotechnology laboratory and Director of the Graduate Programs. He is also the Co-Director for the Center from drug Delivery Research. He has published over 70 peer reviewed publications. His research is supported by several organizations such as the NIH, Georgia Cancer Coalition, Georgia Research Alliance and the Dialysis Clinic Inc. He has graduated over 60 Ph.D. students and is a journal reviewer for over 10 peer reviewed journals

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