

SEMINAR ANNOUNCEMENT

Designing of a Nanoparticulate Cancer Vaccine Formulation for Delivery to Dendritic Cells

Areas of research interest

Drug delivery for proteins, peptides and oligonucleotides; Formulation design, development and preclinical evaluation for biotechnology products such as vaccine antigens and adjuvants; Drug targeting for mucosal delivery; Protein stability; Vaccine delivery to dendritic cells for immunotherapy of cancer and chronic viral diseases

Research Publications

Original peer-reviewed research articles in international journals – 13; Review articles in international journals – 1; Invited book chapters – 4; Presentations at conferences/symposia – 25; Invited lectures – 4

Affiliated to several professional bodies

by

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on

Date: Friday, 2nd July 2004
Time: 1100 – 1200 hrs
Venue: Pharmacy Tutorial Room (S4-05-16)

Synopsis:

The central role of dendritic cells (DCs) in initiating and controlling immune responses is now well recognized. DCs serve as the 'sentries' of the body. They recognize the invading pathogens and initiate immune responses against them. DCs distinguish between 'non-self' and 'self' by recognition of pathogen-associated molecular patterns (PAMPs) on microbes through Toll-like receptors. DCs are also involved in the maintenance of immune-tolerance against 'self-antigens'. The microenvironment of antigen delivery to DCs and antigen presentation to T cells significantly influences the nature and magnitude of immune responses. Biodegradable delivery systems incorporating PAMPs may be used to deliver vaccines to DCs in an 'immunostimulatory microenvironment'. We are investigating poly(D,L-lactic-co-glycolic acid) (PLGA) nanoparticles as delivery system for targeting therapeutic vaccines to DCs. We have shown that PLGA nanoparticles are efficiently internalized by mouse and human DCs. Uptake of PLGA nanoparticles by DCs induces upregulation of MHC class II molecules, costimulatory molecules and maturation markers on DCs. PLGA nanoparticles incorporating PAMP analogs such as monophosphoryl lipid A or CpG oligonucleotides provide an efficient method for delivery of antigens to DCs and induction of primary antigen-specific T cell responses *ex vivo* and *in vivo*. This has been demonstrated for model antigens as well as cell lysate and peptide based candidate cancer vaccines. Tumor challenge studies in immunized mice showed the rejection of a MUC1⁺ cancer in both wild type and transgenic mice model. These studies have important implications for the anti-cancer, anti-viral therapies requiring antigen delivery to DCs.

ALL ARE WELCOME