NM STATE UNIVERSITY

RISE Biomedical & Biobehavioral Research Colloquia

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Friday, June 17, 2011

2:00 pm – Chemistry Bldg. 153

(auditorium located in newer Chem. & BioChem. building)

"Plant-derived Vaccines: Progress and Potential for Future Development"

Plants can be used as recombinant protein expression systems by delivery of exogenous DNA that contains a protein coding sequence linked to transcription control elements (promoter, terminator). It is now 20 years since the first demonstration of plant-based expression of a vaccine antigen, hepatitis B surface antigen (HBsAg). The original idea was to express a vaccine antigen in an edible plant tissue, and deliver the vaccine by ingestion so that immunization would occur via the gut-associated lymphoid tissue. We showed that mice and humans could become "immunized" by eating transgenic potato tuber that expressed different antigens, as indicated by increases in the specific levels of serum antibodies directed to the target antigen. However, we now understand that this approach is very difficult, due to relatively low antigen production in stable transgenic plants, the instability of most proteins in the gut, and regulatory issues concerning the use of edible plants for vaccine production. Thus, studies during the past several years have focused on "transient" expression in tobacco using plant viral vectors to drive very high expression levels. Thus, the proteins can be readily extracted and purified, and then formulated for delivery by injection. Furthermore, we are studying the potential to deliver purified proteins by nasal spray, in order to generate better immune responses in mucosal membranes. Plant based-expression using transient delivery of viral vectors thus has a strong potential for commercial development of new vaccines.

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