Therapeutic vaccines for treatment of allergic and autoimmune diseases

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Inflammatory diseases such as asthma and inflammatory bowel disease are mediated by excessive immune responses. Currently used monoclonal antibody (mAb) therapy can reduce symptoms but it has disadvantages of short half-lives and adverse reactions of developing antibodies to the infused mAb. To overcome them, therapeutic vaccines are being developed. We have developed IgE or cytokine-peptide based and virus-like particle vaccines that induce long lasting antibodies to block IgE or the target cytokine without use of an adjuvant. To break self-tolerance, truncated hepatitis B core antigen (HBcAg) is used as a carrier protein. The vaccine is made by inserting a small peptide derived from receptor binding sites of the target molecule into the immunodominant epitope of HBcAg via gene recombination methods. Recombinant vaccines are expressed, purified and in vitro identified. Then, in vivo evaluation of the vaccine is performed in mice with acute and or chronic airway or intestinal inflammation. The vaccine is administrated before or after the disease has been established. Immunization with an IgE vaccine prevents subsequent increase of IgE and down-regulates elevated IgE in sensitized rodents. Vaccines against IL-13 or IL-4 effectively meliorate and or reverse airway inflammation and remodeling in asthmatic mice, while vaccines against IL-12/IL-23p40, IL-17 or TGFβ1 significantly meliorate and or reverse intestinal inflammation and fibrosis in colitis mice. Safety examination indicates that immunizations with the vaccine to IL-12/IL-23p40 do not increase the susceptibility to the lung infection of Chlamydia muridarum in mice. We conclude that IgE/cytokine vaccines may provide a potential therapeutic strategy for the long term treatment of allergic and autoimmune diseases.

Biography
Zhikang Peng is currently a Professor in the Department of Pediatrics and Child Health and the Department of Immunology, University of Manitoba. She has received her MD in 1968 and MSc in 1982 from Fudan University Medical School (formerly named Shanghai First Medical University). From 1986 to 1991 she was trained as a Postdoctoral fellow at Johns Hopkins University and the University of Manitoba. In 1992, she became a Faculty Member. Her research interests include therapeutic vaccines for treatment of allergic and auto immune diseases and mosquito allergy. She has published more than 80 papers in peer reviewed journals.

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