

Bacteriology and Infectious Diseases

May 25-26, 2017 Chicago, USA

Enhanced delivery of *Mycobacterium tuberculosis* lipids using chitosan nanoparticles induce potent cytokine and antibody response through activation of $\gamma\delta$ T-cells in mice

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Activation of cell mediated and humoral immune responses to *Mycobacterium tuberculosis* (Mtb) are critical for protection. Herein, we show that mice immunized with Mtb lipid bound chitosan nanoparticles (NPs) induce secretion of prominent Th1 and Th2 cytokines in lymph node and spleen cells, and also induced significantly higher levels of IgG, IgG1, IgG2 and IgM in comparison to control mice. Furthermore, significantly enhanced $\gamma\delta$ -T cell activation was observed in lymph node cells isolated from mice immunized with Mtb lipid coated chitosan-NPs as compared to mice immunized with chitosan-NPs alone or Mtb lipid liposomes. In comparison to CD8⁺ cells, significantly higher CD4⁺ cells were present in both the lymph node and spleen cells isolated from mice immunized with Mtb lipid coated chitosan NP. In conclusion, this study represents a promising new strategy for efficient delivery of Mtb lipids using chitosan NPs to trigger enhanced cell mediated and antibody response against Mtb lipids. Also, this delivery system can be promising vaccine candidate against TB.

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