Utilization of manganese magnetic nanoparticles as vaccine adjuvant

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Recent investigations showed that metallic nanoparticles (NPs) can induce immunological responses, such as antibody and cytokine secretion. However, its role as vaccine or immunotherapy component against microbes was not addressed. The objective of this work was to build a new nanoparticulate vaccine using a recombinant fusion protein; CMX (comprising *Mtb* antigens) with manganese ferrite NPs and evaluate its immunogenicity as well as therapeutic agent against tuberculosis. The NPs were synthesized by coprecipitation of $FeCl_3$ and $MnCl_2$ and passivated with sodium citrate. For CMX coating, NPs were incubated under homogenization (500 rpm) at room temperature for 1 hour and separated magnetically for 24 hours. The NPs size were evaluated by hydrodynamic diameter, and shown spherical NPs with approximated 39 ηm before and 120ηm after CMX coating. The coating was confirmed using Dot blot assay. For immunogenicity experiments mice were immunized through intranasal routes three times (50µg NPs + 20 µg CMX), with an interval of 21 days between immunizations. Lungs and spleen were collected for immune response evaluation by flow cytometry and serum samples were collected to evaluate humoral immune response. The system was not capable to induce specific Th1 or Th17 cells as well as no IgG1 and IgG2a response, but induce strong CD8+IFN-γ+. For immunotherapy experiments, BALB/c was infected with 10^4 CFU *Mtb* (H37Rv) and 21 days after the challenge, mice was treated with 50µg NP + 20 µg CMX or only NP (50µg). Mice were euthanized to evaluated the immune response, the bacillary load and the pathological changes in the lungs and the treatment was capable to reduce the inflammation in the lungs as well as reduce the Th1 and Tc1 response but was not correlated with bacillary load changes. In conclusion, NP had adjuvanticity effect for CD8 response and immunomodulatory effect in *Mtb* infection.

Palavras-chave: Vaccine, nanoparticle, tuberculosis

Apoio: CAPES, FAPEG, CNPq