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Functionalized nanoparticles and their effect on immune response to co-delivered antigen

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Supervision sheet

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Title*: "Functionalized nanoparticles and their effect on immune response to co-delivered antigen"*

ABSTRACT

The current study investigated the immunological properties of functionalized nanoparticle as antigen carrier and immune stimulant. Formulated nano-vaccine was positioned to build a protection against chronic respiratory disease (CRD) caused by *Mycoplasma gallisepticum* (MG) which is frequently complicated by avian pathogenic *E. coli* (APEC) causing complicated chronic respiratory disease (CCRD). Field strains of MG and APEC were isolated and the latter was the source of outer membrane vesicles (OMVs). Poly (D,L lactide-*co*-glycolic acid) (PLGA) co-polymer was used as nano-capsule in this study. The first and second components of nano-vaccine were MG protein and DNA, they were both entrapped in PLGA nanocapsule through double emulsion process. The third component was OMVs of APEC. 270 SPF experimental chickens were divided into 6 tested groups and 6 control groups. Three groups were administered the nanovaccine subcutaneously (SC) and compared with killed commercial MG vaccine while other three groups were administered via intraocular route (IO) and compared with F strain. Evaluation of immunizing potency of nano-vaccine was measured by monitoring IgG status of MG with ELISA and estimating protection efficacy from CRD and CCRD after challenge test. It was shown that administration of un-capsulated MG protein failed to stimulate immune response while PLGA capsulated did so, thus it could be inferred that PLGA capsule performed adjuvanting effect. SC administration of booster dose from PLGA- MG proteins achieved (80%) protection from CRD and (70%) without booster. IO administration of PLGA-MG proteins achieved (70 %) protection from CRD. The maximum protection from CRD (90%) was attained in case of SC injection of PLGA -MG protein plus PLGA-DNA. OMVs reduced the incidence of CCRD to (0%) through SC injection provided that the booster dose had been administered.

Dedicated to:

My father

My mother

My wife

My daughter

And

Dr. Hamed El-Banna

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