Spray dried cubosomes with ovalbumin and Quil-A as a nanoparticulate dry powder vaccine formulation - DTU Orbit (07/10/2019)

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Subunit vaccine formulations are often produced as liquid dispersions through complicated processes. It is desirable, however, to have simple, cheap and up-scalable methods to produce nanoparticulate subunit vaccines in powder form. Here, a simple single-step spray drying process for production of powder cubosome precursors with the model antigen ovalbumin (OVA) and the adjuvant Quil-A is presented. The cubosomes were characterized in vitro and evaluated in vivo by subcutaneous and oral administration for their potential as a vaccine formulation. Hydrated cubosomes had average particle size of 257±8nm and zeta potential of −18.0±0.6mV. The powder contained 10.6±0.7% w/w OVA prior to hydration, of which 65±1% was released within the first 20min in 9.5mM PBS at pH 7.3, with the remaining OVA gradually released over the following 24h. Immunization with cubosomes resulted in significantly stronger antigen-specific serum IgG responses (p<0.01), CD8+ T cell expansion (p<0.0001) and target T cell killing compared to controls when given s.c., and was ineffective orally. This study shows that spray drying is a suitable method for producing nanoparticulate vaccine formulations in dry powder form.

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