The impact of size, shape, rugosity and pro-inflammatory activity on the interaction of nanoparticles with antigen presenting cells

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The presented studies address how core physicochemical properties of size, charge and shape alter the interaction of nanoparticles with diverse elements of the immune system, and particularly the variety of subsets of antigen presenting cells (APC), which then progress to activate inflammatory or adaptive immune processes, or conversely, suppress the immune system. Our studies show it is possible to map such nanoparticle properties and use them to rationally design highly potent synthetic vaccine adjuvants, vaccines and anti-inflammatory therapeutics with utility in cancer, malaria and RSV, as well as in the setting of the lung, as preventives against asthma and inflammatory lung disease. A variety of antigens including peptides, proteins, lysates, haptens and DNA can be engineered in such vaccine formulations. In recent studies, we show selected nanoparticle based vaccines do not promote the expansion of inflammation reactive Treg, which occurs using adjuvants such as Poly:IC and Montanide, and how this property may underlie the long lasting nature of nanoparticle vaccine induced responses. Moreover, herein we will describe unpublished data on how surface texturing of adjuvant nanoparticles can be used to dramatically enhance their ability to promote the induction of cytokine producing T cells.

References


