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## The effect of nano-particle size and chemistry on human dendritic cells

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Dendritic cells (DCs) are professional antigen presenting cells that play a key role in initiating immune responses and maintaining tolerance in response to different stimuli and under steady-state conditions. Given the crucial role of DCs in orchestrating immune responses, better understanding of mechanisms and conditions that control DCs function could provide opportunities for developing new treatment for infectious and autoimmune diseases. There is a growing interest in the use of nanoparticles (NPs) in drug delivery, vaccination and imaging; however, the impact of NPs on the immune system particularly the function and phenotype of DCs has remained elusive. The possibility to control size, shape, and other properties of NPs provides the opportunity to achieve immune modulation for immunotherapeutic applications through stimulation or suppression of immune responses. Herein, we hypothesized that NPs with the same size but different chemistries will differentially influence DC phenotype and function. To examine this, NPs with the similar size but different chemistries i.e. PLGA, Silica and polystyrene (PS) were fabricated or commercially sourced. DCs were then exposed to defined concentrations of NPs to study the effect of different NPs on DC phenotype, cytokine profile and endocytic ability. The data show that while spherical Silica and PLGA NPs in 100 nm and 160 nm size range respectively do not change any aspects of DC function, PS NPs of similar size significantly suppress the expression of mannose receptor (MR or CD206) on DCs by around 90% without affecting their viability, maturation status or cytokine profile. Not surprisingly the reduction in MR expression in these cells was also accompanied by reduced endocytic ability. Our data indicates that MR suppression is likely due to enhanced MR shedding in response to PS NPs. None of the NPs induced DCs maturation as evidenced by low CD83 expression. Future work will focus on better understanding of the mechanism underpinning such NP induced phenotypical and functional changes on human DC.

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