**Immunomodulatory nanodiamond aggregate-based platform for the treatment of rheumatoid arthritis**

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Abstract

We previously demonstrated that octadecylamine-functionalized nanodiamond (ND-ODA) and dexamethasone (Dex)-adsorbed ND-ODA (ND-ODA-Dex) promoted anti-inflammatory and pro-regenerative behavior in human macrophages in vitro. In this study, we performed a pilot study to investigate if these immunomodulatory effects translate when used as a treatment for rheumatoid arthritis in mice. Following local injection in limbs of mice with collagen type II-induced arthritis, microcomputed tomography showed that mice treated with a low dose of ND-ODA and ND-ODA-Dex did not experience bone loss to the levels observed in non-treated arthritic controls. A low dose of ND-ODA and ND-ODA-Dex also reduced macrophage infiltration and expression of pro-inflammatory mediators iNOS and tumor necrosis factor-α compared to the arthritic control, while a high dose of ND-ODA increased expression of these markers. Overall, these results suggest that ND-ODA may be useful as an inherently immunomodulatory platform, and support the need for an in-depth study, especially with respect to the effects of dose.