Mesenchymal stem cells as an ideal cell therapy tool for rheumatoid arthritis in combination with nano-fiber scaffold

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Mesenchymal stem cells (MSCs) possess immunoregulatory ability with multipotency which makes this cells an ideal tool for treatment of rheumatoid arthritis (RA). Aiming clinical use, the effect of MSCs combined with nano-fiber poly-lactic-co-glycollic acid sheet scaffold (nano-sheet) was assessed. MSCs were injected intra-articularly (IA) or intra-peritoneally (IP) or seeded on nano-sheet and implanted into ankles (IMP) of collagen induced arthritis (CIA) rats. IA or IP treatment demonstrated no effects whereas, IMP significantly suppressed arthritis evaluated by arthritis score and body weight. X-ray, micro-CT and histological analysis revealed markedly suppressed joint destruction with IMP but not with IA or IP. Furthermore, draining lymph nodes were decreased in size and IL-1β expression, serum anti-type II collagen IgG and proliferation of T cell ex vivo was significantly suppressed. Culture of MSCs on Nano-sheet in vitro increased TGF-β1 production while IL-6 was decreased compared to MSCs cultured on plate. Local delivery of MSCs with nano-sheet scaffold efficiently suppressed immune response in CIA. These data suggest the efficacy of nano-sheet with MSCs for RA.