

Stromal Vascular Fraction (SVF) – A Revolutionizer in Osteoarthritis Knees

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Osteoarthritis of knee, also called as osteoarthrosis, degenerative arthritis of knee, is a chronic, degenerative joint disease characterized by the gradual loss of hyaline cartilage wherein it results in formation of bony spurs, subchondral sclerosis and cysts at the margins of the joints.[1] The management of osteoarthritis knees range from conservative management in the form of analgesics, physiotherapy, collagen & chondroitin sulphate supplementation to surgical modalities in the form of proximal femoral osteotomy, high tibial osteotomy or unicondylar to total knee replacement respectively.

“Orthobiologics” led to the development of less invasive procedures with the administration of substances with osteoinductive and osteogenic properties offering the advantage of decreased morbidity when compared to classic techniques.[2] The recent research in stem cell and regenerative medicine has paved way for inducing the biological active cells such as stem cells, bioactive materials and growth factors towards the healing and tissue regenerative process. In this connotation, Stromal Vascular Fraction (SVF) serve as the perfect cell-based tissue regenerative modality for treating disorders under minimally invasive environment without any significant morbidity, whereby it further induces cellular proliferation, differentiation, characterization, regeneration and rejuvenation of degenerated tissue to attain native homeostasis.[3]

Stromal Vascular Fraction (SVF) acts as a perfect cell based product, which bridges the gap in treatment of osteoarthritis via minimally invasive approach. It provides a strong and positive balance between pro-apoptotic and anti-apoptotic molecules, pro-inflammatory and anti-inflammatory cytokines & pro-angiogenic and anti-angiogenic factors for rejuvenation of degenerated cartilaginous tissues. MSCs upregulate tissue inhibitor of metalloproteinases such as TIMPs -1, -3 and -4 by downregulating the signaling molecules of matrix metalloproteinases such as MMP-1, MMP-3, MMP-13 & MMP-28 and upregulating ADAMTS-4 and 5 which lead to normal joint homeostasis.[4] This stops the vicious pro-degenerative circle, slowing the progression of the disease and restoring tissue homeostasis. Although the MSCs seem to carry, in principle, the greatest biological potency, the therapeutic effect of SVF cells on the progression of OA with all cells present, and the synergies between them and the treated tissue can be also involved.

Food and Drug Administration guidelines, defined cultured cells as “minimally” and “more than minimally” manipulated which describe procedures “that might alter the biological features of the cells”.[5] FDA has established guidelines for human cellular and tissue based therapies or products (HCT/Ps) under Section 351 (Regulation of drugs and/or biological products) and Section 361 (HCT/Ps are non-subjective to any pre and post market review requirements).[5] The REGROW Act aims to hasten the “conditional approval” of certain cell and tissue therapeutic products which demonstrate “reasonable expectation of effectiveness” along with a few other criteria.[6]

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To improve the health standards of adult population and to retard the progression of osteoarthritis knees, intra-articular stromal vascular fraction concentrate provides osteoinductive, osteoconductive and osteointegrative properties along with induction of IL-1Ra which antagonizes the catabolic effect of IL-1, has become the treatment of choice for an early grades of osteoarthritis knees which is noteworthy to improve the functional quality of life.

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