The stromal vascular fraction: a regenerative reality?

In 2001, researchers discovered that fat tissue contains stem cells, which they termed adipose derived stem cells (ADSCs). To obtain these stem cells, fat tissue is taken from the abdomen of healthy adults undergoing liposuction and processed to remove unnecessary tissue. The remaining lipoaspirate contains many different types of cells including ADSCs. Like stem cells derived from bone tissue, ADSCs have the capacity to differentiate into different cell types. Moreover, ADSCs have the potential to regenerate and repair damage tissue.

While the ADSCs alone have been studied extensively, several studies suggest that lipoaspirate contains other cells which can help ADSCs differentiate into other types of cells, regenerate cells, and repair damaged tissue. Researchers have characterized a specific component of fat tissue that contains these different cell populations, named the stromal vascular fraction (SVF). SVF is a group of cells that include ADSCs, endothelial progenitor cells, B cells, T cells, mast cells, pericytes, macrophages, and more. There is growing interest in SVF because this mixture of cells has a significant regenerative potential that can be applied to different disease models.

SVF has already been used clinically by plastic surgeons in a process called fat grafting. In this process, plastic surgeons remove fat tissue from the abdomen, process the some of the fat to isolate SVF, and re-inject the fat and SVF to into another part of the body. The use of SVF in fat grafting produced better cosmetic results, such as improved fat volume, texture, and viability, when compared to fat grafting without SVF.

In addition to plastic surgery, SVF shows promising results in many other fields of medicine. In animal models, the application of SVF has been shown to accelerate wound healing, induce new blood vessel formation in damaged tissue, and enhance nerve regeneration in transected nerves. SVF has also shown significant results in many disease models related to Diabetes, Crohn’s, and Multiple Sclerosis. In several studies, researchers found that SVF induced significant regeneration and repair in damaged tissue. Interestingly, these studies find that using the heterogeneous SVF is either comparable or even better than using stem cells alone. SVF has significant regenerative properties because it contains ADSCs and cells which can secrete growth factors, provide extracellular matrix proteins, inhibit inflammation, and induce stem cells to differentiate. Moreover, scientists believe that these cells communicate with each other differentiation and proliferation in a process called crosstalk. These properties explain why SVF and fat have become popular areas of study in regenerative medicine.

Given its versatility and therapeutic potential, SVF has emerged as a fascinating area of study in regenerative medicine. SVF has already demonstrated the ability to accelerate wound healing, promote cellular regeneration, and enhance tissue repair. These features make it the preferred form of cellular-based therapy in regenerative medicine. As the research on SVF progresses, there has now been a remarkable shift towards clinical trials applying SVF to human diseases and therapies. These advances are gradually making SVF a regenerative reality in the future of

medicine.

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