

Stromal stem cells

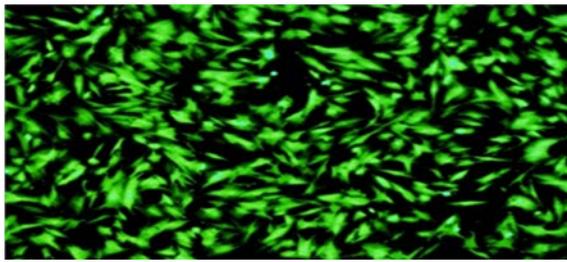
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Reviewed by Dr. Stephen Elliman, Orbsen Therapeutics, Ltd



S Stromal Stem Cells (SSC) can be isolated from bone marrow, the umbilical cord and fat. When grown in the laboratory, these cells adhere to the plastic flask in which they are grown. These plastic-adherent stromal cells (PA-SSC) secrete potent proteins that have been found to impact immune responses and stimulate the growth of new blood vessels. SSCs also release extracellular vesicles (called exosomes) which may indicate that these cells are in communication with other cells in their vicinity. Curiously, there are few immunological processes in which stromal stem cells do not interplay.

SSC are living cells with a well-characterized structure and function. Their structural role is to provide the architecture for the support of other functional cells within the organized tissues of a variety of bodily tissues. Emerging evidence suggests that these cells are deeply involved in the functional regulation of many tissues and organs.



Did you know?

Preclinical studies have shown that a single intravenous administration of PA-SSC can control hyperglycemia in rodents. This has prompted ten recent clinical safety studies in patients with diabetes.

Why stromal stem cells to treat diabetes complications?

Stromal stem cells are therapeutically interesting because they elicit immune responses. SSC are necessary for the maintenance and function of the immune system. These cells have been shown to present antigens, respond to pathogens, allow immune tolerance, inform functional responses from other cells in the immune system, and control wound healing. They move to a site of tissue damage and release an assemblage of protective substances. Like dispersing a crowd at an accident scene, the SSC can dampen down an inflammatory immune response thus clearing the area for repair and healing.

Diabetes complications are the result of unmanaged high glucose levels in the blood stream, or hyperglycemia. Over time hyperglycemia causes damage to small blood vessels which can impede the blood supply to eyes, kidneys, the heart, the nervous system and the skin. Aside from causing premature death in patients (more than 5 million/year), complications of diabetes are clinically challenging and very expensive to treat.



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Culturing the cells

REDDSTAR partner *Orbsen Therapeutics Ltd* is using the marker syndecan 2 (CD362) as a tool for picking stromal stem cells from the mixture of cells residing in the bone marrow. This marker recognizes a protein on the stromal cells' surface and enables the collection of a clearly defined population of SSC from the bone marrow of human donors. Once separated and purified from the bone marrow, the specified stromal stem cells are prepared for a medicinal product according to GMP (good manufacturing practice) legislation. GMP legislation defines the quality requirements that must be met for cells to be grown, handled and stored at each step of the process in advance of their use as a therapeutic agent to treat patients.

Each step of the cell therapy production process must be tracked starting with the bone marrow donor right through to the patient. This includes checking for infectious diseases and the ethical considerations regarding the recruitment of donors. Follow up occurs with both the bone marrow donor and the patient treated with the cell product.

A widely misunderstood concept:

This is not a cell replacement therapy. Stromal stem cells, once transplanted are not replacing anything. They home to a site of tissue damage and secrete a plethora of factors that can dampen down an immune response. REDDSTAR is focused on an adult tissue-derived, live cell therapy – an immuno-modulatory, stromal stem cell therapy.



Funded by the European Commission's FP7, REDDSTAR is a three year, 10 partner project that will comprehensively examine if stromal stem cells derived from bone marrow can safely control blood glucose levels while also alleviate damage caused by six diabetic complications. www.REDDSTAR.eu

