

Cell therapy

Cell therapy (also called cellular therapy or cytotherapy) is therapy in which cellular material is injected into a patient; this generally means intact, living cells.

Cell therapy originated in the nineteenth century when scientists experimented by injecting animal material in an attempt to prevent and treat illness.[1]

Mechanisms of Action

Cell therapy is targeted at many clinical indications in multiple organs and by several modes of cell delivery. Accordingly, the specific mechanisms of action involved in the therapies are wide ranging. However, there are two main principles by which cells facilitate therapeutic action:

Stem cell or progenitor cell engraftment, differentiation, and long term replacement of damaged tissue. In this paradigm pluripotent and multipotent or unipotent cells differentiate into a specific cell type after reaching the site of injury (via systemic administration). These cells then integrate into the site of injury, replacing damaged tissue, and thus facilitate improved function of the organ or tissue. An example of this is the use of cells to replace cardiomyocytes after myocardial infarction.[2][3]

Stem Cells have the capacity to release soluble factors such as cytokines, chemokines, and growth factors which act in a paracrine or endocrine manner. These factors facilitate self-healing of the organ or region. The delivered cells (via systemic administration) naturally secrete the relevant therapeutic factors in large quantities of a specific molecule. Examples of these cells that secrete therapeutic factors are to facilitate angiogenesis, anti-inflammation, and anti-apoptosis [4][5][6] and to treat peripheral artery disease and arteriovenous access complications.[7][8]

Mesenchymal Stem Cell Therapy

MSCs are immunomodulatory, pluripotent as well as multipotent and fast proliferating and these unique capabilities mean they can be used for a wide range of treatments including immunomodulatory therapy, bone and cartilage regeneration, myocardium regeneration and the treatment of Hurler syndrome, a skeletal and neurological disorder.[9]

Researchers have demonstrated the use of MSCs for the treatment of osteogenesis imperfecta (OI). Results show that MSCs can develop into normal osteoblasts, leading to fast bone development and reduced fracture frequencies.[10]

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