Regenerative medicine

Regenerative medicine is a translational field that combines tissue engineering and molecular biology to construct spare organs or help injured or defective tissues to regenerate or restore their normal functions.

Regenerative medicine in neurosurgery

- Generation of Plexin-B1 Conditional Knockout Mouse With CRISPR/Cas9 Technology
- Transplants of fresh and cryopreserved autologous adipose tissue improve reintegrative phenomena in newly formed muscle tissue in the reconstruction of muscle volume loss: A histological evaluation
- Cellular and Molecular Interactions in CNS Injury: The Role of Immune Cells and Inflammatory Responses in Damage and Repair
- Engrafted nitrergic neurons derived from hPSCs improve gut dysmotility in mice
- Rolipram and Electrical Stimulation Synergistically Promote Neuronal Differentiation of Adipose-derived Stromal Cells: an in Vitro Study
- Engineering polyphenol-based osteogenic system for bone and cartilage repair: Transplantation, tissue engineering, and organoid
- Cholinergic neuron-to-glioblastoma synapses in a human iPSC-derived co-culture model
- Insights From Amniotic and Umbilical Cord Mesenchymal Stem Cells in Wound Healing

Goals

The goal of regenerative medicine is to restore function through therapy at levels such as the gene, cell, tissue, or organ. For many disorders, however, regenerative medicine approaches in isolation may not be optimally effective. Rehabilitation is a promising adjunct therapy given the beneficial impact that physical activity and other training modalities can offer. Accordingly, “regenerative rehabilitation” is an emerging concentration of study, with the specific goal of improving positive functional outcomes by enhancing tissue restoration following injury [1)].

This is particularly important with specific organs such as heart, central nervous system, retina or limbs which possess very limited regenerative capacity. As such, regenerative medicine has received peculiar attention in the last decade. In this regard, Wnt signaling pathway has been subject to intensive research, since it plays many essential roles in the regulation of the progenitor cell fate, developmental decisions, proliferation during embryonic development, and adult tissue homeostasis.

Majidinia et al. briefly introduce Wnt signaling pathway and discuss how it integrally contributes to both stem and cancer stem cell maintenance. Finally, they summarize the current understanding of the role of Wnt/β-catenin signaling in the development and regeneration of heart, lung, liver, bone, and cartilage [2)].

1)

Ross HH, Ambrosio F, Trumbower RD, Reier PJ, Behrman AL, Wolf SL. Neural Stem Cell Therapy and

Rehabilitation in the Central Nervous System: Emerging Partnerships. Phys Ther. 2016 May;96(5):734-42. doi: 10.2522/ptj.20150063. Epub 2016 Feb 4. Review. PubMed PMID: 26847015.
2)
Majidinia M, Aghazadeh J, Jahanban-Esfahlani R, Yousefi B. The roles of Wnt/β-catenin pathway in tissue development and regenerative medicine. J Cell Physiol. 2017 Nov 18. doi: 10.1002/jcp.26265. [Epub ahead of print] Review. PubMed PMID: 29150936.