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In vivo Human Cell Regeneration: Current Perspectives

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Introduction

Regeneration of cells for repair of damaged tissue is indeed a very wide topic of research and is emerging as one of the most sought branches of medicine. Human cell regeneration can change the course of disease prognosis in case of chronic diseases and aid in tissue repair in case of other factors such as age, disease, injury, or genetic defects. In this report, some of the most recent scholarly information on human cell regeneration in different tissues and organs has been highlighted while presenting an overview of cell regeneration science and its potential therapeutic applications.

Peripheral nerve cell regeneration

Injury to the peripheral nerves causes denervation, loss of motor functions, sensory and other autonomic functions. Reinnervation with neuron regeneration can take place after peripheral axotomy. By exploring the regeneration mechanisms of axons and the various environmental factors that affect their regeneration it will be possible to regrow the nerves and direct their development for conferring functional status to the regions affected by nerved lesions. Schwann cells are identified as crucial for the regeneration of motor and sensory axons and could contribute substantially to the reinnervations. L2/HNK-1 carbohydrate is identified as a molecular marker that is expressed in

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Disorder of middle and inner ear causes hearing loss and poses a risk for dementia. Currently, cochlear implants are used as a treatment however, regeneration of the inner ear also possible from inner ear stem cells. ese stem cells were discovered in the cochlea and the vestibule can give rise to various cells of the inner ear. Cell therapy based on transplantation of mesenchymal stem cells for regeneration of the inner ear is very promising. Kanzai et al. have demonstrated that spiral ganglion neuron regeneration could potentially improve clinical outcomes among patients with cochlear implants [7].

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e muscle stem cells mediate the regeneration and development of skeletal muscles. ese cells are also termed satellite cells which coordinate to form myo bers. However, it was observed in previous studies that muscle stem cells have to transit through multiple cell states before nally achieving di erentiation and myo ber formation. is regeneration happens in response to muscle injury. e muscle stem cell fate is determined by changes in the gene expression pattern and the cell signaling in the muscle environment. Epigenetic mechanisms also contribute to change in gene expression patterns. Post-translational modi cation of chromatin and nucleosome repositioning renders certain gene loci more or less accessible to transcriptional machinery. Modulation of epigenetic changes has immense potential for restoration of muscle stem cell fate and regeneration to improve muscle repair for treatment of myopathies under disease and advanced age-related conditions [8].

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In vivo human cell regeneration is possible with accurate identi cation of genetic, epigenetic, cellular signaling molecules that participate in cell di erentiation from the progenitor or stem cells. Tissue repair has potential for avoiding transplantations and implantations.

References

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