Definitions

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1.1 Regenerative Medicine

Regenerative medicine is an area of biomedicine, bridging the gap between life science and engineering [1]. Combining tissue engineering and stem cell biology with a focus on translational aspects, it aims to achieve replacement and engineering/regeneration of cells, tissues, and organs.

1.2 Tissue Engineering

Tissue engineering has the ultimate translational goal to utilize scaffolds, cells, and active molecules to form fully functional tissue. It is an inter-

disciplinary field that applies the principles of engineering and life sciences toward the development of biological substitutes. The goal functions include restoration, maintenance, or improvement of tissue or organ [2].

1.3 Stem Cells

Stem cells are undifferentiated cells belonging to multicellular organisms. They are capable of giving rise to identical daughter cells, or alternate phenotypes through differentiation. Stem cells are the building blocks of life, whose un-mutated genetic pool is the hallmark of health. However, stem cells are also the building blocks for molecular medicine in the twenty-first century [3]. Following the principle of regenerative medicine, stem cell-based therapies have the potential to treat countless human diseases.

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References

1. Mao AS, Mooney DJ. Regenerative medicine: current therapies and future directions. *Proc Natl Acad Sci USA*. 2015;112(47):14452–9.
2. Langer R, Vacanti JP. Tissue engineering. *Science*. 1993;260(5110):920–6.
3. Caplan AI, Bruder SP. Mesenchymal stem cells: building blocks for molecular medicine in the 21st century. *Trends Mol Med*. 2001;7(6):259–64.