Cellular and Molecular Biology

Editorial on Tissue Engineering

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Editorial

Tissue engineering and cellular treatments, either on their own or in conjunction with therapeutic gene delivery, have the potential to dramatically a ect medicine. For the production of cells and tissues outside of a live organism, technologies based on these principles require a conveniently available source of cells. Stem cells are an appealing “raw material” for a variety of biotechnological applications due to their unique ability to rebuild functioning tissue throughout the rest of an organism’s life. ey are self-renewing by de nition since they may produce daughter stem cells through cell division. ey can also develop into a variety of specialized and functional cells, making them multipotent. Although stem cells have a lot of potential for making new cell-based products, there are presently no practical technologically relevant approaches for growing stem cells outside the body or reproducibly stimulating them to develop into functional cells.

Stem cells are cells that (i) can reproduce themselves in at least one daughter cell a er dividing and (ii) can develop into many linages. Stem cells have a vital function in the human body, not only as the beginning material for organs and tissues, but also as a means of maintaining, growing, and renewing them throughout life. Stem cells are implanted into numerous tissues and organs as the embryo and baby develop, and they remain there throughout life. Stem cells can also exist in the embryonic stage and be arti cially produced *e , i o* from transitory phases of di erentiation.

Both naturally occurring and arti cially created stem cells are the topic of signi cant research due to their potential to supply crucial ingredients for next-generation medicines such as gene, cellular, and tissue regeneration treatments. e clinical utility of stem cells is limited, however, because no e ective technological methodologies exist to cultivate stem cells *in , i ro*, or to stimulate them down particular di erentiation pathways. e biological features of most stem cell populations make developing bioprocesses for the creation or *e , i o* maintenance of stem cells and their derivatives di cult.

Stem cells are uncommon, dormant, or slowly cycling cells with complicated micro environmental needs. Culture optimization procedures must thus be customized to target stem cell populations while also taking into account input from a potentially dynamic mature and maturing cell population. Alternatively, selection or enrichment techniques can be employed to increase the frequency of stem cells so that their growth may be targeted more e ectively.

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