

Stem cells and cancer stem cells: therapeutic applications in disease and injury; Vol. 6

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Abstrak

The difference among pluripotent stem cells, multipotent stem cells, and unipotent stem cells is pointed out. Vast therapeutic applications of the following specific stem cells in disease and tissue injury are discussed: human embryonic stem cells, human mesenchymal stem cells, germ cell-derived pluripotent stem cells, induced pluripotent stem cells, human umbilical cord blood-derived stem cells, breast tumor stem cells, and hematopoietic stem cells. Because of the potential of human embryonic stem cells to produce unlimited quantities of any human cell type, considerable focus is placed on their therapeutic potential. Because of their pluripotency, these cells have been used in various applications such as tissue engineering, regenerative medicine, pharmacological and toxicological studies, and fundamental studies of cell differentiation. The formation of embryoid bodies, which are three-dimensional aggregates of embryonic stem cells, is explained as this is the first step in cell differentiation. Such embryoid body culture has been widely used as a trigger for the in vitro differentiation of embryonic stem cells. The basic capacity of self-renewal of human embryogenic stem cells is explained. The role of TGF-beta in the propagation of human embryonic stem cells is discussed. The differentiation of human embryonic stem cells into neurons, hepatocytes, cardiomyocytes, and retinal cells is fully explained. Donor policies for hematopoietic stem cells are also explained.