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**Role of hox genes in stem cell differentiation**

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**Abstract**

Hox genes are an evolutionary highly conserved gene family. They determine the anterior-posterior body axis in bilateral organisms and influence the developmental fate of cells. Embryonic stem cells are usually devoid of any Hox gene expression, but these transcription factors are activated in varying spatial and temporal patterns defining the development of various body regions. In the adult body, Hox genes are among others responsible for driving the differentiation of tissue stem cells towards their respective lineages in order to repair and maintain the correct function of tissues and organs. Due to their involvement in the embryonic and adult body, they have been suggested to be useable for improving stem cell differentiations *in vitro* and *in vivo*. In many studies Hox genes have been found as driving factors in stem cell differentiation towards adipogenesis, in lineages involved in bone and joint formation, mainly chondrogenesis and osteogenesis, in cardiovascular lineages including endothelial and smooth muscle cell differentiations, and in neurogenesis. As life expectancy is rising, the demand for tissue reconstruction continues to increase. Stem cells have become an increasingly

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