

Molecular barriers to processes of genetic reprogramming and cell transformation

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Abstract

© 2014 Pleiades Publishing, Ltd. Genetic reprogramming by ectopic expression of transcription factor genes induces the pluripotent state in somatic cells. This technology provides an opportunity to establish pluripotent stem cells for each person, as well as to get better understanding of epigenetic mechanisms controlling cell state. Interestingly, some of the molecular processes that accompany somatic cell reprogramming in vitro are also characteristic for tumor manifestation. Thus, similar "molecular barriers" that control the stability of epigenetic state exist for both processes of pluripotency induction and malignant transformation. The reprogramming of tumor cells is interesting in two aspects: first, it will determine the contribution of epigenetic changes in carcinogenesis; second, it gives an approach to evaluate tumor stem cells that are supposed to form the entire cell mass of the tumor. This review discusses the key stages of genetic reprogramming, the similarity and difference between the reprogramming process and malignant transformation.

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Keywords

epigenetics, genetic reprogramming, induced pluripotent stem cells, transformation, tumor