

The pluripotent transcriptome

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Scientific Abstract:

Pluripotent stem cells, such as Embryonic Stem cells, have the extraordinary ability to give rise to all cell types of the body, and hold great potential for regenerative medicine. Pluripotent stem cells are derived from in vitro culture of early embryos or by over-expression of specific transcription factors in somatic cells. In recent years great progress has been made towards understanding the molecular basis of pluripotency. The transcriptomes of various pluripotent stem cell lines have been examined in order to identify molecular mechanisms that control self-renewal and pluripotency. These studies have begun to reveal the components and architecture of the transcriptional regulatory networks of pluripotency, and suggest that transcription factors maintain the pluripotent state in the backdrop of a loose, accessible chromatin. Such a chromatin state may allow for increased global transcription, resulting in the expression of many novel and as yet uncharacterized transcripts. Fluctuations in the transcriptional networks may alternate pluripotent stem cells between states with distinct probabilities for self-renewal or differentiation. In this chapter, we review studies of the transcriptome of pluripotent stem cells, highlight intriguing transcriptional similarities between pluripotent stem cells, cancer cells and the germline, and discuss future avenues of research.

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