Abstract

Induced pluripotent stem cells (iPSCs) have become a new phenomenon of regenerative medicine. It is obvious that they share some common characteristics with embryonic stem cells (ESCs) such as stemness potential, self-renewal p., differentiation p. iPSCs retain their epigenetic memory, allowing becoming patient-specific and so it is not necessary to apply immunosuppressants. The use of ESCs is controversial, because their acquisition is associated with embryo destruction. As a cell source for iPSCs derivation we can use any somatic cells, however, fibroblasts are preferably used due to their easy availability. With transcriptional reprogramming cocktail (OCT4, SOX2, KLF4, c- MYC / OCT4, SOX2, NANOG, LIN28) we can obtain required iPSCs line, which is then further differentiated into neural precursors (NPCs). These cells can be grafted into lesion site, where they can facilitate regeneration by several mechanisms (cell replacement, protective effect, facilitation the expression of trophic factors). Nevertheless, here we are still dealing with the risk of tumorogenesis or low cell derivation efficiency that limits the use of iPSCs in clinical practice. In this thesis we will therefore mainly focus on the therapeutic potential of iPSCs in preclinical studies, their use in the treatment of neurodegenerative diseases such as amyotrophic lateral sclerosis and in the treatment of acute spinal cord injury.

Key words: iPSCs, differenciation, neural precursors, neurodegenerative diseases, ALS, spinal cord injury