

Abstract

Stem cells may be very useful tool for regenerative medicine. They are able to repair any tissue in a human body and cure any damage caused by injury, sickness or aging. But at first, we have to deal with problems, which are connected with their usage – especially their immunogenicity. This bachelor thesis is focused on immunogenicity of embryonal (ESC), induced pluripotent (iPSC) and adult stem cells (ASC).

Tissues derived from ESC are *in vivo* described as strongly immunogenic, although they seem to be immunosuppressive *in vitro*. Another danger of their usage is their tumorigenic potential.

There also exist ethical issues connected with their usage.

iPSC were supposed to be a good replacement for ESC, because no immunological nor ethical problems were expected. Surprisingly, they were described as immunogenic, too, even in autologous environment. These cells were also described as tumorigenic; this is the main reason for now why they cannot be used for the replacement therapy. Immunogenicity, so as tumorigenicity of iPSC may be a consequence of their dedifferentiation from somatic back to stem cells.

ASC are the only stem cells, which are already used for the replacement therapy (transplantation of bone marrow). Some of them are described as immunosuppressive or tumor-suppressive, other are described as immunogenic and pro-tumorigenic (both *in vitro* and *in vivo*).

Stem cells cannot be used for the replacement therapy until above stated problems are solved.

There have already been suggested solutions, for example genetic modifications or changes in cultivation of them. Some of these solutions could be promising, but without additional research we will never be able to use stem cells without any danger.