

Abstract

Stem cells (SCs) have the potential to be used in regenerative medicine on the basis of their differentiation capacity and promising immunological properties, including low expression of histocompatibility antigens and costimulatory molecules, or secretion of suppressive cytokines. Their immunogenicity has often been ignored in the past but it is becoming clear that rejection of genetically incompatible SCs represents a very common issue. At present, SCs are extensively studied from the immunological point of view, since it represents a critical aspect of the safety of SC therapy. This thesis presents an overview of current knowledge about immunogenicity of SCs and their derivatives, including both pluripotent SCs (embryonic and induced pluripotent SCs) and adult SCs (mesenchymal, limbal, neural, haematopoietic and umbilical cord blood SCs). The expression of immunologically relevant molecules on their surface and interaction with the immune cells *in vitro* and *in vivo* will be discussed, together with suggestions for overcoming the immunological barriers for transplantation. Detailed analysis of these aspects necessarily has to precede the safe clinical translation of SC therapies.