Feasibility of MSCs Transplantation

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Abstract: A number of practical problems need to be addressed before any form of cell therapy can be widely applied in patients with multiple diseases. The choice of cell type is one considered elsewhere in this issue; others include the question of ethics, the mode of delivery of cells, the timing of any treatment and perhaps above all the safety of the patient. Here we review the progress in various of these practical problems in order to explain how we have arrived at the conclusion that the clinical science has progressed to a stage where MSCs can be safely and appropriately applied to treat patients with cardiovascular diseases.

The complex moral and ethical debates surrounding the definition of the origins of human life, together with conflicting current and proposed legislation, are hindering the course of research into the therapeutic utilization of human embryonic stem cells (ESCs) (Moore et al, 2006; Dawson et al, 2003). However, adult stem cells, free from many of the ethical and legal concerns attached to ESCs, offer great promise for the advancement of medicine. Several lines of enquiry suggest the plausibility of using stem cell therapy for the treatment of cardiovascular diseases in adults. These alternative sources
may alleviate the need to resolve the debates on stem cells before further therapeutic benefits of stem cell transplantation can be realized.

Nevertheless, a substantial amount of basic, translational, and clinical research will be required to properly assess such approaches to adult stem cell usage. There are still many essential ethical issues to be addressed (Sugarman, 2007). Here we discuss some of the key ethical considerations regarding research involving bone marrow-derived mesenchymal stem cell (MSC) therapy in cardiovascular diseases.

7.1 General Ethical Considerations

There are a series of ethical considerations that must be taken into account in making the transition from bench to bedside, safety, the possibility of benefits, the experimental designs and informed consent. Careful consideration must firstly be taken regarding the safety of these proposed interventions before they are introduced to human beings. The ethical obligation of protecting human safety is central to a code of ethics, both for basic research and clinical healthcare. In large part, the data necessary to make such a determination will be derived from animal experiments, as well as previous related human research, and the medical condition of potential human subjects. These data need to be considered in the context of therapeutic alternatives when considering a new intervention. If safety can be reasonably ensured, then the answer to these important scientific questions should be determined. By promoting the goals of safety and using a sound research design, the therapeutic benefits can be ascertained. Finally, any potential research subjects must be in a position to give informed consent.

7.2 Safety Issues

The risk of infectious disease transmission from donor to recipient is common to all types of tissue and organ transplantation. Thus, under most conditions, the risks associated with the transmission of infections by MSCs transplantation must be characterized on the basis of previous research concerning other types of tissue donation. Screening is essential to protect the recipients from infectious agents, but sometimes emergent infectious diseases escaping the detection have posed a problem. Currently, transplantation of autologous MSCs is much more popular than an allogenic strategy, which avoids the transmission of infectious diseases from donor to recipient. However, other types of infection from micro-organisms are involved in this situation. Medical hygiene is important during MSCs isolation, expansion, storage and transfer from the laboratory to the patient. In addition, serum is commonly used as a supplement to MSCs culture medium. The most widely used animal serum is fetal bovine serum. Because serum is an ill-defined component and a xenologous