

Abstract of Presentation

The Potential of Amniotic Membrane for Regeneration Medicine

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Abstract :

Recently, in addition to the current therapeutic modalities, such as medical therapy, surgery, organ transplantation, and mechanical assist devices, regenerative medicine is being focused on as a potential alternative to complicated tissue/organ transplantation. Regenerative medicine is a new field based on the use of stem cells to generate biological substitutes and improve tissue functions. Three essential factors are necessary: 1) stem cells, which retain the capacity to renew themselves and may be able to restore damaged tissue with high proliferability and differentiability, 2) the scaffolds that support them, and 3) growth and differentiation factors.

Stem cells isolated from adults or developing embryos (embryonic stem (ES) cells) are currently thought to be a source of cells for regenerative medicine. However, despite their therapeutic potential, both adult and ES cells present a number of challenges associated with their clinical application, and are not in general use yet. For example, although adult stem cells can be directly isolated from the patient and are therefore immunologically compatible with the patient, they are generally hard to isolate and grow in culture, and moreover, transplantation of a sufficient number of cells to adult tissue needs a large-scale cell supply. In contrast, human ES cells can proliferate very fast in culture and differentiate into cells of all adult tissues, but additional research is required to control the growth and to overcome the risks of tumor formation by undifferentiated ES cells and graft rejection. It is also necessary to resolve the ethical issues surrounding the use of materials from embryos. Therefore, much attention is now focused on obtaining a novel source of cells.

Recently, the multipotent differentiation ability of amnion-derived cells has been reported and these cells have attracted a lot of attention as a cell source for cell transplantation therapy. The amnion-derived cells have considerable advantages which will be described in detail later: they can differentiate into all three germ layers, they have low immunogenicity and anti-inflammatory functions, and they do not require the sacrifice of human embryos for their isolation, thus avoiding the current controversies associated with the use of human ES cells. The amniotic membrane has already been applied in medicine, for example, in burn lesion treatment, surgical wound covering to avoid collusion, and ocular surface reconstitution, although uncertainty remains regarding the mechanism of its effects. In this meeting, the most recent and relevant clinical and experimental data about the use of amniotic membrane and cells derived from it will be discussed

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