Cardiac regenerative biology strategies in experimental models

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Abstract

Regeneration is a promising and also complex phenomena in biology and medicine. All species have some kind of capacity for regenerating but the level for this capacity depends on species and tissues are varied.

Regenerative biology is the process of replacing or regenerating animal cells, tissues or organs to restore or establish normal function. Methods for that are different but it could be by stimulating the body to repair or by replacing damaged tissues or organs.

The main strategies for regenerative biology in general and especially in cardiac regenerative biology are based on the two main following approaches: 1- Cell therapy (e.g. stem cell therapy) and 2- Tissue therapy (e.g. tissue engineering).

Stem cells unlike other cell types in the body have two main important properties: 1- They are self-renewal and unspecialized cells. 2- They have unlimited potency.

There are two main types of stem cells: 1- Embryonic stem cells (ESCs) and 2- Adult stem cells (ASCs). In this presentation a brief history and the recent findings of administration of ASCs on the treatment of the heart will be reviewed.

In some vertebrates such as Zebra fish cardiac regeneration was reported following severe injury of heart. The mechanism for this cardiac regeneration has not fully understood but it has suggested that it could be based on divisions of cardiomyocytes.

In animals the idea of regenerating damaged heart tissue after myocardium infarction (MI) using stem cell transplantation is very promising.

Adult stem cells are multipotent and can substitute to repair damaged tissues. Due to lack of ethical concerns they widely are used in the therapy of patients across the world in clinical trials for treatment of different diseases like cardiovascular disease (CVDs), however, adult stem cell therapy is not still a routine approach for treatment of diseases.

As before any clinical studies to undertake experimental studies are necessary, therefore to review the results of such experiments are very important too.

In this oral presentation I explain recent findings on regenerative biology strategies with emphasize on the treatment of heart diseases (especially MI) with stem cells in experimental models.