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PEGylated Fibrin Biomatrix for Treatment of Acute Myocardial Infarction

Technology ID
z02201

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PEGylated Fibrin Biomatrix for Treating Acute Myocardial Infarction

An improved method to deliver bone marrow-derived mononuclear cells (BMNC) into damaged heart tissue has been developed. By injecting a polyethylene glycol polymer chain (PEGylated) fibrin biomatrix carrying bound hepatocyte growth factor (HGF), the rate of cell engraftment and cardiac function after acute myocardial infarction, a heart attack, has been improved. The PEGylated fibrin biomatrix acts as a patch in the area of the damaged myocyte cells. The biomatrix contains engrafted stem or progenitor cells and growth factors to increase cell survival and function at the site of infarction. This treatment is delivered through a catheter, and allows for localized delivery and retention of stem cells and growth factors providing an effective, minimally invasive treatment for acute myocardial infarction.

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Acute Myocardial Infarction and Current Treatments Including BMNC

Acute myocardial infarctions, or heart attacks, are the leading cause of death in developed countries worldwide. The prognosis after an acute myocardial infarction depends greatly on the extent of damage done to the cardiac muscle. Most heart attacks are brought on by lack of blood and subsequent death of cardiac myocytes or muscle cells creating an infarction. Current minimally invasive procedures are not able to reverse myocyte death, so patients must live with compromised cardiac function or undergo invasive surgery to repair the infarction. Tissue engineering solutions, such as bone marrow-derived mononuclear cell (BMNC) transplantation methods, provide the possibility of rescue or regeneration of myocardium cells lost during acute myocardial infarction. However, injecting BMNCs alone has been ineffective because they do not have the matrix and growth factors necessary to promote myocyte regrowth. This PEGylated fibrin biomatrix with bound hepatocyte growth factor meets the needs of the injected cells and facilitates healing of the cardiac tissue.

PEGYLATED FIBRIN BIOMATRIX FOR MYOCYTE REPAIR FOLLOWING ACUTE MYOCARDIAL INFARCTION

- Allows for minimally invasive procedure to regenerate damaged myocytes
- Restores cardiac function after acute myocardial infarction
- PEGylated fibrin biomatrix improves stem cells and growth factor delivery
- Biomatrix provides structure for cells to grow and proliferate on
- Method improves effectiveness of BMNC treatment
- Tissue engineering allows for regrowth of naturally functioning myocytes

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