



## **FCVB 2014: Stem Cells From Discarded Fat Protect Heart**



Patients undergoing cardiac surgery may need to have fat tissue removed for doctors to access the heart. Researchers have discovered that stem cells from the discarded mediastinal fat have protective properties when they are injected into the heart before the chest is closed at the end of surgery. The research results were presented at the biannual Frontiers in CardioVascular Biology (FCVB) congress, held between 4 and 6 July 2014 in Barcelona, Spain.

### **From Useless to Useful**

Research on stem cells from subcutaneous fat was prompted by liposuction, a cosmetic procedure which removes unwanted fat from the body. Scientists have learned that the fat's stem cells can benefit the hearts of cardiac patients by encouraging the regeneration of new blood vessels and reducing the size of the myocardial infarct. In the past, pre-surgical liposuction had to be performed to have the adipose tissue's stem cells available for patients undergoing heart surgery.

### **Surgery and Treatment in a Single Procedure**

The goal of the research was to learn whether stem cells from fat collected during surgery might improve heart function in patients who had recently experienced heart failure or a heart attack. The advantage of collecting the stem cells from mediastinal fat and subsequently injecting them into the heart during surgery is that patients do not have to undergo an additional procedure, since the chest cavity is already open. Additionally, the patient's immune system is unlikely to reject the stem cells since they come from his or her own tissue.

### **Stem Cell Isolation**

Dr. Ganghong Tian, the study's senior author, described two stages of the research. First, the team wanted to know whether stem cells from mediastinal fat collected during surgery could be isolated and differentiated into distinct cell types. They collected tissue from 24 patients undergoing heart surgery and used a standard procedure to isolate a significant number of stem cells. The stem cells successfully differentiated into adipocytes and osteocytes; they expressed markers for cardiomyocytes but making them into beating cardiomyocytes will be one of the goals of future work.

### **Cardioprotective Properties**

In order to determine whether the stem cells are cardioprotective, rats with congestive heart failure induced by occluding the left anterior descending coronary artery were injected with the stem cells in the region of the

infarct. Thirteen rats received the stem cells while five received a saline solution. Six weeks after the injections, MRI revealed that the rats who received the mediastinal fat stem cells had no decrease in left ventricular ejection fraction. They also had greater ventricular contractility compared to the rats who received saline.

#### Next Steps

Additional investigations are needed to learn whether the benefits of stem cell injections are long-lasting, beyond the six weeks of the current study follow-up. The research team is also interested in devising a technique to rapidly isolate stem cells from discarded fat tissue, to make them more immediately available for injection back into the patient during heart surgery. The process of purifying the cells currently takes several hours.

[Source: European Society of Cardiology](#)

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