Cardiac patch to help damaged cardiac tissue recover from a heart attack

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In 2009 it is estimated that a new heart attack will be experienced by 785,000 Americans, while 470,000 will have a recurrent attack.

This number of heart attacks increases by 20% when one adds silent events, unrecognized by the individual and often asymptomatic until more extensive tissue damage is incurred.

Heart attacks are the single largest killer of American men & women.

$33.7 billion is spent in the U.S. each year

- Coronary artery disease and heart attacks provide the underlying cause in 2 out of 3 cases of congestive heart failure (CHF).
- CHF is an end stage condition that draws heavily on health care resources ($33.7 billion / year in direct costs) and broadly affects our communities (5 million diagnosed with CHF with 670,000 added annually).

New therapeutic strategies are urgently required

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Within 6 hours (golden period) this damage can be recovered by restoring blood flow, but many patients miss this window

Pathophysiology of a heart attack

- Acute
- Chronic

No current therapy adequately restores or preserves function

1. Synthetic material easily prepared and characterized so that it can be "off the shelf"
2. Biodegradable breaks down over months in the body so there is no permanent foreign body implanted
3. Excellent mechanical properties provides elastic support to the failing heart in the early period to positively redirect the healing response

Summary

Pre-clinical study is underway in large animal (pig) model of heart attack.

(top) A cardiac patch was implanted onto a sub-acute infarct produced by coronary balloon occlusion (left circumflex). (bottom) The infarct wall was thinned and scarred by 10 weeks, while patch application preserved wall thickness. Black arrows indicate implanted material, and blue arrows indicate infarcted wall.

Summary

Current testing is with pig model where heart size is near human’s. The patch is applied in an open chest procedure, but could ultimately be applied with minimally invasive techniques.

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