V. Melenovsky 3 . 1 IKEM, Prague, Czech Republic; 2 Charles University Prague, myocardial redox state in heart failure

Myocardial triacylglycerol accumulation is related to BNP and TGF in HF.

Background:

Aim of our study was to investigate whether stem cell (SC) therapy with human amniotic fluid stem cells (hAFS, fetal stem cells) and rat adult bone marrow stem cells (BMM, MSC) is able to improve mitochondrial function and to prevent mitochondrial dysfunction, mitochondrial biogenesis, and oxidative stress in myocardial infarction.

Methods:

Myocardial infarction (MI) was induced by left coronary ligation and a 50% revascularization surgery was performed. In the sham-operated group, the MI was not induced.

Results:

1. hAFS transplantation significantly improved myocardial function and reduced infarct size compared to the MI group.
2. BMM transplantation also improved myocardial function and reduced infarct size compared to the MI group.
3. Myocardial function was significantly improved in the hAFS group compared to the BMM group.
4. Myocardial fibrosis was significantly reduced in the hAFS group compared to the BMM group.
5. Mitochondrial biogenesis and oxidative phosphorylation were significantly increased in the hAFS group compared to the BMM group.
6. Mitochondrial function was significantly improved in the MI group compared to the sham-operated group.
7. Myocardial fibrosis was significantly reduced in the MI group compared to the sham-operated group.
8. Mitochondrial biogenesis and oxidative phosphorylation were significantly increased in the MI group compared to the sham-operated group.

Conclusion:

hAFS transplantation is more effective than BMM transplantation in improving myocardial function and reducing myocardial fibrosis after myocardial infarction. hAFS transplantation is also more efficient in improving mitochondrial function and oxidative phosphorylation compared to BMM transplantation.

P5078 | BEDSIDE

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P5080 | SPOTLIGHT 2013

Assessment of arterial stiffness in chronic obstructive pulmonary disease by a novel method: cardio-ankle vascular index

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Introduction:

Patients with chronic obstructive pulmonary disease (COPD) have an increased risk of cardiovascular morbidity and mortality. Increased arterial stiffness is associated with the presence and severity of cardiovascular disease. Cardiac-ankle vascular index (CAVI) is a new method for assessment of arterial stiffness that is weakly influenced by blood pressure and significantly correlated with the presence and severity of cardiovascular disease. The aim of the present study is to evaluate whether there is an association between the presence and severity of COPD according to global initiative for chronic obstructive lung disease (GOLD) criteria with arterial stiffness as assessed by CAVI.

Methods:

We enrolled 127 patients with COPD (104 men) followed by the chest medical outpatient clinics and 38 healthy subjects (28 men). All patients were assessed by spirometry, CAVI and clinical history.

Results:

Baseline patient characteristics are shown in Table 1. Patients with COPD had significantly increased CAVI values than controls (10.24±2.46, 6.78±1.49; p<0.001). CAVI was correlated with FEV1% predicted, FEV1/FVC and COPD stage (r=−0.52, p<0.001; r=−0.53, p<0.001 and r=0.68, p<0.001 consecutively). Multivariate regression analysis showed that CAVI was independently associated with GOLD stages (p<0.001).

Table 1. Patient characteristics of COPD and control group

<table>
<thead>
<tr>
<th>COPD (n=127)</th>
<th>Control (n=38)</th>
<th>p.value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>67.69±12.53</td>
<td>69.18±12.77</td>
</tr>
<tr>
<td>BMI (kg/m2)</td>
<td>26.21±5.18</td>
<td>29.07±5.98</td>
</tr>
<tr>
<td>Current smoking (%)</td>
<td>49.6%</td>
<td>39.5%</td>
</tr>
<tr>
<td>FEV1% predicted</td>
<td>82.25±25.20</td>
<td>84.51±21.83</td>
</tr>
<tr>
<td>FEV1/FVC</td>
<td>62.22±7.37</td>
<td>88.42±6.63</td>
</tr>
<tr>
<td>EF (%)</td>
<td>61.57±5.31</td>
<td>62.68±5.67</td>
</tr>
<tr>
<td>Menopause</td>
<td>10.36±19.61</td>
<td>10.09±23.57</td>
</tr>
<tr>
<td>CAVI</td>
<td>10.24±2.46</td>
<td>6.78±1.49</td>
</tr>
</tbody>
</table>

Conclusion:

In this study we have shown that increased arterial stiffness assessed by CAVI is associated with the spirometric severity of COPD. Therefore patients with COPD might be closely followed up for cardiovascular disorders due to relationship between reduced pulmonary functions and arterial stiffness.

P5081 | BENCH

N-acetylcysteine administration increases superoxide generation in soleus muscle of rats with heart failure

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There is substantial evidence that oxidative stress is increased in skeletal muscle during heart failure. Increasing glutathione (GSH) levels through N-acetylcysteine (NAC) has been shown to protect against oxidative stress in several diseases, including heart failure. However, recent studies have documented that excess GSH from NAC treatment culminates in reductive stress with pro-oxidative consequences in mitochondria and augmented reactive oxygen species (ROS) levels. This study aimed to evaluate the influence of NAC on ROS generation in soleus muscle of rats with myocardial infarction.

Methods:

Myocardial infarction (MI) was induced by left coronary occlusion. Four months later, rats were assigned to three groups: Sham (n=8), MI-C (MI without treatment, n=8), and MI-NAC (MI treated with N-acetylcysteine, 120 mg/kg/day, n=8). Rats with small MI were excluded. ROS was evaluated in muscle fragments by quantifying two dihydroethidium (DHE) oxidation-derived fluorescent compounds, 2-hydroxyethidium (EOH) and ethidium, using high performance liquid chromatography (HPLC). EOH is specifically generated when DHE is oxidized by anion superoxide, while ethidium production is associated to heme protein levels and peroxidase activity. Therefore, DHE-derived products were expressed as ratios of generated EOH or ethidium divided by DHE consumed per tissue mass.

Results:

MI size did not differ between MI-C and MI-NAC (p=0.05). Student’s t-test showed a significant increase in the EOH/DHE ratio (p<0.05). In MI-NAC, the EOH/DHE ratio significantly increased compared to MI-C (p=0.004 vs MI-C). This indicates that NAC treatment increases ROS generation in soleus muscle of rats with MI, which is likely to contribute to myocardial damage and functional impairment.