Exercise-Induced Expression of Angiogenic Cytokines in Normal and Infarcted Hearts

Guiwu Wu, Jiaoxiong Wu, Jian Li, Peter Kang, Roger Laham, BIDMC/Harvard Medical School, Boston, MA

Background: Numerous studies indicate that psychological distress is a significant CAD risk factor, which adversely affects recovery following major CAD events. Although most studies focus on depression and hostility, acute and chronic anxiety also adversely affect cardiovascular risk.

Methods: Using the Kellner Symptom Questionnaire, a validated measure to assess various behavioral characteristics, and the MOS-SF 36 to assess quality of life (QoL), we studied 500 consecutive patients following major cardiac events to determine the prevalence of anxiety (symptom score > 7) and high anxiety (HA). 147 patients were randomized to four groups: myocardial infarction (ligation of left anterior descending artery) +/- exercise or sham surgery (horseshoeomy) +/- exercise and were sacrificed after 2 and 7 days of exercise with assessment of myocardial salvage, collateral development by Evans blue/TTC staining and histology, and expression of endothelial cell specific markers and angiogenic cytokines and receptors.

Results: 14 normal mice were used to study the time course of VEGF, flk-1 and FGR-R-1 expression in normal mice during exercise. There was a 4 fold increase in VEGF expression that peaked 24 hours after exercise and returned to baseline by day 5. FGR-1 increased 5 folds and peaked at days 5-6. Myocardial infarction was associated with a marked increase in VEGF, flk-1, flk-1, and FGR-R1 as early as 24 hours after injury.

Conclusion: Short-term exercise in mice is associated with increased expression of angiogenic cytokines and their receptors. Myocardial infarction is associated with a similar early increased expression. The effect of exercise on myocardial salvage may be related to its induction of angiogenesis.

High Prevalence of Anxiety in Coronary Patients With Marked Improvements Following Cardiac Rehabilitation

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Change of % diameter stenosis

Cardiac Rehabilitation

ABSTRACTS - Cardiac Function and Heart Failure 199A

1161-66 Assessment of Left Ventricular Diastolic Function Following Completion of a Marathon in a Group of Well-Trained Runners

Alison J. Kean, Frank F. Seghatoz, Greg D. Ewerk, David J. Meulan, David D. McPherson, Vera H. M. Miyuhi, Northwestern University, Chicago, IL

Background: Previous studies have demonstrated diastolic dysfunction following ultraendurance exercise. However, there is limited data about diastolic function after a shorter endurance event such as a marathon.

Methods: We examined 45 patients (25 men, 19 women; mean age: 35 ± 8.1 years) who successfully completed the 2001 Chicago Marathon (26.2 miles). Transthoracic echocardiograms (TTE) were performed approximately two weeks before the marathon (17 ± 10.7 days), immediately following the marathon (71 ± 42.0 minutes), and four weeks following the marathon (29 ± 12.9 days). Diastolic echo parameters included isovolumic Relaxation Time (IVRT), Deceleration Time (DT), and E/A ratio.

Results: m=45 patients with a mean marathon completion time of 4 ± 0.7 hours. See table.

<table>
<thead>
<tr>
<th>TTE</th>
<th>Baseline</th>
<th>Immediate Post</th>
<th>Follow-Up</th>
</tr>
</thead>
<tbody>
<tr>
<td>IVRT (ms)</td>
<td>116 ± 60</td>
<td>86 ± 10.0*</td>
<td>111 ± 0.01</td>
</tr>
<tr>
<td>E/A ratio</td>
<td>2 ± 0.5</td>
<td>1 ± 0.4*</td>
<td>2 ± 0.5</td>
</tr>
<tr>
<td>Decel Time (ms)</td>
<td>200 ± 65</td>
<td>202 ± 43.4*</td>
<td>234 ± 52.1</td>
</tr>
<tr>
<td>Systolic BP</td>
<td>117 ± 14.9</td>
<td>115 ± 14.1</td>
<td>116 ± 13.0</td>
</tr>
<tr>
<td>Diastolic BP</td>
<td>68 ± 9.9</td>
<td>72 ± 9.6</td>
<td>68 ± 10.8</td>
</tr>
<tr>
<td>Heart Rate</td>
<td>60 ± 25.9</td>
<td>78 ± 11.7*</td>
<td>59 ± 12.7</td>
</tr>
</tbody>
</table>

* p<0.05 vs. Baseline and Follow Up

Conclusions: A decrease in IVRT, Deceleration Time, and E/A ratio immediately following completion of the marathon likely reflects a reduced ventricular stiffness and increased heart rate rather than altered compliance. All Doppler parameters returned to baseline at one month follow-up, suggesting that completion of an endurance event such as a marathon does not result in impairment of left-ventricular diastolic function.

1161-67 The Effect of Exercise Training on the Endothelial Function of Coronary Artery in Patients With Myocardial Infarction

Shinshiro Honda, Shinyaaki Hikasa, Takahiro Takahashi, Kohshi Kishi, Ryoji Ohtani, Tokushina Red Cross Hospital, Komatsu, Japan

Background: Exercise training improves the endothelial function of arteries in skeletal muscle. A few studies have examined the clinical effect of exercise training on coronary endothelial function. This study investigated whether regular exercise improves endothelial function in human coronary arteries. Method: Non-infarct-related coronary arteries in 41 patients with recent myocardial infarction who underwent successful percutaneous transluminal coronary angioplasty were studied. Patients were divided into two groups: regular exercisers (EX;n=24, 17 males, mean age: 58 years), non-exercisers (NE;n=17, 12 males, mean age: 60 years). We induced acetylcholine into the non-infarct-related coronary artery and measured the diameter by quantitative angiography at baseline and 6 months after angioplasty. Results: Acetylcholine (Ach), given in doses of 1, 3, 10, 30μg per minute, increased the coronary artery diameter in a dose dependent manner in both groups. The mean percent change in the diameter at the site of stenosis change (%DOS) was less in the regular exercisers than in the non-exercisers (11±12 vs. 41±5, p<0.01). Multivariate analysis showed that regular exercise was an only significant determinant of improvement in endothelial function (p=0.01). Conclusion: These findings suggest that regular exercise improves endothelial function in the coronary arteries following myocardial infarction.