Abstract: 1341

The long term effect of exercise in the mobilization of endothelial progenitor cells in patients with chronic heart failure

Authors:
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Topic(s):
Chronic Heart Failure: Rehabilitation

Citation:

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Greece and the European Union (European Social Fund-ESF) through the Operational Programme "Human Resources Development, Education, Lifelong Learning"

Introduction: Vascular endothelial dysfunction is an underlying pathophysiological feature of chronic heart failure (CHF). Exercise has been shown to stimulate the mobilization of endothelial progenitor cells (EPC) in healthy populations and populations with cardiovascular comorbidities. EPC, an index of vascular endothelial function, contribute to the regeneration of the inflammatory endothelium and promote neovascularization.

Purpose: The purpose of the present study was to evaluate the effect of a 36-session exercise training program on the EPC mobilization in patients with CHF.

Methods: Thirty eight patients (32?, 6?) with stable CHF [mean±SD, Age (years): 56±10, EF (%): 32±9, VO2peak (ml/kg/min): 18.1±4.1] enrolled a 36-session exercise training program including either high-intensity interval training (HIIT) or HIIT combined with resistance training (COM). All patients underwent a symptom limited maximal cardiopulmonary exercise testing (CPET) on a cycle ergometer before and after the training program. Venous blood was sampled before and after of each CPET. Five endothelial circulating populations were quantified by flow cytometry (table 1). EPC values are expressed as "cells/million enucleated cells" in median (25th, 75th percentiles).

Results: A significant intervention effect in CD34+/CD45-/CD133+, CD34+/CD45-/CD133+/VEGFR2, CD34+/CD45-/CD133- and CD34+/CD45-/CD133-/VEGFR2 populations and a significant time effect in CD34+/CD45+/CD133+ and CD34+/CD45+/CD133+/VEGFR2 populations were observed (table 1, p<0.001). An increase in 4 cellular populations was also observed during baseline after the 36-session training program (p<0.05). Finally, there were significant intervention by time differences in CD34+/CD45-/CD133+ /VEGFR2 and CD34+/CD45-/CD133-/VEGFR2 (p<0.001).

Conclusion: A 36-session training program stimulates both the acute and long term mobilization of different EPC populations in patients with CHF. The clinical relevance of these findings and the potential mechanisms need further investigation.

<table>
<thead>
<tr>
<th>Endothelial cellular populations</th>
<th>Before rehabilitation</th>
<th>After rehabilitation</th>
<th>Observed significance in intervention, time or intervention by time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Before CPET</td>
<td>After CPET</td>
<td>Before CPET</td>
</tr>
<tr>
<td>CD34+/CD45-/CD133+</td>
<td>66 (39-95)</td>
<td>106 (78-148)</td>
<td>112 (83-176)*</td>
</tr>
</tbody>
</table>

*Significance in baseline values (p<0.05)
#Significance in intervention (p<0.001)
†Significance in time (p<0.001)
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Quantification of endothelial cellular populations before and after exercise

<table>
<thead>
<tr>
<th>CD34+/CD45+/CD133+/VEGFR2</th>
<th>Before CPET</th>
<th>After CPET</th>
<th>Before CPET</th>
<th>After CPET</th>
<th>#, †, ‡</th>
</tr>
</thead>
<tbody>
<tr>
<td>CD34+/CD133+/VEGFR2</td>
<td>11 (7-22)</td>
<td>14 (8-22)</td>
<td>20 (12-29)</td>
<td>24 (17-35)</td>
<td></td>
</tr>
<tr>
<td>CD34+/CD45-/CD133-</td>
<td>367 (253-955)</td>
<td>620 (380-1728)</td>
<td>358 (229-880)</td>
<td>533 (233-1211)</td>
<td>#</td>
</tr>
<tr>
<td>CD34+/CD45+/CD133+/VEGFR2</td>
<td>1 (1-2)</td>
<td>4 (2-6)</td>
<td>4 (2-4)*</td>
<td>9 (6-12)</td>
<td>#, ‡</td>
</tr>
</tbody>
</table>

* Significance in baseline values (p<0.05)

# Significance in intervention (p<0.001)

† Significance in time (p<0.001)

‡ Significance in intervention by time (p<0.001)