Exercise capacity is a function of height in children and the young – impact of congenital heart disease is difficult to define.
Table of contents

- Exercise(testing) in general
- Oxygen consumption at ventilatory threshold
- Peak oxygen consumption
- Exercise capacity in a healthy population
- Exercise capacity in CHD in general
- Results (healthy probands, e.g. Tetralogy of Fallot)
- Summary
- Consequence
Importance of exercise

- Diagnostic tool
- Cardiac prognosis
- Therapeutic effects
- (non)competitive sports
- Sociomedical assessment
Ergospiroergometry?

External work

VCO2

VO2

Wasserman 1987

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Consumption of Oxygen and Production of CO2 – direct

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ergospirometry* – aerob

* preferable to stress ECG

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### Daily Functional Capacity

**- Weber -**

<table>
<thead>
<tr>
<th>WK</th>
<th>VO₂ max. (ml/min/kg)</th>
<th>VO₂ AT (ml/min/kg)</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>&gt;20</td>
<td>&gt;14</td>
<td>keine bis gering</td>
</tr>
<tr>
<td>B</td>
<td>16-20</td>
<td>11-14</td>
<td>gering bis mittelschwer</td>
</tr>
<tr>
<td>C</td>
<td>10-16</td>
<td>8-11</td>
<td>mittelschwer bis schwer</td>
</tr>
<tr>
<td>D</td>
<td>6-10</td>
<td>5-8</td>
<td>Schwer</td>
</tr>
</tbody>
</table>

- VO₂ max > 20 - 25 ml/min/kg / kg KG no functional limitation

*Weber et al. 1987*
### Age distribution of all probands

<table>
<thead>
<tr>
<th></th>
<th>female</th>
<th>male</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>647</td>
<td>548</td>
</tr>
<tr>
<td>mean value [years]</td>
<td>21.34</td>
<td>19.76</td>
</tr>
<tr>
<td>standard deviation [years]</td>
<td>15.637</td>
<td>16.618</td>
</tr>
<tr>
<td>minimum age [years]</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>maximum age [years]</td>
<td>75</td>
<td>78</td>
</tr>
</tbody>
</table>

1195 treadmill 3 – 75 years of age  
849 cycletest
Oxygen uptake – function of height (Ventilatory threshold)

VO2_AT = -0.863 + 1.037 * height^2

VO2_AT = -0.411 + 0.751 * height^2
Peak oxygen uptake – function of height

VO₂̇_peak = -0.376 + 0.961 * height^2

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Dubowy KO Card Young (2009), 19, 657–658
Reduced exercise capacity in GUCH

<table>
<thead>
<tr>
<th>Condition</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>ventricular septal defect</td>
<td>12%</td>
</tr>
<tr>
<td>atrial septal defect</td>
<td>20%</td>
</tr>
<tr>
<td>Tetralogy of Fallot</td>
<td>20%</td>
</tr>
<tr>
<td>single ventricle</td>
<td>35%</td>
</tr>
</tbody>
</table>

- reduced ventilatory threshold in ToF and single ventricle

J. Fritsch et al 1994, Z. Kardiol. 83: Suppl. 3, 131-139
Explore exercise capacity

50. percentile of TOF reflects 3. percentile of healthy probands

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Summary

- Exercise performance is a function of the measured height and gender in the young. This is wrong when considering the elderly.

- Workcapacity of CHD women beyond the age of 20 years declines prior to men`s workcapacity and more distinctly.

- Most of the patients with repaired Tetralogy of Fallot are less able to cope with heavy workload than healthy manual workers.

- This is true for all CHD patients.
Consequence

- Exercise testing is necessary for all CHD patients before starting for a job or a career in athletes.

- All CHD patients should have appropriate and time-sensitive check ups (during the past 6 months) to the targeted job.

- Gender and age have to be considered carefully in order to describe work capacity of healthy peers and especially patients with repaired.