CSEP-Certified Personal Trainer (CSEP-CPT)

Aerobic Exercise Prescription
Exercise Prescription

Key Concepts: 4.0-4.19
The Exercise Prescription

• involves ART & science

  » ART - be creative, flexible, remember the individual!

  » Science
    - Apply fitness principles to the exercise prescription,
    - Base prescription on exercise test results and client’s goals.
Consider:

- Why is client exercising?
- What are his/her GOALS?!

- F Frequency = days/week
- I Intensity = % HRR, %HR, RPE
- T Time = duration, reps/sets, work:rest ratio
- T Type = continuous, interval, circuit
CSEP, Health Canada, & ACSM Recommendations

• Adults should engage in 30-60 minutes of moderate intensity activity on most (preferably all) days of the week

• Moderate-intensity aerobic activities are equivalent to a brisk walk (15-20 min/mile) or ~4-6 METs
General Training Guidelines for “Health”

- Low Intensity (Light Effort) Aerobic Exercise
  - Most (preferably all) days of the week
  - 20-39% of Heart Rate Reserve (HRR) or approximately 2-4 METs
  - Approximately 60 min per day.
  - Example Activities: Light Gardening, Light Walking

  - Aerobic exercise can be accumulated in 10 min bouts of activity throughout the day.
  - The approximate MET values provided are estimates for middle aged adults (40-64 yr).
  - The required METs would be lower for the old and very old, and higher for young adults.
  - Generally, the higher the intensity of activity the lower the time requirement for health benefits (Warburton et al. CMAJ 2006)
General Training Guidelines for “Health”

- Moderate Intensity Aerobic Exercise
  - 3-5 days per week
  - 40-59% HRR or approximately 4-6 METs
  - 20-60 min per day
  - Example Activities: Brisk Walking (15-20 min per mile), Dancing
General Training Guidelines for “Health”

- Vigorous Intensity Aerobic Exercise

**F** 3-5 days per week

**I** 60-84% HRR or approximately 6-8 METs

**T** 20-60 min per day

Example Activities: Jogging, Swimming
High or Low Intensity?

- *Either* can improve aerobic fitness and health
- Intensity is inversely related to duration
  - High intensity = greater risk of injury & DOMS
  - Low intensity = must exercise for longer duration to achieve same health benefit

- What would you recommend for …
  - Someone new to exercise? Why?
  - Someone who exercises fairly regularly but has limited time? Why?
1. Heart Rate
   - % HRmax, % HR Reserve (HRR)

2. Perceived Exertion or talk/sing test

3. Energy Expenditure
Relative intensities for aerobic exercise prescription (for activities lasting up to 60 min).

<table>
<thead>
<tr>
<th>Intensity</th>
<th>%HRR</th>
<th>%HRmax</th>
<th>RPE</th>
<th>RPE</th>
<th>Breathing Rate</th>
<th>Body Temperature</th>
<th>Example Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Light Effort</td>
<td>&lt;20</td>
<td>&lt;35</td>
<td>&lt;10</td>
<td>&lt;2</td>
<td>Normal</td>
<td>Normal</td>
<td>Dusting</td>
</tr>
<tr>
<td>Light Effort</td>
<td>20-39</td>
<td>35-54</td>
<td>10-11</td>
<td>2-3</td>
<td>Slight Increase</td>
<td>Start to Feel Warm</td>
<td>Light Gardening</td>
</tr>
<tr>
<td>Moderate Effort</td>
<td>40-59</td>
<td>55-69</td>
<td>12-13</td>
<td>4-6</td>
<td>Greater Increase</td>
<td>Warmer</td>
<td>Brisk Walking</td>
</tr>
<tr>
<td>Vigorous Effort</td>
<td>60-84</td>
<td>70-89</td>
<td>14-16</td>
<td>7-8</td>
<td>More out of Breath</td>
<td>Quite Warm</td>
<td>Jogging</td>
</tr>
<tr>
<td>Very Hard Effort</td>
<td>&gt;84</td>
<td>&gt;89</td>
<td>17-19</td>
<td>9</td>
<td>Greater Increase</td>
<td>Hot</td>
<td>Running Fast</td>
</tr>
<tr>
<td>Maximal Effort</td>
<td>100</td>
<td>100</td>
<td>20</td>
<td>10</td>
<td>Completely out of Breath</td>
<td>Very Hot/ Perspiring Heavily</td>
<td>Sprinting All-Out</td>
</tr>
</tbody>
</table>

Warburton et al. CMAJ 2006
Intensity

%HRmax

• Established Target Range
  » Individualized and goal-dependent

• Target range = %55-69 HRmax
  » Equivalent to ~40-59% HRR
  » Lower Intensity: 0.55 × HRmax
  » Upper Intensity: 0.69 × HRmax

• Can you identify the limitation(s) of this formula?
Intensity
% Heart Rate Reserve (HRR)

- Required skill for the CSEP-CPT: Preferred method of exercise prescription.

- Estimate HRmax when HRmax data is unavailable
  - Maximal Heart Rate Prediction Equations*
    - General formula for males and females
    - Maximal Heart Rate (b·min⁻¹) = 220 – age (yr)
    - Obese Individuals
    - Maximal Heart Rate (b·min⁻¹) = 220 – (0.5 x age) (yr)
  - *note: research is currently being conducted by CSEP health and fitness professionals (at York University and the University of Toronto (Jamnik et al.)) to establish more appropriate maximal heart rate prediction equations.

- Training HR using HRR
  = [Training Intensity x (HRmax - HR rest)] + HR rest
Heart Rate Reserve Example

- Moderate Effort: 40-59% HRR, 45 yr old man

  » HRmax = 220 – 45 = 175 b·min⁻¹

  » Resting HR = 80 b·min⁻¹

  » HRR = [(HRmax – HRrest) x 40 or 59%] + HRrest
    - 40% HRR = [(175 – 80) x 0.40] + 80 = 118
    - 59% HRR = [(175 – 80) x 0.59] + 80 = 136

  » Training HR Range = 118 – 136 b·min⁻¹
• Can be used on its own or in combination with HR

• Valid & reliable for continuous, aerobic exercise

• **Take RPE during submaximal exercise tests/sessions!**
Exercise Prescription Based on Energy Expenditure

- Energy (kcal) burned with exercise depends on oxygen consumption (or MET level), body mass & duration:

\[
\text{kcal} = \text{METs} \times 3.5 \times \text{body mass (kg)} \times t \text{ (min)}
\]

or...

\[
\text{kcal} = \text{VO}_2 \left(\text{mL} \cdot \text{kg}^{-1} \cdot \text{min}^{-1}\right) \times \text{body mass (kg)} \times t \text{ (min)}
\]
New to Exercise
(i.e., precontemplator, contemplator, preparation, relapse)

Predicted VO₂max:
(normative ratings from CPAFLA & Heyward)

Intensity (HRR)

Frequency/duration

NOTES:
• 'initial stage' likely >4 wks
• goal: ↑ duration to 30 min continuous exercise

Regular Exerciser
(i.e., preparation, action, relapse)

poor

fair or good

light effort (20–40%)

moderate effort (40–60%)

use ‘Initial Stg’ (Table 2) for Frequency & Duration

• Table 2 progressions are appropriate
Predicted VO₂ max:
(normative ratings from CPAFLA & Heyward)

Intensity (HRR)

Frequency/duration

NOTES:

Table 2 progressions may be conservative for a motivated client with specific goals.
Stages of Progression

- Greatest conditioning effects in 1st 6-8 wks

- Rate of improvement depends on age, health, and initial fitness level

- Usually see 5-20% change in VO$_2$max with training (up to 40% in sedentary)

- Table 2 (pg. 22) in Candidate Study Guide
Table 2: Example exercise training prescription and progression.

<table>
<thead>
<tr>
<th>Program Stage</th>
<th>Week</th>
<th>Frequency (days/week)</th>
<th>Intensity %HRR</th>
<th>Duration (min)</th>
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<tbody>
<tr>
<td>Initial Stage</td>
<td>1</td>
<td>3</td>
<td>40-50</td>
<td>15-20</td>
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<td>2</td>
<td>3-4</td>
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<td>4</td>
<td>3-4</td>
<td>50-60</td>
<td>25-30</td>
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<td>Improvement</td>
<td>5-7</td>
<td>3-4</td>
<td>60-70</td>
<td>25-30</td>
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<td>11-13</td>
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<td>65-75</td>
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<td></td>
<td>14-16</td>
<td>3-5</td>
<td>65-75</td>
<td>30-35</td>
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<td></td>
<td>17-20</td>
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<td>70-85</td>
<td>35-40</td>
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<td></td>
<td>21-24</td>
<td>3-5</td>
<td>70-85</td>
<td>35-40</td>
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<tr>
<td>Maintenance</td>
<td>24+</td>
<td>3-5</td>
<td>70-85</td>
<td>30-45</td>
</tr>
</tbody>
</table>

HRR - heart rate reserve. Table adapted from ACSM's Guidelines for Exercise Testing and Prescription (2000).