Assessment of Exercise Tolerance for Development of Safe Exercise Prescription

Part II: The Oxygen Transport System and Normal/Abnormal Responses to Exercise

Ellen Hillegass PT, Ed.D., CCS, FAACVPR, FAPTA

Note to Participants: There are interactive pop-up questions throughout this lecture. If you choose to pause the lecture and return at a later time, a natural break time would be after answering the interactive questions. (You are able to pause at any time and the presentation will “remember” where you were. It’s just a more natural time to pause after the interactive questions.) For your convenience, this outline reflects where/when within the lecture the interactive questions occur.

This lecture has 91 slides and is 143 minutes in duration.

I. The components of the oxygen transport system
   A. Ventilation
   B. Diffusion
   C. Circulation
   D. Delivery of O₂ to muscle

II. Measuring the TRUE maximum function of the O₂ transport system: maximal vO₂ testing
   A. Maximal vO₂
   B. Cardiac output
      1. Normal cardiac output
      2. Stroke volume
   C. Oxygen delivery
   D. Arterial–venous oxygen difference in the muscle

Interactive Questions — slide 21 @ 31 minutes

III. What should I monitor? How much should I monitor?
   A. Heart rate responses
      1. Vs. oxygen consumption
      2. With increasing age
      3. Maximal heart rate
      4. What is the heart rate affected by?
      5. Case examples
      6. Training heart rate
      7. Abnormal heart rate responses
      8. Arrhythmias
   B. Blood pressure
      1. Recommended treatment guidelines
         a. BP management
         b. Hypertension
         c. Dark chocolate?
      2. What is blood pressure affected by?
3. BP responses to activity
   a. Normal
   b. Abnormal
4. BP monitoring recommendations
5. Case examples

Interactive Questions — slide 53 @ 88 minutes

C. Effects of medications
   1. Beta blockers
   2. Diuretics
   3. Calcium channel blockers
   4. Cardiac glycosides
   5. ACE inhibitors and ARBs
   6. Anti-depressants
   7. Nitrates
   8. Anti-arrhythmia meds
   9. Lipid-lowering drugs

D. Other responses to assess
   1. Oxygen saturation (SpO₂)
   2. Respiratory rate
   3. Symptoms
   4. Rating of perceived exertion

Interactive Questions — slide 69 @ 117 minutes

IV. How do I monitor?
   A. Monitoring in different settings
   B. What monitoring equipment should I use?
   C. Case example
   D. Other considerations
      1. Arm vs. leg exercise
      2. Static vs. dynamic exercise
   E. Effects of assistive devices
   F. Importance of warming up and cooling down
   G. Changes in blood lactate, post-exercise

Interactive Questions — slide 87 @ 141 minutes

V. Why monitor?
   A. Danger of untoward events in CVD
   B. Clinical instability
   C. Effects of PT interventions
      1. On healthy volunteers
      2. In patient/client groups
   D. Documentation
   E. Case example