

Running With a Prosthesis

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Learning Objectives

- Recommend the most appropriate running prosthesis based on individual performance factors and contextual demands
- Assess individuals with limb absence to determine readiness and safety for initiation of prosthetic running training
- Evaluate prosthetic running gait to promote injury prevention and long-term functional participation in meaningful physical activity
- Design a pre-running conditioning program with a focus on optimizing prosthetic use and reducing injury risk
- Collaborate with the prosthetist and the individual to support optimal prosthetic running patterns and participation outcomes
- Develop a prosthetic running program tailored to the individual's goals and needs while integrating strategies for injury prevention and sustained engagement in physical activity

Chapter 1

Preprosthetic Running



Disclosure

- These views are my personal views and not the views of any department with which I may be affiliated

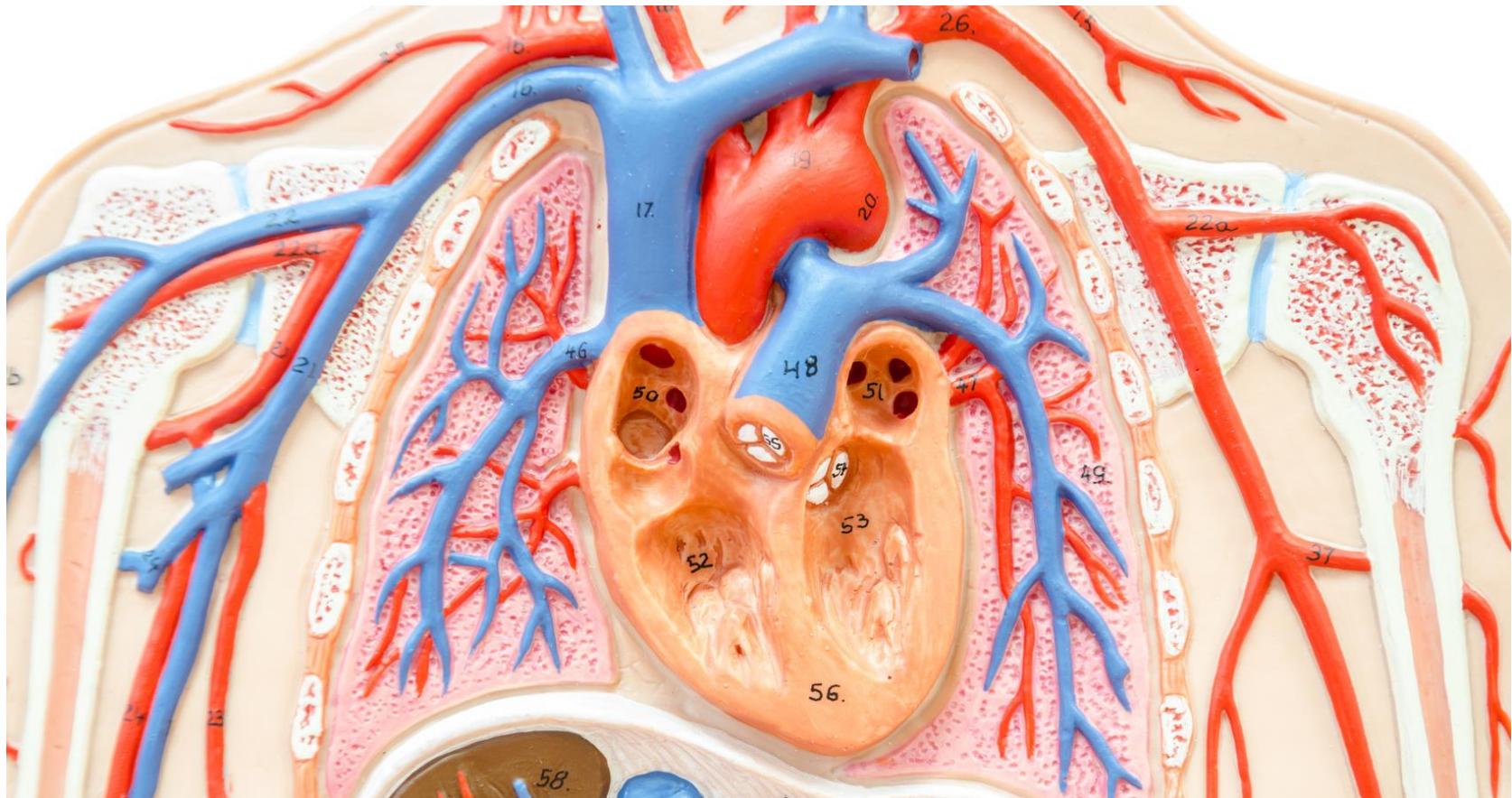
Preprosthetic Running Goals

- When is a patient physically ready to run with a prosthesis?
 - When the skin is well healed
 - When they are able to ambulate in the prosthesis without a deviation
 - When they are medically cleared by the cardiopulmonary team for increased activity levels



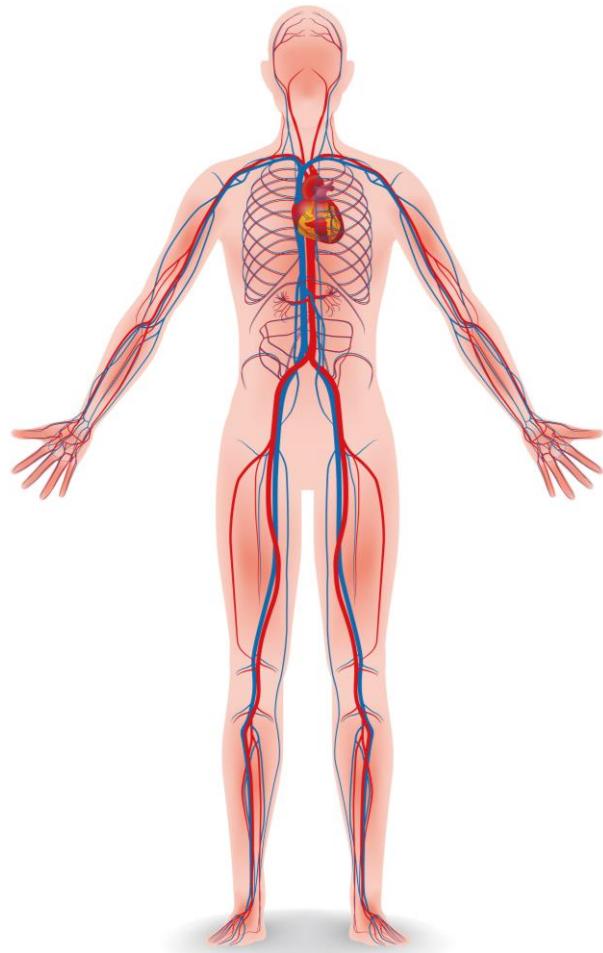
Preprosthetic Running Goals (cont.)

- Changes in energy expenditure



Preprosthetic Running Goals (cont.)

- Cardiopulmonary function changes



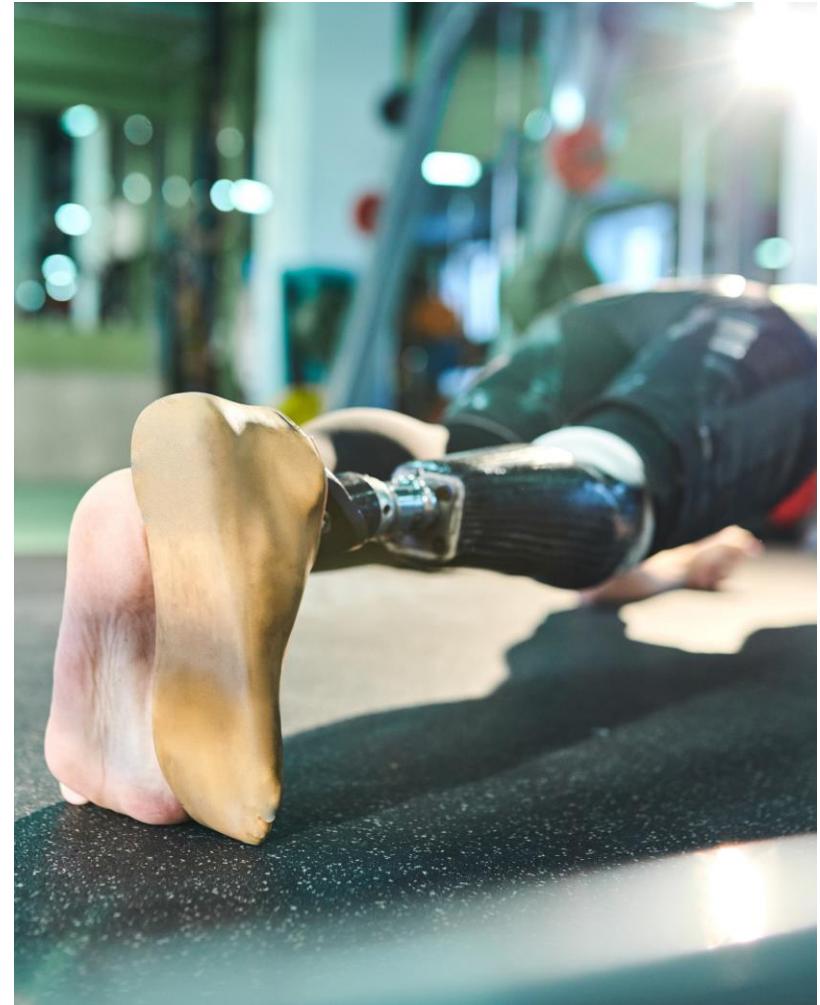
Preprosthetic Running Goals (cont.)

- Importance of vital signs at baseline
- Importance of vital signs at trackside



Preprosthetic Running Goals (cont.)

- Core and hip strengthening
 - Focus on posterior chain
 - Encourage comfort at the edge of the cone of stability



- **INSERT VIDEO OF FOLLOWING EXERCISE:**
 - TheraBand stepping drill
 - Prone glute kick backs
 - Prone swimming

Preprosthetic Running Goals (cont.)

- Skin tolerance
 - The increased/changed pressures with running combined with the increased sweat inside of the liner, creates an environment for potential skin breakdown
 - Skin checks are vital
 - Listen to the body



Preprosthetic Running Goals (cont.)

- Agility drills
 - Be creative!
 - T/W/S drills
 - Hurdles
 - Stairs
 - Boxes



- Insert video of
 - Box drill
 - Ladder drill
 - Hurdle drill

Preprosthetic Running Goals (cont.)

- Prosthetic trust
 - If the patient does not ambulate well with the prosthesis, they will probably not run well with the prosthesis



Chapter Summary

- How to determine when a patient is ready to begin running training
- The importance of vital signs
- How to functionally prepare for running

Chapter 2

Running With a Prosthesis



Basic Running Biomechanics

- Prosthetic sweet spot
 - The limb is designed for the runner to land in a specific spot under their body



Basic Running Biomechanics (cont.)

- Running limb height
 - Alignment in standing is not a concern
 - PSIS should be even when using limb to run



Basic Running Biomechanics (cont.)

- Alignment
 - Runner should report a vertical AND horizontal propulsion to achieve maximum benefit from prosthesis



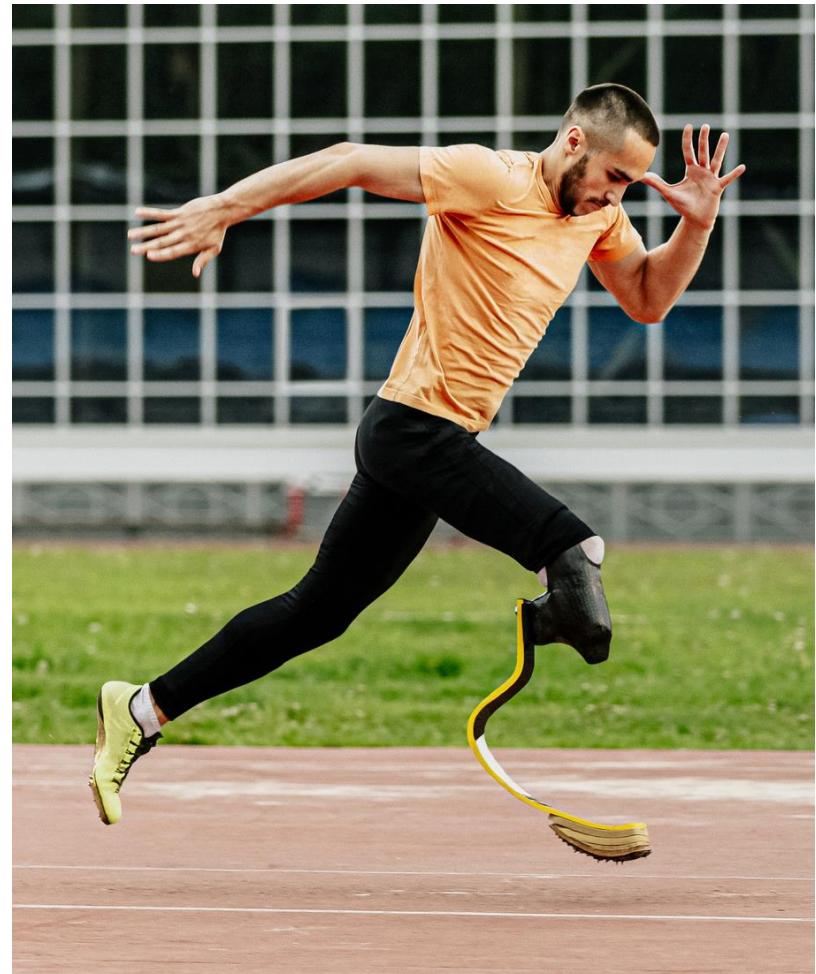
Basic Running Biomechanics (cont.)

- Running changes external rotation
 - Running in a walking limb may cause lateral whip secondary to the change in external rotation from walking to running



Basic Running Biomechanics (cont.)

- Prosthetic running categories
- Potential progression of prosthetic running categories



Basic Running Biomechanics (cont.)

- Current popular running prosthetics

Let's Run!

Video: Basic Running Biomechanics

The Running Evolution



Video: Basic Running Biomechanics

Transtibial Running



Video: Basic Running Biomechanics

Transfemoral Running



Video: Running Drills

Arm Swing and Trunk Rotation



Video: Running Drills

Wall Push



Video: Running Drills

Lateral Bounding



Video: Running Drills

High Knees



Video: Running Drills

Mule Kicks



Video: Running Drills

Cariocas



Video: Running Drills

Skipping



Video: Running Drills

Resisted Running



Chapter Summary

- Basic running biomechanics
 - Appropriate landing
 - Appropriate alignment
 - Appropriate category
- Running drills/exercises to encourage prosthetic trust and proper use of running prosthetic

Chapter 3

Tips and Tricks for Success



Sweat Management

- Increased cardiac demand combined with decreased surface area from which to sweat creates an increased volume of perspiration that must be managed for proper prosthetic fit



Sweat Management (cont.)

- “Hyperhydrate”



Sweat Management (cont.)

- Antiperspirant
 - Apply nightly
 - Apply prior to donning liner



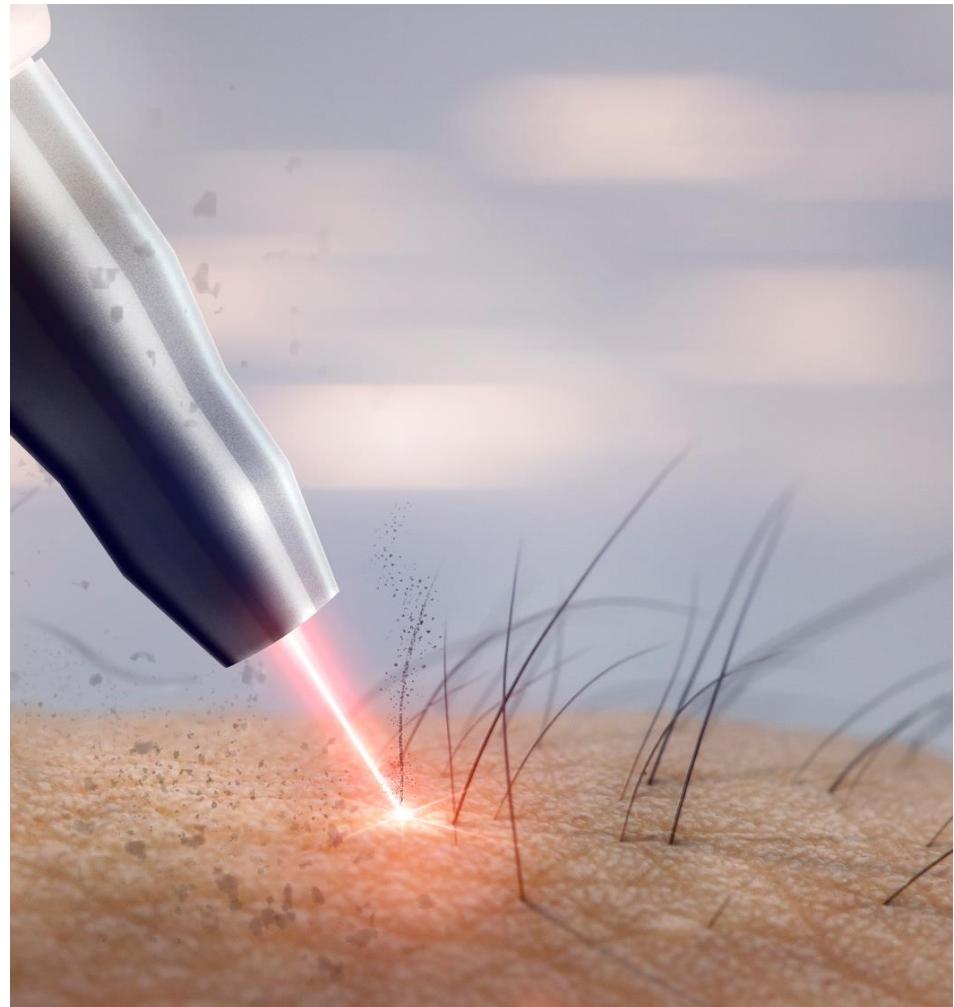
Sweat Management (cont.)

- Prescription strength antiperspirant



Sweat Management (cont.)

- Laser hair removal



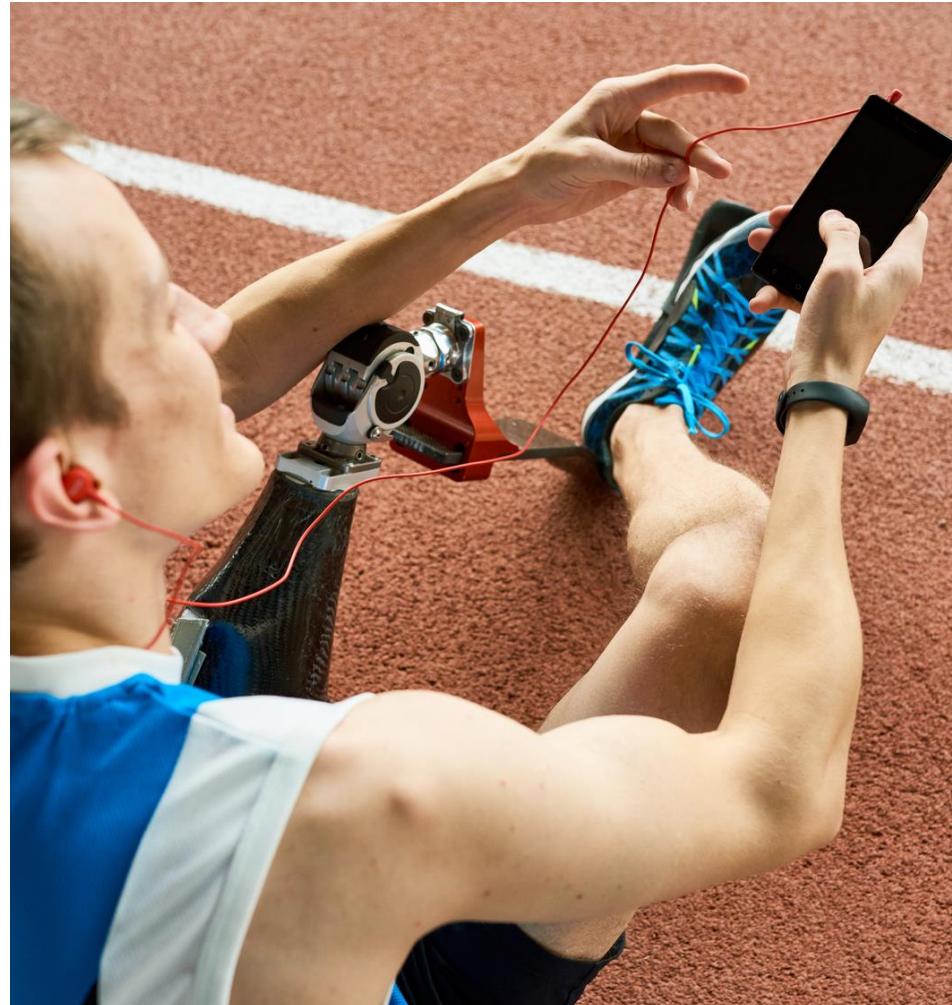
Sweat Management (cont.)

- Botox
 - Temporary treatment
 - Requires time out of limb
 - Anecdotally works for some and not for others



Tips and Tricks

- Musical cues



Tips and Tricks (cont.)

- Running belts



Tips and Tricks (cont.)

- Sweat towels



Tips and Tricks (cont.)

- Hip belts

Chapter Summary

- Sweat is a problem for prosthetic running, but it is not a limitation
- Drink enough water to maintain limb volume
- Use commercial and prescriptions options
- Use technology
- Carry supplies during the run

Course Summary

- The demands of running on a body missing a limb
- Preparing to run with a prosthesis to prevent injury
- Encouraging the patient to use a running prosthesis correctly
- Tips and tricks for prosthetic running success

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