

# Running With a Prosthesis

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# Learning Objectives

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- 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

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# Preprosthetic Running



# Disclosure

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

# Preprosthetic Running Goals

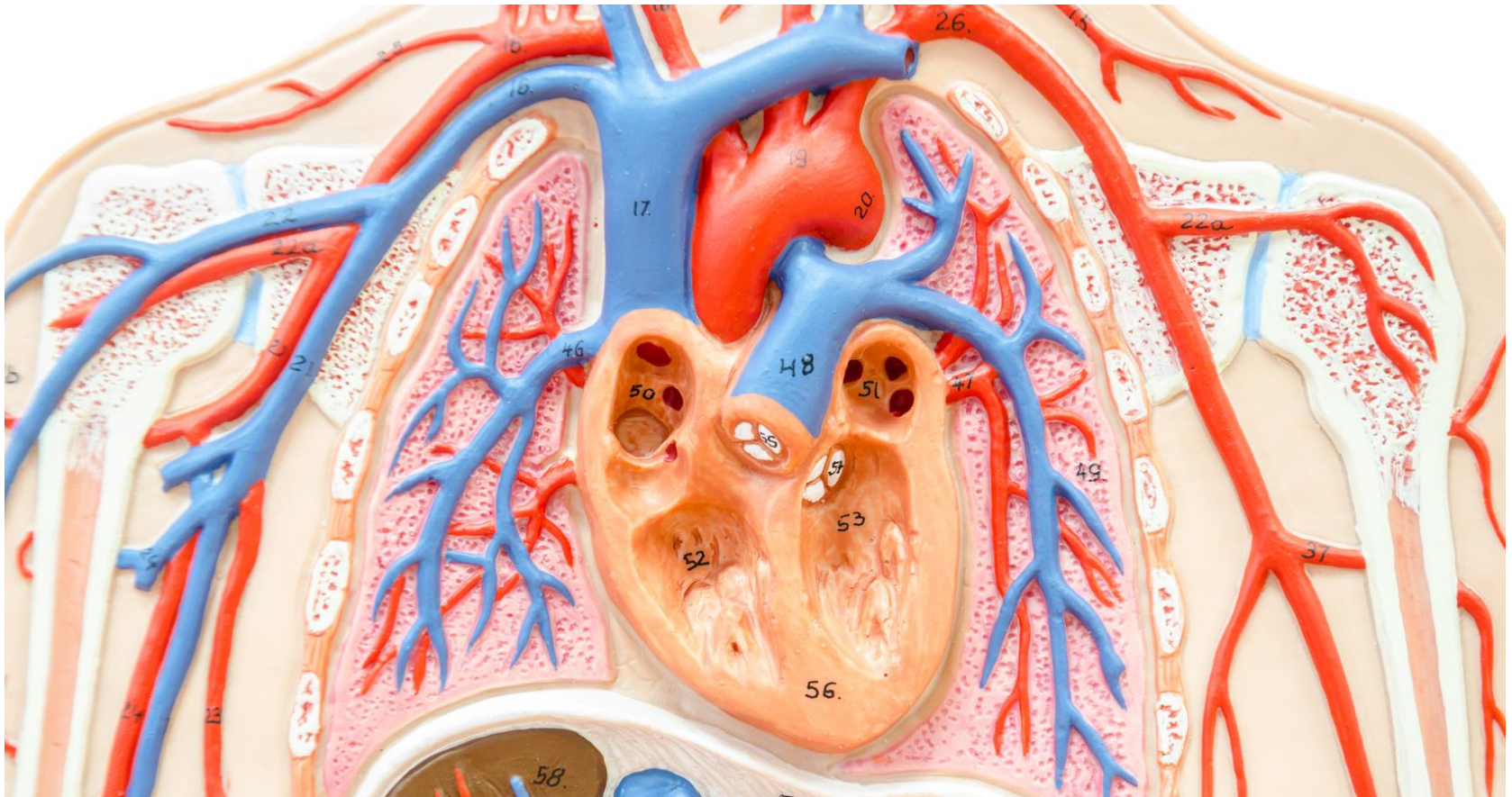
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- When is a patient physically ready to run with a prosthesis?
  - When the skin is well healed
  - When they are able to ambulate in the prosthesis without a deviation
  - When they are medically cleared by the cardiopulmonary team for increased activity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



# Preprosthetic Running Goals (cont.)

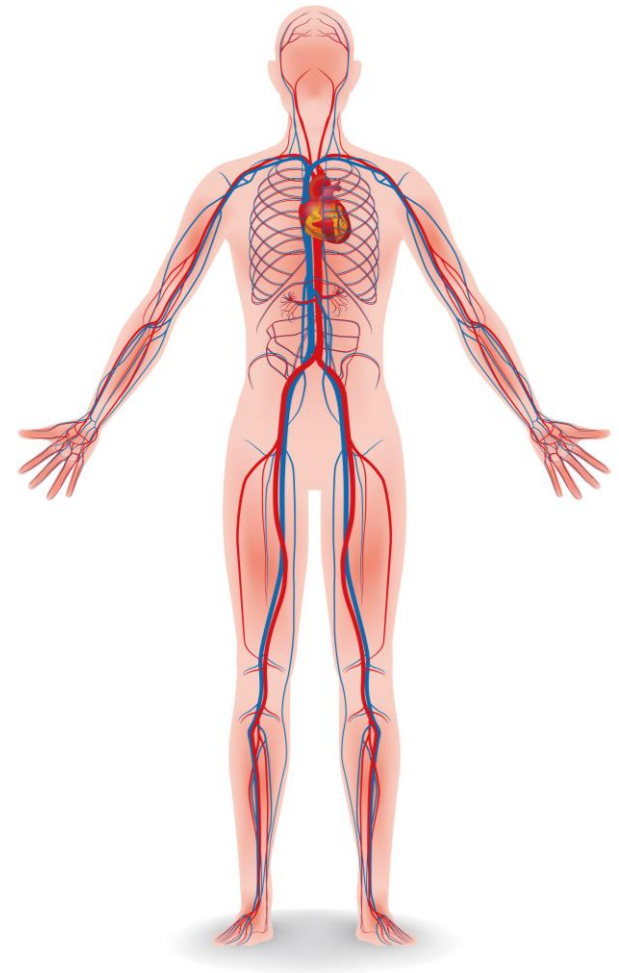
- Changes in energy expenditure



# Preprosthetic Running Goals (cont.)

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- Cardiopulmonary function changes





# Preprosthetic Running Goals (cont.)

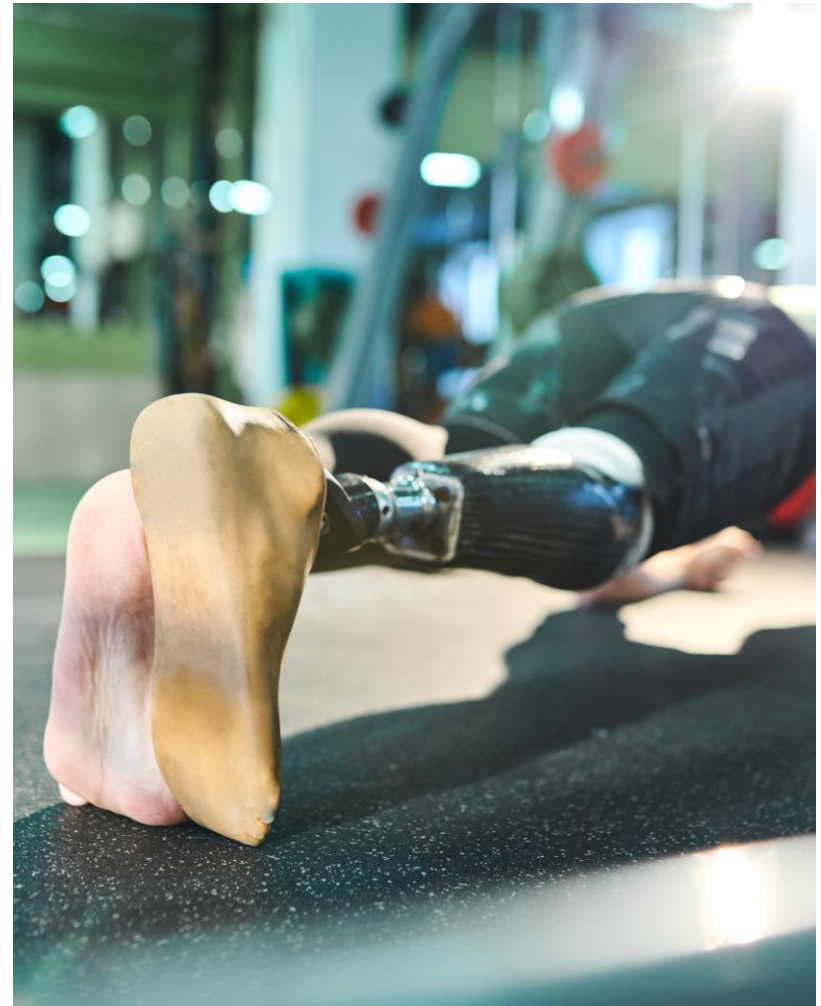
- Importance of vital signs at baseline
- Importance of vital signs at trackside





# Preprosthetic Running Goals (cont.)

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



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- 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



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



# Preprosthetic Running Goals (cont.)

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





# Chapter Summary

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- 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

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# Running With a Prosthesis



# Basic Running Biomechanics

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- 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



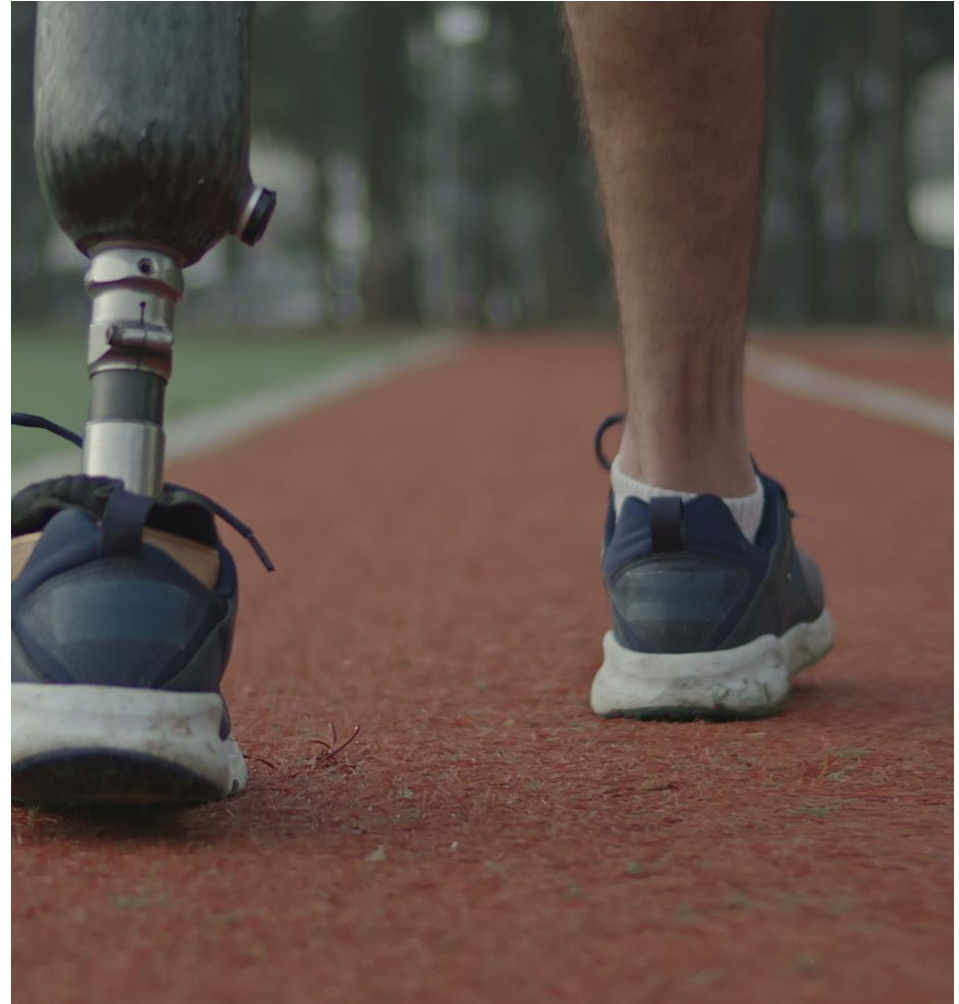
# Basic Running Biomechanics (cont.)

- 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

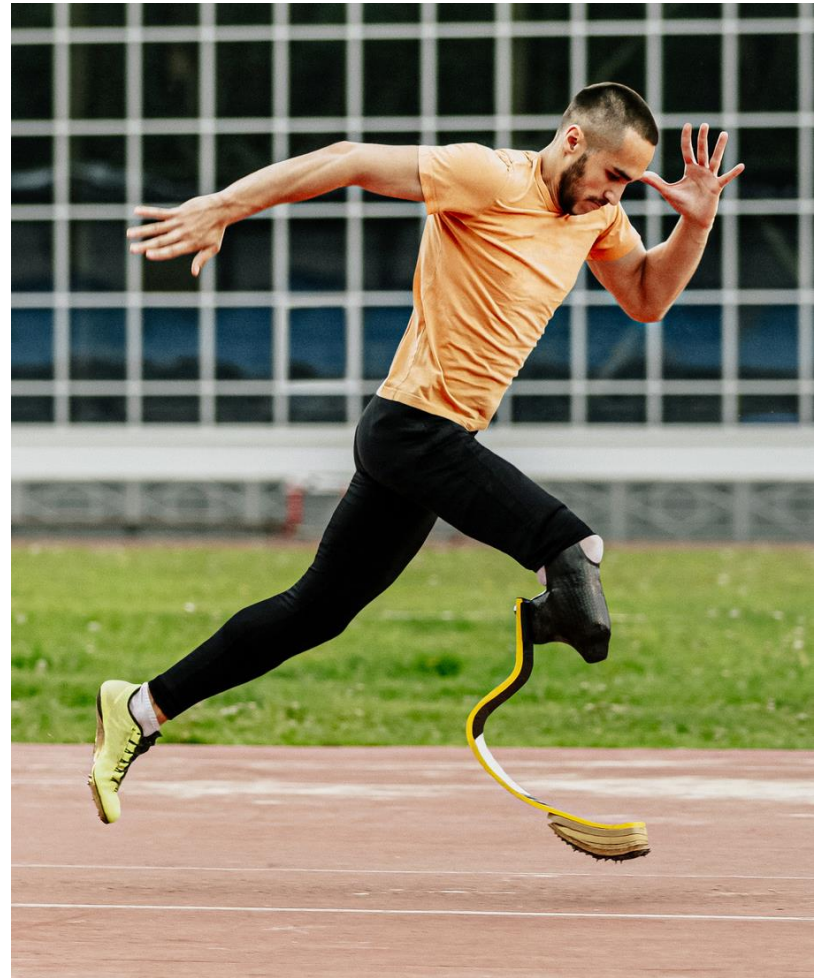




# Basic Running Biomechanics (cont.)

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- Prosthetic running categories
- Potential progression of prosthetic running categories



# Basic Running Biomechanics (cont.)

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- Current popular running prosthetics

# Let's Run!

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Video: Basic Running Biomechanics

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# The Running Evolution



Video: Basic Running Biomechanics

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# Transtibial Running



Video: Basic Running Biomechanics

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# Transfemoral Running





Video: Running Drills

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# Arm Swing and Trunk Rotation



Video: Running Drills

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# Wall Push



Video: Running Drills

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# Lateral Bounding



Video: Running Drills

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# High Knees



Video: Running Drills

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# Mule Kicks



Video: Running Drills

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# Cariocas



Video: Running Drills

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# Skipping



Video: Running Drills

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# Resisted Running





# Chapter Summary

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

## Chapter 3

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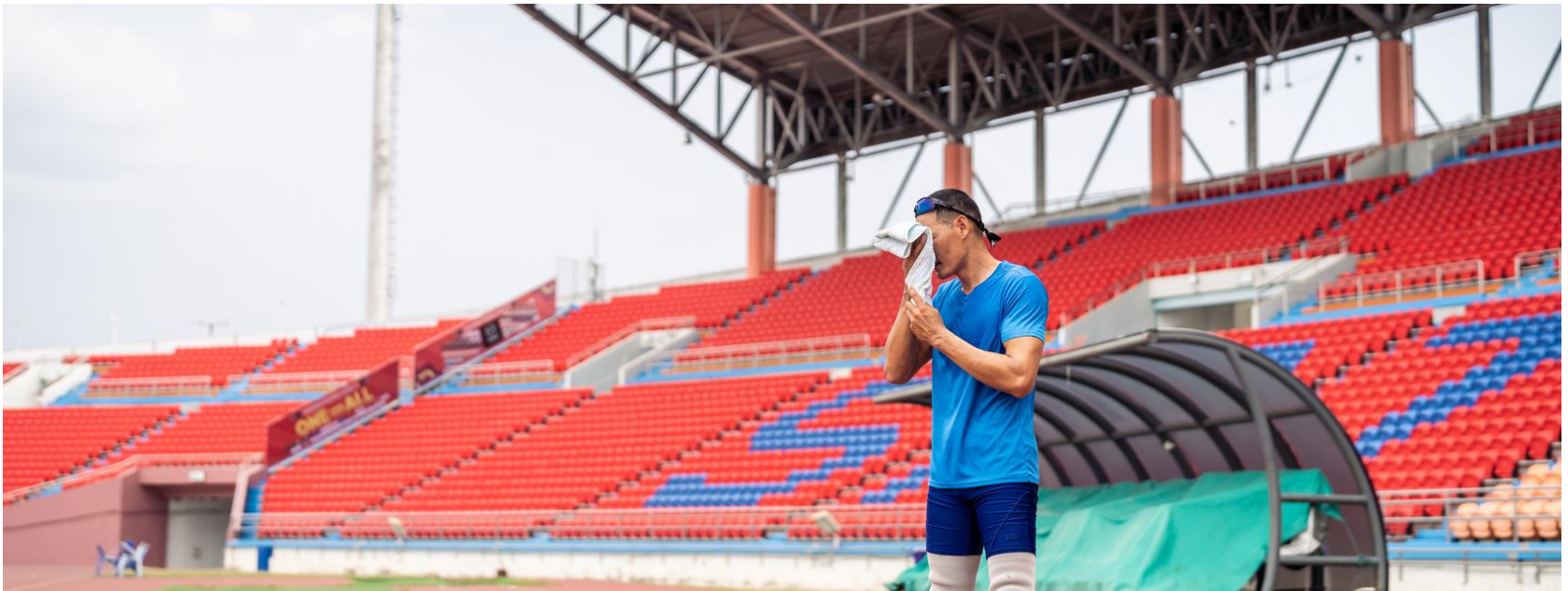
# Tips and Tricks for Success



# Sweat Management

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- 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.)

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- Prescription strength antiperspirant

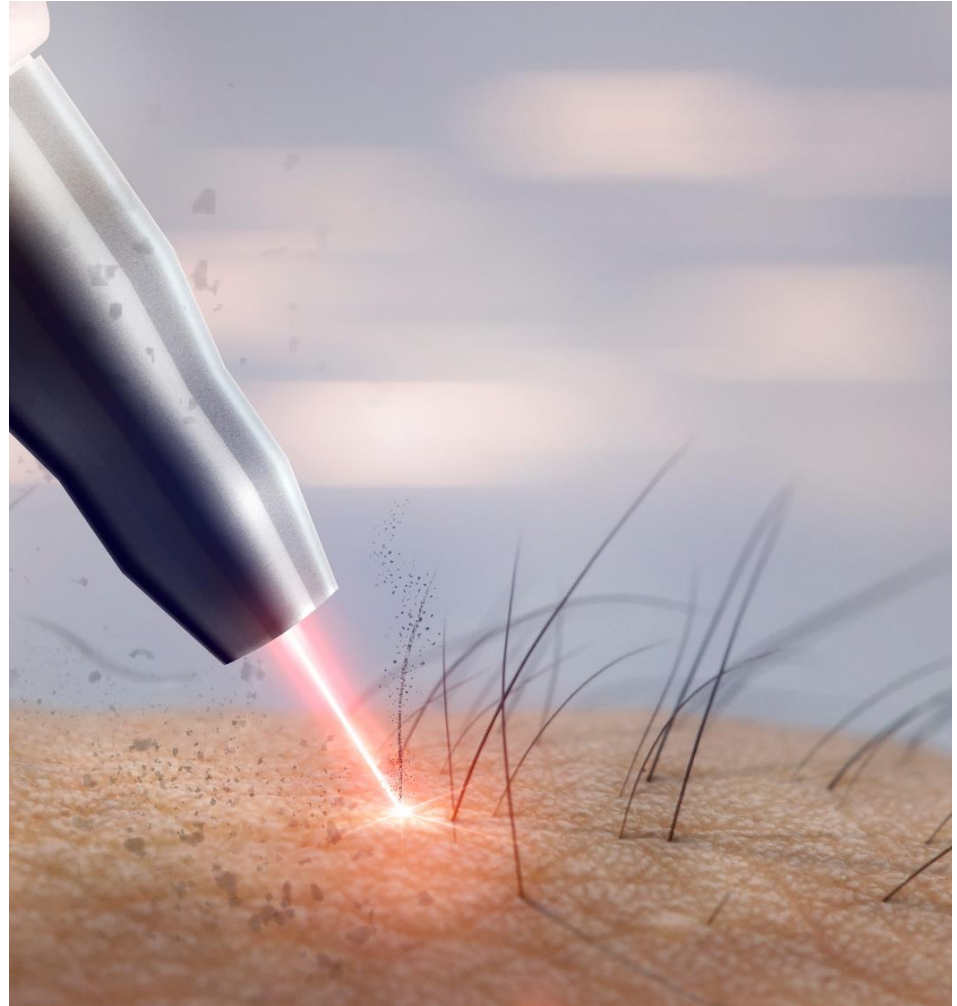




# Sweat Management (cont.)

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- Laser hair removal





# Sweat Management (cont.)

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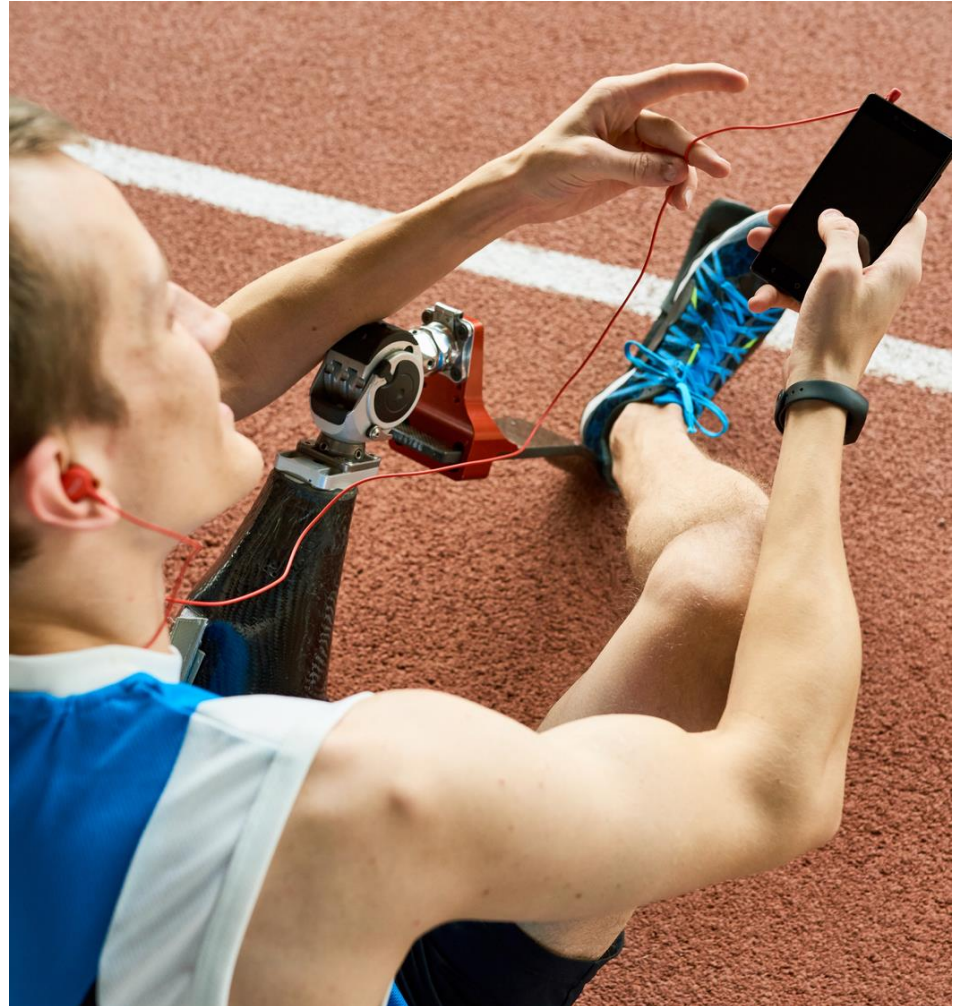
- Botox
  - Temporary treatment
  - Requires time out of limb
  - Anecdotally works for some and not for others



# Tips and Tricks

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- Musical cues



# Tips and Tricks (cont.)

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- Running belts



# Tips and Tricks (cont.)

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- Sweat towels



# Tips and Tricks (cont.)

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- Hip belts

# Chapter Summary

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- 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

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- 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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