Care for the Person with Amputation

Prosthetic Innovation

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- Upon completion of this module, the attendee will be able to identify:
- Current prosthetic innovation and application
- Sock management
- Trouble shooting

- Prosthesis –vs- Prosthetic
- $$-$$$$$
- Inadequate prosthetic training

May, B.J. (2014)

Matching the prosthesis to the wearer is important.

Prosthetic Prescription

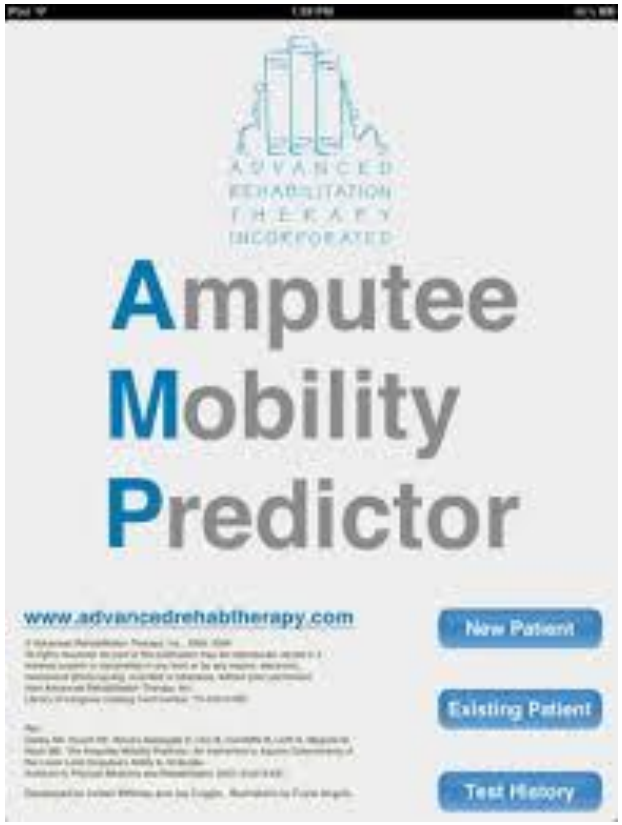
- Physical Function
  - Strength
  - Endurance
  - Range of motion
  - Balance
- Alignment
- Inherent component Stability
- Cognitive function

A prosthesis must:

- Fit comfortably
  - Snugly
    - Proprioception
    - Control
- Provide Stability
- Allow Mobility
- Easy to Don/Doff

Amputee Mobility Predictor

- AMPPRO
- AMPnoPRO
- AMP-B



Gailey et al. (2002)

	AMPPro	AMPnoPro
K0	N/A	0-8
K1	15-26	9-20
K2	27-36	21-28
K3	37-42	29-36
K4	43-47	37-43

Sock Management

- Protect skin
- Absorb/wick perspiration
- Cushion impact
- Take up volume
- Ply
- Appropriate number
- Worn outside liners

Sheath

- Thin nylon
- Worn under socks
- Helps keep skin dry

Insufficient Ply

Trans-Tibial

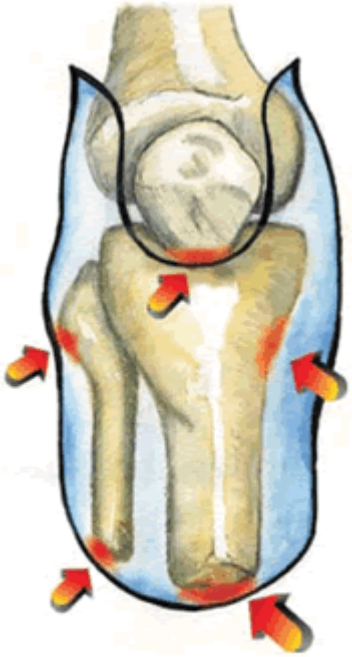


Figure 1. *This figure shows the transtibial skeletal system and the pressure areas that can occur if the residual limb shrinks and requires a sock to replace the volume loss.*

Trans-Femoral

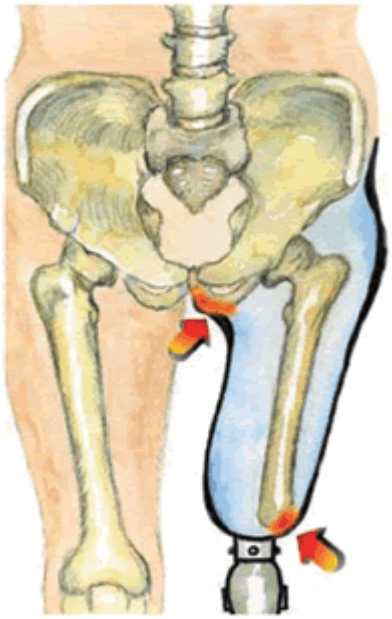


Figure 2. *This figure shows the pelvic and transfemoral skeletal system and the pressure areas that can occur if the residual limb shrinks and requires a sock to replace the volume loss.*

Excessive Ply

Trans-Tibial

- Pressure
  - Tibial crest
  - Fibular head
- Lack distal contact

Trans-Femoral

- Pressure
  - Greater trochanter
- Lack distal contact
- Create adductor roll

Check Socket


APR 9 2003


APR 11 2003

- Pe-Lite
  - Inner socket
  - Soft
  - Cushion inner liner
  - Socks worn under Pe-Lite

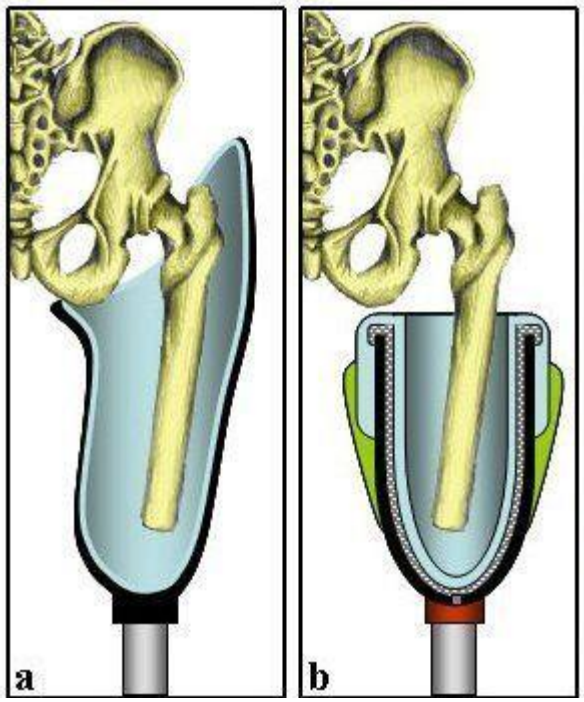
Prosthetic Components

- Socket
- Suspension
- Shank
- Terminal Device
  - Foot
  - Blade
  - Hand
  - Hook
- Articulations
- Add ons
  - Liners
  - Rotation unit
  - Shock absorbers
  - Computers
  - Motors
  - Specialized TD's

Mobility Grades

- K0: prosthesis not indicated
- K1: Indoor
- K2: restricted outdoor
- K3: unrestricted outdoor
- K4: unrestricted outdoor with especially rigorous demands.

Trans-femoral socket design



Ischial Containing –vs- Quadrilateral

Trans-tibial socket design

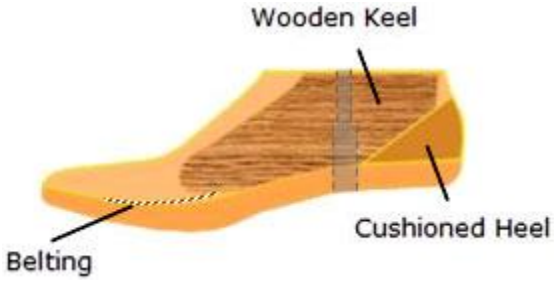
Patellar Tendon Bearing PTB –vs- Total Surface Bearing TSB

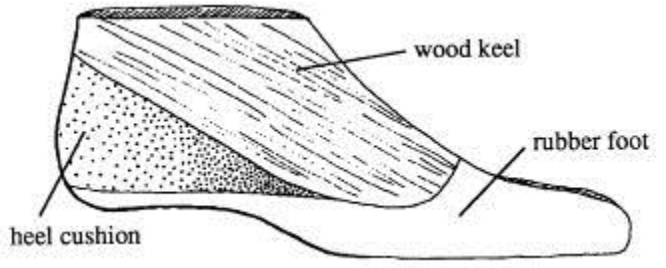
Prosthetic Feet

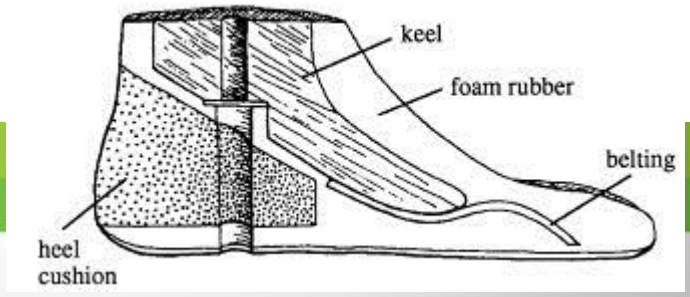
- SACH
- Flexible Endoskeleton
- Single Axis
- Multiaxial
- Dynamic response
- Multiaxial dynamic response
- Sport specific
- Microprocessor
- Powered
- Vertical shock pylon
- Axial rotation unit
- Heel height adjustment

SACH

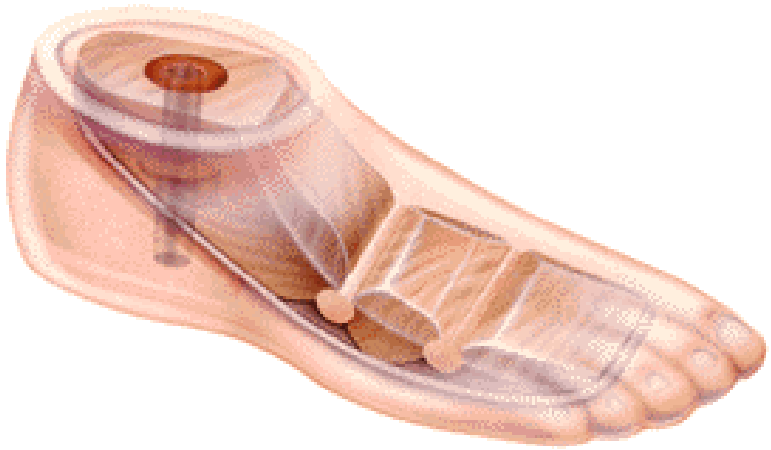
- Low maintenance
- Light weight
- Inexpensive
- Heel height
- Durable
- Many sizes and heel heights







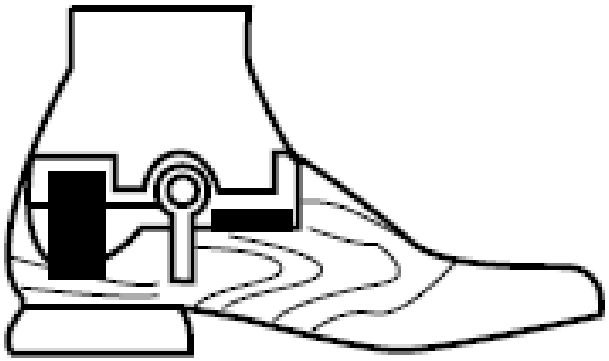
Flexible Endoskeleton



- Greater PF/DF
- Inversion/eversion
- Uneven surfaces
- More expensive
- Heavier
- More maintenance

Single Axis

- DF/PF
- Heavier
- More maintenance
- Rubber bumpers control movement
  - Post controls PF
  - Ant controls DF



Single Axis

Multi Axis

- Sagittal and frontal plane movement
- Absorbs torque
- Uneven surfaces

- More maintenance
- $
- Noisy
- Heavy

Dynamic Response

- DERS
  - Short leaf spring
  - Long leaf spring
  - Absorbs energy
  - Keel deforms at heel strike
  - Returns energy for propulsion
  - Improved endurance?

Knees

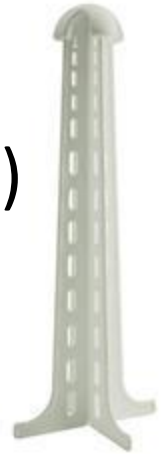
- Manual lock knee (K1)
- Weight activated stance control (K1-K2)
- Polycentric (K2-K3)
- Fluid Friction (hydraulic/pneumatic) (K3-K4)
- Microprocessor (K3-K4)

Prosthetic Knees

Liners (Cushion/Suspension)

- Silicons
- Polyurethane
- Co-polymer

- Do not pull on
- Fully deflect liner
- Roll on
- Wash daily (weekly)
- On stand to dry
- Alternate daily
- Check for damage
- Remove air bubbles



Liners

- Silicone
  - Fleshy limbs
  - May use…Shuttle-lock suspension
  - Durable
  - Easy to clean
  - Low to moderate activity level

Liners

- Polyurethane
  - Flow characteristics
  - Vacuum suspension
  - Suction suspension
  - TSB
  - Low to high activity levels

Liners

- Copolymer
  - Additives
  - Dry skin
  - Pin or suction suspension
  - TSB
  - Low activity level

Liner Liner

- Not a sock
- Worn under liner
- Helps with perspiration

Suspension

- Mechanical
- Vacuum
- Shuttle lock
- Suction

- Must match activity level
- Comfortable
- Retain limb
  - Minimize pistoning
- Proprioception

Suspension

- Mechanical
  - Supracondylar cuff
  - Brim contours
    - PTBSC
    - PTBSCP
  - TESS

Suspension

- Shuttle Lock

- Liner with pin
- Pin inserts into lock
- Release button
- Socks go on outside… socks have holes

Lanyard system

Sealing Sleeve

- Vacuum suspension
- Suction suspension
- Goes over prosthesis
- Rolls onto leg
- Creates an airtight seal

https://www.ottobockus.com

Suspension

- Vacuum
  - Liner
  - Sleeve
  - Pump
  - Exhaust valve
- Regulates volume
- Improves circulation
- No socks

Suspension

- Seal in Liner
  - Liner with seal
  - Socket has valve

TFA suction

- Donning sleeve
- Valve

Hook or Hand/ Power?

Body powered

Externally powered

New and Exciting

- Adjustable prosthetic sockets

Future…. No!…. NOW

- Osseointegration
- “Bionics”
  - Powered knee
  - Powered ankle

Microprocessor Foot

Powered Ankle

Osseointegration