SOCKET DESIGNS

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WillowWood® CORE

CENTER FOR OUTCOMES, RESOURCES & EDUCATION

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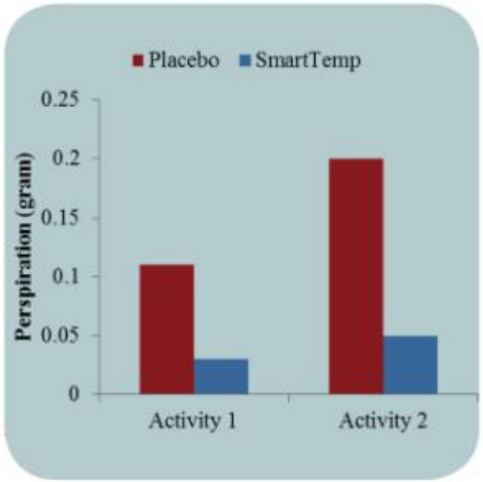
WHAT IS CORE?

- Center for Outcomes, Resources, and Education



OUTCOMES

RESOURCES

EDUCATION

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WHO IS CORE?

EDUCATION TEAM

CUSTOMER CARE

RESEARCH

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WHAT DOES CORE DO?

- Discuss and explore prosthetic issues
- Field product questions and applications
- Promote results of prosthetic research funded by state and federal agencies

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OUTCOMES

Meet the Team

Clinical Outcomes

Research Partners

Bibliography


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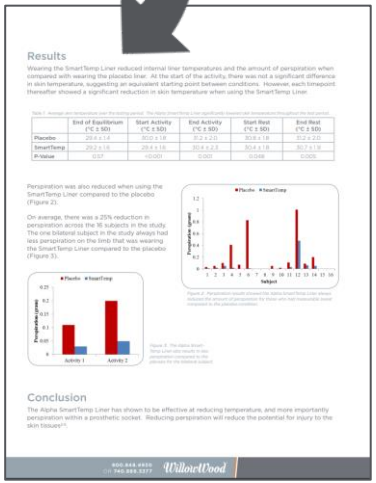
Results

Conclusion

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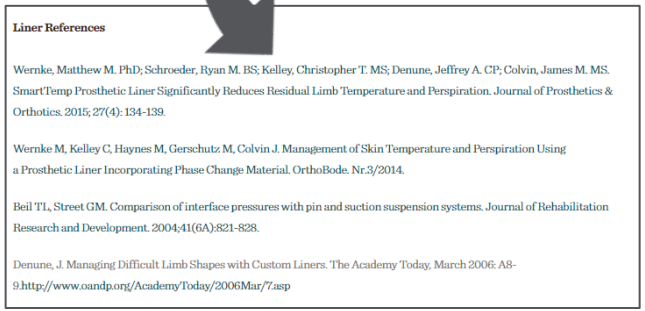
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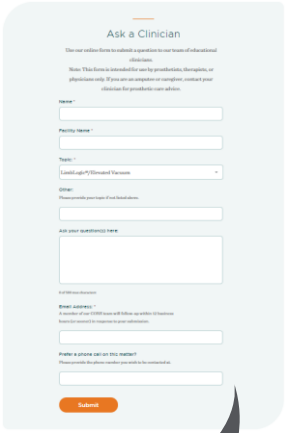
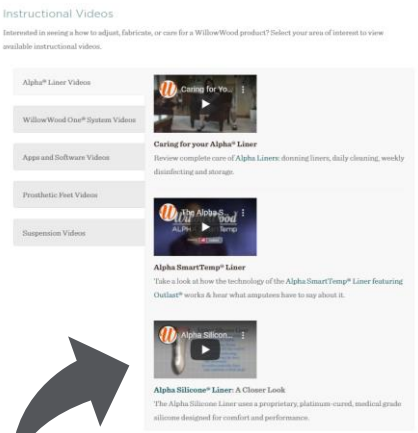
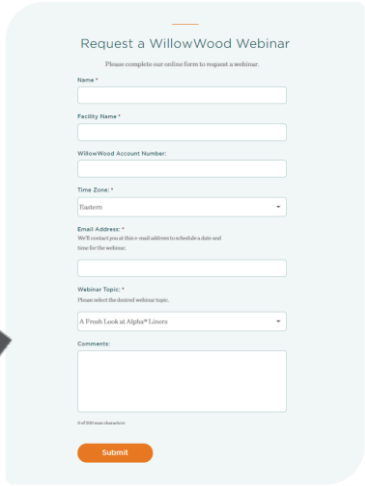
RESOURCES







Meet the Team

Ask A Clinician

Instructional Videos

Webinars on Demand

FAQs

e-Newsletter Sign Up

L-Codes

Patents

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EDUCATION

Meet the Team

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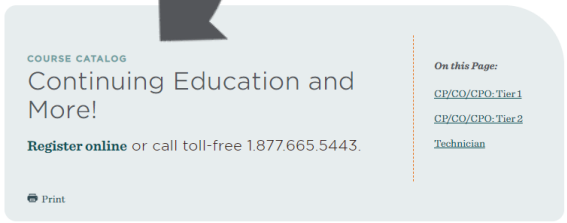
Course Catalog



COURSE CATALOG

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Print

On this Page:

CP/CO/CPO: Tier 1
CP/CO/CPO: Tier 2
Technician

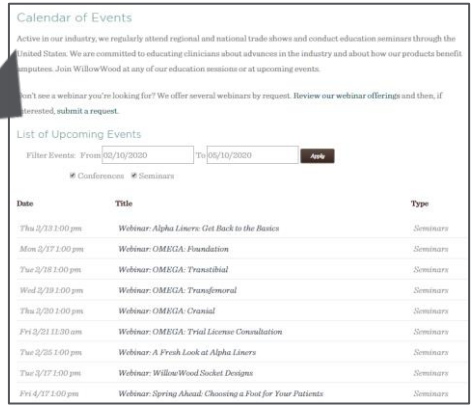
CP/CO/CPO: Tier 1

Alpha Liners: Get Back to the Basics

Webinar: Duration= 1 hour Credits= 1.5 ABC / 1.5 BOC
Live Course: Duration= 1 hour Credits= 1 ABC / 1 BOC

This course provides an overview of the selection, fitting, and use of the Alpha Liner for prosthetists who are just entering the field or who have no experience with this type of product.

Calendar of Events



Calendar of Events

Active in our industry, we regularly attend regional and national trade shows and conduct education seminars through the United States. We are committed to educating clinicians about advances in the industry and about how our products benefit amputees. Join WillowWood at any of our education sessions or at upcoming events.

Don't see a webinar you're looking for? We offer several webinars by request. Review our webinar offerings and then, if interested, submit a request.

List of Upcoming Events

Filter Events: From 02/10/2020 To 05/10/2020 Apply

Conferences Seminars

Date	Title	Type
Thu 2/13 1:00 pm	Webinar: Alpha Liners: Get Back to the Basics	Seminars
Mon 2/17 1:00 pm	Webinar: OMEGA: Foundation	Seminars
Tue 2/18 1:00 pm	Webinar: OMEGA: Transtibial	Seminars
Wed 2/19 1:00 pm	Webinar: OMEGA: Transfemoral	Seminars
Thu 2/20 1:00 pm	Webinar: OMEGA: Cranial	Seminars
Fri 2/21 11:30 am	Webinar: OMEGA: Trial Liner Consultation	Seminars
Tue 2/25 1:00 pm	Webinar: A Fresh Look at Alpha Liners	Seminars
Tue 3/17 1:00 pm	Webinar: WillowWood Socket Designs	Seminars
Fri 4/17 1:00 pm	Webinar: Spring Ahead: Choosing a Foot for Your Patients	Seminars

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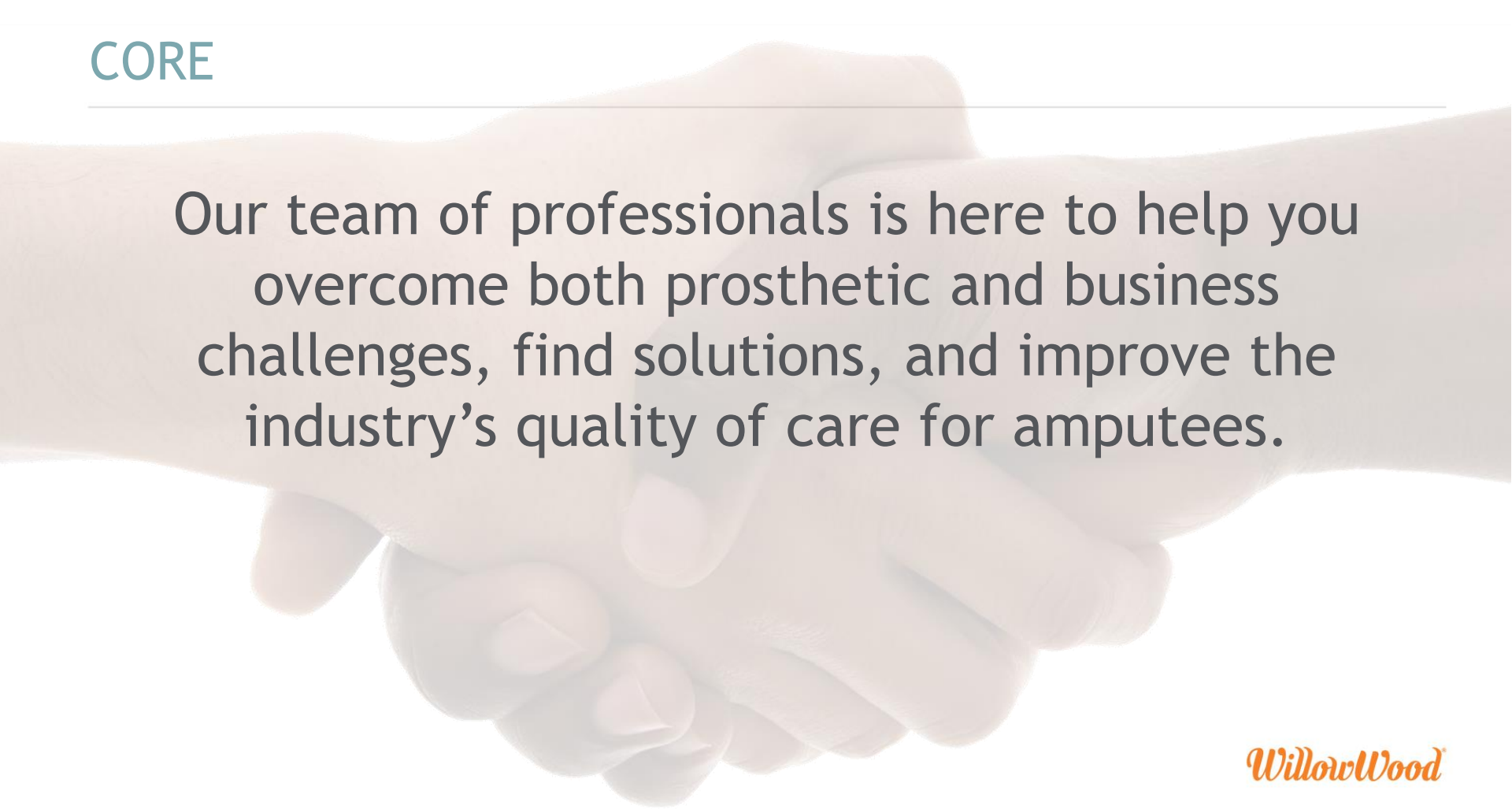
CORE



Our team of professionals is here to help you overcome both prosthetic and business challenges, find solutions, and improve the industry's quality of care for amputees.

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AGENDA

- Traditional Socket Designs
- Total Surface Bearing
- Adjustable Sockets
- Ischial Containment and Beyond
- Vacuum Suspension
  - Vacuum Research
- Shape Capture Methods

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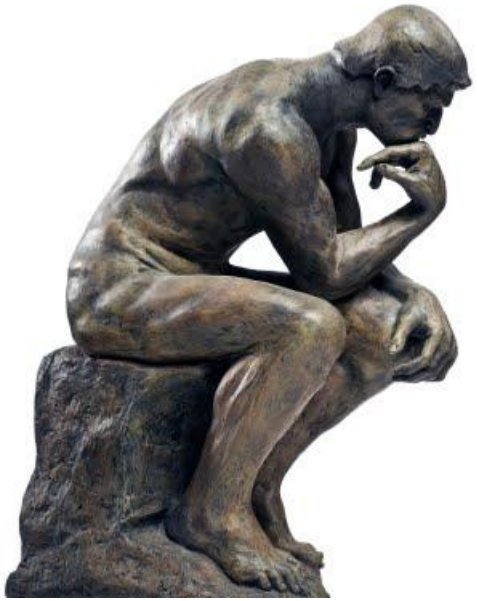
SOCKET DESIGNS

- Emerging and innovative designs and techniques continually emerging
- How does the clinician choose among competing philosophies
- Experience and compliance of amputees
- Residual limb anatomy
- Activities



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IMPORTANCE OF SOCKET FIT

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SOCKET DESIGN

- Must be comfortable and functional
- At least three key functions
  - Contain residual limb tissues
  - Transfer weight from the residual limb to the floor
  - Sitting comfort

SOCKET DESIGN

- Primary connection between residual limb and prosthesis
  - Thorough understanding of biomechanical variables involved
  - Must provide comfort and function
- Alignment: Spatial relationship between prosthetic socket and components such as prosthetic knee and foot
  - A/P positioning
  - Weight distribution
  - Energy efficient gait
- Sitting comfort

SOCKET DESIGN

- Human skin does not have intrinsic capacity to remain undamaged under prosthetic pressure
- Poorly fitted sockets result in mechanical trauma to skin, resulting in ulcers
- Pressure and weight induced stress
- New techniques and materials
  - Shape capture and rectification methods
  - Flexible liners
  - Interface materials
- Evolutionary or revolutionary

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TRANSTIBIAL

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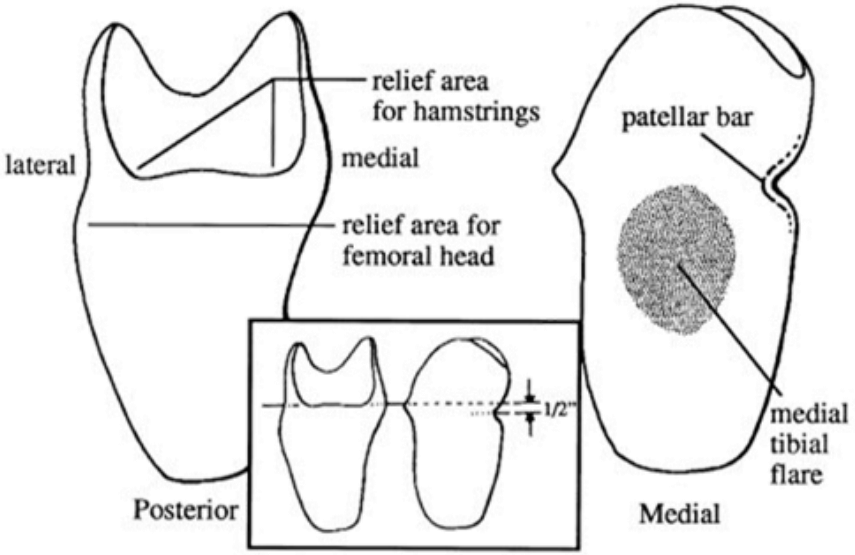
PATELLA TENDON BEARING

- Utilizes the patella ligament as a major weight-bearing region
- Medial flare
- Medial and lateral walls extend proximal to adductor tubercle
- Rotation control
- M/L knee stability
- Reliefs and depressions
- Posterior wall design



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TOTAL SURFACE BEARING (TSB)

- Weight is distributed over the entire surface of the residual limb, including areas which have in the past been considered pressure-sensitive

TSB PRESSURE CAST

- Pressure cast hydrostatic socket
- Conceptually solidifies the residual limb into one mass
  - Theoretically there is equal pressure throughout the socket
- Contours without the reliefs and depressions of a PTB design
- Cast is modified by reducing the positive model globally
- Interface liners flow from high pressure regions

TRANSFEMORAL

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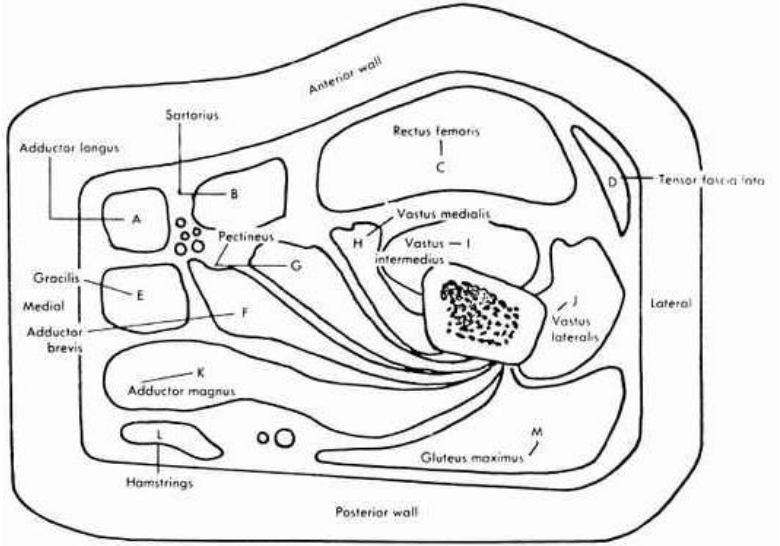
QUADRILATERAL SOCKETS

- Weight-bearing achieved through combination of skeletal and muscular anatomy
  - Ischium and gluteal musculature rest on a wide seat on the proximal posterior wall
- Total contact
- Narrow A-P, wide M-L
- Specific reliefs for various muscle groups and tendons
- Longer limbs



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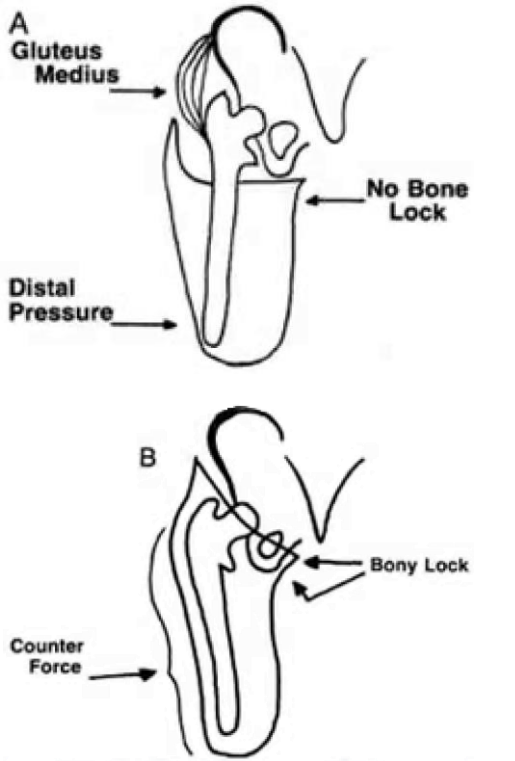
ISCHIAL CONTAINMENT

- "Bony lock"
  - Enclosure of IT and ramus
- Forces required for M-L stability borne by the bones of the pelvis
- Total contact
- Less emphasis on narrow A-P
- Shorter limbs
- Variations of design and technique



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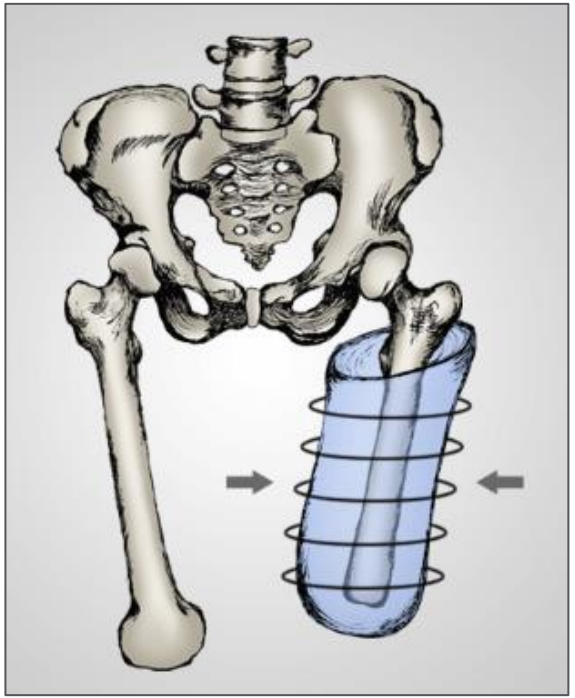
ISNY SOCKETS

- Flexible thermoplastic sockets supported in a rigid or semirigid frame
  - Improved comfort and proprioception
  - Decreased weight
  - Minor volume changes accommodated
  - Temperature reduction (improved heat dissipation)
  - Enhanced suspension
  - Not linked to any one philosophy of TF socket design

SUB ISCHIAL SOCKETS

- Proximal trimlines do not impinge on the pelvis
- Utilizes interface liners
- Often utilized with vacuum to minimize movement and maximize femoral control
- Evenly distributes weight-bearing forces on entire surface of the residual limb



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NU-FLEXSIV SOCKET

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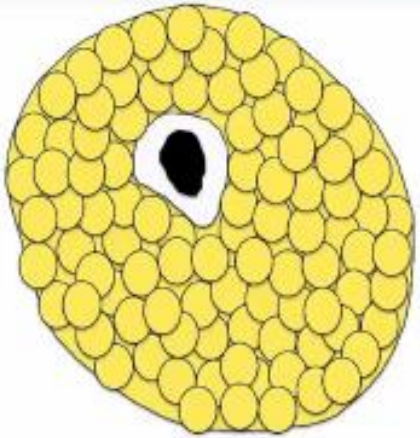
NU-FLEXSIV SOCKET

NORTHWESTERN UNIVERSITY

Tissue Mechanics: Application of Vacuum

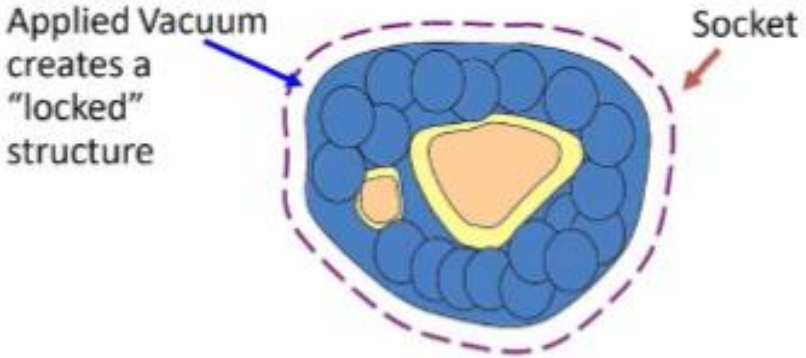


Transfemoral Limb

- Many more cells with less bony structures to lock against.
- Tissue stiffening in this case will require a stiffer liner to compress the tissues prior to hydration.

NORTHWESTERN UNIVERSITY

Tissue Mechanics: Application of Vacuum



Source: Ohio WillowWood

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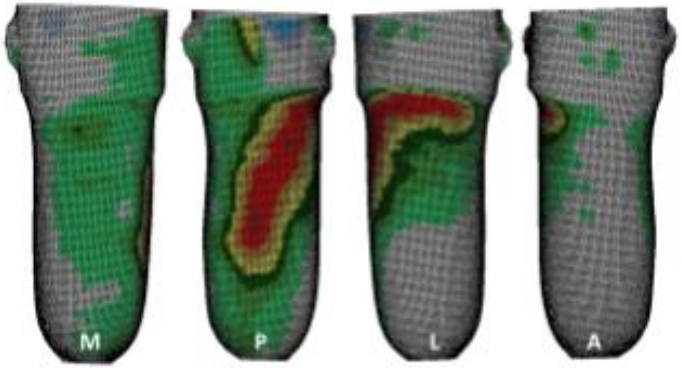
NU-FLEXSIV SOCKET

- Combination of compressive liners, flexible socket materials, vacuum suspension, and impression and rectification techniques
- Clinical algorithm for model rectification



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HIFI™ (HIGH-FIDELITY) INTERFACE

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HIGH-FIDELITY INTERFACE

- Soft tissue that has not been optimally preloaded allows skeletal motion within the socket prior to the socket responding
- Utilizes longitudinal struts for compression of soft tissue nearly the entire length of the bone
- Increased compression on the intrinsic bone
  - Greater than what can be achieved by hydrostatic or other traditional socket designs

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HIGH-FIDELITY INTERFACE

- May improve walking ability, balance and confidence
- Eliminates need for high trimlines
- Use with flexible inner socket
- Uniquely designed windows between the struts help manage the gradual release of displaced soft tissue
- TF and TT configurations

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ADJUSTABLE SOCKETS

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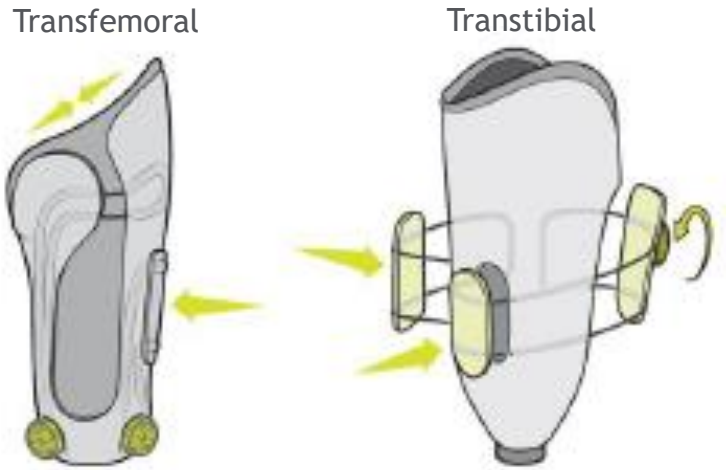
ADJUSTABLE SOCKETS

- Accommodate residual limb volume changes
- Allow patients to adjust
- Reduce follow ups and socket remakes
- Patients need understanding of appropriate socket fit and dexterity to manage fit
- Variations for different levels of lower and upper extremity amputation

CLICK MEDICAL REVOFIT2™

- Adjustable multi panel socket design to provide targeted or global compression
- Micro and macro adjustments
- Adjustable through clothing
- Reduce sock requirements
- Bulbous distal ends
- Single or multiple panel designs
- TT and TF



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REVOFIT2 PROCESS

1. Standard check socket
2. Adjustable check socket to define design
3. Definitive socket

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MARTIN BIONICS

- Open frame socket design
- Uses a combination of fixed and floating struts attached to a base and connected by adjustable straps
- Various TT and TF configurations
- Modular **Socket-less Socket**™
  - Breathable
  - Conforming
  - Micro-adjustable

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MARTIN BIONICS

- TF **SwingBrim**™ conforms like a hammock
  - Provides a soft floating cushioned seat
- Sleeveless TT socket
- Suspension and rotation control enhanced by **SharkSkin Suspension**™ interface on inner struts
- TF **Femoral Lock Pad**
- Lightweight

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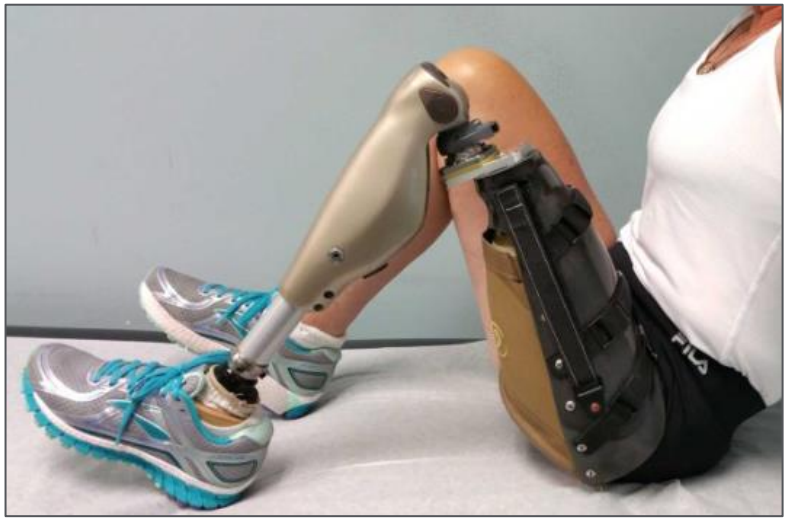
CJ SOCKET

- Three main parts
  - Rigid J-shaped socket covers 50% of residual limb
  - Posterior aspect covered by custom-made, non-elastic ***Sail*** garment
  - User-adjustable closure
- Eliminates ischial extension stop
- Increases socket useful lifetime



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CJ SOCKET

- Reduced weight
  - J-shaped socket covers approximately 50% of the residual limb
- Fluctuations in residual limb volume
- TT and TF designs
- TF may be fully donned while sitting
- Sitting comfort

WILLOWWOOD ONE SYSTEM

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WILLOWWOOD ONE SYSTEM

- Vacuum or suction options
- Internal seal
- Seal durability
- Improved suspension
- Improved knee range of motion (TT)
- Lower socket trimlines (TF)
- Lubricants not required for donning

ONE TRANSTIBIAL SYSTEM

Duo Liner with One Gel Sock

Flexible inner socket

One Sleeve

Laminated socket with One Link

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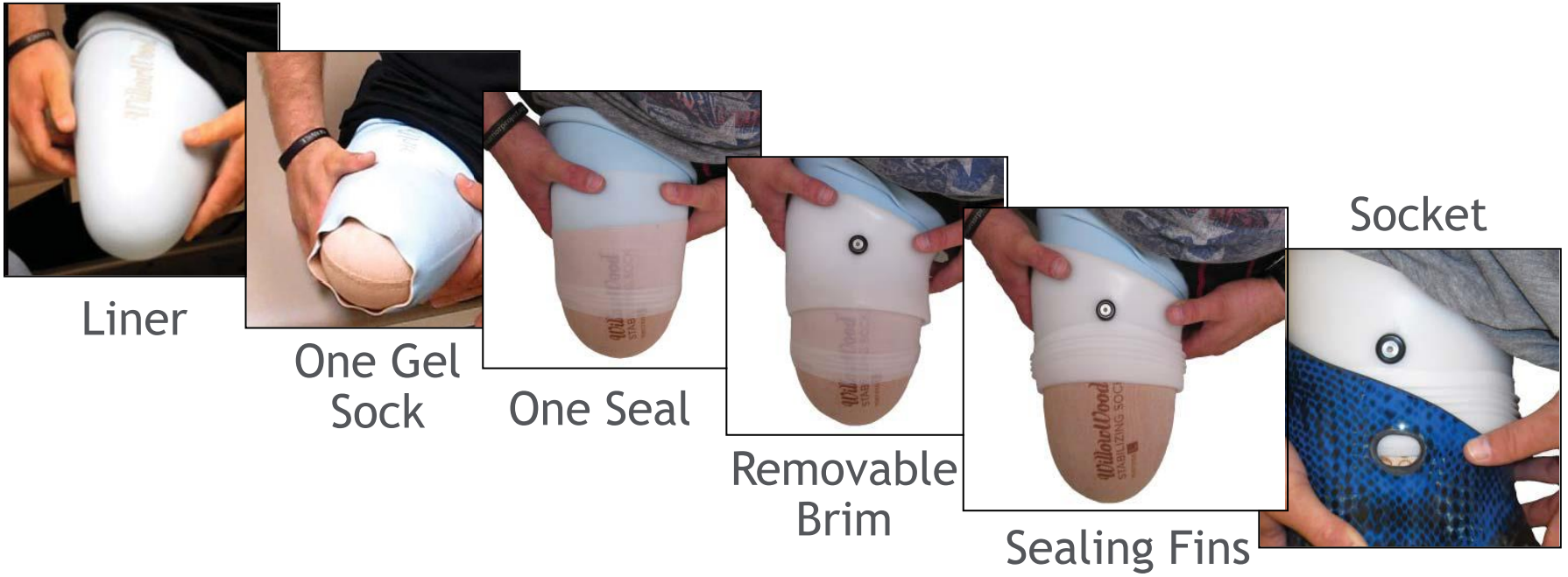
ONE TRANSFEMORAL SYSTEM



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SHAPE CAPTURE

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SHAPE CAPTURE

- Scanning

- Hand Casting

Note specific training or equipment requirements for specific socket designs

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SYMPHONIE® AQUA SYSTEM

- Full weight bearing hydrostatic plaster cast
- Calculated cylinder pressure
- Minimal modification
- TT and TF system options
- Digital impression

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VACUUM CONSIDERATIONS

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VACUUM CONSIDERATIONS

- Limb maturity and stability
- Technology tolerance
- Tolerance to vacuum
- TSB socket design
- Patient dexterity and cognition

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VACUUM

JRRD
Volume 53, Number 6, 2016
Pages 1121–1132

Elevated vacuum suspension preserves residual-limb skin health in people with lower-limb amputation: Randomized clinical trial

Cameron Rink, PhD;[1] Matthew M. Wernke, PhD;[2] Heather M. Powell, PhD;[3] Surya Gynawali, PhD;[1] Ryan M. Schroeder, BS;[2] Jayne Y. Kim, MS;[3] Jeffrey A. Denune, CP;[2] Gayle M. Gordillo, MD;[1,4] James M. Colvin, MS;[2] Chandan K. Sen, PhD[1*]

[1]Department of Surgery, Comprehensive Wound Center, and Dorothy M. Davis Heart and Lung Research Institute, The Ohio State University Wexner Medical Center, Columbus, OH; [2]Ohio Willow Wood Company, Mt. Sterling, OH; [3]Department of Biomedical Engineering, The Ohio State University, Columbus, OH; [4]Department of Plastic Surgery, The Ohio State University Wexner Medical Center, Columbus, OH

Abstract—A growing number of clinical trials and case reports support qualitative claims that use of an elevated vacuum suspension (EVS) prosthesis improves residual-limb health on the basis of self-reported questionnaires, clinical outcomes scales, and wound closure studies. Here, we report first

Key words: amputation, elevated socket suspension, perfusion, prosthesis, residual limb, socket, suspension, transfemoral, transtibial, vacuum.

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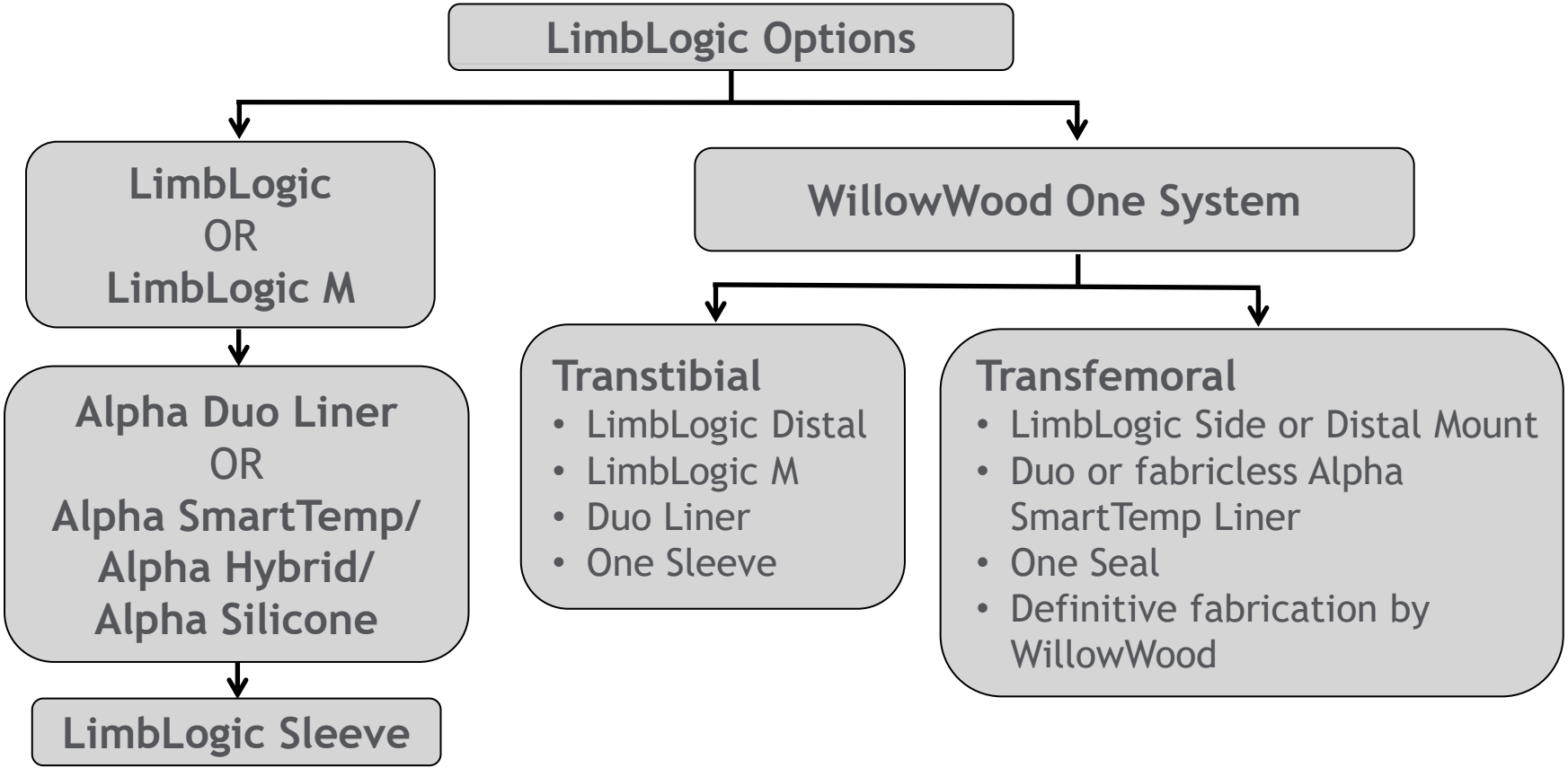
LimbLogic Options
LimbLogic
OR
LimbLogic M
Alpha Duo Liner
OR
Alpha SmartTemp/
Alpha Hybrid/
Alpha Silicone
LimbLogic Sleeve
WillowWood One System
Transtibial
• LimbLogic Distal
• LimbLogic M
• Duo Liner
• One Sleeve
Transfemoral
• LimbLogic Side or Distal Mount
• Duo or fabricless Alpha SmartTemp Liner
• One Seal
• Definitive fabrication by WillowWood

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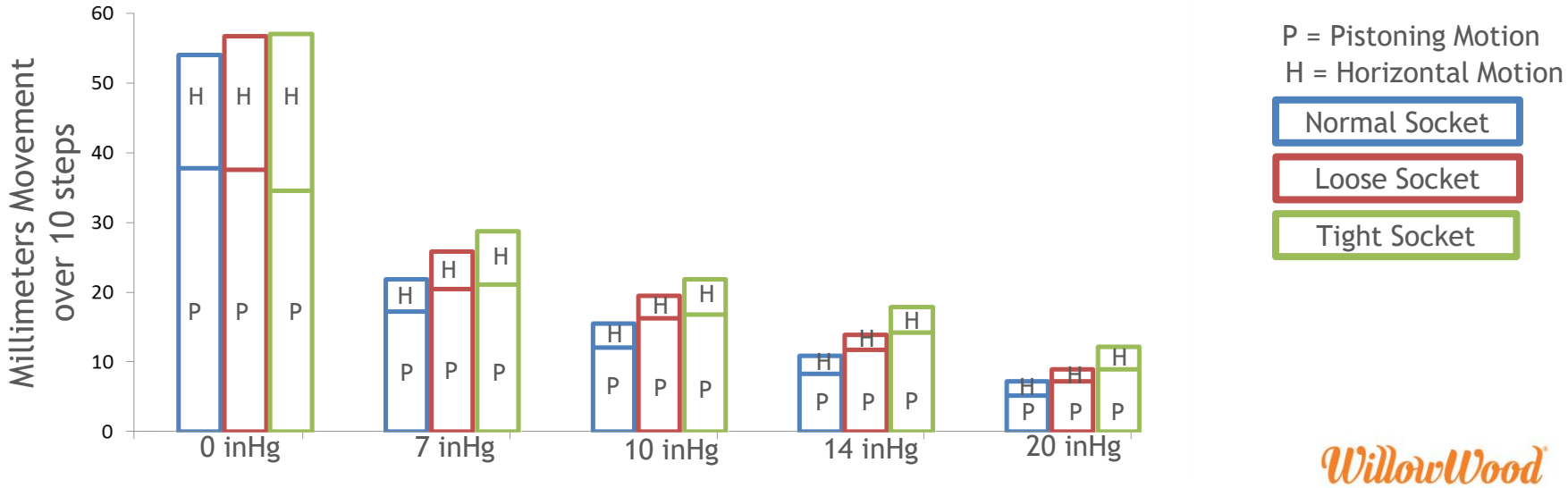
GLOBAL FIT CHANGES: INDUCTIVE SENSOR RESULTS

- Pistoning motion accounted for 61% - 82% of the overall motion
- Horizontal motion accounted for 18% - 39% of the overall motion
- EVS significantly reduced both motions ($p=3.8e^{-7}$ and $p=2.9e^{-7}$ respectively)



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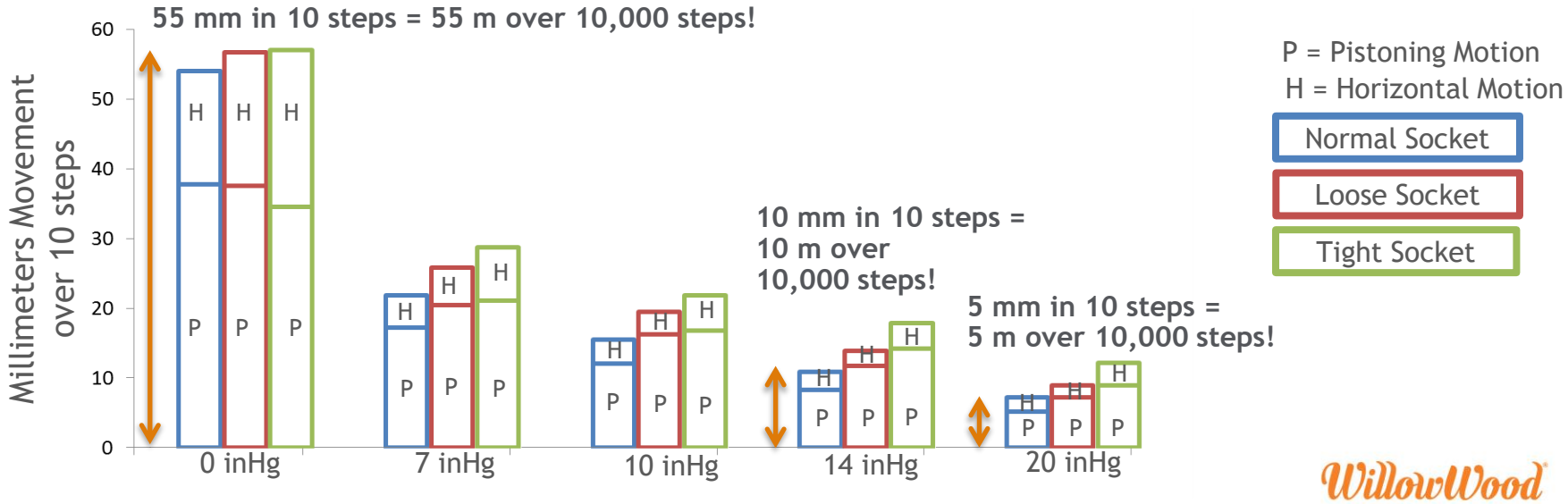
GLOBAL FIT CHANGES: INDUCTIVE SENSOR RESULTS

- Socket fit significantly impacted the amount of total motion ($p=5.3e^{-7}$)
  - Near significant for pistoning motion ($p=0.06$)
  - Significant for horizontal motion ($p=0.01$)



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INTERFACE MATERIALS

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INTERFACE MATERIALS

- Interface material and liner characteristics
- Suspension
- Skin and limb integrity
- Patient preference or allergies

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SOCKET DESIGNS

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