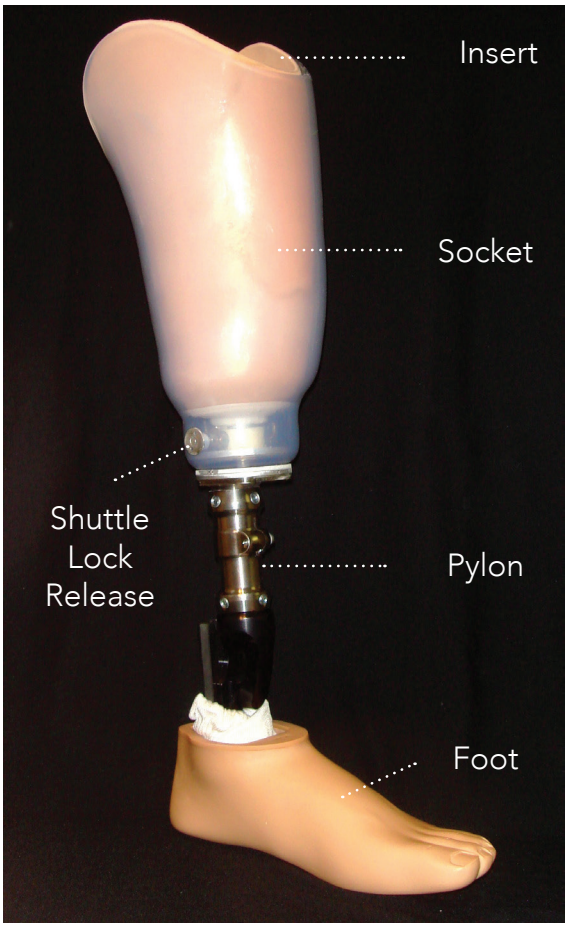
WESTCOAST
BRACE & LIMB

BELOW KNEE (TRANS-TIBIAL) PROSTHESIS TERMS AND TROUBLESHOOTING

The following information is to be used only as a tool for learning. If at any point you have a question or are unsure of what to do, please call your local Westcoast Brace & Limb facility to speak with an Amputee Case Manger or Certified/Licensed Prosthetist



ANATOMY OF PROSTHESIS

(See Diagram)

- **Socket** - The custom fabricated hard piece that encompasses your residual limb
- **Pylon** - Attached the socket to the prosthetic foot
- **Foot** - The artificial prosthetic foot at the far end of your prosthesis
- **Liner** - This is usually a roll on Silicone or Urethane liner. This goes directly against your skin. It may or may not have a pin that sticks off of the outside bottom of the liner.
- **Sleeve** - aka. Suspension sleeve. This is attached to the outside of the prosthetic socket and rolls up onto your thigh.
- **Insert** - This is inside your prosthetic socket. It may be made of a flexible plastic or foam.

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ANATOMICAL TERMS

• **Femur/femoral condyle**- The thigh bone and the inside of the knee

• **Fibula** - the thin bone on the outside of your leg that runs from just below the knee to the end of your leg. The prominence at the top is referred to as your "Fib Head".

• **Hamstring tendons** - the rope-like tendons just behind your knee. They are most easily felt when flexing/bending your knee against resistance

• **Patella** - knee cap

• **Patella tendon or Quad tendon** - tendon just below your patella on the front of your leg. It is often where a doctor checks your reflexes.

• **Popliteal Fossa** - the soft spot at the back of the knee

• **Tibia** - the large bone in your leg, below the knee. Often referred to as the "shin" or "shinbone"

• **Medial flare of the tibia** - below the knee on the inside of the leg, where the tibia changes from wide to narrow.

OTHER PROSTHETIC TERMS

• **Atrophy** - the shrinking of muscles from lack of use.

• **Edema** - swelling or accumulation of fluid in the body. Ie: edema in the residual limb.

• **Residual limb** - The remaining part of your leg after amputation. May also be referred to as "residuum" or less commonly as "stump".

• **Shrink** - refers to the residual limb decreasing in size. This may result from edema being removed from the limb and/or from muscle atrophy that is common with a newly amputated limb.

• **Flexion** - the movement of the knee/leg from a straight position to a bent position.

• **Extension** - the position of the knee/leg in a straight position.

• **Hyperextension** - back knee - the position of the knee past full extension. Looks like the knee is being pushed backwards.

• **Contracture** - refers to the tendons being tight and limiting the knee joint from reaching an end range of motion, such as full extension. Ie: "the knee has a 10 degree flexion contracture" means the knee is 10 degrees away from being straight.

• **Distal end** - the furthest point away from your body, the bottom of your residual limb.

• **Suspension** - how the prosthesis holds on to your residual limb

• **Supracondylar (SC)** - just above the widest part of the knee. Supracondylar suspension of a prosthesis refers to the prosthesis being held on by a tight fit at the narrow part of the leg, just above the knee.

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OTHER PROSTHETIC TERMS (CONT.)

• **Silicone Suction Suspension (3S)** - a prosthesis that holds on by rolling a silicone or urethane liner onto your residual limb with a locking pin or plunger at the end that locks into a shuttle lock in the prosthesis.

• **Shuttle Lock** - a special lock inside the prosthesis that the 3S liner locks into, to hold on the prosthesis.

• **Cuff strap and waist belt** - the cuff strap or fork strap, is a strap that is attached to the side walls at the top of the prosthesis and comes up over the patella. The waist belt attaches around the waist and has a strap that runs along the front of the leg to connect to the cuff/fork strap. It helps suspend the prosthesis and limit pistoning.

• **Suction suspension** - or vacuum suspension- uses a cushion urethane liner (without pin) rolled on to the residual limb and a suspension sleeve that rolls over the prosthesis and onto the thigh to create a seal. The suction is then created by a pump, either mechanical or electronic, to hold on the prosthesis.

• **Piston** - the movement of the prosthesis in an up and down manner. Identified by feeling the prosthesis pulling away or dropping down when you lift up your leg, and then moving up when you put your leg down to bear weight. A prosthesis will piston if the suspension on your leg is no longer adequate (ie the limb has shrunk or there is a leak with the suction suspension system).

• **Ply** - a term that describes the thickness of a prosthetic sock.

TROUBLESHOOTING

A prosthesis is a "static" device, meaning that it cannot change unless your Prosthetist physically makes a change to it. Your residual limb, however, is dynamic and will change on a daily basis. It can increase or decrease in size and can affect how your prosthesis fits and feels. You can accommodate some of the small changes by ensuring the prosthesis was put on/ donned in the correct location, or through adding or removing socks as the leg changes size. If these small adjustments do not work, you will need to schedule an appointment with your Prosthetist to have some physical adjustments made.

How do I know when to call or schedule an appointment with my Prosthetist?

• If the prosthesis is donned correctly and is painful
• If there are any signs of blisters, bruising, or sores
• If the prosthesis is uncomfortable no matter how you put it on or what sock combination you use • If the prosthesis begins to make any noises

SOCKS

Too many ply of socks or tight fit
• Feeling that the prosthesis is too tall
• Residual limb feels choked and starts to throb • Uncomfortable pressure
  • at the patella tendon and back of the knee
  • at the widest part of the knee
  • directly on the side or at the top of the fibula head
  • on the inside of the knee at the top (only for supracondylar systems)
• Cannot get the locking pin/plunger to lock into the lock (only for 3S systems)
• The distal end of the limb becomes red/purple in color or moist. This is from lack of contact at the end of the limb and become very painful.

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TROUBLESHOOTING (CONT.)

Not enough socks or loose fit
• Feeling that the prosthesis is too short
• The prosthesis feels too tight, at the distal end
• Feeling like you are standing straight on the bottom of the limb • Uncomfortable pressure
• at the bottom and/or front of the Tibia
• at the bottom of the Fibula
• under the Fibula Head
• at the back of the knee, on the hamstring tendons
• on the bottom of the Patella

SHOES

Your prosthesis was designed and aligned to the shoes you brought in. Generally the prosthesis will stand fairly straight when in that pair of shoes. You can switch the socks and shoes on the prosthesis just as you would on your foot and leg. However, the heel height of the shoes will make a difference. You will experience one of the following if the heel height is different:

• The prosthesis leans forward in the shoes The heel height of the shoe is TOO HIGH.
• With the prosthesis on you may feel like your knee is flexing too quickly or being pushed forward
• You may have additional pressure on the back of the knee and front end of your tibia
• May feel like you are walking downhill
• The prosthesis leans backward in the shoes The heel height of the shoe is TOO LOW (you will also feel this if you try to walk in the prosthesis without a shoe. This is NOT recommended unless you have an adjustable heel height foot)
• With the prosthesis on you will feel like your knee is being pushed backwards.
• You may have additional pressure on the patella tendon and/or the bottom of the residual limb towards the back • May feel like you are walking up a hill

OTHER PROBLEMS THAT MAY ARISE

Slower walking than usual
• Suspension may be poor, causing pistoning of the prosthesis. This will make you walk slower and feel as if the prosthesis is heavy. You will feel like you have to wait for the "prosthesis to catch-up" and it also will feel like it is hanging from the limb rather than being a part of it. This can typically be resolved by adding another ply of sock to tighten up/improve the socket fit.

Instability/Wobble while walking
• This may also be related to the socket being too loose. As the volume changes, whether it's throughout the day, or over a long period of time, the socket may become too big on your leg. When this happens, your leg will move inside of the socket creating a feeling of instability or wobbliness. The first solution is to add more ply of socks. If this does not work, call your Prosthetist to have it evaluated as you may need adjustments to tighten the socket, or may need the socket replaced.
• See the above information about shoes if you recently changed your shoes and then noticed the instability

Uncomfortable pressure on both sides of the widest part of the knee
• The residual limb tends to shrink mostly where the muscle and tissue are and very little near the knee because it is mostly bone. As a result, adding socks to improve the fit where the limb has shrunk will end up putting additional pressure at the knee. You will need to call your Prosthetist for an adjustment or to discuss if "half socks" are a solution for you.
• You added too many socks and the widest part of your knee is hitting the narrow part of the top of the socket.

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• You don't have one enough socks and the wide part of the knee is resting on the narrow part of the socket below the knee. You will typically feel this at the lower part of the widest portion of your knee.

The bottom of your leg throbs, is red, and/or turning hard. This is usually a sign that you lack contact at the distal(bottom) of your residual limb.
• It can be caused from wearing too many socks, lifting you up and off of the bottom.
• It can also be caused by a change in your limb shape (swelling increases that prevent you from getting all the way into the prosthesis).
• This can also be caused by not having your shrinker or your liner all the way up against the bottom of your residual limb, allowing a space for you to swell into and a pulling sensation at the bottom of your limb.

Noise-Your prosthesis is making noise and you don't know where it's coming from.
This can be one of the most frustrating problems to encounter. Listed below are a few common scenarios in which noise may result. If the solutions provided do not work, call your Prosthetist to schedule an appoint to have your prosthesis inspected.

• Squeaking- Usually caused by friction between the prosthetic foot and the shoe. Add a sock or sprinkle a little baby/talcum powder in the shoe to eliminate the friction. This may also be from the prosthetic foot moving within the foot shell of the prosthesis. You will need this inspected and a possible replacement of the inner spectra sock.
• Clicking- If you have a Pin system (3S) prosthesis with a ratchet pin, you may be between clicks on the pin. Also check to make sure your shoe laces aren't hitting against your pylon (the pipe) while you are walking.
• Air expulsion (burping type noise)-if you are in a suction system, this is a sign that you are losing suction. Typically there is a hole in your suspension sleeve. Also check to make sure that your suspension sleeve is sealed around your socket entirely and also that it is sealed against your skin entirely.
• Foot is rotated too far in/out- Call your Prosthetist to have your alignment checked and your foot returned to the correct position.

SILICONE SUCTION SUSPENSION PROBLEMS (3S)

Rash on the residual limb
• Clean the liner daily with mild soap and water. Be sure to rinse it thoroughly to remove all soap residue.
• Avoid lotions, perfumes, and deodorants or soaps containing these as they can act as irritant when trapped in a closed environment. You may use an anti-perspirant if recommended by your Prosthetist.
• Make sure when donning the liner that you are ROLLING the liner all the way up and not pulling it. By pulling the liner, even just the top edge, you run the risk of developing blisters around the top edge.

The liner is falling or slipping off of the leg
• If your leg shrinks a significant amount, the liner will become too loose and may slip off. See your Prosthetist to be measured for a smaller liner.
• Excessive sweating inside the liner may also cause it slip off. Generally some of the initial sweating will subside, if it becomes or continues to be a problem, see your Prosthetist to discuss some options regarding antiperspirants.

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The prosthesis is making a noise when I lift up my leg

• You may be between clicks on the shuttle pin. Once you get the next click, the noise should subside.
• If the noise continues, the pin may be worn and require replacement or the shuttle lock may be worn and require
replacement.

The shuttle pin sticks or gets stuck in the lock

• The lock can become rusty when it is repeatedly exposed to moisture. Talk to your Prosthetist about spraying it lightly with WD-40.
• The lock can become clogged with dirt, lint, residue. If you have access to compressed air, blow out the lint and dirt. If not, call your Prosthetist.
• The pin/liner is completely stuck – You may have a thread or piece of the sock entangled with the pin and the lock. Call your Prosthetist immediately for assistance.

Suction/Vacuum Systems

• Rash on the leg or the liner is falling or slipping off (see Sections 1 and 2 in the 3S section above)
• Unable to maintain vacuum.
• Check your suspension sleeve for any signs of damage, holes, or tears.
• Call your Prosthetist to have the pump and prosthesis evaluated for any leaks in the system.

For more specific information regarding a particular type of prosthetic system, see that specific literature for instructions.

If at any time you have questions or concerns, you may contact your nearest Westcoast Brace & Limb facility to speak with either a Prosthetist or Prosthetic Case Manager who will help determine if you need to schedule an appointment to be seen in the office.

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