phantom pain aid comes from unlikely origin

Science and Engineering Fair, she set out to develop an alternative solution to the powerful and addictive medications often prescribed.

After interviewing various phantom pain authorities, Bomkamp devised a concept based on thermal biofeedback, in which concentrated, controlled heat applied to severed nerve endings in the residual limb would induce the brain to focus on the heat instead of sending signals to a limb no longer present. (A side benefit is that the heat also relaxes residual limb muscles.)

When her idea sparked initial acceptance, the young student decided to run with it. She engaged a prosthetic consultant to provide professional expertise and build the first prototype of what became known as the Pain-Free Socket. The product consists of thermo-resistive wiring connected to a battery pack incorporated in a below-knee prosthetic socket. After several generations of development, the device is now awaiting patent approval.

Meanwhile, Bomkamp has written a business plan, formed a company (of which she is CEO) to bring the concept to market, and been inducted into the National Gallery for America’s Young Inventors, among other honors. She hopes to bring the Pain-Free Socket into a limited clinical trial in 2014.

Quite a start for a college senior who just turned 22!
It’s Coming: The Portable Power-Assisted Ankle-Foot Orthosis

A New Answer to Residual Limb Volume Change

As the residual limb loses volume during the day, the socket becomes unstable with resulting increased motion between limb and socket. Hydrostatic lift and weight-bearing efficiency are reduced, and the residual limb moves further into the socket with increased distal pressure, pain, and eventually skin shear and breakdown. The system requires a compact, lightweight, high-efficiency power source and actuator capable of providing alternating dorsiflexion and plantarflexion assistance for an extended period.

Common methods of dealing with daily volume changes include the flexible socket, consisting of a rigid frame with openings and a pliable interface that can expand and contract to accommodate residual limb expansion; addition and removal of limb socks; pads; fluid-filled bladders; and vacuum-assisted suspension systems. These measures all are intended to keep the residual limb in intimate contact with the socket to enable effective control and propulsion of the orthotic. All work to some degree, but none has been shown to be a comprehensive solution.

The essential engineering difference in this innovation is a non-elastic but durable actuator that can expand to accommodate residual limb expansion; addition and removal of limb socks; pads; inflatable air bladders; fluid-filled bladders; and vacuum-assisted suspension systems. These measures all are intended to keep the residual limb in intimate contact with the socket to enable effective control and propulsion of the orthotic.

The early generation prototype incorporates a bidirectional pneumatic rotary actuator powered by compressed gas from paintball-style CO2 canisters and generates plantarflexion torque at terminal-stance for propulsion and dorsiflexion assist during swing to prevent foot drop.

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The PJAFOR prototype incorporates a bidirectional pneumatic rotary actuator powered by compressed gas from paintball-style CO2 canisters and generates plantarflexion torque at terminal-stance for propulsion and dorsiflexion assist during swing to prevent foot drop.

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Phantom Pain Aid Comes from Unlikely Origin

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Katherine Bomkamp is a college political science major whose career goal is to become a corporate attorney. But, by the way, she also is developing a potentially breakthrough solution to the widespread amputee phenomenon known as phantom limb pain.

Though originally thought to have psychological roots, phantom pain is now understood to be a result of the brain continuing to send signals and commands to a limb no longer present. An estimated 80 percent of the world’s 10 million amputees experience this sensation to some degree.

While still in high school, Bomkamp met several military amputees while accompanying her father, a disabled Air Force veteran, on lengthy appointments at the former Walter Reed Army Medical Center.

Upon hearing their lingering issues with phantom pain and informed of a below-knee prosthetic socket. After several generations of development, the device is now awaiting patent approval.

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C-J Socket - (Continued from page 3)

But when sitting in a C-J Socket, the sail, which feels and reacts more like clothing than part of a prosthesis, flattens and conforms to the seat surface, allowing the thigh tissue to spread more naturally and definitely more comfortably. The result is a harmonious interface between anatomy and environment, and sitting on cloth feels sitting on hard plastic any day.

Subsequently, the design was successfully adapted for upper-extremity amputees, including those wearing myoelectric prostheses, who report the socket is lighter, less-restrictive and more comfortable than traditional sockets. The concept is now being extended to below-knee applications as well.

C-Brace - (Continued from page 1)

Stance flexion damping – Controlled, partial knee flexion while weight-bearing allows the wearer to exercise knee control when walking down hills and ramps, descending stairs step over step, and when sitting down.

As with the introduction of the C-Leg, the high-tech and not inexpensive C-Brace is being provided to relatively few patients at the outset, but we anticipate with growing experience and clinical acceptance, this advanced limb orthosis will provide a major lifestyle assist to significantly challenged lower-limb patients in the years ahead.

C-Brace for natural walking, allowing the patient to walk with greater ease, reduced concentration and considerably less compensation of the sound side and torso...and therefore less fatigue.

Standing and second mode – Selectable modes allow for comfortable static standing and specific settings for therapy or other activities.

C-Brace a Leap Forward in KAFO Design

Responding to CMS Mandates

Allen Orthopedic Labs Inc. is pleased to present the latest issue of Update, a quarterly newsletter published to help health professionals better serve their physically challenged patients and stay abreast of the latest developments in the prosthetic and orthotic disciplines.

The biggest challenge affecting our patients at present is CMS-imposed documentation requirements and recovery audits. We appreciate your help with the extra documentation now required by CMS. While it has always been mandatory that we obtain detailed prescriptions for O&P items, we now must also attach a letter of medical necessity or physician chart notes for all diabetic shoes, custom knee braces, spinal orthoses and AFO/KAFOs. In addition, prosthetic documentation requirements are now much stricter and require that all patients be seen by their prescribing physician before coming to our office for a physical and gait analysis.

Our staff will help you through this process and we have pre-made packets available to help you obtain this proper documentation. We realize this is an extra burden for you and your staff, but it is the only way for OUR Medicare patients to get the care they need and deserve.

We welcome your comments on Update and requests for further information: (415) 925-1333.