

Dynamicnews

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a publication for patients and clients of
DYNAMIC ORTHOTICS and PROSTHETICS

Patients Achieve Dynamic Results

Having serviced the pediatric orthotic needs of the Houston region for many years, Dynamic Orthotics and Prosthetics has been privileged to watch many of our patients grow, develop, achieve, always overcome their varying degrees of disability. In this quarter's newsletter, we've decided to present the recent accomplishment of one of our long established patients, Nicolas Cugini.

Born with Cerebral Palsy, Nick often remembers, as early as 1st grade, he realized that it was not his calling in life to be a star athlete. However, in the 6th grade, a close friend began to speak highly of a debate club he had joined. Unfortunately, the friend was 3 years Nick's senior, and it would be another 3 years before Nick would enter high school and could join the club he had heard so much about. When that time finally came, he found a good avenue for his interests in politics and current events. His passion and skill in debate have developed ever since.

Currently, Nick competes in three separate debate events, each of which requires a different set of skills and understanding. These include Student Congress, Domestic Extemporaneous Speaking and Original Oratory.

Original Oratory is an event in which competitors deliver original speeches on the subjects of their choosing. These speeches are typically written and memorized by each performer, with various time limits on the day of presentations. Topics vary widely, but usually address current world problems. The goal of the presenter is often to persuade, motivate or alert. Nick enjoys oratory because "it gives me the

freedom to talk about whatever I want to, in any format that I choose."

Student Congress is a much more dynamic event. As the name implies, students act out congressional sessions. They play roles as senators and representatives and are expected to create and debate the merits of their proposed legislation. Throughout the year, students accumulate points at local competitions. Those who accrue enough are then invited to the Texas state



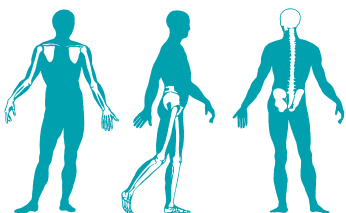
Nicolas Cugini

competition, hosted by the Texas Forensic Association. Nick is one of only 94 students from around the state who has accumulated enough points to qualify for state in this discipline and has actually collected enough points to qualify for the event three times over. According to Nick, "Student Congress is probably the most fun, because I can talk about so many issues in one round. It also gives me the opportunity to respond to arguments, which is always fun...we'll usually go over around 15-30 pieces per round. I'll usually speak on 5-6."

Nick's final event is Domestic Extemporaneous Speaking. "Extemp," as it is often called challenges the speaker's ability to broadly research a wide variety of topics and current events prior to a competition, and to then compose an effective speech on a given topic on relatively short

If your organization would be interested in an in-service on prosthetics and/or orthotic care, please contact company President, Tom DiBello at (713) 747-4171.

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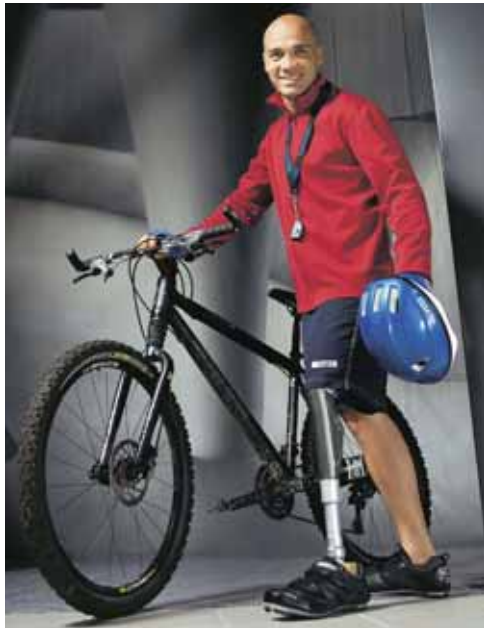
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Prosthetic High-Tech Explosion

Prosthetic science—long a rather docile entity characterized by periodic improvements making momentary headlines—has suddenly discovered steroids.

Several factors have combined to create the current excitement of prosthetics in the 21st century. Space-age materials and digital technology have expanded prosthetic



C-Leg® epitomizes prosthetic advances. Courtesy Otto Bock Health Care

possibilities and increasing numbers of more active amputees have provided a need for fresh thinking about how to enhance prosthetic outcomes. Additionally, the continuing rehabilitation of recent amputee casualties in Iraq and Afghanistan have pushed manufacturers and prosthetists alike towards new and improved prosthetic solutions. These factors are culminating in an atmosphere of continuing advancements, with further innovations seemingly around the corner.

This momentum swing might well be traced to the introduction of the C-Leg® microprocessor-controlled knee-shin component for transfemoral prostheses in 1997. The C-Leg has become the poster child for adaptation of computer technology to limb prostheses, having now been fitted on more than 14,000 people worldwide.

But fame is fleeting: The C-Leg has been eased off the front page by remarkable new

upper-extremity systems, the first commercially available externally powered foot and ankle mechanism to reach the market, and the promise of a whole new way of attaching prosthetic limbs to the body.

We're not yet to the time of Steve Austin, TV's *Six Million Dollar Man*, but led by some inspiring research initiatives, we're getting there.

Microprocessor-Controlled Knees

The Otto Bock C-Leg and its recently introduced competitor, the Össur Rheo Knee™, use on-board microprocessors to adjust the swing of the prosthetic leg in real time. These changes are made in response to the wearers as a result, the leg is ready for heel strike at just the right instant, providing above-knee amputees with unprecedented security, expanded flexibility of gait, greater freedom of movement, more natural swing motions and reduced walking fatigue.

Microprocessor-controlled knee systems enable wearers to change walking speed, negotiate uneven terrain, walk up and down slopes, and descend stairs step-over-step.

The C-Leg now incorporates several new enhancements that improve its performance even further, including:

- a new standing mode, which stabilizes the knee, taking weight off the sound limb and allowing the user to relax while standing;
- a wireless remote control, which enables users to switch easily between modes as well as fine tune swing phase dynamics for different activities; and
- a widened scope of application that now includes transfemoral, knee-disarticulation, hip-disarticulation, and hemipelvectomy amputees.

Sockets and A New Attachment Method Technologically advanced distal componentry demands comparable improvement at the crucial point of integration between prosthesis and biological limb. This connection is achieved where the prosthetic socket is suspended from the residual limb



Omega Tracer T-Ring™ II captures residual limb shape in moments
Courtesy Ohio Willow Wood

Among the advances in socket design and fabrication are new and improved CAD-CAM systems, through which precise, functional and comfortable sockets can be provided in substantially less time.

CAD-CAM systems are complex and made up of many complimentary components. One of these is the measurement device, or digitizer, which inputs the topography of the residual limb. Then there are various types of design



BioScanner™ portable CAD-CAM scanner
Courtesy BioSculptor

software which are used to create the unique socket shapes according to patient capabilities, limb anomalies and functional potentials. Finally, there is often a carving machine to render the finished socket from the finished digital design.

Recent improvements in prosthetic-orthotic CAD-CAM systems have made the limb measurement process much easier and faster for patients.

With one of the new non-contact optical devices, such as Ohio Willow Wood's Omega Tracer T-Ring™ II or BioSculptor's hand-held BioScanner™, a test socket for an amputee patient can be ready in less than an hour, giving prosthetists more time to spend with their patients.

Among emerging socket

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Nicolas (continued)

notice once the competition begins. Competitors usually have about 30 minutes to compose their response once the question for debate is posed. Thus, it demands a collection of public speaking skills, an awareness of current events, good analytical skills and quick organizational skills. Again, Nick is one of only 108 students in the state to have qualified for the state competition in this event. However, Nick has accumulated enough points to qualify in this discipline 5 times over!

Nick describes Domestic Extemp as his favorite, "because everyone is forced to think on their feet. One of the things that I dislike about Student Congress is the use of canned speeches, or pre-written speeches.

Nick enjoyed what was the perfect summer adventure for him last year when he was able to attend the CDE Debate Camp at the University of New Mexico. CDE Debate and Extemp is a commercial supplier of

debating materials, textbooks and evidence which hosts an annual summer camp for students of debate. Their two week summer camp focuses on techniques and background information on Extemporaneous Speaking and has produced a multitude of national qualifiers and champions in multiple events. Unsurprisingly, Nick managed to earn additional recognition at the summer institute, taking home the "Economics Award" as the outstanding student in that class.

Recently Nick was awarded the Hugh O'Brian Youth Leadership(HOBY) award as the sole ambassador from Cypress-Ridge High School. This award, sometimes referred to as the HOBY, is sponsored by regional chapters of the national non-profit HOBY organization which carries its vision, "to motivate and empower individuals to make a positive difference within our global society through understanding and action based on effective and compassionate leadership." Nick's award, presented by the HOBY Texas Gulf Coast

chapter, entitles him to attend a three day leadership conference at Rice University this summer. He will join 240 area sophomores to meet with business and community leaders from the region to critically analyze "America's Incentive System." This will be done through panel discussion, speakers and leadership exercises covering topics ranging from education to media.

With all these activities, honors and camps, Nick has very little time to fret over his physical challenges. As he articulates it, he doesn't look at his disability as something that describes him, but rather, as something he possess.

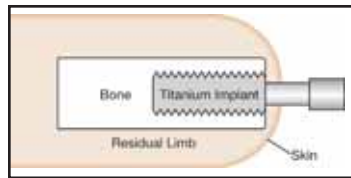
We are pleased to have had the pleasure to work with Nick over the years, as he has continued to learn and achieve. Given that he is only a sophomore in high school, we are excited to follow Nick's accomplishments in the coming years.

Hi-Tech (continued)

designs, the Marlo Anatomical Socket (MAS) stands out for its innovation and potential benefits to appropriate above-knee amputees. This socket features a markedly lower posterior brim than other A/K designs and a pronounced medial alignment, which facilitates a more normal and more energy-efficient gait than provided by other ischial containment or quadrilateral sockets.

MAS users generally demonstrate an increased range of hip motion and often report that the socket is more comfortable to wear when compared to previous sockets.

The greatest potential development in prosthetic attachment does away with the socket altogether, instead anchoring the prosthesis to the residual limb by a titanium bolt surgically implanted into the distal residual bone. Though not yet approved by the FDA for use in the U.S. this pro-cess of osseointegration has been successful with more than 100 lower-limb and more than 30 upper-limb patients in Europe.



Osseointegration cross section

Osseointegration shows the potential to eliminate most if not all of the problems inherent in prosthetic socket attachment for appropriate patients:

- End weight-bearing is restored;
- prosthetic limb control is greatly enhanced and energy expenditure substantially reduced;
- risk of sudden prosthesis detachment from the body is minimized;
- user perception of the limb's place in space is much improved; and
- residual limb pain and skin breakdown caused by contact with the socket environment are virtually eliminated.

Osseointegration, already approved for dental and maxillofacial applications, is expected to be approved for orthopedic use in the United States within five years.



Dynamic Arm offers new capabilities to transhumeral amputees. Courtesy Otto Bock Health Care

Upper-Limb Innovation

For several decades, upper-extremity prosthetics has led the way in high-tech prosthetic applications with myoelectric control of battery-powered hand, elbow and wrist actuators. Leading systems such as Motion Control's Utah Arm series continue to advance through upgraded components, See **Hi-Tech** Page 4

Hi-Tech (continued)

while new offerings, such as the Otto Bock Dynamic Arm, help raise the performance bar.

Like many newly introduced products, the Dynamic Arm offers certain advantages over the field, including faster elbow actuation, greater lifting capacity (13 pounds) and a more natural swing motion.

An intriguing new entry into upper-limb componentry is a new terminal device developed in Scotland that features five distinct fingers, each powered by separated motors. The i-LIMB Hand is still in its infancy at this point – the

fingers, though individually powered, can only move together. However, individual finger actuation is anticipated in the next few years with the development of improved control systems.



Powered Lower Limbs
The industry's first externally powered foot and ankle mechanism was recently introduced. As with microprocessor controlled knee units, Ossur's Proprio Foot is expected to reduce the effort and

energy of walking while enabling appropriate amputees to ambulate confidently over uneven terrain and on stairs. Additionally, the Proprio Foot is designed to provide a power assist for sitting or rising from a chair.

These, like many of the other products described in this newsletter, are not yet ready for the general amputee population. Some are still in the research and development stage; others carry a whopping price tag well beyond the budget of the average American.

But the good news is that the innovation we're seeing today will become the reality of tomorrow. Prospects for improved prosthetic capabilities have never been brighter.

Note to Our Readers

Mention of specific products in our newsletter neither constitutes endorsement nor implies that we will recommend selection of those particular products for use with any particular patient or application. We offer this information to enhance professional and individual understanding of the orthotic and prosthetic disciplines and the experience and capabilities of our practice.

We gratefully acknowledge the assistance of the following resources used in compiling this issue: Becker Orthopedic • Bio-Mechanical Composites Inc. • Custom Composite Mfg. Inc. • Fillauer LLC
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