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Dog's Leg A Major Advance

Prosthesis Fuses With Bone, Skin

By Zoe Elizabeth Buck McClatchy Newspapers

RALEIGH, N.C. — Three years ago, Cassidy Posovsky was a three-legged German shepherd mix hobbling homeless around the Bronx. Last week, he was a medical pioneer getting fitted with a cutting-edge prosthetic that could one day help thousands of veterans and others who lose limbs in trauma.

If all goes well, Cassidy's artificial leg will fuse into his bone, and he should be on all fours in months — paving the way for veterinary orthopedic surgeons at North Carolina State University to start working with doctors for human implantation.

With more than 1.3 million veterans seeking prosthetics from the Department of Veterans Affairs each year, and more service members in Iraq and Afghanistan wounded every day, the need for improved limb-replacement technology is becoming more acute. Futuristic technologies such as computerized legs, microprocessor knees and bionic nerve systems have become top priorities of VA research.

Cassidy's care team sees veterans as ideal candidates for its device.

"Diabetes is the No. 1 cause of amputation, but those patients have other problems that make it more complicated," said Ola Harryson, an engineer in the Department of Industrial and Systems Engineering at NCSU. "A soldier who is a healthy candidate would greatly benefit from this — someone who has been injured, that could be a combat injury or an injury from a trauma, who still wants to live an active life."

Harryson and Dr. Denis Marcellin-Little, an orthopedic surgeon in the School of Veterinary Medicine, already have their first human lined up — a patient from the Virginia Beach, Va., area who could get the surgery within the next few years.

Cassidy's surgery was the third conducted on an animal. Within the past three years, the prosthetic limbs were successfully implanted in two cats — George Bailey and Mr. Fronz — but Cassidy is the first large animal to undergo the procedure.

"This is Cassidy's leg," Marcellin-Little said, holding up a red-and-white plastic model of a bone. "The white part is the part I will remove. Then I will put on this," he said, holding up a complex titanium knob.

One end of the knob was shaped to fit perfectly onto Cassidy's tibia by a computer-controlled machine. During the next few months, the bone will grow through the holes in the knob to fuse the titanium into the structure of the bone itself. This process is called osseointegration.

Meanwhile, Cassidy's skin is attached to a disk around the center of the knob. Eventually the skin will grow into this knob, providing a seamless connection.

The most novel part of the device is its fusion to the bone and protrusion from the skin — a development that had previously been hampered by a tendency for the skin to become infected.

"We have a very different design," Harryson said. "It has both a bone ingrowth part and a soft tissue ingrowth part."

The other end of the knob will stick out of Cassidy's back haunch like a short metal peg leg. In a few months, the full prosthesis will be installed on this end of this peg.

When he is ready to have the prosthesis installed, Cassidy's back leg will look something like a smaller version of the springy, spoon-shaped legs of Oscar Pistorius, the doubleamputee sprinter who fell short of winning a spot on South Africa's Olympic track team this year.

The hope is to perfect implantation of the device on large animals before moving on to human patients.



COREY LOWENSTEIN/MCT Anesthetist Melanie Hathaway, left, and anesthesia technician Cheryl Kata of the College of Veterinary Medicine at North Carolina State University in Raleigh prep Cassidy, a German shepherd mix, for the operating room. Cassidy is the first dog to receive an osseointegrated prosthetic limb. The bone and muscle will grow into the titanium device surgically placed at the end the stump on his right rear leg.

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