

# Engineer develops detergent to promote peripheral nerve healing

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A detergent solution developed at The University of Texas at Austin that treats donor nerve grafts to circumvent an immune rejection response has been used to create acellular nerve grafts now used successfully in hospitals around the country. Research also shows early promise of the detergent solution having possible applications in spinal cord repair.

The solution – combined with an enzyme treatment conceived at the University of Florida in Gainesville – is licensed by AxoGen, an Alachua, Florida-based company, and is used to create an acellular nerve graft from human cadaver tissue, called AVANCE Nerve Graft. Nationwide, nearly 100 patients suffering nerve injuries have received AVANCE grafts, all involving peripheral nerves which transmit sensory information between the brain and muscles.

Christine Schmidt, a biomedical engineering professor, developed the detergent solution in her lab with Terry Hudson and Curt Deister, chemical engineering graduate students at the time, who are now with Genentech in California and with AxoGen, respectively.

"Surgeons are reporting some early successes," she says.

These grafts are being used to treat people with traumatic injuries potentially resulting from lacerations, gunshots and everyday accidents, but it also has been used to treat cavernous nerves after the removal of the prostate. The AVANCE product has treated wounded soldiers and can treat the nerves in hands, arms, legs and the face.

Traditional treatment of these types of nerve trauma required harvesting an intact nerve from the patient's body and transplanting it to repair the damaged area. However, that requires two surgeries, is more costly and leads to loss of nerve function and possible infection at the donor nerve site, Schmidt says.

Synthetic, tubular grafts are another surgery repair option. However, Schmidt says they are limited to repairing very small injuries. She adds AVANCE nerve grafts are able to bridge long nerve gaps, provide a three-dimensional pathway supporting nerve regeneration and are easily bendable because they are human nerve harvested from tissue donors, making it easier for surgeons to handle.

"This method has broader applicability," Schmidt says. "Formerly a patient's only option was to use their own nerve or the completely synthetic grafts."

By using the detergent solution, the donor nerve is stripped of the cellular lipid components, which causes the immune rejection response when implanted. Schmidt's laboratory spent four years developing the solution to be strong enough to remove rejection-inducing factors, but mild enough to preserve the delicate physical architecture of the nerve essential for regeneration. The resulting tolerated transplanted nerve provides a type of scaffolding that serves as a bridge between the two ends of the severed nerve to promote regrowth. And because the immunogenic lipid components have been extracted, patients don't require immunosuppressant drugs.

AxoGen learned about the detergent processing work in Schmidt's lab, licensed it and combined it with the University of Florida enzyme treatment that removes other regrowth inhibiting factors, creating the AVANCE product.

"So they've taken something from our lab that works really well and made it work even better," Schmidt says.

Schmidt now is conducting spinal-cord lab testing in animals using detergent-treated peripheral nerve grafts. She is working with post-doctoral fellow Zin Khaing, a central nervous system expert.

Source: University of Texas at Austin

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