

# Protein could heal erectile dysfunction after cancer surgery

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After men have surgery to remove a cancerous prostate gland, up to 80 percent of them will lose the ability to have an erection because of damage to a critical nerve that runs along the prostate.

New research from Northwestern University Feinberg School of Medicine shows the damaged nerve can be regenerated more quickly with a protein called sonic hedgehog delivered via a nanofiber gel.

The study, done with rats, showed the protein regenerated the damaged nerve twice as fast as it would have regenerated on its own. Speeding up the nerve healing is essential in order to prevent cell death in the penis and to preserve erectile function.

"This discovery about sonic hedgehog could be applicable not only to erectile dysfunction after prostate surgery but also when the cavernous nerve is damaged by diabetes, which also causes erectile dysfunction," said principal investigator Carol Podlasek, assistant professor of urology at Feinberg and a member of the Robert H. Lurie Comprehensive Cancer Center of Northwestern University.

The whimsically named sonic hedgehog, with a wink to the popular video game character, is a vital building block in the body that promotes [nerve regeneration](#) and directs the activity of many other proteins in the body.

"There is a tremendous need for a therapy to treat erectile dysfunction

caused by cavernous [nerve damage](#)," Podlasek said. Men's quality of life after [prostate cancer](#) surgery is of greater concern, she noted, because men are being diagnosed at a younger age and live longer due to improved cancer therapies.

"The biggest concern for many men before they undergo surgery for prostate cancer is quality of life after surgery" Podlasek said. "It not only affects the men undergoing surgery but also their partners."

A recent survey of patients undergoing prostate cancer treatment showed that 45 percent of patients were most concerned with quality of life after surgery, 29 percent with extending their life and 13 percent with delaying [disease progression](#).

"So for patients with prostate cancer, being able to have an erection and lead a normal life after treatment is very important," she noted.

Nonsurgical treatments for erectile dysfunction are only effective in a minority of patients with cavernous nerve damage, she noted.

The new study findings may also apply to any damaged peripheral nerve, such as the sciatic nerve or facial nerve, that needs this protein to maintain its structure, Podlasek said.

Podlasek presented her study findings at the recent American Urological Association 2010 Annual Meeting.

When a man's cancerous [prostate gland](#) is removed, the fragile cavernous nerve is often damaged when it is crushed or pulled during surgery. Once the nerve is damaged, smooth muscle cells quickly begin to die in the penis. The consequent scarring prevents the smooth muscle from relaxing and allowing blood to flow into its tissue to become erect.

"Once the smooth muscle starts to die off, you don't get an erection or you get less of an erection," Podlasek said. "The muscle damage is irreversible, so it's essential to heal the damaged nerve as quickly as possible."

Her goal is to regenerate the nerve more quickly to reduce the damage downstream in the penis. "When the nerve is functional, you get normal erectile function," she said. "It's two pieces to a puzzle."

For the current study, Podlasek combined sonic hedgehog with a nanofiber gel designed by study coauthor Samuel I. Stupp, the Board of Trustees Professor of Chemistry, Materials Science and Engineering, and Medicine at Northwestern. The gel traps the protein as it self-assembles into linear nanofibers, which resemble slender threads made out of gel. Podlasek applied the nanofibers to crushed cavernous nerves in rats. When she examined the nerves six weeks later, they had regenerated twice as fast as they would have on their own.

In previous research, Podlasek saw a 63 percent decrease in smooth muscle cell death in the penis when sonic hedgehog was restored to injured cavernous nerves. Also in previous research, she found that decreasing sonic hedgehog in the penis caused smooth muscle cells to die.

Provided by Northwestern University

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