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Cavernous nerve regeneration as an ED therapy

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The cavernous nerve (CN), which provides innervation to the penis, frequently undergoes, resection, crush and tension injury during prostatectomy surgery, resulting in erectile dysfunction (ED). Penile tissues innervated by the damaged CN undergo smooth muscle apoptosis and fibrosis, resulting in significantly reduced effectiveness of PDE-5 inhibitors. Although peripheral nerves have a limited ability to regenerate, a return of function typically does not occur due to irreversible down stream morphological changes in the penis. Thus new therapies that address both the down stream changes in the penis and injury to the CN are necessary. The secreted protein sonic hedgehog (SHH) plays a prominent role in nerve development, and has been implicated as a critical factor in regeneration of peripheral nerves. We propose that SHH is essential to maintain CN integrity, and that local SHH protein treatment of the CN at the time of injury using novel peptide amphiphile (PA) nanofibers, will speed CN regeneration. We have examined this hypothesis in a Sprague Dawley bilateral CN crush rat model. Our results show that SHH protein is significantly decreased in the CN after crush injury. SHH inhibited CN showed axonal degeneration and demyelination. PA nanofibers were effective in delivering SHH to the PG/CN and SHH treatment is both neuroprotective in the crushed CN and promotes regeneration and return of erectile function. These findings suggest that there is a window of opportunity immediately after nerve insult in which manipulation of the nerve microenvironment can affect long-term regeneration outcome.

Biography

Carol A. Podlasek completed her Ph.D. in 1994 at the University of Notre Dame and performed postdoctoral studies at Northwestern University Feinberg School of Medicine. She is currently an Assistant Professor in the Department of Urology at Northwestern University studying erectile dysfunction, peripheral nerve regeneration, penile development, and sonic hedgehog pathway regulation of smooth muscle function and apoptosis. She has published 34 publications in reputed journals and serves as an editorial board member of repute.

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