Available online at www.sciencedirect.com
ScienceDirect
Nanomedicine: Nanotechnology, Biology, and Medicine 2 (2006) 216
nanomedicine
www.nanomedjournal.com

Editorial Comment

Self-assembly peptide prevents blood loss

Mike Heller, PhD,[a] Chiming Wei, MD, PhD[b,*]

[a]*Department of Surgery, University of California–San Diego, San Diego, California, USA*
[b]*Cancer Nanomedicine Center, Johns Hopkins University, Baltimore, Maryland, USA*

Received 31 October 2006; accepted 31 October 2006

Abstract Recently, researchers from the Massachusetts Institute of Technology and the University of Hong Kong discovered a new peptide that immediately stopped bleeding at the surgical site. Nanohemostat solution stops blood flow in less than 10 seconds in the cutting site of brain, spinal cord, femoral artery, and liver. Although the actual mechanism of action is not known, it is believed that the peptides are able to self-assemble into a nanofibrous scaffold network that provides these remarkable properties.

Key words: Nanomaterial; Bleeding; Self-assembly peptide; Nanohemostat solution

On rare occasions the discovery process can produce unexpected results that may be more rewarding than the original expectations. Recently, researchers from the Massachusetts Institute of Technology and the University of Hong Kong had such an experience. While carrying out experiments to test a new peptide-based reagent for neuronal regeneration, they were amazed to see that it immediately stopped bleeding at the surgical site.

The peptide reagent was originally designed to form an extracellular matrix to facilitate neuronal regeneration. Rutledge Ellis-Behnke and his colleagues first reported on the peptide reagent's properties last March, when they noted that in addition to promoting regrowth of nerve cells in hamsters with severed brain regions, it also stopped blood loss. In this issue of *Nanomedicine: Nanotechnology, Biology, and Medicine*, Ellis-Behnke and his colleagues reported their investigating works on the peptide reagent, which they call Nanohemostat solution (NHS), on a variety of lesions in hamsters and rat, and have found that NHS stops blood flow in less than 10 seconds [1]. The authors demonstrated that a 1% NHS self-assembling solution has a very potent effect in preventing blood loss from incisions in brain, spinal cord, femoral artery, and liver. This is the first time that nanotechnology has been used to stop bleeding in a surgical setting.

Although the actual mechanism of action is not known, it is believed that the peptides are able to self-assemble into a nanofibrous scaffold network that provides these remarkable properties [2]. As many doctors know, once it starts severe bleeding is often very difficult to stop. Present methods to control bleeding utilize hemostatic agents that include vasoconstrictor chemicals, thermal devices for cauterization, and mechanical methods for applying pressure or forming ligatures. Although considerable additional testing must be carried out on the new NHS, it does look extremely promising. The addition of a completely new nano-based technology to control bleeding will certainly be welcomed by the medical community.

References

[1] Ellis-Behnke RG, et al. Nanohemostat solution: immediate hemostasis at the nanoscale. Nanomedicine 2006;2:207-15.
[2] Ellis-Behnke RG, et al. Nano neuro knitting: peptide nanofiber scaffold for brain repair and axon regeneration with functional return of vision. Proc Natl Acad Sci USA 2006;103:5054-9.

* Corresponding author. 600 N. Wolfe Street, Blalock 1206, Baltimore, MD 21205.
E-mail address: cmwei@jhmi.edu (C. Wei).

1549-9634/$ – see front matter © 2006 Elsevier Inc. All rights reserved.
doi:10.1016/j.nano.2006.10.158