

'Nano-in-micro' stem cell delivery could rescue blood flow after injury

July 19 2017

When blood flow is reduced or cut to tissues, cells are deprived of oxygen and nutrients, which can lead to cell death if blood flow isn't efficiently restored. Stem cells are promising treatments, but they do not tend to stay at the site or survive long enough to heal the damage. Today in *ACS Central Science*, researchers combine micro and nano approaches to improve stem cell therapies and outcomes after ischemia, or inadequate blood supply.

Xiaoming "Shawn" He, Zhenguo Liu and colleagues recognized that in order to improve the viability of stem cell treatments for ischemia, it was crucial to continuously deliver molecules like growth factors to help the [stem cells](#) survive and develop into new blood vessels. Nanoparticles are good at this sort of biomolecule delivery, but they tend to drag the cargo inside cells. To treat ischemia, the growth factors need to stay outside the cells. The researchers hypothesized that bigger particles could do the trick.

The researchers encapsulated a [growth factor](#) inside nanoparticles first to protect them from degradation, and then placed the nanoparticles inside much larger hydrogel microcapsules that cannot be taken up by cells. This design provided long-term protection and delivery of the growth factor. When the authors tested their system in a mouse model of ischemia, they observed successful differentiation of stem cells, growth of blood vessels and the restoration of blood supply, collectively rescuing muscle tissue and saving the limbs of the mice.

More information: "A Nano-In-Micro System for Enhanced Stem Cell Therapy of Ischemic Diseases" *ACS Central Science* (2017).
pubs.acs.org/doi/full/10.1021/acscentsci.7b00213

Provided by American Chemical Society

Citation: 'Nano-in-micro' stem cell delivery could rescue blood flow after injury (2017, July 19)
retrieved 28 April 2024 from
<https://phys.org/news/2017-07-nano-in-micro-stem-cell-delivery-blood.html>

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