

Nanoparticles to make leaky vessels

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Scientists at Rice University in Texas have discovered that it may be possible to selectively open gaps in blood vessels just enough to let large molecules through and then close them again.

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This permeability would allow large-molecule drugs to reach target tissues. Strong magnets may be able to lead nanoparticle-infused stem cells or drug-laden nanoparticles themselves to targeted areas, even in deep tissues like organs that current therapies cannot reach.

For many diseases, systemic delivery through the blood stream is the only way to deliver molecules to the site. Small molecules can penetrate the blood vessel and get into the diseased cells, but large molecules like proteins or drug-loaded nanoparticles cannot pass the endothelium effectively unless it is leaky.

The lab created a microfluidic flow chamber that mimicked the vascular system and lined its tubes with real endothelial cells. When a magnetic field was applied to the nanoparticle-infused cells, the gaps opened. Relaxing the force allowed most gaps to close after 12 hours.

Driving this to a clinical setting would be a challenge. In order to treat the heart or liver, a pretty large device would be needed to have the required magnetic field.