Breaking the Blood-Brain Barrier

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Researchers have had early success with a method that might one day thwart the powerful blood-brain barrier and effectively deliver antiretrovirals (ARVs) to the brain. Scientists have long failed at their attempts to deliver treatment to the organ, where HIV can cause serious damage and which is considered a main part of the HIV reservoir.

Investigators at Florida International University's (FIU) Herbert Wertheim College of Medicine used magneto-electric nanoparticles (MENs) to increase by up to 97 percent the delivery of an ARV to infected cells in a laboratory facsimile of the brain.

The researchers bound the drug to MENs inserted into macrophage immune cells operating as a Trojan horse of sorts. Next they used magnetic energy to draw the drug through a cell membrane manufactured as a version of the blood-brain barrier. Then a low-energy electrical current prompted the drug to be released from the nanoparticle.

"What we have done is a significant step forward to send the drugs to the brain, and also [to prompt] the releasing effect," says Madhavan Nair, PhD, a professor and chair of the department of immunology at FIU. "We are hoping that once the drug is released into the brain that we can eliminate the remaining virus in the brain."

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