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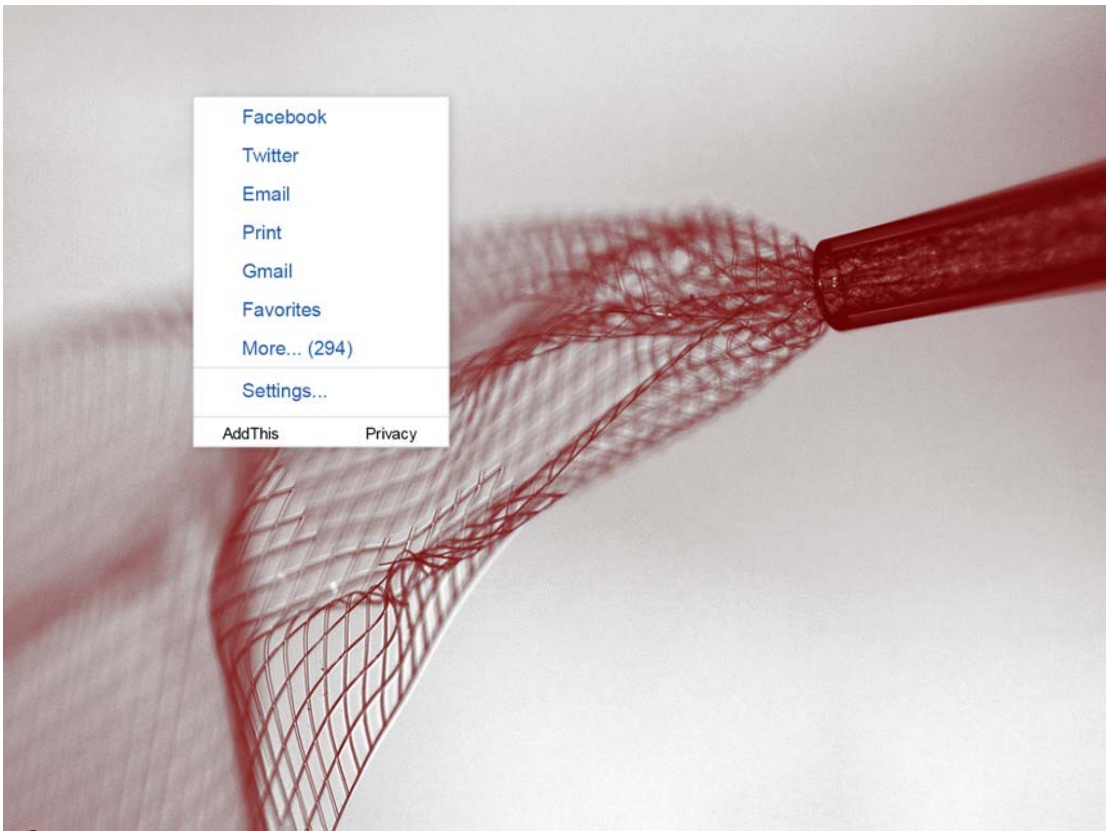
SCIENCE

Injectable nanoscopic mesh could one day be used to monitor our organs

BY NSIKAN AKPAN June 8, 2015 at 1:25 PM EDT



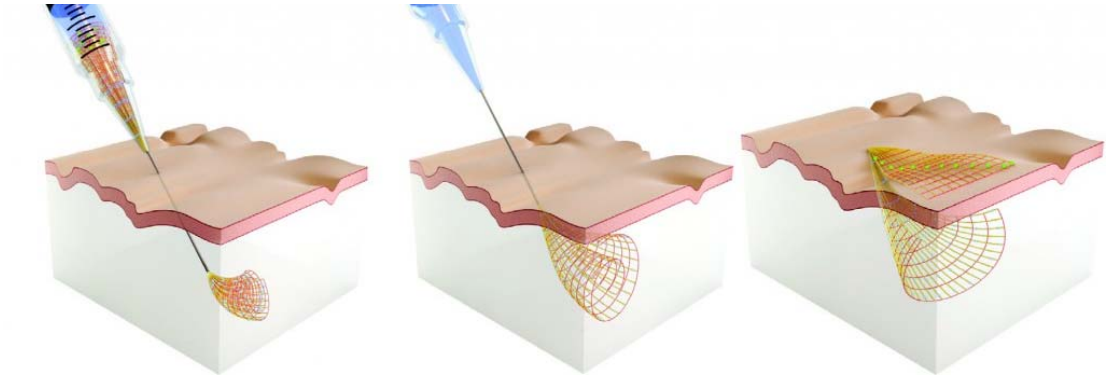
Ultrathin electronic mesh being ejected from a glass needle less than four thousandths of an inch wide. Photo by Lieber Research Group, Harvard University.

Car sensors keep tabs of the health of your vehicle and ultimately let your mechanic know when it needs a tune-up. A group of nanoengineers have taken a step toward doing the same in humans by creating an electronic mesh that can fold into a syringe and be injected into an organ to measure biological activity. Though currently limited to use in mice, such a device might one day scan the brainwaves of epilepsy patients to gauge when a seizure is approaching, or the mesh might wrap around a heart to track its beat.

The nanoscopic fabric boasts flexible nanowires of nickel interwoven with silicon and soft plastic, which were then embedded with sensors made from chromium, palladium and platinum. (Bling!) When finished, the ultrathin mesh could wrap on top of itself and fit inside a syringe with a diameter of 100 micrometer — less than four thousandths of an inch. That's about 20,000 times thinner than your largest blood vessel — the aorta — or about 20 times wider than one of its red blood cells.

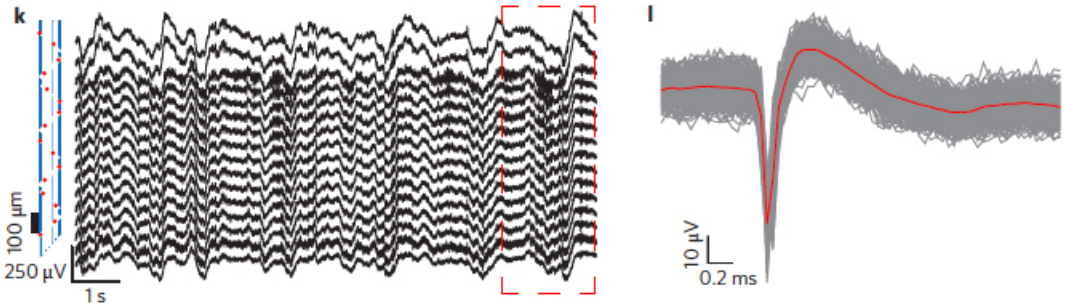
Once the ultrathin mesh is introduced into an organ, it unfurls to more than 30 times the width of the syringe and embeds into the tissue.

After injecting the mesh into the brains of



The microscopic mesh takes about an hour to unravel. Once done, scientists can record electrical signals emitted by cells in the body. Illustration from Liu J et al., Nature Nanotechnology, 2015.

mice, the researchers found that nerve cells began attaching to the electronic device as if it was a regular portion of the connective tissue that holds the brain together — known as the extracellular matrix. Once implanted, the team recorded brain waves in the hippocampus — a region that governs learning and memory. A follow-up exam showed that the mesh could be implanted without causing inflammation or perceivable injury to the brain.



Brain activity of mice as measured by the electronic mesh. Illustration from Liu J et al. Nature Nanotechnology. 2015.

Charles Lieber of Harvard University and Ying Fang of the National Center for Nanoscience and Technology in China led the project, and the invention was unveiled June 8 in Nature Nanotechnology.