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Deutschlandfunk

Implants

Electronics for syringes

Conventional boards are hard and rigid - a problem for example pacemakers or brain electrodes that are placed in the human body. In "Nature Nanotechnology" a research team presented an alternative - electronic implants that are stretchy as rubber and can be easily injected with a syringe.

By Frank Grotelüschen

On the surface, the invention seems fairly unspectacular - a wafer-thin plastic Fitzelchen, hardly bigger than a postage stamp. The actual stimuli reveal themselves only under a microscope, says Charles Lieber, a chemist at Harvard University in the US.

"It resembles a mosquito net, only much smaller. It is an ultrafine polymer networks, woven into the thin metal threads and small sensor elements."

The network has micrometer-fine mesh and acts as an electronic component: It can detect electrical voltages and precisely measured. And that bend almost at will, and can stretch roll, Charles Lieber and his team took an idea:

"We can raise with a syringe - with a normal syringe, how to use them also for seeding this syringe, we can use our electronic simply inject into the tissues.."

There, in the tissue, the rolled electronics mini-networks can be tapped down to stamp size. To test the technique, the researchers injected their micronet into the brain of mice.

"We have looked at how the brain tissue responds to our implant how compatible it is and we were able to show that there were no adverse reactions, no kind of rejection is because.. Our electronic sensor network is very similar to the brain tissue, it is also. stretchable and flexible, and the mesh size corresponds to the size of the nerve cells. This all means that the neurons love our structure literally. "

Meanwhile the mice live for more than three months with the network in the

brain. Since the Sensornetzchen do as provided their service. They record nerve signals and monitor the brain activity. Then the researchers discovered also a surprise: Some types of brain cells appear to be comfortable so that they grow well above average on in the electronic micro-network. So maybe those networks could one day help to attract new nerve cells in the damaged areas of the brain after a stroke. Integrated into the network electronics could monitor nerve growth and even control - so the vision. But before that could even come to another application, hoping Charles Lieber.

"That would be the deep brain stimulation to treat Parkinson Here the patient a brain pacemaker is implanted into the head Until you used for rigid electrodes Our electronic network should have as benefits:... It should be compatible and also more durable."

But before that there are going to be needed for the researchers: They must show that their micro-network is also a long time in the body, at least one year. And the reading of the signal runs so far still rather tentative.

"The improvements could be considered to now directs our network its signals through a fine wire to the outside, the one would naturally do differently:.. One would have to integrate a radio chip, then the communications could run wirelessly But that should be no larger technical problem.. "

And in the long term would refine his micronet extent that there is always more to the neural network in the brain similar to Charles Lieber - Keyword artificial synapse. Thus electronics and brain tissue could be interweave more closely - to the perfect fusion of man and machine.