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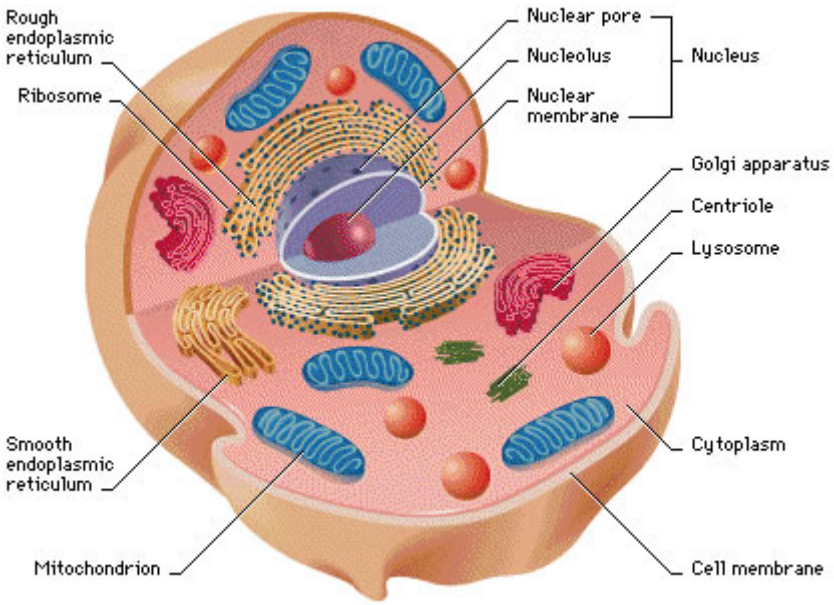
Here comes the nanoneedle--can you see it?

by Dong Ngo



Structure of a cell.
(Credit: mtandao-afrika.net)

I just can't wrap my head around this development--not because it's so big, but because it's so tiny.

Researchers at the University of Illinois **have developed** a "nanoneedle" with a diameter of approximately 50 nanometers--about half the size of **previously reported nanoneedles**.

To put this in perspective, it turns out that the thinnest human head hair is about 10,000 times thicker than this new needle. Obviously, the majority of us won't find any use for a needle of this size. However, this is a breakthrough device with applications for biophysical research.

The nanoneedle is designed to penetrate the membrane of a living cell for the targeted delivery of one or more molecules into the cytoplasm or the nucleus. In addition, it can be used as an electrochemical probe and as an optical biosensor.

According to Min-Feng Yu, a professor of mechanical science and engineering and a researcher at the **Center for Nanoscale Chemical-Electrical-Mechanical Manufacturing Systems**,

nanoneedle-based delivery is a powerful new tool for studying biological processes and biophysical properties at the molecular level inside living cells.

This is because it helps deliver, detect, and track individual fluorescent quantum dots in a cell's cytoplasm and nucleus. The quantum dots can then be used to study the molecular mechanics and physical properties of cells.

The nanoneedle was created with a rigid, but resilient, boron-nitride nanotube. The nanotube is then attached to one end of a glass pipette for easy handling. It is coated with a thin layer of gold.

When a researcher wants to place a substance inside a cell, molecular cargo is then attached to the gold surface with the help of "linker" molecules. When placed in a cell's cytoplasm or nucleus, the bonds with the linker molecules break, freeing the cargo.

Other than delivery, according to Yu, the nanoneedles can also be used as electrochemical probes and as optical biosensors to study cellular environments, stimulate certain types of biological sequences, and examine the effect of nanoparticles on cellular physiology.

This is truly amazing. What is more amazing, however, is the fact that Apple is able to convince people that its **iPod Nano** is so "tiny."

Dong Ngo is a CNET editor who covers networking and network storage, and writes about anything else he finds interesting. You can also listen to his podcast at insidecnetlabs.cnet.com. E-mail Dong.