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New Needle So Tiny It "Injects" Meds Into Cell Organs

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This might hurt ... well, not at all

Syringe scaredy-cats have nothing to fear from a new needle that's a thousand times thinner than a human hair. The gold-plated nanoneedle can deliver particles right into the tiny organs of cells, a new study says.

One of the greatest difficulties in medicine is convincing cells and their organs, or organelles, to collect and use drugs released into the bloodstream.

The new nanoneedle seems to solve that problem by distributing molecules directly to the right organelles.

"What we have here," said study co-author Min-Feng Yu, a University of Illinois molecular biologist, "is a powerful tool for delivering a very tiny amount of drugs into cells that have initially been removed from the body and can—after being injected by the nanoneedle—be placed back into the body for tracking, diagnosing, and treatment of illness."

(Related video: "Needle-Free Injection Invented.")

Agile Improvement

The idea of a nanoneedle isn't new.

Researchers have tried for decades to use tiny syringes to inject cells. But past needles have been relatively clumsy, damaging cells as they poked them.

So instead of building a tube that would squirt, Yu and colleagues designed a solid needle.

Since, unlike a syringe, the nanoneedle didn't need to be hollow, the team was able to make the device a cell-friendly 50 nanometers wide—nanosyringes are typically several hundred nanometers wide.

Tiny particles are attached to the nanoneedle's thin outer layer of gold via "linker" particles. After entering an organelle, the nanoneedle releases the particles.

Straight Shooter?

It might sound like the ultimate in marksmanship to hit an organ smaller than a cell, and so far only agile technicians using powerful microscopes have used the nanoneedles.

But the team says it's designing nanoneedles that can be programmed to target multiple cells and automatically deliver drugs into those cells at the same time—meaning that perhaps someday nanoneedles needn't be rocket science.

More on nanotech: *"Nanotechnology's Big Future" from* National Geographic *magazine.*

Findings published online April 14, 2009, by the journal Nano Letters.