Sugar-Coated Nanoparticles Find Hidden Tumors

Eric Bland, Discovery News

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Nanoparticles include a diverse family of molecular entities, which differ significantly in their properties. For this reason, each nanopartic
March 30, 2009 -- Nanoparticles that first illuminate, and could then destroy hidden tumors have been created by scientists at the University of California, San Diego. If approved for clinical use, the new technique could improve the odds of survival for cancer patients by letting doctors diagnose and treat cancer earlier. It would also, in theory, minimize the toxic side effects associated with traditional chemotherapy.

"The advantage is that if the nanostructure localizes [near the tumor], it gives you an improved ability to see or treat the tumor," said Michael Sailor, a scientist at the University of California, San Diego, who detailed the research in a recent issue of Nature Materials.

The drawback to most techniques for finding and treating cancer is toxicity. The same radioactive cadmium that accumulates inside tumors and shines light that MRI machines can detect also destroys various internal organs. Chemotherapy drugs such as abraxane destroy tumor cells but also kill plenty of healthy cells.

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Scientists started with thin silicon wafers, similar to those used in the semiconductor industry, and broke them into nano-sized pieces using ultrasound. To treat cancer, the particles would soak up whatever cancer drug would work best in a given case. The scientists then coat the particles in a thin layer of dextrose, a form of sugar.

The end result, according to Sailor, are cancer-killing pastries. "They're like little jelly donuts, rolled in chocolate to seal everything in," said Sailor.

Once the poisonous particles are injected into the bloodstream, they travel around the body.

Tumors need a lot of blood to grow quickly, but they are not good plumbers. The blood vessels surrounding the tumors are thin and full of holes. Those holes are typically just over 100 nanometers in size, just big enough for the 100-nanometer nanoparticles to slip through and get stuck inside the tumor itself.

The particles, made of non-toxic silicon instead of traditional toxic cadmium, glow under ultraviolet light. After about an hour of circulating through the body enough of them have physically lodged themselves near the tumor to be detected by an MRI machine, helping doctors pinpoint the location.
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