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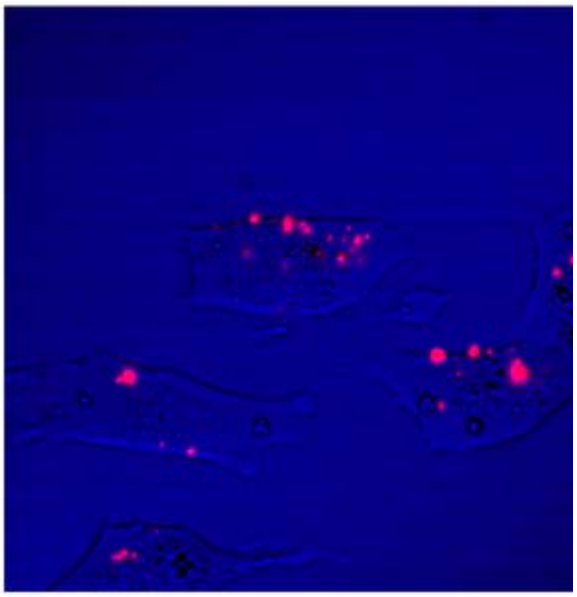
Quantum Dots Glow Where Cancer Cells Grow

By Aaron Rowe June 22, 2007 | 2:11:35 PM Categories: Materials Science, Medicine & Medical Procedures, Nanotechnology, chemistry

Looking for cancer cells is like searching for a pin in a basket of needles. Tiny, glowing particles called quantum dots may someday make it easy to precisely locate malignant masses. When injected into



the body, they would drift around until encountering cancerous tissue. The deadly cells would latch onto a special coating on t glowing dots. Attached to the inside of the cancer cells, the bright particles would serve as a beacon that would show doctors where the deadly disease has spread.

Scientists from SUNY Buffalo, Johns Hopkins, and Zhejiang University worked together to develop and test this somewhat ne type of medical nanotechnology. Many other research groups (everyone and their mother) have recently completed similar studies, but this one is a particularly elegant example.

Quantum dots are extremely tiny semiconductor crystals. Some of them glow very brightly when struck with ultraviolet radiation and photographed with a confocal microscope. Postdoctoral scholar Ken-Tye Yong and graduate student Jun Qian coated some of those shiny quantum dots with *transferrin*, a protein that pancreatic cancer cells quickly gobble up. They attached an antibody that sticks to pancreatic cancer cells onto a second batch of the bright nanoparticles.

Semiconductor nanoparticles have several other very distinct advantages. First off, they don't fade quickly. Their competition, fluorescent molecules made from carbon, get bleached by light very quickly and thus become useless. Second, quantum dots come in a zillion varieties. Since so many scientists have studied them, it is almost easy to make them and attach things to ther and build ones with exactly the right features.

Equipped with two sets of customized particles, the international team led by Professors Paras N. Prasad and Indrajit Roy of SUNY Buffalo tested their ability to identify several types of pancreatic cancer.

The coated nanoparticles would consistently act as a glowing stain that clearly identified the deadly cells. Quantum dots witho the special coating could did not stick to, enter, or otherwise label them.

The research paper that describes this work appears in the June issue of the *Journal of Physical Chemistry B*. It mentions tha their next step will be to test the quantum dots in mice. It may be a while before this imaging method is used in people. The quantum dots are currently made with the element Cadmium, which is very toxic. Before they are injected into humans, scientist will need to prove that they can be made safe. This could be accomplished either by creating a coating that prevents th toxic metal from causing any damage, or replacing it altogether.

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