Nanosize Rods Light Up Pancreatic Cancer Cells

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Quantum dots have shown promise as ultrabright contrast agents for use in a variety of cancer imaging studies. Now, a team of investigators at the Multifunctional Nanoparticles in Diagnosis and Therapy of Pancreatic Cancer Platform Partnership, headed by Paras Prasad, Ph.D., of the State University of New York at Buffalo, has shown that quantum rods may perform even better than their spherical cousins.

Reporting their work in the journal *Advanced Materials*, the investigators created quantum rods of two different sizes: One quantum rod emitted orange light; the other emitted red light.

The investigators then attached the red quantum rod to a monoclonal antibody that recognizes a protein known as mesothelin and the orange quantum rod to a monoclonal antibody that binds to a protein known as Claudin-4. These two proteins are overexpressed by both primary and metastatic human pancreatic cancer cells. After adding both of the conjugated quantum rods to pancreatic cells growing in culture, the investigators were able to easily spot both optical labels using standard fluorescence microscopy.

Subsequent experiments showed that the cells took in the quantum rods via a process known as receptor-mediated endocytosis. When the same quantum rods were added to tumor cells that do not overexpress mesothelin or Claudin-4, the quantum rods were not taken up by the nontargeted tumor cells. These results show that cell uptake is specific to those cells targeted by the antibodies conjugated to the quantum rods.

This work, which was supported in part by the NCI's Alliance for Nanotechnology in Cancer, is detailed in the paper "Multiplex imaging of pancreatic cancer cells by using functionalized quantum rods." An abstract of this paper is available at the journal's Web site.

Source: National Cancer Institute