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Gold Nanorods Diagnose Colon Cancer

Nanoparticles tagged with peptides fit like keys into tumor receptors.

Story by Dale Smith
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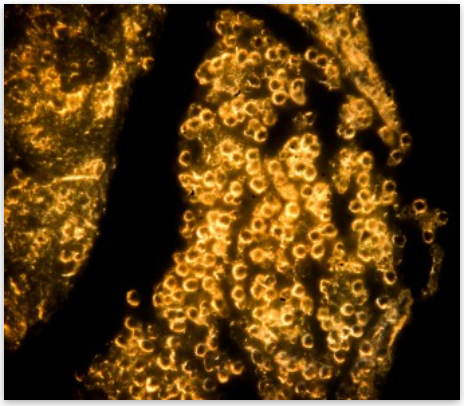

Raghuraman Kannan's gold nanoparticles scatter light and make it easy to see if a tumor has epidermal growth factors. That information is key to deciding the best therapy. Image courtesy of Raghuraman Kannan.

When dealing with a new patient's diagnosis of colorectal cancer, physicians face a host of decisions. A critical one: Which drug is best for each patient? For instance, Cetuximab works well, but only for colorectal tumors that have receptors for epidermal growth factors (EGF), says Raghuraman Kannan, assistant professor of radiology.

The traditional method of using antibodies to locate the receptors is unreliable, and wrong answers

needlessly subject patients to a difficult course of treatment lasting two months and costing $30,000. With 1.2 million new cases of colon cancer worldwide each year, the suffering and expense are immense.

Kannan and Dr. Gerald Arthur, research assistant professor of pathology and anatomical sciences, and their team have come up with a better way of identifying which tumors have EGF receptors. In Kannan's lab, graduate student Chuck Caldwell creates a solution containing tiny lozenge–shaped pieces of gold. To these "nanorods," he attaches a biomolecule that recognizes only the EGF receptors. Immersing biopsied tumor tissue in the nanorod solution allows the biomolecule to lock into the receptors. Then he takes a look at the sample under a lighted microscope. "The rods scatter light," Kannan says, which makes it easy to spot whether the receptors are present. When the nanorods are lit up, Cetuximab is the clear choice.

The new test works well, takes 30 minutes and costs just $150, compared to the current hours–long test costing $1,500. The same technology works on any tumor with EGFs, including glioblastoma and cancers of the breast, head and neck.

This project receives funding from the Coulter Translational Research Program.

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