Nanoparticle Probes Light Up Cancer Cells

November 6 2006

Cancer biologists are always on the lookout for new methods of studying the effects that drug therapy has on malignant cells. Now they have a new tool – silver nanoparticles, embedded in nanoscale silica spheres, which can create cellular markers with a wide variety of colors that can be observed under the microscope. These nanoscale tags could provide a boost to high-throughput drug screening efforts.

Reporting its work in the journal Analytical Chemistry, a research team headed by Yoon–Sik Lee, Ph.D., developed their nanoparticle probes to be used in conjunction with Raman spectroscopy, a technique well-suited to high-throughput assays. Though other groups have developed nanoparticle-based Raman probes, those that use single nanoparticles do not produce an easily readable optical signal.

The solution that Lee and his colleagues developed was to embed multiple silver nanodots and special dye molecules on the surface of silica spheres. The silver nanodots interact electronically with the dye molecules to produce a bright optical signal in a Raman spectrometer.

The researchers also developed methods for attaching cell-targeting molecules, such as antibodies, to the outside of the silica spheres without interfering with the optical properties of the final nanoparticle. In the work reported in this paper, the researchers used antibodies that target the HER2 receptor on breast cancer cells. Experiments showed that the targeted nanodots did bind to breast cancer cells with the HER2 receptor and were easily spotted using Raman spectroscopy.

This work is detailed is a paper titled, “Nanoparticle probes with surface enhanced Raman spectroscopic tags for cellular cancer targeting.” An abstract of this paper is available through PubMed.

Source: National Cancer Institute