Light scattering technology may hold promise for quickly determining chemotherapy's effectiveness

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By examining the patterns in which light bounces off cell surfaces, researchers may be able to assess chemotherapy's success in inducing cancer cell death, according to a study led by investigators in the Duke Comprehensive Cancer Center and Duke's Pratt School of Engineering.

The technique might be used as a tool for measuring patients' response to chemotherapy more quickly and non-invasively.

"The goal of this study was to assess if light-scattering techniques could identify nuclear and cellular structure changes following treatment of breast cancer cells with chemotherapeutic agents," said Julie Hanson Ostrander, Ph.D., a researcher in the Duke Comprehensive Cancer Center and co-lead investigator on this study. "We thought we might see changes due to the cell death process induced by chemotherapy, called apoptosis."

The researchers presented their findings at the 100th annual American Association of Cancer Research meeting on Tuesday, April 21, 2009, in Denver. The study was funded by the United States Department of Defense, the National Institutes of Health and the National Science Foundation.

The researchers treated breast cancer cells, in a dish, with one of two standard chemotherapeutic agents, paclitaxel and doxorubicin. They then

applied light to the cells at various time intervals and observed the way the light deviated depending on the size and shape of the cells through which it passed. The technique is called angle-resolved low coherence interferometry, and it was developed in the lab of Adam Wax in the biomedical engineering department at Duke's Pratt School.

"We observed that in cells experiencing apoptosis, there were marked changes - both early in the process and then up to a day later - in cellular structure that could be captured by light-scattering," Ostrander said. "In contrast, in cells treated with a dose of drug that does not induce apoptosis, we saw some early changes but no later changes."

If successful in laboratory studies, this technique could be applied as a non-invasive way to quickly determine whether chemotherapy is working or not, Ostrander said.

"Typically, patients undergo chemotherapy and then return several weeks later for a scan to measure changes in their tumor size," she said. "Down the road, we're hopeful that there may be faster ways to tell if a patient is being successfully treated, or if he or she might benefit from an adjustment to their therapy strategy."

Source: Duke University Medical Center (news : web)