Nanomedicine: Treating cancer at molecular level

March 4 2005

Earlier detection of cancer means a better chance of effective treatment. The five-year survival rate for a patient with Stage I breast cancer is 98 percent, while the survival rate for later detection, stage II or greater, drops to as low as 16 percent. University of Missouri-Columbia experts from several fields, including physics and radiology, are working together to use ultra tiny nanoparticles to detect and treat cancer at the molecular level. The researchers involved with this project say early detection of all types of cancer is the primary motivation for this research.

"The nanoparticles are safe to handle and safe to administer, so this could speed the process of approval," said Kattesh Katti, professor of radiology and biomedical physics. "This research looks very promising."

The metallic nanoparticles are made especially for medical applications in a patented process on the MU campus. Research is underway to use the nanoparticles to detect cancer, even at a pre-cancerous stage through medical imaging techniques. First, doctors would administer millions of nanoparticles programmed to target cancerous tumors. Once the metallic particles locate the early tumor, doctors would use an X-ray to see the tumor as early as just one cancer cell, possibly months or even years earlier than can be detected now. With current technology, cancer must exist within a cluster of hundreds of cells and in a much more advanced stage to be seen.

"The nanoparticles also can aid in treatment of cancer, making it much more effective," said Evan Boote, assistant professor of radiology. "Soft tissue has a limited ability to absorb radiation used for treating cancer. If you increase the effective density of the tumor with metallic nanoparticles, a higher radiation dose will be delivered to the tumor while sparing normal tissue. Current radiation therapy techniques, while designed to minimize the dose to normal tissue, will often damage healthy tissue causing harmful side effects. It is our hope that these side effects will be minimized to a greater extent with the presence of metallic nanoparticles in the tumor."

"Nanoparticles are so tiny that it would take 100,000 of them lined up to equal the width of a single human hair," said Kannan Raghuraman, research professor of radiology. "A single nanoparticle inside of one cell would be equivalent to an ant inside an automobile."

Source: University of Missouri-Columbia

Citation: Nanomedicine: Treating cancer at molecular level (2005, March 4) retrieved 23 April 2024 from https://phys.org/news/2005-03-nanomedicine-cancer-molecular.html