Radioactive nanoparticles target cancer cells

May 21 2013

Cancers of all types become most deadly when they metastasize and spread tumors throughout the body. Once cancer has reached this stage, it becomes very difficult for doctors to locate and treat the numerous tumors that can develop. Now, researchers at the University of Missouri have found a way to create radioactive nanoparticles that target lymphoma tumor cells wherever they may be in the body. Michael Lewis, an associate professor of oncology in the MU College of Veterinary Medicine, says being able to target secondary tumors is vital to successfully treating patients with progressive cancers.

"Depending on the type of cancer, primary tumors usually are not the cause of death for cancer patients," Lewis said. "If a cancer metastasizes, or spreads creating hard-to-find tumors, it often becomes fatal. Having a way to identify and shrink these secondary tumors is of utmost importance when fighting to save people with these diseases."

In an effort to find a way to locate and kill secondary tumors, Lewis, in collaboration with J. David Robertson, director of research at the MU Research Reactor and professor of chemistry in the College of Arts and Science, have successfully created nanoparticles made of a radioactive form of the element lutetium. The MU scientists then covered the lutetium nanoparticles with gold shells and attached targeting agents.

In previous research, Lewis has already proven the effectiveness of similar targeting agents in mice and dogs suffering from tumors. In that research, the targeting agents were attached to single radioactive atoms that were introduced into the bodies of animals with cancer. The

targeting agents were able to seek out the tumors existing within the animals, which were then revealed through radio-imaging of those animals.

In their current research, the MU scientists have shown the targeting agents can deliver the new radioactive lutetium nanoparticles to lymphoma tumor cells without attaching to and damaging healthy cells in the process. Robertson says this is an important step toward developing therapies for lymphoma and other advanced-stage cancers.

"The ability to deliver multiple radioactive atoms to individual cancer cells should greatly increase our ability to selectively kill these cells," Robertson said. "We are very optimistic about the synergy of combining the targeting strategy developed in Dr. Lewis's lab with our work on new radioactive nanoparticles."

Lewis has been invited to present his research at the City of Hope National Medical Center this June in Duarte, Calif.

This study is an example of the collaborative research taking place in the One Health, One Medicine area of Mizzou Advantage. The early-stage results of this research are promising. If additional studies, including animal studies, are successful within the next few years, the researchers will request permission from the federal government to begin human drug development. After this status has been granted, Lewis and Robertson may conduct human clinical trials with the hope of developing new treatments.

Lewis also is a principal investigator in the Research Service at the Harry S. Truman Memorial Veterans' Hospital. This research was supported by awards from the National Cancer Institute and the Department of Veterans Affairs as well as resources made available by Department of Veterans Affairs through use of facilities at the Harry S. Truman

Memorial Veterans' Hospital in Columbia, Mo.

Provided by University of Missouri-Columbia