Killing cancer like a vampire slayer

September 17 2009

Like vampires, cancer tumors require an ample supply of blood to stay alive. Without fresh blood for sustenance, cancer cells shrivel up like raisins and die.

To that end, Dr. Ronit Satchi-Fainaro of Tel Aviv University's Department of Physiology and Pharmacology, Sackler School of Medicine, and her team of researchers have developed a new drug carrier to deliver compounds straight to the tumor. Ferrying a variety of existing life-saving therapies right to their target so they can work more effectively, this new invention may alleviate particularly nasty forms of cancers like osteosarcomas and bone metastases. Dr. Satchi-Fainaro believes that her technology can also combat resistance to anti-cancer drugs like Taxol, keeping other normal healthy cells around the tumor safe.

Dr. Satchi-Fainaro, together with two of her doctoral students, Ehud Segal and Keren Miller, has just published papers in the prestigious journals *Angewandte Chemie* and PLoS One on their pre-clinical findings in cellular and animal models using this new discovery.

Fatal attractions

The findings, Dr. Satchi-Fainaro says, could be applied to any tumor type and work to improve the efficacy of today's anti-cancer drugs. "Our two recent studies are on bone cancers and metastasis, and doctors know that most metastasis from breast or prostate cancers to the bone will not respond to chemotherapy. Many times, at this advanced stage of disease,

patients are given drugs for palliative rather than curative reasons," she says. "We are out to change that bleak prognosis."

Dr. Satchi-Fainaro's research is based on an understanding of the parasitic behavior of cancer. Most of us have small tumors in our body at all times. They start the size of a pinhead and usually remain at that size as dormant and asymptomatic tumors. Then, at some point, cancer cells proliferate and the tumor grows in mass. At that point the tumor cells migrate to the bones and start recruiting blood vessels using a chemical attractant in order to draw blood for their continued growth in a process called angiogenesis. The researchers looked into the chemical that causes the blood, or endothelial cells, to gravitate to the activated, newly malignant cancer cells.

Living with (instead of dying from) cancer

Armed with this information, "we can turn cancer into a chronic manageable disease," says Dr. Satchi-Fainaro. Her innovative drug delivery system delivers compounds like Taxol known to stop blood vessel growth to cancerous tumors. She bound existing cancer drugs to an inert polymer that doesn't react with the immune system. "Like a stealth airplane," she says, the polymer passes through the body's defense system unnoticed. Then, programmed to find the tumor using the bisphosphonate drug Alendronate, a drug that binds to bones, the carrier delivers its cancer-killing payload.

In animal models, Dr. Satchi-Fainaro found that she was able to reverse the growth of bone cancer tumors. In a second study, she found that loading her polymer with the anti-cancer drug Taxol could inhibit tumor growth by 50%, compared to a Taxol dose that had no effect on tumor growth at all.

Water-soluble and inert, the carrier was found to leak from the blood

only at the tumor site. Regular drug formulations diffuse through the whole body, attacking both normal and diseased organs. This makes Dr. Satchi-Fainaro's formulation more effective at targeting tumors. Her new drug also has applications in other diseases involving dysfunctional blood vessel growth, such as diabetes and arthritis.

Source: Tel Aviv University (news : web)