Nano-Vehicle acts as cluster bomb for tumors

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Chemotherapy, while an effective cancer treatment, also brings debilitating side effects such as nausea, liver toxicity, and a battered immune system. Now, a new way to deliver this life-saving therapy to cancer patients -- getting it straight to the source of the disease -- has been developed by Dan Peer and Rimona Margalit and their colleagues at Tel Aviv University. Drs. Peer and Margalit have developed a nano-sized vehicle with the ability to deliver chemotherapy drugs directly into cancer cells while avoiding interaction with healthy cells, increasing the efficiency of chemotherapeutic treatment while reducing its side effects.

"The vehicle is very similar to a cluster bomb," explains Dr. Peer. Inside the nano-vehicle itself are nanoparticles loaded with chemotherapy drugs. When the delivery vehicle, comprising multiple nanoparticles, comes into contact with cancer cells, it releases the chemotherapeutic payload directly into the cell. According to Dr. Peer, the nanoparticle device can be used to treat many different types of cancer, including lung, blood, colon, breast, ovarian, pancreatic, and even several types of brain cancers. A paper describing their new nanoparticles and their use in targeting tumors appears in the journal *Biomaterials*.

The key to the drug delivery platform is hyaluronan, the molecule used to create the outer coating of this clustered nanoparticle. Hyaluronan is a sugar recognized by receptors on many types of cancer cells. "When the nano-vehicle interacts with the receptor on the cancerous cell, the receptor undergoes a structural change and the chemotherapy payload is released directly into the cancer cell," says Dr. Peer. The result, he explains, is a more to more focused chemotherapeutic treatment against the diseased cells.

Because the nanoparticle reacts only with cancer cells, the healthy cells that surround them remain untouched and unaffected by the therapy. The nano-vehicle itself, adds Dr. Peer, is made from naturally occurring lipid molecules that decompose in the body once the nanoparticles have performed their function, making the treatment potentially safer than current therapies. Tests with tumor-bearing mice showed that hyaluronan-coated nanoparticles filled with paclitaxel were more effective than either free paclitaxel or Abraxane—an albumin nanoparticle loaded with paclitaxel—at stopping tumor growth.

This work is detailed in a paper titled, "Paclitaxel-clusters coated with hyaluronan as selective tumor-targeted nanovectors." An abstract of this paper is available at the journal's Web site.

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