

Nanocomposite labeled cancer cells can be targeted and destroyed using lasers

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A nanocomposite particle can be constructed so that it has a mix of properties that would not otherwise happen in nature. By combining an organic matrix with metallic clusters that can absorb light, it is possible to incorporate such particles into cells and then destroy those targeted cells with a laser.

In a presentation at the NSTI Nanotech 2007 Conference, researchers describe work conducted at the NanoBiotechnology Center, Department of Radiation Medicine, Roswell Park Cancer Institute, Buffalo, NY and the University of Michigan, Ann Arbor, MI, regarding the creation and characterization of a dendrimer nanocomposite (DNC) matrix containing silver clusters that can be used to target and destroy melanoma cancer cells.

Composite NanoDevices (CNDs), are an emerging class of hybrid nanoparticulate materials. CNDs are made from dendrimer-based polymers, for example from poly(amidoamine) [(PAMAMs)].

To visualize the device, Dr. Lajos P. Balogh says simply think of nanoscale, dense, but soft "tumbleweed," where clusters of inorganic materials (such as silver) can be trapped inside. The CND "tumbleweed" device can be made in discrete sizes, carry different electric charges and can encapsulate different materials inside. This design offers researchers a wider choice of size, surface functionality and payload than traditional small in vivo devices where the agent is conjugated directly to the surface.

A laser can be used to kill cells indiscriminately, but it is really a blunt instrument. High powered lasers do so much damage that the tissue becomes opaque to further light. Yet, lower-powered lasers do not deliver enough energy to kill cells. By labeling cells with CNDs, light absorption can be selectively and locally enhanced wherever composite nanodevices are present. Irradiation of the mix of labeled and unlabeled cells by laser light, causes tiny bubbles to form that disrupt and damage the labeled cells, but leave unlabeled cells unaffected. This technology holds promise as an alternative therapy for cancer patients.

According to Dr. Balogh, "The DNC is a multi-functional platform. Because it can carry multiple agents inside, yet present a simple outer surface to the body, it can be programmed to deliver those agents to a particular organ or tissue."

Source: Elsevier Health Sciences

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