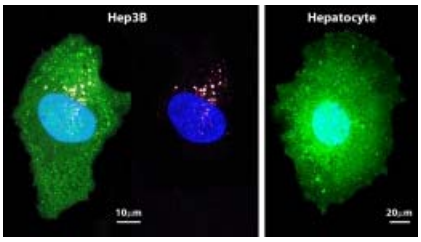
Nanoparticles blast cancerous cells with killer drugs

April 19, 2011 by Editor

Researchers at Sandia National Laboratories, the University of New Mexico, and the UNM Cancer Research and Treatment Center have produced an effective strategy for using nanoparticles to blast cancerous cells with a melange of killer drugs.



Greenly fluoresced cancerous liver cell penetrated by protocells. The small red dots are lipid bilayer wrappings (credit: Carlee Ashley)

The silica nanoparticles are about 150 nanometers in diameter and are honeycombed with cavities that can store large amounts and varieties of drugs. The nanoporous core, with its high surface area combined with the improved targeting of an encapsulating lipid bilayer (liposome), permits a single protocell loaded with a drug cocktail to kill a drug-resistant cancer cell.

The nanoparticles and the surrounding cell-like membranes formed from liposomes together become a protocell: the membrane seals in the drug cocktail and is modified with molecules (peptides) that bind specifically to receptors overexpressed on the cancer cell's surface. The nanoparticles provide stability to the supported membrane and release the drug cargo within the cell.

The lipids serve as a shield that restricts toxic chemotherapy drugs from leaking from the nanoparticle until the protocell binds to and takes hold within the cancer cell. Few poisons leak into the system of the human host if the protocells find no cancer cells. This cloaking mitigates toxic side effects expected from conventional chemotherapy.

The particles are small enough to avoid the liver and other cleansing organs and can circulate harmlessly for days or weeks, depending on their engineered size, seeking their cancerous prey.

Ref.: David S. Peabody & C. Jeffrey Brinker et al., The targeted delivery of multicomponent cargos to cancer cells by nanoporous particle-supported lipid bilayers, *Nature Materials*, April 17, 2011

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April 19, 2011
by Ralph Dratman

If a nanoparticle fails to find a cancer cell and so continues in circulation for "days or weeks," what eventually happens to it?

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