Nanoparticles Improve Drug Targeting to Skin

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Photodynamic therapy is a well-accepted treatment for a number of diseases of the skin, including several forms of skin cancer and actinic keratosis, a precancerous condition. However, the light-sensitizing agents used in photodynamic therapy leave a patient's skin and eyes susceptible to damage from sunlight or even bright indoor light for six weeks or longer following treatment.

In an attempt to overcome this limitation, a research team headed by Antônio Machado, Ph.D., of the Universidade Federal de Uberlândia, in Brazil, has used polymer nanoparticles to encapsulate a light-sensitizing agent known as benzopsoralen.

Reporting its work in the *International Journal of Pharmaceutics*, the investigators used the biocompatible polymer poly(d,l-lactic-co-glycolic acid) (PLGA) to create the benzopsoralen-loaded nanoparticles. Thorough characterization of these nanoparticles showed them to be stable and that most of the benzopsoralen was trapped on the outer surface of the nanoparticle.

When the researchers added these nanoparticles to cells, they observed a burst of drug release occurring over three days. When irradiated with light following this burst, the cells suffered fatal damage resulting from the generation of reactive oxygen molecules. Microscopy studies showed that nanoparticles accumulated in the cells' mitochondria and along the membrane that surrounds the nucleus. The researchers note that by accumulating in the mitochondria, these nanoparticles could increase the

potency of benzopsoralen, which would reduce the dose needed to produce a cell-killing effect.

This work is detailed in a paper titled, “Evaluation of nanoparticles loaded with benzopsoralen in rat peritoneal exudate cells.” This work was published online in advance of print publication. An abstract is available through PubMed.

Source: National Cancer Institute