

Photochemistry creates drug-trapping nanoparticles

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Many of the most potent anticancer agents are poorly soluble in water, presenting a challenge for medicinal chemists who must develop methods of delivering these drugs in the watery environment of the human body. Nanoparticles appear to be perfectly suited to this task, and indeed, numerous research groups are developing nanoparticles specifically for delivering water-insoluble drugs to tumors.

One such team, led by Jeffrey Hubbell, Ph.D., at the École Polytechnique Fédérale de Lausanne (EPFL), in Switzerland, has developed a method that uses light to create a well-defined polymeric nanoparticle with internal spaces that can provide a friendly environment to water-insoluble drugs and channels through which the entrapped drugs can escape into malignant cells. The results of this effort appear in the *European Journal of Pharmaceutical Sciences*.

The investigators created these nanoparticles from two different polymers that crosslink to each other when exposed to light from an argon laser for one hour. They then added the nanoparticles to a solution of doxorubicin and evaporated the solvent used to dissolve the anticancer drug. Nearly half of the drug in solution became encapsulated within the nanoparticles. The researchers note that the resulting nanoparticles contain a protein-repelling surface coating that should result in favorable pharmacokinetic behavior.

Experiments to test the drug-release characteristics of these nanoparticles showed that maximum release occurred at approximately

eight hours and then remained close to that level for a week. The data imply that release occurs through a diffusion mechanism, that is, drug travels through channels in the nanoparticle to the nanoparticle surface, as opposed to a disintegration mechanism in which the nanoparticle falls apart and releases drug.

This work is detailed in a paper titled, "Doxorubicin encapsulation and diffusional release from stable, polymeric, hydrogel nanoparticles." Investigators from the University of Zurich, in Switzerland, and the University of Manchester, in the UK, also participated in this study. An abstract of this paper is available [through PubMed](#).

Source: National Cancer Institute

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