New Drug Delivery System: Niosomes Encapsulating Drugs in a Hydrogel

Researchers at the University of South Florida developed a new method for controlled drug delivery systems that can treat many different disease conditions.

For example, surgical removal of a tumor from brain tissues typically leaves a void. At this excision site, remaining malignant cells may grow into another tumor if left untreated. Many current therapies for patients do not specifically target the tumor site and therefore can be toxic to normal non-specific cells. Other therapies are available in prefixed shapes (i.e. wafer form) for placement in the void to kill any cancer cells that remain at the site; however, the wafer cannot conform to the void and therefore cannot contact all potentially cancerous cells.

USF inventors developed a method for treating these malignant cells by using a biodegradable polymer hydrogel embedded with drugs encapsulated in non-ionic surfactant vesicles (niosomes). The hydrogel and the niosomes each exhibit controlled drug release properties, and together can sustain the bioavailability of the drug. This drug delivery matrix can conform to the void in the surgical site and remains continuously in contact with the diseased area, while being released at a precise, pre-determined rate.

The delivery technology has a wide application because of its ability to deliver drugs to specific disease sites. Therefore it has the advantage of reducing the risk of toxicity associated with systemic therapies, since the agents are targeted to the treatment site, thereby reducing therapeutic dosage and secondary effects typically administered in systemic therapies.

ADVANTAGES:
- Double-control mechanism of drug release ensures sustained drug availability at precise, predetermined rates
- Reduced therapeutic dosage; lowered risk of toxicity
- Product has application as a delivery platform for many disorders

For Optimal Drug Bioavailability

Image 1: Niosomes encapsulating drugs embedded in a Hydrogel matrix.
Image 2: Partial degradation of the Hydrogel matrix prompts release of Niosomes.
Image 3: Degradation of Niosomes outside the Hydrogel matrix prompts release of the drugs