Prescription Drug Dispensing Contact Lenses

Christina Drake – April 7, 2003

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The soft contact lenses encapsulate medicine in oil-based nanoparticles that are mixed into the contact lens matrix during manufacture. These nanoparticles are so small that they do not scatter light and cloud finished contact lenses. These contact lenses can also be used like regular contacts that correct vision while delivering medicine, or simply to deliver medicine.

The research team of these contact lenses is Anuj Chuahan Ph. D, assistant professor of chemical engineering in the Chemical Engineering Department at the University of Florida, and Derya Gulsen, graduate student in Chemical Engineering Department at the University of Florida. Their research is partially funded by the Engineering Research Center for Particle Science and Technology.

The idea of using contact lenses to deliver drugs dates back to 1970s. There have been two types of previous attempts. One is to soak the contact lenses in drug solution. The other is to trap the medicine in a cavity between two pieces of the contact lenses. Unfortunately, these drug soaked lenses are not very effective at delivering medications for extended periods of time. Chauhan and Gulsen have tried using nanoparticals in their method because as Chauhan said, “Our approach allows us great flexibility in designing controlled drug delivery vehicles that can be tailored to different drugs, but are also effective for extended periods of time.”

One commonly known treatment for most eye diseases is eye drops. However, one of biggest problems with the using eye drops is that 95% of the medication goes where it is not needed. The drops can mix with tears and drain into the nasal cavity. From there they would travel through the bloodstream to organs and can cause serious side effects. For example, Timolol is a medicine used to treat glaucoma, but in the bloodstream it can cause heart problems.

The nanoparticles in these new contact lenses will distribute the drug into the thin area between the eye and the contact lens. This would mean that less drug would escape into tears and into the body. It would also mean that rather than getting the medicine all at once, as with an eye drop, the patient gets the right amount of medication all the time.

In theory, these lenses could be worn up to two weeks, steadily supplying drug directly to the eye. These lenses can also incorporate antibiotics to make an extended-wear lens less vulnerable to bacterial infections, a drawback of current contact lenses.

Unfortunately, these lenses are only in the very early engineering design stages. There has been no human or animal testing. The next step before testing is to learn more about how to vary the rate or timing of drug delivery, which could be done through changing the size or concentration of the nanoparticles.

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