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Taking The Sting Out Of Drug Application

Small Firm Here Working On A Painless Drug Delivery Device

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By HARVEY BLACK For the State Journal

A small Madison biotechnology company called Ratio is working to commercialize a painless way to administer drugs.

The product is a disposable, adhesive drug delivery pump worn on the skin. This device can be worn for up to 24 hours and deliver a steady dose of a drug, then it is discarded and a new patch is applied. It is self-contained and small, making it convenient to wear and easy to hide. A small non-electronic pump provides for constant dosing.

The system, which is touted as being simpler and less expensive than others on the market, was invented by David Beebe, a UW-Madison professor of biomedical engineering, and his colleagues at UW-Madison and the University of Illinois.

Headquartered in a combination lab and office suite at the MGE Innovation Center, 510 Charmany Drive, Ratio was co-founded by Beebe and Tony Escarcega in 2005. The privately held company has two employees.

The device, which is about the size of a poker chip, would inject a drug with an array of micro needles. The wearer of the device would press on it to mix a small amount of water with a gel, creating a hydrogel, which expands and presses on the drug, which is injected through the micro needles. The drug is contained in a tiny bladder.

The device has been under development since 2003, with partial funding by the Coulter Foundation. This summer, it successfully was tested on pigs, said Escarcega, who is Ratio's chief executive officer.

He said the aim is to develop the device to inject a clotting factor, known as Factor VIII into hemophiliacs, who suffer a bump or bruise that leads to bleeding. The blood of hemophiliacs is unable to clot on its own.

Carol Diamond, a UW-Madison physician who specializes in childhood blood diseases and cancer, said such a device would greatly benefit parents of hemophiliacs.

If approved by the U.S. Food and Drug Administration, the device would be beneficial to an injured child with hemophilia, for example. It would eliminate the need for treatment at an emergency room, where a clotting factor is injected.

Being able to use this device "would really be very beneficial in terms of ease and comfort and cost, provided it's effective, of course," she said. The device could be used on children as young as 4 months old.

Diamond, who has been advising Ratio, is not an investor in the company.

She said that the company is wise to start its commercialization efforts with the treating of hemophilia, because the clotting factor is a challenging drug to work with.

She and Escarcega envision the system being used to administer other drugs. She said patients could use it to help control pain. It also could be used for anti-fungal drugs for oncology patients, she added.

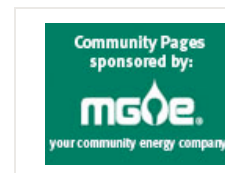
The device could be tailored to administer drugs that the body could use over long periods - for example, between 12 and 24 hours - as well as for immediate use, Escarcega said.

The device represents a major innovation in its use of a hydrogel to pump the drug into the body through the micro needles, said Beebe.

Hydrogels are superabsorbent polymers often used as carriers of drugs.

Beebe said a key feature of the use of hydrogel as a pump is its simplicity. Compared to another delivery system, such as an insulin pump, the hydrogel uses no electronics or miniature components requiring assembly.

Escarcega pegs the cost to make the device at \$1, which he said opens a wide market.



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In using the hydrogel pump for a range of drugs, Beebe said, different hydrogels could be developed that could regulate the flow of the drug into the body. This could be done by essentially making the hydrogel "stiffer" or more flexible by increasing or decreasing the number of chemical bonds.

Escarcega views the device as offering a great deal of flexibility in the pharmaceutical market, allowing Ratio to approach a variety of companies.

"The technology's attractiveness is that it can be applied to different drugs. We can approach several pharmaceutical companies simultaneously and go through the regulatory pathway in parallel," he said.

The company is now seeking to raise \$750,000 for further development of the product. \ \ On the Internet
www.ratiodrugdelivery.com

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