Pill using ultrasound may replace daily needles

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A typical medical syringe with needle. Source: Wikimedia Commons.

(Medical Xpress) -- For patients who need daily injections to stay on course, being able instead to take their medication orally would help improve patients' quality of life and perhaps even outcomes. Daily injections have been an unwelcome part of living with certain illnesses for some patients, with few to no alternatives. For diabetics, for example, insulin taken orally would not penetrate tissue fast enough. A new ultrasound development called uPill may replace daily injections and could represent a new class of drugs. Scientists from the Massachusetts Institute of Technology (MIT) and a company called ZetrOZ are collaborating on the uPill.

This is a type of pill that uses ultrasound to increase the absorption rate of drugs through tissue in the (GI) gastrointestinal tract.

ZetrOZ is a medical device R&D firm focused on portable ultrasound applications, founded in 2009. Development goals include achieving marketable, noninvasive methods of getting pharmaceuticals to the patient. The team behind the uPill wants to solve the problem of the inability of many drugs to be delivered orally as these drugs cannot penetrate the GI tract tissue at a sufficient rate to be effective. The only option has been through injection.

The uPill is an ingestible miniature pill that applies an ultrasound signal to the GI tract while delivering the drug. The ultrasound improves the drug's uptake in the GI tract and speeds delivery. The required drug would be applied as a coating to the uPill and, once swallowed, the device would send ultrasound waves through the patient's gut to aid absorption.

The uPill concept of an ultrasound system small enough to fit into a pill that can be swallowed is of interest to scientists generally who have been looking into the miniaturization of ultrasound systems.

This is not the first attempt by ZetrOZ to come up with an ultrasound solution for delivering drugs; they also have worked on an ultrasound patch to deliver drugs through the skin. In patch mode, ultrasound waves act as an amplifier, pushing the drug deeper into the tissue and making the tissue easier to get through.

ZetrOZ says it sees its technology potential for scaling down an ultrasound system into something ingestible. The team includes George Lewis, co-founder of ZetrOZ and lead engineer for the uPill, and Daniel Anderson, an associate professor of Chemical Engineering and Health Sciences and Technology at MIT.

Animal tests are now being carried out to see if the device can pass through the digestive system safely. Anderson says it is hoped that the uPill could be on the market in the next several years. Earlier this year, a presentation of the "uPill-An ultrasound pill for enhanced oral drug delivery" was given by Anderson and Avi Schroeder, postdoctoral fellow at the David H Koch Institute for Integrative Cancer Research. The annual IdeaStream

conference at MIT is an invitation-only event that draws venture capitalists, entrepreneurs, and MIT researchers to discuss research that could impact the marketplace within the next two to four years.

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