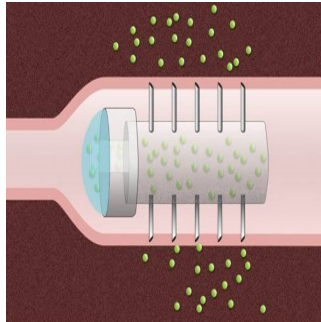


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## Novel Capsule Could Replace Injections



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Researchers at MIT and Massachusetts General Hospital (MGH) have devised a novel drug capsule that is coated with tiny needles and that can be used to inject drugs directly into the lining of the stomach once the capsule is swallowed.

The drug capsule has been designed by Carl Schoellhammer, Giovanni Traverso and their colleagues. They have developed a design that would be able to deliver a wide range of therapeutics directly into the lining of the GI tract. The capsule is 2 centimetres long and 1 centimetre in diameter and has a reservoir for the drug. The capsule is coated with hollow, stainless steel needles that are approximately 5 millimetres long.

The capsule has been tested in pigs that were given insulin as the drug payload. The capsules took a week to move through the entire digestive tract. The researchers did not find any trace of tissue damage. The researchers also found that the microneedles were able to successfully inject the insulin into the lining of the stomach, small intestine and colon, causing the animals' blood glucose levels to drop. The drop in blood glucose was much faster and larger as compared to the same amount of glucose given by subcutaneous injection.

As far as drug-delivery is concerned, patients generally prefer oral formulations to injections. However, there are some drugs that cannot be given in the form of a pill as they get broken down in the stomach before they are absorbed. This novel drug capsule may be able to overcome this obstacle. Studies have already shown that it would be safe for human patients to swallow a capsule coated with short needles. There are no pain receptors in the GI tract and thus patients would not feel any pain from this drug.

According to Giovanni Traverso, a research fellow at MIT's Koch Institute for Integrative Cancer Research, a gastroenterologist at MGH and one of the lead authors of this paper, "This could be a way that the patient can circumvent the need to have an infusion or subcutaneous administration of a drug. The kinetics are much better, and much faster-onset, than those seen with traditional under-the-skin administration. For molecules that are particularly difficult to absorb, this would be a way of actually administering them at much higher efficiency."

The researchers believe that this drug capsule could prove to be very useful for delivering biopharmaceuticals such as antibodies and could help treat cancer and autoimmune disorders such as arthritis and Crohn's disease. This novel approach could also be used to administer vaccines that are normally injected.

The research team plans to further develop the capsule so that peristalsis would slowly squeeze the drug out of this capsule as it travels through the digestive tract. They are also working on developing capsules with needles that are made of degradable polymers and sugars that would break off and become embedded in the gut lining. This would further improve the safety profile of this new drug delivery system.

Source: Massachusetts Institute of Technology

Image Credit: Massachusetts Institute of Technology

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