

Multistage Polymer Therapeutic Delivery System

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Technology description

Invention Description

Drug delivery methods are an important and ongoing medical research concept that still retains the potential of further growth. Current drug delivery technology exists in the form of the typical pill swallowing to implantable devices that provide a desired rate of release internally. Within these methods there exists certain aspects that are unattractive about them, for instance, with pill swallowing the user has to be hyper-vigilant (depending on the drug) on when they take their medicine, what conditions have to be met such as having a meal with it, and how much medicine they need to take, which adds a degree of stress to the user to make sure they are adequately medicated. Then with the implantable devices they are often designed to be implanted then extracted after all the medicine is dissolved, and some of these devices are often just left in the body without extraction, making it lucrative to design a method that gives the user ease of mind and reduce the need of implantation into their body.

UTSA researchers have developed a new multistage polymer therapeutic delivery system. This new drug delivery system solves many fundamental problems with current drug delivery devices. Our device is not exactly a pill, nor is it an implantable, though it does have the functionality of both in that it can be implanted or swallowed. When compared to other implantable devices it is completely degradable within your own body, so once the drug delivery process is complete you will not have some third party object forever stuck within your body until extracted. When compared to the typical swallow-able pill, our device does not immediately break down inside your body, rather it stays inside with a slow but constant rate of payload delivery, which would relieve the constant stress a user may have over the exact specifications of when and where they need to take their medicine, instead of taking a pill daily you could instead take it once a week with our delivery system. Furthermore our delivery system has a plethora of other functionalities that could prove to be immensely beneficial in the medical field, such as the ability to include trace metals into the device to allow for tunable identification with imaging systems such as X-Rays and MRIs, additionally, our device can come in a variety of different geometric forms to allow for multi-stage drug elution rates that give the capability to have individually designed delivery profiles, overall making it a very lucrative solution to current drug delivery systems.

Application area

The primary application for this device is to provide an implantable (or swallow-able) delivery platform that can give a sustained release of drugs, image contrast, diagnostic agents, or any other payload to a living being. This solves a central issue in most delivery strategies where the payload is delivered to quickly and cleared by the body quickly, by having a slow and sustained release rate we can allow for less repeated doses. Alongside drug delivery it can be used for a imaging systems such as X-Rays and MRIs.

Advantages

Unique Geometry: By creating a device that is flexible in terms of form factor we can allow uniquely designed delivery profiles that are based on what kind of geometric form the device takes upon. Having a simple pill-esque shape would elute similar to a normal pill while having a more complex shape like a large spherical shape, would have a slower and longer decay rate, fit for medicine that you need to take repeatedly.

Fully Degradable: By designing our device to be fully degradable we avoid the need to repeatedly implant and extract the device to refill medicinal payload.

Simple Manufacturing: This novel delivery method is simple to produce by 3D printing with the appropriate polymer based inks.

Institution

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