System for Minimally Invasive Local Drug Delivery

Local drug delivery is a useful approach to deliver much higher concentrations of a drug to a target site while minimizing systemic side effects. Drug-eluting polymers can be delivered via local injection to deliver drug over an extended period of time. Current systems for local drug delivery have two long-standing challenges: local injections are prone to migration and current systems do not allow for precise, repeated, and simple delivery to the same anatomic location.

A Mayo Clinic physician has designed an improved platform for local drug delivery that allows for the anchoring of a drug/polymer pellet as well as the ability to deliver multiple, subsequent drug/polymer pellets to the same anatomic location. The system utilizes imaging guidance (e.g. ultrasound) to place a needle in a preferred anatomic location. A wire with an anchoring element (e.g. soft-tissue helix or bone screw) is placed through the needle and fixed into position. The needle is then removed and a drug/polymer pellet that contains a central lumen is placed onto the wire and pushed down the wire to the anchor. The wire holding the pellet is left in place (with the proximal end of the wire sutured under the skin). When subsequent therapy is needed, the wire is accessed and a second pellet is placed onto the wire and pushed into position. This platform can be used to deliver repeated drug therapy for chronic pain, cancer, and any other application where subcutaneous access is possible and where anchored, repeated drug delivery is desired.

Stage of Development A prototype system has been developed and tested in a series of cadaver and live animal (porcine) studies. Anatomical access and anchoring has been demonstrated in cadavers using both a tissue helix and bone screw. Over-the-wire delivery of a mock drug pellet has been achieved in an acute animal model, and the ability to deliver subsequent pellets was shown by delivering a second mock pellet over the same wire/anchor system after 6 weeks. A PCT patent application is pending which covers the methods and devices for delivering and anchoring drug/polymer implants over a wire.

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