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Abstract Submission**

Title

Mini Drug Pump for Ophthalmic Use

Authors

Saloomeh Saati, MD, Ellis Meng, PhD, Ronalee Lo, M.S, Po-Ying Li, M.S, Rohit Varma, MD, MPH, **Mark S. Humayun, MD, PhD***,

Abstract

Purpose:

To evaluate the feasibility of developing a novel mini drug pump for ophthalmic use.

Methods:

Using principles of microelectromechanical systems engineering, a mini drug pump was fabricated. The pumping mechanism is based on electrolysis and the pump also includes a port for drug refill as well as a check valve to control delivery of the drug. Drug pumps were first tested on the bench-top. Then, after obtaining USC animal care and use committee approval, we implanted 4 of paraboloid-shaped (9.9mm x 7.7mm x 1.8mm) non-electrically active drug pumps in 4 rabbits. The procedure is similar to implantation of a glaucoma seton. To determine the ability to refill and also the patency of the cannula and drug reservoir, at intervals of 4-6 weeks after implantation, we accessed the drug reservoir with a transconjunctival needle and delivered approximately 100µl of Trypan blue ophthalmic solution (0.06%) into the anterior chamber. All animals were followed by slit lamp examination and photography as well as iris angiography.

Results:

Bench-top testing showed 2.0 µl/min delivery using 0.4 mW of power for electrolysis. One-way check valves showed reliable opening pressures of 470 mm Hg. All implanted devices could be refilled at 4-6 weeks intervals for a period of 4-6 months. No infection or adverse events were seen. No devices extruded. No filtering bleb formed over the implants.

Conclusion:

A mini drug pump for the eye can be built, implanted, and refilled. Such a platform needs more testing to determine the longterm biocompatibility of any electronically active implanted pump as well as testing with various pharmacological agents to determine its ultimate potential for ophthalmic use.

Presentation Preference: Paper