Microneedle for Ocular Drug Delivery

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Gateway to Discovery, Innovation, and Products.
Opportunity

• Methods and devices for delivering drugs to the eye using microneedles

• Treatment of AMD, diabetic retinopathy, diabetic edema, and glaucoma

• Significant markets: Wet AMD (1.7M US patients in 2010) and glaucoma (2.8M US patients in 2010)

• <5% of the volume of topically applied drugs reaches the intraocular tissues due to drug loss

• Clear unmet need for effective ocular drug delivery to the back of the eye
Technology

- Microneedles durable enough to deliver drugs to eye by penetrating the sclera for targeted drug delivery
- Animal data show that microneedle delivery approach is more effective than topical application
- Safety have shown hole in cornea caused by microneedle piercing healed after 3 hours
Rabbit Eye India Ink Delivery

Targeted delivery to the back of the eye
Particles maintain concentrated levels in the suprachoroidal space for several months.
Competing Technologies

- Direct injection into the eye
  - painful and invasive

- Iontophoresis (Phase II trials): uses a small electrical current to transport ionized drugs into the eye
  - may result in retinal damage

- Intraocular patch: can be used as slow release devices delivering the needed drug locally
  - invasive (requires surgical implant)
  - bioavailability of drug not very good
IP and Future Work

- US Patent 7,918,814 issued April 5\textsuperscript{th}, 2011
  - Claims address methods of use

- Pending CIP which covers microneedle devices

- Development and refinement of metal microneedle design

- Further testing of microneedles in animal disease models

- Pharmacodynamic and bioavailability studies with various therapeutics