A Quick Peek into the Future Glaucoma Therapeutic Innovations

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Disclosures
AdeTherapeutics: C
Aerie Pharmaceuticals: C
Amgen: C, R, S
Alcon: C
Allergan: C, R
Aqueous: C, R
Bausch & Lomb: C
Carl Zeiss: C, R, S
Clarity Medical Systems: C
Croma Pharma: C
Envisia Therapeutics: C
Eyelight: C
ForSight Labs: C
Glaukos: C, R, S
InnFocus: C
Iridex: C, R
Ivantis: C, R, S
LayerBio: C
New World Medical: R
Oziris Therapeutics: C
Ono Pharma: C
Philips: C
Saviance: C
Science Based Health: C
SOLX: C, R
Stryker: C
Transcend: C
Travanta: C

Therapeutics

Drug Delivery

MIGS

Neuroprotection

Regeneration

Innovation Span

Diagnostics
Early Detection
Progression
IOP Telemetry

Sustained Release Approaches

Ocular Surface

Suprachoroidal

Anterior Chamber

Intravitreal

Subconjunctival

Scleral

Drug-Eluting Contact Lens

To address poor compliance
Preservative Free
Can be made with refractive error correction
Sustained, controlled delivery
Therapeutic payload
Duration of 2 weeks or 1 month
Could be used as a continuous wear lens

Latanoprost-Eluting Contact Lens

Dr. Joseph B. Giles, Dr. Daniel S. Kahane
Massachusetts Eye and Ear Infirmary, MIT, Boston Children’s Hospital

Drug-Eluting Punctal Plug System

Mati Therapeutics

Drug-Eluting Punctal Plug System

Matrisys

In situ Polymeric Collagen Solution

Euclid Systems Corp

Forsight Vision5 Helios Insert

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Massachusetts Eye and Ear Infirmary, MIT, Boston Children’s Hospital

Drug-Eluting Punctal Plugs & Injectable Depots

Ocular Therapeutix

Drug-Eluting Punctal Plugs

• Biodegradable microspheres or beads
• Biodegradable drug elution or micropumps
• Controlled and reliable drug release

Refina® Saline

• In situ forming biodegradable
• Localized ocular protection from inflammation
• Optimal and adjustable to biodegradable

Drug-Eluting Injectable Depots

• 4-6 months sustained release – anti-VEGF
• Injectable biodegradable micropumps
• 30 gauge needle in subconjunctival injectability

Forsight Vision5 Helios Insert

• Fornix ocular insert
• Bimatoprost elution

In situ Polymerizable Collagen Solution

Euclid Systems Corp

• Injectable viscous forms solid gel
• Drug depot when exposed to physiological fluids or injected into tissues within 60 seconds
• Subconjunctival injection
• Latanoprost gel = >1 month
Implantable Collagen Films/Wafers
Euclid Systems Corp

- Biodegradable film can be prepared to degrade from minutes to >6 months
- Subconjunctival injection
- Latanoprost collagen wafer showed sustained release for 180 days with minimal burst

Drug-Polymer Conjugate Implant
PolyActivia

- Biodegradable implant visibly decreasing in size over time
- No sign of adverse response to implant
- Subconjunctival or intravitreal 23G injection
- Combination drugs: 3-6 mos duration

“PRINT” Engineered Nanoparticles
Envisia Therapeutics

- Implants: Extended release formulations of biologics and small molecule drugs
- Reproducible implant size, shape, composition and dose
- Simple delivery

Micro/Nano Particles
- Topical delivery with fewer doses
- Sustained release
- Permeation and targeted to increase efficacy

“PRINT” Engineered Nanoparticles
Envisia Therapeutics

- Intracameral injection: 0.03 mg bimatoprost SR
- Intraocular pressure (IOP) monitoring
- Preliminary studies demonstrate successful intracameral, intravitreal and subconjunctival injections with PRINT implants in rabbits
- No post-insertion adverse effects observed

Allergan Bimatoprost SR
Intracameral Bioerodible Drug Pellet

- A bioerodible, extended-release drug pellet that can be administered via injection with a small gauge needle-injector to the front of the eye

Replenish Ophthalmic MicroPump

- Subconjunctival implant
- Inject programmed amount of drug at set times
- MEMS device
- 12 month drug supply
- Refilled with 31G needle
- Recharge wirelessly

Intravitreal Encapsulated Cell Therapy

- ECT Principles
- ECT Design
- ECT Implantation

Microinvasive Glaucoma Surgery

- Az-interno approach
- Minimally traumatic
- At least modest efficacy
- Extremely high safety profile
- Rapid recovery

Microinvasive Glaucoma Surgery

- iSilent
- iSilent inject
- Hydrus
- Cypass
- iSilent supra
- Xen
Suprachoroidal Micro-Stent
Transcend CyPass Micro-Stent

Investigational device. Not approved by the FDA.

AqueSys XEN Implant Generations

Investigational device. Not approved by the FDA.

Glaucoma Treatment Algorithm

Now & Potentially In 5 years

1 Med → Multiple Meds → SLT → Multiple Meds → Trab → 2nd Trab or Tube

Level of Invasiveness:

1 Med
SLT
Drug Delivery → MIGS → MIGS2 → Trab or Tube
Phaco + MIGS