Development of a novel retinal tamponade to replace gas and oil

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Financial Disclosure

Co-founder and equity co-owner with Tony Stefater MD PhD in a start-up company (Pykus Therapeutics, Inc., Cambridge, MA) which is developing the presented technology for clinical use
Summary

- Gas/oil tamponade is a considerable burden for patients
- Many promising alternatives have not advanced to the clinic
- We have spent the last 5 years developing an *in situ* forming, biodegradable polymer to provide two weeks of continuous retinal tamponade
- No positioning required, no induced refractive shift, no removal surgery
- Human pilot studies to begin Q3 2020
Current tamponade methods are a burden
Many promising alternatives have not advanced to the clinic

- Heavy silicone oils
- Magnetic oils
- Combination gas-oils
- Retinal sealants
- Intraocular capsules

- Hydrogels
Our Approach

• Find really smart polymer chemists
• Design a tamponade that meets design criteria
• Test it in animals for safety and efficacy
• Manufacture in compliance with Regulatory and Quality standards of the FDA

• Perform clinical trial
Our Approach
PYK-1105 (functionalized PVA-PEG hydrogel)
### Physical Characteristics of PYK-1105

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time to injection (duration of minimal viscosity after mixing at 25°C)</td>
<td>10 min</td>
</tr>
<tr>
<td>Time to gel formation after injection (duration until viscous gel formation at 37 °C)</td>
<td>4 min</td>
</tr>
<tr>
<td>Time until degradation</td>
<td>11-14 days</td>
</tr>
<tr>
<td>Refractive index</td>
<td>1.3385</td>
</tr>
<tr>
<td>Transparency</td>
<td>&gt;90% across visual spectrum</td>
</tr>
</tbody>
</table>
ISO 10993 Biocompatibility Data

- Evaluated in mice and rabbits using standard ISO protocols for evaluating biocompatibility of medical devices

<table>
<thead>
<tr>
<th>Test</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cytotoxicity</td>
<td>Non-cytotoxic</td>
</tr>
<tr>
<td>Intravitreal injection</td>
<td>Non-irritant</td>
</tr>
<tr>
<td>Acute systemic toxicity</td>
<td>Non-toxic</td>
</tr>
<tr>
<td>Material-mediated pyrogenicity</td>
<td>Non-pyrogenic</td>
</tr>
<tr>
<td>Endotoxin</td>
<td>&lt; 0.2 EU/device</td>
</tr>
<tr>
<td>Implantation</td>
<td>No macroscopic reaction; minimal to no microscopic reaction</td>
</tr>
<tr>
<td>Genotoxicity</td>
<td>Non-mutagenic</td>
</tr>
</tbody>
</table>
Preclinical studies

• PYK-1105 formulation is well tolerated in a rabbit & mini-pig vitrectomy model
  – 25g vitrectomy/fluid-air exchange/PYK-1105 implantation

• Pre-GLP study in rabbit (4) & mini-pig (5)
  – One pig removed from study on POD3 due to post-op VH

• Manuscript accepted for publication in *JVRD*
Preclinical studies

Representative animals from post-operative week 4
Preclinical studies

Clinical exam scores over first month
(Modified Draize/ McDonald-Shadduck scoring systems)
Preclinical studies

Representative animals from Post-operative week 4

IOP remains normal post-operatively
Normal histopath; normal ffERG

Rabbit H&E, post-operative week 4

Mini-pig H&E, post-operative week 4

<table>
<thead>
<tr>
<th>Rabbit, pow4</th>
<th>Mini-Pig, pow4</th>
</tr>
</thead>
<tbody>
<tr>
<td>scotopic maximum combined response</td>
<td>scotopic maximum combined response</td>
</tr>
<tr>
<td>photopic flash</td>
<td>photopic flash</td>
</tr>
<tr>
<td>30 Hz flicker</td>
<td>30 Hz flicker</td>
</tr>
</tbody>
</table>

Graphs show data comparisons between Control and Hydrogel conditions.
Pilot human study

• 10 patient, first-in-human study to begin Q3 2020

• Multicenter, single cohort, open label study

• Enrollment restricted to patients with RRD who have limited visual potential

• Primary outcome is safety and tolerability

• Patients will be followed for 6 months post-operatively

• Interim study results expected Q1 2021
**Leadership**

James A. Stefater, MD, PhD
President & Cofounder
Vitreoretinal surgeon; Eye Health Services

Tomasz P. Stryjewski, MD
Chief Scientific Officer & Cofounder
Vitreoretinal surgeon; Tallman Eye Co-Founder, Helio Vision Inc.

Sameer Sabir
Executive Chairman
Founder & CEO, Brixton
Founder & CEO, Seven Oaks
Founder & CEO, MoMelon

**Team**

Larry Roth
Product Development
20+ years experience in medical device development

Gordon Roberts
Quality
20+ years in medical device quality and regulatory

Maureen O’Connell
Regulatory
20+ years in ophthalmic device regulatory

Olivier Kagan
Project Management
Previously Director of Quality Systems at NSF

Lori Gilmartin, RN
Clinical Operations
20+ years in clinical study management

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