The safety and efficacy of a second generation suprachoroidal retinal prosthesis

The Retina Society Meeting 2020
PJ Allen
Centre for Eye Research Australia
Disclosures

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• National Health and Medical Research Council Grant 1082358

• Victorian Government infrastructure support

• We have industry support from Bionic Vision Technology

• I and my colleagues hold patents in the technology
Summary

• Surgical approach safe and reliable

• Device produces reliable reproduceable percepts

• Results better for orientation and mobility (O and M) and activities of daily living (ADL) testing device on vs device off

• Produces functional advantages for O and M and ADL

• Produces positive patient experiences
An Australian bionic eye for vision restoration

Device position

Retinal implant

Bionic eye system

Allen et al., ARVO Poster, USA, 2019
# Clinical Trial Participants

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
<th>Male</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td>Male</td>
<td>Female</td>
<td>Male</td>
<td>Male</td>
</tr>
<tr>
<td><strong>Age at implant</strong></td>
<td>39</td>
<td>66</td>
<td>47</td>
<td>63</td>
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<tr>
<td><strong>Eye condition</strong></td>
<td>Rod Cone Dystrophy</td>
<td>Cone Rod Dystrophy</td>
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<tr>
<td><strong>Observed nystagmus</strong></td>
<td>Mild</td>
<td>None</td>
<td>Mild</td>
<td>Intermittent</td>
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<td><strong>Level of vision</strong></td>
<td>Light perception only</td>
<td>Light perception only</td>
<td>Light perception only</td>
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<tr>
<td><strong>Years of blindness</strong></td>
<td>19</td>
<td>~25</td>
<td>~17</td>
<td>~20</td>
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<tr>
<td><strong>Primary mobility aid</strong></td>
<td>Cane</td>
<td>Dog</td>
<td>Cane</td>
<td>Cane</td>
</tr>
</tbody>
</table>
Surgery
Clinical images – P 1 - 4
Thresholds vs Weeks Post Switch-On

![Graphs showing threshold versus weeks post switch-on for P1, P2, P3, and P4. Each graph plots threshold (nC) against weeks post switch-on, with data points and a trend line.](image-url)
Clinical trial - Device ON consistently better than Device OFF in the lab

Kolic et al., ARVO Poster, USA, 2019
Obstacle Avoidance

Successful Obstacle Detection on Approach

- **Device Off**
- **Device On**

Obstacle Collision or Contact

- **Device Off**
- **Device On**
Patient anecdotes of using device in the real world

• “From the ground floor looking up, the first floor is like a veranda, where you can see people walking around. I’ve been in .... nearly 26 years and I never knew this!”

• “I did have success though when doing the washing as in I was able to separate the light items from the dark ones. Something I haven’t been able to do for a number of years. So that was rather cool!”

• "Picked up on a lot of different things such as the pylons that support the building and was able to note things in the shop windows. I couldn't really tell what they were but to me, at least it was an awareness that there was something in those shop windows. Something I'm not aware of with my natural eyes."

• “I was sitting in a café, scanning around to see what I could pick up. I found myself observing people and tracking them. Where were they going? To some people this might seem like a trivial thing but I found it fascinating.”
Activities of daily living
Acknowledgements – Study personnel

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Dr Daniel Chiu
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A/Prof Chris Williams, Pre-clinical Lead
A/Prof David Nayagam, Pre-clinical Lead
Owen Burns, Electrode Fabrication
Dr Matt Petoe, Fitting & Evaluation Lead
Sam Titchener, Fitting & Evaluation
Jessica Kvansakul, Fitting & Evaluation
A/Prof Chi Luu, Pre-clinical and Clinical
A/Prof Nick Barnes, Computer Vision Lead
Dr Carla Abbott, Pre-clinical & Clinical
Maria Kolic, Clinical Lead
Elizabeth Baglin, Clinical
William Kentler, Hardware Development