So where do we go from here?

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FIGS Party
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We now know risk factors which suggest a future fall

Poor balance

Gait parameters

Specific areas of the home

- **Bathroom**: 17 falls, 6 injuries
- **Bedroom**: 22 falls, 8 injuries
- **Dining room**: 6 falls, 0 injuries
- **Hallway**: 5 falls, 3 injuries
- **Kitchen**: 14 falls, 7 injuries
- **Living room**: 15 falls, 6 injuries
- **Basement**: 5 falls, 3 injuries
- **Other**: 4 falls, 0 injuries
What do we do with this information?
The future of home modification

Currently few services to make the home safer

Need for professional to visit home expensive and prohibitive

However, home modification has been shown to reduce falls

>50% of falls occur in / just outside home
Currently proposing:

Methods to self-assess home
  Is it as good as a professional assessment?

Can people self-modify their home for safety?
  Is this is as good as a profession doing it?

Down the road: Can we turn this into a viable business model?
Other avenues to explore

Balance & strength training programs to ↓ falls

Can use relevant measures of balance & gait as surrogate measures to see if training likely to be effective

Important to target persons at highest risk of falls

Need to look at falls/steps taken, not falls/year
Direction #2: Might physical activity prevent vision loss?

Mediation analyses

Animal data

Longitudinal studies
Accelerometers are the best way to measure real-world physical activity

Calculate steps or minutes of moderate/vigorous physical activity (MVPA)

Reasonable correlation with gold-standard measurement of energy expenditure

Much more related to BMI, triglycerides, blood glucose, skinfold thickness than self-reported activity
Large impact of visual field loss on physical activity

<table>
<thead>
<tr>
<th>Variable</th>
<th>Interval</th>
<th>RR, MVPA</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unilateral VF loss</td>
<td>vs. normal sight</td>
<td>1.00</td>
<td>0.74 – 1.36</td>
</tr>
<tr>
<td>Bilateral VF loss</td>
<td>vs. normal sight</td>
<td>0.70</td>
<td>0.52 – 0.94</td>
</tr>
<tr>
<td>Age</td>
<td>10 years older</td>
<td>0.72</td>
<td>0.68 – 0.75</td>
</tr>
<tr>
<td>Education</td>
<td>No college</td>
<td>0.75</td>
<td>0.67 – 0.84</td>
</tr>
<tr>
<td>Arthritis</td>
<td>vs. no arthritis</td>
<td>0.82</td>
<td>0.72 – 0.93</td>
</tr>
<tr>
<td>Diabetes</td>
<td>vs. no diabetes</td>
<td>0.72</td>
<td>0.57 – 0.91</td>
</tr>
<tr>
<td>Cong heart failure</td>
<td>vs. no CHF</td>
<td>0.57</td>
<td>0.37 – 0.90</td>
</tr>
<tr>
<td>Stroke</td>
<td>vs. no stroke</td>
<td>0.55</td>
<td>0.36 – 0.86</td>
</tr>
</tbody>
</table>
Dose-response between VF loss severity & PA in glaucoma patients
Fear of falling significantly higher in glaucoma patients

<table>
<thead>
<tr>
<th>Variable</th>
<th>Interval</th>
<th>$\Delta$ Fear of falling score (logits)</th>
<th>$p$ value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glaucoma</td>
<td>Present</td>
<td>-1.20</td>
<td>0.001</td>
</tr>
<tr>
<td>VF Loss, better eye</td>
<td>5 dB worse</td>
<td>-0.52</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Gender</td>
<td>female</td>
<td>-0.55</td>
<td>0.03</td>
</tr>
<tr>
<td>Comorbidities</td>
<td>1 illness</td>
<td>-0.53</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Lives alone</td>
<td>Yes</td>
<td>+1.16</td>
<td>0.006</td>
</tr>
</tbody>
</table>

Other covariates: BMI, grip strength, age (all NS with $p>0.05$)
In glaucoma, physical activity does not seem the result of mobility problems.
But in AMD patients, less physical activity is the result of mobility problems.

-Fear of falling

-Log CS, 0.1 worse → -11%

+2% → Physical activity
In mice, exercise can protect against age-related IOP damage to ERG

Chrysostomou, Neurobiology of Aging 2014.
National Runner’s Health Study: fitness protective vs. glaucoma

Glaucoma incidence decreased with running speed

No new cases of glaucoma over 8 years in 781 men who ran 10k in under 34 minutes

Williams, MSSE 2009; IOVS 2009
Will be proposing & testing:

Are retinal vascular measures better amongst persons who are more active?

Can these measures be improved with greater activity?

Can greater activity prevent (or even reverse) glaucoma damage?

What is the reason for such an association?