1. Background.
   - Gap junctions in the Aii/ON cone bipolar (CB) network of the mammalian retina are essential for vision.
   - In retinal degeneration, the Aii/ON CB network is the epicenter of oscillatory behavior underlying retinal network hyperactivity that contributes to visual impairment.
   - Oscillations require Cx36-containing gap junctions.
   - Reports of additional gap junctions among ON CBs.

2. Aim.
   - Does this hyperactivity reflect changes in circuitry or dysfunction of normative circuitry?
     1) Define the coupling architecture of the Aii/ON CB network in healthy adult retina using connectome RC1.
     2) Evaluate changes in coupling motifs in RPC1, a path connectome from a rabbit retinal degeneration model of retinitis pigmentosa.

3. Normative coupling motifs in healthy adult rabbit retina (Connectome RC1).
   RC1:
   - 13-month-old, female, Dutch Belted rabbit. Light adapted, mid-periphery. (Anderson et al., 2009, 2011a,b).
   - 25 mm diameter volume built from 341 serial TEM sections (70-90 nm thick) at 2.18 nm/pixel resolution.

4. Altered coupling motifs in degenerate retina (Pathoconnectome RPC1).
   - Transgenic Rhodopsin P347L rabbit model of autosomal dominant retinitis pigmentosa (Kondo et al., IOVS 2009).
   - 10-months-old, male, New Zealand White background. Light adapted, para-visual streak.
   - Presenting with ~50% rod photoreceptor loss and early stage 1 retinal remodeling.
   - 0.67 mm diameter volume built from 946 serial TEM sections (70 nm thick) at 2.16 nm/pixel.

5. Network Summary & Conclusions
   - Gap junctions provide a mechanism for extensive lateral signal transfer within and across parallel processing streams.
   - Circuit topology is altered in retinal degeneration prior to complete loss of rods, with implications for therapeutic interventions.

6. Support & Disclosures
   - NIH grants R01 EY028297 and R01 EY015128 (BJW), R01 EY02576 (REM), T32 EY024234 Vision Training Grant (REM and CLS), P30 EY14850 Vision Core Grant; the Calvin and Jeanie Hatch Presidential Endowed Chair (REM); an unrestricted grant from Research to Prevent Blindness to the Moran Eye Center; and a Research to Prevent Blindness Career Development Award (BJW).
   - Funding for the JEOL JEM-1400 was generously provided by the late Martha Ann Healy, a friend of the Moran Eye Center.
   - Robert E. Mac is a principal of Signature Immunologics, Inc., manufacturer of some antibodies used for cell classification.