HEART OF AMERICA VISION GROUP

4th Meeting

September 27-28, 1991

University of Kansas Medical Center

Kansas City, Kansas

Sponsored by:
Department of Ophthalmology
Department of Anatomy and Cell Biology

EFFECTS OF THE LACK OF N-LINKED GLYCOSYLATION OF OPSIN IN THE *DROSOPHILA* MUTANT *ΔAsn20*.

J. Scott Christianson, Gary Brown, De-Mao Chen and William S. Stark.
Division of Biological Sciences, University of Missouri-Columbia, MO 65211.

O'Tousa (1991, *Visual Neuroscience*, in press) transfected an opsin deficient strain to produce a *Drosophila* stock, *ΔAsn20*, in which the N-linked glycosylation site of opsin at position #20 was changed from asparagine to isoleucine, thereby preventing glycosylation at this site. For positive controls, some flies, called *w9*, were also transfected, but with the wild type gene for R1-6 opsin (Rh1). We studied these mutants from the standpoint of EM morphometry, microspectrophotometry and electroretinography.

Computer image analysis of the rhabdomeres showed a decrease in size with age in receptor cells R1-6 of *ΔAsn20* flies. This decrease was not as drastic as in the negative control (opsin deficient, not transfected) and these rhabdomeres in *w9* remain constant or even increase with age. Receptor cell #7's rhabdomeres, which were an internal control due to their expression of opsin genes other than Rh1, did not differ in size between *ΔAsn20* and *w9*. Qualitatively, *ΔAsn20* flies have a noticeable disconfiguration of their rhabdomeric membrane.

Microspectrophotometry showed no functional visual pigment in *ΔAsn20* (over a 144 hour time course). *w9* flies had near normal visual pigment levels. An analysis of the intensity-responsivity of ERG waveforms shows a diminution of R1-6 function from .5 to 7 days with only R7 and R8 function remaining at 11 days. Analysis of *ΔAsn20*'s sensitivity and Prolonged Depolarizing Afterpotential shows that R1-6 receptor function is drasticly lower than wild type from the outset.

Since opsin mRNA levels in *ΔAsn20* are not different from the wild type (O'Tousa, 1991), but the rhabdomeres degenerate with time, we suspect that opsin is being produced, but not deployed into the visual membrane. It appears that glycosylation affects either the final synthesis or the deployment of opsin into the rhabdomere.