"Expression of $G_{\alpha}14$ and TRPC7 in Melanopsin-Containing Retinal Ganglion Cells"

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The vertebrate circadian pacemaker located within the suprachiasmatic nuclei of the brain regulates many physiological processes such as body temperature, blood pressure, and sleep cycles. This apparatus depends on retinal input that traverses a pathway utilizing melanopsin-containing retinal ganglion cells (RGCs). Prior research has indicated that melanopsin is an initiator of this phototransduction cascade, but subsequent steps are unknown. Recent developments indicate that the G protein $G_{\alpha}14$ and the cation channel TRPC7 may constitute downstream components of the melanopsin-based signaling cascade in RGCs and therefore have enriched RNA messages for these proteins in melanopsin-containing cells compared to other RGCs. This hypothesis can be tested using dual *in situ* hybridization to produce both red and green fluorescent signals in the same population of melanopsin-containing RGCs, indicating that labeled melanopsin probes and labeled $G_{\alpha}14$ or TRPC7 probes can be localized to the same cells simultaneously. Observing a high level of expression of these genes in melanopsin-containing RGCs, cells already known to initiate the phototransduction cascade, would imply that these two proteins play a role in continuation of the cascade. *In situ* control retinal sections were successfully developed; however, due to time and experimental constraints, dual *in situ* hybridization could not be utilized at this time. Further research in this area may be benefited by using such methods as single-cell RT to avoid such dilemmas as low expression of target sequences within melanopsin-containing RGCs.