**Title:** **Projections of rod pathways in human visual cortex**

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**Abstract:**

INTRODUCTION. The rod and cone photoreceptors of the retina are organized such that the central fovea contains no rod photoreceptors. Consequently the most central foveal representations in early visual cortex (e.g., V1) receive only cone signals. In contrast, signals from both rod and cone photoreceptors travel from the retina to the more peripheral regions of primary visual cortex. Most studies of retinotopy have examined visual field map organization under full luminance (photopic) conditions. Here we report new measurements of visual field maps in human visual cortex under low luminance (scotopic) conditions that only activate the rod photoreceptors.

METHODS. We measured angular and eccentric retinotopic organization in dorsal and ventral human visual cortex using fMRI at two different luminance levels. Retinotopic stimuli consisted of black and white, drifting radial checkerboards 3° and 7.4° in radius comprising wedges, ring, and/or bars. We examined the organization of the responses of the previously defined visual field maps along the ventral and dorsal pathways under photopic and scotopic conditions. We additionally measured the population receptive fields (Dumoulin and Wandell, 2007) of these regions under both luminance levels.

RESULTS/CONCLUSION. As expected for early visual cortex, the central foveal representations in V1, V2, and V3 are not activated under scotopic conditions. In regions with larger receptive fields, we find that the rod signals continue to activate even the most central representations in those maps. In addition, our measurements show that, in contrast to previous reports, the color-responsive ventral visual field maps (e.g., hV4, VO-1, VO-2) receive rod signals.

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