Predictive Mathematical Models for the Spread and Treatment of Hyperoxia-induced Photoreceptor Degeneration in Retinitis Pigmentosa
IOVS — Supplementary Material

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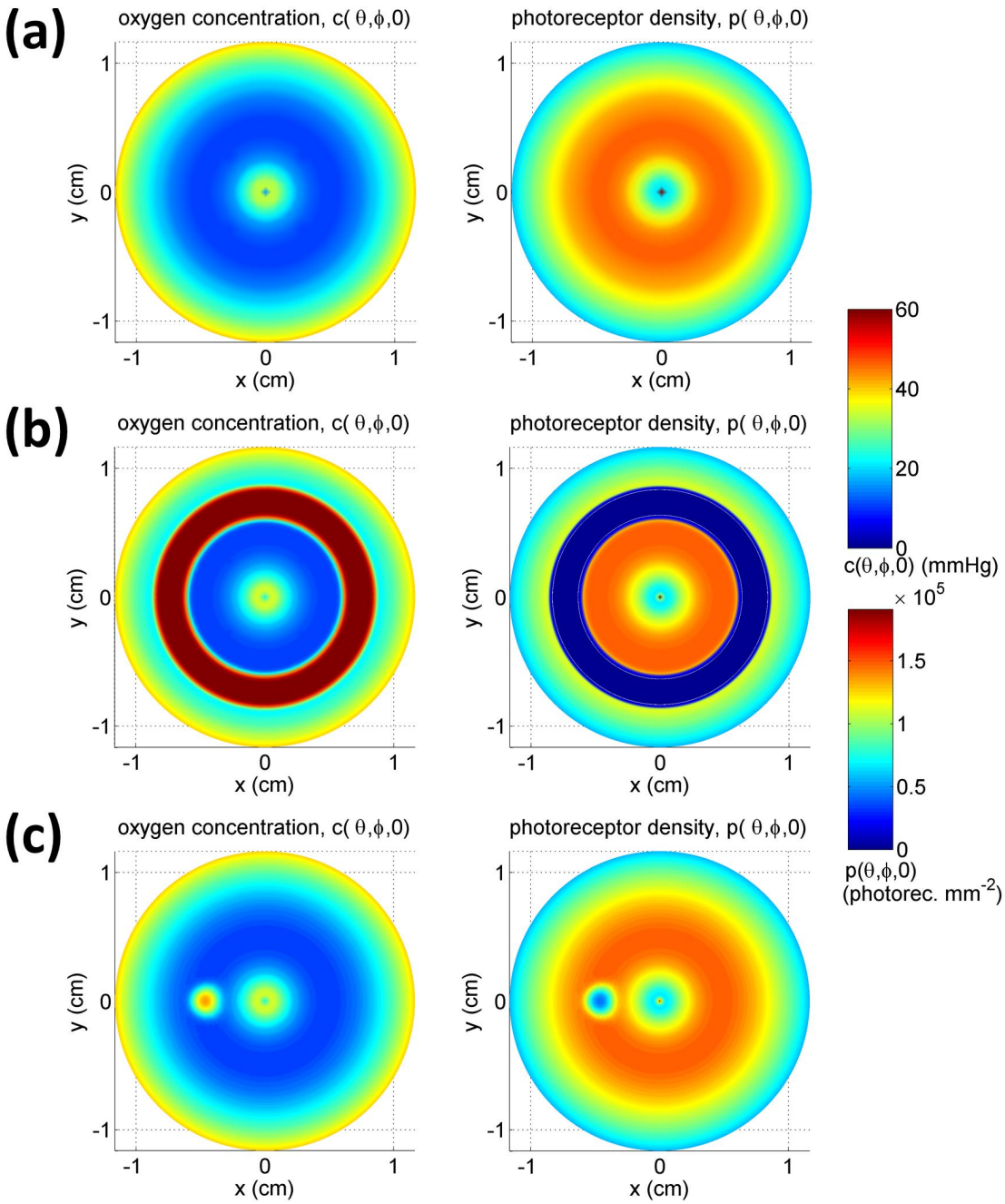

Figure S1: Simulation results showing exemplar initial oxygen and photoreceptor profiles (see Eq. (7)). The initial oxygen profile is the steady-state distribution corresponding to the initial photoreceptor profile. Panel **(a)** shows healthy oxygen and photoreceptor profiles without photoreceptor degeneration ($F(\theta,\phi)=1$). Panel **(b)** shows oxygen and photoreceptor profiles where photoreceptors have been removed from an annular region with inner and outer boundaries $(\theta_1,\theta_2)=(0.4,0.6)\times\Theta$ (rad) ($F(\theta,\phi)=\frac{1}{2}(\tanh(S(\theta_1-\theta))+\tanh(S(\theta-\theta_2))+2)$). Panel **(c)** shows oxygen and photoreceptor profiles where photoreceptors have been removed from a disc-shaped region with centre eccentricity $\theta_c=0.3\times\Theta$ (rad) and radius parameter $\psi=0.05\times\Theta$ (rad) ($F(\theta,\phi)=\frac{1}{2}(\tanh(\hat{S}((\theta-\theta_c)^2+(\phi-\hat{\phi}_c)^2\sin^2(\theta)-\psi^2))+1)$). See Tables 2 and 3 for the remaining parameter values.

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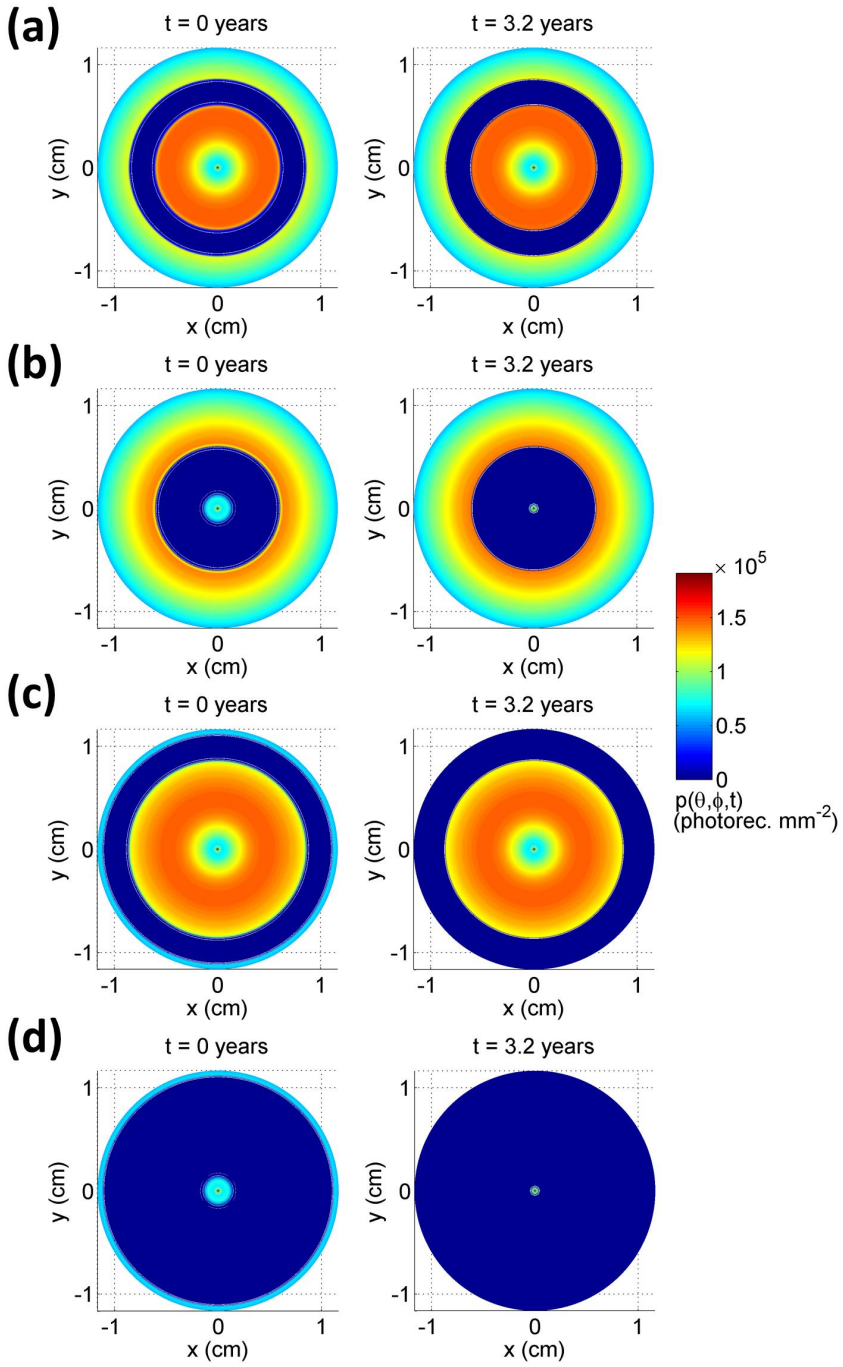

Figure S2: Simulation results showing how retinal degeneration progresses following the loss of an annulus of photoreceptors. Heat maps show the photoreceptor distribution in the initial- (left) and steady-states (right), while θ_1 (rad) and θ_2 (rad) are the initial eccentricities of the inner and outer boundaries of the degenerate annulus respectively. **(a)** $(\theta_1,\theta_2) = (0.4,0.6) \times \Theta$ (rad): the degenerate annulus does not expand, **(b)** $(\theta_1,\theta_2) = (0.08,0.4) \times \Theta$ (rad): the degenerate annulus expands centrally only, **(c)** $(\theta_1,\theta_2) = (0.6,0.9) \times \Theta$ (rad): the degenerate annulus expands peripherally only and **(d)** $(\theta_1,\theta_2) = (0.08,0.9) \times \Theta$ (rad): the degenerate annulus expands both centrally and peripherally. See Tables 2 and 3 for the remaining parameter values.

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