SUPPLEMENTAL INFORMATION

Retinal Organoid Chip: Engineering a Physiomimetic Oxygen Gradient for Optimizing Long Term Culture of Human Retinal Organoids

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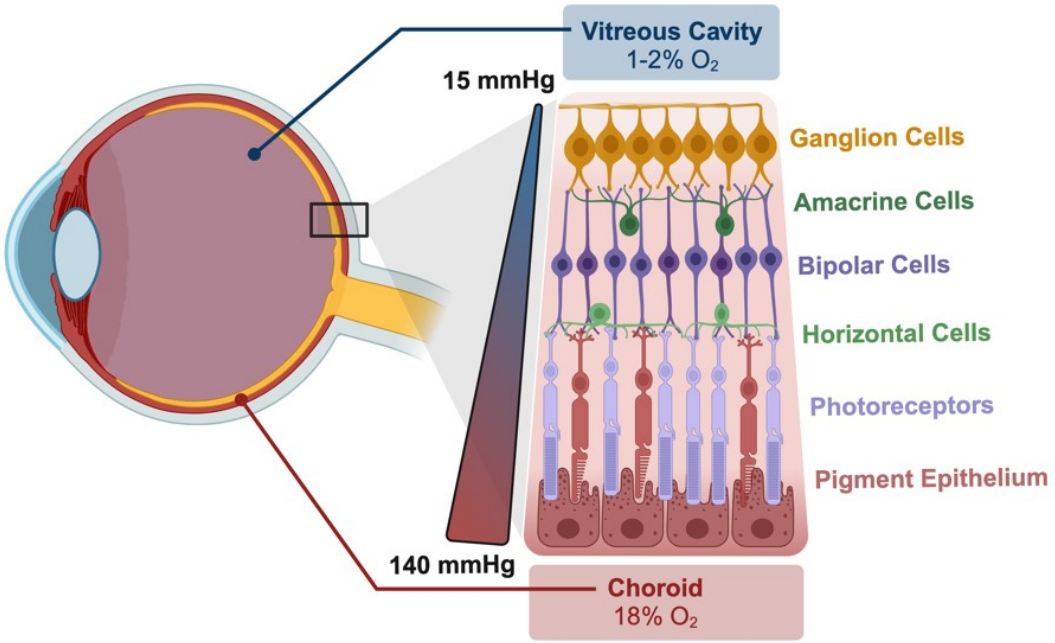
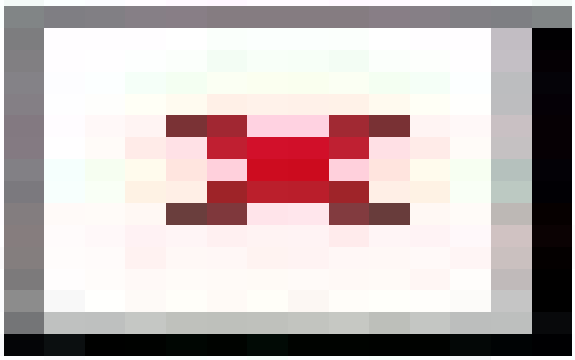
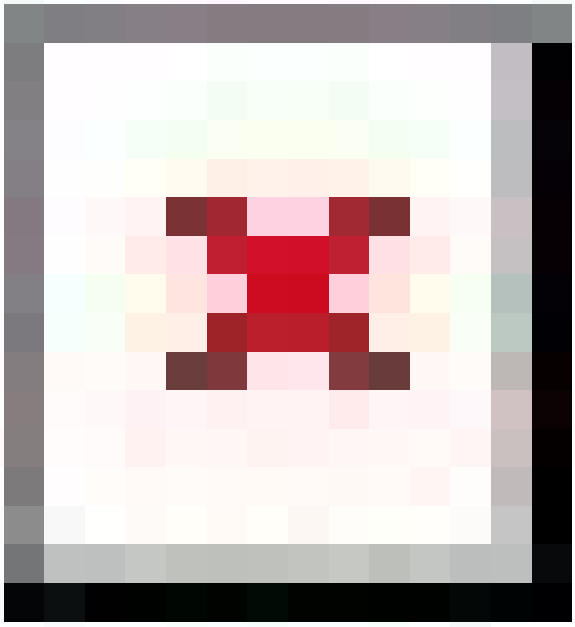


Supplementary Figure 1. *A schematic of the human eye anatomy highlights the retina, which is organized into distinct layers with various retinal cell phenotypes, situated between the hypoxic vitreous cavity and the oxygenated choroid. This positioning leads to the establishment of a steep oxygen gradient across the retinal tissue.*



Supplementary Figure 2. *Dental Pulp Stem Cells (DPSC) reprogrammed for pluripotency were tested on pluripotency markers SOX2, OCT4 and SSEA4 with immunofluorescence staining. Both original DPSC derived iPSC line and a genetically modified iPSC line were found to be pluripotent.*



Supplementary Figure 3. *The workflow of RBPMS quantification from immunofluorescent images using ImageJ, as described in the materials and methods.*

Supplementary Table 1: Computational Modeling Parameters

Physics & Study Type	Laminar Flow; Stationary Transport of Diluted Species; Time-dependent
Oxygen Diffusion Coefficients	Water: $3.0 \cdot 10^{-9}$ m^2/s PFA: $4.56 \bullet 10^{-8}$ m^2/s
Retinal Organoid Consumption Rates	Oxygen: -0.034091 $mol/(m^3 \cdot s)$ Glucose: 1.0278E-11 kg/s
Boundary Conditions Oxygen	C_{water}= 0.245 mol/m^3 $C_{sodium\ sulfate\ channel}$ = 0 mol/m^3
Fluid Flow	V = 50 µL/hour

Supplementary Table 2: Retinal Organoid Culture Media

Neural Induction Media (50 mL)		
48.5 mL	Gibco™ DMEM:F12	Thermo Fisher Scientific #11320033
0.5 mL	Non-Essential Amino Acids	VWR #16777-186
0.5 mL	Gibco™ GlutaMAX™ Supplement	Thermo Fisher Scientific #35050061
50 µL	Heparin Solution	Stemcell Tehcnologies # 07980
0.5 mL	Gibco™ N-2 Supplement	Thermo Fisher Scientific #17502048
Retinal Differentiation Media (50 mL)		
24 mL	Gibco™ DMEM:F12	Thermo Fisher Scientific #11320033
24 mL	Gibco™ DMEM	Thermo Fisher Scientific #11965092
0.5 mL	Non-Essential Amino Acids	VWR #16777-186
0.5 mL	Gibco™ GlutaMAX™ Supplement	Thermo Fisher Scientific #35050061
1.0 mL	Gibco™ B27™ Supplement	Thermo Fisher Scientific #12587010
0.5 mL	Gibco™ Antibiotic-Antimycotic	Thermo Fisher Scientific #15240096