



943 **Supplemental Figure 1: Comparison between Collagen IV and Isolectin B4 Staining for**
 944 **the Detection of Vaso-obliteration.** **A:** Representative image of retinal flatmount stained with
 945 Collagen IV (red). **A':** The retina in panel A with areas of vaso-obliteration highlighted (yellow).
 946 **B:** Representative image of retinal flatmount stained with Isolectin B4 (green). **B':** The retina in
 947 panel B with areas of vaso-obliteration highlighted (yellow). **C:** Summary of quantification of
 948 vaso-obliteration areas. Values are expressed as percentage of total retina \pm SEM, n = 3 retinas
 949 for each data set.

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Table S1. Genes differentially regulated in the OIR model as compared to normoxia.

Gene ID	Description	Fold change	p value
Up-regulated			
Angiogenesis, proliferation and endothelial physiology			
Esm1	endothelial cell-specific molecule 1	21.23	3.73E-08
Igfbp3	insulin-like growth factor binding protein 3	5.76	1.10E-05
Angpt2	angiopoietin 2	3.95	6.21E-06
Vwf	Von Willebrand factor homolog	3.86	2.94E-08
Igfbp5	insulin-like growth factor binding protein 5	3.55	6.87E-05
Ednra	endothelin receptor type A	3.18	1.93E-08
Pecam1	platelet/endothelial cell adhesion molecule 1	2.76	6.58E-08
Procr	protein C receptor, endothelial	2.42	1.28E-05
Vegfa	vascular endothelial growth factor A	2.40	9.47E-07
Vwa1	von Willebrand factor A domain containing 1	2.38	3.99E-04
Angptl2	angiopoietin-like 2	2.24	2.34E-03
Eng	endoglin	1.91	5.43E-06
Kit	kit oncogene	1.84	7.10E-05
Ephb4	Eph receptor B4	1.77	3.27E-05
Efna1	ephrin A1	1.68	5.29E-06
Ece1	endothelin converting enzyme 1	1.51	6.43E-04
Inflammation			
Tgfb1	transforming growth factor, beta induced	6.88	2.23E-09
Egln3	egl-9 family hypoxia-inducible factor 3	6.24	1.27E-04
Cxcr4	chemokine (C-X-C motif) receptor 4	2.97	2.25E-07
Ctla2b	cytotoxic T lymphocyte-associated protein 2 beta	2.93	1.90E-05
Ifitm3	interferon induced transmembrane protein 3	2.79	2.97E-04
Ctla2a	cytotoxic T lymphocyte-associated protein 2 alpha	2.34	9.42E-05
Lyn	Yamaguchi sarcoma viral (v-yes-1) oncogene homolog	2.26	1.77E-04
Tgfb1	transforming growth factor, beta 1	2.13	7.63E-05
Tgfb2	transforming growth factor, beta receptor II	2.02	1.23E-05
Ets2	E26 avian leukemia oncogene 2, 3' domain	1.94	3.60E-04
Ets1	E26 avian leukemia oncogene 1, 5' domain	1.88	2.29E-05
Egln1	egl-9 family hypoxia-inducible factor 1	1.86	4.68E-05
Tgif1	TGFB-induced factor homeobox 1	1.74	5.21E-05
ECM remodeling			
Col1a1	collagen, type I, alpha 1	4.63	2.22E-03
Col4a1	collagen, type IV, alpha 1	4.21	2.84E-07
Col3a1	collagen, type III, alpha 1	3.54	3.79E-04
Col4a2	collagen, type IV, alpha 2	3.54	9.82E-06
Lama4	laminin, alpha 4	3.41	5.39E-08
Fn1	fibronectin 1	3.30	2.84E-05
Nid1	nidogen 1	3.29	4.47E-04
Nid2	nidogen 2	3.02	2.19E-06
Col5a2	collagen, type V, alpha 2	2.60	3.54E-05
Col5a3	collagen, type V, alpha 3	2.39	7.29E-05
Lamb1	laminin B1	2.38	1.06E-04
Lamc1	laminin, gamma 1	2.29	9.52E-08
Col15a1	collagen, type XV, alpha 1	2.00	3.99E-04
Col2a1	collagen, type II, alpha 1	1.89	5.24E-07
Cell-matrix interaction			
Itga6	integrin alpha 6	2.39	1.23E-05
Icam1	intercellular adhesion molecule 1	2.09	3.77E-04
Itga9	integrin alpha 9	1.98	5.74E-04
Itgb1	integrin beta 1 (fibronectin receptor beta)	1.98	1.80E-05
Icam2	intercellular adhesion molecule 2	1.70	1.01E-04
Down-regulated			
Neuronal and retina-specific pathways			
Trhr	thyrotropin releasing hormone receptor	-2.66	7.90E-05
Tacr3	tachykinin receptor 3	-2.17	1.22E-03
Grik1	glutamate receptor, ionotropic, kainate 1	-1.78	8.13E-04
Arr3	arrestin 3, retinal	-1.74	1.10E-04
Nova1	neuro-oncological ventral antigen 1	-1.62	4.20E-04
Syt2	synaptotagmin II	-1.59	9.79E-04
Cadps	Ca ²⁺ -dependent secretion activator	-1.59	2.11E-03
Transporters and channels			
Slc22a29	solute carrier family 22. member 29	-2.57	2.20E-03
Slco1a4	solute carrier organic anion transporter family, member 1a4	-2.56	2.26E-04
Slc22a8	solute carrier family 22 (organic anion transporter), member 8	-1.99	1.74E-05
Cacna2d3	calcium channel, voltage-dependent, alpha2/delta subunit 3	-1.90	2.33E-04
Aqp4	aquaporin 4	-1.83	5.42E-05
Abca8a	ATP-binding cassette, sub-family A (ABC1), member 8a	-1.80	2.65E-04
Atxn7l1	ataxin 7-like 1	-1.55	1.47E-04
Slc2a3*	solute carrier family 2 (facilitated glucose transporter), member 3	1.54	2.13E-03
Slc39a8	solute carrier family 39 (metal ion transporter), member 8	1.72	8.61E-04
Slc7a1	solute carrier family 7 (cationic amino acid transporter, y ⁺ system), member 1	1.85	2.63E-06
Slc16a3	solute carrier family 16 (monocarboxylic acid transporters), member 3	2.11	1.10E-04
Slc12a4	solute carrier family 12, member 4	2.35	1.77E-04

Table S2. Genes differentially regulated in the combination treatment as compared to the individual cellular treatments, in the P5/P17 model

Gene ID	Description	Fold change	p value
CD34⁺/ECFCs vs. CD34⁺			
Up-regulated			
Neuronal structure and function			
Mbp*	myelin basic protein	8.60	8.20E-03
Mobp*	myelin-associated oligodendrocytic basic protein	7.05	2.36E-02
Slc17a6	solute carrier family 17 (Na-dependent inorganic phosphate cotransporter)	6.56	3.61E-04
Cldn11*	claudin 11	4.65	1.42E-02
Tspan2	tetraspanin 2	4.09	1.94E-03
Sncg	synuclein, gamma	3.53	2.95E-03
Olig1*	oligodendrocyte transcription factor 1	3.42	2.61E-02
Apod	apolipoprotein D	3.27	3.13E-03
Kcnd2	potassium voltage-gated channel, Shal-related family, member 2	3.15	5.82E-04
Gng4	guanine nucleotide binding protein (G protein), gamma 4	3.07	1.27E-03
Chra6	cholinergic receptor, nicotinic, alpha polypeptide 6	2.88	5.49E-04
Scn2a1	sodium channel, voltage-gated, type II, alpha 1	2.70	2.33E-03
Tacr3	tachykinin receptor 3	2.68	1.13E-04
Scn1a	sodium channel, voltage-gated, type I, alpha	2.67	5.32E-04
Nefl	neurofilament, light polypeptide	2.67	1.51E-03
Cplx1	complexin 1	2.62	2.07E-03
Cacng5	calcium channel, voltage-dependent, gamma subunit 5	2.62	1.90E-04
Chrb3	cholinergic receptor, nicotinic, beta polypeptide 3	2.37	2.42E-03
Cacnb4	calcium channel, voltage-dependent, beta 4 subunit	2.35	2.16E-04
Gabra1	gamma-aminobutyric acid (GABA) A receptor, subunit alpha 1	2.21	1.50E-05
Caln1	calneuron 1	2.13	3.44E-04
Syn2	synapsin II	2.02	3.30E-03
Visual system genes			
Vsn1	visinin-like 1	2.28	7.31E-04
Vsx1	visual system homeobox 1 homolog (zebrafish)	2.17	5.92E-04
Plcb1	phospholipase C, beta 1	1.94	2.10E-03
Gucy1b3	guanylate cyclase 1, soluble, beta 3	1.94	1.32E-04
Cabp2	calcium binding protein 2	1.84	1.37E-04
Gnao1	guanine nucleotide binding protein, alpha O	1.71	3.33E-06
Prkcg	protein kinase C, gamma	1.71	3.18E-03
Gucy1a3	guanylate cyclase 1, soluble, alpha 3	1.69	1.81E-06
Vsx2	visual system homeobox 2	1.68	2.35E-06
Slc24a3	solute carrier family 24 (sodium/potassium/calcium exchanger), member 3	1.64	7.87E-04
Cabp5	calcium binding protein 5	1.61	3.91E-04
Calm1	calmodulin 1	1.59	5.46E-06
Gnai1	guanine nucleotide binding protein (G protein), alpha inhibiting 1	1.51	2.64E-04
Down-regulated			
Extracellular matrix, WNT pathway			
Sfrp1	secreted frizzled-related protein 1	-10.49	1.52E-06
Sdc1	syndecan 1	-4.70	7.46E-07
Wnt7b	wingless-type MMTV integration site family, member 7B	-4.28	3.15E-03
Plau	plasminogen activator, urokinase	-3.91	3.21E-03
Col4a6	collagen, type IV, alpha 6	-3.79	1.86E-05
Col4a3	collagen, type IV, alpha 3	-3.29	7.09E-05
Col8a1	collagen, type VIII, alpha 1	-3.27	2.14E-03
Gene ID			
Description			
Fold change			
p value			
Wls	wntless homolog (Drosophila)	-2.93	4.95E-06
Nid1	nidogen 1	-2.57	3.38E-03
Col4a5	collagen, type IV, alpha 5	-2.50	3.69E-04
Loxl1	lysyl oxidase-like 1	-2.50	2.15E-04
Wnt5b	wingless-type MMTV integration site family, member 5B	-2.47	5.89E-07
Col4a4	collagen, type IV, alpha 4	-2.44	7.47E-06
Bgn	biglycan	-2.43	3.03E-04
Emid1**	EMI domain containing 1	-2.10	1.60E-05
Timp3	tissue inhibitor of metalloproteinase 3	-2.01	1.55E-04
Col4a1	collagen, type IV, alpha 1	-1.94	1.32E-03
Fmod	fibromodulin	-1.88	2.39E-03
P4ha2	proline 4-hydroxylase, alpha II polypeptide	-1.72	7.04E-04
P4ha1	proline 4-hydroxylase, alpha 1 polypeptide	-1.69	3.83E-05
Lama5	laminin, alpha 5	-1.57	3.25E-03
Stress response			
Nupr1	nuclear protein transcription regulator 1	-9.48	1.91E-04
Gsta2	glutathione S-transferase, alpha 2 (Yc2)	-3.30	1.02E-04
Pon3	paraoxonase 3	-3.06	1.48E-04
Gsta3	glutathione S-transferase, alpha 3	-2.55	7.00E-05
Gpx3	glutathione peroxidase 3	-2.52	3.27E-03
Gss	glutathione synthetase	-2.50	8.49E-04
Ggct	gamma-glutamyl cyclotransferase	-2.47	9.07E-04
Gstm2	glutathione S-transferase, mu 2	-2.46	6.67E-04
Mgst1	microsomal glutathione S-transferase 1	-2.45	1.61E-03
Gstm1	glutathione S-transferase, mu 1	-2.44	1.85E-05
Rrm2	ribonucleotide reductase M2	-2.26	1.61E-03
Prdx4	peroxiredoxin 4	-1.61	3.81E-03
Pon2	paraoxonase 2	-1.57	1.87E-04
CD34⁺/ECFCs vs. ECFCs			
Up-regulated			
Myelin structure and function			
Mbp*	myelin basic protein	9.87	5.37E-03
Mobp*	myelin-associated oligodendrocytic basic protein	6.86	2.53E-02
Plp1	proteolipid protein (myelin) 1	5.42	9.65E-03
Olig1*	oligodendrocyte transcription factor 1	3.57	2.18E-02
Mal	myelin and lymphocyte protein, T cell differentiation protein	2.99	3.60E-02
Slc15a2	solute carrier family 15 (H ⁺ /peptide transporter), member 2	2.47	3.94E-02
Cldn11*	claudin 11	3.80	3.02E-02
Scd1	stearoyl-Coenzyme A desaturase 1	2.10	7.60E-03
Down-regulated			
Immune response			
Tgtp1	T cell specific GTPase 1	-3.51	1.26E-02
H2-Q6	histocompatibility 2, Q region locus 6	-2.77	2.12E-02
Ccl5	chemokine (C-C motif) ligand 5	-2.62	3.62E-02
H2-Q7	histocompatibility 2, Q region locus 7	-2.50	1.05E-02
H2-K1	histocompatibility 2, K1, K region	-2.14	3.64E-02
H2-T10	histocompatibility 2, T region locus 10	-1.74	1.57E-02
H2-D1	histocompatibility 2, D region locus 1	-1.71	1.79E-02
Neovascularization			
Crispld1	cysteine-rich secretory protein LCCL domain containing 1	-1.78	3.29E-03
Ptger4	prostaglandin E receptor 4 (subtype EP4)	-1.68	1.05E-02
ECM			
Emid1**	EMI domain containing 1	-1.61	1.64E-03

Table S3. Proteomic analysis in the OIR model with the various treatments

Pathway	Score	Proteins
OIR vs. Normoxia		
Up-regulated		
Growth factors signaling pathways		
Development HGF Signaling Pathway	51.42	ABL1, NFKB1, MAP2K1, MAPK3, PTPN11, STAT3, RAF1, BRAF, EIF4E, ERBB2, RPS6KA1, CDK1
Development IGF-1 Receptor Signaling	46.34	NFKB1, MAP2K1, MAPK3, GYS1, PTPN11, BCL2L11, STAT3, RAF1, RPS6, RPS6KA1
PI3K-Akt Signaling Pathway	40.84	NFKB1, MAP2K1, MAPK3, MCL1, GYS1, BCL2L11, RAF1, EIF4E, PDGFRA, ERBB2, RPS6, FN1, KDR
Development VEGF Signaling Via VEGFR2 - Generic Cascades	33.52	NFKB1, MAP2K1, MAPK3, PTPN11, STAT3, RAF1, BRAF, KDR
Development EGFR Signaling Via Small GTPases	33.42	MAP2K1, MAPK3, PTPN11, STAT3, RAF1, PDGFRA, ERBB2
EGF/EGFR Signaling Pathway	32.29	ABL1, MAP2K1, PTPN11, STAT3, RAF1, BRAF, ERBB2, RPS6KA1
Angiopoietin Like Protein 8 Regulatory Pathway	25.28	MAP2K1, MAPK3, GYS1, PTPN11, RAF1, EIF4E, RPS6KA1
Inflammation and immune response		
Interleukin-11 Signaling Pathway	40.12	MAP2K1, MAPK3, PTPN11, STAT3, RAF1, RPS6, RPS6KA1
Cytokine Signaling in Immune System	37.96	NFKB1, LCK, MAP2K1, MAPK3, MCL1, PTPN11, HIST1H3A, STAT3, RAF1, BRAF, EIF4E, PDGFRA, ERBB2, FN1
HIF-1 Signaling Pathway	37.90	NFKB1, MAP2K1, MAPK3, STAT3, HK2, EIF4E, ERBB2, RPS6
TGF-Beta Pathway	36.49	NFKB1, MAP2K1, MAPK3, HIST1H3A, STAT3, RAF1, BRAF, EIF4E, PDGFRA, ERBB2, RPS6, RPS6KA1, KDR
B Cell Receptor Signaling Pathway (KEGG)	33.92	NFKB1, LCK, MAP2K1, MAPK3, PTPN11, RAF1, BRAF, RPS6KA1
IL-2 Pathway	33.76	ABL1, NFKB1, LCK, MAP2K1, MAPK3, STAT3, RAF1, BRAF, ERBB2, RPS6KA1
Immune Response IL-23 Signaling Pathway	32.50	NFKB1, MAPK3, YAP1, PTPN11, STAT3, PDGFRA, ERBB2, FN1
IL6-mediated Signaling Events	24.00	MAP2K1, MAPK3, MCL1, PTPN11, STAT3
Cell-Matrix interaction		
Focal Adhesion	30.87	MAP2K1, MAPK3, STAT3, RAF1, BRAF, PDGFRA, ERBB2, FN1, KDR
Down-regulated		
ErbB Signaling Pathway	25.36	MAPK9, PRKCA, STAT5A, PAK4, PDK1, CCND1
Autophagy - Animal	20.79	MAPK9, ATG3, PTEN, BCL2L1, BECN1
CD34⁺/ECFCs vs. CD34⁺		
Up-regulated		
ErbB Signaling Pathway	21.00	MDM2, STAT5A, RAF1, PAK4
Autophagy	15.93	MDM2, BECN1, RAF1, IRS1
Down-regulated		
Class I MHC Mediated Antigen Processing and Presentation	9.74	UBAC1, ZAP70, CDH1
Cytoskeletal Signaling	8.27	STMN1, CDH1, MYH11
CD34⁺/ECFCs vs. ECFC		
Up-regulated		
Nanog in Mammalian ESC Pluripotency	15.11	PLCG2, POU5F1, PRKAA2, SOX2, RAF1
Retinoblastoma (RB) in Cancer	14.83	RAF1, MSH6, CHEK1
Down-regulated		
ERK Signaling	14.25	COL6A1, SMAD3, ZAP70, CDK1