

Table S3. Biofunctions identified by IPA for genes affected in summer granulosa cells

Category	Functions	Functions Annotation	Num. of Molecules	Predicted Activation State	Activation z-score	p-Value	Molecules
Cardiovascular System Development and Function Tissue Development	development	development of cardiovascular tissue	5	Decreased	-1.969	2.59×10 ⁻²	↑↑ANGPTL1, ↓↓F2RL1, ↑↑PTPRM, ↑↑TFPI, ↑↑TGFB3
Cardiovascular System Development and Function Cellular Development Cellular Growth and Proliferation Organismal Development Tissue Development	proliferation	proliferation of endothelial cells	4	Decreased	-1.969	3.19×10 ⁻²	↑↑ANGPTL1, ↓↓F2RL1, ↑↑PTPRM, ↑↑TFPI
Cardiovascular System Development and Function	development	development of cardiovascular system	9		-1.510	3.97×10 ⁻²	↑↑ALCAM, ↑↑ANGPTL1, ↓↓F2RL1, ↑↑HOPX, ↓↓MYCN, ↓↓PTGER3, ↑↑PTPRM, ↑↑TFPI, ↑↑TGFB3
Cardiovascular System Development and Function Organismal Development	vasculogenesis	vasculogenesis	7		-1.464	3.59×10 ⁻²	↑↑ALCAM, ↑↑ANGPTL1, ↓↓F2RL1, ↓↓PTGER3, ↑↑PTPRM, ↑↑TFPI, ↑↑TGFB3
Cellular Growth and Proliferation	proliferation	proliferation of cells	28		-1.241	2.63×10 ⁻³	↓↓AKR1B10, ↑↑AKR1C1/AKR1C2, ↑↑ALCAM, ↑↑ANGPTL1, ↑↑ARID5B, ↑↑COL14A1, ↑↑EZR, ↓↓F2RL1, ↓↓GPX4, ↑↑H2AFY, ↑↑HOPX, ↑↑INPP4A, ↓↓MAFB, ↑↑MLLT3, ↓↓MT-ND2, ↑↑MT3, ↓↓MYCN, ↑↑PRICKLE2, ↑↑PTPRM, ↑↑RORA, ↑↑SLC20A1, ↓↓SLC26A2, ↓↓STC2, ↑↑TFG, ↑↑TFPI, ↑↑TGFB3, ↑↑TJP1, ↑↑VWF
Lipid Metabolism Small Molecule Biochemistry	metabolism	fatty acid metabolism	6		1.154	3.51×10 ⁻²	↑↑ACSL3, ↑↑AKR1C1/AKR1C2, ↓↓F2RL1, ↓↓GPX4, ↑↑MDH1, ↑↑VWF
Neurological Disease	damage	damage of nervous system	4		-1.067	4.74×10 ⁻³	↓↓F2RL1, ↑↑MT3, ↓↓PTGER3, ↑↑VWF
Developmental Disorder	growth failure	Growth Failure	7		-0.896	2.19×10 ⁻²	↑↑ARID5B, ↓↓MYCN, ↑↑REV3L, ↓↓SHISA2, ↑↑SLC20A1, ↑↑SYNE1, ↑↑TFPI
Cardiovascular Disease	heart disease	Heart Disease	9		0.849	3.46×10 ⁻²	↓↓F2RL1, ↑↑HOPX, ↓↓MYCN, ↑↑PTPRM, ↑↑RBFOX1, ↑↑SLC20A1, ↑↑TFPI, ↑↑TGFB3, ↑↑VWF

Cell-To-Cell Signaling and Interaction	binding	binding of cells	6	0.701	1.92×10^{-2}	↑↑ALCAM, ↑↑ANGPTL1, ↑↑DNAJC1, ↑↑PTPRM, ↑↑TFPI, ↑↑VWF
Cellular Development Cellular Growth and Proliferation	proliferation	proliferation of tumor cell lines	12	-0.676	4.24×10^{-2}	↓↓AKR1B10, ↑↑ANGPTL1, ↑↑COL14A1, ↑↑EZR, ↓↓F2RL1, ↑↑H2AFY, ↑↑MLLT3, ↓↓MT-ND2, ↓↓MYCN, ↑↑RORA, ↓↓SLC26A2, ↑↑TGFB3
Organismal Survival	neonatal death	neonatal death	6	-0.420	1.51×10^{-2}	↑↑ARID5B, ↓↓F2RL1, ↓↓MAFB, ↓↓MYCN, ↑↑SYNE1, ↑↑TFPI
Cellular Movement	cell movement	cell movement	16	-0.234	2.10×10^{-2}	↑↑ALCAM, ↑↑ANGPTL1, ↑↑ANKRD28, ↑↑ARID5B, ↑↑EZR, ↓↓F2RL1, ↑↑GPM6A, ↓↓MAFB, ↑MARK1, ↓↓NAV1, ↓↓PTGER3, ↑↑PTPRM, ↑↑TFPI, ↑↑TGFB3, ↑↑TJP1, ↑↑VWF
Cellular Assembly and Organization Cellular Function and Maintenance	organization	microtubule dynamics	13	-0.164	7.19×10^{-4}	↑↑CRIPT, ↑↑EZR, ↓↓F2RL1, ↑↑GPM6A, ↓↓GPX4, ↑↑MAP9, ↑MARK1, ↑↑MID1, ↑↑MT3, ↑↑PRICKLE2, ↑↑PTPRM, ↑↑SYNE1, ↑↑VWF
Cellular Movement	migration	migration of cells	14	-0.076	3.69×10^{-2}	↑↑ALCAM, ↑↑ANGPTL1, ↑↑ANKRD28, ↑↑ARID5B, ↑↑EZR, ↓↓F2RL1, ↑↑GPM6A, ↓↓MAFB, ↑MARK1, ↓↓NAV1, ↓↓PTGER3, ↑↑PTPRM, ↑↑TFPI, ↑↑VWF
Cellular Growth and Proliferation	formation	formation of neuroblastoma cell lines	2		1.34×10^{-5}	↑↑PRICKLE1, ↑↑PRICKLE2
Cancer	endometrioid carcinoma	endometrioid carcinoma	24		3.61×10^{-4}	↑↑AKR1C1/AKR1C2, ↓ALAS1, ↑↑ANKRD28, ↑↑ARID5B, ↓↓C8orf47, ↑↑COL14A1, ↓↓GALNT7, ↓↓HMCN1, ↑↑INPP4A, ↓↓KCNAB1, ↑MARK1, ↑↑MDH1, ↑↑MLLT3, ↓↓MYCN, ↓↓NAV1, ↑↑PTPRM, ↑↑REV3L, ↑↑SLC20A1, ↑↑SYNE1, ↓↓TMEM106B, ↑TMEM87A, ↓↓VAT1L, ↑↑VWF, ↑↑ZNF614
Cancer	uterine tumor	uterine tumor	11		4.78×10^{-4}	↑↑COL14A1, ↑DR1, ↓↓F2RL1, ↑↑GPM6A, ↑↑H2AFY, ↑↑HOPX, ↑↑MDH1, ↓↓PTGER3, ↑↑RORA, ↑↑TFPI, ↑↑TGFB3

Developmental Disorder Organismal Injury and Abnormalities Reproductive System Disease	congenital anomaly of genital system	congenital anomaly of genital system	3	5.69×10 ⁻⁴	↑↑AKR1C1/AKR1C2, ↑↑ARID5B, ↑↑MID1
Developmental Disorder Hereditary Disorder Metabolic Disease Neurological Disease Ophthalmic Disease Skeletal and Muscular Disorders	Leber's optic atrophy	Leber's optic atrophy	2	5.91×10 ⁻⁴	↓↓MT-ND2, ↓↓MT-ND4L
Digestive System Development and Function Embryonic Development Hepatic System Development and Function Organ Development Organismal Development Tissue Development	development	development of liver	4	6.77×10 ⁻⁴	↓↓MYCN, ↑↑SLC20A1, ↑↑TGFB3, ↑↑VWF
Cancer	malignant neoplasm of abdomen	malignant neoplasm of abdomen	34	7.27×10 ⁻⁴	↑↑ACSL3, ↓↓AKR1B10, ↑↑AKR1C1/AKR1C2, ↓ALAS1, ↑↑ALCAM, ↑↑ANKRD28, ↑↑ANXA4, ↑↑COL14A1, ↑↑EZR, ↓↓F2RL1, ↑↑FAM13A, ↑↑GPM6A, ↑↑H2AFY, ↓↓HMCN1, ↓↓LYZ, ↓↓MAFB, ↑↑MAP9, ↑MARK1, ↑↑MDH1, ↑↑MID1, ↑↑MLLT3, ↓↓MT-ND4L, ↓↓MYCN, ↓↓PTGER3, ↑↑PTPRM, ↑↑REV3L, ↑↑RORA, ↓↓SLC26A2, ↓↓SVIL, ↑↑SYNE1, ↑↑TFPI, ↑↑TGFB3, ↑↑TJP1, ↑↑VWF
Cancer Gastrointestinal Disease	metastatic colorectal cancer	metastatic colorectal cancer	5	7.96×10 ⁻⁴	↑↑AKR1C1/AKR1C2, ↓↓MAFB, ↑↑REV3L, ↑↑TFPI, ↑↑TGFB3
Embryonic Development Tissue Development	growth	growth of embryonic tissue	3	9.29×10 ⁻⁴	↓↓F2RL1, ↓↓MYCN, ↑↑REV3L

Cancer	solid tumor	solid tumor	40	1.16×10 ⁻³	↑↑ACSL3, ↓↓AKR1B10, ↑↑AKR1C1/AKR1C2, ↓ALAS1, ↑↑ALCAM, ↑↑ANGPTL1, ↑↑ANKRD28, ↑↑ANXA4, ↑↑ARID5B, ↑↑COL14A1, ↑↑EZR, ↓↓F2RL1, ↑↑FAM13A, ↑↑GPM6A, ↑↑H2AFY, ↓↓HMCN1, ↓↓MAFB, ↑↑MAP9, ↑MARK1, ↑↑MDH1, ↑↑MID1, ↑↑MLLT3, ↓↓MT-ND2, ↓↓MT-ND4L, ↓↓MYCN, ↑↑PGAP1, ↑↑PRICKLE1, ↑↑PTPRM, ↑↑REV3L, ↑↑RORA, ↓↓SHISA2, ↓↓SVIL, ↑↑SYNE1, ↑↑TFG, ↑↑TFPI, ↑↑TGFB3, ↑↑TJP1, ↓↓TMEM106B, ↑↑VWF, ↑↑ZNF614
Hereditary Disorder Neurological Disease	progressive myoclonic epilepsy	progressive myoclonic epilepsy	2	1.36×10 ⁻³	↑↑PRICKLE1, ↑↑PRICKLE2
Cancer	cancer	Cancer	47	1.52×10 ⁻³	↑↑ACSL3, ↓↓AKR1B10, ↑↑AKR1C1/AKR1C2, ↓ALAS1, ↑↑ALCAM, ↑↑ANGPTL1, ↑↑ANKRD28, ↑↑ANXA4, ↑↑ARID5B, ↑↑COL14A1, ↑↑CRIPT, ↑↑EZR, ↓↓F2RL1, ↑↑FAM13A, ↑↑GPM6A, ↑↑H2AFY, ↓↓HMCN1, ↓↓KCNAB1, ↓↓LYZ, ↓↓MAFB, ↑↑MAP9, ↑MARK1, ↑↑MDH1, ↑↑MID1, ↑↑MLLT3, ↓↓MT-ND2, ↓↓MT-ND4L, ↓↓MYCN, ↑↑PGAP1, ↑↑PRICKLE1, ↑↑PRICKLE2, ↓↓PTGER3, ↑↑PTPRM, ↑↑RBFOX1, ↑↑REV3L, ↑↑RORA, ↓↓SHISA2, ↓↓SLC26A2, ↓↓SVIL, ↑↑SYNE1, ↑↑TFG, ↑↑TFPI, ↑↑TGFB3, ↑↑TJP1, ↓↓TMEM106B, ↑↑VWF, ↑↑ZNF614
Cancer	benign neoplasia	benign neoplasia	10	1.54×10 ⁻³	↑↑ALCAM, ↑↑ANGPTL1, ↑DR1, ↑↑GPM6A, ↑↑HOPX, ↑↑MDH1, ↓↓PTGER3, ↑↑PTPRM, ↑↑RORA, ↑↑TGFB3

Cancer Gastrointestinal Disease	colorectal cancer	colorectal cancer	27	1.70×10 ⁻³	↑↑ACSL3, ↑↑AKR1C1/AKR1C2, ↓ALAS1, ↑↑ALCAM, ↑↑ANKRD28, ↑↑ANXA4, ↑↑COL14A1, ↓↓F2RL1, ↑↑H2AFY, ↓↓HMCN1, ↓↓MAFB, ↑↑MAP9, ↑MARK1, ↑↑MDH1, ↑↑MID1, ↑↑MLLT3, ↓↓MT-ND4L, ↓↓MYCN, ↑↑PTPRM, ↑↑REV3L, ↓↓SLC26A2, ↓↓SVIL, ↑↑SYNE1, ↑↑TFPI, ↑↑TGFB3, ↑↑TJP1, ↑↑VWF
Cardiovascular Disease	unstable angina	unstable angina	2	1.76×10 ⁻³	↓↓F2RL1, ↑↑TFPI
Cardiovascular Disease	peripheral arterial occlusive disease	peripheral arterial occlusive disease	5	1.81×10 ⁻³	↑↑KCTD12, ↓↓MAFB, ↑MARK1, ↓↓PTGER3, ↑↑USP15
Cancer Gastrointestinal Disease	digestive organ tumor	digestive organ tumor	30	1.88×10 ⁻³	↑↑ACSL3, ↓↓AKR1B10, ↑↑AKR1C1/AKR1C2, ↓ALAS1, ↑↑ALCAM, ↑↑ANKRD28, ↑↑ANXA4, ↑↑COL14A1, ↑↑EZR, ↓↓F2RL1, ↑↑H2AFY, ↓↓HMCN1, ↓↓MAFB, ↑↑MAP9, ↑MARK1, ↑↑MDH1, ↑↑MID1, ↑↑MLLT3, ↓↓MT-ND4L, ↓↓MYCN, ↑↑PTPRM, ↑↑REV3L, ↑↑RORA, ↓↓SLC26A2, ↓↓SVIL, ↑↑SYNE1, ↑↑TFPI, ↑↑TGFB3, ↑↑TJP1, ↑↑VWF
Cancer	carcinoma	carcinoma	39	2.04×10 ⁻³	↑↑ACSL3, ↓↓AKR1B10, ↑↑AKR1C1/AKR1C2, ↓ALAS1, ↑↑ALCAM, ↑↑ANGPTL1, ↑↑ANKRD28, ↑↑ANXA4, ↑↑ARID5B, ↑↑COL14A1, ↑↑EZR, ↓↓F2RL1, ↑↑FAM13A, ↑↑GPM6A, ↑↑H2AFY, ↓↓HMCN1, ↓↓MAFB, ↑↑MAP9, ↑MARK1, ↑↑MDH1, ↑↑MID1, ↑↑MLLT3, ↓↓MT-ND2, ↓↓MT-ND4L, ↓↓MYCN, ↑↑PGAP1, ↑↑PRICKLE1, ↑↑PTPRM, ↑↑REV3L, ↑↑RORA, ↓↓SHISA2, ↓↓SVIL, ↑↑SYNE1, ↑↑TFPI, ↑↑TGFB3, ↑↑TJP1, ↓↓TMEM106B, ↑↑VWF, ↑↑ZNF614

Cancer Gastrointestinal Disease	gastrointestinal tract cancer	gastrointestinal tract cancer	28	2.41×10 ⁻³	↑↑ACSL3, ↑↑AKR1C1/AKR1C2, ↓ALAS1, ↑↑ALCAM, ↑↑ANKRD28, ↑↑ANXA4, ↑↑COL14A1, ↑↑EZR, ↓↓F2RL1, ↑↑H2AFY, ↓↓HMCN1, ↓↓MAFB, ↑↑MAP9, ↑MARK1, ↑↑MDH1, ↑↑MID1, ↑↑MLLT3, ↓↓MT-ND4L, ↓↓MYCN, ↑↑PTPRM, ↑↑REV3L, ↓↓SLC26A2, ↓↓SVIL, ↑↑SYNE1, ↑↑TFPI, ↑↑TGFB3, ↑↑TJP1, ↑↑VWF
Cancer	epithelial neoplasia	epithelial neoplasia	40	2.51×10 ⁻³	↑↑ACSL3, ↓↓AKR1B10, ↑↑AKR1C1/AKR1C2, ↓ALAS1, ↑↑ALCAM, ↑↑ANGPTL1, ↑↑ANKRD28, ↑↑ANXA4, ↑↑ARID5B, ↑↑COL14A1, ↑↑EZR, ↓↓F2RL1, ↑↑FAM13A, ↑↑GPM6A, ↑↑H2AFY, ↓↓HMCN1, ↓↓KCNAB1, ↓↓MAFB, ↑↑MAP9, ↑MARK1, ↑↑MDH1, ↑↑MID1, ↑↑MLLT3, ↓↓MT-ND2, ↓↓MT-ND4L, ↓↓MYCN, ↑↑PGAP1, ↑↑PRICKLE1, ↑↑PTPRM, ↑↑REV3L, ↑↑RORA, ↓↓SHISA2, ↓↓SVIL, ↑↑SYNE1, ↑↑TFPI, ↑↑TGFB3, ↑↑TJP1, ↓↓TMEM106B, ↑↑VWF, ↑↑ZNF614
Cellular Assembly and Organization	formation	formation of microtubule bundles	2	2.95×10 ⁻³	↓↓NAV1, ↑↑VWF
Small Molecule Biochemistry	metabolism	metabolism of aldehyde	2	2.95×10 ⁻³	↓↓AKR1B10, ↑↑ALDH9A1
Cancer Organismal Injury and Abnormalities Reproductive System Disease	uterine serous papillary cancer	uterine serous papillary cancer	5	3.08×10 ⁻³	↑↑COL14A1, ↓↓F2RL1, ↑↑GPM6A, ↓↓PTGER3, ↑↑TGFB3
Cancer	uterine leiomyoma	uterine leiomyoma	5	3.43×10 ⁻³	↑DR1, ↑↑GPM6A, ↑↑HOPX, ↑↑MDH1, ↑↑RORA
Embryonic Development Organismal Development	development	development of blastocyst	3	3.44×10 ⁻³	↑↑REV3L, ↑↑TGFB3, ↑↑TJP1
Organismal Injury and Abnormalities	blood clot	blood clot	3	3.56×10 ⁻³	↓↓PTGER3, ↑↑TFPI, ↑↑VWF

Organismal Injury and Abnormalities Reproductive System Disease	spontaneous abortion	spontaneous abortion	2	4.75×10 ⁻³ ↓↓PTGER3, ↑↑TFPI
Cell Morphology Cellular Assembly and Organization Cellular Function and Maintenance	reorganization	reorganization of actin cytoskeleton	3	4.90×10 ⁻³ ↑↑EZR, ↓↓F2RL1, ↑↑VWF
Lipid Metabolism Small Molecule Biochemistry	metabolism	metabolism of prostaglandin	4	5.40×10 ⁻³ ↑↑AKR1C1/AKR1C2, ↓↓F2RL1, ↓↓GPX4, ↑↑VWF
Lipid Metabolism Small Molecule Biochemistry	reduction	reduction of lipid	2	5.81×10 ⁻³ ↑↑AKR1C1/AKR1C2, ↓↓GPX4
Cardiovascular Disease	disorder of artery	disorder of artery	9	6.02×10 ⁻³ ↑↑KCTD12, ↓↓MAFB, ↑MARK1, ↓↓PTGER3, ↑↑PTPRM, ↑↑RBFOX1, ↑↑TFPI, ↑↑USP15, ↑↑VWF
Cell Morphology	morphology	morphology of breast cancer cell lines	2	6.96×10 ⁻³ ↑↑EZR, ↑↑RORA
Cancer	hemangioma	hemangioma	3	7.04×10 ⁻³ ↑↑ALCAM, ↑↑ANGPTL1, ↑↑TGFB3
Cancer	metastasis	metastasis	8	7.28×10 ⁻³ ↑↑AKR1C1/AKR1C2, ↑↑ANGPTL1, ↑↑EZR, ↓↓MAFB, ↓↓MYCN, ↑↑REV3L, ↑↑TFPI, ↑↑TGFB3
Embryonic Development Organismal Development	development	development of abdomen	7	7.36×10 ⁻³ ↑↑ANXA4, ↑↑ARID5B, ↑↑EZR, ↓↓MYCN, ↑↑SLC20A1, ↑↑TGFB3, ↑↑VWF
Cardiovascular Disease	occlusion	occlusion of artery	8	7.39×10 ⁻³ ↑↑KCTD12, ↓↓MAFB, ↑MARK1, ↓↓PTGER3, ↑↑PTPRM, ↑↑RBFOX1, ↑↑USP15, ↑↑VWF
Cancer Organismal Injury and Abnormalities Reproductive System Disease	endometrial cancer	endometrial cancer	6	7.94×10 ⁻³ ↑↑COL14A1, ↓↓F2RL1, ↑↑GPM6A, ↑↑H2AFY, ↓↓PTGER3, ↑↑TGFB3
Cardiovascular Disease Developmental Disorder	hypoplasia	hypoplasia of trabeculae carne	2	8.20×10 ⁻³ ↓↓MYCN, ↑↑TGFB3
Cellular Function and Maintenance	elevation	elevation of Ca ²⁺ in cytosol	3	9.23×10 ⁻³ ↓↓F2RL1, ↑↑NPTN, ↓↓PTGER3
Cardiovascular Disease Organismal Injury and Abnormalities	formation	formation of blood clot	2	9.54×10 ⁻³ ↓↓PTGER3, ↑↑VWF

Vitamin and Mineral Metabolism	quantity	quantity of mineral	2	1.00×10 ⁻² ↑↑MT3, ↑↑RORA
Neurological Disease Organismal Injury and Abnormalities	damage	damage of brain	3	1.06×10 ⁻² ↑↑MT3, ↓↓PTGER3, ↑↑VWF
Cancer Respiratory Disease	carcinoma	carcinoma in lung	8	1.07×10 ⁻² ↓↓AKR1B10, ↑↑ANGPTL1, ↑↑EZR, ↓↓MAFB, ↑MARK1, ↑↑MLLT3, ↓↓TMEM106B, ↑↑VWF
Cardiovascular Disease	vascular disease	vascular disease	10	1.07×10 ⁻² ↑↑KCTD12, ↓↓MAFB, ↑MARK1, ↓↓PTGER3, ↑↑PTPRM, ↓↓PYGL, ↑↑RBFOX1, ↑↑TFPI, ↑↑USP15, ↑↑VWF
Cancer Respiratory Disease	lung cancer	lung cancer	9	1.09×10 ⁻² ↓↓AKR1B10, ↑↑ANGPTL1, ↑↑EZR, ↑↑H2AFY, ↓↓MAFB, ↑MARK1, ↑↑MLLT3, ↓↓TMEM106B, ↑↑VWF
Developmental Disorder Gastrointestinal Disease Hepatic System Disease	hypoplasia	hypoplasia of liver	2	1.10×10 ⁻² ↓↓MYCN, ↑↑SLC20A1
Cancer Organismal Injury and Abnormalities Reproductive System Disease	uterine cancer	uterine cancer	7	1.11×10 ⁻² ↑↑COL14A1, ↓↓F2RL1, ↑↑GPM6A, ↑↑H2AFY, ↓↓PTGER3, ↑↑TFPI, ↑↑TGFB3
Molecular Transport	transport	transport of anion	3	1.13×10 ⁻² ↓↓PTGER3, ↑↑SLC20A1, ↓↓SLC26A2
Tissue Morphology	morphology	morphology of rhombomere	2	1.15×10 ⁻² ↓↓MAFB, ↑↑MID1
Ophthalmic Disease	primary open-angle glaucoma	primary open-angle glaucoma	2	1.15×10 ⁻² ↓↓PTGER3, ↑↑TJP1
Cellular Development Cellular Growth and Proliferation	proliferation	proliferation of kidney cancer cell lines	2	1.15×10 ⁻² ↑↑COL14A1, ↑↑TGFB3
Cell-To-Cell Signaling and Interaction Connective Tissue Development and Function	binding	binding of fibroblast cell lines	2	1.20×10 ⁻² ↑↑ALCAM, ↑↑TFPI

Cell Morphology Cellular Assembly and Organization Cellular Development Cellular Function and Maintenance Nervous System Development and Function Tissue Development	morphogenesis	morphogenesis of neurites	5	1.26×10 ⁻²	↑↑EZR, ↑↑GPM6A, ↑↑PRICKLE2, ↑↑PTPRM, ↑↑SYNE1
Cancer	adenocarcinoma	adenocarcinoma	29	1.33×10 ⁻²	↑↑ACSL3, ↑↑AKR1C1/AKR1C2, ↓ALAS1, ↑↑ALCAM, ↑↑ANKRD28, ↑↑ARID5B, ↑↑COL14A1, ↑↑EZR, ↓↓F2RL1, ↑↑FAM13A, ↑↑GPM6A, ↓↓HMCN1, ↑↑MAP9, ↑MARK1, ↑↑MDH1, ↑↑MID1, ↑↑MLLT3, ↓↓MT-ND2, ↓↓MYCN, ↑↑PGAP1, ↑↑PRICKLE1, ↑↑PTPRM, ↑↑REV3L, ↓↓SVIL, ↑↑SYNE1, ↑↑TJP1, ↓↓TMEM106B, ↑↑VWF, ↑↑ZNF614
Embryonic Development Organ Development Organ Morphology Organismal Development Skeletal and Muscular System Development and Function Tissue Development	morphogenesis	morphogenesis of muscle	2	1.35×10 ⁻²	↑↑ARID5B, ↑↑TGFB3
Cellular Movement Nervous System Development and Function	migration	migration of neurons	4	1.36×10 ⁻²	↑↑GPM6A, ↓↓MAFB, ↑MARK1, ↓↓NAV1
Immunological Disease Inflammatory Disease Inflammatory Response Neurological Disease	experimental autoimmune encephalomyelitis	experimental autoimmune encephalomyelitis	4	1.51×10 ⁻²	↑↑ALCAM, ↓↓F2RL1, ↑↑RORA, ↑↑VWF
Cell-To-Cell Signaling and Interaction Cellular Compromise Tissue Development Tumor Morphology	adhesion	adhesion of tumor cells	2	1.52×10 ⁻²	↑↑TFPI, ↑↑VWF
Inflammatory Response	inflammation	inflammation of airway	2	1.52×10 ⁻²	↓↓F2RL1, ↓↓PTGER3

Digestive System Development and Function	development	development of digestive system	5	1.56×10 ⁻²	↑↑ARID5B, ↓↓MYCN, ↑↑SLC20A1, ↑↑TGFB3, ↑↑VWF
Nervous System Development and Function Organ Morphology Organismal Development	abnormal morphology	abnormal morphology of brain	6	1.61×10 ⁻²	↑↑MID1, ↑↑MT3, ↓↓MYCN, ↑↑PGAP1, ↑↑RORA, ↓↓SHISA2
Cellular Development Cellular Growth and Proliferation Lymphoid Tissue Structure and Development	proliferation	proliferation of bone marrow cells	3	1.67×10 ⁻²	↑↑INPP4A, ↓↓MAFB, ↑↑VWF
Cancer	head and neck tumor	head and neck tumor	9	1.70×10 ⁻²	↑↑ALCAM, ↑↑EZR, ↓↓HMCN1, ↓↓KCNAB1, ↓↓MT-ND2, ↓↓MYCN, ↑↑PTPRM, ↑↑SYNE1, ↑↑TFPI
Cell Signaling	I-kappaB kinase/NF- kappaB cascade	I-kappaB kinase/NF- kappaB cascade	3	1.80×10 ⁻²	↓↓F2RL1, ↑↑SLC20A1, ↑↑TFG
Ophthalmic Disease	macular degeneration	macular degeneration	2	1.81×10 ⁻²	↓↓HMCN1, ↓↓PTGER3
Cardiovascular Disease Hematological Disease	thrombosis	thrombosis of vein	2	1.81×10 ⁻²	↑↑TFPI, ↑↑VWF
Nucleic Acid Metabolism Small Molecule Biochemistry	metabolism	metabolism of purine nucleotide	3	1.83×10 ⁻²	↑↑MDH1, ↓↓MT-ATP8, ↑↑RORA
Cellular Compromise Lipid Metabolism Small Molecule Biochemistry	peroxidation	peroxidation of lipid	2	1.87×10 ⁻²	↓↓GPX4, ↓↓PTGER3
Cancer	breast or colorectal cancer	breast or colorectal cancer	28	1.89×10 ⁻²	↑↑ACSL3, ↑↑AKR1C1/AKR1C2, ↓ALAS1, ↑↑ALCAM, ↑↑ANKRD28, ↑↑ANXA4, ↑↑COL14A1, ↓↓F2RL1, ↑↑H2AFY, ↓↓HMCN1, ↓↓MAFB, ↑↑MAP9, ↑MARK1, ↑↑MDH1, ↑↑MID1, ↑↑MLLT3, ↓↓MT-ND2, ↓↓MT-ND4L, ↓↓MYCN, ↑↑PTPRM, ↑↑REV3L, ↓↓SLC26A2, ↓↓SVIL, ↑↑SYNE1, ↑↑TFPI, ↑↑TGFB3, ↑↑TJP1, ↑↑VWF

Cancer	squamous-cell carcinoma	squamous-cell carcinoma	7	1.93×10 ⁻²	↑↑AKR1C1/AKR1C2, ↑↑ALCAM, ↑↑EZR, ↓↓HMCN1, ↑↑MLLT3, ↓↓MT-ND4L, ↓↓MYCN
Cellular Assembly and Organization Cellular Compromise	depolymerization	depolymerization of filaments	2	1.94×10 ⁻²	↓↓F2RL1, ↑↑MID1
Behavior	grooming	grooming	2	1.94×10 ⁻²	↑↑ARID5B, ↑↑SYNE1
Cell Signaling Vitamin and Mineral Metabolism	signaling	signaling of Ca ²⁺	2	1.94×10 ⁻²	↑↑DNAJC1, ↓↓F2RL1
Cell Signaling Small Molecule Biochemistry	quantity	quantity of nitric oxide	2	2.00×10 ⁻²	↓↓STC2, ↑↑TFPI
Cancer	clear-cell adenocarcinoma	clear-cell adenocarcinoma	5	2.03×10 ⁻²	↑↑ACSL3, ↑↑GPM6A, ↓↓HMCN1, ↑↑MLLT3, ↑↑REV3L
Organismal Injury and Abnormalities	bleeding	bleeding of tissue	2	2.06×10 ⁻²	↑↑TFPI, ↑↑VWF
Cellular Assembly and Organization Cellular Function and Maintenance	quantity	quantity of cellular protrusions	3	2.06×10 ⁻²	↑↑EZR, ↑↑GPM6A, ↓↓GPX4
Embryonic Development Organ Development Organismal Development Skeletal and Muscular System Development and Function Tissue Development	development	development of striated muscle	3	2.09×10 ⁻²	↓↓F2RL1, ↓↓SVIL, ↑↑TGFB3
Cell Morphology	cell polarity formation	cell polarity formation	2	2.13×10 ⁻²	↑↑EZR, ↑↑PRICKLE2
Embryonic Development Organ Development Organismal Development Skeletal and Muscular System Development and Function Tissue Development	development	development of muscle	5	2.15×10 ⁻²	↑↑ARID5B, ↓↓F2RL1, ↑↑HOPX, ↓↓SVIL, ↑↑TGFB3
Lipid Metabolism Small Molecule Biochemistry	conversion	conversion of lipid	3	2.16×10 ⁻²	↑↑AKR1C1/AKR1C2, ↓↓GPX4, ↓↓PTGER3
Cardiovascular Disease Hematological Disease	thrombosis	Thrombosis	3	2.20×10 ⁻²	↓↓PTGER3, ↑↑TFPI, ↑↑VWF

Cell-To-Cell Signaling and Interaction Hematological System Development and Function Immune Cell Trafficking Inflammatory Response	activation	activation of myeloid cells	4	2.29×10 ⁻² ↓↓F2RL1, ↓↓MYCN, ↓↓PTGER3, ↑↑RORA
Cellular Growth and Proliferation	formation	formation of cells	5	2.32×10 ⁻² ↑↑HOPX, ↓↓MYCN, ↑↑PRICKLE1, ↑↑PRICKLE2, ↑↑VWF
Neurological Disease	progressive motor neuropathy	progressive motor neuropathy	6	2.40×10 ⁻² ↑↑ALCAM, ↑↑DNAJC1, ↑↑EZR, ↓↓F2RL1, ↑↑MDH1, ↑↑RBFOX1
Cancer Gastrointestinal Disease	colon cancer	colon cancer	21	2.62×10 ⁻² ↑↑ACSL3, ↑↑AKR1C1/AKR1C2, ↑↑ALCAM, ↑↑ANKRD28, ↑↑ANXA4, ↑↑COL14A1, ↓↓F2RL1, ↑↑H2AFY, ↓↓HMCN1, ↑↑MAP9, ↑MARK1, ↑↑MDH1, ↑↑MID1, ↑↑MLLT3, ↓↓MYCN, ↑↑PTPRM, ↓↓SLC26A2, ↓↓SVIL, ↑↑SYNE1, ↑↑TJP1, ↑↑VWF
Cancer Hematological Disease	leukemia	leukemia	7	2.76×10 ⁻² ↑↑ARID5B, ↑↑CRIPT, ↓↓LYZ, ↓↓MYCN, ↑↑PRICKLE2, ↑↑TFPI, ↑↑TJP1
Organismal Injury and Abnormalities	thrombus	thrombus	2	2.82×10 ⁻² ↑↑TFPI, ↑↑VWF
Inflammatory Response	inflammation	inflammation of respiratory system component	5	3.02×10 ⁻² ↓↓F2RL1, ↓↓PTGER3, ↑↑RORA, ↑↑TFPI, ↑↑ZNF614
Hematological System Development and Function Organismal Functions	coagulation	coagulation of blood	3	3.13×10 ⁻² ↓↓F2RL1, ↑↑TFPI, ↑↑VWF
Digestive System Development and Function	development	development of palate	2	3.20×10 ⁻² ↑↑ARID5B, ↑↑TGFB3
Cardiovascular System Development and Function Cellular Development Cellular Growth and Proliferation Skeletal and Muscular System Development and Function	proliferation	proliferation of cardiomyocytes	2	3.20×10 ⁻² ↓↓MYCN, ↑↑TGFB3
Cardiovascular Disease	valvulopathy	valvulopathy	2	3.20×10 ⁻² ↑↑SLC20A1, ↑↑VWF

Cellular Development Cellular Growth and Proliferation Connective Tissue Development and Function	proliferation	proliferation of fibroblast cell lines	5	3.39×10^{-2}	↑↑ARID5B, ↓↓F2RL1, ↑↑INPP4A, ↓↓MYCN, ↑↑TFG
Cardiovascular Disease Neurological Disease	ischemia	ischemia of brain	2	3.52×10^{-2}	↓↓PYGL, ↑↑VWF
Cell Signaling	protein kinase cascade	protein kinase cascade	5	3.67×10^{-2}	↓↓F2RL1, ↑MARK1, ↑↑SLC20A1, ↑↑TFG, ↑↑TGFB3
Cancer Organismal Injury and Abnormalities Reproductive System Disease	female genital tract cancer	female genital tract cancer	8	3.76×10^{-2}	↑↑ALCAM, ↑↑COL14A1, ↓↓F2RL1, ↑↑GPM6A, ↑↑H2AFY, ↓↓PTGER3, ↑↑TFPI, ↑↑TGFB3
Developmental Disorder	dysgenesis	dysgenesis	2	3.84×10^{-2}	↑↑AKR1C1/AKR1C2, ↓↓MAFB
Dermatological Diseases and Conditions Gastrointestinal Disease Organismal Injury and Abnormalities	ulcer	ulcer	2	3.84×10^{-2}	↑↑COL14A1, ↑↑TFPI
Cancer Gastrointestinal Disease	gastrointestinal carcinoma	gastrointestinal carcinoma	20	3.97×10^{-2}	↑↑ACSL3, ↑↑AKR1C1/AKR1C2, ↑↑ALCAM, ↑↑ANKRD28, ↑↑ANXA4, ↑↑COL14A1, ↑↑EZR, ↓↓F2RL1, ↓↓HMCN1, ↑↑MAP9, ↑MARK1, ↑↑MDH1, ↑↑MID1, ↑↑MLLT3, ↓↓MYCN, ↑↑PTPRM, ↓↓SVIL, ↑↑SYNE1, ↑↑TJP1, ↑↑VWF
Cellular Movement	cell rolling	cell rolling	2	4.18×10^{-2}	↓↓F2RL1, ↑↑VWF
Organismal Development	morphology	morphology of head	8	4.29×10^{-2}	↓↓GPX4, ↑↑MID1, ↑↑MT3, ↓↓MYCN, ↑↑PGAP1, ↑↑RORA, ↓↓SHISA2, ↑↑TFPI
Cancer Gastrointestinal Disease	colon carcinoma	colon carcinoma	19	4.34×10^{-2}	↑↑ACSL3, ↑↑AKR1C1/AKR1C2, ↑↑ALCAM, ↑↑ANKRD28, ↑↑ANXA4, ↑↑COL14A1, ↓↓F2RL1, ↓↓HMCN1, ↑↑MAP9, ↑MARK1, ↑↑MDH1, ↑↑MID1, ↑↑MLLT3, ↓↓MYCN, ↑↑PTPRM, ↓↓SVIL, ↑↑SYNE1, ↑↑TJP1, ↑↑VWF

Cell-To-Cell Signaling and Interaction Hematological System Development and Function Nervous System Development and Function	activation	activation of microglia	2	4.44×10 ⁻² ↓↓F2RL1, ↓↓PTGER3
Connective Tissue Development and Function Embryonic Development Organ Development Organismal Development Skeletal and Muscular System Development and Function Tissue Development	morphogenesis	morphogenesis of skeletal system	2	4.44×10 ⁻² ↑↑ARID5B, ↓↓MYCN
Cancer Neurological Disease	brain tumor	brain tumor	4	4.45×10 ⁻² ↑↑ALCAM, ↓↓KCNAB1, ↓↓MYCN, ↑↑TFPI
Cardiovascular Disease	acute coronary syndrome	acute coronary syndrome	3	4.50×10 ⁻² ↓↓F2RL1, ↑↑TFPI, ↑↑VWF
Embryonic Development Organ Development Organismal Development Skeletal and Muscular System Development and Function Tissue Development	development	development of skeletal muscle	2	4.53×10 ⁻² ↓↓F2RL1, ↓↓SVIL
Molecular Transport	transport	transport of inorganic anion	2	4.71×10 ⁻² ↑↑SLC20A1, ↓↓SLC26A2
Nervous System Development and Function Organ Morphology Organismal Development	abnormal morphology	abnormal morphology of diencephalon	2	4.80×10 ⁻² ↑↑MT3, ↓↓SHISA2
Organ Development	function	function of muscle	2	4.80×10 ⁻² ↑↑COL14A1, ↑↑SYNE1

Symbols for genes with increased (or decreased) expression and fold-change≥2 are preceded with ↑↑ (or ↓↓). Symbols for genes with increased (or decreased) expression and fold-change<2 are preceded with ↑ (or ↓).
