Table S7. IPA Networks identified for genes affected in summer cumulus cells

ID	Molecules in Network	Score	Focus Molecules	Top Functions	Upstream regulators
N1	↑ACPP, ↑↑ADAMTS1, ↑↑AKR1C1/AKR1C2, ↑↑ALCAM, ↓ALG9, Alpha catenin, ↓↓ATP2B1, ↓BCAT1, ↓BHMT, ↑↑BTC, Cg, ↓↓CTSV, Dynamin, ↓↓ELAVL2, ↓ELK3, ERK1/2, FSH, ↓GGPS1, Lh, ↑↑MAP4K4, ↑MT1X, ↓PFKFB4, PI3K (family), Rab5, ↓RABEP1, ↓RASD1, ↑↑RGS4, ↓↓RGS7, ↑SEPT6, ↓SEPT11, ↑SHC4, ↓SLC12A2, ↑↑SLC20A1, ↓↓TNFAIP6, ↓VEGFC	49	27	Cellular Movement, Cell Morphology, Cellular Compromise	Cg(M/12), FSH(M/10), Lh(M/9), ERK1/2(M/3), Alpha catenin(M/4), TGFB1(7), beta-estradiol(5), IL1B(5), TNF(9), OSM(5), SB203580(5), tretinoin(5), HNF4A(6)
N2	Akt, ↑↑ANGPTL1, ↓CDCA7L, ↓↓COL12A1, ↑↑COL14A1, ↑COL4A2, ↑↑COL4A3, ↓↓COL5A1, collagen, Collagen Alpha1, Collagen type I, Collagen type IV, Collagen(s), ↓↓COX4I1, ↑↑DCN, ↓↓DDIT4, ↑↑HPGD, Hsp27, ↑↑INPP4A, Integrin alpha V beta 3, Laminin, ↓↓LHFP, ↓mir-210, Mitochondrial complex 1, ↓↓MMP1, ↓↓MT-ND2, ↓↓MT-ND4L, MTORC1, ↑↑NOV, Pdgf (complex), ↓↓PID1, ↓SMAD7, ↓↓SORBS2, Tgf beta, ↑↑VWF	37	22	Connective Tissue Disorders, Dermatological Diseases and Conditions, Gastrointestinal Disease	Tgf beta(M/3), ↓mir-210(M/3), Integrin alpha V beta 3(M/1), Akt(M/2), ↓SMAD7(M/3), TGFB1(9), AHR(5), TNF(6), tretinoin(6), IL6(5), TP53(5)
N3	alcohol group acceptor phosphotransferase, ↓↓ANGPT2, ↑↑ANXA4, Calcineurin protein(s), calpain, ↓CDK8, ↓CPNE4, Cyclin A, Cyclin E, ↓↓DCLK1, E2f, ↓EGLN1, ↓↓GUCY1A3, ↓GUCY1B3, Hdac, HISTONE, Histone h3, Histone h4, Hsp70, Hsp90, ↓IRX3, NFkB (complex), Notch, ↓↓OLFM4, ↓↓PELP1, Pro-inflammatory Cytokine, ↓↓PTGIS, PXR ligand-PXR-Retinoic acid-RXRα, ↓↓SAP30, ↓SMYD3, SYK/ZAP, ↑↑TFPI, ↓TYMS, ↓↓UGT1A9 (includes others), ↓ZEB1	27	18	Cardiovascular System Development and Function, Lymphoid Tissue Structure and Development, Cell Morphology	Notch(M/3), HISTONE(M/1), beta-estradiol(7), MYC(4)

N4	ADCY, Alpha Actinin, ↑↑ANK3, Ap1, ↑↑BMPR1B, Calmodulin, CaMKII, ↓CANX, ↓CAV1, ↓CAV2, Caveolin, ↓CES1, Creb, ERK, estrogen receptor, G protein alphai, Immunoglobulin, Integrin, ↑↑KCTD12, LDL, ↓MAP2K6, Mek, NMDA Receptor, PDGF BB, ↓PON2, ↓POSTN, Ras, ↑↑RHOQ, ↓↓RYR2, ↓↓SGMS2, ↓↓SLC2A1, ↑↑SLC7A2, Sos, ↑↑SYNE1, ↑↑TNFRSF11A	26	17	Organismal Functions, Cancer, Organ Morphology	↓CAV1(M/3), estrogen receptor(M/2), ↓CAV2(M/1), ERK(M/2), ↑↑BMPR1B(M/1), Ras(M/1), PDGF BB(M/3), TGFB1(5), beta-estradiol(7), D-glucose(4), TNF(5), AGT(4), PD98059(4), tretinoin(5), TP53(4)
N5	↑ACPL2, ↓↓ANKRD37, ↓BDH2, ↓DCAF13, DHCR24, ↑↑FAM13A, FEM1B, ↓GLCE, ↓KIAA1430, ↓↓KLHL23/PHOSPHO2-KLHL23, LONP1, ↓MRPL30, ↓MRPS10, ↓↓MT-ATP8, ↓NSG1, PACSIN1, POLG, ↑↑PRICKLE1, RAB34, RAPGEF2, ↓RARS2, ↓↓SLC26A2, TCF7L1, UBC, ZNF43, ZNF85, ZNF91, ZNF100, ZNF254, ↓ZNF350, ZNF429, ZNF431, ZNF528, ZNF665, ZNF708	24	16	Cell Death and Survival, Cellular Assembly and Organization, Cellular Function and Maintenance	ZNF100(M/1), ZNF85(M/1), ZNF254(M/1), ZNF431(M/1), ZNF708(M/1), ZNF665(M/1), ZNF528(M/1), ZNF43(M/1), ZNF429(M/1), ZNF91(M/1), LONP1(M/1), WNT3A(2), PD98059(2), FGF1(2), HNF4A(2)
N6	AQP8, CDC42, cholesterol, CSHL1, ↑↑DNAJC1, E2F1, ↓↓ENO2, ↑↑FAM110B, GNAQ, HNF4A, IL17B, ↓INSIG2, ↑↑KCNJ8, LTA4H, ↑↑MAML2, MRPS12, NDUFS4, ↓NME5, NME7, NOTCH1, ↓↓OPN3, phosphatidylinositol 4, 5-diphosphate, PIP4K2A, ↑RBMS3, RELA, ↓↓RHPN2, ↓↓RIF1, ↓RNF144A, ↓SH3D19, SPIDR, ↓STYXL1, ↓TCEA3, TGFB1, thyroid hormone, ↓TRMT61B	23	16	Cellular Assembly and Organization, Cell Death and Survival, Cell Cycle	TGFB1(M/3), E2F1(M/1), HNF4A(M/3)

N7	14-3-3, Alp, AMPK, ↑AUTS2, ↓↓BNIP3, caspase, CD3, ↓↓CYP19A1, ↑CYP2B6, cytochrome C, ↓↓DAPK1, F Actin, ↑↑FOXO1, Gsk3, ↓H3F3A/H3F3B, ↓HMCN1, ↓HMGB1, IL1, Insulin, Interferon alpha, Jnk, P38 MAPK, p70 S6k, PI3K (complex), Pkc(s), ↑↑PKN2, PP2A, Proinsulin, ↓↓PYGL, ↓RIMS2, ↑↑RORA, ↓SKP2, ↓↓STC2, Tnf (family), ↑TOX	23	16	Cancer, Tumor Morphology, Cellular Movement	IL1(M/3), P38 MAPK(M/2), ↓SKP2(M/1), ↑↑FOXO1(M/2), ↑TOX(M/1), ↑↑RORA(M/3), ↓HMGB1(M/1), Proinsulin(M/1), PI3K (complex)(M/2), TGFB1(4), beta-estradiol(5), CEBPA(4), progesterone(4), IL1B(5), OSM(4), butyric acid(5), HNF4A(8), TP53(4)
N8	AP2M1, ↓ARV1, ↓↓C8orf47, ↓↓CBWD3/CBWD6, CCT3, EPS15, Epsin, ↓ETAA1, ↓IFT81, IFT88, KRT4, KRT6A, LAPTM5, ↓LMBR1, ↓↓LRRC49, MOB4, OPTN, ↓↓PABPC4L, RABGEF1, ↓RIMKLB, RNF11, ↓↓SLC22A23, STAM, ↓STON1, SYNJ1, UBC, UBE2E1, UBE2H, UBQLN2, VPRBP, ↓ZNF12, ZNF473, ↓ZNF627, ↓↓ZNF879, ↓ZSCAN29	22	15	Cellular Function and Maintenance, Infectious Disease, Developmental Disorder	
N9	ABCF2, AGPAT2, ↑↑ALDH9A1, ANKRD26, ↑↑ANKRD28, ANKRD52, ↓CHST7, ↓CKLF, ↓↓CRIP1, CTTNBP2NL, EID2, ↑↑EID3, GOLGA4, MAGEB1, MAGED4/MAGED4B, ↓MRPL44, NDN, ↓NIN, ↓PARP11, PCBP4, PPP6R1, ↓PROSC, ↑RBFOX1, RBM24, ↓↓RIN2, RNF114, SCN8A, SMC6, TGS1, TNKS, TNKS2, ↓↓TRIM9, UBC, ↓↓UST, ZNF235	20	14	Cardiovascular System Development and Function, Organismal Development, Tissue Morphology	TGFB1(2), HNF4A(2), TP53(2)
N10	APP, ARF5, ↓ARL5A, CAPN1, ↓CCBL1, CGB (includes others), COX6A2, CRHR2, ↓↓DCLK1, DHCR24, HABP2, KCNA1, KCNA4, ↓↓KCNAB1, KCNB1, KCNB2, KCND2, ↑KCNG3, KISS1R, ↓LARP6, MAK, MSTN, MT-CO3, MT-ND5, ↑NAA25, ↑↑NMRK1, SCN1A, ↓SERTM1, ↓↓SH3BGR, SLC40A1, ↓SPATA7, ↓↓ST3GAL5, testosterone, ↑TMEM144, ↓↓VAT1L	19	14	Molecular Transport, Inflammatory Disease, Neurological Disease	KISS1R(M/1), testosterone(M/1), TGFB1(2), beta-estradiol(2)

N11	ABCA1, ↓↓ABCA8, ACOT13, ↑↑ALG6, ↓↓CCM2L, CDH1, CUTA, DLG4, ↓↓DYNC1I1, DYNLRB2, ↓↓DYNLT3, ↓FANK1, ↓↓FRMD5, GLOD4, IL2, IL12 (complex), ↓↓JAKMIP2, JUN, LNX1, ↓↓MCC, MLEC, MYPN, NAPSA, ↑↑NEAT1, ↓↓PDZRN3, PKD1, POLG, PUS7, RASAL2, REXO2, TMA16, ↓TMX1, TSFM, UBC, ↓ZBTB8A	18	13	Cancer, Organismal Injury and Abnormalities, Tissue Morphology	PKD1(M/2), IL13(2)
N12	AKAP3, ↑↑AKAP4, ASPM, ↓C9orf91, ↑↑CPEB4, CYB5B, ↑↑DPP8, DRG1, ↑↑DST, DTX3L, ELAVL1, ETV6, GLIPR2, IER2, IFNG, ↓IKBIP, ↑↑KAT6A, ↓KCTD1, MEAF6, MGST3, ↓MSANTD3, ↑↑NOV, NUPR1, ↓PDE7B, PFDN1, PUS7, RAB38, RANBP6, RAVER1, RERE, ↓↓RFTN2, SNX3, SUMO2, ↓SYNDIG1, TOB1	18	13	Cell Signaling, Organ Morphology, Organismal Development	SUMO2(M/1), NUPR1(M/3)
N13	26s Proteasome, Actin, ↓↓ACTN2, ↓AJUBA, ↓ASAP1, ↓ASAP2, ↓CDR2, CIT, Ck2, CLIC5, EGFR ligand, Focal adhesion kinase, ↑↑GPR116, ↑↑HNRNPD, ↓↓LHCGR, LPAR1, Mapk, Mmp, p85 (pik3r), ↑↑PABPC1, PAIP2, PALLD, Pka, PLC, Rac, Ras homolog, RNA polymerase II, ↓↓SHISA2, ↑↑SND1, SRC (family), SSTR4, ↓TES, TRHR, Ubiquitin, Vegf	16	12	Organ Morphology, Reproductive System Development and Function, Developmental Disorder	↓↓LHCGR(M/1), Vegf(M/2), beta-estradiol(2), TNF(2), PRL(2), MYC(2), GATA4(2)
N14	FIGLA, ↓LRRC27	2	1	Cell Cycle, Cell Death and Survival, Endocrine System Disorders	

The numbers in parenthesis next to regulators' gene IDs in the last column signify how many molecules in those networks the regulators are affecting (e.g. Vegf regulates five molecules in Network 1). Letter (M/…) signifies that the regulators are also member of those networks, e.g. Vegf is also a member of network 1.
Symbols for regulators 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 ↓).