Supplementary information

Larval red drum (*Sciaenops ocellatus*) sublethal exposure to weathered Deepwater Horizon crude oil: Developmental and transcriptomic consequences

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Summary: 23 pages, 6 figures, and 6 tables.

Fig. S1 Percent composition for 50 PAH analytes as determined by GC-MS for HEWAF of 2.5% slick DHW oil.

Fig. S2 Plot of normalized mean counts (expression) versus log2 fold change for untreated versus treated comparisons. The plots show relative expression of genes in slick oil treated larvae compared with control at 24 (A), 48 (B) and 96 (C) hpf. The X-axis plots normalized mean expression and the Y-axis is the log2 fold change (FC). Black dots represent non-significant genes, whereas red dots indicate significant differentially expressed genes ($q < 0.1$).

Fig. S3 Significantly enriched gene ontology terms and KEGG pathways using the Advaita Pathway Guide. Red drum embryos were exposed to slick oil for 24, 48 and 72 hpf. The X-axis is a negative log of the adjusted p-value.

Fig. S4 Role of NFAT in cardiac hypertrophy provided by IPA

Fig. S5 Inhibition of eye formation and induced retinal degeneration by IPA.

Fig. S6 Overlapping canonical pathways clustered at 24 (A), 48 (B) and 72 hpf (C). Each pathway is displayed as a single "node" colored proportionally to the Fisher's Exact Test p-value, where red is statistically significant. A line connects any two pathways when there are at least three DEGs shared between them (no line means no shared genes between two pathways).

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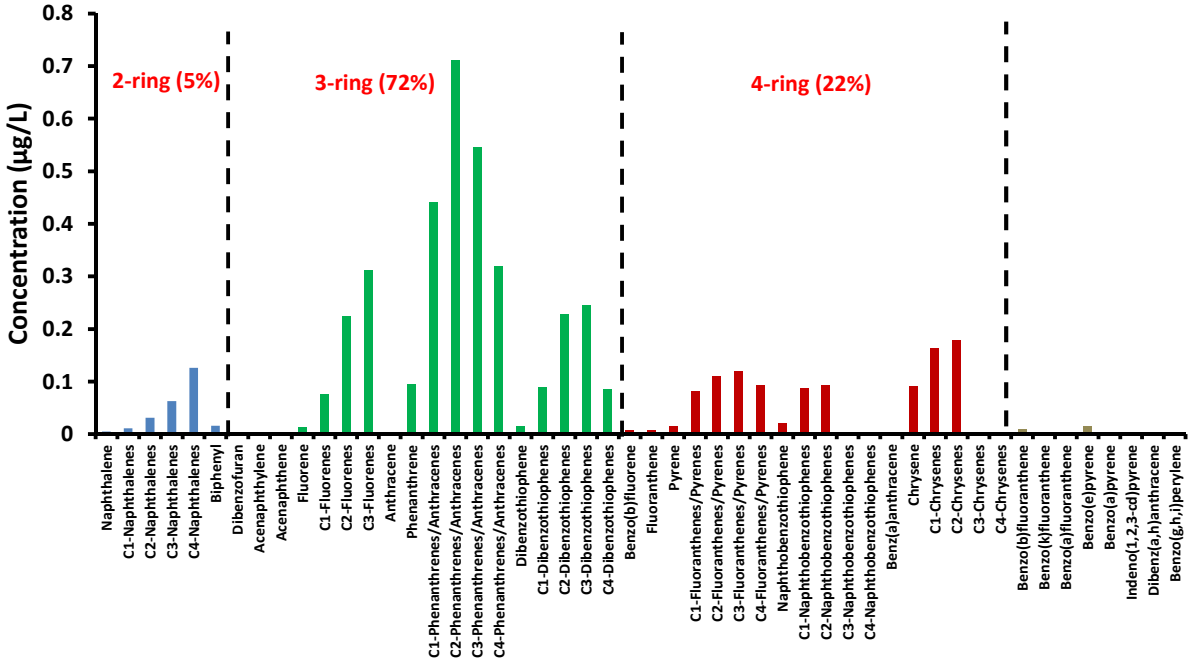
Table S5 Top impacted bio-pathways, enriched diseases and miRNAs at 24, 48 and 74 hpf red drum larva exposed to slick oil by Advaita

Table S6. Top canonical pathways at 24, 48 and 72 hpf by IPA



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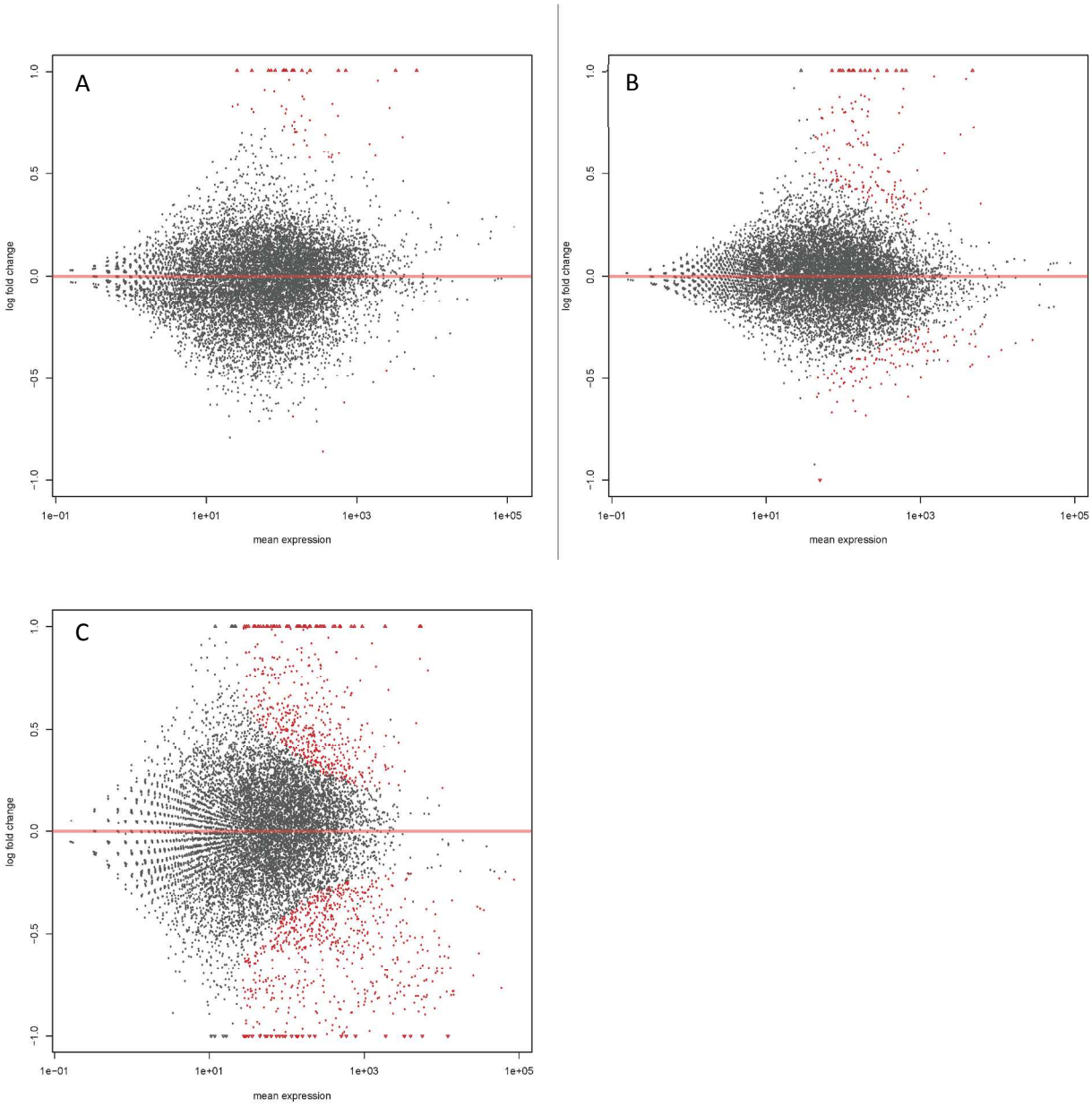

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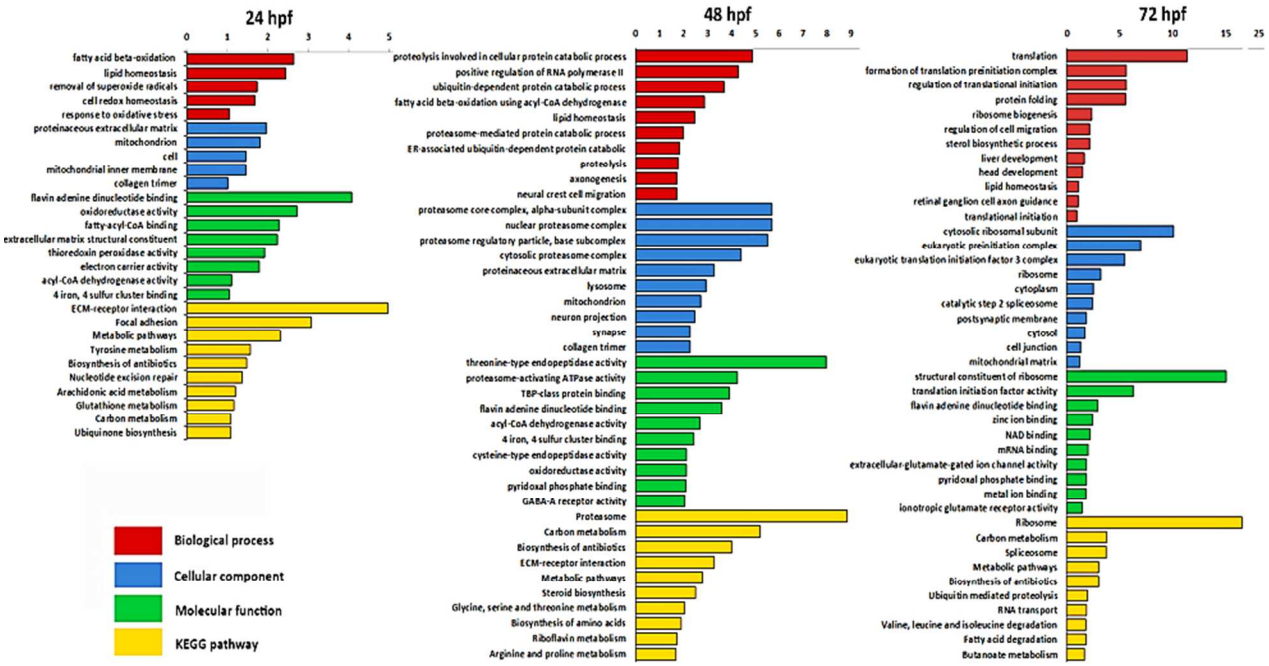

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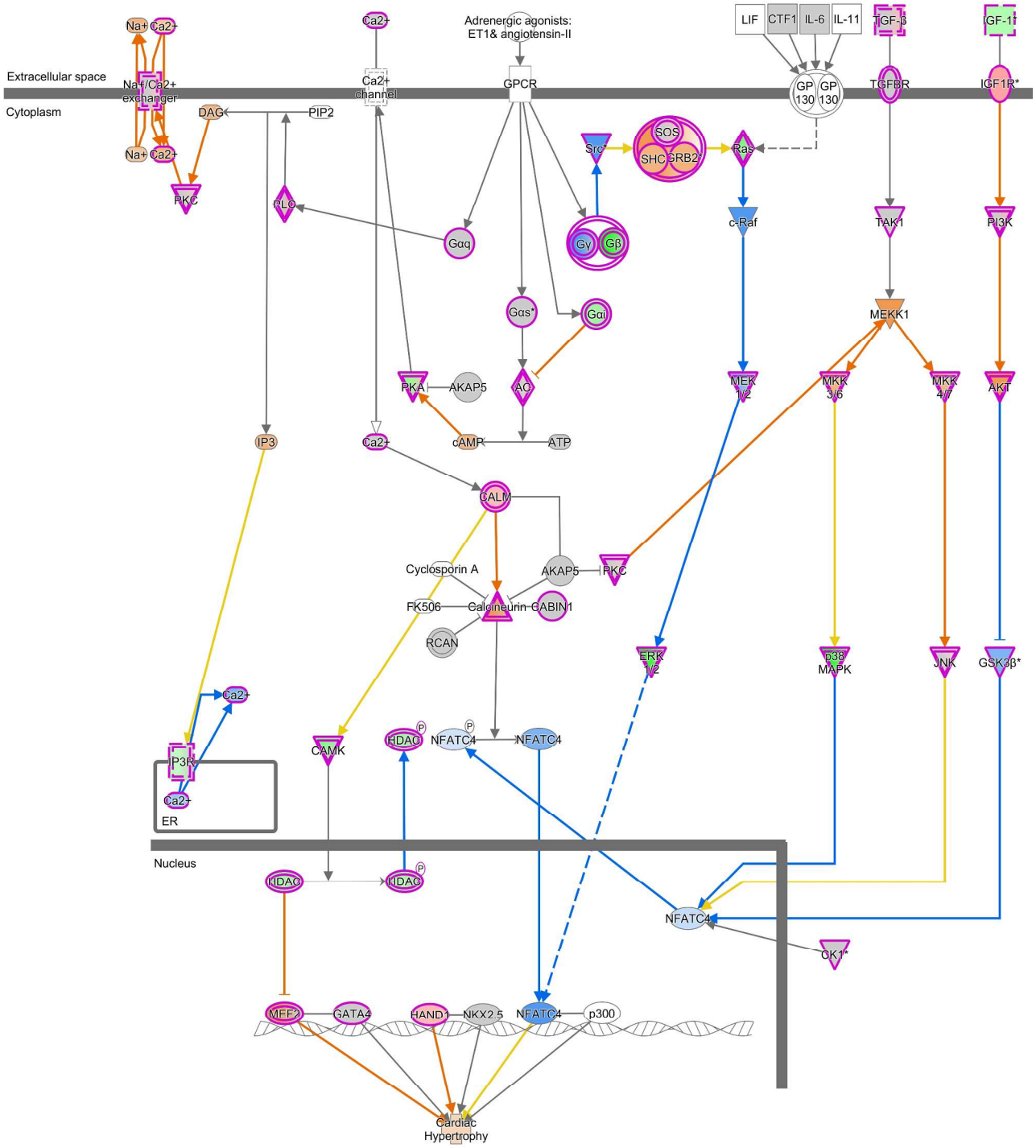

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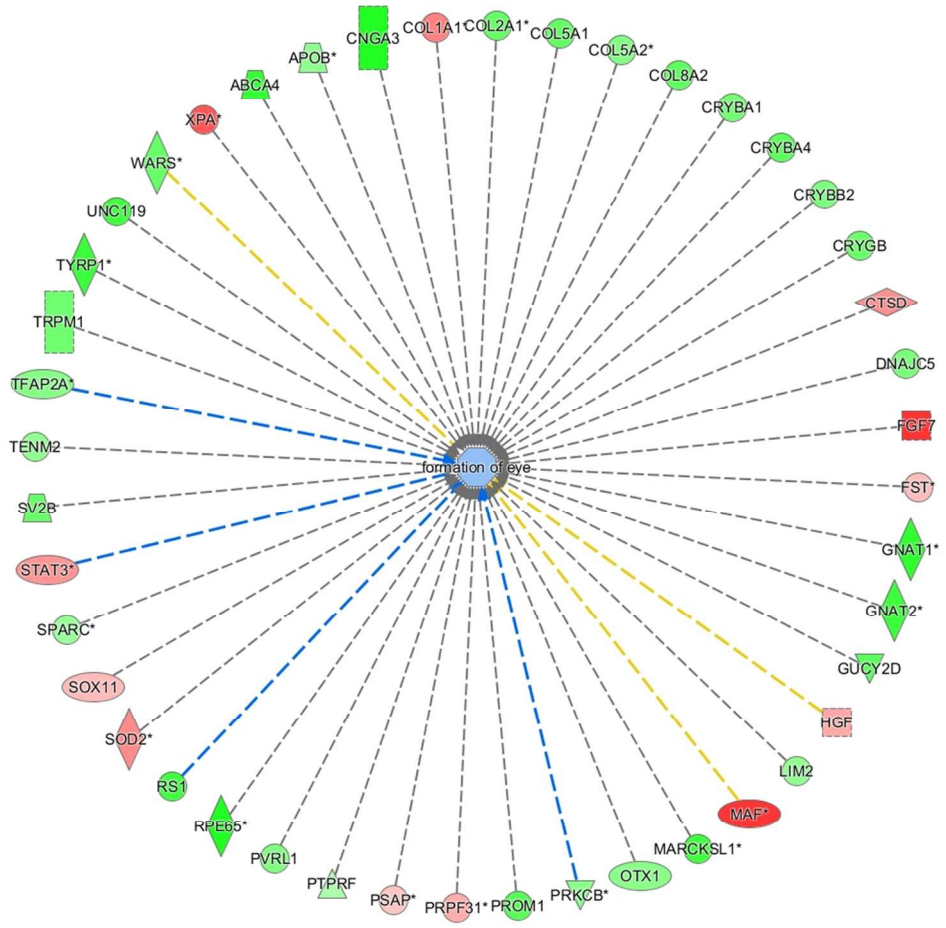

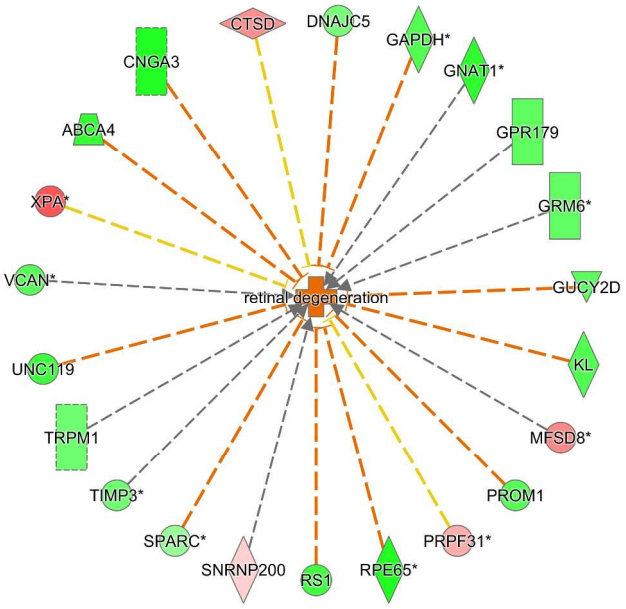

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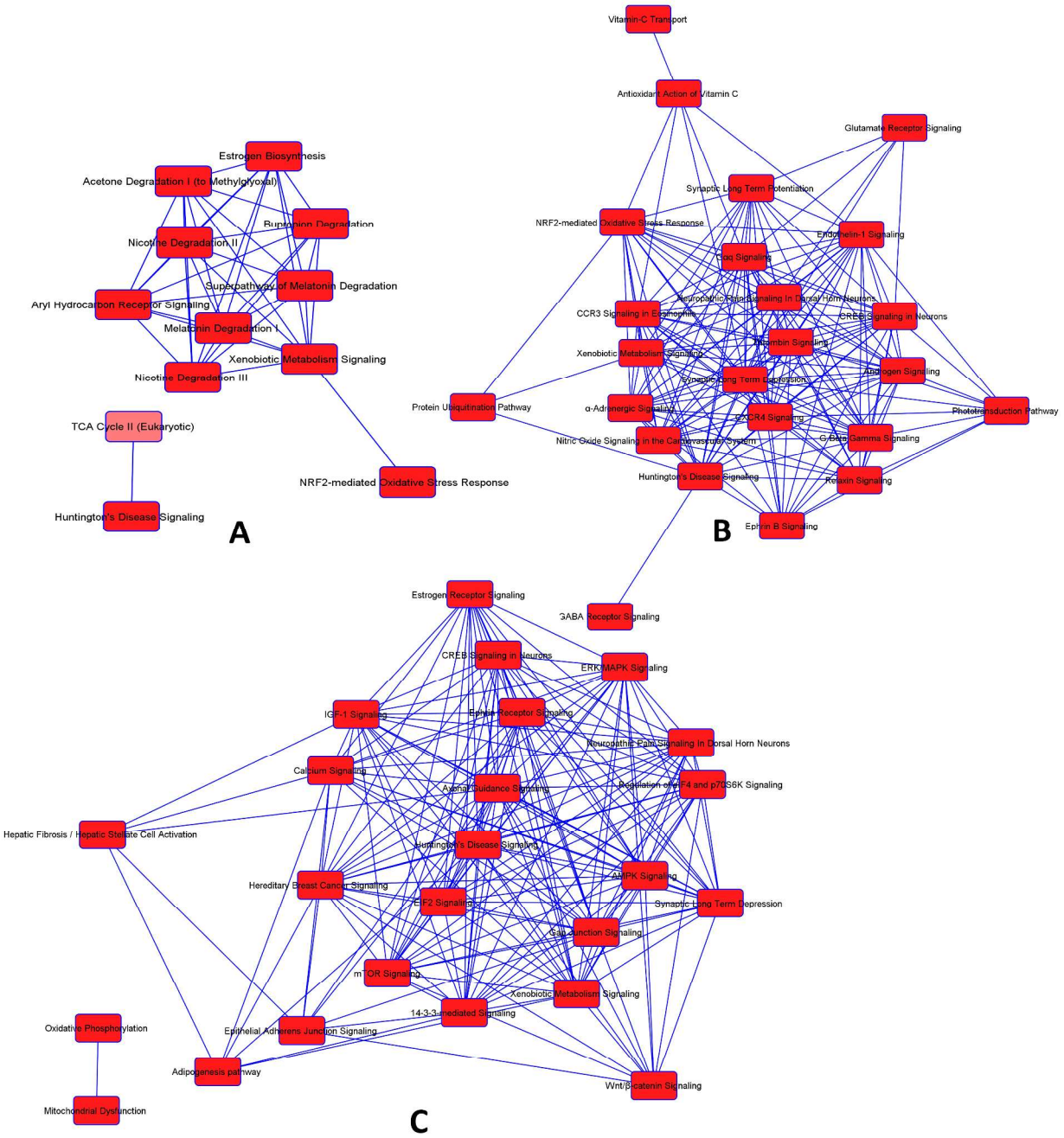

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Table S1 Water quality parameters for morphometric analysis.

Treatment	Time (hour)	Water temp. (°C)	pH	D.O. (mgL^{-1})	Salinity (ppt)
Control	0	25.4	8.09	7.07	29.4
	24	20.6	8.18	7.18	29.8
	48	27.8	8.14	6.17	30.5
	72	28.2	8.19	6.48	31.0
2.5% Slick HEWAF	0	25.8	8.16	7.27	30.0
	24	20.2	8.21	7.32	30.3
	48	28.4	8.33	6.19	30.0
	72	28.8	8.29	6.30	29.4

Table S2 Individual measurements (μgL^{-1}) for PAH analytes from initial samples collected from HEWAF dilutions (2.5%). ND = not detected.

PAHs	Concentration (μgL^{-1})
cis/trans-Decalin	ND
C1-Decalins	ND
C2-Decalins	ND
C3-Decalins	ND
C4-Decalins	ND
Benzo(b)thiophene	ND
C1-Benzothiophenes	ND
C2-Benzothiophenes	ND
C3-Benzothiophenes	ND
C4-Benzothiophenes	ND
Naphthalene	0.01
C1-Naphthalenes	0.01
C2-Naphthalenes	0.03
C3-Naphthalenes	0.06
C4-Naphthalenes	0.13
Biphenyl	0.02
Dibenzofuran	ND
Acenaphthylene	ND
Acenaphthene	ND
Fluorene	0.01
C1-Fluorenes	0.08
C2-Fluorenes	0.22
C3-Fluorenes	0.31
Anthracene	ND
Phenanthrene	0.09
C1-Phenanthrenes/Anthracenes	0.44
C2-Phenanthrenes/Anthracenes	0.71
C3-Phenanthrenes/Anthracenes	0.55

C4-Phenanthrenes/Anthracenes	0.32
Retene	0.02
Dibenzothiophene	0.01
C1-Dibenzothiophenes	0.09
C2-Dibenzothiophenes	0.23
C3-Dibenzothiophenes	0.25
C4-Dibenzothiophenes	0.09
Benzo(b)fluorene	0.01
Fluoranthene	0.01
Pyrene	0.02
C1-Fluoranthenes/Pyrenes	0.08
C2-Fluoranthenes/Pyrenes	0.11
C3-Fluoranthenes/Pyrenes	0.12
C4-Fluoranthenes/Pyrenes	0.09
Naphthobenzothiophene	0.02
C1-Naphthobenzothiophenes	0.09
C2-Naphthobenzothiophenes	0.09
C3-Naphthobenzothiophenes	ND
C4-Naphthobenzothiophenes	ND
Benz(a)anthracene	ND
Chrysene	0.09
C1-Chrysenes	0.16
C2-Chrysenes	0.18
C3-Chrysenes	ND
C4-Chrysenes	ND
Benzo(b)fluoranthene	0.01
Benzo(k)fluoranthene	ND
Benzo(a)fluoranthene	ND
Benzo(e)pyrene	0.015
C30-Hopane	0.10
Benzo(a)pyrene	ND
Perylene	ND
Indeno(1,2,3-cd)pyrene	ND
Dibenz(a,h)anthracene	ND
Benzo(g,h,i)perylene	ND
4-Methyldibenzothiophene	0.04
2-Methyldibenzothiophene	0.02
1-Methyldibenzothiophene	0.02
3-Methylphenanthrene	0.09
2-Methylphenanthrene	0.10
2-Methylanthracene	ND
9-Methylphenanthrene	0.12
1-Methylphenanthrene	0.10
2-Methylnaphthalene	0.01
1-Methylnaphthalene	0.01
2,6-Dimethylnaphthalene	0.01
2,3,5-Trimethylnaphthalene	0.02
total ∑50	**4.74**
total	**5.39**

Table S3 Means of morphological measurements: lens, pupil, pericardial area, tectum, notochord and body length in control and oil treated red drum larvae at 24, 48, and 74 hpf. (one replicate, n = 10)

Time	Treatment	Lens diameter (mm)	Pupil diameter (mm)	Pericardial area (mm^2)	Tectum area (mm^2)	Notochord length (mm)	Body length (mm)
24 hpf	Control	0.226±0.015	0.057±0.003	0.017±0.004	0.021±0.004	2.071±0.107	2.775±0.119
	Oil-treated	0.182±0.027	0.052±0.007	0.121±0.025	0.011±0.003	1.791±0.170	2.492±0.186
48 hpf	Control	0.247±0.015	0.081±0.012	0.017±0.003	0.035±0.005	2.141±0.128	2.792±0.185
	Oil-treated	0.170±0.030	0.059±0.009	0.108±0.052	0.015±0.007	1.719±0.161	2.488±0.135
72 hpf	Control	0.267±0.010	0.089±0.012	0.012±0.002	0.039±0.007	2.059±0.087	2.763±0.085
	Oil-treated	0.181±0.024	0.068±0.011	0.058±0.028	0.014±0.005	1.726±0.222	2.450±0.230

Table S4 Summary statics of red drum transcriptome assembly and annotation

Total assembled bases	181,576,332
Total trinity transcript contigs	257,434
Percent GC	43.85
Transcrip contig N10	4,140
Transcrip contig N20	2,835
Transcrip contig N30	2,047
Transcrip contig N40	1,480
Transcrip contig N50	1,071
Median contig length	397
Average contig	705
E90N50 value	2,500
BLASTX_hit	41,891
BLASTP_hit	34,939
Pfam	30,950
ThHMM	9,219
eggnog	34,080
GO_blast	38,647
GO_pfam	21,599

Table S5 Top impacted bio-pathways, enriched diseases and miRNAs at 24, 48 and 74 hpf red drum larva exposed to slick oil by Advaita

24 hpf					
Bio-pathway	**p_fdr**	**Diseases**	**genes**	**miRNA**	**genes**
Chemical carcinogenesis	2.0E-05	Ehlers-Danlos syndrome (EDS)	3	hsa-miR-767-5p	7
Metabolic pathways	3.0E-05	Tyrosinemia;	2	hsa-miR-29c-3p	7
Protein digestion and absorption	6.2E-05	Disorders in androgen synthesis	2	hsa-miR-29b-3p	7
Metabolism of xenobiotics by cytochrome P450	6.2E-05	Anemia due to disorders of glutathione metabolism	2	hsa-miR-29a-3p	7
ECM-receptor interaction	2.5E-04	Disorders of nucleotide excision repair	3	hsa-let-7i-5p	6
Amoebiasis	6.8E-04	Glutaric acidemia	2	hsa-miR-4458	6
Steroid biosynthesis	2.0E-03	Primary open angle glaucoma	2	hsa-let-7a-5p	6
Focal adhesion	2.8E-03	Mitochondrial respiratory chain deficiencies (MRCD)	2	hsa-let-7f-5p	6
Glutathione metabolism	2.8E-03	Smith-Lemli-Opitz syndrome	1	hsa-let-7g-5p	6
Tyrosine metabolism	8.6E-03	Alkaptonuria	1	hsa-let-7c-5p	6
Ubiquinone and other terpenoid-quinone biosynthesis	1.1E-02	Isovaleric acidemia (IVA)	1	hsa-miR-98-5p	6
Arachidonic acid metabolism	1.1E-02	Paget's disease of bone and related disorders	1	hsa-let-7e-5p	6
PI3K-Akt signaling pathway	1.4E-02	Pseudoxanthoma elasticum	1	hsa-let-7d-5p	6
Sulfur metabolism	2.0E-02	Hereditary angiopathy	1	hsa-let-7b-5p	6
Tryptophan metabolism	2.5E-02	Alport syndrome	1	hsa-miR-4500	6
Ovarian steroidogenesis	3.1E-02	Epidermolysis bullosa, dysprophica	1	hsa-miR-202-3p	6
Phenylalanine metabolism	3.1E-02	Odontoonychodermal dysplasia	1	hsa-miR-1246	3
Nucleotide excision repair	3.4E-02	Transient bullous dermolysis	1	hsa-miR-4269	3
48 hpf					
Proteasome	6.2E-22	Retinitis pigmentosa (RP)	8	hsa-miR-30c-5p	56
Protein digestion and absorption	2.6E-10	Ehlers-Danlos syndrome (EDS)	6	hsa-miR-30a-5p	56
Metabolic pathways	2.6E-10	Congenital stationary night blindness	5	hsa-miR-30d-5p	56
ECM-receptor interaction	6.9E-07	Non-syndromic X-linked mental retardation	5	hsa-miR-30b-5p	56
Carbon metabolism	5.3E-06	Cataract	5	hsa-miR-30e-5p	56
Retrograde endocannabinoid signaling	1.1E-05	Secondary hyperammonemia	5	hsa-miR-128-3p	37
Circadian entrainment	1.8E-05	Cytochrome c oxidase deficiency	4	hsa-miR-133a-3p	31
Glutamatergic synapse	3.3E-05	Macular degeneration	4	hsa-miR-133b	31
GABAergic synapse	4.6E-05	Cone-rod dystrophy and cone dystrophy	4	hsa-miR-4514	30
Nicotine addiction	5.5E-05	Creatine deficiency syndrome	3	hsa-miR-4692	30
Cholinergic synapse	1.9E-04	Achromatopsia; Rod monochromacy	3	hsa-miR-940	27
Steroid biosynthesis	2.5E-04	Neuronal ceroid lipofuscinosis	3	hsa-miR-140-3p	23
Glutathione metabolism	3.3E-04	Multiple epiphyseal dysplasia (MED)	3	hsa-miR-514b-5p	20
Insulin secretion	6.4E-04	Vitreoretinal degeneration	3	hsa-miR-1276	17
Tyrosine metabolism	1.1E-03	Stargardt disease (STGD)	3	hsa-miR-1183	17

Biosynthesis of amino acids	1.1E-03	Malignant melanoma	3	hsa-miR-491-3p	15
Gastric acid secretion	1.2E-03	Oculocutaneous albinism (OCA)	2	hsa-miR-3622b-	11
Type I diabetes mellitus	1.6E-03	Disorders in androgen synthesis	2	hsa-miR-432-5p	11
Serotonergic synapse	1.6E-03	Anemia due to disorders of glutathione metabolism	2	hsa-miR-490-3p	8
72 hpf					
Ribosome	1.0E-24	Diamond-Blackfan anemia (DBA)	6	hsa-miR-137	12
Metabolic pathways	7.7E-10	Retinitis pigmentosa (RP)	6	hsa-miR-22-3p	11
Arachidonic acid metabolism	9.0E-07	Cytochrome c oxidase deficiency	4	hsa-miR-218-5p	8
Metabolism of xenobiotics by cytochrome P450	8.7E-04	Leigh syndrome	4	hsa-miR-421	7
Porphyrin and chlorophyll metabolism	3.3E-03	Glycogen storage diseases (GSD)	4	hsa-miR-452-5p	7
Glycolysis / Gluconeogenesis	3.4E-03	Xeroderma pigmentosum (XP)	3	hsa-miR-4676-3p	7
Fat digestion and absorption	3.4E-03	Inherited thrombophilia	3	hsa-miR-892c-3p	7
Glutathione metabolism	3.4E-03	Disorders of nucleotide excision repair	3	hsa-miR-448	5
Phototransduction	4.2E-03	Mitochondrial respiratory chain deficiencies (MRCD)	3	hsa-miR-3167	4
Carbon metabolism	4.7E-03	Thyroid cancer	3	hsa-miR-876-5p	4
Fructose and mannose metabolism	4.7E-03	Secondary hyperammonemia	3	hsa-miR-214-5p	4
Pentose phosphate pathway	4.9E-03	Glutaric acidemia	2	hsa-miR-190a-5p	4
Glycine, serine and threonine metabolism	1.1E-02	Primary open angle glaucoma	2	hsa-miR-190b	4
Steroid biosynthesis	1.2E-02	Fraser syndrome	2	hsa-miR-488-3p	4
Linoleic acid metabolism	1.5E-02	Hereditary pancreatitis; Hereditary	2	hsa-miR-122-5p	3
Pyrimidine metabolism	1.5E-02	Familial flecked retina syndrome	2	hsa-miR-376c-3p	3
DNA replication	3.2E-02	Congenital stationary night blindness	2	hsa-miR-4735-3p	3
Tryptophan metabolism	4.3E-02	Hereditary fructose intolerance	1	hsa-miR-18a-5p	3
Retinol metabolism	5.0E-02	Fructose-1,6-bisphosphatase deficiency	1	hsa-miR-18b-5p	3

Table S6. Top canonical pathways at 24, 48 and 72 hpf by IPA

24 hpf	**-log p**	**Ratio**	**z-score**	**Molecules**
NRF2-mediated Oxidative Stress Response	2.97	0.0259	1	PRDX1,MAF,GCLC,SQSTM1,GSTO1
48 hpf	**-log p**	**Ratio**	**z-score**	**Molecules**
Synaptic Long Term Depression	8.27	0.135	-4.146	GUCY2D,GRM8,GRIA1,GNA11,PLA2G1B,GNAI1,ITPR1,GNAZ,GRIA4,GRM5,PLA2G4A,GNAT1,MAPK3,GNAO1,ITPR3,PRKCE,GRM6,GNAT2,GUCY1B3,GRIA3,PRKCB
CREB Signaling in Neurons	8.64	0.125	-4	Calm1 (includes others),GRM8,GRIA1,GNA11,GNAI1,GNB5,GNG13,ITPR1,GNAZ,GRIA4,GRM5,GNB3,CAMK2A,GNAT1,KL,IRS1,MAPK3,GNAO1,ITPR3,PRKCE,GRM6,GNAT2,GRIA3,PRKCB
Synaptic Long Term Potentiation	5.28	0.117	-3.873	Calm1 (includes others),GRM8,GRIA1,GNA11,ITPR1,GRIA4,GRM5,CAMK2A,PPP1R10,MAPK3,ITPR3,PRKCE,GRM6,PRKCB,GRIA3

Calcium Signaling	2.92	0.0753	-3.464	CAMK2A,Calm1 (includes others),MYL6,CHRNA6,CHRNB2,MAPK3,GRIA1,ITPR3,CHRNB3,ITPR1,CHRND,GRIA4,ACTA1,GRIA3
Neuropathic Pain Signaling In Dorsal Horn Neurons	5.73	0.127	-3.357	GRM8,GRIA1,TAC1,ITPR1,GRIA4,GRM5,CAMK2A,KL,MAPK3,IRS1,ITPR3,PRKCE,GRM6,GRIA3,PRKCB
G Beta Gamma Signaling	4.54	0.122	-3.317	GNB3,GNAT1,MAPK3,GNAO1,GNA11,GNB5,GNAI1,PRKCE,GNAT2,GNG13,GNAZ,PRKCB
CXCR4 Signaling	4.86	0.0983	-3.162	MYL6,GNA11,GNB5,GNAI1,GNG13,ITPR1,GNAZ,GNB3,GNAT1,KL,IRS1,MAPK3,GNAO1,ITPR3,GNAT2,PRKCE,PRKCB
Thrombin Signaling	4.33	0.0861	-3.162	MYL6,GNA11,GNB5,GNAI1,GNG13,ITPR1,GNAZ,CAMK2A,GNB3,GNAT1,KL,MAPK3,IRS1,GNAO1,ITPR3,GNAT2,PRKCE,PRKCB
fMLP Signaling in Neutrophils	3.41	0.0938	-3.162	Calm1 (includes others),GNB3,KL,IRS1,MAPK3,ITPR3,GNB5,GNAI1,PRKCE,GNG13,ITPR1,PRKCB
Role of NFAT in Regulation of the Immune Response	3.28	0.0785	-3.162	Calm1 (includes others),GNA11,GNB5,GNAI1,GNG13,GNAZ,ITPR1,GNB3,GNAT1,KL,IRS1,MAPK3,GNAO1,ITPR3,GNAT2
GNRH Signaling	1.75	0.0667	-3	DNM1,CAMK2A,MAPK3,ITPR3,GNA11,GNAI1,PRKCE,ITPR1,PRKCB
α-Adrenergic Signaling	3.9	0.113	-2.828	Calm1 (includes others),GNB3,PYGM,MAPK3,ITPR3,GNB5,GNAI1,PRKCE,GNG13,ITPR1,PRKCB
eNOS Signaling	3.36	0.0833	-2.828	Calm1 (includes others),HSPA9,SLC7A1,ITPR1,CNGA3,HSPA8,HSP90AB1,KL,IRS1,ITPR3,PRKCE,HSP90AA1,GUCY1B3,PRKCB
Corticotropin Releasing Hormone Signaling	3.06	0.0909	-2.828	Calm1 (includes others),GUCY2D,MAPK3,CNR1,GNAO1,ITPR3,GNAI1,PRKCE,ITPR1,GUCY1B3,PRKCB
Role of NFAT in Cardiac Hypertrophy	2.23	0.0653	-2.714	GNB3,CAMK2A,Calm1 (includes others),KL,MAPK3,IRS1,ITPR3,GNAI1,GNB5,PRKCE,GNG13,ITPR1,PRKCB
Huntington's Disease Signaling	7.71	0.105	-2.673	SDHA,SDHB,HSPA9,GNA11,GNB5,GNG13,Ubb,ITPR1,RPH3A,DNM1,HSPA8,GRM5,TGM2,PSMA8,CTSD,NSF,CAPNS1,DNAJC5,GNB3,KL,IRS1,MAPK3,PRKCE,CAPN7,NAPB,PRKCB
Aldosterone Signaling in Epithelial Cells	2.24	0.0682	-2.646	HSPA8,DNAJC5,HSP90AB1,KL,IRS1,MAPK3,HSPA9,ITPR3,PRKCE,HSP90AA1,ITPR1,PRKCB
Renin-Angiotensin Signaling	1.44	0.062	-2.646	KL,IRS1,MAPK3,ITPR3,PRKCE,STAT3,ITPR1,PRKCB
Glioma Signaling	1.23	0.0593	-2.646	Calm1 (includes others),CAMK2A,KL,IRS1,MAPK3,PRKCE,PRKCB
cAMP-mediated signaling	2.95	0.0705	-2.5	NAPEPLD,Calm1 (includes others),PDE7A,GRM8,CNR1,DUSP6,GNAI1,GABBR1,HTR1D,STAT3,CNGA3,MPPE1,CAMK2A,MAPK3,GNAO1,GRM6
Nitric Oxide Signaling in the Cardiovascular System	4.7	0.111	-2.496	Calm1 (includes others),GUCY2D,SLC7A1,ITPR1,CACNA1A,HSP90AB1,KL,IRS1,MAPK3,ITPR3,PRKCE,HSP90AA1,GUCY1B3,PRKCB
Gαq Signaling	3.88	0.0893	-2.496	NAPEPLD,Calm1 (includes others),GNA11,GNB5,GNG13,ITPR1,PLD1,GRM5,GNB3,KL,IRS1,MAPK3,ITPR3,PRKCE,PRKCB
Relaxin Signaling	5.24	0.105	-2.449	NAPEPLD,PDE7A,GUCY2D,GNA11,GNB5,GNAI1,GNG13,GNAZ,MPPE1,GNB3,GNAT1,KL,IRS1,MAPK3,GNAO1,GNAT2,GUCY1B3
IL-1 Signaling	2.76	0.0957	-2.449	GNB3,GNAT1,GNAO1,GNA11,GNB5,GNAI1,GNAT2,GNG13,GNAZ
PI3K Signaling in B Lymphocytes	1.02	0.0526	-2.449	Calm1 (includes others),CAMK2A,IRS1,MAPK3,ITPR3,ITPR1,PRKCB
Cardiac Hypertrophy Signaling	2.24	0.0615	-2.333	Calm1 (includes others),MYL6,GNA11,GNB5,GNAI1,GNG13,GNAZ,CACNA1

				A,GNB3,GNAT1,KL,MAPK3,IRS1,GNAO1,GNAT2
Dopamine-DARPP32 Feedback in cAMP Signaling	1.13	0.0511	-2.333	Calm1 (includes others),PPP1R10,ITPR3,GNAI1,PRKCE,ITPR1,GUCY1B3,CACNA1A,PRKCB
UVB-Induced MAPK Signaling	1.36	0.0758	-2.236	KL,IRS1,MAPK3,PRKCE,PRKCB
Calcium-induced T Lymphocyte Apoptosis	1.27	0.0714	-2.236	Calm1 (includes others),ITPR3,PRKCE,ITPR1,PRKCB
ErbB4 Signaling	1.18	0.0676	-2.236	KL,IRS1,MAPK3,PRKCE,PRKCB
Chemokine Signaling	1.16	0.0667	-2.236	Calm1 (includes others),CAMK2A,MAPK3,GNAI1,PRKCB
Non-Small Cell Lung Cancer Signaling	1.02	0.0602	-2.236	KL,IRS1,MAPK3,ITPR3,ITPR1
LPS-stimulated MAPK Signaling	0.968	0.0581	-2.236	KL,IRS1,MAPK3,PRKCE,PRKCB
Type II Diabetes Mellitus Signaling	0.841	0.0473	-2.236	KL,IRS1,MAPK3,PRKCE,SLC27A1,ACSBG2,PRKCB
Cholecystokinin/Gastrin-mediated Signaling	0.7	0.0472	-2.236	MAPK3,ITPR3,PRKCE,ITPR1,PRKCB
CD28 Signaling in T Helper Cells	0.435	0.0368	-2.236	Calm1 (includes others),KL,IRS1,ITPR3,ITPR1
Role of Pattern Recognition Receptors in Recognition of Bacteria and Viruses	0.428	0.0365	-2.236	KL,IRS1,MAPK3,PRKCE,PRKCB
Ephrin Receptor Signaling	2.22	0.0678	-2.121	GNB3,GNAT1,MAPK3,GNAO1,GNA11,GNB5,GNAI1,GNAT2,GNG13,STAT3,GNAZ,MAP4K4
EIF2 Signaling	2.19	0.0625	-2.121	PABPC1,WARS,RPS20,RPL18A,SREBF1,KL,RPL3,MAPK3,IRS1,RPS9,RPS10,RPL3L,RPS3,ACTA1
Production of Nitric Oxide and Reactive Oxygen Species in Macrophages	0.64	0.0402	-2.121	APOB,PPP1R10,KL,IRS1,APOA2,MAPK3,PRKCE,PRKCB
Androgen Signaling	5.21	0.123	-2	Calm1 (includes others),GNA11,GNB5,GNAI1,GNG13,GNAZ,GNB3,GNAT1,MAPK3,GNAO1,GNAT2,PRKCE,HSP90AA1,PRKCB
Glutamate Receptor Signaling	4.81	0.156	-2	SLC17A8,GRM5,Calm1 (includes others),GNB3,L-glutamine,GRM8,GRIA1,GRM6,GRIA4,GRIA3
Antiproliferative Role of Somatostatin Receptor 2	2.66	0.101	-2	GNB3,KL,GUCY2D,IRS1,MAPK3,GNB5,GNG13,GUCY1B3
Neuregulin Signaling	1.26	0.0645	-2	HSP90AB1,MAPK3,DCN,PRKCE,HSP90AA1,PRKCB
iCOS-iCOSL Signaling in T Helper Cells	0.772	0.0472	-2	Calm1 (includes others),CAMK2A,KL,IRS1,ITPR3,ITPR1
Role of PI3K/AKT Signaling in the Pathogenesis of Influenza	0.711	0.0513	-2	KL,IRS1,MAPK3,GNAI1
PEDF Signaling	0.635	0.0476	-2	SOD2,KL,IRS1,MAPK3
RANK Signaling in Osteoclasts	0.457	0.0392	-2	Calm1 (includes others),KL,IRS1,MAPK3
PAK Signaling	0.449	0.0388	-2	MYL6,KL,IRS1,MAPK3
Sphingosine-1-phosphate Signaling	0.291	0.0315	-2	KL,IRS1,MAPK3,GNAI1
Gα12/13 Signaling	0.271	0.0305	-2	MYL6,KL,IRS1,MAPK3
PKCθ Signaling in T Lymphocytes	0.247	0.0294	-2	CAMK2A,KL,IRS1,MAPK3
IL-8 Signaling	1.81	0.0597	-1.897	NAPEPLD,GNB3,KL,IRS1,MAPK3,GNB5,GNAI1,PRKCE,GNG13,MAP4K4,PLD1,PRKCB
ERK/MAPK Signaling	1.43	0.0542	-1.897	PLA2G4A,YWHAG,PPP1R10,KL,IRS1,DUSP6,MAPK3,PLA2G1B,PRKCE,STAT3,PRKCB
Gαi Signaling	3.01	0.0894	-1.89	GNB3,GRM8,MAPK3,CNR1,GNB5,GNAI1,GRM6,GABBR1,GNG13,HTR1D,STAT3

Melatonin Signaling	2.14	0.0909	-1.89	Calm1 (includes others),CAMK2A,MAPK3,GNAO1,GNAI1,PRKCE,PRKCB
VEGF Family Ligand-Receptor Interactions	1.69	0.0745	-1.89	PLA2G4A,KL,IRS1,MAPK3,PLA2G1B,PRKCE,PRKCB
PDGF Signaling	1.65	0.0729	-1.89	SYNJ1,KL,IRS1,MAPK3,STAT3,INPP5K,PRKCB
P2Y Purigenic Receptor Signaling Pathway	1.62	0.0634	-1.89	GNB3,KL,IRS1,MAPK3,GNB5,GNAI1,PRKCE,GNG13,PRKCB
p70S6K Signaling	1.31	0.0584	-1.89	YWHAG,KL,IRS1,MAPK3,GNAI1,PRKCE,PLD1,PRKCB
Sperm Motility	2.56	0.0786	-1.667	SLC16A10,PLA2G4A,Calm1 (includes others),ITPR3,PLA2G1B,CACNA1H,PRKCE,ITPR1,CNGA3,GUCY1B3,PRKCB
Tec Kinase Signaling	3.74	0.0867	-1.633	GNA11,GNB5,GNAI1,GNG13,STAT3,GNAZ,GNB3,GNAT1,KL,IRS1,GNAO1,GNAT2,PRKCE,ACTA1,PRKCB
Phospholipase C Signaling	2.23	0.0612	-1.633	NAPEPLD,Calm1 (includes others),MYL6,PLA2G1B,GNB5,GNG13,ITPR1,PLD1,TGM2,PLA2G4A,GNB3,MAPK3,ITPR3,PRKCE,PRKCB
Signaling by Rho Family GTPases	2.16	0.0602	-1.633	MYL6,GNA11,GNB5,GNAI1,GNG13,GNAZ,PLD1,GNB3,GNAT1,KL,IRS1,MAPK3,GNAO1,GNAT2,ACTA1
Thrombopoietin Signaling	1.81	0.087	-1.633	KL,IRS1,MAPK3,PRKCE,STAT3,PRKCB
EGF Signaling	1.73	0.0833	-1.633	KL,IRS1,MAPK3,ITPR3,STAT3,ITPR1
GM-CSF Signaling	1.67	0.0811	-1.633	CAMK2A,KL,IRS1,MAPK3,STAT3,PRKCB
Growth Hormone Signaling	1.42	0.0706	-1.633	KL,IRS1,MAPK3,PRKCE,STAT3,PRKCB
Prolactin Signaling	1.39	0.0698	-1.633	KL,IRS1,MAPK3,PRKCE,STAT3,PRKCB
Dendritic Cell Maturation	0.311	0.0314	-1.633	COL1A2,COL1A1,KL,IRS1,MAPK3,COL2A1
Endothelin-1 Signaling	6.26	0.104	-1.528	NAPEPLD,GUCY2D,GNA11,PTGS1,PLA2G1B,GNAI1,ITPR1,GNAZ,PLD1,PLA2G4A,GNAT1,KL,IRS1,MAPK3,GNAO1,ITPR3,PRKCE,GNAT2,EDNRA,GUCY1B3,PRKCB
Protein Kinase A Signaling	3.41	0.0619	-1.528	NAPEPLD,YWHAG,Calm1 (includes others),PTPN2,PDE7A,MYL6,DUSP6,GNAI1,GNB5,GNG13,ITPR1,PTPRM,CNGA3,PTPRF,MPPE1,PTPRU,PYGM,CAMK2A,GNB3,PPP1R10,MAPK3,ITPR3,PRKCE,CDC16,PRKCB
mTOR Signaling	1.75	0.0585	-1.414	DGKZ,NAPEPLD,RPS20,KL,IRS1,MAPK3,RPS9,RPS10,PRKCE,RPS3,PLD1,PRKCB
B Cell Receptor Signaling	0.711	0.0421	-1.414	Calm1 (includes others),CAMK2A,SYNJ1,KL,IRS1,MAPK3,INPP5K,PRKCB
Cardiac β-adrenergic Signaling	1.57	0.0621	-1.342	NAPEPLD,GNB3,PPP1R10,PDE7A,GRK3,GNB5,GNG13,CACNA1A,MPPE1
Macropinocytosis Signaling	1.05	0.0617	-1.342	KL,IRS1,HGF,PRKCE,PRKCB
VEGF Signaling	0.668	0.0459	-1.342	KL,IRS1,MAPK3,ACTA1,PRKCB
HGF Signaling	1.23	0.0593	-1.134	KL,IRS1,MAPK3,HGF,PRKCE,STAT3,PRKCB
IL-6 Signaling	1.1	0.0551	-1.134	COL1A1,KL,IRS1,MAPK3,STAT3,IL1RAPL1,MAP4K4
Glioblastoma Multiforme Signaling	0.686	0.0427	-1.134	WNT9B,KL,IRS1,MAPK3,ITPR3,FZD6,ITPR1
Intrinsic Prothrombin Activation Pathway	1.96	0.133	-1	COL1A2,COL1A1,PROS1,COL2A1
Renal Cell Carcinoma Signaling	1.46	0.0723	-1	KL,IRS1,RBX1,MAPK3,HGF,Ubb
CD40 Signaling	1.11	0.0641	-1	KL,IRS1,MAPK3,PTGS1,STAT3
CNTF Signaling	0.948	0.0635	-1	KL,IRS1,MAPK3,STAT3
Role of NANOG in Mammalian Embryonic Stem Cell Pluripotency	0.829	0.0492	-1	WNT9B,KL,IRS1,MAPK3,FZD6,STAT3
Glioma Invasiveness Signaling	0.812	0.0563	-1	TIMP3,KL,IRS1,MAPK3
IL-17A Signaling in Airway Cells	0.698	0.0506	-1	KL,IRS1,MAPK3,STAT3

IGF-1 Signaling	0.678	0.0463	-1	YWHAG,KL,IRS1,MAPK3,STAT3
JAK/Stat Signaling	0.647	0.0482	-1	KL,IRS1,MAPK3,STAT3
Leptin Signaling in Obesity	0.579	0.0449	-1	KL,IRS1,MAPK3,STAT3
Acute Myeloid Leukemia Signaling	0.529	0.0426	-1	KL,IRS1,MAPK3,STAT3
Rac Signaling	0.33	0.0333	-1	KL,IRS1,MAPK3,PLD1
RhoGDI Signaling	2.62	0.0726	1	DGKZ,GDI1,GNB3,GNAT1,MYL6,GNAO1,GNA11,GNAI1,GNB5,GNAT2,GNG13,GNAZ,ACTA1
Ceramide Signaling	0.5	0.0412	1	CTSD,KL,IRS1,MAPK3
PI3K/AKT Signaling	1.07	0.0543	1.134	YWHAG,SYNJ1,HSP90AB1,MAPK3,HSP90AA1,INPP5K,MAPK8IP1
PPARα/RXRα Activation	2.11	0.0656	1.265	GPD1,HSP90AB1,IRS1,APOA2,MAPK3,GNA11,HSP90AA1,SLC27A1,IL1RAPL1,MAP4K4,ACVR2A,PRKCB
Apoptosis Signaling	0.921	0.0562	2	CAPNS1,MAPK3,PRKCE,CAPN7,MAP4K4
ErbB2-ErbB3 Signaling	0.844	0.058	2	KL,IRS1,MAPK3,STAT3
Sumoylation Pathway	0.457	0.0392	2	GDI1,CTBP2,MYB,UBE2I
NF-κB Activation by Viruses	0.952	0.0575	2.236	KL,IRS1,MAPK3,PRKCE,PRKCB
72 hpf	**-log p**	**Ratio**	**z-score**	**Molecules**
EIF2 Signaling	30.9	0.393	-3	RPL11,RPL22,MAPK1,RPS27,RPL39,HRAS,RPL35A,EIF4A2,HSPA5,PIK3R4,RPS11,FGFR3,MYC,EIF3B,RPS20,EIF3D,MAPK3,PIK3CG,RPL23A,RPL21,IRS2,RPS2,RPL36,RPL32,PABPC1,RPL3,FGFR1,RPS8,EIF4G3,FGFR2,RPL12,EIF2S3,RPL37A,RPL9,EIF3M,RPL10A,PIK3R3,PTBP1,HNRNPA1,EIF4A3,RPS15A,INSR,RPL13A,RPSA,RPL24,RPLP1,RPS3A,RPL36A,RPS18,PPP1CB,EIF2S1,RPL7A,EIF4E,RPS4X,RPL14,RPL27A,RPL35,RPL18A,UBA52,RPS9,SOS1,EIF3A,IGF1R,RPS3,RPS17,RPS12,RPL18,RPS24,EIF3H,PIK3C2A,RPL34,ACTB,RPL17,RPL30,RPS10,RPL23,RPS21,RPL27,EIF3F,RPS15,RPS16,SREBF1,EIF3I,RPS27A,RPL5,RPL3L,EIF1AX,RPS14
Ceramide Signaling	1.84	0.175	-2.5	PIK3C2A,TNFRSF1A,PPP2CA,FGFR1,HRAS,FGFR2,PIK3R4,FGFR3,PIK3R3,CTSD,PPP2CB,PIK3CG,PPM1J,MAPK3,IRS2,TNF,ENPP7
Intrinsic Prothrombin Activation Pathway	1.6	0.233	-2.449	KNG1,F10,PROS1,COL10A1,COL18A1,FGA,F2
Coagulation System	2.22	0.257	-2.333	KNG1,F10,PROS1,VWF,PLAU,TFPI,FGA,F2,SERPIND1
PTEN Signaling	2.1	0.174	-2.236	FOXO4,CSNK2A1,MAPK1,FGFR1,RAC1,HRAS,FGFR2,IGF2R,OCRL,PIK3R3,FGFR3,FOXO1,SYNJ1,PIK3CG,MAPK3,SOS1,IGF1R,INPP5K,CSNK2B,INSR,MAGI3
NF-κB Activation by Viruses	1.32	0.161	-2.138	PIK3R3,FGFR3,MAPK1,PIK3C2A,MAPK3,PIK3CG,PRKCD,FGFR1,ITGAV,FGFR2,HRAS,IRS2,PIK3R4,PRKCG
Role of p14/p19ARF in Tumor Suppression	2.59	0.256	-2.111	FGFR3,PIK3R3,PIK3C2A,PIK3CG,FGFR1,SENP3,RAC1,FGFR2,IRS2,UBTF,PIK3R4
LXR/RXR Activation	3.13	0.195	-1.698	KNG1,HPX,APOB,APOH,MSR1,TNFRSF1A,NR1H4,VTN,APOA2,AHSG,ABCG1,C4A/C4B,APOA1,LDLR,LCAT,SREBF1,FASN,LPL,NCOR1,IL1RAPL1,NCOR2,HMGCR,FGA,TNF,CYP51A1
14-3-3-mediated Signaling	8.45	0.28	-1.633	MAPK1,PDIA3,HRAS,PIK3R4,FGFR3,YWHAQ,PLCE1,PIK3CG,MAPK3,TSC2,PLCB1,IRS2,TUBA1C,PDCD6IP,TUBB1,YWHAG,PIK3C2A,YWHAE,TNFRSF1A,YWHAB,FGFR1,TUBG1,TUBB2A,EDC3,TUBA4A,FGFR2,VIM,PLCG1,PRKCG,PIK3R3,TUBA1A,FOXO1,TUBB6,PRKCD,MAPK10,PLCB3,TNF
PI3K/AKT Signaling	3.08	0.194	-1.46	GAB2,YWHAG,JAK1,YWHAE,MAPK1,YWHAB,PPP2CA,HRAS,OCRL,EIF4E,PIK3R3,YWHAQ,PPP2CB,HSP90B1,GYS1,FOXO1,SYNJ1,HSP90AB1,MAPK3,PPM1J,PIK3CG,SOS1,TSC2,HSP90AA1,INPP5K
RhoGDI Signaling	3.12	0.179	-1.46	MYL6,RACK1,RHOT2,GNA11,MYL6B,GNB3,GNAT1,CFL2,CDH3,ARPC3,ARHGEF2,PI4KA,CFL1,ACTB,ARHGEF15,CR

				EBBP,GNAI1,RAC1,GRIP1,GNAZ,MYL7,DGKZ,CDH2,CDH1,ARPC1A,ARPC2,GNAO1,GNAT2,ARHGEF9,ACTG1,ESR1,MSN
G Beta Gamma Signaling	2.48	0.194	-1.414	PRKACB,MAPK1,GNA11,RACK1,GNAI1,HRAS,PLCG1,GNAZ,PRKCG,GNB3,GNAT1,PIK3CG,PRKCD,MAPK3,GNAO1,SOS1,PRKACA,GNAT2,CAV3
RhoA Signaling	2.62	0.185	-1.342	SEPT8,MYL6,CFL1,NRP2,SEPT4,ACTB,PPP1CB,MYL6B,TTN,PLD1,MYL7,ARPC1A,CFL2,IGF1,ARPC2,IGF1R,ARPC3,SEMA3F,SEPT6,ACTG1,SEPT2,PI4KA,MSN
LPS/IL-1 Mediated Inhibition of RXR Function	2	0.15	-1.265	PPARA,SLC27A2,NR1H4,ABCC2,ABCG1,ALAS1,FMO5,CHST15,SLC27A4,HS3ST3A1,CHST2,ALDH1L1,UST,ACSL5,CYP2A6 (includes others),FABP7,ALDH6A1,GSTK1,GSTA3,TNFRSF1A,GSTM3,ACSL6,ALDH8A1,ACSBG2,GSTO1,HS3ST3B1,ALDH1L2,CYP3A4,SREBF1,IL1RAPL1,ABCC3,TNF,ACSL1,PPARGC1A
Acute Phase Response Signaling	1.5	0.146	-1.213	SERPING1,TCF4,APOH,MAPK1,APOA2,HRAS,CP,HNF1A,F2,SERPIND1,C4A/C4B,SOD2,MAPK3,PIK3CG,SOS1,HPX,TNFRSF1A,AHSG,VWF,STAT3,PIK3R3,APOA1,FGA,SOCS5,TNF
ErbB2-ErbB3 Signaling	3.01	0.232	-1	NRG2,PIK3C2A,MAPK1,FGFR1,HRAS,FGFR2,STAT3,PIK3R4,MYC,FGFR3,PIK3R3,FOXO1,MAPK3,PIK3CG,SOS1,IRS2
Ephrin B Signaling	4	0.253	1	PXN,RGS3,CFL1,MAPK1,KALRN,CXCR4,GNA11,RACK1,CXCL12,GNAI1,RAC1,HRAS,GNAZ,GNB3,CFL2,GNAT1,MAPK3,GNAO1,GNAT2
Calcium Signaling	6.98	0.231	1	PRKACB,GRIN2A,Calm1 (includes others),MYH9,TNNI2,MAPK1,MYL6,GRIA1,TNNT2,MYL6B,MYH11,TRPC5,GRIA4,SLC8B1,MAPK3,RYR3,CREB1,HDAC7,CAMK1G,GRIN1,GRIN2B,HDAC9,CALR,HDAC4,HDAC2,TNNC2,MYH14,TRDN,HDAC1,CREBBP,GRIA2,SLC8A2,TRPC6,ITPR1,CHRND,HDAC5,MYL7,CHRNG,HDAC3,PRKACA,CHRNE,CHRNA2,GRIA3
Neuregulin Signaling	2.75	0.204	1	NRG2,MAPK1,DCN,HRAS,PLCG1,TMEFF2,PRKCG,MYC,PIK3R3,HSP90B1,HSP90AB1,CDK5,PRKCD,MAPK3,SOS1,GRB7,DLG4,HSP90AA1,RNF41
Telomerase Signaling	5.55	0.252	1.091	MAPK1,PPP2CA,HRAS,PIK3R4,FGFR3,MYC,HSP90B1,HSP90AB1,MAPK3,PPM1J,PIK3CG,HDAC7,SOS1,IRS2,ETS1,HDAC9,HDAC4,PIK3C2A,HDAC2,FGFR1,DKC1,HDAC1,FGFR2,HDAC5,PIK3R3,PPP2CB,HDAC3,HSP90AA1
Remodeling of Epithelial Adherens Junctions	3.57	0.25	1.134	TUBB1,ACTB,TUBG1,TUBB2A,TUBA4A,RAB7A,MAPRE2,CDH1,ARPC1A,TUBA1A,TUBB6,HGF,ARPC2,CBLL1,ARPC3,TUBA1C,ACTG1
CXCR4 Signaling	4.09	0.197	1.134	MAPK1,MYL6,RACK1,RHOT2,GNA11,CXCL12,HRAS,MYL6B,PIK3R4,FGFR3,GNB3,GNAT1,MAPK3,PIK3CG,PLCB1,IRS2,PXN,PIK3C2A,CXCR4,FGFR1,GNAI1,RAC1,ADCY6,FGFR2,GNAZ,ITPR1,MYL7,PRKCG,PIK3R3,PRKCD,GNAO1,MAPK10,PLCB3,GNAT2
Antiproliferative Role of Somatostatin Receptor 2	2.37	0.203	1.155	PIK3C2A,MAPK1,GUCY1A3,GUCY2D,FGFR1,RACK1,HRAS,FGFR2,PIK3R4,FGFR3,PIK3R3,GNB3,MAPK3,PIK3CG,IRS2,GUCY1B3
ILK Signaling	3.91	0.187	1.183	MYH9,MAPK1,MYL6,PPP2CA,RHOT2,MYL6B,MYH11,PIK3R4,FGFR3,MYC,CFL2,FLNA,PIK3CG,PPM1J,MAPK3,CREB1,IRS2,PXN,PARVA,FBLIM1,PIK3C2A,CFL1,TNFRSF1A,MYH14,FGFR1,ACTB,CREBBP,FGFR2,VIM,MYL7,PIK3R3,PPP2CB,CDH1,MAPK10,RSU1,TNF,ACTG1
Glioma Invasiveness Signaling	3.33	0.239	1.213	TIMP3,PIK3C2A,MAPK1,VTN,FGFR1,RHOT2,HRAS,FGFR2,MMP2,PIK3R4,FGFR3,PIK3R3,MAPK3,PIK3CG,ITGAV,IRS2,PLAU
STAT3 Pathway	3.11	0.23	1.213	MAPK1,PTPN2,FGFR1,RAC1,HRAS,FGFR2,STAT3,IGF2R,MYC,FGFR3,PIM1,MAPK3,CISH,MAPK10,IGF1R,INSR,SOCS5
HIPPO signaling	3.56	0.23	1.265	YWHAG,YWHAE,FAT4,YWHAB,PPP2CA,SMAD3,PPP1R3C,CSNK1D,PPP1CB,SMAD5,LATS2,DLG3,ITCH,YWHAQ,CSNK1E,PPP2CB,DLG5,PPM1J,DLG4,LATS1

Androgen Signaling	3.13	0.202	1.265	POLR2I,PRKACB,CALR,Calm1 (includes others),MAPK1,SMAD3,CREBBP,GNA11,RACK1,GNAI1,POLR2J,GNAZ,POLR2B,ERCC2,PRKCG,GNB3,GNAT1,PRKCD,MAPK3,GNAO1,PRKACA,HSP90AA1,GNAT2
Hypoxia Signaling in the Cardiovascular System	3.31	0.246	1.342	UBE2G2,HSP90B1,EDN1,HSP90AB1,UBE2A,UBE2G1,COPS5,CREB1,CREBBP,CSNK1D,HSP90AA1,UBE2S,LDHA,SLC2A4,UBE2E1,UBE2C
Type II Diabetes Mellitus Signaling	4.32	0.209	1.342	SLC27A2,MAPK1,D-glucose,PIK3R4,SLC27A4,FGFR3,PIK3CG,MAPK3,SLC2A2,ACSL5,ABCC8,PRKAA2,IRS2,glyceraldehyde-3-phosphate,PIK3C2A,TNFRSF1A,FGFR1,ACSL6,FGFR2,ACSBG2,SLC2A4,PRKCG,PIK3R3,PRKCD,GCK,MAPK10,INSR,TNF,ENPP7,SOCS5,ACSL1
Nitric Oxide Signaling in the Cardiovascular System	4.44	0.222	1.347	KNG1,PRKACB,Calm1 (includes others),MAPK1,PIK3R4,FGFR3,HSP90B1,HSP90AB1,PDE3B,MAPK3,PIK3CG,IRS2,GUCY1B3,PIK3C2A,GUCY1A3,GUCY2D,FGFR1,FGFR2,ITPR1,CACNA1A,PRKCG,PIK3R3,PRKG1,PRKCD,PRKACA,HSP90AA1,PDE5A,L-ornithine
ERK/MAPK Signaling	6.28	0.217	1.406	PRKACB,FYN,MAPK1,PPP2CA,DUSP6,PPP1R3C,HRAS,PPP1CB,TLN1,RAPGEF4,PIK3R4,EIF4E,MYC,YWHAQ,FGFR3,MAPK3,PPM1J,PIK3CG,SOS1,CREB1,IRS2,STAT1,PLA2G12B,ETS1,PXN,YWHAG,PIK3C2A,YWHAB,FGFR1,CREBBP,RAC1,PLA2G1B,PLCG1,FGFR2,STAT3,MKNK2,PRKCG,PIK3R3,PLA2G4A,PPP2CB,H3F3A/H3F3B,PRKCD,PRKACA,ESR1
Endothelin-1 Signaling	5.15	0.203	1.406	MAPK1,PDIA3,GNA11,HRAS,PIK3R4,FGFR3,MYC,PLCE1,LCAT,GNAT1,EDN1,MAPK3,PIK3CG,SOS1,PLCB1,PNPLA3,IRS2,PLA2G12B,GUCY1B3,PIK3C2A,GUCY1A3,GUCY2D,FGFR1,PTGS1,GNAI1,PLA2G1B,ADCY6,PLCG1,FGFR2,GNAZ,ITPR1,PLD1,PRKCG,PIK3R3,PLA2G4A,PRKCD,GNAO1,MAPK10,PLCB3,GNAT2,EDNRA
Acute Myeloid Leukemia Signaling	2.69	0.202	1.5	TCF4,PIK3C2A,MAPK1,FGFR1,HRAS,FGFR2,STAT3,PIK3R4,HNF1A,IDH1,PIK3R3,MYC,FGFR3,alpha-hydroxyglutarate,PIM1,MAPK3,PIK3CG,SOS1,IRS2
Thrombin Signaling	5.14	0.201	1.521	MAPK1,MYL6,PDIA3,RACK1,RHOT2,GNA11,HRAS,PPP1CB,MYL6B,PIK3R4,F2,FGFR3,PLCE1,GNB3,GNAT1,MAPK3,PIK3CG,CREB1,SOS1,CAMK1G,GATA6,PLCB1,ARHGEF2,IRS2,PIK3C2A,FGFR1,ARHGEF15,GNAI1,ADCY6,PLCG1,FGFR2,GNAZ,ITPR1,MYL7,PRKCG,PIK3R3,PRKCD,GNAO1,PLCB3,GNAT2,GATA3,ARHGEF9
Signaling by Rho Family GTPases	4.25	0.181	1.521	MAPK1,MYL6,RACK1,RHOT2,GNA11,MYL6B,PIK3R4,FGFR3,GNB3,CFL2,GNAT1,CDH3,MAPK3,PIK3CG,ARPC3,ARHGEF2,IRS2,PI4KA,SEPT8,PIK3C2A,CFL1,SEPT4,FGFR1,ACTB,ARHGEF15,RAC1,GNAI1,VIM,FGFR2,GNAZ,PLD1,MYL7,PIK3R3,CDH1,CDH2,ARPC1A,ARPC2,GNAO1,MAPK10,GNAT2,ARHGEF9,SEPT6,ACTG1,SEPT2,MSN
Non-Small Cell Lung Cancer Signaling	2.94	0.217	1.604	PIK3C2A,PA2G4,MAPK1,SUV39H1,FGFR1,HRAS,PLCG1,FGFR2,ITPR1,PIK3R4,SIN3A,PIK3R3,FGFR3,MAPK3,PIK3CG,SOS1,RARB,IRS2
IL-6 Signaling	1.34	0.15	1.606	CSNK2A1,PIK3C2A,MAPK1,TNFRSF1A,FGFR1,HRAS,FGFR2,STAT3,PIK3R4,FGFR3,PIK3R3,PIK3CG,MAPK3,SOS1,MAPK10,IRS2,IL1RAPL1,CSNK2B,TNF
Glutamate Receptor Signaling	2.9	0.234	1.667	GRIN1,GRIN2B,GRIN2A,Calm1 (includes others),L-glutamine,GRM1,GRIA1,GRIA2,GRIP1,GRIA4,GNB3,SLC1A2,DLG4,GLUL,GRIA3
Fcγ Receptor-mediated Phagocytosis in Macrophages and Monocytes	3.63	0.222	1.706	GAB2,FYN,PXN,MAPK1,ACTB,RAC1,PLCG1,TLN1,PLD1,PRKCG,PIK3R3,MYO5A,ARPC1A,RAB11B,ARPC2,PRKCD,PIK3CG,MAPK3,HCK,ARPC3,ACTG1,FGR
Synaptic Long Term Potentiation	3.9	0.211	1.732	PRKACB,GRIN2A,Calm1 (includes others),MAPK1,PDIA3,GRIA1,PPP1R3C,GNA11,HRAS,PPP1CB,GRIA4,PLCE1,MAPK3,CREB1,PLCB1,GRIN2B,GRIN1,GR

				M1,CREBBP,GRIA2,PLCG1,ITPR1,PRKCG,PRKCD,PRKACA,PLCB3,GRIA3
Cardiac Hypertrophy Signaling	4.81	0.189	1.761	PRKACB,Calm1 (includes others),MAPK1,MYL6,PDIA3,RACK1,RHOT2,GNA11,HAND1,HRAS,MYL6B,PIK3R4,EIF4E,FGFR3,PLCE1,GNB3,GNAT1,IGF1,MAPK3,PIK3CG,SOS1,CREB1,TGFB2,IGF1R,PLCB1,IRS2,ADRA1B,ADRB2,PIK3C2A,FGFR1,MAP3K13,CREBBP,GNAI1,ADCY6,PLCG1,FGFR2,GNAZ,CACNA1A,MYL7,ADSS,PIK3R3,GNAO1,MAPK10,PRKACA,PLCB3,GNAT2
PAK Signaling	3.37	0.214	1.789	PXN,PIK3C2A,MYL6,CFL1,MAPK1,FGFR1,RAC1,HRAS,FGFR2,MYL6B,EPHA3,PIK3R4,MYL7,FGFR3,PIK3R3,CFL2,PIK3CG,MAPK3,SOS1,MAPK10,IRS2,TNF
Regulation of eIF4 and p70S6K Signaling	14.3	0.323	1.807	MAPK1,PPP2CA,RPS27,HRAS,EIF4A2,PIK3R4,RPS11,FGFR3,EIF3B,EIF4EBP3,RPS20,EIF3D,MAPK3,PPM1J,PIK3CG,IRS2,RPS2,PABPC1,FGFR1,RPS8,EIF4G3,FGFR2,EIF2S3,EIF3M,PIK3R3,PPP2CB,EIF4A3,RPS15A,RPSA,RPS3A,RPS18,EIF2S1,EIF4E,RPS4X,SOS1,RPS9,EIF3A,RPS12,RPS3,RPS17,RPS24,EIF3H,PIK3C2A,RPS10,RPS21,RPS15,EIF3F,RPS16,EIF3I,RPS27A,EIF1AX,RPS14
fMLP Signaling in Neutrophils	2.77	0.188	1.877	Calm1 (includes others),PIK3C2A,MAPK1,FGFR1,RACK1,RAC1,GNAI1,HRAS,FGFR2,ITPR1,PIK3R4,PRKCG,FGFR3,PIK3R3,GNB3,ARPC1A,PIK3CG,ARPC2,PRKCD,MAPK3,PLCB3,PLCB1,ARPC3,IRS2
HMGB1 Signaling	2.23	0.173	1.877	ICAM1,PIK3C2A,MAPK1,TNFRSF1A,HAT1,FGFR1,RHOT2,RBBP7,RAC1,HRAS,FGFR2,PIK3R4,FGFR3,PIK3R3,KAT6B,PIK3CG,LTA,KAT6A,MAPK3,MAPK10,TGFB2,IRS2,TNF
VEGF Family Ligand-Receptor Interactions	2.69	0.202	1.886	PIK3C2A,MAPK1,NRP2,FGFR1,PLA2G1B,HRAS,FGFR2,PLCG1,PIK3R4,PRKCG,PIK3R3,FGFR3,PLA2G4A,PIK3CG,PRKCD,MAPK3,SOS1,IRS2,PLA2G12B
Th1 Pathway	1.32	0.147	1.886	DLL1,ICAM1,JAK1,PIK3C2A,HLA-A,FGFR1,FGFR2,STAT3,PIK3R4,CD8A,PIK3R3,FGFR3,CD28,NFIL3,NOTCH2,PIK3CG,LTA,IRS2,STAT1,GATA3
IL-2 Signaling	2.76	0.227	1.941	PIK3R3,FGFR3,CSNK2A1,JAK1,MAPK1,PIK3C2A,MAPK3,PIK3CG,FGFR1,SOS1,FGFR2,HRAS,IRS2,CSNK2B,PIK3R4
mTOR Signaling	12.5	0.278	1.961	MAPK1,PPP2CA,RPS27,HRAS,EIF4A2,PIK3R4,RPS11,FGFR3,EIF3B,RPS20,EIF3D,MAPK3,PPM1J,PIK3CG,TSC2,IRS2,RPS2,FGFR1,RPS8,RAC1,FGFR2,EIF4G3,MLST8,PLD1,EIF3M,PIK3R3,PPP2CB,EIF4A3,PRKCD,RPS15A,INSR,RPSA,ULK1,RPS3A,RHOT2,RPS18,EIF4E,RPS4X,RPS9,PRKAA2,EIF3A,RPS12,RPS17,RPS3,RPS24,PIK3C2A,EIF3H,RPS10,RPS21,PRKCG,DGKZ,EIF3F,RPS15,RPS16,EIF3I,RPS27A,RPS14
Prolactin Signaling	4.6	0.256	1.964	FYN,PIK3C2A,MAPK1,FGFR1,CREBBP,HRAS,FGFR2,PLCG1,STAT3,PIK3R4,PRKCG,FGFR3,PIK3R3,MYC,PIK3CG,PRKCD,MAPK3,SOS1,IRS2,STAT1,TCF7,SOCS5
Mouse Embryonic Stem Cell Pluripotency	2.8	0.198	1.964	TCF4,JAK1,PIK3C2A,MAPK1,FGFR1,CREBBP,DVL1,HRAS,FGFR2,SMAD5,STAT3,FZD1,PIK3R4,HNF1A,PIK3R3,FGFR3,MYC,PIK3CG,MAPK3,SOS1,IRS2
Neurotrophin/TRK Signaling	2.25	0.198	2	PIK3C2A,MAPK1,SPRY1,FGFR1,CREBBP,HRAS,PLCG1,FGFR2,PIK3R4,FGFR3,PIK3R3,MAPK3,PIK3CG,SOS1,CREB1,IRS2
VEGF Signaling	2.65	0.193	2	PXN,PIK3C2A,MAPK1,YWHAE,ACTB,FGFR1,HRAS,PLCG1,FGFR2,EIF2S3,PIK3R4,EIF2S1,PIK3R3,FGFR3,FOXO1,MAPK3,PIK3CG,SOS1,IRS2,ACTG1,EIF1AX
GM-CSF Signaling	4.08	0.257	2.065	ETS1,PIK3C2A,MAPK1,FGFR1,RACK1,HRAS,FGFR2,STAT3,PIK3R4,FGFR3,PIK3R3,PIM1,PIK3CG,MAPK3,SOS1,CISH,HCK,IRS2,STAT1
Paxillin Signaling	2.81	0.195	2.065	PXN,PARVA,PIK3C2A,MAPK1,ACTB,FGFR1,ITGA8,RAC1,HRAS,FGFR2,TLN1,PIK3R4,PTPN12,FGFR3,PIK3R3,ITGA9,PIK3CG,SOS1,MAPK10,ITGAV,IRS2,ACTG1
Actin Cytoskeleton Signaling	2.84	0.164	2.121	KNG1,MYH9,MAPK1,MYL6,FGF2,HRAS,PPP1CB,TLN1,MYL6B,MYH11,PIK3R4,F2,FGFR3,CFL2,FLNA,MAPK3,PIK3CG

				,FGF12,SOS1,ARPC3,IRS2,FGF7,PXN,CFL1,PIK3C2A,MYH14,FGFR1,ACTB,RAC1,FGFR2,TTN,MYL7,FGF1,PIK3R3,ARPC1A,ARPC2,ACTG1,MSN
IGF-1 Signaling	6.89	0.278	2.132	PRKACB,CSNK2A1,CTGF,JAK1,MAPK1,HRAS,PIK3R4,FGFR3,YWHAQ,IGF1,MAPK3,PIK3CG,SOS1,IGF1R,IRS2,CSNK2B,PXN,YWHAG,PIK3C2A,YWHAE,YWHAB,FGFR1,FGFR2,STAT3,PIK3R3,NOV,FOXO1,PRKACA,CYR61,SOCS5
Rac Signaling	2.46	0.183	2.132	PIK3C2A,CFL1,MAPK1,FGFR1,RAC1,HRAS,FGFR2,PIK3R4,PLD1,PIK3R3,FGFR3,MCF2L,ARPC1A,CFL2,PIK3CG,ARPC2,MAPK3,ARPC3,SH3RF1,IRS2,ELK4,PI4KA
Leptin Signaling in Obesity	4.36	0.247	2.138	PRKACB,PIK3C2A,MAPK1,PDIA3,FGFR1,PDE3A,ADCY6,FGFR2,PLCG1,STAT3,PIK3R4,FGFR3,PIK3R3,PLCE1,FOXO1,PDE3B,PIK3CG,MAPK3,PRKACA,PLCB3,PLCB1,IRS2
UVB-Induced MAPK Signaling	2.76	0.227	2.138	PIK3C2A,MAPK1,FGFR1,FGFR2,PIK3R4,EIF4E,PRKCG,FGFR3,PIK3R3,H3F3A/H3F3B,MAPK3,PRKCD,PIK3CG,MAPK10,IRS2
CD40 Signaling	2.04	0.192	2.138	ICAM1,PIK3C2A,MAPK1,FGFR1,PTGS1,FGFR2,STAT3,PIK3R4,FGFR3,PIK3R3,MAPK3,LTA,PIK3CG,MAPK10,IRS2
Role of NANOG in Mammalian Embryonic Stem Cell Pluripotency	2.37	0.18	2.138	JAK1,PIK3C2A,WNT3,MAPK1,WNT9B,FGFR1,DVL1,WNT2B,HRAS,FGFR2,FZD1,SMAD5,STAT3,PIK3R4,FGFR3,PIK3R3,PIK3CG,MAPK3,SOS1,GATA6,IRS2,BMP6
Growth Hormone Signaling	4.18	0.247	2.183	D-glucose,PIK3C2A,MAPK1,FGFR1,FGFR2,PLCG1,STAT3,PIK3R4,SLC2A4,PRKCG,PIK3R3,FGFR3,IGF1,PIK3CG,PRKCD,MAPK3,CSHL1,IGF1R,IRS2,STAT1,SOCS5
JAK/Stat Signaling	2.53	0.205	2.183	JAK1,PIK3C2A,MAPK1,FGFR1,HRAS,FGFR2,STAT3,PIK3R4,FGFR3,PIK3R3,PIK3CG,MAPK3,SOS1,CISH,IRS2,STAT1,SOCS5
Glioblastoma Multiforme Signaling	3.13	0.183	2.191	MAPK1,WNT3,PDIA3,RHOT2,HRAS,FZD1,PIK3R4,FGFR3,MYC,PLCE1,IGF1,PIK3CG,MAPK3,TSC2,SOS1,IGF1R,PLCB1,IRS2,PIK3C2A,WNT9B,FGFR1,WNT2B,RAC1,FGFR2,PLCG1,ITPR1,PIK3R3,FOXO1,PRKCD,PLCB3
Wnt/β-catenin Signaling	5.02	0.212	2.2	TCF4,CSNK2A1,FRZB,WNT3,PPP2CA,LRP6,TLE1,Ubb,FZD1,HNF1A,CSNK1E,MYC,APPL1,CDH3,PPM1J,RARB,TGFB2,SFRP5,CSNK2B,GJA1,AXIN2,WNT9B,CSNK1G2,WNT2B,DVL1,HDAC1,CREBBP,CSNK1D,SOX11,PPP2CB,CDH2,CDH1,GNAO1,TLE3,SFRP1,LRP1
Gαq Signaling	1.82	0.155	2.2	Calm1 (includes others),MAPK1,RHOT2,RACK1,GNA11,PIK3R4,FGFR3,GYS1,GNB3,MAPK3,PIK3CG,PLCB1,IRS2,ADRA1B,PIK3C2A,GRM1,FGFR1,RGS16,PLCG1,FGFR2,ITPR1,PLD1,PRKCG,PIK3R3,PRKCD,PLCB3
Glioma Signaling	3.69	0.212	2.236	Calm1 (includes others),PIK3C2A,PA2G4,MAPK1,SUV39H1,FGFR1,HRAS,FGFR2,PLCG1,PIK3R4,IGF2R,SIN3A,PRKCG,IDH1,FGFR3,PIK3R3,alpha-hydroxyglutarate,IGF1,PIK3CG,PRKCD,MAPK3,SOS1,CAMK1G,IGF1R,IRS2
nNOS Signaling in Neurons	1.52	0.192	2.236	GRIN2B,GRIN1,GRIN2A,Calm1 (includes others),CAPNS1,PRKCD,DLG4,CAPN9,CAPN7,PRKCG
P2Y Purigenic Receptor Signaling Pathway	3.88	0.204	2.268	PRKACB,MAPK1,PDIA3,P2RY11,RACK1,HRAS,PIK3R4,FGFR3,MYC,GNB3,PLCE1,PIK3CG,MAPK3,CREB1,PLCB1,IRS2,UTP,PIK3C2A,FGFR1,CREBBP,GNAI1,ADCY6,PLCG1,FGFR2,PRKCG,PIK3R3,PRKCD,PRKACA,PLCB3
Dendritic Cell Maturation	1.63	0.147	2.268	B2M,ICAM1,MAPK1,PDIA3,HLA-A,COL10A1,PIK3R4,FGFR3,PLCE1,MAPK3,PIK3CG,CREB1,PLCB1,IRS2,COL18A1,STAT1,PIK3C2A,TNFRSF1A,FGFR1,CREBBP,PLCG1,FGFR2,PIK3R3,FSCN1,LTA,MAPK10,PLCB3,TNF
Lymphotoxin β Receptor Signaling	1.76	0.188	2.309	PIK3R3,FGFR3,MAPK1,PIK3C2A,MAPK3,PIK3CG,LTA,FGFR1,TRAF4,CREBBP,FGFR2,IRS2,PIK3R4
CNTF Signaling	2.98	0.238	2.324	JAK1,PIK3C2A,MAPK1,FGFR1,HRAS,FGFR2,STAT3,PIK3R

				4,FGFR3,PIK3R3,PIK3CG,MAPK3,SOS1,IRS2,STAT1
Renal Cell Carcinoma Signaling	2.94	0.217	2.324	ETS1,PIK3C2A,MAPK1,FGFR1,CREBBP,RAC1,HRAS,Ubb,FGFR2,PIK3R4,FGFR3,PIK3R3,MAPK3,PIK3CG,RBX1,HGF,SOS1,IRS2
Colorectal Cancer Metastasis Signaling	4.12	0.179	2.343	PRKACB,TCF4,JAK1,MMP3,MAPK1,WNT3,SMAD3,RACK1,RHOT2,MMP15,LRP6,HRAS,FZD1,PIK3R4,HNF1A,MYC,FGFR3,APPL1,GNB3,MAPK3,PIK3CG,SOS1,TGFB2,IRS2,MMP11,STAT1,RALGDS,WNT9B,PIK3C2A,TNFRSF1A,FGFR1,WNT2B,DVL1,RAC1,ADCY6,FGFR2,MMP2,STAT3,PIK3R3,CDH1,MAPK10,MSH6,PRKACA,TNF,LRP1
Melanocyte Development and Pigmentation Signaling	2.92	0.206	2.357	PRKACB,PIK3C2A,MAPK1,TYR,FGFR1,CREBBP,ADCY6,HRAS,PLCG1,FGFR2,PIK3R4,TYRP1,FGFR3,PIK3R3,PIK3CG,MAPK3,SOS1,CREB1,PRKACA,IRS2
eNOS Signaling	2.96	0.179	2.449	KNG1,PRKACB,Calm1 (includes others),PIK3R4,HSPA5,FGFR3,HSP90B1,HSP90AB1,PIK3CG,PRKAA2,IRS2,GUCY1B3,PIK3C2A,GUCY1A3,FGFR1,HSPA9,ADCY6,PLCG1,FGFR2,ITPR1,PRKCG,HSPA8,PIK3R3,PRKG1,CNGB1,PRKCD,PRKACA,HSP90AA1,CHRNE,ESR1
IL-17A Signaling in Airway Cells	1.33	0.165	2.496	PIK3R3,FGFR3,JAK1,MAPK1,PIK3C2A,MAPK3,PIK3CG,FGFR1,MAPK10,FGFR2,IRS2,STAT3,PIK3R4
ErbB4 Signaling	2.67	0.216	2.5	NRG2,PIK3C2A,MAPK1,FGFR1,HRAS,PLCG1,FGFR2,PIK3R4,PRKCG,FGFR3,PIK3R3,MAPK3,PIK3CG,PRKCD,SOS1,IRS2
GDNF Family Ligand-Receptor Interactions	2.77	0.215	2.5	PIK3C2A,MAPK1,FGFR1,RAC1,HRAS,PLCG1,FGFR2,ITPR1,PIK3R4,FGFR3,PIK3R3,MAPK3,PIK3CG,SOS1,CREB1,MAPK10,IRS2
LPS-stimulated MAPK Signaling	2	0.186	2.5	PIK3C2A,MAPK1,FGFR1,RAC1,HRAS,FGFR2,PIK3R4,PRKCG,FGFR3,PIK3R3,MAPK3,PRKCD,PIK3CG,CREB1,MAPK10,IRS2
Thrombopoietin Signaling	4.54	0.275	2.524	GAB2,PIK3C2A,MAPK1,FGFR1,HRAS,PLCG1,FGFR2,STAT3,PIK3R4,PRKCG,FGFR3,MYC,PIK3R3,PIK3CG,PRKCD,MAPK3,SOS1,IRS2,STAT1
EGF Signaling	4.26	0.264	2.524	CSNK2A1,JAK1,PIK3C2A,MAPK1,FGFR1,HRAS,PLCG1,FGFR2,ITPR1,STAT3,PIK3R4,PIK3R3,FGFR3,PIK3CG,MAPK3,SOS1,IRS2,CSNK2B,STAT1
Sphingosine-1-phosphate Signaling	1.34	0.15	2.524	PIK3C2A,MAPK1,PDIA3,FGFR1,RHOT2,ADCY6,GNAI1,RAC1,FGFR2,PLCG1,PIK3R4,FGFR3,PIK3R3,PLCE1,PIK3CG,MAPK3,PLCB3,PLCB1,IRS2
p70S6K Signaling	5.47	0.234	2.646	JAK1,MAPK1,PDIA3,PPP2CA,HRAS,PIK3R4,F2,FGFR3,YWHAQ,PLCE1,PPM1J,MAPK3,PIK3CG,SOS1,PLCB1,IRS2,BCAP31,YWHAG,PIK3C2A,YWHAE,EEF2,YWHAB,FGFR1,GNAI1,FGFR2,PLCG1,PLD1,PRKCG,PIK3R3,PPP2CB,PRKCD,PLCB3
Production of Nitric Oxide and Reactive Oxygen Species in Macrophages	2.36	0.161	2.694	PPARA,JAK1,APOB,MAPK1,PPP2CA,APOA2,PPP1R3C,RHOT2,PPP1CB,PIK3R4,FGFR3,MAPK3,PPM1J,PIK3CG,IRS2,STAT1,PIK3C2A,TNFRSF1A,MAP3K13,FGFR1,CREBBP,RAC1,PLCG1,FGFR2,PRKCG,PIK3R3,PPP2CB,MPO,APOA1,PRKCD,MAPK10,TNF
FGF Signaling	4.45	0.245	2.711	PIK3C2A,MAPK1,FGF2,FGFR1,CREBBP,RAC1,HRAS,PLCG1,FGFR2,ITPR1,STAT3,PIK3R4,FGF1,FGFR3,PIK3R3,PIK3CG,MAPK3,HGF,SOS1,CREB1,FGF12,IRS2,FGF7
PDGF Signaling	4.3	0.24	2.711	CSNK2A1,JAK1,PIK3C2A,MAPK1,FGFR1,HRAS,FGFR2,PLCG1,STAT3,PIK3R4,OCRL,FGFR3,PIK3R3,MYC,SYNJ1,PIK3CG,MAPK3,SOS1,IRS2,INPP5K,CSNK2B,STAT1,CAV3
Renin-Angiotensin Signaling	3.08	0.194	2.711	PRKACB,MAPK1,PIK3C2A,FGFR1,ADCY6,RAC1,FGFR2,PLCG1,HRAS,ITPR1,STAT3,PIK3R4,PRKCG,PIK3R3,FGFR3,PRKCD,PIK3CG,MAPK3,SOS1,PRKACA,MAPK10,IRS2,STAT1,TNF,ACE
FcγRIIB Signaling in B Lymphocytes	1.64	0.193	2.714	FGFR3,PIK3R3,PIK3C2A,PIK3CG,FGFR1,SOS1,MAPK10,FGFR2,HRAS,IRS2,PIK3R4
Role of NFAT in Cardiac Hypertrophy	5.31	0.206	2.722	PRKACB,Calm1 (includes others),MAPK1,PDIA3,RACK1,HAND1,HRAS,PIK3R4,FGFR3

				,GNB3,PLCE1,IGF1,MAPK3,PIK3CG,SOS1,HDAC7,TGFB2,CAMK1G,IGF1R,PLCB1,IRS2,HDAC9,HDAC4,HDAC2,PIK3C2A,FGFR1,HDAC1,GNAI1,ADCY6,PLCG1,FGFR2,SLC8A2,ITPR1,HDAC5,PRKCG,PIK3R3,HDAC3,PRKCD,MAPK10,PRKACA,PLCB3
Dopamine-DARPP32 Feedback in cAMP Signaling	3.59	0.188	2.828	PRKACB,GRIN2A,Calm1 (includes others),PDIA3,PPP2CA,PPP1R3C,PPP1CB,CSNK1E,PLCE1,CDK5,PPM1J,CREB1,PLCB1,DRD3,GUCY1B3,GRIN1,GRIN2B,GUCY1A3,CSNK1G2,KCNJ15,CREBBP,ADCY6,CSNK1D,GNAI1,PLCG1,ITPR1,CACNA1A,PRKCG,PPP2CB,PRKG1,PRKCD,PRKACA,PLCB3
UVA-Induced MAPK Signaling	2.97	0.204	2.837	PIK3C2A,MAPK1,PDIA3,FGFR1,HRAS,FGFR2,PLCG1,PIK3R4,PARP1,PIK3R3,FGFR3,TNKS,PLCE1,PIK3CG,MAPK3,MAPK10,PLCB3,PLCB1,IRS2,PARP11,STAT1
Aldosterone Signaling in Epithelial Cells	3.25	0.182	2.837	MAPK1,PDIA3,HSPB8,DNAJC3,HSPA5,PIK3R4,FGFR3,HSP90B1,PLCE1,HSP90AB1,SLC12A1,PIK3CG,MAPK3,SOS1,PLCB1,IRS2,PI4KA,PIK3C2A,FGFR1,HSPA9,PLCG1,FGFR2,DNAJC1,ITPR1,HSPD1,PRKCG,PIK3R3,HSPA8,PRKCD,DNAJB11,HSP90AA1,PLCB3
AMPK Signaling	5.7	0.209	2.959	PRKACB,FOXO4,ULK1,PFKFB1,MAPK1,PPP2CA,CFTR,PFKL,PIK3R4,FGFR3,GYS1,FASN,PPM1J,PIK3CG,SMARCB1,TSC2,CREB1,PRKAA2,SMARCC2,IRS2,HNF4A,ADRA1B,ADRB2,PFKFB3,CKM,PIK3C2A,EEF2,FGFR1,ACTB,CREBBP,FGFR2,SMARCD1,SLC2A4,MLST8,PPM1G,PIK3R3,PPP2CB,FOXO1,PRKACA,CHRNE,INSR,HMGCR,PPARGC1A
Integrin Signaling	2.99	0.168	2.959	FYN,MAPK1,RHOT2,ITGA8,HRAS,PPP1CB,TLN1,PIK3R4,FGFR3,TSPAN3,ITGA9,MAPK3,PIK3CG,GRB7,SOS1,ITGAV,ARPC3,IRS2,PXN,PARVA,PIK3C2A,ACTB,FGFR1,RAC1,FGFR2,PLCG1,TTN,MYL7,PIK3R3,ARPC1A,CAPNS1,ARPC2,CAPN9,CAPN7,TSPAN6,NEDD9,ACTG1
NGF Signaling	1.73	0.163	2.982	PIK3C2A,MAPK1,MAP3K13,FGFR1,CREBBP,RAC1,HRAS,PLCG1,FGFR2,PIK3R4,PIK3R3,FGFR3,PIK3CG,PRKCD,MAPK3,SOS1,TRAF4,CREB1,MAPK10,IRS2
Neuropathic Pain Signaling In Dorsal Horn Neurons	6.5	0.263	3.053	PRKACB,GRIN2A,MAPK1,PDIA3,GRIA1,TAC1,PIK3R4,GRIA4,FGFR3,PLCE1,MAPK3,PIK3CG,CREB1,CAMK1G,PLCB1,IRS2,GRIN1,GRIN2B,PIK3C2A,GRM1,FGFR1,GRIA2,PLCG1,FGFR2,ITPR1,PRKCG,PIK3R3,PRKCD,PRKACA,PLCB3,GRIA3
CREB Signaling in Neurons	7.46	0.234	3.087	PRKACB,GRIN2A,Calm1 (includes others),MAPK1,PDIA3,GRIA1,RACK1,GNA11,POLR2J,HRAS,POLR2B,PIK3R4,GRIA4,FGFR3,PLCE1,GNB3,GNAT1,MAPK3,PIK3CG,SOS1,CREB1,PLCB1,IRS2,POLR2I,GRIN2B,GRIN1,PIK3C2A,GRM1,FGFR1,CREBBP,GNAI1,ADCY6,GRIA2,PLCG1,FGFR2,GNAZ,ITPR1,PRKCG,PIK3R3,PRKCD,GNAO1,PRKACA,PLCB3,GNAT2,GRIA3
Pancreatic Adenocarcinoma Signaling	2.46	0.183	3.153	JAK1,PIK3C2A,PA2G4,MAPK1,SUV39H1,SMAD3,FGFR1,RAC1,FGFR2,STAT3,PIK3R4,PLD1,SIN3A,FGFR3,PIK3R3,PIK3CG,MAPK3,MAPK10,TGFB2,IRS2,STAT1,RALGDS
Macropinocytosis Signaling	1.89	0.185	3.207	MRC1,PIK3C2A,FGFR1,RAC1,HRAS,PLCG1,FGFR2,PIK3R4,PRKCG,FGFR3,PIK3R3,HGF,PIK3CG,PRKCD,IRS2
HGF Signaling	2.56	0.186	3.273	ETS1,PXN,PIK3C2A,MAPK1,MAP3K13,FGFR1,RAC1,HRAS,FGFR2,PLCG1,STAT3,PIK3R4,PRKCG,FGFR3,PIK3R3,PIK3CG,PRKCD,MAPK3,HGF,SOS1,MAPK10,IRS2
Tec Kinase Signaling	2.75	0.173	3.273	FYN,JAK1,RACK1,RHOT2,GNA11,PIK3R4,FGFR3,GNB3,GNAT1,PIK3CG,HCK,IRS2,STAT1,FGR,PIK3C2A,ACTB,FGFR1,GNAI1,PLCG1,FGFR2,GNAZ,STAT3,PRKCG,PIK3R3,PRKCD,GNAO1,MAPK10,GNAT2,TNF,ACTG1
IL-9 Signaling	3.51	0.289	3.464	FGFR3,PIK3R3,JAK1,PIK3C2A,PIK3CG,FGFR1,CISH,FGFR2,IRS2,STAT3,STAT1,PIK3R4,TNF