

miR-27a is a master regulator of metabolic reprogramming and chemoresistance in colorectal cancer

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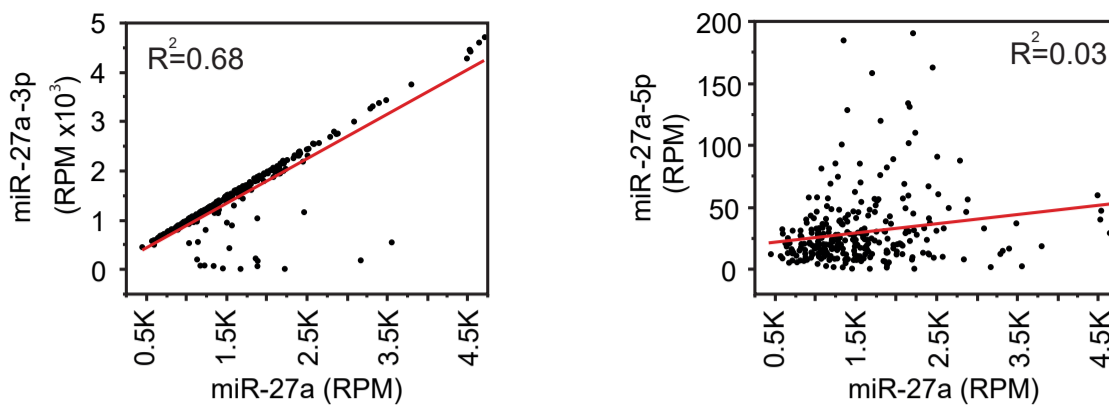
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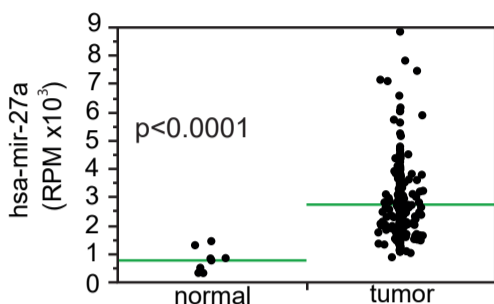
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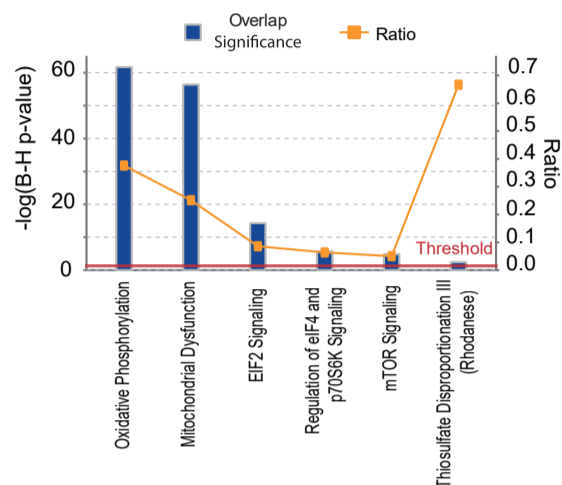
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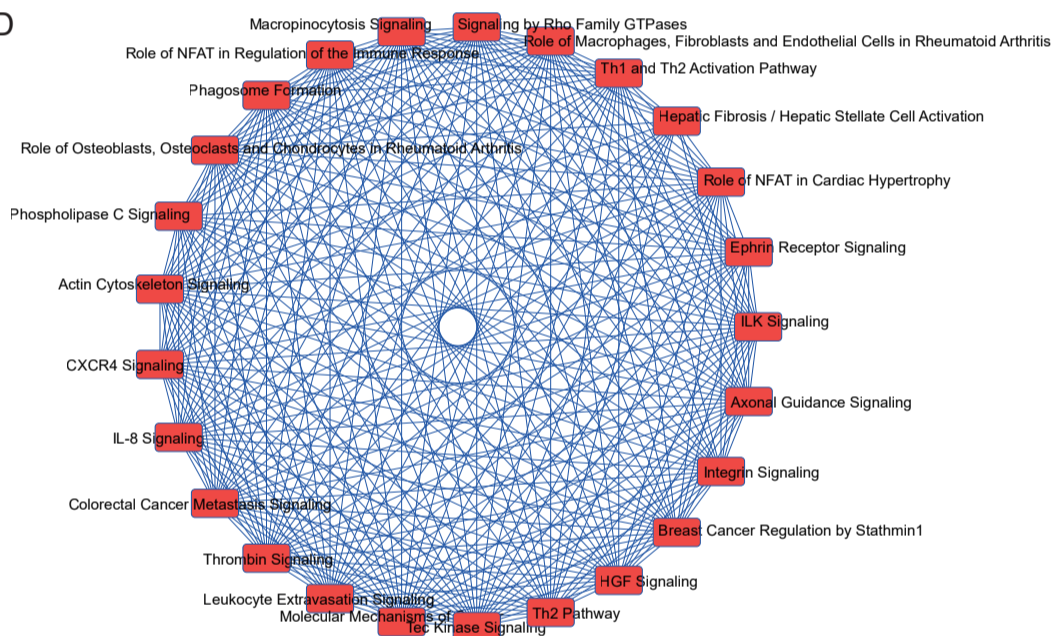
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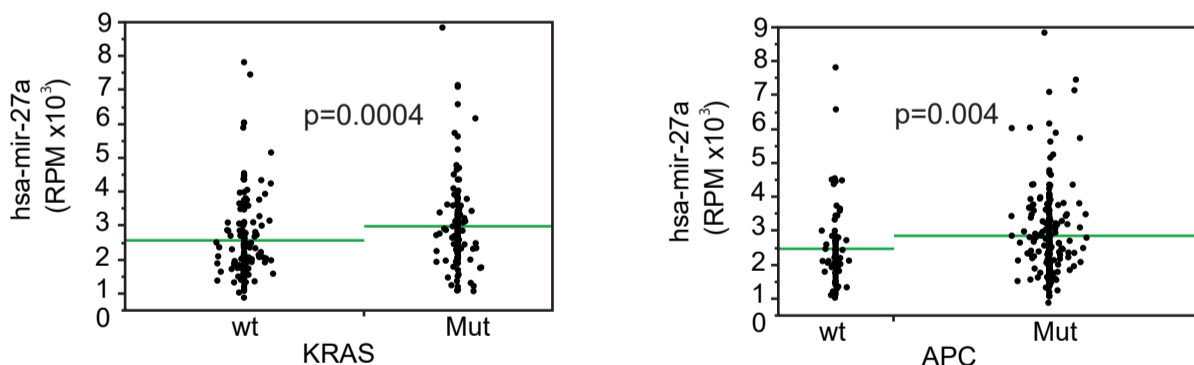
C



D



E



Data supporting miR-27a in silico analysis of TCGA-COAD dataset

A) Evaluation of the contribution of the two mature miR-27a-3p or miR-27a-5p forms to the total miR-27a expression levels measured in the TCGA-COAD dataset. The Reads Per Million (RPM) are reported in Y- and X-axes. R2 of linear fit is reported.

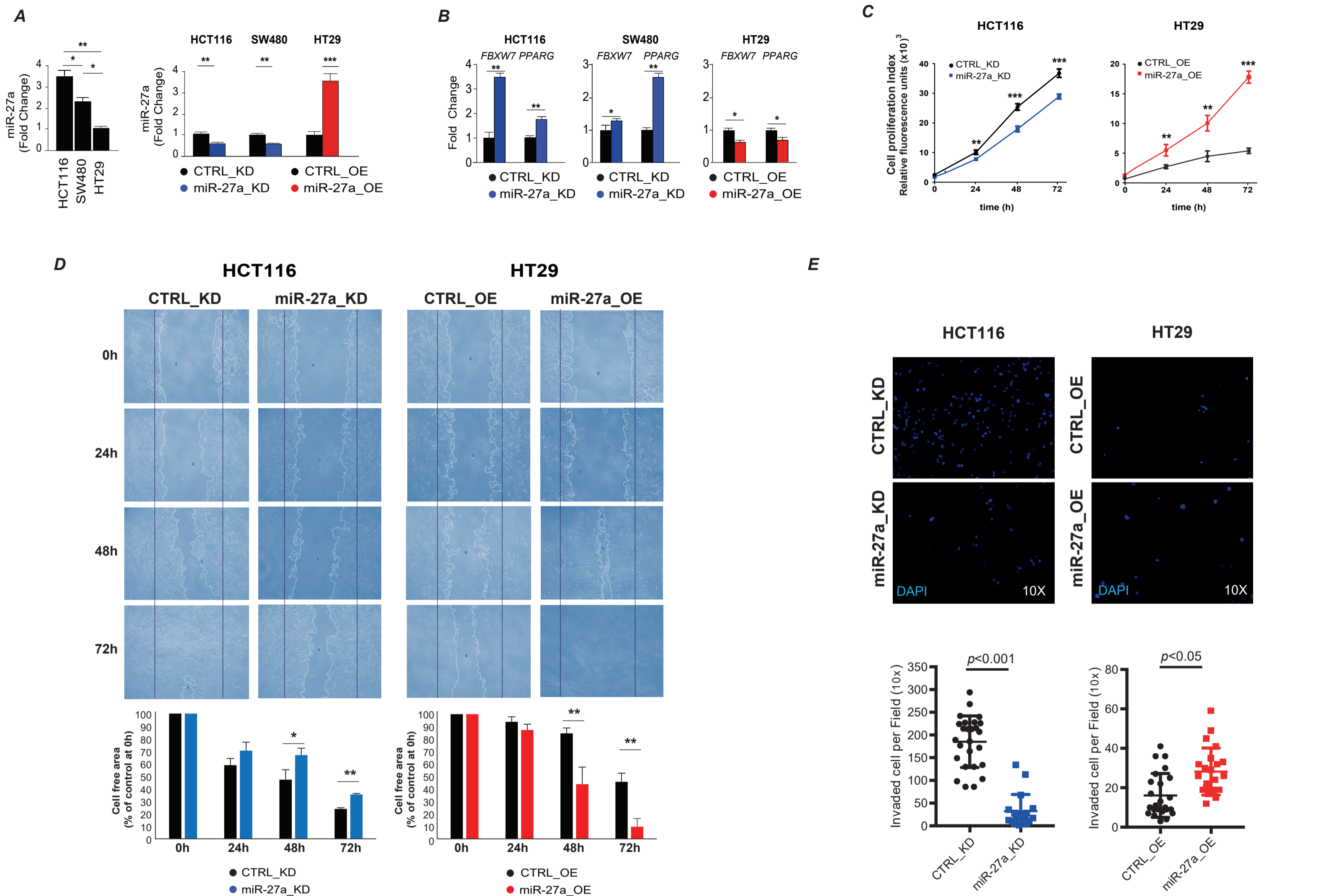
B) Expression analysis of miR-27a in CRC samples (n=283) vs. normal tissues (n=8) available in the TCGA-COAD dataset. The Reads Per Million (RPM) are reported in Y-axes. Wilcoxon test was performed to test for significance of the differential expression.

C) Overrepresentation of canonical pathways in high-miR-27a CRCs using IPA. The blue bars indicate the overlap significance (Benjamini-Hochberg multiple test correction; primary Y-axes) in high-miR-27a CRCs related to the selected pathways (X-axes); red line indicates significance threshold ($q < 0.05$); the yellow line indicates the ratio (secondary Y-axes) of present genes over the total constituting each pathway.

D) IPA network of overlapping canonical pathways significantly overrepresented in low-miR-27a CRCs ($q < 0.05$; Benjamini-Hochberg multiple test correction). The blue lines (i.e. edges) represent the connection among pathways due to overlapping genes within.

E) Expression analysis of miR-27a in CRC samples mutated in KRAS and APC vs. wt in the TCGA-COAD dataset. The Reads Per Million (RPM) are reported in Y-axes. Wilcoxon test was performed to test for significance of the differential expression.

Supplementary Figure 2



Experimental data supporting the results illustrated in the main figures.

A) miR-27a expression was quantified by qRT-PCR in HCT116, SW480 and HT29 cells (left panel), or in HCT116 and SW480 miR-27a_KD and HT29 miR-27a_OE cells and their relative controls (right panel). Normalization was carried out by assessing U6 RNA levels. Data are reported as mean \pm SEM of experiments performed in triplicate; the mean values were compared by one-way analysis of variance test (ANOVA). * $p \leq 0.05$, ** $p \leq 0.01$ *** $p \leq 0.001$.

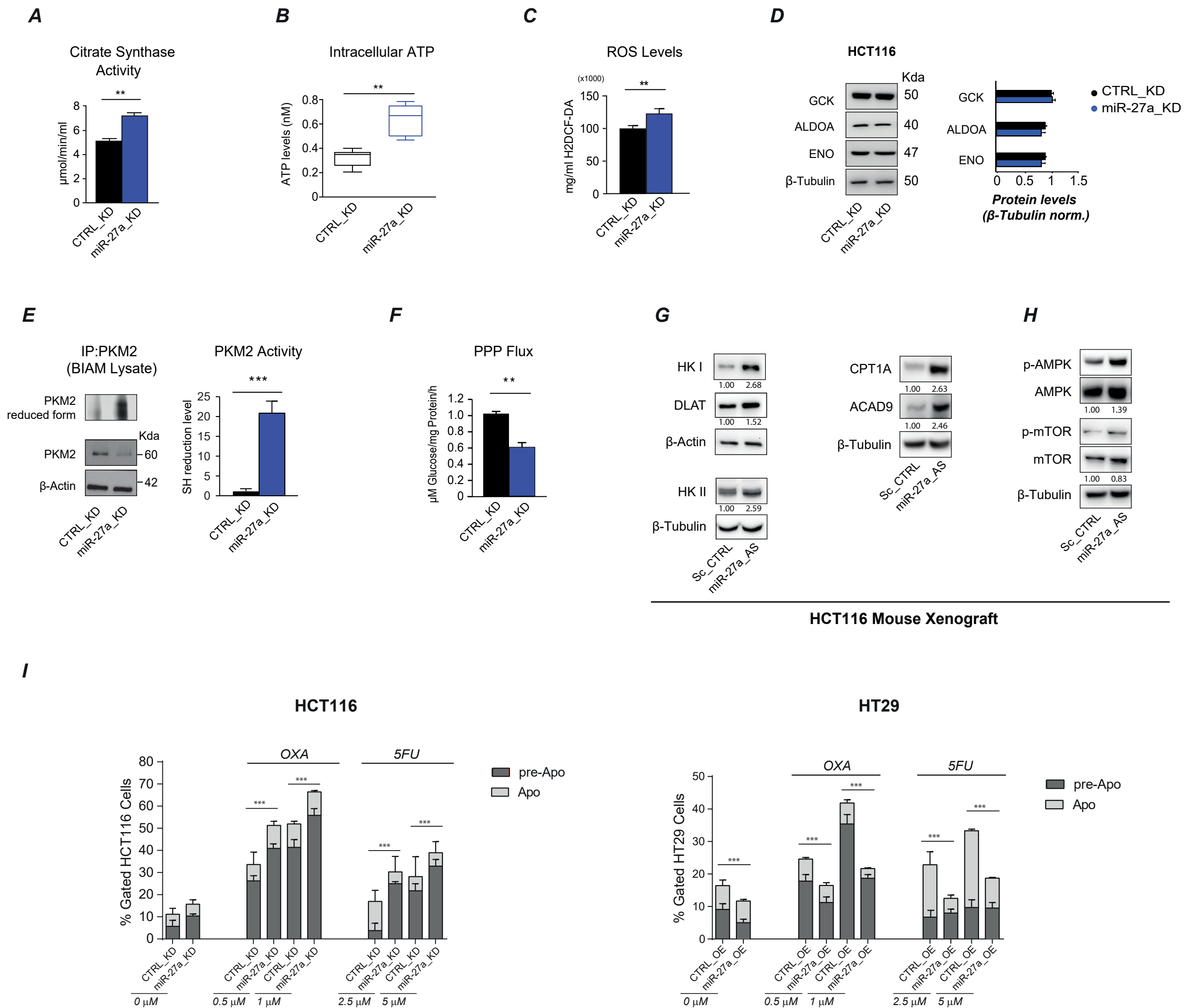
B) The expression profile of FBXW7 and PPARG, two known miR-27a targets, was assessed by qRT-PCR analysis in HCT116 and SW480 miR-27a_KD and HT29 miR-27a_OE cells and their relative controls. Data are reported as mean \pm SEM of experiments performed in triplicate; the mean values were compared by one-way analysis of variance test (ANOVA). * $p \leq 0.05$, ** $p \leq 0.01$.

C) Growth assessment of HCT116 miR-27a_KD, and HT29 miR-27a_OE cells and relative controls was carried out at 72hs using the PrestoBlue™ Cell Viability test. Data are reported as mean \pm SEM of experiments performed in triplicate; the mean values were compared by one-way analysis of variance test (ANOVA). * $p \leq 0.05$, ** $p \leq 0.01$. *** $p \leq 0.001$.

D) Wound healing assay of the same cells as in C) was performed at 24, 48 and 72 hs after scratches. Cells migration was inversely evaluated as percentage of cell-free area at the indicated time-points compared with the area at the start of the experiments. Blue lines indicate the positions of the initial scratches. Data are reported as mean \pm SEM of experiments performed in triplicate; the mean values were compared by one-way analysis of variance test (ANOVA). * $p \leq 0.05$, ** $p \leq 0.01$.

E) Invasion ability of same cells as in C) was evaluated by the Transwell assay. The scatter dot plots show the numbers of invading cells (twenty fields analyzed; magnitude 10X) in triplicate experiments, counted by DAPI nuclear fluorescence. Data are reported as mean \pm SEM of experiments performed in triplicate; the mean values are compared by one-way analysis of variance test (ANOVA). * $p \leq 0.05$, *** $p \leq 0.001$.

Supplementary Figure 3



Experimental data supporting the results illustrated in the main figures

A) Mitochondrial citrate synthase activity was fluorimetrically determined in HCT116 miR-27a_KD and CTRL_KD cells as described in Materials and Methods. Data are reported as mean \pm SEM of experiments performed in triplicate; the mean values were compared by one-way analysis of variance test (ANOVA). ** $p \leq 0.01$

B) Intracellular ATP levels were assayed in the same cells as in C), as previously published²⁶. Data are reported as mean \pm SEM of experiments performed in triplicate; the mean values were compared by one-way analysis of variance test (ANOVA). ** $p \leq 0.01$.

C) Intracellular ROS levels were determined in the same cells as in C) with the H2DCF-DA fluorimetric assay and normalized to protein content. Data are reported as mean \pm SEM of experiments performed in triplicate; the mean values were compared by one-way analysis of variance test (ANOVA) ** $p \leq 0.01$.

D) Glucokinase (GSK), Aldolase (ALDO) and Enolase (ENO) immunoblot showed no variations in HCT116 derived cells. Data are reported as mean \pm SEM of experiments performed in triplicate; the mean values were compared by one-way analysis of variance test (ANOVA)

E) PKM2 BIAM-labeled immunocomplexes and immunoblot of PKM2 in HCT116 derived cells. Data are reported as mean \pm SEM of experiments performed in triplicate; the mean values were compared by one-way analysis of variance test (ANOVA) *** $p \leq 0.001$

F) Measurement of the PPP flux in HCT116 miR-27a_KD compared to CTRL cells. Data are reported as mean \pm SEM of experiments performed in triplicate; the mean values were compared by one-way analysis of variance test (ANOVA). ** $p \leq 0.01$.

G, H) Immunoblot analysis of HKI, HKII, DLAT, CPT1A, ACAD9, p-AMPK/AMPK and p-mTOR/mTOR on tumor extracts obtained from HCT116 cells xenografted in immunocompromised mice. β -Tubulin and β -Actin were used for protein loading normalization. The fold change is reported below the corresponding bands and referred to Sc_CTRL= Scrambled Control and miR-27a_AS= miR-27a Antisense.

I) Flow cytometry analysis of pre-apoptotic (annexin V-PE+ and 7-AAD-) and apoptotic (annexin V-PE+ and 7-AAD+) in HCT116 miR-27a_KD and HT29 miR-27a_OE cells, with respect to their relative controls, treated with Oxaliplatin (OXA, 0.5 or 1 μM) or with 5-fluorouracil (5-FU, 2.5 or 5 μM) for 72h. One representative experiment out of three is shown. The mean values are tested by one-way analysis of variance (ANOVA). *** $p \leq 0.001$.

Supplementary Table 1.

List of the antibodies used in the experiments reported in this manuscript.

Cell Signaling Technology (Beverly MA USA)	Santa Cruz Biotechnology (Dallas TX USA)	Sigma Aldrich (St Louis MO USA)
Hexokinase I (#2024)	PGC-1 α (sc-13067)	anti- β -Actin (F-3022)
Hexokinase II (#2867)	GCK (sc-17819)	
Aldolase (#3188s)	PTEN (sc-7974)	
Enolase (#3810)	ERK1 (sc-93)	
DLAT (#12362)	p-ERK (sc-7383)	
CPT1A (#12252)	c-MYC (sc-40)	
ACAD9 (#9796)	anti-mouse (sc-2031)	
AMPK (#2603)	anti-rabbit (sc-2004)	
p-AMPK (Thr172) (#2335)		
mTOR (#2983)		
p-mTOR (Ser 2448) (#2971)		
P70S6K (#2708)		
p-P70S6K (Thr389) (#9205)		
AKT (#9272)		
p-AKT (Ser473) (#9271)		
p-AKT (Thr308) (#4056)		
PKM2 (#4053S)		
β -Tubulin (#2146)		

Supplementary Table 2.

GSEA, leading edge and IPA pathway analysis performed on tumor samples from a selected TCGA-COAD cohort stratified according to miR-27a levels.

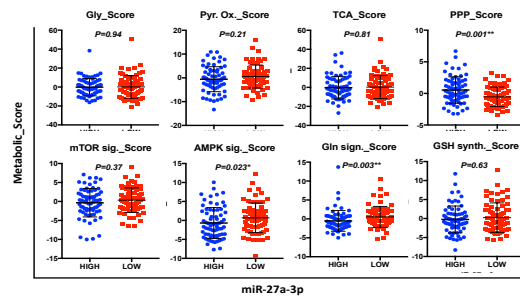
2A) List of metabolic pathways represented in Figure 1C (upper table). Median of metabolic scores in high- vs. low-miR-27a are shown together with significance p values; box plots of metabolic scores for each CRC sample is also shown (on the top right); List of genes coding for metabolic proteins used to calculate metabolic scores (lower table; see also methods

List of metabolic pathways represented in Figure 1C

ID	Pathway	Median Metabolic Score		P value	-Log (P)
		Low miR-27a (N=71)	High miR-27a (N=7)		
Glyc	Glycolysis	-1.12	-1.15	0.94	0.03
Pyr. Ox.	Pyruvate oxidation	-0.01	-1.05	0.21	0.68
TCA	Tricarboic acid cycle	-1.25	-2.69	0.81	0.09
PPP	Pentose phosphate pathway	-0.10	0.24	0.001	3.00
mTOR sig.	mTOR signaling	0.24	-0.11	0.37	0.43
AMPK sig.	AMPK signaling	0.50	-1.34	0.023	1.64
Gln sig.	Glutaminolysis	0.08	-1.01	0.001	2.52
GSH synth	Glutathione synthesis	-0.38	-0.43	0.63	0.20

List of genes coding for metabolic proteins used to calculate metabolic scores

ID	Gene name	Activator (A) Inducer (I)		
		Activator (A)	Inhibitor (I)	
Glyc	GCK	A		
	HK1	A		
	HK2	A		
	HK3	A		
	PFKB1	A		
	PFKB2	A		
	PFKB3	A		
	PFKB4	A		
	PFKL	A		
	PFKM	A		
	PFKP	A		
	PFKB	A		
	PKM	A		
	SLC2A1	A		
	SLC2A2	A		
	SLC2A3	A		
	SLC2A4	A		
	SLC2A5	A		
	ALDOA	B		
	ALDOB	B		
	ALDOC	B		
	ENO1	B		
	ENO2	B		
	ENO3	B		
	GAPDH	B		
	GAPDH5	B		
	GPI	B		
	PGAM1	B		
	PGK1	B		
	PGK2	B		
	TP1	B		
	PGAM3	B		
	GCKR	I		
Pyr. Ox.	DLAT	A		
	PDH41	A		
	PDH42	A		
	PDHB	A		
	PDHK	A		
	PDP1	A		
	DL	B		
	PDP2	B		
	PDP3	B		
	MPC1	B		
	MPC2	B		
	PK1	I		
	PK2	I		
	PK3	I		
	PK6	I		
	TCA	CS	A	
		DLD	A	
DLST		A		
OGDH		A		
PC		A		
FH		B		
IDH1		B		
IDH2		B		
IDH3A		B		
IDH3B		B		
IDH3G		B		
MDH1		B		
MDH1B		B		
MDH2		B		
ME1		B		
ME2		B		
SUCLA2		B		
SUCLG1		B		
SUCLG2		B		
SDHA		B		
SDHB		B		
SDHC		B		
SDHD		B		
SDHAF1	B			
SDHAF2	B			
ACD1	B			
ACD2	B			
PCX1	I			
PCX2	I			
PPP	GFPO	A		
	PGD	A		
	PGLS	A		
mTOR sig.	MTOR	A		
	RPTOR	A		
	RHEB	B		
	RPS6KB1	B		
	EIF4E	B		
	EIF4B	B		
	RPS6	B		
	MLST8	B		
	TELO2	B		
	TTL	B		
	TSC2	I		
TSC1	I			
AKT1S1	I			
DEPTOR	I			
TBC1D7	I			
EIF4EBP1	I			
AMPK sig.	STRK11	A		
	CAB39	A		
	STRADB	A		
	CAMKK1	A		
	CAMKK2	A		
	STRADA	A		
	PRKAB2	A		
	PRKAG1	A		
	PRKAG3	A		
	PRKAB1	A		
PRKAA2	A			
PRKAG2	A			
PRKAA1	A			
CAB39L	A			
MAP3K7	A			
PPP1E	I			
PPP1F	I			
Gln sig.	GLS	A		
	GLS2	A		
	GLUD1	A		
GSH synth.	GLCL	B		
	GLLM	B		
	GPX1	B		
	GPX2	B		
	GPX3	B		
	GPX4	B		
	GPX5	B		
	GPX6	B		
	GPX7	B		
	GPX8	B		
GSR	B			
GSS	B			



Supplementary Table 2.

GSEA, leading edge and IPA pathway analyses performed on tumor samples from a selected TCGA-COAD cohort stratified according to miR-27a levels.

28) Gene-sets enriched in high-miR-27a CRCs;

NAME	GS follow link to MSigDB	GS DETAILS	SIZE	ES	NES	NOM p-val	FDR q-val	FWER p-val	RANK AT MA' LEADING EDGE
GINESTIER_BREAST_CANCER_ZNF217_AMPLIFIED_DN	GINESTIER_BREAST_CANCER_ZNF217_AMPLIFIED_DN	Details...		306	0.61977124	2.8014293	0	0	3763 tags=55%, list=19%, signal=66%
LI_DCP2_BOUND_MRNA	LI_DCP2_BOUND_MRNA	Details...		87	0.63672185	2.4697342	0	0	4134 tags=62%, list=21%, signal=78%
WAMUNYOKOLI_OVARIAN_CANCER_LMP_UP	WAMUNYOKOLI_OVARIAN_CANCER_LMP_UP	Details...		244	0.5614954	2.4688834	0	0	3231 tags=46%, list=16%, signal=55%
NIKOLSKY_BREAST_CANCER_16P13_AMPLICON	NIKOLSKY_BREAST_CANCER_16P13_AMPLICON	Details...		111	0.6043511	2.3895779	0	0	4472 tags=51%, list=22%, signal=66%
MOOTHA_VOXPHOS	MOOTHA_VOXPHOS	Details...		85	0.6166683	2.3765981	0	0	4522 tags=68%, list=23%, signal=88%
DAIRKEE_TERT_TARGETS_UP	DAIRKEE_TERT_TARGETS_UP	Details...		343	0.5154307	2.3388069	0	0	4144 tags=48%, list=21%, signal=60%
NIKOLSKY_BREAST_CANCER_16Q24_AMPLICON	NIKOLSKY_BREAST_CANCER_16Q24_AMPLICON	Details...		46	0.6841178	2.324745	0	0	3452 tags=50%, list=17%, signal=60%
BILANGES_SERUM_AND_RAPAMYCIN_SENSITIVE_GENES	BILANGES_SERUM_AND_RAPAMYCIN_SENSITIVE_GENES	Details...		68	0.62630635	2.2839308	0	9.18E-05	4794 tags=62%, list=24%, signal=81%
CHNG_MULTIPLE_MYELOMA_HYPERPLOID_UP	CHNG_MULTIPLE_MYELOMA_HYPERPLOID_UP	Details...		52	0.6452931	2.265758	0	8.16E-05	4309 tags=69%, list=22%, signal=88%
PECE_MAMMARY_STEM_CELL_UP	PECE_MAMMARY_STEM_CELL_UP	Details...		135	0.5571837	2.2543752	0	7.35E-05	5383 tags=67%, list=27%, signal=91%
NIKOLSKY_BREAST_CANCER_1Q21_AMPLICON	NIKOLSKY_BREAST_CANCER_1Q21_AMPLICON	Details...		37	0.6954604	2.2526822	0	6.68E-05	4597 tags=68%, list=23%, signal=88%
LI_EZH2_TARGETS_UP	LI_EZH2_TARGETS_UP	Details...		264	0.49526238	2.1703641	0	3.71E-04	4180 tags=47%, list=21%, signal=60%
NIKOLSKY_BREAST_CANCER_12Q24_AMPLICON	NIKOLSKY_BREAST_CANCER_12Q24_AMPLICON	Details...		15	0.8187875	2.1501544	0	5.11E-04	2701 tags=60%, list=14%, signal=69%
CHARAFE_BREAST_CANCER_LUMINAL_VS_MESENCHYMAL_UP	CHARAFE_BREAST_CANCER_LUMINAL_VS_MESENCHYMAL_UP	Details...		418	0.46311936	2.1349651	0	5.27E-04	3722 tags=43%, list=19%, signal=51%
KIM_ALL_DISORDERS_DURATION_CORR_DN	KIM_ALL_DISORDERS_DURATION_CORR_DN	Details...		140	0.5251871	2.1031315	0	0.00121455	4021 tags=56%, list=21%, signal=71%
SPIELMAN_LYMPHOBLAST_EUROPEAN_VS_ASIAN_UP	SPIELMAN_LYMPHOBLAST_EUROPEAN_VS_ASIAN_UP	Details...		467	0.4528463	2.0859635	0	0.00151184	3791 tags=46%, list=19%, signal=55%
SCHLOSSER_MYC_AND_SERUM_RESPONSE_SYNERGY	SCHLOSSER_MYC_AND_SERUM_RESPONSE_SYNERGY	Details...		31	0.6687953	2.0815234	0	0.00163839	2348 tags=61%, list=12%, signal=69%
WONG_MITOCHONDRIA_GENE_MODULE	WONG_MITOCHONDRIA_GENE_MODULE	Details...		215	0.47671196	2.047557	0	0.00328799	5034 tags=58%, list=25%, signal=77%
CRIGHTON_AKT1_SIGNALING_VIA_MTOR_UP	CRIGHTON_AKT1_SIGNALING_VIA_MTOR_UP	Details...		34	0.6498718	2.0460303	0.0025974	0.00326896	3925 tags=59%, list=20%, signal=73%
YAO_TEMPORAL_RESPONSE_TO_PROGESTERONE_CLUSTER_13	YAO_TEMPORAL_RESPONSE_TO_PROGESTERONE_CLUSTER_13	Details...		159	0.4992591	2.0386188	0	0.00339596	4092 tags=50%, list=21%, signal=62%
SHEDDEN_LUNG_CANCER_GOOD_SURVIVAL_AS	SHEDDEN_LUNG_CANCER_GOOD_SURVIVAL_AS	Details...		63	0.5509695	2.0292678	0	0.00372008	2497 tags=41%, list=12%, signal=47%
RUNNE_GENDER_EFFECT_UP	RUNNE_GENDER_EFFECT_UP	Details...		8	0.93734765	2.0270898	0	0.00961753	1103 tags=88%, list=5%, signal=92%
LI_NA_PC_TARGETS	LI_NA_PC_TARGETS	Details...		76	0.535565	1.9934074	0	0.00546252	4311 tags=49%, list=22%, signal=62%
WELCSH_BRCA1_TARGETS_DN	WELCSH_BRCA1_TARGETS_DN	Details...		139	0.49500626	1.9928306	0	0.00523492	3211 tags=41%, list=16%, signal=49%
CROMER_METASTASIS_DN	CROMER_METASTASIS_DN	Details...		79	0.5261268	1.9887983	0	0.00525999	3039 tags=41%, list=15%, signal=47%
WEBER_METHYLATED_HCP_IN_SPERM_UP	WEBER_METHYLATED_HCP_IN_SPERM_UP	Details...		20	0.7094615	1.9790269	0.00257069	0.00576544	1866 tags=35%, list=18%, signal=43%
JIANG_TIP30_TARGETS_DN	JIANG_TIP30_TARGETS_DN	Details...		23	0.6653203	1.9746488	0.00549599	0.00601622	0.2
HOLLEMAN_ASPARAGINASE_RESISTANCE_ALL_UP	HOLLEMAN_ASPARAGINASE_RESISTANCE_ALL_UP	Details...		22	0.6866668	1.9739554	0	0.00585189	0.201
CHARAFE_BREAST_CANCER_BASAL_VS_MESENCHYMAL_UP	CHARAFE_BREAST_CANCER_BASAL_VS_MESENCHYMAL_UP	Details...		23	0.6849469	1.969552	0	0.00568052	0.207
CRIGHTON_AKT1_SIGNALING_VIA_MTOR_DN	CRIGHTON_AKT1_SIGNALING_VIA_MTOR_DN	Details...		23	0.6849469	1.969552	0	0.00568052	0.208
MOOTHA_HUMAN_MITOD6_6_2002	MOOTHA_HUMAN_MITOD6_6_2002	Details...		418	0.42412034	1.9623524	0	0.00608409	0.228
LI_AMPLIFIED_IN_LUNG_CANCER	LI_AMPLIFIED_IN_LUNG_CANCER	Details...		174	0.47027424	1.9538959	0	0.00676457	0.257
SCHLOSSER_SERUM_RESPONSE_AUGMENTED_BY_MYC	SCHLOSSER_SERUM_RESPONSE_AUGMENTED_BY_MYC	Details...		101	0.49921402	1.9449719	0	0.00752847	0.284
HOLLEMAN_VINCISTRINE_RESISTANCE_ALL_DN	HOLLEMAN_VINCISTRINE_RESISTANCE_ALL_DN	Details...		19	0.6985665	1.9374452	0.00247525	0.00799416	0.306
MOOTHA_MITOCHONDRIA	MOOTHA_MITOCHONDRIA	Details...		110	0.4550506	1.9280098	0	0.00700632	0.403
OKAWA_NEUROBLASTOMA_IP36_31_DELETION	OKAWA_NEUROBLASTOMA_IP36_31_DELETION	Details...		22	0.66468775	1.9153379	0	0.0105723	0.407
SANSOM_APC_TARGETS_REQUIRE_MYC	SANSOM_APC_TARGETS_REQUIRE_MYC	Details...		191	0.4463298	1.9127492	0	0.0106844	0.417
DAZARD_UV_RESPONSE_CLUSTER_G5	DAZARD_UV_RESPONSE_CLUSTER_G5	Details...		12	0.7863257	1.9100306	0	0.01067362	0.425
WHITE_NEUROBLASTOMA_WITH_IP36_3_DELETION	WHITE_NEUROBLASTOMA_WITH_IP36_3_DELETION	Details...		20	0.66898453	1.8998445	0	0.0121045	0.486
LIU_CD2X_TARGETS_DN	LIU_CD2X_TARGETS_DN	Details...		8	0.86239207	1.8763633	0	0.01619142	0.602
SABATES_COLORECTAL_ADENOMA_UP	SABATES_COLORECTAL_ADENOMA_UP	Details...		128	0.45542254	1.8691233	0	0.0171702	0.628
HOLLEMAN_VINCISTRINE_RESISTANCE_B_ALL_DN	HOLLEMAN_VINCISTRINE_RESISTANCE_B_ALL_DN	Details...		15	0.7033762	1.8689619	0.00471698	0.01697729	0.629
TAKAO_RESPONSE_TO_UVB_RADIATION_UP	TAKAO_RESPONSE_TO_UVB_RADIATION_UP	Details...		86	0.488814	1.8606431	0	0.0183047	0.669
NIKOLSKY_BREAST_CANCER_17Q21_Q25_AMPLICON	NIKOLSKY_BREAST_CANCER_17Q21_Q25_AMPLICON	Details...		313	0.4168596	1.8549353	0	0.01905478	0.691
NIKOLSKY_BREAST_CANCER_7P22_AMPLICON	NIKOLSKY_BREAST_CANCER_7P22_AMPLICON	Details...		34	0.59195644	1.8495029	0	0.0197533	0.711
ODONNELL_METASTASIS_DN	ODONNELL_METASTASIS_DN	Details...		23	0.62623036	1.8356116	0	0.02246768	0.766
TIMOFEEVA_GROWTH_STRESS_VIA_STAT1_DN	TIMOFEEVA_GROWTH_STRESS_VIA_STAT1_DN	Details...		16	0.70214176	1.8280098	0.00247525	0.02382766	0.788
SENGUPTA_EBNA1_ANTI_CORRELATED	SENGUPTA_EBNA1_ANTI_CORRELATED	Details...		142	0.44266927	1.8183827	0	0.02631569	0.838
RICKMAN_METASTASIS_DN	RICKMAN_METASTASIS_DN	Details...		243	0.41624513	1.8157729	0	0.02655714	0.843
NIKOLSKY_BREAST_CANCER_20Q12_Q13_AMPLICON	NIKOLSKY_BREAST_CANCER_20Q12_Q13_AMPLICON	Details...		129	0.43961748	1.8137465	0	0.02649285	0.849
ZUCCHI_METASTASIS_DN	ZUCCHI_METASTASIS_DN	Details...		41	0.5523463	1.8115171	0	0.02668107	0.86
BARRIER_CANCER_RELAPSE_NORMAL_SAMPLE_DN	BARRIER_CANCER_RELAPSE_NORMAL_SAMPLE_DN	Details...		28	0.5564707	1.8013793	0.00288184	0.02809372	0.895
LAHO_COLORECTAL_CANCER_SRRATED_DN	LAHO_COLORECTAL_CANCER_SRRATED_DN	Details...		77	0.47419295	1.7941638	0	0.03116865	0.917
HSIAO_HOUSEKEEPING_GENES	HSIAO_HOUSEKEEPING_GENES	Details...		378	0.3936959	1.7821214	0	0.0350607	0.945
FAELT_B_CLL_WITH_VH3_21_UP	FAELT_B_CLL_WITH_VH3_21_UP	Details...		42	0.54012704	1.7798955	0.00303951	0.0352087	0.946
NIKOLSKY_BREAST_CANCER_20Q11_AMPLICON	NIKOLSKY_BREAST_CANCER_20Q11_AMPLICON	Details...		28	0.58151084	1.7757787	0.0027248	0.03611989	0.954
YANG_BREAST_CANCER_ESR1_LASER_UP	YANG_BREAST_CANCER_ESR1_LASER_UP	Details...		32	0.5750255	1.7740098	0.00555556	0.03612828	0.955
LIU_THYROID_CANCER_CLUSTER_3	LIU_THYROID_CANCER_CLUSTER_3	Details...		28	0.58037764	1.773409	0.00527705	0.03577017	0.955
LIM_MAMMARY_STEM_CELL_DN	LIM_MAMMARY_STEM_CELL_DN	Details...		405	0.38666487	1.7715569	0	0.03588473	0.958
BONOME_OVARIAN_CANCER_POOR_SURVIVAL_DN	BONOME_OVARIAN_CANCER_POOR_SURVIVAL_DN	Details...		20	0.6172401	1.7547132	0.01015228	0.04219415	0.979
NIKOLSKY_BREAST_CANCER_5P15_AMPLICON	NIKOLSKY_BREAST_CANCER_5P15_AMPLICON	Details...		25	0.59309	1.7476573	0	0.04470218	0.982
HONMA_DOCETAXEL_RESISTANCE	HONMA_DOCETAXEL_RESISTANCE	Details...		32	0.5554958	1.7464287	0.00251889	0.04453478	0.982
DAZARD_UV_RESPONSE_CLUSTER_G4	DAZARD_UV_RESPONSE_CLUSTER_G4	Details...		20	0.60824084	1.7253377	0.01084011	0.05466839	0.994
MUELLER_COMMON_TARGETS_OF_AML_FUSIONS_UP	MUELLER_COMMON_TARGETS_OF_AML_FUSIONS_UP	Details...		14	0.6759897	1.7184759	0.01522843	0.05784596	0.996
BILANGES_RAPAMYCIN_SENSITIVE_VIA_TSC1_AND_TSC2	BILANGES_RAPAMYCIN_SENSITIVE_VIA_TSC1_AND_TSC2	Details...		69	0.45817512	1.6943016	0	0.07781918	1
GENTILE_UV_LOW_DOSE_UP	GENTILE_UV_LOW_DOSE_UP	Details...		27	0.5579804	1.6835866	0.00789474	0.07780741	1
STARK_PREFRONTAL_CORTX_22Q11_DELETION_DN	STARK_PREFRONTAL_CORTX_22Q11_DELETION_DN	Details...		465	0.36245567	1.6760212	0	0.08236612	1
GRADE_METASTASIS_DN	GRADE_METASTASIS_DN	Details...		43	0.4990298	1.6709152	0.0026738	0.08495686	1
YANAGISAWA_LUNG_CANCER_RECURRENCE	YANAGISAWA_LUNG_CANCER_RECURRENCE	Details...		7	0.8083519	1.6690421	0.01631702	0.08496416	1
FOSTER_KOMIA_TARGETS_DN	FOSTER_KOMIA_TARGETS_DN	Details...		196	0.3892077	1.6684625	0	0.08410447	1
YAO_TEMPORAL_RESPONSE_TO_PROGESTERONE_CLUSTER_17	YAO_TEMPORAL_RESPONSE_TO_PROGESTERONE_CLUSTER_17	Details...		172	0.39954036	1.668025	0	0.08319025	1
KIM_GASTRIC_CANCER_CHEMOSENSITIVITY	KIM_GASTRIC_CANCER_CHEMOSENSITIVITY	Details...		95	0.42754507	1.6580029	0	0.0900038	1
BILANGES_SERUM_RESPONSE_TRANSLATION	BILANGES_SERUM_RESPONSE_TRANSLATION	Details...		36	0.51448333	1.6548424	0.01139601	0.09136397	1

RPL22	4	BAIAP2L1	2	QTRT1	2	SLC6A9	1	BET1L	1	MAZ	3	TEX264	2	GTPBP1	1	ZNF217	1	ABCC10	1
ZBTB48	4	MVP	2	SMHG3	2	ZNF579	1	SRPK3	1	UBE2M	3	ZMYND8	2	DENNDD1A	1	SLC9A8	1	SCAF1	1
KRT8	4	STX8	2	ZNF358	2	DGKQ	2	PRPF31	1	PPAPC	3	ZGPAT	2	TOM1L2	2	PMFPA1	1	ANKRD13D	1
TJF3	4	ARPC1A	2	RANBP3	2	RPUSD3	1	SPNS2	1	SBC4	3	FAM83H	2	TRAPP1	1	CTS2	1	LEM02	1
ATP1B1	4	STAP2	2	PHK2	2	ANKZF1	1	EBPL	1	PSD4	3	FA2H	2	PML	1	UBE2V1	1	DMWD	1
LGALS3BP	4	SULF2	2	MOG5	2	TBL3	1	MRP56	1	IFITM1	3	CANT1	2	RALGDS	1	ABHD16B	1	SLC4A11	1
CD44	4	SORDL	2	NUP214	2	METRN	1	APFH	1	ZBTB7A	3	TSPAN8	2	ALDH16A1	1	TAFA	1	EVIS	1
HNRNP4	4	S100A13	2	TAF1C	2	PKMYT1	1	TACO1	1	RNH3	3	DOHH	2	AGAP3	1	RNF114	1	MSTO1	1
RPL35	4	RPL23A	2	HDAC10	2	SLC9A3R2	1	HMOX2	1	AURKAIP1	3	FOXQ1	2	SH3BGR3	1	TMEM189	1	HAUS8	1
CLTA	4	RPS26	2	SH3BP2	2	UNKL	1	DUECC1	1	FLAD3	3	ACYP1	2	SH5GLB2	1	SLC04A1	1	FBLX19	1
RPS17	4	ATP13A2	2	ZNF524	2	CCDC7B	1	PDKK	1	RAB9P2	3	CFDP1	2	CCM2	1	ADRM1	1	KAT8	1
RPS9	4	UBA7	2	UNC13D	2	NOXO1	1	FUJ1	1	FAM110A	3	FKBP2	2	KEAP1	1	SKR4	1	FXR2	1
EEF1G	4	RPS15	2	CDK3	2	LMF1	1	FAHD2A	1	ARIF2	3	CDK5	2	MIER2	1	TCFL5	1	PPRC1	1
RPL14	4	RTKN	2	RTKN	2	NARFL	1	MRT0A	1	RAB40C	3	RPL19	2	PKP4	1	GLTSCR1	1	GLTSCR1	1
RPS6	4	ATIC	2	CLIC1	2	EME2	1	FAM50A	1	DDR1	3	SF3A2	2	ALS2CL	1	OTUD3	1	NOL8	1
RPL13A	4	CIRBP	2	PDCD11	2	AXIN1	1	PITRM1	1	S100A14	3	EIF4EBP1	2	NPW2	1	WDR33	1	SPPL2B	1
RPL31	4	ITPK1	2	EIF4A	1	MSLN	1	RAC1	1	CDH5	3	PAR6	2	CLK3	1	L3MBTL1	1	SET2	1
UBAS2	4	H3F3B	2	KDMSD	1	TMEM8A	1	MCL1	1	IGFBP2	3	FKBP3	2	TBC1D2	1	YIPF2	1	SNAPC4	1
FBL	4	KDELR1	2	USP9Y	1	RHBDL1	1	KPNB1	1	MYO5B	3	PSME2	2	ATG4D	1	KLHL26	1	CRYG5	1
RPL3	4	TRIM28	2	UTY	1	PIGQ	1	CUX1	1	CBLC	3	FDPS	2	DAPK3	1	XAB2	1	CYP206	1
ACTB	4	RPL27	2	ZFY	1	ZNF205	1	PRPSA2	1	SSH3	3	PGLS	2	S100A16	1	CHERP	1	COP57B	1
NEDD8	4	SERPINB6	2	PRKY	1	FAM173A	1	ECH1	1	BSPRY	3	ENO3	2	PAX8	1	DCAF15	1	ABCA7	1
RPS21	4	NFIB	2	DDX3Y	1	CLCN7	1	TMEM205	1	ESRP2	3	HE51	2	PHLDA3	1	CLMT1	1	PKC1	1
RPL31	4	S100A2	2	NUCB1	1	PRSS27	1	CD320	1	OVOL2	3	CLC3	1	BTBD2	1	MED16	1	GA4	1
RPL38	4	KRT6B	2	MIF	1	PRSS22	1	ACYP2	1	HOOK2	3	BLOC151	2	RNF187	1	EIF5B	1	MICAL11	1
PPIA	4	CLTB	2	CTSA	1	RPUSD1	1	RBM3	1	ITGA3	3	DVL1	2	RHOG	1	NOP58	1	GATAD2A	1
RPL6	4	SMHG6	2	MRP57	1	PDIA2	1	PSMG4	1	SLC16A3	3	PKN1	2	SLC2A1	1	NANS	1	ZNF692	1
SERPINB5	4	GAS5	2	DHCR7	1	TSC2	1	PIGX	1	MRPL27	3	RGS14	2	ARHGAP4	1	EIF2B5	1	FBLT5L1	1
RPL27A	4	RPS27A	2	ATP6VOC	1	CHTF18	1	HDCC2	1	EVPL	3	GD1I	2	SMPD3	1	ARRDC2	1	MYPOP	1
FAU	4	RPL15	2	FCHO1	1	PKD1	1	CETN3	1	NARF	3	SF3B2	2	TP53I13	1	USMG5	1	GGYF1	1
MDH2	4	RPL5	2	ALKBH6	1	SLC45A1	1	DBNL	1	DUSL1	3	CLC8	2	CISH	1	KRTCAP1	1	PPP1R12C	1
MRPL17	4	RPL26	2	ORAI1	1	DGAT2	1	PEK7	1	NFE2L1	3	NDUFAF3	2	KCNK7	1	IL20RA	1	FURIN	1
TXNRD2	4	BLCAP	2	TFCP2L1	1	LCN2	1	NAA38	1	PRR15L	3	NUDC	2	CESA4	1	SIRT7	1	SH3BP1	1
TOMM34	4	AKAP1	2	SLC39A11	1	MSX2	1	SF3B5	1	T0B1	3	RNPS1	2	KCTD17	1	CDCA2EP5	1	L3MBTL2	1
POR	4	DGCR14	2	ZSWIM4	1	GRM8	1	LAGE3	1	RP56KA4	3	RBM10	2	SREBF1	1	SURF6	1	TMEM86B	1
LONP1	4	MTOR	2	SNX15	1	ETV4	1	B9D1	1	ADAP1	3	RAP1GAP2	2	UBE2O	1	FUT2	1	SUV39H1	1
ECH1	4	ACA11	2	CORO2A	1	CH13L1	1	TOMM5	1	KDM4B	3	STOML1	2	WDR81	1	RRBP1	1	GRIPAP1	1
MRPL4	4	RPAIN	2	DBND2	1	AFIP3	1	TSEN34	1	MSLN	3	SLC22A1B	2	MAP2K3	1	BAEC2	1	DOT1L	1
HK1	4	PRPF6	2	PPA2	1	FREM2	1	COMT01	1	GER	3	ATP1A1	2	PLEKHM1	1	INF2	1	HSF4	1
BAK1	4	IMP3	2	HTATIP2	1	PF4	1	HOGFRP2	1	HAGH	3	SLPI	2	ATPV0E1	1	EHRD2	1	ATAD3B	1
MRPL9	4	HLC5	2	MRP521	1	UGT1A6	1	VOPP1	1	AXIN2	3	PDZK1IP1	1	ZDHHC14	1	NADSYN1	1	RBM33	1
BDH1	4	UROS	2	VILL	1	JOSD2	1	JOSD2	1	DRG2	3	KRT15	2	VAV2	1	CC2D1A	1	MIIP	1
IVD	4	MLYCD	2	PYROXD2	1	DUOX2	1	LINC00152	1	SHMT1	3	MAPKAPK3	2	GDDP5	1	ANKRD9	1	ANKRD54	1
MRPL34	4	HPS1	2	SDSL	1	FAIM2	1	UNC45A	1	DLAGA4	3	PLXNB1	2	FCHSD1	1	UNC5CL	1	ZNF580	1
MRP34	4	ACP6	2	PRKCZ	1	UCG1	1	HNRNP3	1	GSS	3	B3GAT3	2	ZFYVE28	1	TMEM129	1	PPP1T	1
MRP511	4	TFB1M	2	GRTF1	1	GPSM2	1	SMHG11	1	PSMD13	3	MVD	2	HPY	1	DHTKD1	1	CUL9	1
MRP515	4	MRP527	2	CGN	1	CLDN2	1	SMHG10	1	MARCKSL3	3	DPEP1	2	TLL3	1	GMDS	1	CUL7	1
TIMM13	4	TIMM44	2	ATG2A	1	CLDN1	1	PEX16	1	NR2F6	3	GAS8	2	STK10	1	RPL26L1	1	SAFB2	1
DUT	4	PP0X	2	DHRS4	1	LRRK36	1	PODXL2	1	ICT1	3	NUP93	2	ZBTB17	1	PHKA2	1	WASH3P	1
TSPO	4	TIMM8A	2	THNSL2	1	LRRK34	1	GALT	1	PDAP1	3	NPRL3	2	DNHD1	1	HEXIM1	1	PTBP1	1
COX10	4	ZNF338	2	AP1G2	1	SRPX2	1	WDR83	1	MRPL36	3	DZHDGH	2	NSUN5P2	1	APEX2	1	RXO1	1
SLC25A1	4	HTATSF1	2	PLEKHG3	1	FABP6	1	MEXD	1	CLPTM1L	3	POLR2E	2	WDTX1	1	TARBP1	1	TRAF2	1
NDUFA9	4	PYCR1	2	COBL	1	RPL22L1	1	OSRPL5	1	ATP5G3	3	HMG20B	2	ABND15	1	PIASA	1	RANGAP1	1
MRP533	4	CASP8	2	HDAC11	1	PPL6	1	UQCRF51	3	KARS	3	CAPN1	2	NHLH1	1	PNRP01	1	DAGLB	1
NDUFA10	4	SUPV3L1	2	SIL1	1	TNFRSF10C	1	PPP2R2A	1	KARS	3	ZNRD1	2	EFTUD2	1	POLA2	1	TMCC1	1
NDUFB3	4	MRPL20	2	PPL	1	NFE2L3	1	HSD11B1L	1	CHMP2	3	ALDH7A1	2	PHF7	1	TAX1BP3	1	MAPRE3	1
BCL2L1	4	MRPL24	2	ZFAND2B	1	DSG3	1	OCEL1	1	ENGASE	3	LMAN2	2	TMEM102	1	PEX14	1	RBM15B	1
ATPIF1	4	LYPLA2	2	ZDHHC24	1	CCNO	1	ZNF814	1	DNAJB2	3	CDC34	2	REC8	1	TACC3	1	ARHGAP17	1
POLRMT	4	MRPL46	2	RHBD2	1	ART3	1	HE54	1	CNRPD1	3	ALDH7A1	2	PHF7	1	PNPLA6	1	CLASSP	1
BCAT2	4	ME3	2	PGAP2	1	DUOXA2	1	PUSL1	1	EDF1	3	H3F3A	2	CATSPER2	1	ZNF84	1	KIF16	1
BAX	4	SLC25A14	2	RFK1	1	SH3TC2	1	SYMPK	4	CHMP1A	3	CDC25B	2	HSBP9	1	TCF7	1	RNF207	1
HGDF	4	SLC25A37	2	NGEF	1	GALNT6	1	SYTL1	4	DGUOK	2	POLD1	2	NOCAL	1	CDK11A	1	ABCF3	1
JTB	4	ACAD5	2	SLCSA1	1	RAB8A	1	ELMO3	4	ACADVL	2	LVPALL1	1	GNL1	1	POLM	1	POLM	1
SYNGR2	4	ACAD8	2	SIRTS	1	PHYH	1	PKP3	4	ALDH2	2	TMEM54	1	PRMT1	1	ZNF330	1	NEURL4	1
CSNK2B	4	TIMM22	2	DDX51	1	TERF2IP	1	S100P	4	MCAT	2	PCB02	1	CCL20	1	AUP1	1	CDCA3	1
VSNL1	4	AMT	2	CHFR	1	HTT	1	SPINT2	4	MTX2	2	MBOAT1	1	PHLDA1	1	CC77	1	PSME1	1
HRAS	4	FXR1	2	GOLGA3	1	ZNF212	1	CDH1	4	SLC25A22	2	PTPM6	1	RNF183	1	HIST2HAC	1	OAZ1	1
TNPO2	4	ENO1	2	TRIM46	1	TROAP	1	ELF3	4	CAPNS1	2	SLC25A35	1	TNS4	1	STK19	1	SSBP1	1
RALY	3	HSD17B10	2	ADAM15	1	E4F1	1	RAB25	4	TUBAA4	2	TMEM41A	1	SLC6A14	1	PITX1	1		
PPDPF	3	DEAF1	2	SLC50A1	1	MBOAT7	1	CD24	4	TUBB3	2	PEX11G	1	ACSL6	1	SLC25A26	1		

SOA11	13	SECG2	9	TMX1	6	GAS2	5	ARMCI	4	AMOTL1	3	ZFYV26	2	POCD1G2	2	MAGOH	1	YEAT54	1		
ADAM1	13	NRML2	9	RM2L2	6	FAM20A	5	CP276	4	ZWRF1	3	ZDF921	2	FDW54	1	YF54B	1	ZNF569	1		
GC11	13	MGAT4A	9	CD248	5	NSM4F	5	CD248	5	TSY26P	3	SEN2P	2	TTL5	2	UBD11	1	MED19	1		
ALOX5AP	13	KAT2B	9	SN09	5	PRUNE2	5	ZNR87	4	STAR08	3	PC01B	2	AGF01	2	O57F1	1	ABC310	1		
LDR2	13	A021	9	AHSD1A	5	MR22	5	ALSD1	4	IR3A	3	TAB3	2	ARE1	2	A8E1	1	C2F53	1		
SHD21A	13	RD23B	9	THEM5S	6	MILT11	5	L2T11	4	PARD6G	3	SNAPC3	2	RUNK3	1	NRB1	1	NB61	1		
GMAPA	13	RAB5A	9	TBC1D15	6	SERPNI1	5	KD0M6	4	TSY12	3	TM03	3	KN25	1	WHSCL1	1	NM03	1		
IRK	13	TPO2	9	SFK1	6	AJCB4B	5	SKR1	4	NSF	3	RAB51F	2	RAB51F	2	S1P94	1	W1P92	1		
SELL	13	TRPC1	9	TRPC1	9	CHRD1	5	STAM2	4	ARL15	3	PHKCR4	2	SLR2	1	LC245	1	MSC2	1		
RAB27A	13	DNAB9	9	MEDX2	5	SFMB2	4	HRC3	3	HERC3	3	TMTCC	3	SACS	1	RXRG	1	F8	1		
FILP1	13	OC4M1	9	GAS2L3	5	OR1	5	GAR1	4	ZC3H12C	3	MATN3	2	CH984	1	TNCF32	1	HEATR3	1		
EDL3	13	CCCO	9	PPN3	6	SPPD1	5	WNV2C	4	ZDMV6	3	LBP4F	2	R46	1	PR46	1	PO4	1		
PAPPA	13	ML2B	9	SLC25A4	5	SERTAD4	4	MCFO2	3	MTMR12	2	MTRM12	2	S1002	1	EFA2	1	CY20A1	1		
SP9A	13	DGLG45	9	CC13	5	PPP13A4A	5	SYO2	4	POE7B	3	PCY11A	2	FAM148A	1	TB1	1	RNF11	1		
REP1	13	F17B	9	GGT4F	6	ATV02L5	5	FBO2B	4	FBO2B	4	ACTN3	1	P297E	1	P297E	1	ZNF536	1		
MGP	13	ENPEF	9	FCGR2C	6	FZD2	5	LRF1	4	CRTAP	3	DAG1	2	MYO21	1	PRCCA	1	GPATCH2	1		
COL11A1	13	SERINC5	9	ATP4V002	6	ARNTL2	5	EP841L5	4	HRH3	3	SCN3A	3	KN0A5	1	PPP2R5D	1	FAM33C	1		
PTF	13	SC24A	9	SLC35A3	6	FAM30D	5	MBO012	4	FROD1	3	FAM35A	2	ZCCK1C	1	GR54B	1	ZNF536	1		
LAMA4	13	ATP2C1	9	EREG	6	GPX8	5	FRS1	4	GNAO3	3	TLL2	2	SOR1	1	AB3	1	ZNF107	1		
MFAP4	13	SFB1	9	CMKR1	5	SLC35B4	5	HPS3	4	TMEM43	3	ATL3	2	ELAVL4	1	CCD42E1	1	ZBT11	1		
FBN1	13	NR22	9	COL4A3BP	6	FGFRNC1	5	NR3C2	4	NR3C2	4	RND3	1	C12L3	1	SMO	1	NECAF1	1		
DRR2	13	FBNX11	9	CCPG1	6	CCPG1	6	AGTFRP1	4	FADS1	3	JD2	2	TMEM26	1	GP5	1	TB21	1		
FAM125A	13	DG1	9	CRTAM	6	ARLP2	5	TRC4	4	TRC4	4	ZSMW6	2	JAMMP2	1	PF4V1	1	WDR47	1		
PTX3	13	USP9A	9	LIBR4	6	SIZ2	5	NEO21	4	LP23	3	LRFNS	2	TRAPPC3	1	SMO	1	NECAF1	1		
IL6R	13	POL3	9	NLRP3	6	BGALT1	5	SLC25A40	4	MIR3	3	DLG2	2	RPRD2	1	SETD7	1	PDL1	1		
ID3	13	DKC	9	WRN	6	VGLL3	5	DCUN101	4	ARLB8	3	GABR2	2	LRNMLC1	1	CTNN1	1	HIST1H2BN	1		
CTGF	13	MTZ	9	HMGCR4	6	PPIBP1	5	NNT	4	MAD3K1BL	3	AKAP7	2	CLEC14A	1	NCSI	1	HIST1H2BU	1		
SMAD3	13	WH01	9	EIF2S1	6	KITBD2	5	PIAS1	4	KIF4F3	3	TRIM35	2	RPS6KA1	1	ILK	1	FA2	1		
PTPRM	13	ATAD2	9	ATP4V1C1	6	TSYPA12	5	FNP1	4	RASL11B	3	SCARF1	2	TMEM126A	1	MPSR22	1	ZNF254	1		
TGIR1	13	NBN	9	USP2	6	EIF3A	5	Y1	4	F3H3B	3	EDY17	2	PDZD12	1	VPS3B	1	ZNF580	1		
IST1	13	ACADM	9	NPCL	6	FAM114A1	5	TJF1	4	UBE2K	3	PLVAP	2	XPT	1	ATE1	1	NA25	1		
LYN	13	TK	9	ARL6P5	6	SLC14A2	5	UCS1	3	PTPNC1	2	ZMYM1	1	CYSR4	1	EDN3	1	EDN3	1		
TGSM45A	13	PP2R3B	9	TM6SF4	6	TM6SF4	6	PUS2	3	BDF1	2	BMF1	2	TM4E	1	TM4E	1	ZNF501	1		
NAMP2	13	AMD1	9	ATF9B	6	IL13	5	KHL20	4	GAP43	3	SLAIN2	2	HSPA2	1	BTBD1	1	MBT52	1		
TM64	13	ATP2A2	9	TM64	13	SV2B	5	CHRC1	4	THS04	3	ATP4V1E1	2	RMR1	1	BTBD19	1	PE26	1		
ZEB1	13	TUSC3	9	CSF2RA	6	MED14	5	SE1	4	TG82	3	CD3	2	CDG6	1	ELL1	1	USP44	1		
SAMSN1	13	AR	9	RFC3	6	RAB7A	5	RNF3	4	CHSY3	3	RNF315	2	KIF17	1	TM114	1	ZNF523	1		
FAM46C	13	MICB	9	KLC1	6	KLC1	6	PPF4R2	4	FLC02	3	CSD2	2	ZDMHC3	1	LRRC32	1	ARHGFE26	1		
ST64A4	13	SLC25A36	9	LTBP3	6	SMNDC1	5	AKOR1	4	ISYNA1	3	GMCL1	2	CHY18	1	ZNF124	1	ST17	1		
USP1	13	YAP1	9	ATXN10	5	NOX3	5	NOTC1	4	NSX1	3	ELMOD2	2	SPATC1	1	CCO44B	1	PCOR1	1		
BACH1	13	RBP1	9	TMOD1	6	DUSP3	5	PTO1	2	SRY1	1	PMO1	1	SLC24A2	1	CFZ	1	ADAMTS7	1		
B3GALT1	13	KAT5B	9	HPD05	6	SIX15	5	KRRI	4	MCC	3	PUGL7	2	ZNF34	1	PLEKH02	1	TOR1AIP2	1		
LEPROT	13	HMGB2	9	CMF7E	6	HMGB2	6	TM2D3	4	DCI1	3	DHXC2	2	VSN	1	GP62	1	TM6SF1	1		
FBNP1	13	ZEB2	9	CSF3R	6	PD46	5	SK1	4	DNAF2	3	ST7L	2	KHLH38	1	ZNF374	1	ZNF374	1		
USP16	13	DNMT3	9	ABCA6	6	HGX08	5	TRUB1	4	USP3	3	RCD1	2	CY1	1	GP174	1	MGA73B	1		
NAB1	13	USP16	9	HNSG1	6	USP16	9	USP16	9	USP16	9	USP16	9	USP16	9	USP16	9	USP16	9	USP16	9
SYY1	13	RECQL	9	CEKX	6	CEKX	6	CEKX	6	CEKX	6	CEKX	6	CEKX	6	CEKX	6	CEKX	6	SUSO2	1
CHD2	13	MEGF9	9	KIR3B1	6	SPAG9	5	NGD10	4	RD54B	3	MTFR1	2	MED30	1	MARX12	1	PTPFR	1		
GAT3	13	STAT2	9	KANAO30	6	F3K01	5	FXN1	4	RASGA2	3	SYNRR	2	SPATC1	1	GPATC1	1	USP44	1		
GP171	13	HAT1	9	DOX5	6	DOX5	6	DOX5	6	DOX5	6	DOX5	6	DOX5	6	DOX5	6	DOX5	6	DOX5	6
PKRCH	13	SAMPD3A	9	G12	6	FEM1B	5	AKAP11	4	UBE2E2	3	ANGPT4	2	TRAPPC9	1	ACAP1	1	PSMA6	1		
UBASH3B	13	BANK	9	DNASE1L3	6	DNASE1L3	6	DNASE1L3	6	DNASE1L3	6	DNASE1L3	6	DNASE1L3	6	DNASE1L3	6	DNASE1L3	6	DNASE1L3	6
HPK42A	13	LPTM48	9	UBR2	6	THAP11	5	EC2	3	EC2	3	EC2	3	EC2	3	EC2	3	EC2	3	EC2	3
RS1	13	ORL1	9	SNN	6	DDX118	5	USP9K	4	BTFL3A	3	MKNK1	2	LTKN1	1	LIBRA4	1	ZNF740	1		
CD9	13	ADAM10	9	CD9	13	ADAM10	9	ADAM10	9	ADAM10	9	ADAM10	9	ADAM10	9	ADAM10	9	ADAM10	9	ADAM10	9
ENTPD1	13	VWF	9	USP25	6	USP25	6	USP25	6	USP25	6	USP25	6	USP25	6	USP25	6	USP25	6	USP25	6
IL10	13	EMCN	9	SPIN1	6	ARR1	5	CREB3L2	4	POLE3	3	PTAFR	2	ADP0R2	1	VASH1	1	TAPT1	1		
CELF7	13	TMEM200B	9	TGFRIP1	6	USP14	5	USP14	5	USP14	5	USP14	5	USP14	5	USP14	5	USP14	5	USP14	5
SCARB2	13	TYRP1	9	TYRP1	9	FNTA	5	SYNPD	4	LAG3	3	MAPRE1	2	SMARCA4D1	1	FCBL2	1	ARID3B	1		
MTF	13	OAS3	9	UCHL5	6	PPP2R3A	5	IAR5	4	BA21B	3	FBW8	2	OSTN	1	GLT1D1	1	TRF2M	1		
WBP5	13	MIR22HG	9	FAMV01	6	SLC25A46	5	HOOX3	4	SRT1	3	FAM49B	2	VNN2	1	VNN2	1	ATFB82	1		
CERS6	13	COL4A5	9	RARB	6	CRADD	5	MAD7D3	4	MAD7D3	4	MAD7D3	4	MAD7D3	4	MAD7D3	4	MAD7D3	4	MAD7D3	4
JAK1	13	EPH4	9	EPH4	9	EPH4	9	EPH4	9	EPH4	9	EPH4	9	EPH4	9	EPH4	9	EPH4	9	EPH4	9
RFTNL	13	RFBP1	9	DNOC1	6	USP22	5	USP22	5	USP22	5	USP22	5	USP22	5	USP22	5	USP22	5	USP22	5
ATXN1	13	CLIP1	9	PDE5A	6	CLIP1	9	CLIP1	9	CLIP1	9	CLIP1	9	CLIP1	9	CLIP1	9	CLIP1	9	CLIP1	9
CFP	13	CCD42E2	9	GCE	6	GSK3B	5	DDN6	4	DDN6	4	DDN6	4	DDN6	4	DDN6	4	DDN6	4	DDN6	4
PTFNC2	13	TM6SF2	9	PKMT	6	ARFGAP1	5	ARFGAP1	5	ARFGAP1	5	ARFGAP1	5	ARFGAP1	5	ARFGAP1	5	ARFGAP1	5	ARFGAP1	5
BGN2T2	13	KEO3	9	HMGCR	6	WDR43	5	RAB5C	4	SCAF8	3	TRG61	2	NME4	1	ZNF365	1	TAF3	1		
ZFP961	13	CHD9L	9	SLC35A3	6	PXK	5	STYX	4	ANKRD17	3	NROV2	2	FAM60A	1	CHGI1	1	ZNF41	1		
UFR	13	ARMCX1	9	ARMCX1	9	ARMCX1	9	ARMCX1	9	ARMCX1	9	ARMCX1	9	ARMCX1	9	ARMCX1	9	ARMCX1	9	ARMCX1	9
BNP3L	13	IL1RN	9	MOB3B	6	MOB3B	6	MOB3B	6	MOB3B	6	MOB3B	6	MOB3B	6	MOB3B	6	MOB3B	6	MOB3B	6
KHL24	13	CLRA	9	MOB4	6	MOB4	6	MOB4	6	MOB4	6	MOB4	6	MOB4	6	MOB4	6	MOB4	6	MOB4	6
CN3	13	RBM45	9	SEC22B	6	CN3	13	CN3	13	CN3	13	CN3	13	CN3	13	CN3	13	CN3	13	CN3	13
ZFAND5	13	NFKB1	9	ZFAND5	13	ZFAND5	13	ZFAND5	13	ZFAND5	13	ZFAND5	13	ZFAND5	13	ZFAND5	13	ZFAND5	13	ZFAND5	13
PCALM	13	MYO5A	9	TRIM38	6	ZFHX3	5	TRIM38	6	TRIM38	6	TRIM38	6	TRIM38	6	TRIM38	6	TRIM38	6	TRIM38	6
CASP3	13	HECTD1	9	HECTD1	9	HECTD1	9	HECTD1	9	HECTD1	9	HECTD1	9	HECTD1	9	HECTD1	9	HECTD1	9	HECTD1	9
IKAM1	13	ADP9	9	ADP9	9	ADP9	9	ADP9	9	ADP9	9	ADP9	9	ADP9	9	ADP9	9	ADP9	9	ADP9	9
BMF2	13	SLC31A1	9	DEGS1	6	HUSA5E	5	AD01	4	PHLD81	3	SYNDG1	2	ARL11	1	ADAMTS18	1	DONSON	1		
ANGPT2	13	HECTD3	9	CNMR1G3	6	LNL6	5	PRIS1	4	LOC73101	3	PH15	2	STOK1	1	AHRH	1	EZP3	1		
SP100	13	MARP2E2	9	UBN2A	6	MORF4L2	5	HERPUD1	4	FXP2	3	NFASC	2	COX4	1	RIMK1A	1	IBP1	1</		

Supplementary Table 2.

GSEA, leading edge and IPA pathway analyses performed on tumor samples from a selected TCGA-COAD cohort stratified according to miR-27a levels.
 2F) overrepresented pathways in the set of genes identified by leading-edge-analysis in high-miR-27a CRCs;

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 Ingenuity Canonical Pathways

	-log(B-H p-value)	Ratio	z-score	Molecules
Oxidative Phosphorylation	6,17E+01	3,76E-01	NaN	NDUFA4,ATP5G1,ATP5H,COX6A1,NDUFA7,ATP5D,COX6C,UQCRCR,COX5B,NDUFB5,COX8A,ATP5L,NDUFB8,NDUFA1,ATP5E,NDUFA2,NDUFS6,NDUFS2,NDUFB1,ATP5I,COX411,ATP5J,SDHA,ATP5G2,COX6B1,NDUFS7,COX7C,ATP5O,SURF1,NDUFB1,UQCRC1,ATP5C1,NDUFB2,NDUFS8,UQCRC10,NDUFB7,NDUFA3,NDUFS3,UQCRC1,NDUFB2,UQCRCQ
Mitochondrial Dysfunction	5,64E+01	2,51E-01	NaN	NDUFA4,ATP5G1,ATP5H,COX6A1,ATP5D,NDUFA7,COX6C,UQCRCR,COX5B,NDUFB5,COX8A,ATP5L,NDUFB8,NDUFA1,ATP5E,NDUFA2,VDAC2,NDUFS6,NDUFS2,GPX4,NDUFB1,ATP5I,COX411,ATP5J,SDHA,ATP5G2,COX6B1,NDUFS7,COX7C,ATP5O,SURF1,NDUFB1,UQCRC1,ATP5C1,NDUFB2,NDUFS8,UQCRC10,NDUFB7,NDUFA3,NDUFS3,UQCRC1,NDUFB2,UQCRCQ
EIF2 Signaling	1,43E+01	8,60E-02	NaN	RPS19,RPL36A,RPL29,RPL2,RPL35A,RPL7A,RPL28,EIF3G,EIF3F,RPS16,RPL18A,RPL13,RPS25,RPS2,RPL36,RPS12,RPL18,EIF3K,RPS14
Regulation of eIF4 and p70S6K Signaling	5,70E+00	6,37E-02	NaN	EIF3G,RPS19,EIF3F,PPP2R1A,RPS16,RPS25,RPS2,RPS12,RPS14,EIF3K
mTOR Signaling	4,83E+00	5,03E-02	NaN	EIF3G,RPS19,EIF3F,PPP2R1A,RPS16,RPS25,RPS2,RPS12,RPS14,EIF3K
Thiosulfate Disproportionation III (Rhodanese)	2,44E+00	6,67E-01	NaN	MPST,TST
DNA damage-induced 14-3-3if Signaling	8,15E-01	1,05E-01	NaN	TP53,SFN
Alanine Biosynthesis III	8,15E-01	1,00E+00	NaN	NFS1
Pyrimidine Deoxyribonucleotides De Novo Bio:	8,15E-01	8,70E-02	NaN	NME3,NME2
Glutathione Redox Reactions I	8,15E-01	8,33E-02	NaN	GPX4,GSTP1
Tryptophan Degradation X (Mammalian, via Tr	8,15E-01	8,00E-02	NaN	ALDH4A1,AKR1A1
Aryl Hydrocarbon Receptor Signaling	8,15E-01	2,86E-02	NaN	TP53,ALDH4A1,GSTP1,SMARCA4
Proline Degradation	8,15E-01	5,00E-01	NaN	ALDH4A1
L-cysteine Degradation III	8,15E-01	5,00E-01	NaN	MPST
4-hydroxyproline Degradation I	8,15E-01	5,00E-01	NaN	ALDH4A1
Adenine and Adenosine Salvage I	8,15E-01	5,00E-01	NaN	APRT
Apoptosis Signaling	7,37E-01	3,37E-02	NaN	TP53,ENDOG,LMNA
Regulation of Actin-based Motility by Rho	7,37E-01	3,30E-02	NaN	PFN1,BAIAP2,ARHGDI
Methylglyoxal Degradation I	7,37E-01	3,33E-01	NaN	HAGHL
D-glucuronate Degradation I	7,37E-01	3,33E-01	NaN	AKR1A1
Ethanol Degradation II	7,05E-01	5,41E-02	NaN	ALDH4A1,AKR1A1
tRNA Charging	7,05E-01	5,13E-02	NaN	FARSA,QARS
Arginine Degradation I (Arginase Pathway)	7,05E-01	2,50E-01	NaN	ALDH4A1
Molybdenum Cofactor Biosynthesis	7,05E-01	2,50E-01	NaN	NFS1
Noradrenaline and Adrenaline Degradation	7,05E-01	5,00E-02	NaN	ALDH4A1,AKR1A1
Mechanisms of Viral Exit from Host Cells	7,02E-01	4,88E-02	NaN	CHMP2A,ACTG1
Pyrimidine Ribonucleotides Interconversion	6,79E-01	4,65E-02	NaN	NME3,NME2
NRF2-mediated Oxidative Stress Response	6,77E-01	2,07E-02	NaN	AKR1A1,TXN,ACTG1,GSTP1
Pyrimidine Ribonucleotides De Novo Biosynth	6,77E-01	4,44E-02	NaN	NME3,NME2
ILK Signaling	6,77E-01	2,04E-02	NaN	PPP2R1A,TMSB10/TMSB4X,ACTG1,NACA
Cell Cycle: G2/M DNA Damage Checkpoint Reg	6,57E-01	4,08E-02	NaN	TP53,SFN
Thioredoxin Pathway	6,57E-01	1,67E-01	NaN	TXN
Pentose Phosphate Pathway (Non-oxidative Br	6,57E-01	1,67E-01	NaN	TALDO1
RhoA Signaling	6,47E-01	2,46E-02	NaN	PFN1,BAIAP2,ACTG1
PI3K/AKT Signaling	6,42E-01	2,42E-02	NaN	TP53,PPP2R1A,SFN
Role of CHK Proteins in Cell Cycle Checkpoint C	6,09E-01	3,64E-02	NaN	TP53,PPP2R1A
Actin Cytoskeleton Signaling	5,66E-01	1,75E-02	NaN	PFN1,BAIAP2,TMSB10/TMSB4X,ACTG1
Sucrose Degradation V (Mammalian)	5,46E-01	1,11E-01	NaN	ALDOA
Hereditary Breast Cancer Signaling	5,45E-01	2,11E-02	NaN	TP53,SFN,SMARCA4
Huntington's Disease Signaling	5,45E-01	1,66E-02	NaN	TP53,ATP5J,SDHA,RACK1
Epithelial Adherens Junction Signaling	5,45E-01	2,05E-02	NaN	BAIAP2,JUP,ACTG1
Pentose Phosphate Pathway	5,45E-01	1,00E-01	NaN	TALDO1
Myc Mediated Apoptosis Signaling	5,00E-01	2,86E-02	NaN	TP53,SFN
Acy-CoA Hydrolysis	4,99E-01	8,33E-02	NaN	ACOT7
BER pathway	4,99E-01	8,33E-02	NaN	POLG
Serotonin Degradation	4,87E-01	2,70E-02	NaN	ALDH4A1,AKR1A1
Tight Junction Signaling	4,80E-01	1,80E-02	NaN	F11R,PPP2R1A,ACTG1
Role of BRCA1 in DNA Damage Response	4,80E-01	2,56E-02	NaN	TP53,SMARCA4
Cyclins and Cell Cycle Regulation	4,80E-01	2,56E-02	NaN	TP53,PPP2R1A
Isoleucine Degradation I	4,80E-01	7,14E-02	NaN	ECHS1
Vitamin-C Transport	4,67E-01	6,67E-02	NaN	TXN
RhoGDI Signaling	4,67E-01	1,73E-02	NaN	RACK1,ARHGDI,ACTG1
Granzyme B Signaling	4,63E-01	6,25E-02	NaN	ENDOG
Methylglyoxal Degradation III	4,63E-01	6,25E-02	NaN	AKR1A1
Sertoli Cell-Sertoli Cell Junction Signaling	4,63E-01	1,69E-02	NaN	F11R,JUP,ACTG1
HIPPO signaling	4,52E-01	2,30E-02	NaN	PPP2R1A,SFN
Valine Degradation I	4,46E-01	5,56E-02	NaN	ECHS1
Acute Myeloid Leukemia Signaling	4,46E-01	2,20E-02	NaN	IDH2,JUP
Death Receptor Signaling	4,46E-01	2,17E-02	NaN	LMNA,ACTG1
GADD45 Signaling	4,46E-01	5,26E-02	NaN	TP53
Histamine Degradation	4,46E-01	5,26E-02	NaN	ALDH4A1
Prostate Cancer Signaling	4,46E-01	2,13E-02	NaN	TP53,GSTP1
Salvage Pathways of Pyrimidine Ribonucleotid	4,46E-01	2,11E-02	NaN	NME3,NME2
DNA Methylation and Transcriptional Repressi	4,46E-01	5,00E-02	NaN	MBD3
Sumoylation Pathway	4,46E-01	2,08E-02	NaN	TP53,ARHGDI
Oxidative Ethanol Degradation III	4,34E-01	4,76E-02	NaN	ALDH4A1
Breast Cancer Regulation by Sathmin1	4,34E-01	1,48E-02	NaN	TP53,PPP2R1A,RACK1
Fatty Acid Î±-oxidation	4,34E-01	4,55E-02	NaN	ALDH4A1
Antioxidant Action of Vitamin C	4,34E-01	1,94E-02	NaN	TXN,PAFAH1B3
VEGF Signaling	4,34E-01	1,94E-02	NaN	SFN,ACTG1
TCA Cycle II (Eukaryotic)	4,34E-01	4,35E-02	NaN	SDHA
Putrescine Degradation III	4,34E-01	4,35E-02	NaN	ALDH4A1
Tumoricidal Function of Hepatic Natural Killer	4,31E-01	4,17E-02	NaN	ENDOG
Ethanol Degradation IV	4,31E-01	4,00E-02	NaN	ALDH4A1
Glioma Signaling	4,31E-01	1,82E-02	NaN	TP53,IDH2
Amyotrophic Lateral Sclerosis Signaling	4,31E-01	1,80E-02	NaN	TP53,SSR4
p53 Signaling	4,31E-01	1,80E-02	NaN	TP53,SFN
Telomerase Signaling	4,31E-01	1,80E-02	NaN	TP53,PPP2R1A
Glycolysis I	4,31E-01	3,85E-02	NaN	ALDOA
Gluconeogenesis I	4,31E-01	3,85E-02	NaN	ALDOA
HIF1Î± Signaling	4,15E-01	1,74E-02	NaN	TP53,ELOB
p38 MAPK Signaling	4,09E-01	1,71E-02	NaN	TP53,MKNK2
Glutathione-mediated Detoxification	3,90E-01	3,33E-02	NaN	GSTP1
G Protein Signaling Mediated by Tubby	3,74E-01	3,12E-02	NaN	RACK1
Fatty Acid Î²-oxidation I	3,74E-01	3,12E-02	NaN	ECHS1
Inhibition of Angiogenesis by TSP1	3,64E-01	2,94E-02	NaN	TP53

p70S6K Signaling	3,64E-01	1,53E-02	NaN	PPP2R1A,SFN
Signaling by Rho Family GTPases	3,64E-01	1,21E-02	NaN	RACK1,BAIAP2,ACTG1
Cell Cycle Regulation by BTG Family Proteins	3,64E-01	2,86E-02	NaN	PPP2R1A
Dopamine Degradation	3,64E-01	2,86E-02	NaN	ALDH4A1
Cardiac β -adrenergic Signaling	3,49E-01	1,46E-02	NaN	PPP2R1A,RACK1
Role of PKR in Interferon Induction and Antiviral	3,35E-01	2,50E-02	NaN	TP53
Thyroid Cancer Signaling	3,35E-01	2,50E-02	NaN	TP53
Phagosome Maturation	3,35E-01	1,39E-02	NaN	DYNLL1,PRDX2
MIF Regulation of Innate Immunity	3,35E-01	2,44E-02	NaN	TP53
Stearate Biosynthesis I (Animals)	3,35E-01	2,44E-02	NaN	ACOT7
Synaptic Long Term Depression	3,35E-01	1,37E-02	NaN	PPP2R1A,PAFAH1B3
UVC-Induced MAPK Signaling	3,31E-01	2,38E-02	NaN	TP53
Role of p14/p19ARF in Tumor Suppression	3,26E-01	2,33E-02	NaN	TP53
Role of Oct4 in Mammalian Embryonic Stem Cell	3,05E-01	2,17E-02	NaN	TP53
Xenobiotic Metabolism Signaling	2,97E-01	1,05E-02	NaN	ALDH4A1,PPP2R1A,GSTP1
Cancer Drug Resistance By Drug Efflux	2,90E-01	2,04E-02	NaN	TP53
Wnt/ β -catenin Signaling	2,71E-01	1,18E-02	NaN	TP53,PPP2R1A
Tec Kinase Signaling	2,71E-01	1,18E-02	NaN	RACK1,ACTG1
Germ Cell-Sertoli Cell Junction Signaling	2,65E-01	1,16E-02	NaN	JUP,ACTG1
Melanoma Signaling	2,64E-01	1,82E-02	NaN	TP53
Actin Nucleation by ARP-WASP Complex	2,61E-01	1,79E-02	NaN	BAIAP2
MSP-RON Signaling Pathway	2,54E-01	1,69E-02	NaN	ACTG1
Induction of Apoptosis by HIV1	2,54E-01	1,67E-02	NaN	TP53
Retinoic acid Mediated Apoptosis Signaling	2,54E-01	1,64E-02	NaN	DAP3
Phospholipases	2,54E-01	1,61E-02	NaN	PAFAH1B3
AMPK Signaling	2,54E-01	1,06E-02	NaN	PPP2R1A,SMARCA4
ERK5 Signaling	2,54E-01	1,59E-02	NaN	SFN
PCP pathway	2,54E-01	1,59E-02	NaN	PFN1
RAR Activation	2,54E-01	1,05E-02	NaN	RPL7A,SMARCA4
Endometrial Cancer Signaling	2,54E-01	1,56E-02	NaN	TP53
Cell Cycle: G1/S Checkpoint Regulation	2,54E-01	1,56E-02	NaN	TP53
Hypoxia Signaling in the Cardiovascular System	2,54E-01	1,54E-02	NaN	TP53
Mitotic Roles of Polo-Like Kinase	2,54E-01	1,52E-02	NaN	PPP2R1A
UVB-Induced MAPK Signaling	2,54E-01	1,52E-02	NaN	TP53
Eicosanoid Signaling	2,54E-01	1,49E-02	NaN	PAFAH1B3
ERK/MAPK Signaling	2,54E-01	1,01E-02	NaN	PPP2R1A,MKNK2
CCRS Signaling in Macrophages	2,54E-01	1,45E-02	NaN	RACK1
Agrin Interactions at Neuromuscular Junction	2,54E-01	1,45E-02	NaN	ACTG1
Remodeling of Epithelial Adherens Junctions	2,54E-01	1,45E-02	NaN	ACTG1
Caveolar-mediated Endocytosis Signaling	2,51E-01	1,41E-02	NaN	ACTG1
Basal Cell Carcinoma Signaling	2,51E-01	1,39E-02	NaN	TP53
Role of MAPK Signaling in the Pathogenesis of	2,51E-01	1,39E-02	NaN	PAFAH1B3
Ephrin B Signaling	2,51E-01	1,37E-02	NaN	RACK1
GM-CSF Signaling	2,51E-01	1,37E-02	NaN	RACK1
Leukocyte Extravasation Signaling	2,50E-01	9,52E-03	NaN	F11R,ACTG1
Antiproliferative Role of Somatostatin Receptor	2,49E-01	1,33E-02	NaN	RACK1
Non-Small Cell Lung Cancer Signaling	2,46E-01	1,30E-02	NaN	TP53
Dopamine Receptor Signaling	2,46E-01	1,30E-02	NaN	PPP2R1A
Integrin Signaling	2,42E-01	9,13E-03	NaN	PFN1,ACTG1
ATM Signaling	2,42E-01	1,25E-02	NaN	TP53
LPS/IL-1 Mediated Inhibition of RXR Function	2,42E-01	9,01E-03	NaN	ALDH4A1,GSTP1
Renal Cell Carcinoma Signaling	2,42E-01	1,23E-02	NaN	ELOB
Systemic Lupus Erythematosus Signaling	2,39E-01	8,89E-03	NaN	SNRNP70,SNRPD2
Small Cell Lung Cancer Signaling	2,39E-01	1,19E-02	NaN	TP53
PEDF Signaling	2,39E-01	1,19E-02	NaN	TP53
β -Adrenergic Signaling	2,36E-01	1,15E-02	NaN	RACK1
Bladder Cancer Signaling	2,36E-01	1,15E-02	NaN	TP53
G Beta Gamma Signaling	2,36E-01	1,14E-02	NaN	RACK1
HER-2 Signaling in Breast Cancer	2,36E-01	1,14E-02	NaN	TP53
Crosstalk between Dendritic Cells and Natural	2,35E-01	1,12E-02	NaN	ACTG1
IL-1 Signaling	2,32E-01	1,10E-02	NaN	RACK1
Reelin Signaling in Neurons	2,32E-01	1,09E-02	NaN	PAFAH1B3
Ceramide Signaling	2,32E-01	1,08E-02	NaN	PPP2R1A
Fc γ Receptor-mediated Phagocytosis in Macrophages	2,32E-01	1,08E-02	NaN	ACTG1
Colorectal Cancer Metastasis Signaling	2,26E-01	8,10E-03	NaN	TP53,RACK1
CTLA4 Signaling in Cytotoxic T Lymphocytes	2,24E-01	1,01E-02	NaN	PPP2R1A
CDK5 Signaling	2,24E-01	1,01E-02	NaN	PPP2R1A
FAK Signaling	2,24E-01	1,01E-02	NaN	ACTG1
Virus Entry via Endocytic Pathways	2,20E-01	9,80E-03	NaN	ACTG1
UVA-Induced MAPK Signaling	2,20E-01	9,80E-03	NaN	TP53
Chronic Myeloid Leukemia Signaling	2,19E-01	9,62E-03	NaN	TP53
SAPK/JNK Signaling	2,19E-01	9,62E-03	NaN	TP53
Mouse Embryonic Stem Cell Pluripotency	2,19E-01	9,43E-03	NaN	TP53
IGF-1 Signaling	2,19E-01	9,43E-03	NaN	SFN
G β s Signaling	2,13E-01	9,17E-03	NaN	RACK1
Androgen Signaling	2,10E-01	9,01E-03	NaN	RACK1
Paxillin Signaling	2,08E-01	8,85E-03	NaN	ACTG1
Rac Signaling	2,08E-01	8,55E-03	NaN	BAIAP2
NGF Signaling	2,08E-01	8,55E-03	NaN	TP53
Axonal Guidance Signaling	2,08E-01	6,68E-03	NaN	PFN1,RACK1,BAIAP2
Pancreatic Adenocarcinoma Signaling	2,08E-01	8,47E-03	NaN	TP53
G β i Signaling	2,08E-01	8,33E-03	NaN	RACK1
LXR/RXR Activation	2,08E-01	8,26E-03	NaN	ECHS1
fMLP Signaling in Neutrophils	2,08E-01	8,26E-03	NaN	RACK1
Role of NANOG in Mammalian Embryonic Stem Cell	2,08E-01	8,20E-03	NaN	TP53
Role of Tissue Factor in Cancer	2,08E-01	8,20E-03	NaN	TP53
Sperm Motility	2,04E-01	8,00E-03	NaN	PAFAH1B3
Atherosclerosis Signaling	2,04E-01	7,87E-03	NaN	PAFAH1B3
Estrogen Receptor Signaling	2,04E-01	7,81E-03	NaN	SMARCA4
14-3-3-mediated Signaling	2,04E-01	7,69E-03	NaN	SFN
CCR3 Signaling in Eosinophils	2,04E-01	7,69E-03	NaN	RACK1
Cellular Effects of Sildenafil (Viagra)	2,04E-01	7,69E-03	NaN	ACTG1
P2Y Purigenic Receptor Signaling Pathway	2,02E-01	7,58E-03	NaN	RACK1
Adipogenesis pathway	2,00E-01	7,46E-03	NaN	TP53
Ovarian Cancer Signaling	1,83E-01	6,94E-03	NaN	TP53
Relaxin Signaling	1,71E-01	6,58E-03	NaN	RACK1
Glioblastoma Multiforme Signaling	1,62E-01	6,29E-03	NaN	TP53
G β q Signaling	1,62E-01	6,25E-03	NaN	RACK1
Dopamine-DARPP32 Feedback in cAMP Signaling	1,61E-01	6,17E-03	NaN	PPP2R1A
CXCR4 Signaling	1,59E-01	6,06E-03	NaN	RACK1

Supplementary Table 2.

GSEA, leading edge and IPA pathway analyses performed on tumor samples from a selected TCGA-COAD cohort stratified according to miR-27a levels.

2G) overrepresented pathways in the set of genes identified by leading-edge-analysis in lowmiR-27a CRCs. In bold are represented the significantly overrepresented pathways (p <0.05; Benjamini Hochberg). Ratio, fraction of genes selected for analysis over total genes annotated by IPA in the considered pathway.

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Ingenuity Canonical Pathways	-log(B-H p-value)	Ratio	z-score	Molecules
				RAF1, TGFB1, PIK3R1, SOS2, TAB2, RBL1, PAK1, PIK3CG, PLCB1, GNA13, PRKD3, PRKD1, ITGA4, CCNE2, PRKCO, TFPD1, CREB, BP, RALB, ITGA5, FGF2, RAP1A, MAX, IRS1, ARHGFE6, PIK3CD, FYN, TCF4, BMP2, CRK, FZD1, CHEK1, PIK3C3, SOS1, E2F5, ARHGFE3, ITGB1, PRKDC, PMAIP1, GNA12, GNAQ, GNAI3, PAK3, RASGRP1, RBPJ, BMP7, PRKCB, BIRC2, FZD7, MAP2K4, PRKACB, JAK1, SMAD3, PTK2, TGFB2, TGFB1, GSK3B, BIRC3, SMAD1, FZD2, CASP3, FGF1, RHOJ, APC, PIK3R3, ADCY9, RHQO, PTPN11, RND3, CDC42, RHOA, FZD6, TGFB3, PRKCH, LEF1, CDK2, FNBP1, BMP2, HIF1A, SMAD5, NFKB1, RHOH, CDKN2B, BCL2, NFKBIA, BMP1A, SMAD4, AKT3, MAP2K1, PRKCA, ARHGFE12, NRAS, PIK3C2A, HAT1, GNAI1, NBN, FZD8, RRAS2, PRKCI, PRKAR2B, MAPK14, FOXO1, NF1, PAK2, BCL2L1, WNT5A
Molecular Mechanisms of Cancer	2,35E+01	2,81E-01	NaN	CCR5, TGFB1, CTGF, SMAD3, COL8A1, IL6, CXCL9, TGFB2, TGFB1, IL1RAP, PDGFRB, TIMP2, COL4A1, FGF1, IL6R, FGF2, IGFBP5, IFNGR1, IFNAR2, MYL9, COL6A3, ACTA2, TGFB3, IGFBP3, IL10RA, CD14, PDGFD, TNF, CCR7, COL3A1, ICAM1, COL4A5, FN1, LEPR, COL10A1, CCL5, COL4A2, NFKB1, PDGFC, COL15A1, BCL2, COL1A2, COL6A1, CCL2, IGF1, HGF, PDGFR, SMAD4, COL18A1, STAT1, EGFR, COL5A2, VCAM1, FLT1, EDNRR, IL10, COL12A1, IL1R1, FGF1, COL1A1, LY96, CSF1, CCL21, EDNRA, COL11A1, KDR, A2M, MMP9
Hepatic Fibrosis / Hepatic Stellate Cell Activ	2,24E+01	3,72E-01	NaN	MAP2K4, MMP16, PIK3R1, WASL, JAM2, CXCL12, ITGB3, ROCK2, PTK2, PIK3CG, CYBB, DLC1, PRKD3, PRKD1, ITK, TIMP2, ITGA4, PRKCO, CRKL, FGF1, RDX, THY1, ITGA5, FGF2, NCF4, RAP1A, ARHGAP5, PIK3R3, ITGAM, PTPN11, ACTA2, CDH5, ICAM3, CD42, JAM3, RHOA, PLCG2, IRS1, NCF2, PECAM1, ITGA1, PRKCH, PIK3CD, ICAM1, MMP14, CRK, RHOH, PIK3C3, VCL, MMP12, ACTC1, ACTN1, PRKCA, ITGB1, TIMP3, VCAM1, PIK3C2A, CXCR4, GNAI1, ITGAL, SELPLG, BTK, ROCK1, ITGB2, GNAI3, WIPF1, EDIL3, PRKCI, MAPK14, RASGRP1, MMP9, MSN, PRKCB
Leukocyte Extravasation Signaling	2,23E+01	3,48E-01	NaN	MAP2K4, RAF1, PIK3R1, SOS2, WASL, NCK1, ITGB3, PTEN, PTK2, PAK1, ITGA9, PIK3CG, CAV1, ITGAV, GSK3B, ITGA4, ACTR2, TSAN5, CRKL, FGF1, RALB, ITGA5, FGF2, TSPAN2, RHOJ, RAP1A, ARHGAP5, PIK3R3, MYL9, RHQO, ITGAM, PTPN11, RND3, ACTA2, CDC42, RHOA, PLCG2, IRS1, ITGA1, PIK3CD, FNBP1, FYN, TSPAN7, PPP1CB, CRK, MYLK, PIK3R3, SDCBP, PTPN11, PIK3C3, SOS1, PFN2, AKT3, VCL, MAP2K1, ACTC1, ACTN1, MYL12A, ITGB1, PARVA, NRAS, PIK3C2A, ASAP1, ITGAL, ROCK1, ITGB2, WIPF1, RAS2, PAK3, LIMS1, PAK2, NEDD9
Integrin Signaling	2,12E+01	3,33E-01	NaN	SLIT3, KLC1, RAF1, ITSN1, PIK3R1, SOS2, NCK1, ADAMTS2, GNB4, PAK1, PIK3CG, PLCB1, GNA13, PRKD3, PRKD1, GNG12, ITGA4, ACTR2, PRKCO, KALRN, CRKL, TUBB2A, ITGA5, FGF2, PLCL2, RAP1A, MYL9, ADAMTS6, IRS1, PLCG2, ARHGFE6, PIK3CD, PDGFD, NRP1, FYN, BDNF, CRK, FZD1, EIF4E, ACTR3, IGF1, PIK3C3, SOS1, PFN2, PPP3CA, MYL12A, ITGAM, PTPN11, RND3, PHA3, SLIT2, GNAI3, WIPF1, TUBA1A, PAK3, ADAM10, BMP7, SEMA3C, FZD7, PRKCB, PRKACB, WASL, UNC5B, CXCL12, PTK2, ROCK2, SEMA6D, CFL2, ADAM28, GSK3B, ADAMTS5, FZD2, PAPP, ADAMTS1, FGF1, GNG2, HHP, PIK3R3, SDCBP, PTPN11, ADAM12, CDC42, RHOA, FZD6, PRKCH, ENPEP, BMP2, ROBO1, PDGFC, GNG11, SDC2, AKT3, SEMA4A, MAP2K1, PRKCA, PLXN1, ARHGFE12, NRAS, PIK3C2A, CXCR4, GNAI1, PLXND1, ROCK1, FZD8, RRAS2, PRKCI, PRKAR2B, PAK2, ADAM9, MMP9, WNT5A
Axonal Guidance Signaling	2,12E+01	2,49E-01	NaN	FCGR2C, RAF1, CD4, PIK3R1, SOS2, FCER1A, FCGR1A, CD28, GNB4, PIK3CG, PLCB1, XPO1, GNA13, GSK3B, GNG12, ITK, PRKCO, FGF1, GNG2, FGF2, CD79A, ITPR1, ATF2, PIK3R3, CD3G, PTPN11, PLCG2, IRS1, ZAP70, CD86, PIK3CD, LCP2, BLNK, FYN, FCGR2B, NFKB1, GNG11, NFKBIA, PIK3C3, SOS1, AKT3, MAP2K1, FCGR3A, FCGR3B, PPP3CA, FCGR1B, NRAS, PIK3C2A, FCGR2A, GNAI2, CSNK1G3, MEF2A, GNAQ, GNAI1, CD3D, BTK, GNAI3, RCAN1, CALM1 (includes others), RRAS2, CD80, FCER1G, LYN, MEF2C, RCAN2
Role of NFAT in Regulation of the Immune R	1,95E+01	3,46E-01	NaN	MAP2K4, RAF1, SOS3, TRAF3, PIK3R1, CXCL12, LTB, IL6, FCGR1A, IL18R1, ROCK2, TGFB1, PIK3CG, TLR1, PLCB1, DKK2, GSK3B, IL1RAP, FZD2, PRKD3, PRKD1, SFRP4, PRKCO, FGF1, CREBBP, IL6R, FGF2, PLCL2, IL7, APC, ATF2, IL33, PIK3R3, PTPN11, IL1RN, RHOA, PLCG2, IRS1, FZD6, PRKCH, PIK3CD, LEF1, PDGFD, TNF, IL6ST, TCF4, ICAM1, SFRP2, FN1, FRZB, FZD1, CCL5, NFKB1, PDGFC, NFKBIA, CCL2, DKK3, PIK3C3, CREB1, TLR7, AKT3, MAP2K1, FCGR3A, FCGR3B, PPP3CA, PRKCA, VCAM1, CSAR1, NRAS, PIK3C2A, IL10, DAAM1, GNAQ, IL1R1, ROCK1, IL16, FZD8, CALM1 (includes others), RRAS2, PRKCI, RIKP1, MAPK14, CSF1, FZD7, PRKCB, RYK, WNT5A
Role of Macrophages, Fibroblasts and Endot	1,95E+01	2,78E-01	NaN	RAF1, FCGR2C, SOS2, GNB4, PLCB1, GNA13, PRKD3, PRKD1, GNG12, ITGA4, ITK, HDAC4, PLD3, PRKCO, GNG2, RALB, CREBBP, ITGA5, PPP1R14A, CD79A, RHOJ, ITPR1, RAP1A, PLD1, ATF2, MYL9, ADCY9, CD3G, MARCKS, RHQO, RND3, RHOA, PLCG2, ZAP70, ARHGFE6, PRKCH, FNBP1, LCP2, BLNK, FYN, RPS6KA3, PPP1CB, FCGR2B, NFKB1, RHOH, TGM2, HMOX1, GNG11, PPP1R12A, SOS1, CREB1, ARHGFE3, MAP2K1, PPP3CA, PRKCA, MYL12A, ITGB1, HDAC9, NRAS, ARHGFE12, FCGR2A, MEF2A, GNAQ, CD3D, PLD4, BTK, PLA2G4A, CALM1 (includes others), RRAS2, PRKCI, FCER1G, LYN, MEF2C, PRKCB
Phospholipase C Signaling	1,95E+01	3,08E-01	NaN	MAP2K4, RAF1, PIK3R1, ITGB3, ROCK2, PTK2, GNB4, PIK3CG, ITGAV, CYBB, GNA13, PRKD3, PRKD1, TEK, GNG12, NOX4, PLD3, PRKCO, FGF1, GNG2, FGF2, RHOJ, PLD1, PIK3R3, MYL9, ITGAM, RHQO, RND3, PTPN11, RHOA, IRS1, NCF2, PRKCH, PIK3CD, FNBP1, ANGGPT2, ICAM1, NFKB1, IQGAP1, PDGFC, RHOH, BCL2, HMOX1, GNG11, PIK3C3, AKT3, MAP2K1, PRKCA, EGFR, VCAM1, NRAS, ANGGPT1, FLT1, PIK3C2A, GNA12, GNAI1, PLD4, ROCK1, GNAI3, ITGB2, RRAS2, PRKCI, PAK2, KDR, MMP9, PRKCB
IL-8 Signaling	1,95E+01	3,35E-01	NaN	RAF1, F2R, PIK3R1, SOS2, WASL, SSH1, ROCK2, PTK2, PAK1, CFL2, PIK3CG, GNA13, GNG12, MATR, ITGA4, ACTR2, TIAM1, FGF9, CRKL, FGF1, RDX, ITGA5, FGF2, APC, PIK3R3, MYL9, PIP5K1A, PTPN11, ACTA2, CYFIP1, CDC42, ITGAM, IRS1, ARHGFE6, CD14, PIK3CD, PDGFD, PIP4K2A, FN1, TRIO, PPP1CB, CRK, MYLK, IQGAP1, PDGFC, IQGAP2, ACTR3, PPP1R12A, FLNA, PIK3C3, SOS1, PFN2, VCL, FGF7, MAP2K1, ACTC1, ACTN1, NCKAP1, MYL12A, ITGB1, NRAS, ARHGFE12, PIK3C2A, GNA12, FGF1, ROCK1, RRAS2, PAK3, PAK2, NCKAP1, MSN
Actin Cytoskeleton Signaling	1,90E+01	3,11E-01	NaN	MAP2K4, RAF1, PIK3R1, WASL, CLIP1, ROCK2, PTK2, GNB4, PAK1, CFL2, PIK3CG, CYBB, GNA13, CDH13, GNG12, ITGA4, ACTR2, NOX4, FGF1, GNG2, RDX, ITGA5, FGF2, RHOJ, PLD1, PIK3R3, MYL9, PIP5K1A, CDH2, RHQO, PTPN11, RND3, ACTA2, CDH5, CYFIP1, CDC42, RHOA, IRS1, ARHGFE6, NCF2, PIK3CD, PIP4K2A, FNBP1, WASF3, MYLK, NFKB1, IQGAP1, RHOH, CDH11, ACTR3, GNG11, PPP1R12A, PIK3C3, ARHGFE3, MAP2K1, ACTC1, MYL12A, ITGB1, NEDD4, ARHGFE12, PIK3C2A, GNA12, GNAQ, GNAI3, PTPN11, VIM, CDC42EP3, ROCK1, GNAI3, WIPF1, PRKCI, PAK3, PAK2, MSN
Signaling by Rho Family GTPases	1,81E+01	2,96E-01	NaN	MAP2K4, JAK1, PIK3R1, FCER1A, PTK2, GNB4, PAK1, PIK3CG, GNA13, PRKD3, PRKD1, GNG12, FGR, ITGA4, ITK, PRKCO, FGF1, GNG2, ITGA5, FGF2, RHOJ, PIK3R3, RHQO, RND3, ACTA2, PTPN11, RHOA, PLCG2, IRS1, PRKCH, PIK3CD, TNF, FNBP1, FYN, TNFSF10, NFKB1, RHOH, GNG11, PIK3C3, HCK, STAT1, ACTC1, PRKCA, ITGB1, PIK3C2A, GNA12, GNAQ, GNAI1, BTK, STAT4, GNAI3, PRKCI, PAK3, PAK2, FCER1G, LYN, PRKCB
Tec Kinase Signaling	1,68E+01	3,35E-01	NaN	SOS3, CCR5, TGFB1, TNFRSF4, JAK1, TGFB3, CD4, PIK3R1, MAF, IL6, CD8A, IL18R1, TGFB2, CD28, TGFB1, PIK3CG, CD274, IL2RB, PRKCO, FGF1, IL6R, FGF2, IFNGR1, IL33, PIK3R3, CD3G, PTPN11, IRS1, IL10RA, CXCR6, CD86, PIK3CD, TNFSF4, ICAM1, BMPR2, NFKB1, NFIL3, NOTCH2, PIK3C3, IL27RA, STAT1, CCR1, PIK3C2A, CXCR4, IL10, IKZF1, ACVR1, CD3D, TSLP, STAT4, ITGB2, NOTCH4, CD80, IL12B, ICOS, S1PR1, IL2RA, GATA3, ACVR2A
Th1 and Th2 Activation Pathway	1,63E+01	3,19E-01	NaN	MAP2K4, RAF1, CD4, PIK3R1, CXCL12, PTK2, ROCK2, GNB4, PAK1, PIK3CG, PLCB1, GNA13, PRKD3, PRKD1, GNG12, PRKCO, FGF1, GNG2, FGF2, RHOJ, ITPR1, MYL9, PIK3R3, ADCY9, RHQO, RND3, PTPN11, RHOA, IRS1, PRKCH, PIK3CD, ELMO1, FNBP1, CRK, RHOH, GNG11, PIK3C3, AKT3, MAP2K1, PRKCA, MYL12A, NRAS, PIK3C2A, CXCR4, GNA12, GNAQ, GNAI1, ROCK1, PIK3C3, PRKCI, RRAS2, PAK3, PAK2, LYN, PRKCB
CXCR4 Signaling	1,61E+01	3,33E-01	NaN	MAP2K4, PIK3R1, TAB2, ACP5, IL6, ITGB3, IL18R1, TGFB1, RUNX2, PIK3CG, DKK2, GSK3B, IL1RAP, ADAMTS5, BIRC3, SMAD1, FZD2, SFRP4, SPP1, FGF1, ITGA5, FGF2, IL7, APC, IL33, PIK3R3, PTPN11, IL1RN, IRS1, FZD6, LEF1, PIK3CD, TNF, TCF4, SFRP2, FRZB, MMP14, BMP2, BMPR2, FZD1, SMAD5, NFKB1, BCL2, NFKBIA, IGF1, BMP1A, DKK3, PIK3C3, SMAD4, AKT3, PPP3CA, ITGB1, CTSC, PIK3C2A, IL10, IL1R1, CSF1R, FZD8, COL1A1, CALM1 (includes others), MAPK14, FOXO1, CSF1, BMP7, BIRC2, WNT5A, FZD7
Role of Osteoblasts, Osteoclasts and Chondr	1,61E+01	2,89E-01	NaN	MRC1, FCGR2C, FN1, MSR1, PIK3R1, FCER1A, FCGR2B, FCGR1A, RHOH, PIK3CG, PIK3C3, TLR1, TLR7, PLCB1, PRKD3, FCGR3A, FCGR3B, PRKD1, FCGR1B, ITGA4, PRKCA, ITGB1, PRKCO, PIK3C2A, FCGR2A, MRC2, FGF1, ITGA5, FGF2, RHOJ, PLCL2, PIK3R3, MARCKS, CLEC7A, RHQO, PRKCI, RND3, PTPN11, SCARA3, RHOA, PLCG2, IRS1, FCER1G, PIK3CD, PRKCH, FNBP1, PRKCB
Phagosome Formation	1,58E+01	3,77E-01	NaN	RAF1, F2R, PIK3R1, GATA2, ROCK2, PTK2, GNB4, PIK3CG, PLCB1, GNA13, PRKD3, PRKD1, GNG12, PRKCO, FGF1, GNG2, FGF2, RHOJ, PLCL2, ITPR1, PIK3R3, MYL9, ADCY9, RHQO, RND3, PTPN11, RHOA, PLCG2, IRS1, ARHGFE6, PRKCH, FNBP1, PIP1CB, MYLK, NFKB1, RHOH, GNG11, PPP1R12A, PIK3C3, SOS1, CREB1, AKT3, ARHGFE3, MAP2K1, PRKCA, MYL12A, EGFR, NRAS, ARHGFE12, PIK3C2A, GNA12, GNAQ, GNAI1, ROCK1, GNAI3, RRAS2, MAPK14, PRKCI, GATA3, PRKCB
Thrombin Signaling	1,55E+01	3,00E-01	NaN	RAF1, ITSN1, WASL, SOS2, CXCL12, NCK1, PTK2, ROCK2, GNB4, PAK1, CFL2, PIK3CG, GNA13, GNG12, ITGA4, ACTR2, KALRN, CRKL, GNG2, CREBBP, ITGA5, RAP1A, ATF2, SDCBP, PTPN11, CDC42, RHOA, PDGFD, FYN, CRK, PDGFC, ACTR3, GNG11, SDC2, SORBS1, SOS1, AKT3, MAP2K1, ITGB1, NRAS, ANGGPT1, CXCR4, GNA12, GNAQ, GNAI1, EPHA3, FGF1, ROK1, GNAI3, WIPF1, RRAS2, PAK3, PAK2, ADAM10
Ephrin Receptor Signaling	1,50E+01	3,16E-01	NaN	MRC1, PIK3R1, ITGB8, PDGFC, ITGB3, RAB5A, PAK1, HGF, PIK3CG, PIK3C3, PRKD3, PRKD1, PRKCA, ITGB1, NRAS, PRKCO, PIK3C2A, FGF1, ITGA5, FGF2, CSF1R, PIK3R3, ITGB2, PRKCI, RRAS2, PTPN11, CSF1, CDC42, RHOA, PLCG2, IRS1, CD14, PIK3CD, PRKCH, PDGFD, PRKCB
Macropinocytosis Signaling	1,50E+01	4,44E-01	NaN	

Role of NFAT in Cardiac Hypertrophy	1,49E+01	3,02E-01	NaN	MAP2K4,PRKACB,RAF1,TGFBF1,PIK3R1,SOS2,IL6,TGFBF2,GNB4,TGFB1,PIK3CG,PLCB1,GSK3B,PRKD3,PRKD1,GN12,P RKCO,HDAC4,FGFR1,NG2,FGFR2,PLCL2,ITPR1,PIK3R3,ADCY9,PTPN11,PLCG2,IRS1,TGFB3,PRKCH,PIK3CD,SLC8A1,IL6 ST,GN11,JGF1,PIK3C3,SOS1,AKT3,MAP2K1,PPP3CA,PRKCA,HDAC9,NRAS,PIK3C2A,MAP3K1,MEF2A,GNAQ,GNAI1,RC AN1,GNAI3,CALM1 (includes others),PRKAR2B,MAPK14,PRKCI,RRAS2,MEF2C,RCAN2,PRKCB MAP2K4,RAF1,PIK3R1,SOS2,IL6,PTK2,PAK1,HGF,PIK3CG,PIK3C3,SOS1,AKT3,MAP2K1,PRKD3,PRKD1,ITGA4,MAP3K2,P RKCA,ETS1,ITGB1,NRAS,PRKCO,PIK3C2A,CRKL,FGFR1,MAP3K1,ITGA5,FGFR2,RAP1A,ATF2,PIK3R3,PRKCI,RRAS2,PTPN 11,CDC42,PLCG2,IRS1,PIK3CD,MAP3K8,PRKCH,ELK3,CDK2,PRKCB MAP2K4,PIK3R1,ITGB3,PTEN,PTK2,CFL2,PIK3CG,GSK3B,CASP3,FGFR1,CREBBP,FERMT2,SNAI1,FGFR2,RHOJ,ATF2,MYL 9,PIK3R3,RHOQ,RND3,ACTA2,PTPN11,CDC42,PPP2R3A,RHOA,IRS1,ARHGFE6,LEF1,PIK3CD,TNF,FNBP1,SNAI2,FN1,FM P2,HIF1A,ITGB8,NFKB1,PDGFC,RHOH,PPP1R12A,FLNA,PIK3C3,CREB1,AKT3,VCL,ACTC1,ACTN1,ITGB1,PARVA,PIK3C2A ,VIM,RPS6KA5,ITGB2,FLNC,UIMS1,PPP2R5E,PPP2R1B,MMP9 PRKACB,RAF1,PIK3R1,SOS2,ROCK2,GNB4,PAK1,PIK3CG,PLCB1,GNAI3,PRKD3,PRKD1,GN12,CCNE2,PRKCO,FGFR1,G NG2,TUBB2A,FGFR2,PPP1R14A,ITPR1,PIK3R3,ADCY9,PTPN11,CDC42,PPP2R3A,RHOA,IRS1,ARHGFE6,PRKCH,PIK3CD, UHMK1,CDK2,PPP1R3C,PPP1CB,GN11,PPP1R12A,PIK3C3,SOS1,E2F5,RB1C1,ARHGFE3,MAP2K1,PRKCA,NRAS,ARH GEF12,PIK3C2A,GNAQ,GNAI1,ROCK1,GNAI3,CALM1 (includes others),RRAS2,TUBA1A,PRKAR2B,PRKCI,PPP2R5E,PPP2R1B,PRKCB MAP2K4,PRKACB,JAK1,TGFBF1,SMAD3,MMP16,PIK3R1,SOS2,IL6,TGFBF2,GNB4,TGFB1,PIK3CG,TLR1,GSK3B,FZD2,GN G12,CASP3,FGFR1,NG2,IL6R,FGFR2,IFNGR1,RHOI,APC,PIK3R3,ADCY9,RHOQ,PTPN11,RND3,PRKCH,PIK3CG,FGFR1,FGF R2,PIK3R3,IL33,CD3G,PTPN11,IRS1,CXCR6,CD86,PIK3CD,TNFSF4,ICAM1,BMPR2,NFKB1,NOTCH2,PIK3C3,CCR1,PIK3C2 A,CXCR4,IL10,IKZF1,ACVR1,TSLP,CD3D,STAT4,ITGB2,NOTCH4,CD80,IL12B,ICOS,S1PR1,IL2RA,GATA3,ACVR2A RAF1,CCR5,PIK3R1,CD4,NFKB1,ITGB3,NFKBIA,PIK3CG,PIK3C3,ITGAV,AKT3,PRKD3,PRKD1,ITGA4,PRKCA,ITGB1,NRAS,P RKCO,PIK3C2A,FGFR1,MAP3K1,ITGA5,FGFR2,ITGAL,PIK3R3,ITGB2,RRAS2,PRKCI,RIPK1,PTPN11,IRS1,ITGA1,PIK3CD,PR KCH,EIF2AK2,PRKCB MAP2K4,RAF1,JAK1,TGFBF1,SMAD3,PIK3R1,SOS2,TGFBF2,TGFB1,PIK3CG,GSK3B,FZD2,PDGFRB,ETS1,FGF9,FGFR1,SN AI1,FGFR2,ZEB1,APC,PIK3R3,CDH2,PTPN11,RHOA,IRS1,FZD6,TGFB3,LEF1,PIK3CD,PDGFR,ITGAL,ITGAE,ITGAE1,ITGAE2, 1,NFKB1,NOTCH2,PIK3C3,HGF,SOS1,SMAD4,AKT3,MAP2K1,FGF7,EGFR,NRAS,PIK3C2A,FGF1,FZD8,NOTCH4,RRAS2,ZE B2,RBPJ,MMP9,WNT5A,FZD7 MAP2K4,RAF1,PIK3R1,WASL,SOS2,MYLK,NCK1,PDGFC,PTK2,PAK1,CFL2,PIK3CG,PIK3C3,SOS1,PDGfra,MAP2K1,ITGA 4,MYL12A,PDGFRB,ITGB1,NRAS,CASP3,PIK3C2A,FGFR1,ITGA5,FGFR2,EPHA3,MYL9,PIK3R3,RRAS2,PAK3,PTPN11,CDC 42,IRS1,ARHGFE6,PAK2,PIK3CD,PDGFD,TNF TCF4,TGFBF1,BMP2,TGFBF3,BMPR2,SMAD5,FZD1,TGFBF2,BMPR1A,TGFB1,SMAD4,GSK3B,SMAD1,FZD2,PRKD3,PRK D1,PRKCA,NOX4,CCNE2,PRKCO,CD6,ACVR1,APC,ATF2,FZD8,MAPK14,PRKCI,FZD6,TGFB3,MEF2C,PRKCH,BMP7,LEF1, CDK2,ACVR2A,FZD7,PRKCB RAF1,FYN,PIK3R1,KLRB1,SOS2,NCK1,CD300A,PAK1,SH2D1A,PIK3CG,PIK3C3,SOS1,AKT3,PRKD3,MAP2K1,FCGR3A/FCG R3B,PRKD1,PRKCA,NRAS,PRKCO,KLRC4- KLRL1/KLRL1,LAIR1,PIK3C2A,FCGR2A,TYROBP,FGFR1,FGFR2,LILRB1,PIK3R3,RRAS2,PRKCI,INPP5F,PAK3,PTPN11,PLCG 2,IRS1,PAK2,ZAP70,FCER1G,PIK3CD,PRKCH,LCP2,PRKCB MAP2K4,RAF1,PIK3R1,IQGAP1,NFKB1,CDK5R1,PTK2,PAK1,IQGAP2,ACTR3,CFL2,PIK3CG,PIK3C3,CYBB,MAP2K1,NCKA P1,ITGA4,ITGB1,ACTR2,NOX4,TIAM1,NRAS,PIK3C2A,FGFR1,MAP3K1,ITGA5,FGFR2,PLD1,PIK3R3,PIPSK1A,PRKCI,RRAS 2,PAK3,PTPN11,CDC42,CYFIP1,RHOA,IRS1,NCF2,PAK2,PIK3CD,PIP4K2A MAP2K4,PIK3R1,SOS2,CRK,ITGB8,NCK1,ITGB3,PTK2,PAK1,ITGA9,PIK3CG,PIK3C3,SOS1,ITGAV,VCL,ACTC1,ACTN1,ITGA 4,ITGB1,PARVA,NRAS,PIK3C2A,FGFR1,ITGA5,FGFR2,ITGAL,GIT2,PIK3R3,ITGB2,RRAS2,MAPK14,ITGAM,ACTA2,PAK3,P TPN11,CDC42,IRS1,PAK2,ARHGFE6,ITGA1,PIK3CD MAP2K4,FCGR2C,PIK3R1,LTB,IL6,FCGR1A,CD1D,PIK3CG,PLCB1,FGFR1,CREBBP,CD1B,FGFR2,PLCL2,ATF2,PIK3R3,IL33, PTPN11,IL1RN,IRS1,PLCG2,CD86,PIK3CD,IRF8,TNF,CCR7,COL3A1,ICAM1,LEPR,COL10A1,CD83,FCGR2B,NFKB1,COL1A 2,NFKBIA,DDR2,PIK3C3,CREB1,AKT3,CD1C,STAT1,COL18A1,FCGR3A/FCGR3B,FCGR1B,PIK3C2A,IL10,FCGR2A,TYROBP, STAT4,COL1A1,MAPK14,CD80,IL12B,TREM2,FCER1G MAP2K4,TGFBF1,PIK3R1,WASL,PTK2,TGFBF2,PAK1,CFL2,TGFB1,PIK3CG,MTMR2,MAP3K2,FGFR1,TUBB2A,FGFR2,RH OJ,PLS1,PIK3R3,CDH2,RHOQ,RND3,ACTA2,PTPN11,CDC42,RHOA,IRS1,TGFB3,PIK3CD,TNF,FNBP1,NECTIN3,IQGAP1,R HOH,AGG1,SORBS1,PIK3C3,VCL,MAP2K1,ACTC1,RAB8B,ACTN1,ITGB1,NRAS,PIK3C2A,MAP3K1,TUBA1A,MAPK14,RR AS2,PAK3,PAK2,MAP3K8,A2M MAP2K4,RAF1,FCGR2C,PIK3R1,SOS2,BCL6,PTEN,PTPRC,PTK2,CFL2,PIK3CG,GSK3B,MAP3K2,ETS1,PRKCO,FGFR1,CREB BP,FGFR2,CD79A,MALT1,RAP1A,ATF2,PIK3R3,PTPN11,INPP5F,CDC42,PLCG2,IRS1,PIK3CD,BCL2A1,BLNK,FCGR2B,NFK B1,NFKBIA,PIK3C3,CREB1,SOS1,AKT3,MAP2K1,PPP3CA,NRAS,PIK3C2A,FCGR2A,MAP3K1,BTK,CALM1 (includes others),MAPK14,RRAS2,FOXO1,PAG1,LYN,MAP3K8,MEF2C,PRKCB MAP2K4,PRKACB,RAF1,PIK3R1,SOS2,CCL5,NFKB1,PTK2,PAK1,CCL2,PIK3CG,PIK3C3,SOS1,STAT1,PRKD3,MAP2K1,PRK D1,PRKCA,NRAS,PRKCO,PIK3C2A,FGFR1,MAP3K1,GNAQ,FGFR2,ITPR1,ATF2,PIK3R3,ADCY9,RRAS2,PRKAR2B,MAPK14, PRKCI,PAK3,PTPN11,PLCG2,IRS1,PAK2,PIK3CD,PRKCH,TNF,PRKCB MAP2K4,PIK3R1,C1QC,C1QA,C1QB,CCL5,IL6,NFKB1,EIF2S1,IFIH1,TGFB1,PIK3CG,PIK3C3,TLR1,CREB1,TLR7,PRKD3,PR KD1,PRKCA,PTX3,OAS1,NLRP3,PRKCO,CSAR1,OAS2,PIK3C2A,IL10,FGFR1,FGFR2,OAS3,PIK3R3,CLEC7A,PRKCI,PTPN11, IL12B,PLCG2,IRS1,DDX58,TGFB3,PIK3CD,PRKCH,EIF2AK2,C3AR1,TNF,PRKCB MAP2K4,JAK1,PIK3R1,PIK3CG,CYBB,PRKD3,PRKD1,MAP3K2,PRKCO,FGFR1,CREBBP,FGFR2,PPP1R14A,RHOJ,IFNGR1,N CF4,RAP1A,PIK3R3,RHOQ,RND3,PTPN11,PPP2R3A,RHOA,IRS1,PLCG2,NCF2,PRKCH,PIK3CD,IRF8,TNF,FNBP1,APOD,AP OE,PPP1R3C,PPP1CB,NFKB1,RHOH,NFKBIA,PPP1R12A,PIK3C3,AKT3,STAT1,MAP2K1,PRKCA,PIK3C2A,MAP3K1,MAPK14,PR K14,PRKCI,CAT,APOC1,MAP3K8,PPP2R5E,PPP2R1B,CLU,PRKCB MAP2K4,PRKACB,RAF1,TGFBF1,PIK3R1,IL6,TGFBF2,ROCK2,GNB4,TGFB1,PIK3CG,PLCB1,GNAI3,GSK3B,GN12,MAP3 K2,FGFR1,NG2,IL6R,CREBBP,FGFR2,RHOJ,PLCL2,ATF2,MYL9,PIK3R3,ADCY9,RHOQ,RND3,PTPN11,RHOA,PLCG2,IRS1, TGFB3,PIK3CD,FNBP1,RHOH,EIF4E,GN11,JGF1,PIK3C3,SOS1,CREB1,MAP2K1,PPP3CA,MYL12A,ADRB2,NRAS,PIK3C2 A,GNAI2,MAP3K1,MEF2A,GNAQ,GNAI1,ROCK1,GNAI3,CALM1 (includes others),PRKAR2B,MAPK14,RRAS2,MEF2C,MAP3K8 FYN,ITSN1,PIK3R1,ITGB8,ITGB3,FLNA,PIK3CG,PIK3C3,CAV1,PRKD3,ACTC1,PRKD1,ITGA4,PRKCA,ITGB1,NRAS,PRKCO,P IK3C2A,FGFR1,ITGA5,FGFR2,ITGAL,PIK3R3,ITGB2,RRAS2,PRKCI,ACTA2,PTPN11,CDC42,FLNC,PLCG2,IRS1,TFRC,ITGA1, PIK3CD,PRKCH,CXADR,PRKCB MAP2K4,PRKACB,RAF1,JAK1,TGFBF1,SGK1,SMAD3,PIK3R1,SOS2,PBX1,IL6,HSPA5,FCGR1A,TGFBF2,TGFB1,PIK3CG,FG FR1,CREBBP,FGFR2,MED14,NCOA3,TAF9B,PIK3R3,CD3G,PTPN11,IL1RN,SMARCA2,IRS1,TGFB3,NCOA1,HSP90AA1,PIK 3CD,TNF,ESR1,PBRM1,ICAM1,CCL5,NFKB1,CCL3,GT2A1,NR3C1,BCL2,CCL13,KAT2B,NFKBIA,CCL2,PIK3C3,ANXA1,SOS 1,CREB1,SMAD4,AKT3,STAT1,FKBP5,TA2,MAP2K1,PPP3CA,ADRB2,VCAM1,NRAS,PIK3C2A,IL10,MAP3K1,CCL11,CD3 D,RRAS2,MAPK14,NRIP1,SMARCC1,A2M FYN,PIK3R1,CRK,NCK1,FCGR1A,PTEN,HMOX1,PAK1,ACTR3,PIK3CG,HCK,VAMP3,AKT3,ACTC1,PRKD3,FCGR3A/FCGR3 B,PRKD1,FGFR,PRKCA,ACTR2,PRKCO,PLD3,FCGR2A,FYB,PLD1,MYO5A,PLD4,PIK3R3,PIPSK1A,PRKCI,ACTA2,CDC42,LYN, PRKCH,LCP2,PRKCB MAP2K4,RAF1,PIK3R1,SOS2,NCK1,NRG1,PAK1,PIK3CG,ERBB4,PIK3C3,SOS1,GSK3B,PRKD3,MAP2K1,PRKD1,PRKCA,EG FR,NRAS,PRKCO,PIK3C2A,FGFR1,FGFR2,PIK3R3,RRAS2,MAPK14,PRKCI,PAK3,PTPN11,FOXO1,CDC42,PLCG2,IRS1,PAK 2,PIK3CD,PRKCH,EREG,PRKCB RAF1,FYN,PIK3R1,HMMR,SOS2,CRK,PTEN,PTK2,PAK1,PIK3CG,PIK3C3,SOS1,AKT3,VCL,MAP2K1,ACTC1,ITGA4,EGFR,IT GB1,NRAS,PIK3C2A,ASAP1,FGFR1,ITGA5,FGFR2,GIT2,PIK3R3,RRAS2,ACTA2,PAK3,PTPN11,PLCG2,IRS1,ARHGFE6,PAK 2,PIK3CD,TNS1 RAF1,PIK3R1,PPP1CB,MYLK,ROCK2,GNB4,PAK1,GN11,CFL2,PPP1R12A,PIK3CG,PIK3C3,PLCB1,PRKD3,MAP2K1,PRKD 1,GN12,PRKCA,NRAS,PRKCO,PIK3C2A,FGFR1,NG2,GNAI1,FGFR2,ITPR1,CCL11,PIK3R3,ROCK1,CALM1 (includes others),GNAI3,PLA2G4A,RRAS2,MAPK14,PRKCI,PAK3,PTPN11,RHOA,IRS1,PAK2,PIK3CD,PRKCH,PRKCB PRKACB,RAF1,TRAF3,TGFBF1,TGFBF3,PIK3R1,TAB2,TNFRSF17,TGFBF2,PIK3CG,TLR1,GSK3B,PDGFRB,PRKCO,FGFR1,C REBBP,FGFR2,MALT1,PIK3R3,IL33,PTPN11,IL1RN,PLCG2,IRS1,ZAP70,PIK3CD,TNF,BMP2,TNFAIP3,BMPR2,NFKB1,TAN K,NFKBIA,BMPR1A,PIK3C3,TLR7,PDGfra,AKT3,EGFR,NRAS,FLT1,PIK3C2A,MAP3K1,IL1R1,RIPK1,RRAS2,PELL1,FCER1G, MAP3K8,EIF2AK2,KDR,PRKCB RAF1,PIK3R1,SOS2,RBL1,CDKN2B,PDGFC,LDH1,PTEN,IGF1,PIK3CG,PIK3C3,SOS1,PDGFRA,E2F5,AKT3,PRKD3,MAP2K1, PRKD1,PRKCA,PDGFRB,EGFR,RBL2,NRAS,PRKCO,TFDP1,PIK3C2A,FGFR1,FGFR2,PIK3R3,CALM1 (includes others),RRAS2,PRKCI,PTPN11,PLCG2,IRS1,PIK3CD,PRKCH,PDGFD,PRKCB
HGF Signaling	1,47E+01	3,74E-01	NaN	
ILK Signaling	1,45E+01	2,96E-01	NaN	
Breast Cancer Regulation by Stathmin1	1,44E+01	2,91E-01	NaN	
Colorectal Cancer Metastasis Signaling	1,42E+01	2,67E-01	NaN	
Th2 Pathway	1,41E+01	3,27E-01	NaN	
NF- κ B Activation by Viruses	1,41E+01	4,19E-01	NaN	
Regulation of the Epithelial-Mesenchymal T	1,41E+01	2,96E-01	NaN	
PAK Signaling	1,39E+01	3,86E-01	NaN	
Factors Promoting Cardiogenesis in Vertebr	1,39E+01	4,02E-01	NaN	
Natural Killer Cell Signaling	1,37E+01	3,52E-01	NaN	
Rac Signaling	1,37E+01	3,59E-01	NaN	
Paxillin Signaling	1,36E+01	3,63E-01	NaN	
Dendritic Cell Maturation	1,34E+01	2,89E-01	NaN	
Germ Cell-Sertoli Cell Junction Signaling	1,34E+01	3,01E-01	NaN	
B Cell Receptor Signaling	1,34E+01	2,92E-01	NaN	
Renin-Angiotensin Signaling	1,34E+01	3,50E-01	NaN	
Role of Pattern Recognition Receptors in Re	1,32E+01	3,28E-01	NaN	
Production of Nitric Oxide and Reactive Oxy	1,32E+01	2,85E-01	NaN	
Cardiac Hypertrophy Signaling	1,32E+01	2,64E-01	NaN	
Virus Entry via Endocytic Pathways	1,31E+01	3,73E-01	NaN	
Glucocorticoid Receptor Signaling	1,31E+01	2,44E-01	NaN	
Fc γ Receptor-mediated Phagocytosis in Mac	1,30E+01	3,87E-01	NaN	
ErbB Signaling	1,30E+01	3,78E-01	NaN	
FAK Signaling	1,28E+01	3,74E-01	NaN	
CCR3 Signaling in Eosinophils	1,28E+01	3,31E-01	NaN	
NF- κ B Signaling	1,28E+01	2,89E-01	NaN	
Glioma Signaling	1,27E+01	3,55E-01	NaN	

FMLP Signaling in Neutrophils	1,26E+01	3,39E-01	NaN	FPR3,RAF1,PIK3R1,NFKB1,GNB4,ACTR3,NGG11,NFKBIA,PIK3CG,PIK3C3,CYBB,PLCB1,PRKD3,MAP2K1,PRKD1,GNG12,PPP3CA,PRKCA,ACTR2,NOX4,NRAS,PRKCO,PIK3C2A,FGFR1,NGG2,GNAI1,FGFR2,ITPR1,FP1,PIK3R3,CALM1 (includes others),GNAI3,RRAS2,PRKCI,PTPN11,CDC42,IRS1,NCF2,PIK3CD,PRKCH,PRKCB
Glioblastoma Multifactorial Signaling	1,26E+01	3,02E-01	NaN	RAF1,PIK3R1,SOS2,FZD1,PDGFC,RHOH,PTEN,IGF1,PIK3CG,PIK3C3,SOS1,PDGFRA,E2F5,PLCB1,AKT3,GSK3B,FZD2,MAP2K1,EGFR,PDGFRB,NRAS,PIK3C2A,FGFR1,FGFR2,RHOJ,PLCL2,ITPR1,APC,PIK3R3,FZD8,RRAS2,RHOQ,RND3,FOXO1,PTP N11,NF1,CDC42,RHOA,PLCG2,IRS1,FZD6,LEF1,PIK3CD,PDGFD,CDK2,FNBP1,WNF5A,FZD7
Cholecystokinin/Gastrin-mediated Signaling	1,26E+01	3,66E-01	NaN	MAP2K4,RAF1,SOS2,RHOH,PTK2,ROCK2,SOS1,PLCB1,GNAI3,PRKD3,MAP2K1,PRKD1,PRKCA,EGFR,NRAS,PRKCO,GNA 12,MEF2A,GNAQ,RHOJ,ITPR1,ATF2,ROCK1,IL33,RRAS2,RHOQ,MAPK14,PRKCI,RND3,IL1RN,RHOA,CREM,MEF2C,PRK C H,TNF,FNBP1,PRKCB
G β q Signaling	1,25E+01	3,00E-01	NaN	RAF1,RGS18,PIK3R1,NFKB1,RHOH,ROCK2,HMOX1,GNB4,NGG11,NFKBIA,PIK3CG,PIK3C3,PLCB1,AKT3,GSK3B,PRKD3, MAP2K1,PRKD1,NGG12,PPP3CA,PRKCA,RRAS2,PRKCO,PLD3,PIK3C2A,FGFR1,NGG2,GNAQ,FGFR2,RHOJ,ITPR1,PLD1,PL D4,BTK,PIK3R3,ROCK1,CALM1 (includes others),PRKCI,RHOQ,RND3,PTPN11,RHOA,PLCG2,IRS1,PRKCH,PIK3CD,FNBP1,PRKCB
Protein Kinase A Signaling	1,24E+01	2,14E-01	NaN	PRKACB,RAF1,TGFBFR1,PTPN14,SMAD3,AKAP9,PTEN,PTPRC,ROCK2,PTK2,TGFBFR2,YWHAQ,GNB4,TGFB1,PLCB1,GNA1 3,GSK3B,PRKD3,PRKD1,NGG12,SMPDL3A,PTPRG,PRKCO,NGG2,CREBBP,YWHAZ,PPP1R14A,PLCL2,PDE4B,ITPR1,PTP A1,RAP1A,PTPRM,ATF2,PDE8A,MYL9,ADCY9,AKAP13,PTPN11,RHOA,PLCG2,PTPRB,CREM,TGFB3,PRKCH,LEF1,EBI3,TC F4,PPP1R3C,UBASH3B,PPP1CB,MYL,PDE1A,NFKB1,CDKN3,NFKBIA,NGG11,PPP1R12A,FLNA,CREB1,PTPN1,SMAD4,P DE4D,MAP2K1,PPP3CA,PRKCA,MYL12A,ATF1,MAP3K1,GNAQ,GNAI1,PYGL,ROCK1,CALM1 (includes others),GNAI3,PRKCI,PRKAR2B,ADD3,FLNC,AKAP10,PDE5A,PTPN22,CDK27,PRKCB
T Cell Receptor Signaling	1,21E+01	3,49E-01	NaN	MAP2K4,RAF1,FYN,PIK3R1,CD4,SOS2,NFKB1,CD8A,CTLA4,PTPRC,CD28,NFKBIA,PIK3CG,PIK3C3,SOS1,MAP2K1,PPP3C A,ITK,NRAS,PRKCO,PIK3C2A,FGFR1,MAP3K1,FGFR2,MALTI,CD3D,BTK,PIK3R3,CD3G,CALM1 (includes others),RRAS2,PTPN11,RASGRP1,IRS1,PAG1,ZAP70,PIK3CD,LCP2
p70S6K Signaling	1,20E+01	3,21E-01	NaN	RAF1,JAK1,F2R,PIK3R1,SOS2,YWHAQ,PIK3CG,PIK3C3,SOS1,PLCB1,AKT3,PRKD3,MAP2K1,PRKD1,PRKCA,EGFR,NRAS,P RKCO,PIK3C2A,FGFR1,YWHAZ,GNAI1,GNAQ,FGFR2,CD79A,PLCL2,PLD1,BTK,PIK3R3,GNAI3,RRAS2,PRKCI,PTPN11,PPP 2R3A,PLCG2,IRS1,LIN,PIK3CD,PRKCH,PPP2R5E,PPP2R1B,PRKCB
Granulocyte Adhesion and Diapedesis	1,19E+01	2,82E-01	NaN	SELL,MMP16,CXCL12,CXCL9,ITGB3,CXCL10,IL1RAP,ITGA4,CSF3R,RDX,ITGA5,THY1,FP1R,IL13,ITGAM,CCL4,SELP,CDH5, JAM3,IL1RN,PECAM1,ITGA1,TNF,FPR3,ICAM1,MMP14,CCL22,CCL5,CCL3,CCL13,CCL8,CCL2,SDC2,XCL1,MMP12,ITGB1 ,VCAM1,CSAR1,CXCR4,GNAI1,IL1R1,CCL11,ITGAL,SELP,ITGB2,GNAI3,CCL21,MMP9,CCL7,MSN
Human Embryonic Stem Cell Pluripotency	1,19E+01	3,08E-01	NaN	TCF4,TGFBFR1,BDNF,PIK3R1,BMP2,SMAD3,BMP2,SMAD5,FZD1,PDGFC,TGFBFR2,BMP1R1A,INHB1,PIK3CG,PIK3C3,PDG FRA,SPHK1,AKT3,SMAD4,GSK3B,SMAD1,FZD2,PDGFRB,PIK3C2A,FGFR1,ACVR1,FGFR2,APC,GNB8,PIK3R3,S1PR3,FZD 8,FOXO1,PTPN11,IRS1,TGFB3,S1PR1,FZD6,LEF1,BMP7,PIK3CD,PDGFD,WNF5A,FZD7
Mouse Embryonic Stem Cell Pluripotency	1,19E+01	3,49E-01	NaN	IL6ST,RAF1,TCF4,JAK1,PIK3R1,SOS2,BMP2,SMAD5,FZD1,LIFR,BMP1R1,PIK3CG,PIK3C3,SOS1,SMAD4,AKT3,GSK3B,S MAD1,MAP2K1,FZD2,NRAS,PIK3C2A,FGFR1,CREBBP,FGFR2,ID3,APC,PIK3R3,FZD8,MAPK14,RRAS2,PTPN11,IRS1,FZD6 ,PIK3CD,LEF1,FZD7
Role of Tissue Factor in Cancer	1,18E+01	3,28E-01	NaN	FYN,CTGF,PIK3R1,RPS6KA3,E1F4E,PTEN,ITGB3,PAK1,ARRB1,CFL2,PIK3CG,PIK3C3,ITGAV,HCK,PLCB1,AKT3,RPS6KA2,G NA13,FGFR,PRKCA,EGFR,ITGB1,NRAS,CASP3,PIK3C2A,GNA12,FGFR1,GNAQ,FGFR2,RPS6KA5,PIK3R3,RPS6KA6,RRAS2, MAPK14,PTPN11,CSF1,CDC42,IRS1,LIN,PIK3CD
RhoGDI Signaling	1,18E+01	2,83E-01	NaN	WASL,ROCK2,GNB4,PAK1,CFL2,GNA13,DLCL1,CDH13,NGG12,ITGA4,ACTR2,NGG2,CREBBP,RDX,ITGA5,RHOJ,MYL9,AR HGAP5,CDH2,P1PSK1A,RHOQ,CDH5,ACTA2,RND3,CD42,RHOA,ARHGFE6,PIP4K2A,ESR1,FNBP1,RHOH,CDH11,NGG11 ,ACTR3,PPP1R12A,ARHGFE3,ACTC1,MYL12A,PRKCA,ITGB1,ARHGFE12,GNAI2,GNAQ,GNAI1,ROCK1,GNAI3,PAK3,PAK 2,MSN
G Beta Gamma Signaling	1,16E+01	3,75E-01	NaN	PRKACB,RAF1,CAV2,SOS2,GNB4,PAK1,NGG11,PIK3CG,SOS1,CAV1,AKT3,GNA13,PRKD3,PRKD1,NGG12,PRKCA,EGFR,N RAS,PRKCO,GNA12,NGG2,GNAI1,GNAQ,BTK,GNAI3,PRKAR2B,PRKCI,RRAS2,CDC42,PLCG2,ARHGFE6,PRKCH,PRKCB
VEGF Signaling	1,16E+01	3,50E-01	NaN	RAF1,PIK3R1,SOS2,HIF1A,E1F2S1,PDGFC,BCL2,ARNT,PTK2,ROCK2,PIK3CG,PIK3C3,SOS1,CREB1,VCL,MAP2K1,ACTC1,AC TN1,PRKCA,NRAS,PIK3C2A,FLT1,FGFR1,FGFR2,ROCK1,PIK3R3,RRAS2,ACTA2,PTPN11,FOXO1,PLCG2,IRS1,PIK3CD,KDR, E1F1AX,PRKCB
ERK/MAPK Signaling	1,16E+01	2,66E-01	NaN	PRKACB,RAF1,PIK3R1,SOS2,PTK2,YWHAQ,PAK1,PIK3CG,ITGA4,ETS1,CRKL,FGFR1,CREBBP,YWHAZ,ITGA5,FGFR2,PPP1 R14A,RAP1A,ATF2,PIK3R3,PTPN11,PPP2R3A,PLCG2,IRS1,PIK3CD,ELK3,ESR1,FYN,PPP1R3C,PPP1CB,CRK,E1F4E,PPP1R1 2A,PIK3C3,CREB1,SOS1,STAT1,MAP2K1,PRKCA,ITGB1,NRAS,ATF1,PIK3C2A,RPS6KA5,PLA2G4A,PRKAR2B,PRKCI,RRAS 2,PAK3,PAK2,PPP2R5E,PPP2R1B,PRKCB
Gap Junction Signaling	1,15E+01	2,82E-01	NaN	PRKACB,RAF1,PIK3R1,SOS2,SP3,PIK3CG,PIK3C3,SOS1,CAV1,PLCB1,AKT3,PRKD3,ACTC1,MAP2K1,PRKD1,PPP3CA,GUC Y1B3,MAP3K2,PRKCA,EGFR,NRAS,PRKCO,PIK3C2A,GUCY1A3,FGFR1,CSNK1G3,TUBB2A,GNAI1,GNAQ,FGFR2,PLCL2,IT PR1,PIK3R3,ADCY9,GNAI3,NOV,RRAS2,PRKCI,PRKAR2B,TUBA1A,LPAR1,ACTA2,PTPN11,PLCG2,IRS1,PRKCH,PIK3CD,P RKCB
PDGF Signaling	1,13E+01	3,67E-01	NaN	MAP2K4,RAF1,JAK1,PIK3R1,SOS2,CRK,PDGFC,PIK3CG,PIK3C3,SOS1,CAV1,SPHK1,PDGFRA,STAT1,MAP2K1,PRKCA,PD GFRB,NRAS,PIK3C2A,FGFR1,CRKL,MAP3K1,FGFR2,PIK3R3,RRAS2,PTPN11,INPP5F,PLCG2,IRS1,PIK3CD,E1F2AK2,PDGF D,PRKCB
IGF-1 Signaling	1,12E+01	3,40E-01	NaN	PRKACB,SOC3,RAF1,JAK1,CTGF,PIK3R1,SOS2,IGFBP7,PTK2,YWHAQ,IGF1,PIK3CG,PIK3C3,SOS1,SOC3,AKT3,MAP2K1 ,NEDD4,NRAS,PIK3C2A,FGFR1,YWHAZ,FGFR2,IGFBP5,GRB10,PIK3R3,NOV,PRKAR2B,PRKCI,RRAS2,PTPN11,FOXO1,IRS 1,IGFBP3,PIK3CD,SOC3
Reelin Signaling in Neurons	1,10E+01	3,59E-01	NaN	MAP2K4,APOE,FYN,PIK3R1,CDK5R1,ITGB3,PIK3CG,PIK3C3,HCK,MAP4K1,GSK3B,ARHGFE3,FGFR,ITGA4,ITGB1,ARHGFE 12,PIK3C2A,FGFR1,CRKL,ITGA5,FGFR2,VLDLR,RELN,ITGAL,APP,PIK3R3,ITGB2,PTPN11,IRS1,ARHGFE6,LYN,ITGA1,PIK 3CD
Epithelial Adherens Junction Signaling	1,10E+01	2,95E-01	NaN	TCF4,SNAI2,TGFBFR1,TGFBFR3,WASL,NECTIN3,BMPR2,CRK,IQGAP1,CLIP1,PTEN,TGFBFR2,NOTCH2,AGGF1,ACTR3,SORB S1,HGF,AKT3,VCL,ACTC1,ACTN1,EGFR,ACTR2,NRAS,FGFR1,SNAI1,TUBB2A,ACVR1,PTPRM,RAP1A,APC,FGF1,MYL9,NO TCH4,CDH2,RRAS2,TUBA1A,ACTA2,CDC42,RHOA,SSX2IP1,LEF1,ACVR2A
Prolactin Signaling	1,09E+01	3,73E-01	NaN	FYN,SOC3,RAF1,PIK3R1,SOS2,NR3C1,PIK3CG,PIK3C3,SOS1,SOC3,STAT1,MAP2K1,PRKD3,PRKD1,PRKCA,NRAS,PRK C Q,PIK3C2A,FGFR1,CREBBP,FGFR2,PIK3R3,PRKCI,RRAS2,PTPN11,PLCG2,IRS1,PIK3CD,PRKCH,SOC3,PRKCB
Neuregulin Signaling	1,09E+01	3,64E-01	NaN	RAF1,PIK3R1,SOS2,CRK,CDK5R1,PTEN,NRG1,ERBB4,SOS1,AKT3,MAP2K1,PRKD3,PRKD1,ITGA4,PRKCA,EGFR,MATK,IT GB1,NRAS,PRKCO,DCN,CRKL,ITGA5,PIK3R3,PRKCI,RRAS2,PTPN11,PLCG2,HSP90AA1,PRKCH,EREG,PRKCB
HER-2 Signaling in Breast Cancer	1,09E+01	3,64E-01	NaN	PIK3R1,SOS2,ITGB8,ITGB3,NRG1,PIK3CG,PIK3C3,SOS1,AKT3,GSK3B,PRKD3,PRKD1,PRKCA,EGFR,ITGB1,CCNE2,NRAS,P RKCO,PIK3C2A,FGFR1,FGFR2,PIK3R3,ITGB2,PRKCI,RRAS2,PTPN11,FOXO1,CDC42,IRS1,PIK3CD,PRKCH,PRKCB
P2Y Purigenic Receptor Signaling Pathway	1,07E+01	3,03E-01	NaN	PRKACB,RAF1,PIK3R1,NFKB1,ITGB3,GNB4,NGG11,PIK3CG,PIK3C3,CREB1,PLCB1,AKT3,PRKD3,MAP2K1,PRKD1,GNG12 ,PRKCA,NRAS,PRKCO,PIK3C2A,FGFR1,NGG2,CREBBP,GNAI1,GNAQ,FGFR2,PLCL2,ATF2,PIK3R3,ADCY9,GNAI3,PIK3 R3,RRAS2,PTPN11,PLCG2,IRS1,PIK3CD,PRKCH,PRKCB
Melanocyte Development and Pigmentation	1,06E+01	3,47E-01	NaN	PRKACB,RAF1,PIK3R1,SOS2,RPS6KA3,CRK,BCL2,PIK3CG,PIK3C3,SOS1,CREB1,KIT,RPS6KA2,MAP2K1,NRAS,PIK3C2A,M I TF,FGFR1,CREBBP,FGFR2,RPS6KA5,ATF2,KITLG,TYRPI,PIK3R3,ADCY9,RPS6KA6,PRKAR2B,RRAS2,PTPN11,PLCG2,IRS1, PIK3CD
Chemokine Signaling	1,05E+01	3,94E-01	NaN	RAF1,CCR5,CXCL12,PPP1CB,CCL5,ROCK2,PTK2,CCL13,CCL2,PPP1R12A,PIK3CG,PLCB1,MAP2K1,PRKCA,NRAS,CXCR4,G NAQ,GNAI1,CCL11,GNAI3,CALM1 (includes others),CCL4,MAPK14,RRAS2,PLCG2,RHOA,PRKCB,CCL7
NGF Signaling	1,05E+01	3,16E-01	NaN	MAP2K4,RAF1,PIK3R1,SOS2,RPS6KA3,TRIO,CRK,NFKB1,ROCK2,PIK3CG,PIK3C3,SOS1,CREB1,AKT3,RPS6KA2,MAP2K1, MAP3K2,NRAS,PIK3C2A,FGFR1,MAP3K1,CREBBP,FGFR2,RPS6KA5,RAP1A,ATF2,PIK3R3,ROCK1,RPS6KA6,RRAS2,PTPN 11,CDC42,RHOA,PLCG2,IRS1,PIK3CD,MAP3K8
LPS-stimulated MAPK Signaling	1,04E+01	3,60E-01	NaN	MAP2K4,RAF1,PIK3R1,NFKB1,PAK1,NFKBIA,PIK3CG,PIK3C3,CREB1,MAP2K1,PRKD3,PRKD1,PRKCA,NRAS,PRKCO,ATF1 ,PIK3C2A,FGFR1,FGFR2,ATF2,PIK3R3,MAPK14,PRKCI,RRAS2,PTPN11,CDC42,IRS1,CD14,PIK3CD,PRKCH,PRKCB
Th1 Pathway	1,04E+01	2,96E-01	NaN	SOC3,CCR5,ICAM1,JAK1,PIK3R1,CD4,IL6,NFKB1,CD8A,IL18R1,CD28,NFIL3,NOTCH2,PIK3CG,PIK3C3,CD274,IL27RA,ST AT1,PRKCO,PIK3C2A,IL10,FGFR1,IL6R,FGFR2,IFNGR1,CD3D,PIK3R3,STAT4,CD3G,ITGB2,NOTCH4,PTPN11,CD80,IL12B, IRS1,ICOS,IL10RA,CD86,PIK3CD,GATA3
PTEN Signaling	1,03E+01	3,11E-01	NaN	RAF1,TGFBFR1,TGFBFR3,PIK3R1,SOS2,BMPR2,NFKB1,BCL2,PTEN,TGFBFR2,PTK2,BMP1R1,PIK3CG,SOS1,PDGFRA,AKT3,G SK3B,MAP2K1,ITGA4,PDGFRB,EGFR,ITGB1,NRAS,CASP3,FLT1,FGFR1,ITGA5,FGFR2,CNKSR3,PIK3R3,RRAS2,FOXO1,INP PSF,CDC42,PIK3CD,KDR,BCL2L1
IL-3 Signaling	1,02E+01	3,61E-01	NaN	RAF1,JAK1,PIK3R1,PAK1,PIK3CG,PIK3C3,SOS1,AKT3,STAT1,MAP2K1,PRKD3,PRKD1,PPP3CA,PRKCA,NRAS,PRKCO,PIK 3C2A,FGFR1,CRKL,FGFR2,PIK3R3,CSF2RB,PRKCI,RRAS2,PTPN11,FOXO1,IRS1,PIK3CD,PRKCH,PRKCB
HMGBl Signaling	9,96E+00	2,93E-01	NaN	MAP2K4,ICAM1,PIK3R1,IL6,NFKB1,RHOH,KAT2B,CCL2,TGFB1,PIK3CG,PIK3C3,AKT3,MAP2K1,PLAT,VCAM1,NRAS,PIK 3C2A,HAT1,FGFR1,FGFR2,RHOJ,IFNGR1,IL1R1,PIK3R3,KAT6B,RRAS2,RHOQ,MAPK14,PTPN11,RND3,CDC42,IL12B,KAT6 A,RHOA,IRS1,TGFB3,PIK3CD,TNF,FNBP1
Sphingosine-1-phosphate Signaling	9,81E+00	3,01E-01	NaN	PIK3R1,PDGFC,RHOH,PTK2,PIK3CG,PIK3C3,PDGFRA,SPHK1,PLCB1,AKT3,GNA13,PDGFRB,CASP3,PIK3C2A,GNA12,FGF R1,GNAI1,GNAQ,FGFR2,RHOJ,PLCL2,ASAHI,PIK3R3,S1PR3,ADCY9,GNAI3,ACER3,RHOQ,PTPN11,RND3,RHOA,PLCG2,I RS1,S1PR1,PIK3CD,PDGFD,FNBP1
Pancreatic Adenocarcinoma Signaling	9,74E+00	3,05E-01	NaN	MAP2K4,RAF1,JAK1,TGFBFR1,PIK3R1,SMAD3,NFKB1,CDKN2B,PDGFC,BCL2,TGFBFR2,HMOX1,TGFB1,PIK3CG,PIK3C3,E2 F5,SMAD4,AKT3,STAT1,MAP2K1,EGFR,PLD3,TFDP1,PIK3C2A,FGFR1,FGFR2,PLD1,PLD4,PIK3R3,PTPN11,CDC42,IRS1,T GFB3,PIK3CD,CDK2,MMP9

Growth Hormone Signaling	9,72E+00	3,58E-01	NaN	SOC3, PIK3R1, RPS6KA3, IGF1, PIK3CG, PIK3C3, SOC3, RPS6KA2, STAT1, PRKD3, PRKD1, PRKCA, PRKCC, PIK3C2A, FGFR1, FGFR2, RPS6KA5, PIK3R3, RPS6KA6, PRKCI, PTPN11, PLCG2, IRS1, IGF1R, PIK3CD, PRKCH, A2M, SOC55, PRKCB
Renal Cell Carcinoma Signaling	9,72E+00	3,58E-01	NaN	RAF1, PIK3R1, SOS2, CRK, HIF1A, ARNT, PAK1, TGFB1, HGF, PIK3CG, PIK3C3, SOS1, AKT3, MAP2K1, ETS1, NRAS, PIK3C2A, FGFR1, CREBBP, FGFR2, RAS, PIK3R3, RAS2, PAK3, PTPN11, CDC42, IRS1, PAK2, PIK3CD
G12/13 Signaling	9,68E+00	2,92E-01	NaN	MAP2K4, RAF1, LPAR4, F2R, PIK3R1, NFKB1, CDH11, PTK2, ROCK2, NFKBIA, PIK3CG, PIK3C3, AKT3, GNA13, MAP2K1, CDH13, MYL12A, NRAS, PIK3C2A, GNA12, FGFR1, MAP3K1, MEF2A, FGFR2, MYL9, BTK, ROCK1, PIK3R3, CDH2, RAS2, CDH5, LPAR1, PTPN11, CDC42, RHOA, IRS1, MEF2C, PIK3CD
Fc Epsilon RI Signaling	9,64E+00	3,03E-01	NaN	MAP2K4, RAF1, FYN, PIK3R1, SOS2, FCER1A, PIK3CG, PIK3C3, SOS1, AKT3, PRKD3, MAP2K1, PRKD1, PRKCA, NRAS, PRKCC, PIK3C2A, FGFR1, FGFR2, BTK, PIK3R3, PLA2G4A, MAPK14, PRKCI, RAS2, INPP5F, PTPN11, PLCG2, IRS1, LYN, FCER1G, PIK3CD, PRKCH, TNF, LCP2, PRKCB
ErbB4 Signaling	9,60E+00	3,75E-01	NaN	RAF1, PIK3R1, SOS2, NRG1, ERBB4, PIK3C3, PIK3CG, SOS1, MAP2K1, PRKD3, PRKD1, PRKCA, NRAS, PRKCC, YAP1, PIK3C2A, FGFR1, FGFR2, PIK3R3, PRKCI, RAS2, PTPN11, IRS1, PLCG2, PIK3CD, PRKCH, PRKCB
Angiopoietin Signaling	9,59E+00	3,64E-01	NaN	ANGPT2, GRB14, PIK3R1, CRK, NCK1, NFKB1, PTK2, PAK1, NFKBIA, PIK3CG, PIK3C3, SOS1, AKT3, TEK, NRAS, PIK3C2A, ANGPT1, FGFR1, FGFR2, TIE1, PIK3R3, RAS2, PTPN11, PAK3, FOXO1, IRS1, PAK2, PIK3CD
CD28 Signaling in T Helper Cells	9,59E+00	2,90E-01	NaN	MAP2K4, FYN, PIK3R1, CD4, NFKB1, CTLA4, PTPRC, CD28, PAK1, ACTR3, NFKBIA, PIK3CG, PIK3C3, AKT3, MAP2K1, PPP3CA, ITK, ACTR2, PRKCC, PIK3C2A, FGFR1, MAP3K1, FGFR2, MALT1, ITPR1, CD3D, PIK3R3, CD3G, CALM1 (includes others), PTPN11, CD80, CDC42, IRS1, ZAP70, FCER1G, CD86, PIK3CD, LCP2
VEGF Family Ligand-Receptor Interactions	9,47E+00	3,41E-01	NaN	RAF1, PIK3R1, SOS2, PIK3CG, PIK3C3, SOS1, AKT3, MAP2K1, PRKD3, PRKD1, PRKCA, NRAS, PRKCC, NRP2, PIK3C2A, FLT1, FGFR1, FGFR2, PIK3R3, PLA2G4A, PRKCI, RAS2, PTPN11, PLCG2, IRS1, PIK3CD, PRKCH, KDR, NR1P1, PRKCB
GM-CSF Signaling	9,46E+00	3,70E-01	NaN	RAF1, PIK3R1, SOS2, PIM1, CSF2RA, PIK3C3, PIK3CG, SOS1, HCK, AKT3, STAT1, MAP2K1, PPP3CA, ETS1, NRAS, PIK3C2A, FGFR1, APOE, ICAM1, MSR1, CD36, CXCL12, COL10A1, IL6, CCR2, NFKB1, PDGFC, PLA2G7, COL1A2, CCL2, TGFB1, COL18A1, ITGA4, P NPLA8, VCAM1, CXCR4, CCL11, TPSAB1/TPSB2, SELPLG, IL33, ITGB2, COL1A1, PLA2G4A, SELP, CSF1, IL1LR1, APOC1, ALOX5, PDGFD, TNF, CLU, MMP9, APOD, COL3A1
Atherosclerosis Signaling	9,41E+00	2,91E-01	NaN	RAF1, PIK3R1, SOS2, NFKB1, BCL2, PTEN, NFKBIA, PIK3CG, PIK3C3, SOS1, CREB1, AKT3, GSK3B, MAP2K1, CCNE2, NRAS, TFDP1, PIK3C2A, FGFR1, CREBBP, FGFR2, ATF2, PIK3R3, RAS2, PTPN11, FOXO1, IRS1, HSP90AA1, PIK3CD, LEF1, CDK2
Prostate Cancer Signaling	9,39E+00	3,30E-01	NaN	IL6ST, RAF1, JAK1, PIK3R1, BMP2, SOS2, BMPR2, SMAD5, FZD1, LIFR, RIF1, BMPR1A, PIK3CG, PIK3C3, SOS1, SMAD4, AKT3, GSK3B, SMAD1, MAP2K1, FZD2, NRAS, PIK3C2A, FGFR1, FGFR2, APC, PIK3R3, FZD8, RAS2, PTPN11, IRS1, FZD6, PIK3CD, BMP7, WNT5A, FZD7
Role of NANOG in Mammalian Embryonic St	9,34E+00	2,95E-01	NaN	SOC3, RAF1, PIK3R1, SOS2, NFKB1, NFKBIA, PIK3CG, PIK3C3, SOS1, AKT3, MAP2K1, PRKD3, PRKD1, PRKCA, NRAS, PRKCC, PIK3C2A, FGFR1, FGFR2, PIK3R3, PRKCI, RAS2, PTPN11, IRS1, PLCG2, PIK3CD, PRKCH, PRKCB
Erythropoietin Signaling	9,32E+00	3,54E-01	NaN	AOC3, SELL, ICAM1, FN1, MMP14, MMP16, CXCL12, CCL22, CCL5, CXCL9, CCL3, CXCL10, CCL13, CCL2, CCL8, XCL1, MMP12, AC TC1, ITGA4, ITGB1, VCAM1, CSAR1, CXCR4, RDX, GNAI1, ITGA5, IL1R1, CCL11, SELPLG, MYL9, IL33, GNAI3, ITGB2, CCL4, SELP, CDH5, ACTA2, IAM3, IL1RN, CCL21, PECAM1, ITGA1, CD34, TNF, MMP9, MSN, CCL7
Agranulocyte Adhesion and Diapedesis	9,31E+00	2,49E-01	NaN	MAP2K4, APOE, PIK3R1, MAF, NFKB1, TGFB1, PIK3CG, PIK3C3, AKT3, STAT1, PRKD3, MAP2K1, PRKD1, PRKCA, PRKCC, PIK3C2A, IL10, FGFR1, RAB7A, FGFR2, JNFR1, PIK3R3, STAT4, MAPK14, PRKCI, PTPN11, IL12B, IRS1, NCOA1, TGFB3, APOC1, PIK3CD, MAP3K8, PRKCH, IRF8, REL, TNF, CLU, APOD, PRKCB
IL-12 Signaling and Production in Macrophag	9,29E+00	2,74E-01	NaN	PRKACB, RAF1, SOC3, FYN, JAK1, SGK1, PIK3R1, PPP1R3C, SOS2, PPP1CB, CRK, NCK1, EIF4E, PTEN, PPP1R12A, PIK3CG, PIK3C3, PTPN11, SOS1, AKT3, GSK3B, MAP2K1, NRAS, PIK3C2A, CRKL, FGFR1, PPP1R14A, FGFR2, GRB10, PIK3R3, RAS2, PRKAR2B, RHOQ, PRKCI, INPP5F, PTPN11, FOXO1, IRS1, PIK3CD
Insulin Receptor Signaling	9,20E+00	2,77E-01	NaN	TIMP3, NRAS, PIK3C2A, F2R, HMMR, FGFR1, PIK3R1, FGFR2, RHOJ, RHOH, ITGB3, PTK2, PIK3R3, RAS2, RHOQ, RND3, PTPN11, RHOA, PIK3CG, PIK3C3, IRS1, ITGAV, PIK3CD, FNBP1, MMP9, TIMP2
Glioma Invasiveness Signaling	9,19E+00	3,71E-01	NaN	ITGB1, ACTR2, NRAS, GNA12, SOS2, WASL, ITGA5, RHOJ, NCK1, RHOH, ROCK1, ROCK2, WIPF1, ACTR3, RAS2, PRKCC, RND3, P PP1R12A, CDC42, RHOA, SOS1, FNBP1, ITGA4
Actin Nucleation by ARP-WASP Complex	9,16E+00	4,11E-01	NaN	MAP2K4, RAF1, PIK3R1, YWHAQ, SRPK2, PIK3CG, PIK3C3, AKT3, PLCB1, GSK3B, PRKD3, MAP2K1, PRKD1, PRKCA, NRAS, PRKCC, Q, YAP1, PIK3C2A, FGFR1, TUBB2A, YWHAZ, VIM, FGFR2, PLCL2, PIK3R3, RAS2, TUBA1A, PRKCI, PTPN11, FOXO1, PLCG2, IRS1, PIK3CD, PRKCH, SNCA, TNF, PRKCB
14-3-3-mediated Signaling	9,13E+00	2,85E-01	NaN	MAP2K4, RAF1, TCF4, PIK3R1, SOS2, NFKB1, IDH1, PIM1, CSF2RA, PIK3CG, PIK3C3, SOS1, AKT3, KIT, MAP2K1, CSF3R, NRAS, PIK3C2A, FGFR1, FGFR2, CSF1R, KITLG, PIK3R3, CSF2RB, RAS2, PTPN11, IRS1, PIK3CD, LEF1, PIM2
Acute Myeloid Leukemia Signaling	9,12E+00	3,30E-01	NaN	PRKACB, PIK3R1, PDE1A, PDGFC, ATP2A2, BDKRB2, PIK3CG, PIK3C3, CAV1, AKT3, PRKD3, MAP2K1, PRKD1, GUCY1B3, PRKCA, PRKCC, GUCY1A3, PIK3C2A, FLT1, FGFR1, FGFR2, ITPR1, PIK3R3, CALM1 (includes others), PRKAR2B, PRKCI, PTPN11, IRS1, PDE5A, HSP90AA1, PIK3CD, PRKCH, KDR, PRKCB
Nitric Oxide Signaling in the Cardiovascular	9,11E+00	3,01E-01	NaN	MAP2K4, RAF1, DNABJ4, PIK3R1, MAF, HSPB8, DNABJ1, CUL3, HMOX1, GSTM2, PIK3CG, PIK3C3, DNABJ2, GSK3B, FKBP5, PRK D3, MAP2K1, ACTC1, PRKD1, PRKCA, NRAS, PRKCC, PIK3C2A, GSTA4, GSTM3, FGFR1, MAP3K1, CREBBP, FGFR2, DNABJ9, DN AB14, TXNRD1, BACH1, PIK3R3, RAS2, MAPK14, PRKCI, ACTA2, PTPN11, IRS1, STIP1, CAT, PIK3CD, PRKCH, AOX1, DNABJ6, P RKC B
NRF2-mediated Oxidative Stress Response	9,02E+00	2,44E-01	NaN	RAF1, PIK3R1, PLA2G7, HMOX1, PIK3CG, PIK3C3, SOS1, PLCB1, GNA13, PRKD3, PRKD1, GUCY1B3, PRKCA, PNPLA8, NRAS, PRK CQ, PLD3, CASP3, EDNRB, PIK3C2A, GUCY1A3, GNA12, FGFR1, PTGS1, MAPK6, GNAI1, GNAQ, FGFR2, PLCL2, ITPR1, PLD1, PLD 4, PIK3R3, ADCY9, PLA2G4A, GNAI3, RAS2, PRKCI, MAPK14, PTPN11, PLCG2, IRS1, EDNRB, PRKCH, PIK3CD, PRKCB
Endothelin-1 Signaling	8,99E+00	2,46E-01	NaN	MAP2K4, RAF1, TGFB1, SMAD3, BMP2, SOS2, BMPR2, SMAD5, BCL2, TGFB2, RUNX2, TGFBR1, BMPR1A, SOS1, SMAD4, MA P4K1, SMAD1, MAP2K1, NRAS, CREBBP, ACVR1, INHBA, MAPK14, RAS2, CDC42, TGFB3, SMURF2, BMP7, ACVR2A
TGF-β Signaling	8,96E+00	3,33E-01	NaN	PRKACB, RAF1, TCF4, PIK3R1, FZD1, PDGFC, BCL2, PTEN, ARRB1, PIK3CG, PIK3C3, AKT3, GSK3B, FZD2, MAP2K1, EGFR, GJA1, N RAS, TFDP1, PIK3C2A, FGF9, FGFR1, PTGS1, FGFR2, APC, PIK3R3, FZD8, RAS2, PRKAR2B, PTPN11, IRS1, MSH6, FZD6, EDNRB, LEF1, PIK3CD, MMP9, WNT5A, FZD7
Ovarian Cancer Signaling	8,94E+00	2,71E-01	NaN	RAF1, TGFB1, PIK3R1, SMAD3, SOS2, CRK, RBL1, NFKB1, TGFB2, TGFB1, PIK3CG, PIK3C3, SOS1, E2F5, SMAD4, AKT3, MAP2 K1, HDAC9, RBL2, NRAS, HDAC4, TFDP1, PIK3C2A, CRKL, FGFR1, FGFR2, PIK3R3, RAS2, PTPN11, IRS1, TGFB3, PIK3CD
Chronic Myeloid Leukemia Signaling	8,87E+00	3,08E-01	NaN	MAP2K4, PRKACB, RAF1, SOS2, NFKB1, PTK2, PAK1, SOS1, CREB1, PLCB1, PRKD3, MAP2K1, PRKD1, MAP3K2, PRKCA, EGFR, N RAS, PRKCC, MAP3K1, CREBBP, GNAI1, GNAQ, ITPR1, ATF2, ADCY9, GNAI3, PRKAR2B, MAPK14, PRKCI, RAS2, PAK3, CDC42, PAK2, MAP3K8, PRKCH, PRKCB
GNRH Signaling	8,65E+00	2,79E-01	NaN	MAP2K4, CCR5, PRKCC, CD4, GNG2, GNAI1, CCL5, CCL3, CD3D, CD3G, GNB4, CALM1 (includes others), GNAI3, CCL4, PRKCI, MAPK14, GNG11, PLCG2, FCER1G, PRKCH, PRKD3, PRKD1, GNG12, PRKCA, PRKCB
CCR5 Signaling in Macrophages	8,61E+00	3,62E-01	NaN	RAF1, PIK3R1, SOS2, CRK, HGF, PIK3CG, PIK3C3, CREB1, SOS1, AKT3, MAP2K1, FGF7, PRKCA, PIK3C2A, FGF9, FGFR1, CRKL, MA P3K1, CREBBP, FGFR2, RPS6KA5, ITPR1, FGF1, ATF2, PIK3R3, MAPK14, PTPN11, IRS1, PIK3CD
FGF Signaling	8,58E+00	3,22E-01	NaN	RAF1, PIK3R1, SOS2, RPS6KA3, EIF4E, PIK3CG, PIK3C3, CREB1, SOS1, AKT3, RPS6KA2, STAT1, MAP2K1, NRAS, PIK3C2A, FGFR1 , CREBBP, FGFR2, RPS6KA5, ATF2, STAT4, PIK3R3, RPS6KA6, MAPK14, RAS2, PTPN11, IRS1, PIK3CD
FLT3 Signaling in Hematopoietic Progenitor	8,54E+00	3,29E-01	NaN	PRKACB, LPAR4, PIK3R1, HSPA5, PDGFC, BDKRB2, PIK3CG, PIK3C3, CAV1, AKT3, PRKD3, PRKD1, GUCY1B3, PRKCA, PRKCC, CA SP3, GUCY1A3, PIK3C2A, FLT1, FGFR1, GNAQ, FGFR2, AQP1, ITPR1, PIK3R3, ADCY9, CALM1 (includes others), AQP9, PRKAR2B, PRKCI, LPAR1, PTPN11, PLCG2, IRS1, HSP90AA1, PIK3CD, PRKCH, KDR, ESR1, PRKCB
eNOS Signaling	8,51E+00	2,58E-01	NaN	RAF1, NRAS, PRKCC, PIK3C2A, FGFR1, PIK3R1, FGFR2, PIK3R3, PRKCI, RAS2, PTPN11, PIK3C3, PIK3CG, PLCG2, IRS1, SOS1, PR KCH, PIK3CD, STAT1, PRKD3, MAP2K1, PRKD1, PRKCB, PRKCA
Thrombopoietin Signaling	8,48E+00	3,69E-01	NaN	ITGB1, FYN, ITSN1, CD48, ITGA5, ITGB8, ITGAL, ITGB3, ITGB2, RAB5A, ITGAM, ACTA2, ITGA9, FLNA, FLNC, PTPN11, CAV1, ITGAV , ITGA1, PTRF, ACTC1, ITGA4, MAP3K2, PRKCA, EGFR
Caveolar-mediated Endocytosis Signaling	8,33E+00	3,52E-01	NaN	MAP2K4, PRKCC, PIK3C2A, FGFR1, PIK3R1, RPS6KA3, FGFR2, RPS6KA5, EIF4E, PIK3R3, PRKCI, MAPK14, PTPN11, PIK3C3, PIK3 CG, IRS1, PRKCH, PIK3CD, PRKD3, MAP2K1, PRKD1, PRKCB, PRKCA, EGFR
UVB-Induced MAPK Signaling	8,33E+00	3,64E-01	NaN	MAP2K4, IL6ST, RAF1, SOC3, PIK3R1, SOS2, IL6, NFKB1, NFKBIA, PIK3CG, PIK3C3, SOS1, AKT3, MAP2K1, IL1RAP, ABCB1, NRA S, TNFAIP6, PIK3C2A, FGFR1, IL6R, FGFR2, IL1R1, PIK3R3, IL33, COL1A1, RAS2, MAPK14, PTPN11, IL1RN, IRS1, CD14, PIK3CD, A2M, TNF
IL-6 Signaling	8,28E+00	2,76E-01	NaN	MAP2K4, PBRM1, PRKACB, PIK3R1, BMP2, SMAD3, NR2F2, SMAD5, NFKB1, PTEN, NR2F1, KAT2B, ALDH1A1, ALDH1A3, TGFB 1, PIK3CG, RARB, SMAD4, AKT3, SMAD1, PRKD3, MAP2K1, PRKD1, CITED2, PRKCA, PRKCC, RHOH1, MAP3K1, CREBBP, PIK3R3 , ADCY9, CSF2RB, PRKAR2B, MAPK14, PRKCI, SMARCA2, NCOA1, TGFB3, IGF1R, PIK3CD, PRKCI, SMARCC1, NR1P1, REL, PRK CB
RAR Activation	8,27E+00	2,37E-01	NaN	PRKACB, RAF1, PIK3R1, SOS2, GNB4, GNG11, PIK3CG, PIK3C3, SOS1, CREB1, PLCB1, AKT3, GNA13, PRKD3, MAP2K1, PRKD1, G NG12, PRKCA, NRAS, PRKCC, PIK3C2A, FGFR1, GNA12, GNG2, CREBBP, GNAI1, GNAQ, FGFR2, PLCL2, ITPR1, ATF2, PIK3R3, AD CY9, CALM1 (includes others), GNAI3, RAS2, PRKCI, PRKAR2B, PTPN11, PLCG2, IRS1, PIK3CD, PRKCH, PIK3CD, PRKCB
CREB Signaling in Neurons	8,23E+00	2,39E-01	NaN	SOC3, RAF1, JAK1, PIK3R1, SOS2, IL6, NFKB1, PIK3CG, PIK3C3, PTPN11, SOS1, AKT3, SOC2, STAT1, MAP2K1, NRAS, PIK3C2A, F GFR1, GNAQ, FGFR2, STAT4, PIK3R3, RAS2, PTPN11, IRS1, PIK3CD, SOC55
JAK/Stat Signaling	8,13E+00	3,25E-01	NaN	GADD45B, SNAI2, PIK3R1, PLAGL1, HIF1A, CHEK1, BCL2, PTEN, KAT2B, THBS1, STAG1, PIK3CG, PIK3C3, AKT3, GSK3B, WT1, PR KDC, HDAC9, PMAIP1, TP53INP1, PIK3C2A, TOPBP1, FGFR1, FGFR2, PIK3R3, PCNA, MAPK14, PTPN11, IRS1, PIK3CD, CDK2, DR AM1
p53 Signaling	8,13E+00	2,88E-01	NaN	

3-phosphoinositide Biosynthesis	8,11E+00	2,31E-01	NaN	SOC33,FYN,MINPP1,PIK3R1,TRAT1,ACPS,PTEN,SACM1L,PTPRC,MTMR6,CD28,PPP1R12A,PIK3CG,PIK3C3,ERBB4,PTPN1,PDGFRA,KIT,MTMR2,PI4K2B,PPP3CA,EGFR,PDGFRB,PPFIA1,PIK3C2A,FGFR1,PPPTC7,PPP1R14A,FGFR2,PAWR,PTPRM,PIK3R3,TNS3,PIPSK1A,INPP5F,PTPN11,CD80,PPP2R3A,PPP1R16B,IRS1,ICOS,CD86,PIK3CD,PPP2R5E,PIP4K2A,PTPN22,IL6ST,RAF1,NRAS,JAK1,PIK3C2A,FGFR1,PIK3R1,RP56KA3,FGFR2,RP56KA5,LIFR,PIK3R3,RP56KA6,RRAS2,PTPN11,PIK3C3,PIK3CG,IRS1,SOS1,PIK3CD,RP56KA2,STAT1,MAP2K1
CNTF Signaling	8,05E+00	3,65E-01	NaN	IL6ST,NRAS,SGK1,GNA12,CREBBP,MEF2A,YWHAZ,GNAQ,RP56KA3,RP56KA5,ATF2,YWHAQ,RP56KA6,RRAS2,PTPN11,CREB1,MAP3K8,MEF2C,RP56KA2,GNA13,WNK1,MAP3K2,EGFR
ERK5 Signaling	8,05E+00	3,65E-01	NaN	MAP2K4,FYN,RAF1,TGFB1,SMAD3,SOS2,NFKB1,TGFB2,CD28,NFKBIA,TGFB1,SOS1,SMAD4,MAP2K1,PPP3CA,NRAS,MAP3K1,MALTI,CD3D,CALM1 (includes others),CD3G,RRAS2,CD80,PLCG2,ZAP70,TGFB3
Regulation of IL-2 Expression in Activated ar	7,97E+00	3,29E-01	NaN	ITGB1,MAP2K4,NRAS,LAMA2,ITGAS,ITGAL,ITGB3,PTK2,LAMC1,NRG1,ITGB2,PAK1,RRAS2,PAK3,ACTA2,CD42,ERBB4,ARHGFE6,PAK2,UTRN,ITGA1,ACTC1,ITGA4,EGFR
Aggrin Interactions at Neuromuscular Junctio	7,91E+00	3,48E-01	NaN	MAP2K4,PIK3R1,RP56KA3,PARP9,TIPARP,PIK3C3,PIK3CG,PLCB1,RP56KA2,STAT1,PRKCA,EGFR,NRAS,CASP3,PIK3C2A,FGFR1,ZC3HAV1,PARP8,FGFR2,RP56KA5,TNKS2,PLCL2,PIK3R3,RP56KA6,MAPK14,RRAS2,PTPN11,IRS1,PLCG2,PIK3CD
UVA-Induced MAPK Signaling	7,87E+00	2,94E-01	NaN	WASL,PPP1CB,MYLK,RHOH,PAK1,ACTR3,PPP1R12A,PFN2,ACTC1,ITGA4,MYL12A,ITGB1,ACTR2,ITGAS,RHOJ,ROCK1,M
Regulation of Actin-based Motility by Rho	7,84E+00	3,08E-01	NaN	YLR9,PIP5K1A,WIPF1,RHOQ,RND3,PAK3,ACTA2,CD42,RHOA,PAK2,PIP4K2A,FNBP1
Clathrin-mediated Endocytosis Signaling	7,78E+00	2,28E-01	NaN	APOE,EP515,F2R,PICALM,PIK3R1,WASL,NUMB,SH3GLB1,ITGB8,PDGFC,ITGB3,RAB5A,CD2AP,ACTR3,SNX9,ARRB1,IGF1,PIK3CG,PIK3C3,DAB2,FGF7,ACTC1,PPP3CA,ITGB1,ACTR2,PIK3C2A,FGF9,FGFR1,RAB7A,ITGAS,FGFR2,FGF1,PIK3R3,ITGB2,ACTA2,PTPN11,CD42,IRS1,APOC1,TFRC,PIK3CD,PDGFD,MYO1E,CLU,APOD
PPAR α /RXR α Activation	7,72E+00	2,36E-01	NaN	MAP2K4,PRKACB,RAF1,TGFB1,CD36,TGFB3,SMAD3,SOS2,BMPR2,IL6,NFKB1,ABCA1,NR2F1,TGFB2,NFKBIA,TGFB1,SOS1,CLOCK,SMAD4,PLCB1,MAP2K1,IL1RAP,PRKCA,NRAS,CREBBP,ACVR1,GNAQ,PLCL2,IL1R1,NCOA3,ADCY9,PRKAR2B,MAPK14,RRAS2,GK,PLCG2,IRS1,TGFB3,HSP90AA1,MEF2C,ACVR2A,PRKCB
Adipogenesis pathway	7,66E+00	2,61E-01	NaN	BMP2,SMAD3,NR2F2,BMPR2,HIF1A,SMAD5,FZD1,EGR2,KAT2B,BMPR1A,TGFB1,EZH2,CLOCK,SMAD1,FZD2,HDAC9,ARNTL,HDAC4,HAT1,FGFR1,FGFR2,FGF1,FZD8,NR1D2,KAT6B,RUNX1T1,FOXO1,KAT6A,FZD6,BMP7,KLF3,TNF,FZD7,WN
Ceramide Signaling	7,62E+00	3,01E-01	NaN	TSA,RBBP4
Xenobiotic Metabolism Signaling	7,43E+00	1,99E-01	NaN	MAP2K4,RAF1,NRAS,PIK3C2A,FGFR1,PIK3R1,MAP3K1,FGFR2,CERK,NFKB1,BCL2,PIK3R3,S1PR3,RRAS2,PTPN11,PPP2R3A,PIK3CG,PIK3C3,IRS1,S1PR1,SPHK1,AKT3,PIK3CD,PPP2R5E,PPP2R1B,TNF,MAP2K1,NSMAF
Acute Phase Response Signaling	7,41E+00	2,37E-01	NaN	MAP2K4,RAF1,PIK3R1,MAF,IL6,CHST15,ARNT,CHST2,ALDH1A1,GSTM2,PIK3CG,CHST11,PRKD3,PRKD1,ALDH6A1,AHR,MAP3K2,PRKCO,HDAC4,GSTM3,FGFR1,CREBBP,FGFR2,PIK3R3,H3S3T3B1,PTPN11,PPP2R3A,IRS1,NCOA1,HSP90AA1,PRKCH,PIK3CD,TNF,NFKB1,CUL3,HMOX1,ALDH1A3,PIK3C3,MAP2K1,CITED2,PRKCA,ABCB1,NRAS,PIK3C2A,GSTA4,MA
PDF Signaling	7,37E+00	3,10E-01	NaN	P3K1,CYP1B1,MAPK14,PRKCI,RRAS2,CAT,MAP3K8,PPP2R5E,NR1P1,PPP2R1B,PRKCB,MAOA
EGF Signaling	7,35E+00	3,38E-01	NaN	MAP2K4,IL6ST,RAF1,SOC33,SERPINF1,TCF4,FN1,PIK3R1,SOS2,IL6,NFKB1,NR3C1,C1B1,HMOX1,NFKBIA,PIK3CG,SOS1,S
Fc γ RIIB Signaling in B Lymphocytes	7,33E+00	3,77E-01	NaN	OC52,AKT3,OSMR,MAP2K1,IL1RAP,NRAS,C1S,MAP3K1,IL6R,SERPINF1,VWF,IL1R1,PIK3R3,IL33,RRAS2,MAPK14,RIK1,PTPN11,IL1RN,PIK3CD,SOC55,A2M,TNF
PKC δ Signaling in T Lymphocytes	7,30E+00	2,58E-01	NaN	RAF1,TCF4,BDNF,PIK3R1,NFKB1,BCL2,TCF12,ROCK2,NFKBIA,PIK3C3,PIK3CG,AKT3,NRAS,PIK3C2A,FGFR1,SERPINF1,FG
Sertoli Cell-Sertoli Cell Junction Signaling	7,24E+00	2,30E-01	NaN	FR2,ZEB1,ROCK1,PIK3R3,MAPK14,RRAS2,PTPN11,IRS1,RHOA,PIK3CD
Relaxin Signaling	7,23E+00	2,43E-01	NaN	MAP2K4,RAF1,JAK1,PIK3C2A,PIK3R1,FGFR1,MAP3K1,SOS2,FGFR2,ITPR1,PIK3R3,MAPK14,PTPN11,PIK3C3,PIK3CG,IRS1,SOS1,AKT3,PIK3CD,STAT1,MAP2K1,PRKCA,EGFR
MSP-ROD Signaling Pathway	7,18E+00	2,09E-01	NaN	BLNK,MAP2K4,NRAS,PIK3C2A,FGFR1,PIK3R1,FGFR2,CD79A,FCGR2B,PIK3R3,BTK,RRAS2,PTPN11,PIK3C3,IRS1,PLCG2,P
ICOS-ICOSL Signaling in T Helper Cells	7,10E+00	2,62E-01	NaN	IK3CG,SOS1,LYN,PIK3CD
RhoA Signaling	7,10E+00	2,62E-01	NaN	MAP2K4,FYN,PIK3R1,CD4,SOS2,NFKB1,CD28,NFKBIA,PIK3CG,PIK3C3,SOS1,PPP3CA,MAP3K2,NRAS,PRKCO,PIK3C2A,F
β -Adrenergic Signaling	7,05E+00	2,99E-01	NaN	GFR1,MAP3K1,FGFR2,MALTI,CD3D,PIK3R3,CD3G,RRAS2,PTPN11,CD80,PLCG2,IRS1,ZAP70,FCER1G,CD86,PIK3CD,MA
CTLA4 Signaling in Cytotoxic T Lymphocytes	7,00E+00	2,83E-01	NaN	P3K8,LCP2
Telomerase Signaling	7,00E+00	2,70E-01	NaN	MAP2K4,PRKACB,RAF1,TGFB3,NECTIN3,JAM2,PTEN,AGGF1,SORBS1,AKT3,MTMR2,VCL,GSK3B,ACTC1,MAP2K1,RAB
Small Cell Lung Cancer Signaling	6,75E+00	2,98E-01	NaN	8B,ACTN1,GUCY1B3,ITGA4,MAP3K2,ITGB1,DLG1,NRAS,GUCY1A3,MAP3K1,TUBB2A,ITGAS,PLS1,ATF2,EPB41,RRAS2,P
T Helper Cell Differentiation	6,74E+00	3,15E-01	NaN	PRKACB,PIK3R1,PDE1A,NFKB1,GNB4,NG11,NFKBIA,PIK3CG,PIK3C3,CREB1,AKT3,PDE4D,GNA13,MAP2K1,NG12,G
STAT3 Pathway	6,74E+00	3,15E-01	NaN	UCY1B3,SMPDL3A,PIK3C2A,GUCY1A3,FGFR1,GNA12,NG2,GNA11,GNAQ,FGFR2,PDE4B,RAP1A,PDEBA,PIK3R3,ADCY
Aldosterone Signaling in Epithelial Cells	6,68E+00	2,29E-01	NaN	9,GNAI3,PRKAR2B,PTPN11,IRS1,PDESA,PIK3CD,MM9
Inhibition of Angiogenesis by TSP1	6,63E+00	4,41E-01	NaN	SOC33,MINPP1,PIK3R1,TRAT1,ACPS,PTEN,SACM1L,PTPRC,CD28,PIK3CG,PLCB1,MTMR2,PDGFRB,FGFR1,PPPTC7,FGFR
PI3K Signaling in B Lymphocytes	6,59E+00	2,50E-01	NaN	2,PPP1R14A,PAWR,PTPRM,PIK3R3,PIPSK1A,PTPN11,INPP5F,PPP2R3A,IRS1,PLCG2,CD86,PIK3CD,PIP4K2A,FYN,MTMR
SAPK/JNK Signaling	6,52E+00	2,69E-01	NaN	6,PPP1R12A,PIK3C3,ERBB4,PTPN1,PDGFRA,KIT,PI4K2B,PPP3CA,EGFR,PPFIA1,PIK3C2A,PLD4,TNS3,CD80,PPP1R16B,IC
Dopamine-DARPP32 Feedback in cAMP Sign	6,50E+00	2,28E-01	NaN	OS,PPP2R5E,PTPN22
PI3K/AKT Signaling	6,40E+00	2,50E-01	NaN	PIK3C2A,FGFR1,PIK3R1,FGFR2,CCR2,PIK3R3,CSF2R2,ITGB2,ITGAM,CCL2,PTPN11,ACTA2,IL12B,CSF1,PIK3C3,PIK3CG,I
IL-15 Signaling	6,40E+00	3,03E-01	NaN	RS1,PIK3CD,RP56KA2,TNF,ACTC1
GDNF Family Ligand-Receptor Interactions	6,40E+00	3,03E-01	NaN	PIK3R1,CD4,TRAT1,NFKB1,PTEN,PTPRC,CD28,NFKBIA,PIK3CG,PIK3C3,AKT3,PPP3CA,IL2RB,ITK,PRKCO,PIK3C2A,FGFR1
Ephrin A Signaling	6,35E+00	3,33E-01	NaN	,FGFR2,ITPR1,CD3D,PIK3R3,CD3G,CALM1 (includes others),PTPN11,CD80,IRS1,ICOS,ZAP70,FCER1G,IL2RA,PIK3CD,LCP2
Role of JAK1 and JAK3 in T γ Cytokine Signali	6,33E+00	3,10E-01	NaN	LPAR4,PPP1CB,MYLK,ROCK2,PTK2,ACTR3,CFI2,PPP1R12A,IGF1,PFN2,GNA13,DL1,ACTC1,MYL12A,ACTR2,NEDD4,AR
Type II Diabetes Mellitus Signaling	6,16E+00	2,44E-01	NaN	HGEF12,NRP2,GNA12,RDX,CD42EP3,PLD1,ROCK1,ARHGAP5,MYL9,PIPSK1A,ACTA2,LPAR1,RND3,RHOA,PIP4K2A,MS
Ephrin B Signaling	6,10E+00	3,01E-01	NaN	N
Systemic Lupus Erythematosus Signaling	6,07E+00	2,00E-01	NaN	PRKACB,RAF1,GNB4,NG11,MAP2K1,PRKD3,NG12,PRKD1,PRKCA,PRKCO,NRAS,NG2,GNAQ,GNAI1,PYGL,ITPR1,AD

IL-17 Signaling	6,06E+00	2,82E-01	NaN	MAP2K4,NRAS,JAK1,PIK3C2A,PIK3R1,FGFR1,FGFR2,IL6,CCL11,NFKB1,ATF2,PIK3R3,CXCL10,MAPK14,RRAS2,CCL2,PTP N11,PIK3C3,PIK3CG,IRS1,AKT3,PIK3CD,GSK3B,MAP2K1
IL-10 Signaling	6,04E+00	3,09E-01	NaN	MAP2K4,CCR1,SOC3,FCGR2C,CCR5,JAK1,IL10,FCGR2A,IL1R1,IL6,FCGR2B,NFKB1,IL33,HMOX1,MAPK14,NFKBIA,IL1R N,IL1ORA,CD14,IL1RAP,TNF
Wnt/ β -catenin Signaling	6,03E+00	2,19E-01	NaN	TCF4,SFRP2,TGFBF1,FRZB,TGFBF3,BMPR2,TLE1,FZD1,SOX17,TGFBF2,TGFB1,DKK3,RARB,DKK2,AKT3,MAP4K1,GSK3B ,FZD2,SFRP4,GAI1,CSNK1G3,CREBBP,ACVR1,GNAQ,APC,FZD8,CDH2,CDH5,PPP2R3A,FZD6,TGFB3,LEF1,PPP2R5E,PPP2 R1B,ACVR2A,WNT5A,FZD7
Docosahexaenoic Acid (DHA) Signaling	6,03E+00	3,46E-01	NaN	CASP3,PIK3C2A,FGFR1,PIK3R1,SERPINF1,FGFR2,BCL2,APP,PIK3R3,FOXO1,PTPN11,PIK3C3,IRS1,PIK3CG,AKT3,PIK3CD, GS3B,BCL2A1
G-Protein Coupled Receptor Signaling	5,94E+00	1,88E-01	NaN	PRKACB,RAF1,PIK3R1,SOS2,PIK3CG,RS10,PLCB1,SMPDL3A,FGFR1,CREBBP,FGFR2,PDE4B,RAP1A,ATF2,FPR1,PIK3R3, S1PR3,PDE8A,ADCY9,PTPN11,IRS1,PIK3CD,FYN,RS18,PTGER3,PDE1A,NFKB1,NFKBIA,PIK3C3,CREB1,SOS1,AKT3,PDE 4D,MAP2K1,PRKCA,ADRB2,RS2,RRAS,PIK3C2A,GNAQ,GNAI1,GNAI3,PRKAR2B,RRAS2,P2RY14,LPAR1,RASGRP1,S1PR 1,PDE5A,MAP3K8,PRKCB
Corticotropin Releasing Hormone Signaling	5,92E+00	2,52E-01	NaN	PRKACB,RAF1,BDNF,CREB1,MAP2K1,PRKD3,PRKD1,GUCY1B3,PRKCA,PRKCO,GUCY1A3,CREBBP,MEF2A,GNAI1,GNAQ ,ITPR1,RAP1A,ATF2,ADCY9,CALM1 (includes others),GNAI3,PRKAR2B,MAPK14,PRKCI,PLCG2,PRKCH,MEF2C,PRKCB
Androgen Signaling	5,92E+00	2,52E-01	NaN	PRKACB,SMAD3,NFKB1,GTFA21,NCOA4,GNB4,GNG11,KAT2B,GNAI3,PRKD3,TAF2,PRKD1,GNG12,PRKCA,PRKCO,GNA 12,GNG2,CREBBP,GNAI1,GNAQ,GNAI3,CALM1 (includes others),PRKAR2B,PRKCI,NCOA1,HSP90AA1,PRKCH,PRKCB
Semaphorin Signaling in Neurons	5,90E+00	3,40E-01	NaN	ITGB1,FYN,ARHGFE12,DPLYSL3,RHOJ,RHOH,ROCK1,ROCK2,PTK2,PAK1,RHOQ,RND3,CFL2,PAK3,RHOA,PAK2,FNBP1,NR P1
Endometrial Cancer Signaling	5,87E+00	3,12E-01	NaN	RAF1,NRAS,PIK3C2A,PIK3R1,FGFR1,SOS2,FGFR2,PTEN,PIK3R3,RRAS2,PTPN11,PIK3C3,PIK3CG,IRS1,SOS1,AKT3,PIK3C D,LEF1,GSK3B,MAP2K1
Cell Cycle: G1/S Checkpoint Regulation	5,87E+00	3,12E-01	NaN	HDAC9,CNNE2,RBL2,HDAC4,TFDP1,BMI1,SMAD3,CUL1,RBL1,CDKN2B,SKP2,NRG1,MAX,FOXO1,TGFB1,E2F5,TGFB3,S MAD4,GSK3B,CDK2
IL-2 Signaling	5,87E+00	3,12E-01	NaN	RAF1,NRAS,JAK1,PIK3C2A,PIK3R1,FGFR1,SOS2,FGFR2,PIK3R3,RRAS2,PTPN11,PIK3C3,PIK3CG,IRS1,SOS1,AKT3,PIK3CD ,IL2RA,MAP2K1,IL2RB
Myc Mediated Apoptosis Signaling	5,83E+00	3,00E-01	NaN	MAP2K4,NRAS,CASP3,PIK3C2A,FGFR1,PIK3R1,SOS2,YWHAZ,FGFR2,BCL2,YWHAQ,PIK3R3,RRAS2,PTPN11,IGF1,PIK3C 3,PIK3CG,IRS1,SOS1,AKT3,PIK3CD
Neurotrophin/TRK Signaling	5,80E+00	2,89E-01	NaN	MAP2K4,RAF1,NRAS,PIK3C2A,BDNF,PIK3R1,FGFR1,CREBBP,SOS2,FGFR2,ATF2,PIK3R3,RRAS2,PTPN11,CDCA4,PIK3C3, PIK3CG,IRS1,SOS1,CREB1,PIK3CD,MAP2K1
BMP signaling pathway	5,80E+00	2,89E-01	NaN	MAP2K4,PRKACB,RAF1,NRAS,BMP2,CREBBP,BMPR2,GREM1,SMAD5,NFKB1,ATF2,MAPK14,RRAS2,PRKAR2B,RUNX2, BMPR1A,CREB1,SOS1,SMAD4,BMP7,SMAD1,MAP2K1
Role of IL-17F in Allergic Inflammatory Airw:	5,74E+00	3,64E-01	NaN	RAF1,CREBBP,RPS6KA3,RPS6KA5,IL6,NFKB1,ATF2,CXCL10,RPS6KA6,CCL4,CCL2,IGF1,CREB1,RPS6KA2,MAP2K1,CCL7
RANK Signaling in Osteoclasts	5,72E+00	2,57E-01	NaN	MAP2K4,RAF1,PIK3R1,TAB2,NFKB1,NFKBIA,PIK3CG,AKT3,MAP2K1,BIRC3,PPP3CA,MAP3K2,PIK3C2A,MITF,FG FR1,MAP3K1,FGFR2,PIK3R3,CALM1 (includes others),MAPK14,PTPN11,IRS1,PIK3CD,MAP3K8,BIRC2
Non-Small Cell Lung Cancer Signaling	5,70E+00	2,86E-01	NaN	RAF1,NRAS,TFDP1,PIK3C2A,FGFR1,PIK3R1,SOS2,FGFR2,ITPR1,PIK3R3,RRAS2,PTPN11,PIK3C3,PIK3CG,IRS1,RARB,SOS 1,AKT3,PIK3CD,MAP2K1,PRKCA,EGFR
Crosstalk between Dendritic Cells and Natur	5,70E+00	2,70E-01	NaN	KLRC4
IL-9 Signaling	5,59E+00	3,56E-01	NaN	KLRC4,ILKLR1,TYROBP,CD69,LTB,TNFSF10,CD83,IL6,NFKB1,ITGAL,CD28,CSF2RB,PRF1,CD80,MICB,ACTA2,IL12B,ICAM 3,TREM2,TLR7,CD86,TNF,ACT1,CCR7,IL2RB
mTOR Signaling	5,52E+00	2,01E-01	NaN	SOC3,JAK1,PIK3C2A,FGFR1,PIK3R1,FGFR2,NFKB1,PIK3R3,PTPN11,PIK3C3,IRS1,PIK3CG,SOC2,PIK3CD,STAT1,TNF
Pathogenesis of Multiple Sclerosis	5,40E+00	7,78E-01	NaN	PIK3R1,RPS6KA3,HIF1A,PDGFC,RHOH,EIF4E,HMOX1,PIK3CG,PIK3C3,AKT3,RPS6KA2,PRKD3,PRKD1,PRKCA,NRAS,PRKC Q,PLD3,PIK3C2A,FGFR1,FGFR2,RHOJ,RPS6KA5,PLD1,PLD4,PIK3R3,RPS6KA6,RRAS2,RHOQ,PRKCI,PTPN11,RND3,PPP2 R3A,RHOA,IRS1,PIK3CD,PRKCH,PPP2R5E,PPP2R1B,FNBP1,PRKCB
ErbB2-ErbB3 Signaling	5,32E+00	2,90E-01	NaN	CCR1,CXCL10,CCR5,CCL4,CCL5,CCL3,CXCL9
HIPPO signaling	5,32E+00	2,64E-01	NaN	RAF1,NRAS,PIK3C2A,PIK3R1,FGFR1,SOS2,FGFR2,PTEN,PIK3R3,NRG1,RRAS2,FOXO1,PTPN11,PIK3C3,PIK3CG,IRS1,SOS 1,PIK3CD,GSK3B,MAP2K1
Synaptic Long Term Potentiation	5,23E+00	2,33E-01	NaN	DLG1,YAP1,FAT4,SMAD3,PPP1R3C,WWTR1,CUL1,YWHAZ,PPP1CB,PPP1R14A,FRMD6,SMAD5,STK3,SKP2,ITCH,YWHA Q,PPP1R12A,PPP2R3A,SMAD4,MOB1A,PPP2R5E,PPP2R1B,SMAD1
Role of PI3K/AKT Signaling in the Pathogene	5,21E+00	2,76E-01	NaN	PRKACB,RAF1,PPP1R3C,PPP1CB,PPP1R12A,CREB1,PLCB1,MAP2K1,PRKD3,PRKD1,PPP3CA,PRKCA,PRKCO,NRAS,CREB BP,GNAQ,PPP1R14A,PLCL2,ITPR1,RAP1A,ATF2,CALM1 (includes others),PRKAR2B,PRKCI,RRAS2,PLCG2,PRKCH,PRKCB
Pyridoxal 5'-phosphate Salvage Pathway	5,13E+00	2,92E-01	NaN	CCR5,PIK3C2A,PIK3R1,FGFR1,CRKL,GNAI1,FGFR2,CRK,CCL5,NFKB1,PIK3R3,GNAI3,NFKBIA,PTPN11,PIK3C3,PIK3CG,IRS 1,AKT3,PIK3CD,GSK3B,MAP2K1
Melatonin Signaling	5,12E+00	2,82E-01	NaN	MAP2K4,DAPK1,PRKCO,SGK1,MAPK6,TTK,PAK1,CDK8,PAK3,PIM1,PRPF4B,PAK2,PRKCH,MAP3K8,EIF2AK2,HIPK1,MA P2K1,CDK2,ACVR2A
Estrogen-Dependent Breast Cancer Signaling	5,12E+00	2,73E-01	NaN	MAP2K4,PRKACB,RAF1,PRKCO,GNAQ,GNAI1,PLCL2,CALM1 (includes others),GNAI3,PRKCI,PRKAR2B,ROSA,PLCG2,PLCB1,PRKCH,PRKD3,MAP2K1,PRKD1,PRKCB,PRKCA
IL-17A Signaling in Airway Cells	5,12E+00	2,73E-01	NaN	NRAS,PIK3C2A,FGFR1,PIK3R1,CREBBP,HSD17B11,FGFR2,NFKB1,ATF2,PIK3R3,RRAS2,PTPN11,IGF1,PIK3C3,PIK3CG,IRS 1,CREB1,AKT3,PIK3CD,ESR1,EGFR
HIF1 α Signaling	5,12E+00	2,35E-01	NaN	MAP2K4,JAK1,PIK3C2A,PIK3R1,FGFR1,FGFR2,IL6,NFKB1,CCL11,PTEN,PIK3R3,NFKBIA,MAPK14,PTPN11,PIK3C3,PIK3C G,IRS1,AKT3,PIK3CD,GSK3B,MAP2K1
TNFR1 Signaling	5,06E+00	3,27E-01	NaN	MMP14,MMP16,PIK3R1,HIF1A,PDGFC,LDHB,ARNT,PIK3C3,PIK3CG,AKT3,MMP12,SLC2A5,NRAS,PIK3C2A,FGFR1,CREB BP,MAPK6,FGFR2,PIK3R3,MAPK14,RRAS2,PTPN11,IRS1,NCOA1,HSP90AA1,PIK3CD,MMP9
CD40 Signaling	5,03E+00	2,69E-01	NaN	MAP2K4,CASP3,MAP3K1,TNFAIP3,NFKB1,TANK,PAK1,RIPK1,NFKBIA,CRADD,PAK3,CDCA2,PAK2,TNF,BIRC3,BIRC2
Melanoma Signaling	5,00E+00	3,09E-01	NaN	MAP2K4,TRAF3,ICAM1,PIK3C2A,ATF1,FGFR1,PIK3R1,PTGS1,TNFAIP3,FGFR2,NFKB1,TANK,PIK3R3,NFKBIA,MAPK14,P TPN11,PIK3C3,PIK3CG,IRS1,PIK3CD,MAP2K1
Lymphotoxin β Receptor Signaling	4,94E+00	2,84E-01	NaN	RAF1,NRAS,PIK3C2A,MITF,FGFR1,PIK3R1,FGFR2,PTEN,PIK3R3,RRAS2,PTPN11,PIK3C3,PIK3CG,IRS1,AKT3,PIK3CD,MAP 2K1
Role of IL-17A in Arthritis	4,94E+00	2,84E-01	NaN	TRAF3,VCAM1,CASP3,PIK3C2A,FGFR1,PIK3R1,CREBBP,LTB,FGFR2,NFKB1,PIK3R3,NFKBIA,PTPN11,PIK3C3,PIK3CG,IRS 1,AKT3,PIK3CD,BIRC2
Huntington's Disease Signaling	4,91E+00	1,83E-01	NaN	MAP2K4,PIK3C2A,FGFR1,PIK3R1,FGFR2,CCL5,NFKB1,ATF2,PIK3R3,NFKBIA,MAPK14,CCL2,PTPN11,PIK3C3,PIK3CG,IRS 1,PIK3CD,MAP2K1,CCL7
Cdc42 Signaling	4,89E+00	2,04E-01	NaN	MAP2K4,SGK1,BDNF,PIK3R1,SOS2,HSPA5,CDK5R1,TGM2,GNB4,GNG11,IGF1,PIK3CG,PIK3C3,SOS1,CREB1,VAMP3,PL CB1,AKT3,PRKD3,PRKD1,GNG12,PRKCA,EGFR,HDAC9,PRKCO,HDAC4,CASP3,PIK3C2A,FGFR1,GNG2,CREBBP,GNAQ,FG FR2,ITPR1,ITGB9,ATF2,PIK3R3,PRKCI,PTPN11,IRS1,PIK3CD,PRKCH,SNCA,PRKCB
PPAR Signaling	4,81E+00	2,47E-01	NaN	MAP2K4,RAF1,WASL,PPP1CB,MYLK,IQGAP1,CLIP1,IQGAP2,PAK1,ACTR3,CFL2,PPP1R12A,EXOC5,GSK3B,ITGA4,MYL12 A,ITG,ITGB1,ACTR2,ITGA5,CD3D,APC,ATF2,MYL9,CD3G,WIPF1,MAPK14,PRKCI,PAK3,CDCA4,ARHGFE6,PAK2,FCER1G,F NBP1L
Antiproliferative Role of TOB in T Cell Signal	4,78E+00	4,23E-01	NaN	RAF1,NRAS,CREBBP,SOS2,IL1R1,NFKB1,PDGFC,IL33,NR2F1,RRAS2,NFKBIA,IL1RN,SOS1,NCOA1,PDGFR4,HSP90AA1,N RIP1,PDGFD,IL1RAP,TNF,MAP2K1,CITED2,PDGFRB
Wnt/Ca ⁺ pathway	4,78E+00	2,98E-01	NaN	TGFBF2,CNNE2,TGFBF1,TGFB1,SMAD3,CUL1,TGFB3,SMAD4,TWSG1,CDK2,SKP2
TREM1 Signaling	4,75E+00	2,67E-01	NaN	CREBBP,PLCL2,FZD1,NFKB1,ROR1,ATF2,FZD8,PLCG2,CREB1,FZD6,PLCB1,GSK3B,FZD2,PPP3CA,WNT5A,FZD7,PRKCA
UVC-Induced MAPK Signaling	4,59E+00	3,33E-01	NaN	ITGB1,TREM1,ICAM1,NLRP3,IL10,LTB,CD79A,IL6,NFKB1,TNFRSF17,IL33,CD28,CD80,IL12B,CSF1,TGFB1,IL1RN,TLR1,TLR7,FCE R1G,CCL21,CD86,TNF
Complement System	4,56E+00	3,51E-01	NaN	MAP2K4,TGFB1,TAB2,RPS6KA3,TGFBF2,TGFB1,CREB1,MAP4K1,RPS6KA2,STAT1,IL1RAP,ATF1,CREBBP,MEF2A,RPS6 KA5,IL1R1,ATF2,IL33,PLA2G4A,RPS6KA6,MAX,MAPK14,IL1RN,TGFB3,MEF2C,TNF
Altered T Cell and B Cell Signaling in Rheum:	4,54E+00	2,44E-01	NaN	WT1,SPP1,PRKCO,CCNC,IGFBP5,CCL5,THBD,NCOA3,CXCL10,PRKCI,FOXO1,RUNX2,IGFBP3,NCOA1,CD14,PRKCH,PRKD 3,PRKD1,PRKCB,PRKCA
p38 MAPK Signaling	4,51E+00	2,22E-01	NaN	RAF1,PLA2G7,IGF1,PLCB1,GNAI3,MAP2K1,PRKD3,PRKD1,GUCY1B3,PRKCA,PNPLA8,NRAS,PRKCO,GUCY1A3,GNAI2, GNAQ,GNAI1,PLCL2,ITPR1,GNAI3,PLA2G4A,PRKCI,RRAS2,PPP2R3A,PLCG2,LYN,PRKCH,PPP2R5E,PPP2R1B,PRKCB
VDR/RXR Activation	4,48E+00	2,56E-01	NaN	PRKACB,SOC3,PIK3C2A,LEPR,FGFR1,PIK3R1,FGFR2,PLCL2,PIK3R3,ADCY9,PRKAR2B,FOXO1,PTPN11,PIK3C3,PIK3CG,P LCG2,IRS1,PLCB1,AKT3,PIK3CD,MAP2K1
Synaptic Long Term Depression	4,45E+00	2,05E-01	NaN	ITGB1,RBL1,NFKB1,CHEK1,ARNT,TGM2,NR2F1,GSTM2,ALDH1A1,ALDH1A3,TGFB1,RARB,ALDH6A1,AHR,RBL2,CNNE2,TF DP1,GSTM3,GSTA4,NCOA3,CYP1B1,TGFB3,HSP90AA1,DHFR,NRIP1,TNF,ESR1,CDK2,MMCP9
Leptin Signaling in Obesity	4,43E+00	2,47E-01	NaN	TIMP3,MMMP14,RECK,MMP16,TFPI2,ADAM12,SDC2,THBS2,ADAM10,MMP12,A2M,MMP9,TIMP2
Aryl Hydrocarbon Receptor Signaling	4,39E+00	2,07E-01	NaN	PRKACB,BDNF,PIK3R1,PIK3C3,PIK3CG,CREB1,PLCB1,PRKD3,PRKD1,PRKCA,PRKCO,PIK3C2A,FGFR1,FGFR2,PLCL2,ITPR 1,PIK3R3,PRKAR2B,PRKCI,PTPN11,IRS1,PLCG2,PIK3CD,PRKCH,PRKCB
Inhibition of Matrix Metalloproteases	4,29E+00	3,33E-01	NaN	
Neuropathic Pain Signaling In Dorsal Horn N	4,26E+00	2,19E-01	NaN	

Antiproliferative Role of Somatostatin Receptor	4,20E+00	2,53E-01	NaN	NRAS,PIK3C2A,GUCY1A3,FGFR1,PIK3R1,GN2,FGFR2,PIK3R3,GNB4,RRAS2,GN11,PTPN11,PIK3C3,PIK3CG,IRS1,PIK3CD,MAP2K1,GN12,GUCY1B3
Role of JAK family kinases in IL-6-type Cytokine	4,13E+00	4,00E-01	NaN	IL6ST,MAP2K4,SOC33,JAK1,MAPK14,PTPN11,IL6R,OSMR,IL6,STAT1
Communication between Innate and Adaptive Immunity	4,12E+00	2,36E-01	NaN	IL10,CD4,CD83,CCL5,IL6,CCL3,CD8A,TNFRSF17,IL33,CXCL10,CD28,CCL4,CD80,IL12B,IL1RN,TLR1,TLR7,FCER1G,CD86,TNFR,CCR7
Sumoylation Pathway	4,09E+00	2,29E-01	NaN	ETS1,MAP2K4,SERBP1,CREBBP,RHO1,ZEB1,RFCS,NFKB1,NR3C1,RHOH,SP100,TDG,PCNA,SP3,RHOQ,NFKBIA,RND3,RHOA,SMAD4,SNCA,FNBP1,RF3
Type I Diabetes Mellitus Signaling	4,07E+00	2,18E-01	NaN	MAP2K4,SOC33,JAK1,CASP3,IFNGR1,IL1R1,NFKB1,CD3D,BCL2,CD3G,CD28,PRF1,RIKPK1,MAPK14,NFKBIA,CD80,IL12B,FCER1G,CD86,SOC2,STAT1,IL1RAP,TNF,SOC55
Role of MAPK Signaling in the Pathogenesis of Cancer	3,92E+00	2,50E-01	NaN	PNPLA8,MAP2K4,RAF1,NRAS,CASP3,CCL5,PLA2G7,BCL2,ATF2,CXCL10,PLA2G4A,MAPK14,RRAS2,CCL2,AKT3,TNF,MAP2K1,PRKCA
GPCR-Mediated Nutrient Sensing in Enterocytes	3,92E+00	2,35E-01	NaN	PRKACB,PRKCO,GN2,GNAI1,GNAQ,PLCL2,ITPR1,ADCY9,GNAI3,PRKCI,GN11,PRKAR2B,PLCG2,PLCB1,PRKCH,PRKD3,PRKD1,GN12,PRKCB,PRKCA
Death Receptor Signaling	3,90E+00	2,28E-01	NaN	GAS2,MAP2K4,CASP3,ZC3HAV1,TNFSF10,PARP8,TNKS2,NFKB1,PARP9,BCL2,ROCK1,TANK,RIKPK1,NFKBIA,ACTA2,CRA DD,TIPARP,TNF,ACTC1,BIRC3,BIRC2
ATM Signaling	3,80E+00	2,38E-01	NaN	MAP2K4,SMC3,GADD45B,ATF1,TOBPB1,CREBBP,CENB2,ZEB1,CHEK1,NBN,ATF2,SMC1A,NFKBIA,MAPK14,SMC2,CREB1,TLK1,TLK2,CDK2
Cancer Drug Resistance By Drug Efflux	3,78E+00	2,86E-01	NaN	PIK3R3,RAF1,ABCN1,NRAS,RRAS2,FOXO1,PIK3CG,ABC2,PIK3R1,AKT3,PIK3CD,NFKB1,MAP2K1,PTEN
Differential Regulation of Cytokine Production	3,73E+00	4,44E-01	NaN	CCL4,CCL2,IL12B,IL10,IL6,CCL5,CCL3,TNF
Salvage Pathways of Pyrimidine Ribonucleotides	3,69E+00	2,21E-01	NaN	MAP2K4,APOBEC3B,DAPK1,PRKCO,SGK1,MAPK6,TTK,APOBEC3G,PAK1,CDK8,PAK3,PIM1,PRPF4B,PAK2,PRKCH,MAP3K8,EIF2AK2,HIPK1,MAP2K1,CDK2,ACVR2A
IL-4 Signaling	3,64E+00	2,25E-01	NaN	IRF4,NRAS,JAK1,PIK3C2A,IL13RA1,FGFR1,PIK3R1,SOS2,FGFR2,NR3C1,PIK3R3,RRAS2,PTPN11,INPP5F,PIK3C3,PIK3CG,IRS1,SOS1,AKT3,PIK3CD
PCP pathway	3,62E+00	2,54E-01	NaN	MAP2K4,DAAM1,CTHRC1,FZD1,ATF2,ROCK1,ROCK2,FZD8,SDC2,RHOA,FZD6,PFN2,PRICKLE1,FZD2,WNT5A,FZD7
Oncostatin M Signaling	3,56E+00	3,24E-01	NaN	IL6ST,TIMP3,RAF1,EPAS1,JAK1,RRAS2,NRAS,SOS1,OSMR,STAT1,MAP2K1
Role of PKR in Interferon Induction and Antiviral Activity	3,51E+00	3,00E-01	NaN	TRAF3,NFKBIA,MAPK14,CASP3,TAB2,EIF2AK2,STAT1,NFKB1,EIF2S1,TNF,FCGR1A,ATF2
IL-1 Signaling	3,50E+00	2,20E-01	NaN	MAP2K4,PRKACB,GNAI2,GN2,MAP3K1,TAB2,GNAQ,GNAI1,IL1R1,NFKB1,ADCY9,GNB4,GNAI3,MAPK14,GN11,PRKAR2B,NFKBIA,GNAI3,IL1RAP,GN12
Hereditary Breast Cancer Signaling	3,47E+00	1,90E-01	NaN	PBRM1,GADD45B,PIK3R1,CHEK1,PTEN,PIK3C3,PIK3CG,AKT3,HDAC9,NRAS,HDAC4,PIK3C2A,FGFR1,WEE1,CREBBP,FGFR2,RFCS,NBN,PIK3R3,RRAS2,PTPN11,SMARCA2,IRS1,MSH6,PIK3CD,SMARCC1,RF3
Gli3 Signaling	3,47E+00	2,00E-01	NaN	PRKACB,RAF1,NRAS,PTGER3,GN2,RALB,SOS2,GNAI1,RAP1A,FPR1,S1PR3,ADCY9,GNAI3,GNB4,RRAS2,GN11,PRKAR2B,P2RY14,LPAR1,RGS10,SOS1,S1PR1,CAV1,GN12
Cyclins and Cell Cycle Regulation	3,47E+00	2,31E-01	NaN	HDAC9,RAF1,CNNE2,HDAC4,TFDP1,WEE1,CUL1,CCNB2,CDKN2B,SKP2,TGFB1,PPP2R3A,E2F5,TGFB3,GSK3B,PPP2R5E,PPP2R1B,CDK2
Estrogen Receptor Signaling	3,43E+00	1,95E-01	NaN	RAF1,PRKDC,NRAS,CCNC,SOS2,CREBBP,RFBOX2,GT2A1,NR3C1,NCOA3,MED14,TA99B,DDX5,CDK8,RRAS2,KAT2B,RUNX2,SOS1,MED21,NCOA1,MED13L,NR1P1,TA7,MAP2K1,ESR1
Mechanisms of Viral Exit from Host Cells	3,40E+00	2,93E-01	NaN	NEDD4,PRKCI,PRKCO,ACTA2,SH3GLB1,XPO1,PRKCH,ACTC1,PRKD3,PRKD1,PRKCB,PRKCA
Calcium-induced T Lymphocyte Apoptosis	3,38E+00	2,42E-01	NaN	PRKCO,CD4,ITPR1,ATP2A2,CD3D,CALM1 (includes others),CD3G,PRKCI,ZAP70,FCER1G,PRKCH,PRKD3,PRKD1,PPP3CA,PRKCA,PRKCB
Mitotic Roles of Polo-Like Kinase	3,38E+00	2,42E-01	NaN	KIF23,SMC3,CD2C20,WEE1,CCNB2,SMC1A,PLK4,TGFB1,PPP2R3A,FBXO5,HSP90AA1,PPP2R5E,PPP2R1B,CD27,RAD21,STAG2
Role of Hypercytokinemia/hyperchemokine	3,20E+00	2,79E-01	NaN	IL33,CCR1,CXCL10,CCR5,CCL4,CCL2,IL12B,IL1RN,IL6,CCL5,CCL3,TNF
Apoptosis Signaling	3,19E+00	2,13E-01	NaN	GAS2,MAP2K4,RAF1,PRKCO,NRAS,CASP3,NFKB1,BCL2,ROCK1,RRAS2,NFKBIA,PLCG2,BCL2A1,TNF,MAP2K1,BIRC3,BCL2L11,BIRC2,PRKCA
Activation of IRF by Cytosolic Pattern Recognition Receptors	3,18E+00	2,42E-01	NaN	MAP2K4,TRAF3,IL10,CREBBP,IL6,NFKB1,ATF2,TANK,IFIH1,RIKPK1,NFKBIA,DDX58,IFI2,STAT1,TNF
Amyotrophic Lateral Sclerosis Signaling	3,16E+00	1,98E-01	NaN	CASP3,PIK3C2A,FGFR1,PIK3R1,FGFR2,PDGFC,BCL2,PIK3R3,PAK1,RAB5A,PTPN11,IGF1,MINPP1,PIK3CG,IRS1,CAT,AKT3,PIK3CD,BIRC3,RNF19A,PPP3CA,BIRC2
Regulation of eIF4 and p70S6K Signaling	3,13E+00	1,78E-01	NaN	RAF1,PIK3R1,SOS2,EIF2S1,EIF4E,PIK3CG,PAIP1,SOS1,AKT3,MAP2K1,ITGA4,ITGB1,NRAS,PIK3C2A,FGFR1,ITGA5,FGFR2,PIK3R3,MAPK14,RRAS2,PTPN11,PPP2R3A,IRS1,PIK3CD,PPP2R5E,PPP2R1B,EIF1AX
AMPK Signaling	3,11E+00	1,69E-01	NaN	PBRM1,PRKACB,CAB39,PIK3R1,KAT2B,TBC1D1,PIK3CG,PIK3C3,CREB1,AKT3,PPM1A,ADRB2,PIK3C2A,FGFR1,CREBBP,FGFR2,ATF2,PIK3R3,MAPK14,PRKAR2B,FOXO1,PTPN11,SMARCA2,PPP2R3A,IRS1,PIK3CD,PPP2R5E,SMARCC2,HMGCRA,AK2,PPP2R1B,PPAT
Tight Junction Signaling	3,03E+00	1,74E-01	NaN	PRKACB,TGFB1,NECTIN3,JAM2,MYLK,NFKB1,PTEN,TGFB2,MPDZ,TGFB1,VAMP3,AKT3,VCL,ACTC1,TIAM1,CNKR3,MYL9,EPB41,PRKAR2B,PRKCI,ACTA2,JAM3,PPP2R3A,CDCA4,RHOA,TGFB3,PPP2R5E,TNF,PPP2R1B
CDK5 Signaling	3,02E+00	2,02E-01	NaN	ITGB1,PRKACB,RAF1,NRAS,BDNF,PPP1R3C,MAPK6,PPP1CB,PPP1R14A,CDK5R1,LAMC1,ADCY9,MAPK14,RRAS2,PRKAR2B,PPP1R12A,PPP2R3A,PPP2R5E,PPP2R1B,MAP2K1
Cardiac β -adrenergic Signaling	2,98E+00	1,82E-01	NaN	PRKACB,PPP1R3C,AKAP9,PPP1R5E,PPP2R5E,PPP2R1B,MAP2K1
TNFR2 Signaling	2,83E+00	3,10E-01	NaN	AKAP10,PDE5A,PPP2R5E,SLC8A1,PPP2R1B
Sperm Motility	2,82E+00	1,84E-01	NaN	MAP2K4,TANK,NFKBIA,MAPK31,TNFAIP3,NFKB1,BIRC3,TNF,BIRC2
Toll-like Receptor Signaling	2,80E+00	2,16E-01	NaN	PNPLA8,PRKACB,PRKCO,GUCY1A3,PLCL2,ITPR1,PDE4B,PDE1A,PLA2G7,PTK2,PLA2G4A,CALM1 (includes others),PRKCI,PRKAR2B,PLCG2,PLCB1,PRKCH,PDE4D,PRKD3,PRKD1,GUCY1B3,PRKCB,PRKCA
Antioxidant Action of Vitamin C	2,80E+00	1,94E-01	NaN	MAP2K4,MAP3K1,TAB2,TNFAIP3,NFKB1,IL33,LY96,MAPK14,NFKBIA,IL12B,IL1RN,TLR1,TLR7,CD14,EIF2AK2,TNFPNPLA8,MAP2K4,SLC2A5,PLD3,PLCL2,NFKB1,PLA2G7,TXNRD1,PLD1,PLD4,PLA2G4A,HMOX1,CSF2RB,SLC23A2,MAPK14,NFKBIA,CSF2RA,PLCG2,PLCB1,TNF
Role of CHK Proteins in Cell Cycle Checkpoint	2,71E+00	2,36E-01	NaN	RFCS,CHEK1,RAD1,NBN,PCNA,PPP2R3A,E2F5,TLK1,PPP2R5E,TLK2,PPP2R1B,CDK2,RF3
Hepatic Cholestasis	2,71E+00	1,70E-01	NaN	MAP2K4,PRKACB,IL6,NFKB1,NFKBIA,TGFB1,IL1RAP,PRKD3,PRKD1,PRKCA,ABC81,PRKCO,IL1R1,IL33,ADCY9,LY96,PRKAR2B,PRKCI,SLCO3A1,IL1RN,IL12B,TGFB3,CD14,PRKCH,TNF,ESR1,PRKCB
Remodeling of Epithelial Adherens Junctions	2,68E+00	2,17E-01	NaN	ACTR2,TUBB2A,RAB7A,IQGAP1,CLIP1,MAPRE2,APC,RAB5A,ACTR3,TUBA1A,ACTA2,HGF,VCL,ACTC1,ACTN1
D-myo-inositol-5-phosphate Metabolism	2,62E+00	1,68E-01	NaN	SOC53,MINPP1,ACPS,PTEN,SACM1L,PTPRC,MTMR6,PPP1R12A,PTPN11,PLCB1,MTMR2,PPP3CA,PPF1A1,PPTCT,PPP1R14A,PAWR,PTPRM,PLD4,TNS3,PTPN11,INPP5F,PPP1R16B,PPP2R3A,PLCG2,PPP2R5E,PIP4K2A,PTPN22
Cardiomyocyte Differentiation via BMP Receptor Signaling	2,59E+00	3,50E-01	NaN	BMPRI1A,BMP2,SMAD4,BMPR2,BMP7,MEF2C,ATF2
Cell Cycle Control of Chromosomal Replication	2,51E+00	2,63E-01	NaN	PCNA,PRIM1,MCM2,CD6,TOP2A,PRIM2,DFB4,MCM4,CDK2,MCM7
Bladder Cancer Signaling	2,46E+00	1,95E-01	NaN	RAF1,DAPK1,NRAS,TFDP1,MMP14,MMP16,FGF9,RP56KA5,PDGFC,FGF1,RRAS2,THBS1,MMP12,FGF7,MAP2K1,MMP9,EGFR
Role of JAK2 in Hormone-like Cytokine Signaling	2,31E+00	2,65E-01	NaN	SOC53,JAK1,PTPN11,IRS1,SH2B3,PTPN11,SOC52,STAT1,SOC55
Hematopoiesis from Pluripotent Stem Cells	2,30E+00	2,34E-01	NaN	KITLG,CD3G,IL12B,IL10,CSF1,CD4,FCER1G,IL6,CD8A,IL7,CD3D
LXR/RXR Activation	2,30E+00	1,74E-01	NaN	APOE,MSR1,CD36,SERPINF1,IL1R1,IL6,NFKB1,ABCA1,IL33,LY96,CCL2,IL1RN,APOC1,CD14,HMGCRA,IL1RAP,TNF,CLU,MMP9,CCL7,APOD
TR/RXR Activation	2,28E+00	1,84E-01	NaN	UCP2,PIK3C2A,FGFR1,PIK3R1,FGFR2,HIF1A,NCOA3,NCOA4,PIK3R3,PTPN11,COL6A3,PIK3C3,PIK3CG,IRS1,NCOA1,AKT3,PIK3CD,RCAN2
Coagulation System	2,22E+00	2,57E-01	NaN	BDKRB2,F2R,PROS1,F13A1,VWF,THBD,TFPI,A2M,PLAT
cAMP-mediated signaling	2,21E+00	1,48E-01	NaN	PRKACB,RAF1,RGS18,PTGER3,AKAP9,PDE1A,RGS10,CREB1,PDE4D,MAP2K1,PPP3CA,ADRB2,SMPDL3A,RGS2,CREBBP,GNAI1,PDE4B,RAP1A,ATF2,FPR1,PDE8A,S1PR3,ADCY9,CALM1 (includes others),AKAP13,GNAI3,P2RY14,PRKAR2B,LPAR1,CREM,AKAP10,S1PR1,PDE5A
Differential Regulation of Cytokine Production	2,21E+00	3,04E-01	NaN	CCL4,CCL2,IL12B,IL10,CCL5,CCL3,TNF
Intrinsic Prothrombin Activation Pathway	2,20E+00	2,76E-01	NaN	COL1A2,COL1A1,PROS1,F13A1,COL10A1,COL18A1,THBD,COL3A1
Interferon Signaling	2,14E+00	2,50E-01	NaN	IFIT3,IFIT1,OAS1,JAK1,IFNGR1,IFNAR2,STAT1,MED14,BCL2
Role of p14/p19ARF in Tumor Suppression	2,10E+00	2,33E-01	NaN	PIK3R3,PTPN11,PIK3C2A,PIK3CG,PIK3C3,PIK3R1,IRS1,FGFR1,FGFR2,PIK3CD
Estrogen-mediated S-phase Entry	2,10E+00	2,92E-01	NaN	CNNE2,TFDP1,E2F5,RBL1,ESR1,CDK2,SKP2
D-myo-inositol (1,4,5,6)-Tetrakisphosphate 1	2,07E+00	1,61E-01	NaN	PPF1A1,SOC53,MINPP1,PPTCT,PPP1R14A,PAWR,ACPS,PTPRM,SACM1L,PTEN,MTMR6,PTPRC,TNS3,PTPN11,INPP5F,PPP1R12A,PPP1R16B,PPP2R3A,PTPN11,MTMR2,PPP2R5E,PTPN22,PPP3CA
D-myo-inositol (3,4,5,6)-tetrakisphosphate 1	2,07E+00	1,61E-01	NaN	PPF1A1,SOC53,MINPP1,PPTCT,PPP1R14A,PAWR,ACPS,PTPRM,SACM1L,PTEN,MTMR6,PTPRC,TNS3,PTPN11,INPP5F,PPP1R12A,PPP1R16B,PPP2R3A,PTPN11,MTMR2,PPP2R5E,PTPN22,PPP3CA
iNOS Signaling	2,04E+00	2,27E-01	NaN	CALM1 (includes others),LY96,NFKBIA,JAK1,MAPK14,CREBBP,CD14,IFNGR1,STAT1,NFKB1
IL-17A Signaling in Gastric Cells	2,00E+00	2,80E-01	NaN	CXCL10,MAP2K4,MAPK14,CCL5,NFKB1,TNF,EGFR
Nur77 Signaling in T Lymphocytes	1,98E+00	2,03E-01	NaN	HDAC9,CD3G,CALM1 (includes others),CD28,CASP3,CD80,FCER1G,CD86,CD3D,PPP3CA,BCL2,MAP3K2
Cellular Effects of Sildenafil (Viagra)	1,95E+00	1,62E-01	NaN	PRKACB,GUCY1A3,PPP1CB,MYLK,PLCL2,ITPR1,PDE4B,PDE1A,MYL9,ADCY9,CALM1 (includes others),PRKAR2B,PPP1R12A,ACTA2,PLCG2,PLCB1,PDE5A,PDE4D,ACTC1,GUCY1B3,MYL12A
3-phosphoinositide Degradation	1,88E+00	1,53E-01	NaN	PPF1A1,SOC53,MINPP1,PPTCT,PPP1R14A,PAWR,ACPS,PTPRM,SACM1L,PTEN,MTMR6,PTPRC,TNS3,PTPN11,INPP5F,PPP1R12A,PPP1R16B,PPP2R3A,PTPN11,MTM1,MTMR2,PPP2R5E,PTPN22,PPP3CA
Role of Wnt/GSK-3 β Signaling in the Pathogenesis of Cancer	1,87E+00	1,84E-01	NaN	TCF4,CNSK1G3,FZD1,NCOA3,APC,NCOA4,FZD8,FZD6,NCOA1,LEF1,GSK3B,FZD2,WNT5A,FZD2
Calcium Transport I	1,79E+00	4,00E-01	NaN	ATP2B1,ATP2C1,ANXA5,ATP2A2

EIF2 Signaling	1,79E+00	1,40E-01	NaN	RAF1,PIK3R1,SOS2,PPP1CB,HSPA5,EIF2S1,EIF4E,BCL2,PIK3CG,PIK3C3,PAIP1,SOS1,EIF5,AKT3,GSK3B,MAP2K1,ACTC1,NOX4,NRAS,PIK3C2A,FGFR1,FGFR2,PIK3R3,WARS,RRAS2,ACTA2,PTPN11,IRS1,PIK3CD,EIF2AK2,EIF1AX
Role of BRCA1 in DNA Damage Response	1,77E+00	1,79E-01	NaN	PBRM1,RBL2,ATF1,TOPBP1,RBL1,RFC5,CHEK1,NBN,SMARCA2,E2F5,MSH6,SMARCC1,STAT1,RFC3
Primary Immunodeficiency Signaling	1,77E+00	2,08E-01	NaN	BLNK,PTPRC,BTK,IL7R,CD4,ZAP70,ICOS,CD79A,CD8A,CD3D
LPS/IL-1 Mediated Inhibition of RXR Functio	1,76E+00	1,40E-01	NaN	MAP2K4,APOE,SLC27A2,CHST15,ABCA1,CHST2,GSTM2,ALDH1A1,ALDH1A3,CHST11,ACSL4,XPO1,FABP5,I11RAP,ALD,H6A1,ABCB1,GSTA4,GSTM3,MAP3K1,IL1R1,IL33,HS3ST3B1,LY96,IL1RN,CAT,APOC1,NCOA1,CD14,TNF,ACSL1,MAOA,PRKACB,HDAC9,TRPC1,HDAC4,ATP2B1,ATP2C1,CREBBP,MEF2A,TPM1,ITPR1,TPM2,ATP2A2,KAT2,MYL9,RCAN1,CALM1 (includes others),PRKAR2B,ACTA2,CREB1,MEF2C,ASPH,SLC8A1,RCAN2,ACTC1,PPP3CA
Calcium Signaling	1,76E+00	1,46E-01	NaN	YWHAQ,PRKDC,WEE1,CUL1,YWHAZ,TOP2A,CCNB2,CHEK1,SKP2
Cell Cycle: G2/M DNA Damage Checkpoint R	1,71E+00	2,04E-01	NaN	KNPNA4,TNPO1,XPO1,KNPNA1,IPO5
RAN Signaling	1,71E+00	3,12E-01	NaN	TCF4,BMP2,HHIP,FZD1,APC,FZD8,FZD6,BMP7,LEF1,GSK3B,FZD2,WNT5A,FZD7
Basal Cell Carcinoma Signaling	1,69E+00	1,81E-01	NaN	NFKBIA,UBE2J1,CREBBP,CREB1,HSP90AA1,UBE2V2,HIF1A,UBE2D1,UBE2D3,ARNT,PTEN,ATF2
Hypoxia Signaling in the Cardiovascular Syst	1,66E+00	1,85E-01	NaN	MAP2K4,RIPK1,NFKBIA,SLC25A4,CASP3,CXCR4,NFKB1,BIRC3,TNF,BCL2,BIRC2
Hypoxia Signaling in the Cardiovascular Syst	1,52E+00	1,83E-01	NaN	MAP2K4,SOC3,JAK1,MAPK14,AKT3,STAT1
Induction of Apoptosis by HIV1	1,52E+00	2,50E-01	NaN	RAF1,JAK1,IFNGR1,IFNAR2,STAT1,NFKB1
IL-22 Signaling	1,52E+00	2,50E-01	NaN	MAP2K4,TFNRF59,NFKBIA,MAPK14,NFKB1,MAP2K1,ATF2
Role of JAK1, JAK2 and TYK2 in Interferon Si	1,52E+00	2,50E-01	NaN	PRKACB,ADCY9,GCH1,PRKAR2B,PPP1R12A,PPP2R3A,PPP1R3C,PPP1CB,PPP1R14A,PPP2R5E,SLC18A2,PPP2R1B,MAO
4-1BB Signaling in T Lymphocytes	1,50E+00	2,26E-01	NaN	A
Dopamine Receptor Signaling	1,47E+00	1,69E-01	NaN	GNB4,GNG11,PLCG2,GNG2,GNAQ,PLCB1,GNG12
G Protein Signaling Mediated by Tubby	1,43E+00	2,19E-01	NaN	CALM1 (includes others),PRKCI,PRKCQ,PRKCH,PRKDD3,PPP3CA,PRKD1,PRKCB,PRKCA
nNOS Signaling in Neurons	1,41E+00	1,91E-01	NaN	CCNE2,CCNB2,AKT3,CDK2,RAD1
DNA damage-induced 14-3-3if Signaling	1,39E+00	2,63E-01	NaN	PLD4,HMOX1,PLD3,PLD1
Choline Biosynthesis III	1,38E+00	3,08E-01	NaN	PER3,ARNTL,CREBBP,CREB1,CLOCK,CRY1,ATF2
Circadian Rhythm Signaling	1,37E+00	2,12E-01	NaN	CD1D,CD1B,FCER1G,CANX,PSAP,CD1C
Lipid Antigen Presentation by CD1	1,37E+00	2,31E-01	NaN	IL33,CD28,PRF1,CD80,IL1RN,FCER1G,CD86,IL6,TNF
Graft-versus-Host Disease Signaling	1,36E+00	1,88E-01	NaN	TRAF3,RIPK1,NFKBIA,CASP3,NFKB1,BIRC3,BIRC2
TWEAK Signaling	1,30E+00	2,06E-01	NaN	PRKACB,ABCN1,GSTM2,PRKAR2B,ALDH1A1,FOXO1,NCOA1,AKT3,IL6,NR3C1,TNF
PXR/RXR Activation	1,30E+00	1,69E-01	NaN	PTK2,ITGB1,RRAS2,NRAS,ITGA5,VCL,ACTN1,CDK2,ITGA4,EGFR
Regulation of Cellular Mechanics by Calpain	1,30E+00	1,75E-01	NaN	PTK2,PRKCI,JAK1,IL6,STAT1,NFKB1
IL-15 Production	1,30E+00	2,22E-01	NaN	PLD4,PIPS1A,PLCG2,PLCB1,PI4K2B,PIP4K2A
D-myo-inositol (1,4,5)-Trisphosphate Biosyn	1,30E+00	2,22E-01	NaN	PRKDC,WRN,XRCC5,NBN
DNA Double-Strand Break Repair by Non-Hor	1,28E+00	2,86E-01	NaN	NFKBIA,MAPK14,CCL2,IL6,GSK3B,NFKB1,CCL7
IL-17A Signaling in Fibroblasts	1,25E+00	2,00E-01	NaN	CTSK,NOX4,CTSO,ATP6V1C1,CTSW,TUBB2A,RAB7A,CTSG,CANX,ATP6V0D2,ATP6V1A,LAMP2,RAB5A,TUBA1A,CTSS,PI
Phagosome Maturation	1,25E+00	1,39E-01	NaN	K3C3,NCF2,CYBB,VAMP3,CTSC
G1s Signaling	1,24E+00	1,47E-01	NaN	PRKACB,RGS2,GNG2,CREBBP,RAP1A,ATF2,ADCY9,GNB4,GNG11,PRKAR2B,ADD3,CREB1,HCK,MAP2K1,GNG12,ADRB2
Protein Ubiquitination Pathway	1,24E+00	1,25E-01	NaN	USP24,USP12,USP18,CDCC20,DNAJB4,CUL1,HSPB8,UBE2V2,HSPA5,DNAJA1,USP8,USP16,UCLH5,BIRC3,NEDD4,USP15,USP1,DNAJB9,UBE2D1,DNAJB14,UBE3A,SKP2,UBE2J1,HSPA13,HSP90AA1,USP46,SMURF2,DNAJB6,USP34,USP25,UB
Role of RIG1-like Receptors in Antiviral Innate	1,23E+00	1,86E-01	NaN	E2D3,BIRC2
Telomere Extension by Telomerase	1,19E+00	2,67E-01	NaN	IFIH1,TANK,TRAF3,RIPK1,NFKBIA,CREBBP,DDX58,NFKB1
Prostanoid Biosynthesis	1,18E+00	3,33E-01	NaN	TNKS2,TERF1,XRCC5,NBN
autophagy	1,18E+00	1,67E-01	NaN	PTGIS,PTGS1,HPGDS
CD27 Signaling in Lymphocytes	1,18E+00	1,73E-01	NaN	LAMP2,CTSK,CTSO,CTSS,PIK3C3,CTSW,CTSG,RB1CC1,CTSC,BCL2
Polyamine Regulation in Colon Cancer	1,17E+00	2,27E-01	NaN	MAP2K4,NFKBIA,CASP3,MAP3K1,MAP3K8,CD27,NFKB1,MAP2K1,MAP3K2
Phospholipases	1,10E+00	1,61E-01	NaN	TCF4,MAX,AZIN1,APC,ODC1
Extrinsic Prothrombin Activation Pathway	1,10E+00	2,50E-01	NaN	PLD4,PNPLA8,PLA2G4A,HMOX1,PLD3,PLCG2,PLCB1,PLCL2,PLA2G7,PLD1
Mismatch Repair in Eukaryotes	1,10E+00	2,50E-01	NaN	PROS1,F13A1,THBD,TFPI
April Mediated Signaling	1,10E+00	1,84E-01	NaN	PCNA,MSH6,RFC5,RFC3
GPCR-Mediated Integration of Enteroendocri	1,05E+00	1,53E-01	NaN	MAP2K4,TRAF3,NFKBIA,MAPK14,MAP3K1,NFKB1,TFNRF517
Tumoricidal Function of Hepatic Natural Kill	1,03E+00	2,08E-01	NaN	PRKACB,ADCY9,GNAI3,PRKAR2B,PLCG2,GNAQ,GNAI1,PLCB1,PLCL2,ITPR1,ADRB2
Cytotoxic T Lymphocyte-mediated Apoptosis	1,00E+00	1,88E-01	NaN	PRF1,ICAM1,CASP3,SRGN,ITGAL
B Cell Activating Factor Signaling	1,00E+00	1,75E-01	NaN	CD3G,PRF1,CASP3,FCER1G,CD3D,BCL2
Thyroid Cancer Signaling	1,00E+00	1,75E-01	NaN	MAP2K4,TRAF3,NFKBIA,MAPK14,MAP3K1,NFKB1,TFNRF517
Myo-inositol Biosynthesis	9,80E-01	4,00E-01	NaN	TCF4,RRAS2,NRAS,BDNF,CXCL12,LEF1,MAP2K1
Ethanol Degradation IV	9,73E-01	2,00E-01	NaN	IMPAD1,INPP5F
MIF-mediated Glucocorticoid Regulation	9,56E-01	1,82E-01	NaN	TYRP1,ALDH1A1,ALDH1A3,CAT,ACSL1
Eicosanoid Signaling	9,29E-01	1,49E-01	NaN	PLA2G4A,LY96,NFKBIA,CD14,NFKB1,NR3C1
GADD45 Signaling	8,82E-01	2,11E-01	NaN	PTGIS,PNPLA8,PTGFR,PLA2G4A,PTGER3,PTGS1,ALOX5AP,HPGDS,ALOX5,PLA2G7
Hematopoiesis from Multipotent Stem Cells	8,77E-01	2,50E-01	NaN	PCNA,CCNE2,GADD45B,CDK2
Acy Carrier Protein Metabolism	8,67E-01	1,00E+00	NaN	KITLG,CSF1,IL7
Xanthine and Xanthosine Salvage	8,67E-01	1,00E+00	NaN	AASDHPTT
Histamine Biosynthesis	8,67E-01	1,00E+00	NaN	PNP
Cell Cycle Regulation by BTG Family Proteins	8,67E-01	1,71E-01	NaN	HDC
B Cell Development	8,67E-01	1,71E-01	NaN	CCNE2,PPP2R3A,E2F5,PPP2R5E,PPP2R1B,CDK2
Gustation Pathway	8,62E-01	1,29E-01	NaN	PTPRC,IL7R,CD80,CD86,CD79A,IL7
Chondroitin and Dermatan Biosynthesis	8,47E-01	3,33E-01	NaN	SMPDL3A,PRKACB,LPAR4,GNG2,P2RX5,PDE4B,ITPR1,PDE1A,PDE8A,ADCY9,P2RY10,GNG11,PRKAR2B,P2RY14,PDE5A,
UDP-N-acetyl-D-glucosamine Biosynthesis II	8,47E-01	3,33E-01	NaN	PDE4D
Purine Nucleotides Degradation II (Aerobic)	8,29E-01	2,00E-01	NaN	CSGALNACT2,CHSY1
Superpathway of Cholesterol Biosynthesis	8,19E-01	1,79E-01	NaN	GFPT1,UAP1
Fatty Acid Activation	8,09E-01	2,31E-01	NaN	CECR1,GDA,PNP,AOX1
Mevalonate Pathway I	8,09E-01	2,31E-01	NaN	SQLE,IDI1,ACAT1,HMGCR,LBR
Guanosine Nucleotides Degradation III	8,09E-01	2,31E-01	NaN	SLC27A2,ACSL4,ACSL1
Unfolded protein response	7,94E-01	1,48E-01	NaN	IDI1,ACAT1,HMGCR
Role of Oct4 in Mammalian Embryonic Stem	7,70E-01	1,52E-01	NaN	GDA,PNP,AOX1
Ceramide Biosynthesis	7,40E-01	2,86E-01	NaN	UBXN4,INSIG1,EDEM1,CANX,DNAJA2,DNAJB9,HSPA5,BCL2
Adenine and Adenosine Salvage III	7,40E-01	2,86E-01	NaN	NR2F1,KDM5B,SPP1,BMI1,NR2F2,MEF2A,SH3GLB1
Ceramide Degradation	7,40E-01	2,86E-01	NaN	SPTLC2,KDSR
Netrin Signaling	7,12E-01	1,54E-01	NaN	CECR1,PNP
tRNA Splicing	7,12E-01	1,54E-01	NaN	ACER3,ASAH1
Neuroprotective Role of THOP1 in Alzheimer'	6,77E-01	1,50E-01	NaN	PRKACB,PRKAR2B,UNC5B,NCK1,PPP3CA,ENAH
Transcriptional Regulatory Network in Embry	6,77E-01	1,50E-01	NaN	SMPDL3A,PDE8A,PDE5A,PDE4D,PDE4B,PDE1A
nNOS Signaling in Skeletal Muscle Cells	6,77E-01	2,00E-01	NaN	PRKACB,PRKAR2B,CREB1,PNOC,MMP9,APP
Airway Pathology in Chronic Obstructive Puln	6,54E-01	2,50E-01	NaN	RIF1,CDYL,KAT6A,MEIS1,FOXC1,ZFXH3
Superoxide Radicals Degradation	6,54E-01	2,50E-01	NaN	SNTB2,CALM1 (includes others),DMD
Tryptophan Degradation to 2-amino-3-carbo:	6,54E-01	2,50E-01	NaN	TNF,MMP9
Purine Ribonucleosides Degradation to Ribos	6,54E-01	2,50E-01	NaN	TYRP1,CAT
Salvage Pathways of Pyrimidine Deoxyribonu	6,54E-01	2,50E-01	NaN	KMO,KYNU
Sphingomyelin Metabolism	6,54E-01	2,50E-01	NaN	CECR1,PNP
MIF Regulation of Innate Immunity	6,50E-01	1,46E-01	NaN	POBEC3B,APOBEC3G
Superpathway of D-myo-inositol (1,4,5)-trisp	6,37E-01	1,67E-01	NaN	SGMS2,SGMS1
Granzyme B Signaling	6,36E-01	1,88E-01	NaN	MAP2K4,PLA2G4A,LY96,NFKBIA,CD14,NFKB1
Parkinson's Signaling	6,36E-01	1,88E-01	NaN	MINPP1,IMPAD1,INPP5F,PTEN
Dermatan Sulfate Biosynthesis	6,36E-01	1,33E-01	NaN	PRKDC,PRF1,CASP3
UDP-D-xylose and UDP-D-glucuronate Biosyn	6,36E-01	5,00E-01	NaN	MAPK14,CASP3,SNCA
Epoxysqualene Biosynthesis	6,36E-01	5,00E-01	NaN	CHST2,HS3ST3B1,CSGALNACT2,XYLTI1,CHSY1,CHST11,CHST15,DSE
l ² -alanine Degradation I	6,36E-01	5,00E-01	NaN	UGDH
Guanine and Guanosine Salvage I	6,36E-01	5,00E-01	NaN	SQLE
Spermine Biosynthesis	6,36E-01	5,00E-01	NaN	ALDH6A1
GDP-L-fucose Biosynthesis II (from L-fucose)	6,36E-01	5,00E-01	NaN	PNP
Spermidine Biosynthesis I	6,36E-01	5,00E-01	NaN	AMD1
				FPGT
				AMD1

Adenine and Adenosine Salvage I	6,36E-01	5,00E-01	NaN	PNP
Putrescine Biosynthesis III	6,36E-01	5,00E-01	NaN	ODC1
Glutamate Biosynthesis II	6,36E-01	5,00E-01	NaN	GLUD2
Glutamate Degradation X	6,36E-01	5,00E-01	NaN	GLUD2
Amyloid Processing	6,36E-01	1,37E-01	NaN	PRKACB,PRKAR2B,MAPK14,AKT3,GSK3B,CDK5R1,APP
OX40 Signaling Pathway	6,27E-01	1,24E-01	NaN	MAP2K4,CD3G,TRAF3,TNFSF4,NFKBIA,TNFRSF4,CD4,FCER1G,NFKB1,CD3D,BCL2
Retinoic acid Mediated Apoptosis Signaling	6,17E-01	1,31E-01	NaN	CASP3,TIPARP,RARB,ZC3HAV1,PARP8,TNFSF10,TNKS2,PARP9
Sphingosine and Sphingosine-1-phosphate M Ketolysis	5,96E-01	2,22E-01	NaN	ACER3,ASAH1
β -linolenate Biosynthesis II (Animals)	5,96E-01	1,76E-01	NaN	ACAT1,OXCT1
Mitochondrial L-carnitine Shuttle Pathway	5,96E-01	1,76E-01	NaN	SLC27A2,ACSL4,ACSL1
Adenosine Nucleotides Degradation II	5,96E-01	1,76E-01	NaN	SLC27A2,ACSL4,ACSL1
Superpathway of Geranylgeranyldiphosphate	5,96E-01	1,76E-01	NaN	CECR1,PNP,AOX1
Role of Cytokines in Mediating Communicati	5,60E-01	1,30E-01	NaN	ID1,ACAT1,HMGCR
D-myo-inositol (1,3,4)-trisphosphate Biosynt	5,00E-01	1,58E-01	NaN	IL33,IL12B,IL10,TGFB1,IL1RN,IL6,TNF
Autoimmune Thyroid Disease Signaling	4,97E-01	1,28E-01	NaN	MINPP1,INPP5F,PTEN
5-aminoimidazole Ribonucleotide Biosynthes	4,97E-01	3,33E-01	NaN	CD28,PRF1,CD80,IL10,FCER1G,CD86
Tetrahydrobiopterin Biosynthesis I	4,97E-01	3,33E-01	NaN	PPAT
Tetrahydrobiopterin Biosynthesis II	4,97E-01	3,33E-01	NaN	GCH1
Chondroitin Sulfate Biosynthesis	4,65E-01	1,21E-01	NaN	GCH1
Glutathione-mediated Detoxification	4,40E-01	1,33E-01	NaN	CHST2,HS3ST3B1,CSGALNACT2,XYLTI,CHSY1,CHST11,CHST15
Sonic Hedgehog Signaling	4,40E-01	1,33E-01	NaN	GSTM2,GSTA4,GSTM3,HPGDS
Oxidative Ethanol Degradation III	4,29E-01	1,43E-01	NaN	PRKACB,PRKAR2B,HHIP,GSK3B
Endoplasmic Reticulum Stress Pathway	4,29E-01	1,43E-01	NaN	ALDH1A1,ALDH1A3,ACSL1
Inflammasome pathway	4,29E-01	1,43E-01	NaN	CASP3,HSPA5,EIF2S1
Chondroitin Sulfate Biosynthesis (Late Stages	4,28E-01	1,20E-01	NaN	NLRP3,NEK7,NFKB1
Glycogen Degradation II	4,27E-01	1,67E-01	NaN	CHST2,HS3ST3B1,CSGALNACT2,CHSY1,CHST11,CHST15
Airway Inflammation in Asthma	4,09E-01	2,50E-01	NaN	PYGL,AGL
Arsenate Detoxification I (Glutaredoxin)	4,09E-01	2,50E-01	NaN	TNF
Uracil Degradation II (Reductive)	4,09E-01	2,50E-01	NaN	PNP
Heme Degradation	4,09E-01	2,50E-01	NaN	DPYD
Phenylethylamine Degradation I	4,09E-01	2,50E-01	NaN	HMOX1
Thymine Degradation	4,09E-01	2,50E-01	NaN	AOC3
Melatonin Degradation II	4,09E-01	2,50E-01	NaN	DPYD
Acetate Conversion to Acetyl-CoA	4,09E-01	2,50E-01	NaN	MAOA
Fatty Acid β -oxidation I	3,95E-01	1,25E-01	NaN	ACSL1
Oleate Biosynthesis II (Animals)	3,93E-01	1,54E-01	NaN	SLC27A2,ACSL4,ACADM,ACSL1
Cholesterol Biosynthesis I	3,93E-01	1,54E-01	NaN	UFSP2,ALDH6A1
Cholesterol Biosynthesis II (via 24,25-dihydro	3,93E-01	1,54E-01	NaN	SQLE,LBR
Cholesterol Biosynthesis II (via Desmosterol)	3,93E-01	1,54E-01	NaN	SQLE,LBR
Pyrimidine Deoxyribonucleotides De Novo Bi	3,77E-01	1,30E-01	NaN	SQLE,LBR
Putrescine Degradation III	3,77E-01	1,30E-01	NaN	RRM2,APOBEC3G,RRM1
Pyrimidine Ribonucleotides Interconversion	3,76E-01	1,16E-01	NaN	ALDH1A1,ALDH1A3,MAOA
FXR/RXR Activation	3,75E-01	1,03E-01	NaN	SMARCA1,ENTPD1,ANXA1,RECQL,DDX3X
DNA Double-Strand Break Repair by Homoloq	3,59E-01	1,43E-01	NaN	MAP2K4,APOE,CREBBP,SERPINF1,VLDLR,IL33,FOXO1,IL1RN,APOC1,AKT3,TNF,CLU,APOD
Glycogen Degradation III	3,59E-01	1,43E-01	NaN	ATRX,NBN
Urate Biosynthesis/Inosine 5'-phosphate Deg	3,59E-01	1,43E-01	NaN	PYGL,AGL
Phenylalanine Degradation IV (Mammalian, v	3,59E-01	1,43E-01	NaN	PNP,AOX1
Retinoate Biosynthesis I	3,56E-01	1,18E-01	NaN	SLC27A2,MAOA
Glutathione Redox Reactions I	3,56E-01	1,25E-01	NaN	ALDH1A1,ALDH1A3,RDH11,BMP2
Tryptophan Degradation III (Eukaryotic)	3,56E-01	1,25E-01	NaN	CLIC2,GSTM2,GPX8
Tetrahydrofolate Salvage from 5,10-metheny	3,54E-01	2,00E-01	NaN	KMO,ACAT1,KYNU
Serine Biosynthesis	3,54E-01	2,00E-01	NaN	MTHFD2
Lysine Degradation II	3,54E-01	2,00E-01	NaN	PSAT1
Lysine Degradation V	3,54E-01	2,00E-01	NaN	AASDHPPT
Trans, trans-farnesyl Diphosphate Biosynthes	3,54E-01	2,00E-01	NaN	AASDHPPT
dTMP De Novo Biosynthesis	3,54E-01	2,00E-01	NaN	ID1
Pyrimidine Ribonucleotides De Novo Biosynt	3,48E-01	1,11E-01	NaN	DHFR
Tryptophan Degradation X (Mammalian, via 1	3,35E-01	1,20E-01	NaN	SMARCA1,ENTPD1,ANXA1,RECQL,DDX3X
NAD biosynthesis II (from tryptophan)	3,34E-01	1,33E-01	NaN	ALDH1A1,ALDH1A3,MAOA
Vitamin-C Transport	3,34E-01	1,33E-01	NaN	KMO,KYNU
Dermatan Sulfate Biosynthesis (Late Stages)	3,12E-01	1,06E-01	NaN	SLC23A2,TXNRD1
Dermatan Sulfate Degradation (Metazoa)	3,08E-01	1,25E-01	NaN	CHST2,HS3ST3B1,CHST11,CHST15,DSE
Arginine Biosynthesis IV	3,08E-01	1,67E-01	NaN	IDS,HEXA
Pyruvate Fermentation to Lactate	3,08E-01	1,67E-01	NaN	GLUD2
Thioredoxin Pathway	3,08E-01	1,67E-01	NaN	LDHB
Pentose Phosphate Pathway (Non-oxidative I	3,08E-01	1,67E-01	NaN	TXNRD1
Glycerol Degradation I	3,08E-01	1,67E-01	NaN	RPE
Zymosterol Biosynthesis	3,08E-01	1,67E-01	NaN	GK
Glycogen Biosynthesis II (from UDP-D-Glucos	3,08E-01	1,67E-01	NaN	LBR
Rapoport-Luebering Glycolytic Shunt	3,08E-01	1,67E-01	NaN	GBE1
NAD Biosynthesis III	3,08E-01	1,67E-01	NaN	MINPP1
Notch Signaling	2,91E-01	1,05E-01	NaN	NAMPT
Heparan Sulfate Biosynthesis	2,69E-01	9,64E-02	NaN	NOTCH2,NOTCH4,NUMB,RBPJ
Superpathway of Serine and Glycine Biosynt	2,65E-01	1,43E-01	NaN	CHST2,HS3ST3B1,XYLTI,CHST11,EXT1,GLCE,EXTL2,CHST15
Acetyl-CoA Biosynthesis I (Pyruvate Dehydroq	2,65E-01	1,43E-01	NaN	PSAT1
Glycoaminoglycan-protein Linkage Region Bic	2,65E-01	1,43E-01	NaN	DLAT
D-myo-inositol (1,4,5)-trisphosphate Degrad	2,59E-01	1,11E-01	NaN	XYLTI
Histamine Degradation	2,34E-01	1,05E-01	NaN	IMPAD1,INPP5F
Phototransduction Pathway	2,31E-01	9,43E-02	NaN	ALDH1A1,ALDH1A3
Histidine Degradation III	2,29E-01	1,25E-01	NaN	PRKACB,PRKAR2B,GUCY1A3,OPN3,GUCY1B3
Heparan Sulfate Biosynthesis (Late Stages)	2,26E-01	9,21E-02	NaN	MTHFD2
DNA Methylation and Transcriptional Repres	2,16E-01	1,00E-01	NaN	CHST2,HS3ST3B1,CHST11,EXT1,GLCE,EXTL2,CHST15
Granzyme A Signaling	2,16E-01	1,00E-01	NaN	ARID4B,RBBP4
Serotonin Receptor Signaling	2,16E-01	9,30E-02	NaN	PRF1,CREBBP
Phosphatidylethanolamine Biosynthesis II	2,02E-01	1,11E-01	NaN	ADCY9,GCH1,SLC18A2,MAOA
Leucine Degradation I	2,02E-01	1,11E-01	NaN	ETNK1
Folate Transformations I	2,02E-01	1,11E-01	NaN	ACADM
Fatty Acid β -oxidation	1,81E-01	9,09E-02	NaN	MTHFD2
Ketogenesis	1,77E-01	1,00E-01	NaN	ALDH1A1,ALDH1A3
Pentose Phosphate Pathway	1,77E-01	1,00E-01	NaN	ACAT1
Purine Nucleotides De Novo Biosynthesis II	1,54E-01	9,09E-02	NaN	RPE
UDP-N-acetyl-D-galactosamine Biosynthesis I	1,54E-01	9,09E-02	NaN	PPAT
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