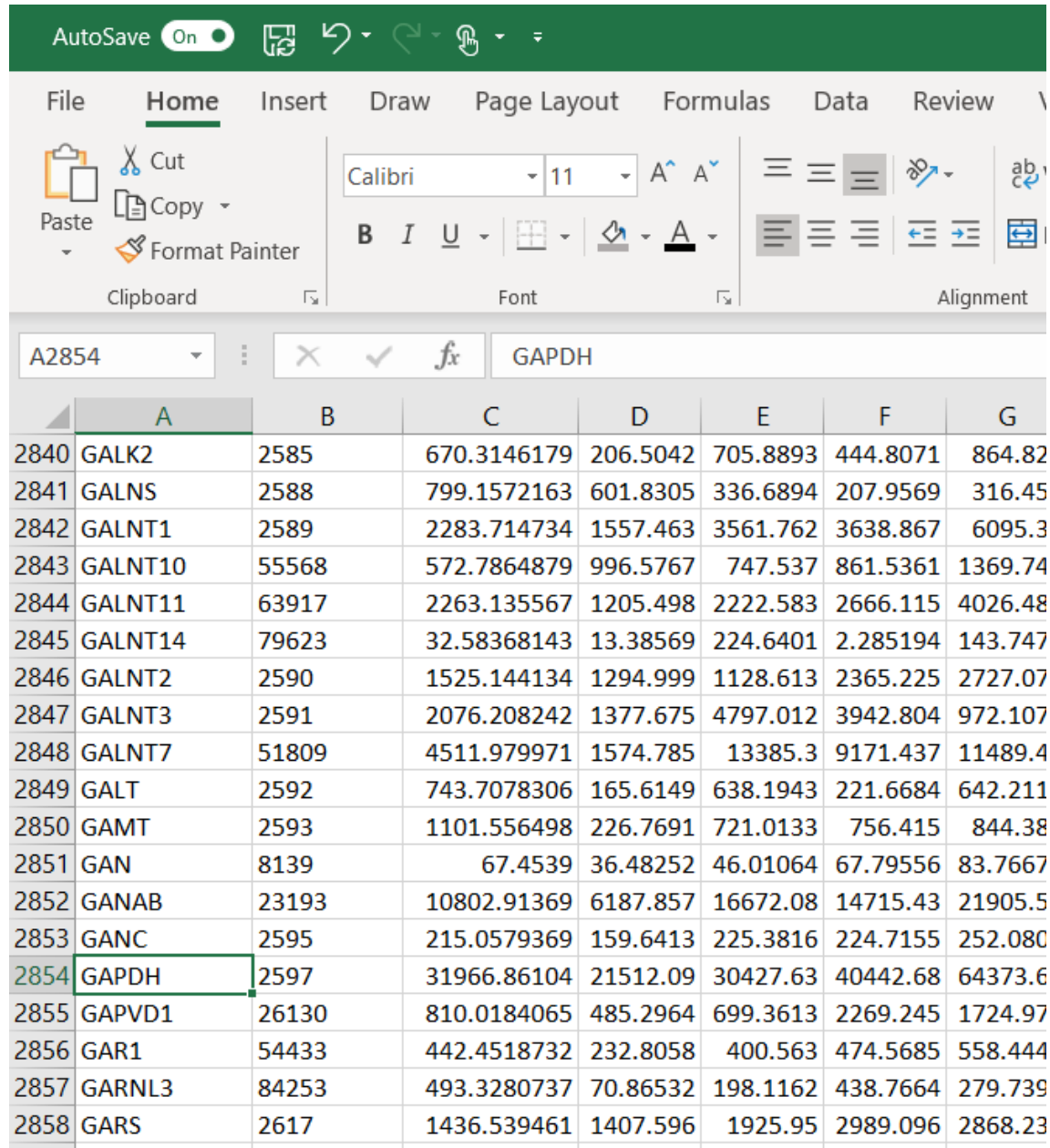


#1



AutoSave On

File Home Insert Draw Page Layout Formulas Data Review

Clipboard: Cut, Copy, Paste, Format Painter

Font: Calibri, 11, Bold, Italic, Underline, Text Color, Background Color

Alignment: Left, Center, Right, Indent, Decrease Indent, Increase Indent, Wrap Text, Merge & Center

Formula Bar: A2854, GAPDH

	A	B	C	D	E	F	G
2840	GALK2	2585	670.3146179	206.5042	705.8893	444.8071	864.82
2841	GALNS	2588	799.1572163	601.8305	336.6894	207.9569	316.45
2842	GALNT1	2589	2283.714734	1557.463	3561.762	3638.867	6095.3
2843	GALNT10	55568	572.7864879	996.5767	747.537	861.5361	1369.74
2844	GALNT11	63917	2263.135567	1205.498	2222.583	2666.115	4026.48
2845	GALNT14	79623	32.58368143	13.38569	224.6401	2.285194	143.747
2846	GALNT2	2590	1525.144134	1294.999	1128.613	2365.225	2727.07
2847	GALNT3	2591	2076.208242	1377.675	4797.012	3942.804	972.107
2848	GALNT7	51809	4511.979971	1574.785	13385.3	9171.437	11489.4
2849	GALT	2592	743.7078306	165.6149	638.1943	221.6684	642.211
2850	GAMT	2593	1101.556498	226.7691	721.0133	756.415	844.38
2851	GAN	8139	67.4539	36.48252	46.01064	67.79556	83.7667
2852	GANAB	23193	10802.91369	6187.857	16672.08	14715.43	21905.5
2853	GANC	2595	215.0579369	159.6413	225.3816	224.7155	252.080
2854	GAPDH	2597	31966.86104	21512.09	30427.63	40442.68	64373.6
2855	GAPVD1	26130	810.0184065	485.2964	699.3613	2269.245	1724.97
2856	GAR1	54433	442.4518732	232.8058	400.563	474.5685	558.444
2857	GARNL3	84253	493.3280737	70.86532	198.1162	438.7664	279.739
2858	GARS	2617	1436.539461	1407.596	1925.95	2989.096	2868.23

I used Ctrl + F to find GAPDH in the data. It is row 2854.

#1

AutoSave On For DEGs - Saved to OneDrive sinclair stock

File Home Insert Draw Page Layout Formulas Data Review View Help Tell me what you want to do

PivotTable Recommended PivotTables Tables

Online Pictures Shapes Icons Illustrations

3D Models SmartArt Screenshot Add-ins

Get Add-ins My Add-ins

Recommended Charts Charts

Maps PivotChart Tours

Line Column Win/Loss Sparklines

Slicer Timeline Filters

Link Links

R5 $= (C5/C\$2854)*32322$

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1			Patients	Patients	Patients	Patients	Patients	Patients	Patients	Patients	Patients	Patients	Patients	Patients	Patients	Patients	Patients		
2			Hormone	Hormone	Hormone	Hormone	Hormone	Non-Horr	Non-Horr	Non-Horr	Non-Horr	Non-Horr	Normal	Normal	Normal	Normal	Normal	C	D
3	Gene_Name	GeneID	TCGA-2A-A8VL	TCGA-4L-A	TCGA-CH-	TCGA-CH-	TCGA-CH-	TCGA-ZG-	TCGA-ZG-	TCGA-ZG-	TCGA-ZG-	TCGA-ZG-	TCGA-CH-	TCGA-CH-	TCGA-CH-	TCGA-CH-	TCGA-EJ-7115-11A-01R-2118-07		
4																			
5	AAAS	8086	1024.384621	357.2139	1142.146	743.4652	1414.726	1204.751	442.0457	591.3249	1009.878	534.7919	1160.842	573.0193	812.5294	835.9338	684.2992	1035.765	
6	AACS	65985	1091.266914	329.6551	1626.069	1045.117	2899.258	1261.375	426.0681	431.2505	1584.465	705.7684	1653.263	623.4532	940.4868	1476.757	909.9568	1103.39	
7	AADAT	51166	823.1662448	133.8567	706.9395	441.8134	431.2434	281.6303	89.20799	96.48319	1051.335	95.29837	356.4491	199.2754	320.8075	239.9996	317.2394	832.3113	
8	AAGAB	79719	1390.236334	592.1193	1152.972	1334.581	1596.738	1183.145	767.9213	1155.605	1945.135	943.4537	1321.594	791.3612	1213.767	997.1117	1007.033	1405.681	
9	AAK1	22848	1292.48529	1048.807	2469.958	2232.681	3937.035	3343.8	818.5168	584.7465	2993.983	1979.963	1801.307	1048.861	2401.943	1191.161	1129.02	1306.844	
10	AAMP	14	3643.653924	1568.749	4761.286	4187.325	3999.084	6420.87	1854.728	2301.708	4842.11	2880.813	4569.665	2026.992	3906.356	3337.373	2982.27	3684.133	

In order to normalize the data, I had to make a new column for each subject (ex: see columns C and D above). I then used the formula shown above to normalize the data to GAPDH.

For example, I first normalized row C, which is the first Hormone column. I made a new C column and filled it using the formula above. C5 is the first value in the original Hormone column. C\$2854 corresponds to the GAPDH expression in column C. 32322 is the mean expression of GAPDH. I double clicked in the right corner of the cell to fill the cells below. For each remaining column, I used the same formula but changed the columns.

#1

Finished normalized data

AutoSave On

For DEGs - Saving...

sinclair stockard

FileHomeInsertDrawPage LayoutFormulasDataReviewViewHelpTell me what you want to do

Cut

Copy

Format Painter

Clipboard

Calibri

11

A^A

B

I

U

Font

Alignment

General

\$

%

Number

Conditional Formatting

Format as Table

Cell Styles

Styles

Insert

Delete

Format

Cells

AutoSum

Fill

Clear

Editing

Sort & Filter

Find & Select

AF5

#2

For DEGs - Saving...																	
AutoSave On																	
File Home Insert Draw Page Layout Formulas Data Review View Help Tell me what you want to do																	
Clipboard Font Alignment Number Styles Cells																	
AG5 =LOG(AVERAGE(W5:AA5)/AVERAGE(AB5:AF5),2)																	
	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG
1	Patients																
2	Normal	Hormone	Hormone	Hormone	Hormone	Hormone	Non	Non	Non	Non	Non	Normal	Normal	Normal	Normal	Normal	Normal vs. Non
3	TCGA-EJ-7115-11A-01R-2118-07																
4																	
5	684.2992	1035.765	361.1824	1154.834	751.7248	1430.443	1218.136	446.9567	597.8943	1021.098	540.7332	1173.739	579.3853	821.5563	845.2206	691.9015	-0.104380001
6	909.9568	1103.39	333.3174	1644.134	1056.728	2931.468	1275.389	430.8016	436.0416	1602.067	713.6092	1671.63	630.3796	950.9352	1493.164	920.0661	-0.346008138
7	317.2394	832.3113	135.3438	714.7933	446.7218	436.0343	284.7591	90.19906	97.55508	1063.015	96.3571	360.4091	201.4893	324.3715	242.6659	320.7638	0.170785473
8	1007.033	1405.681	598.6975	1165.781	1349.408	1614.477	1196.289	776.4526	1168.444	1966.745	953.935	1336.276	800.1529	1227.252	1008.189	1018.221	0.169452093
9	1129.02	1306.844	1060.459	2497.398	2257.485	3980.774	3380.948	827.6102	591.2428	3027.245	2001.96	1821.319	1060.514	2428.628	1204.395	1141.563	0.360375849
10	2982.27	3684.133	1586.177	4814.182	4233.844	4043.512	6492.203	1875.333	2327.279	4895.904	2912.818	4620.432	2049.511	3949.754	3374.45	3015.402	0.121456273
11	3032.457	4940.692	1812.015	6435.329	1877.002	6667.038	2711.237	1495.353	1129.274	3218.386	3019.944	5040.588	2130.563	4046.788	3777.583	3066.146	-0.642019418
12	420.54	786.0603	289.474	513.8904	786.1533	884.0256	1021.509	356.734	654.0032	808.9978	386.5619	907.1196	505.1515	757.7909	537.8534	425.212	0.042950358
13	581.7276	806.3015	319.783	837.9391	564.5639	1273.597	1398.182	359.7866	429.3901	881.095	555.4702	815.2571	455.6311	625.6396	648.3003	588.1903	0.209999284

I created a new column for each comparison, and used the above formula to calculate log fold change. For each analysis, I had to change which columns were used depending on the groups that were being compared.

#2

AutoSave On For DEGs - Saved to OneDrive

File Home Insert Draw Page Layout Formulas Data Review View Help Tell me what you want to do

Clipboard Font Alignment Number Styles Cells

Clipboard: Paste, Cut, Copy, Format Painter

Font: Calibri, 11, Bold, Italic, Underline, Text Color, Background Color

Alignment: Wrap Text, Merge & Center

Number: General, Currency, Percentage, Decimals

Styles: Conditional Formatting, Format as Table, Cell Styles

Cells: Insert, Delete, Format, AutoSum, Fill, Clear

Formula Bar: =T.TEST(AB5:AF5,W5:AA5,2,2)

	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ
1												Log fold change			T-test
2	Hormone	Non	Non	Non	Non	Non	Normal	Normal	Normal	Normal	Normal	Normal vs. Non	Normal vs. Hormone	Non vs. Hormone	Normal vs. Non
3															
4															
5	710.3337	1055.17	928.7007	1153.135	1253.884	442.8053	1057.11	830.1858	843.5374	367.4349	751.1881	0.328471787	0.087533868	-0.24093792	0.308338145
6	1455.717	1104.763	895.1331	840.9764	1967.301	584.373	1505.529	903.2541	976.378	649.1091	998.9033	0.09949856	0.158327336	0.058828776	0.800463324
7	216.5272	246.6632	187.4185	188.1507	1305.357	78.90662	324.597	288.7086	333.0502	105.4919	348.2489	0.519151754	0.749594356	0.230442602	0.615284148
8	801.7217	1036.246	1613.338	2253.532	2415.116	781.1754	1203.497	1146.518	1260.087	438.2807	1105.469	0.652165187	0.064211786	-0.587953402	0.136273109
9	1976.784	2928.635	1719.635	1140.307	3717.385	1639.401	1640.343	1519.582	2493.607	523.5754	1239.38	0.587635604	0.321454804	-0.2661808	0.227939514
10	2007.939	5623.657	3896.627	4488.533	6012.055	2385.3	4161.323	2936.69	4055.432	1466.943	3273.781	0.495398667	0.049885588	-0.44551308	0.14643238
11	3310.737	2348.52	3107.091	2177.986	3952.102	2473.026	4539.73	3052.826	4155.062	1642.193	3328.873	-0.249995634	0.19878595	0.448781584	0.400737683
12	438.992	884.8484	741.2332	1261.35	993.4302	316.5547	816.9837	723.8181	778.0659	233.816	461.6469	0.477664129	-0.097939415	-0.575603544	0.25186723
13	632.4462	1211.129	747.576	828.148	1081.964	454.8733	734.249	652.8617	642.3789	281.8296	638.5903	0.551592402	0.135552893	-0.416039509	0.112479624
14	338.5509	398.0542	437.776	249.4421	403.5488	141.1036	394.6082	449.3993	548.4416	99.89879	413.3947	-0.225547959	-0.170778785	0.054769174	0.573484734
15	1000.075	1015.364	842.684	886.4746	849.1719	250.1803	929.8173	899.0957	1139.582	180.8432	847.7006	-0.056370074	0.149756249	0.206126323	0.887704674
16	862.9931	1675.09	1688.165	1757.498	1356.83	692.9856	1097.613	947.2138	1254.394	447.6026	804.6721	0.655747057	0.24191978	-0.413827277	0.061563173

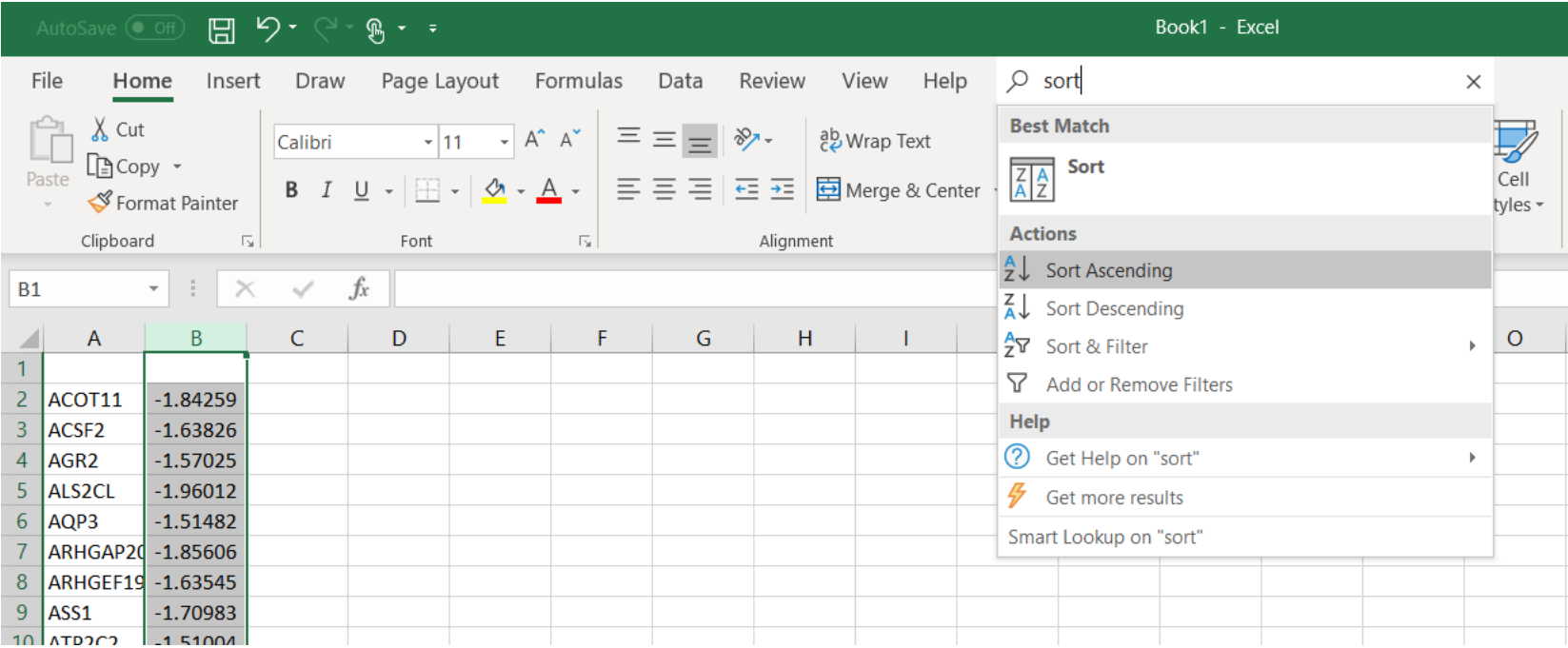
For T-test, I used the formula above and created columns as described previously.

#3 and 4

87	35.40656	65.43472	119.7267	25.15022	27.77351	149.0462	172.7687	340.3775	49.67685	156.9187	-1.667507261	-	
Custom AutoFilter												?	×
Show rows where:													
is greater than		1.5											
<input type="radio"/> And <input checked="" type="radio"/> Or													
is less than		-1.5											
Use ? to represent any single character													
Use * to represent any series of characters													
<div>OKCancel</div>													
915	171.006	104.3348	72.42723	58.68381	52.71302	195.9444	433.4507	278.1647	85.05816	209.2742	-1.388223308	-	
1091	90.39959	199.2457	286.0137	25.98858	9.635687	156.7555	152.3607	129.3789	81.12688	88.15445	0.008300225	-	

To find differentially expressed genes, I used the filter tool. For each comparison group, I filtered for genes with a log fold change over >1.5 and -1.5 . I added a second filter on top of this for genes with $<.05$ p-value.

#3 and 4



I pasted the genes and corresponding log fold changes of the remaining rows into a new file and sorted them. The negative values are downregulated genes for that analysis and the positives are upregulated. I uploaded the file with the final results. For #3, there were 74 upregulated genes. For #4, there were 124 downregulated genes.

To find overlapping genes, I used the formula below in a new column called “Match?” This formula prints a 0 if a gene in the upregulated column for Normal vs. Hormone also appears in the downregulated column for Normal vs. Non. 1 is printed if there is a match. There were no overlapping genes.

AutoSave On Mod2_HW2_DiffExpressedGenes - Saving...

File Home Insert Draw Page Layout Formulas Data Review View Help Tell me what you want to do

Paste Cut Copy Format Painter Clipboard

Calibri 11 A⁺ A⁻ B I U Font

Wrap Text Merge & Center Alignment

General \$ % , .00 0 Number

Conditional Formatting Format as Table Cell Styles Styles

Insert Delete Format Cells

P3 X ✓ fx =COUNTIF(B:B,L3)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1		Normal vs. Hormone								Normal	Non Hormone						
2		Upregulated in Hormone				Downregulated in Hormone				Upregulated in Non				Downregulated in Non			
3		NETO1	6.409007		EPHB3	-1.50403			TIMM16	1.500021		CKK	-6.01136			Match?	
4		FOXD1	4.977581		TGFB2	-1.50589			FLJ43663	1.50416		C20orf56	-5.51856			0	
5		NKX2-2	4.449001		C1orf183	-1.50776			COLQ	1.508928		ITLN2	-4.80525			0	
6		C4orf48	4.105288		SIDT1	-1.50798			IFI27L1	1.512601		EDN3	-4.39232			0	
7		EN2	3.993393		RGS9	-1.50867			NPFF	1.514479		MSMB	-4.28623			0	
8		LPPR4	3.710661		PPP1R12B	-1.52214			TIAF1	1.514867		RPE65	-4.19525			0	
9		ERG	3.678158		CAV2	-1.52661			GPIHBP1	1.520787		HMGCS2	-4.07984			0	
10		EBF2	3.631211		SATB1	-1.52673			ATP5E	1.525937		KIAA1210	-3.87696			0	
11		NRIP3	3.249449		LYNX1	-1.52841			HTRA3	1.528757		NOS1	-3.86433			0	
12		ALB	3.187838		LOC28583	-1.53245			C6orf1	1.530533		LIX1	-3.78564			0	
13		MYLPF	3.187305		TEF	-1.53468			C19orf20	1.531433		KCNS1	-3.77271			0	
14		FAM110B	3.132658		ATP2C2	-1.53633			HTR2B	1.533021		CD38	-3.50729			0	
15		CD163L1	3.105845		ADAMTS8	-1.53901			SERPINE2	1.544504		PCDH8	-3.49523			0	
16		NETO2	3.050774		RIPK4	-1.53928			ABHD11	1.545375		C1orf150	-3.39755			0	
17		TWIST1	3.026742		RSPO3	-1.53951			MRPL41	1.548319		EPHA5	-3.22476			0	
18		MCTP1	3.009479		RARB	-1.54431			C19orf60	1.551056		CFC1B	-3.2104			0	
19		DLX1	2.991835		BCL11A	-1.55712			PRPH	1.55745		NLRP9	-3.17365			0	
20		EPHA8	2.823014		CTSH	-1.55769			LOC44120	1.559018		KRT15	-3.16607			0	
21		GDF1	2.746266		GNAZ	-1.55823			APBA2	1.5716		CHP2	-3.16364			0	
22		RGS11	2.744542		MAOB	-1.56079			CCDC64	1.580309		MUC4	-3.13253			0	
23		CST2	2.736232		KANK1	-1.56089			CHTF18	1.582547		KL	-3.10037			0	
24		PLA1A	2.711432		TRIP6	-1.56395			EME2	1.598161		PROK1	-3.01478			0	
25		SDK1	2.629825		MRAP2	-1.56428			HN1	1.598862		WFDC5	-2.92653			0	
26		ECEL1	2.614062		GPX3	-1.56816			PKDCC	1.598954		HSPA4L	-2.88914			0	
27		CACNA1B	2.557129		RIMS3	-1.57416			SPDYE8P	1.599491		CA14	-2.8403			0	
28		MNX1	2.520878		MCC	-1.58118			SBK1	1.604818		MGAM	-2.7891			0	
29		SHISA2	2.514927		ABCC3	-1.58303			ZNF680	1.622828		AOX1	-2.7796			0	

Sheet1