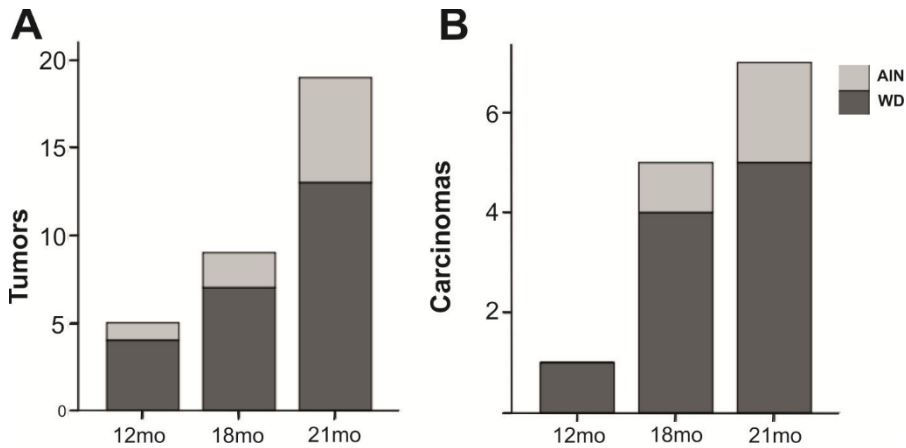


SUPPLEMENTARY INFORMATION

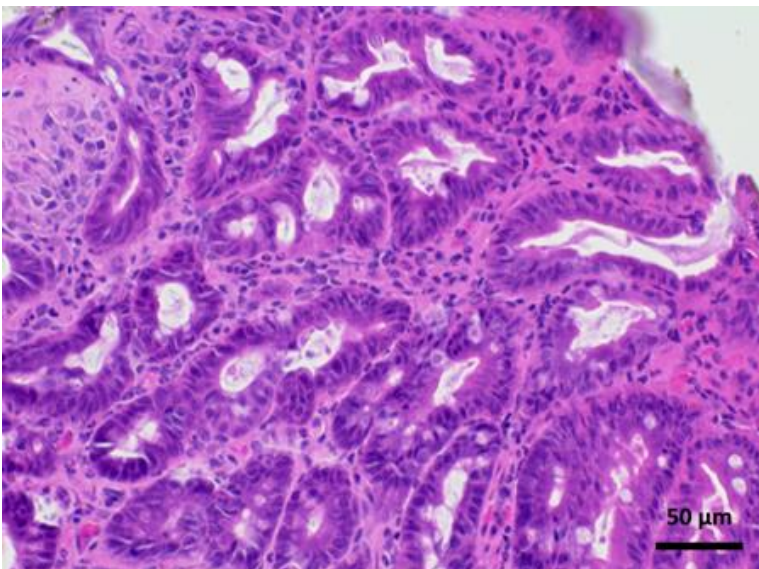
Mlh1 deficiency in normal mucosa associates with microsatellite stable colon cancer

Marjaana Pussila¹, Petri Törönen², Elisabet Einarsdottir^{3,4}, Shintaro Katayama³, Kaarel Krjutškov^{3,4,5},
Liisa Holm^{1,2}, Juha Kere^{3,4,6}, Päivi Peltomäki⁷, Markus J. Mäkinen^{8,9}, Jere Linden¹⁰, Minna Nyström^{1*}

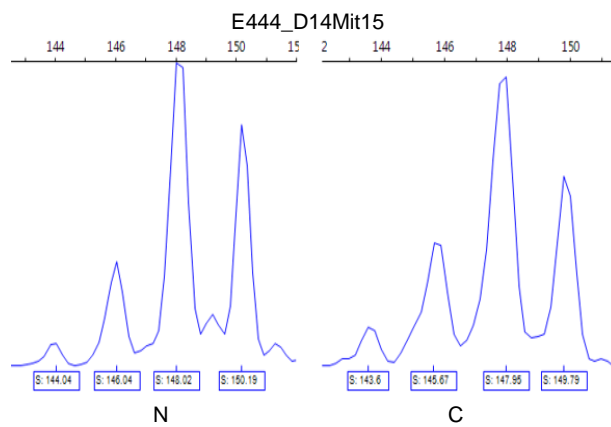
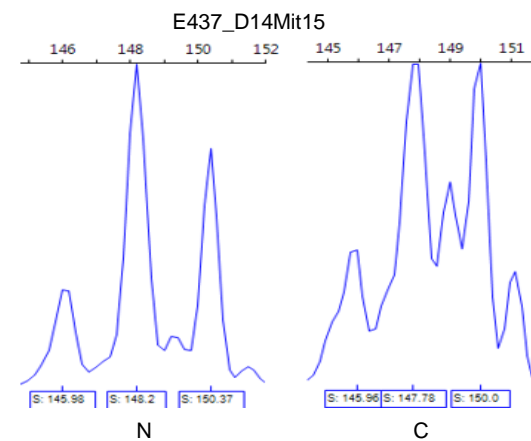
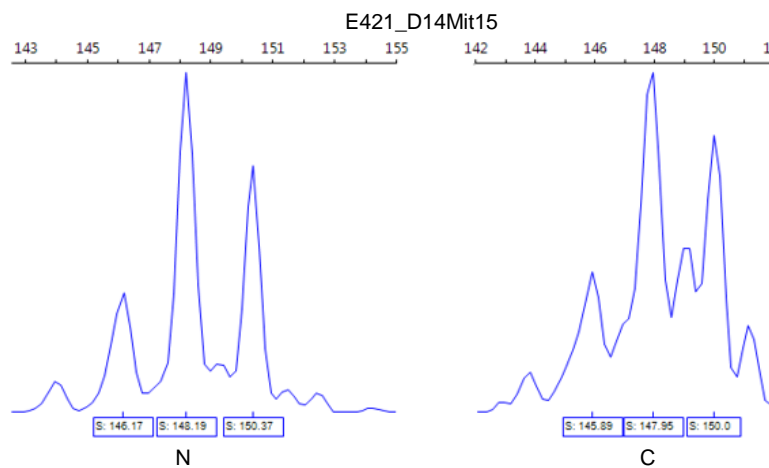
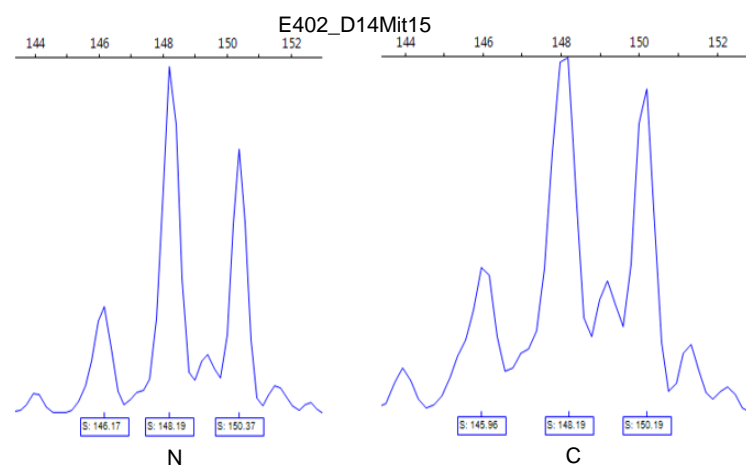
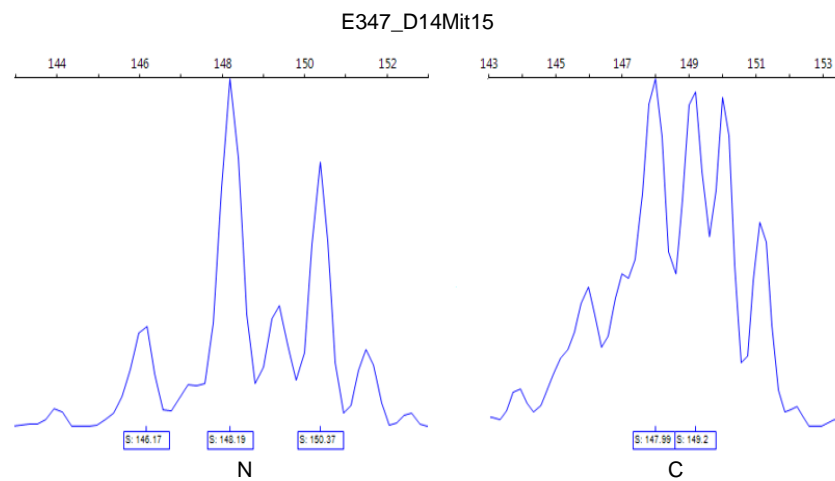
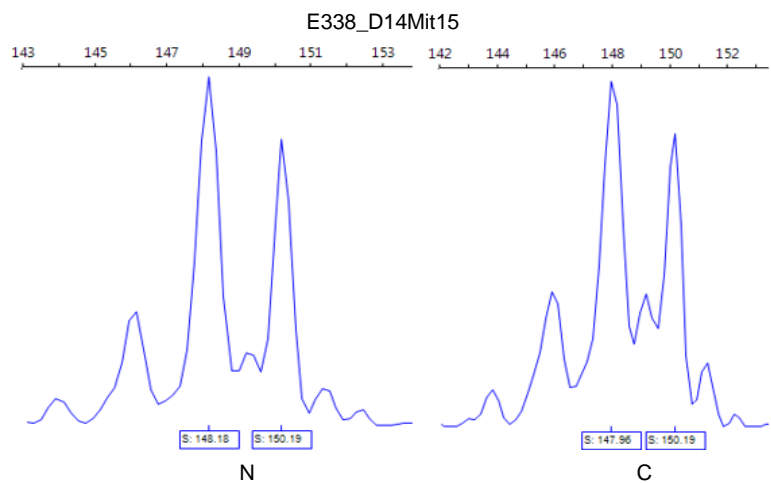


Supplementary figure 1. Number of colon tumors and carcinomas in different age and diet groups.

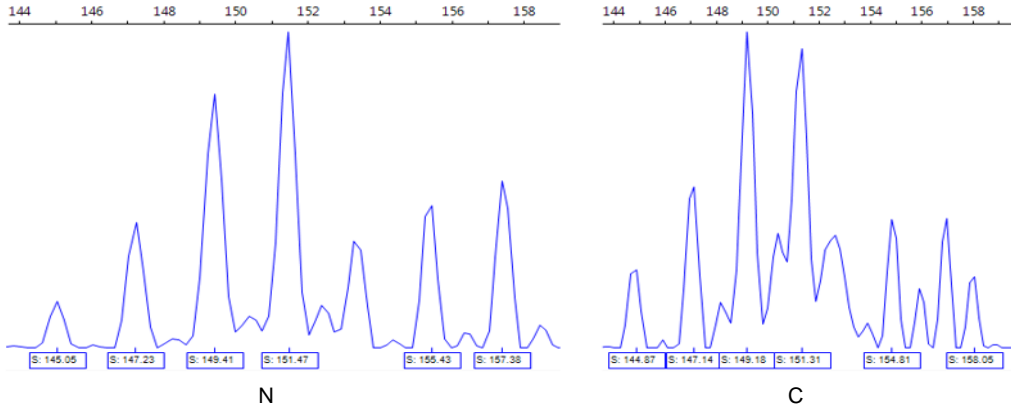
Aging and Western-style diet increased the total number of (A) colon tumors and (B) carcinomas. AIN (AIN-93G control diet), WD (Western-style diet).



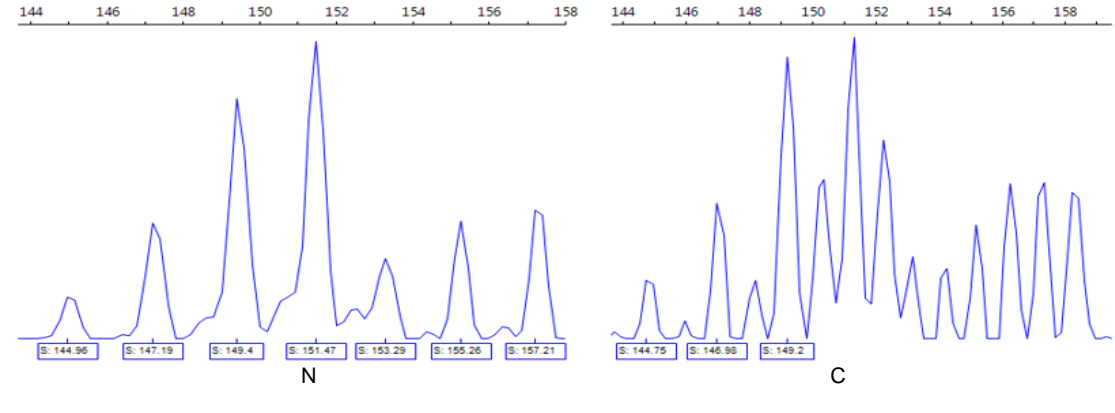
Supplementary figure 2. Histopathology of serrated adenocarcinoma E347



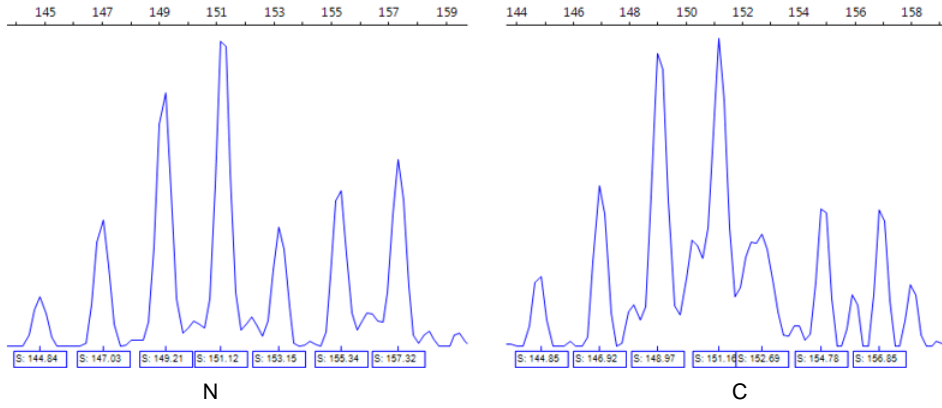
E338_D18Mit15



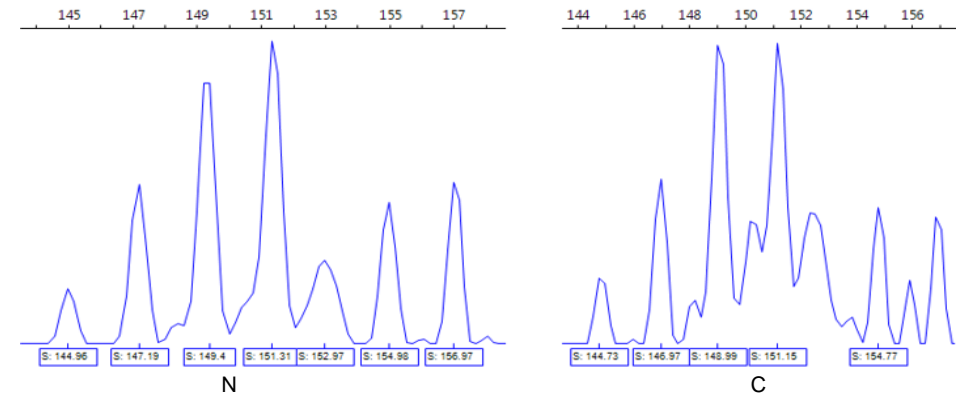
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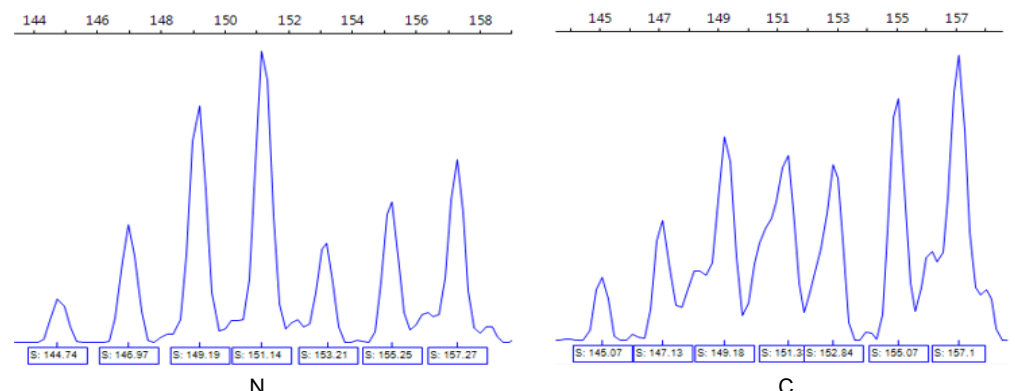
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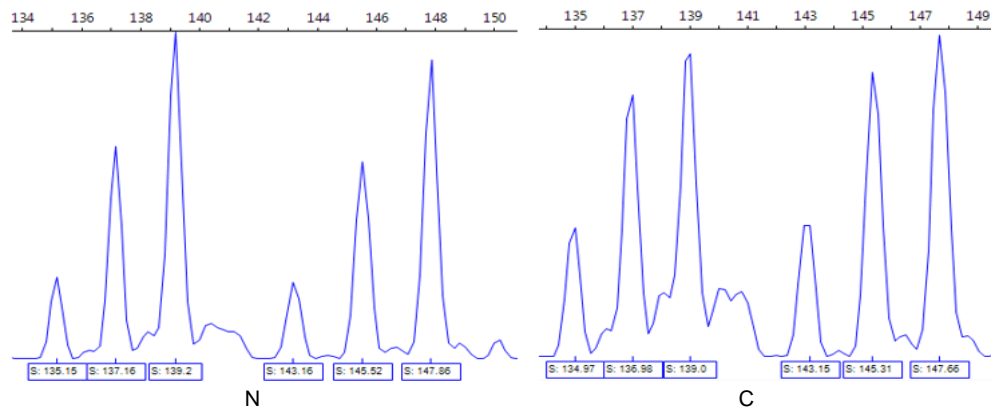
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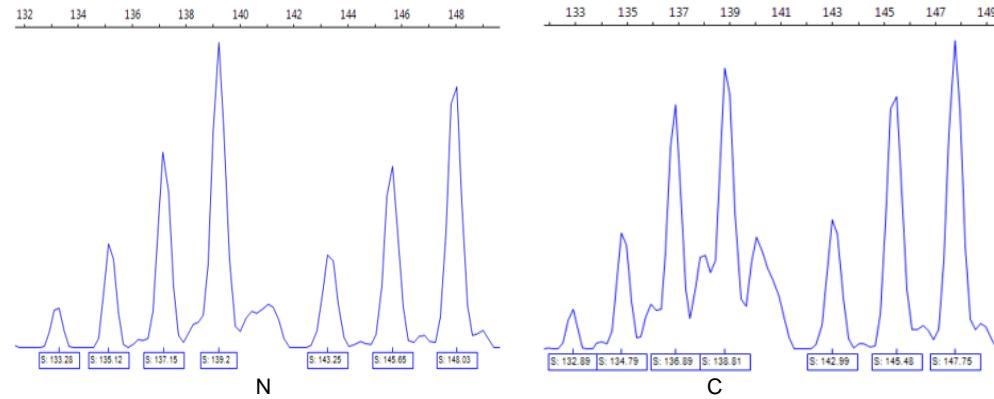
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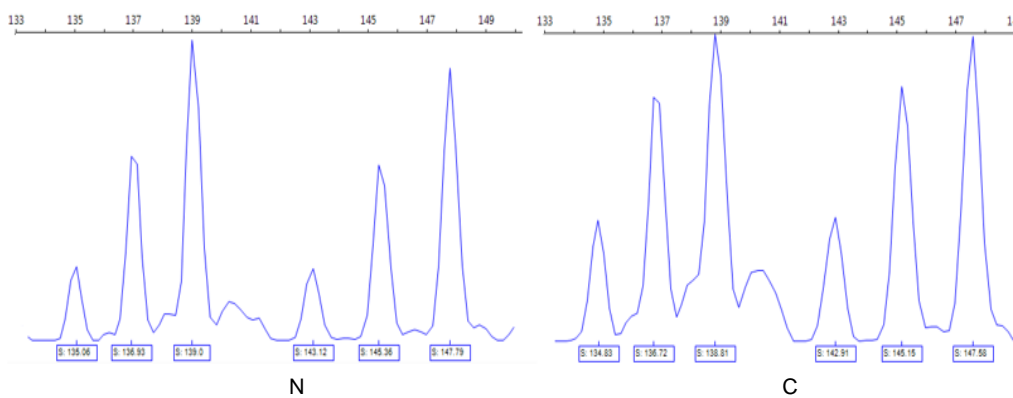
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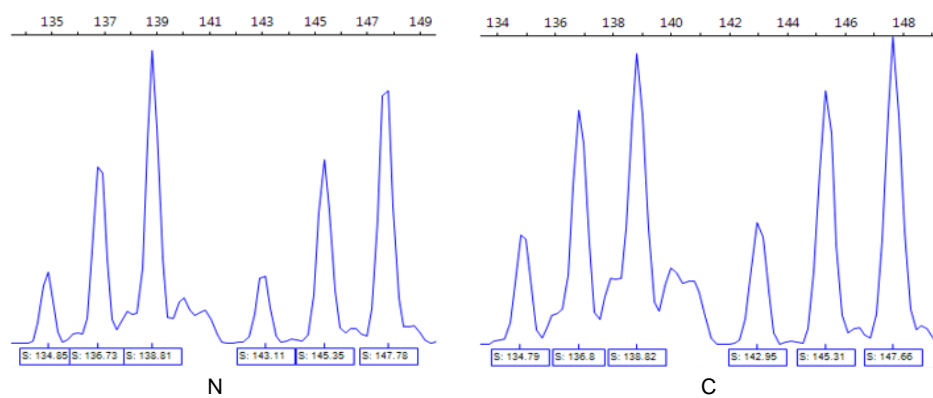
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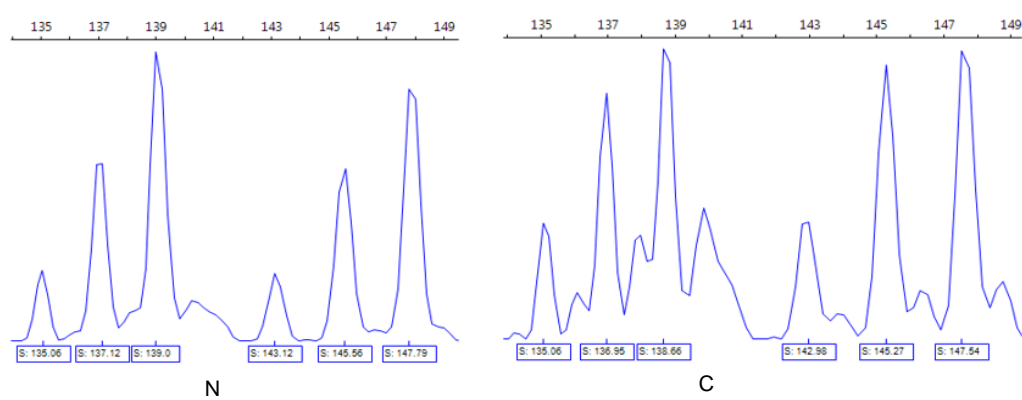
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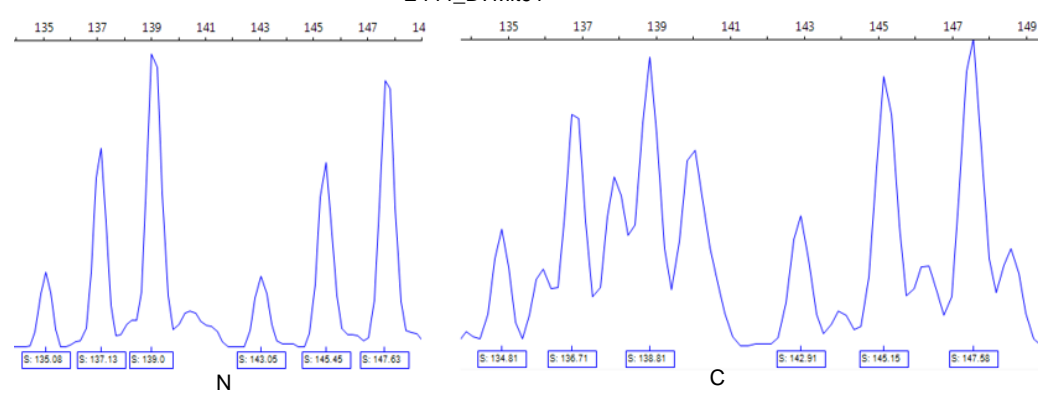
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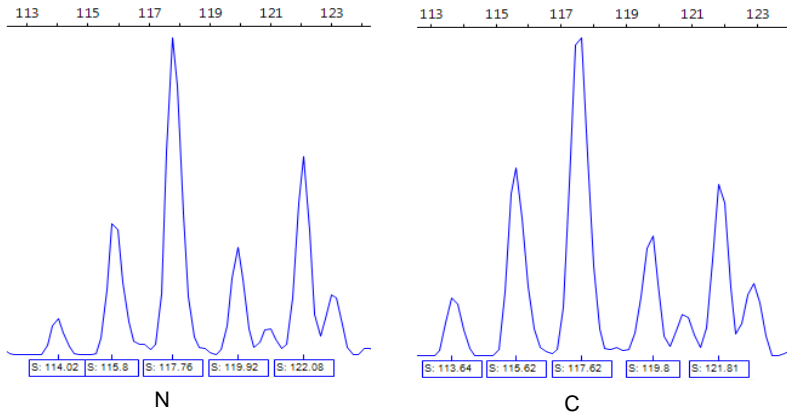
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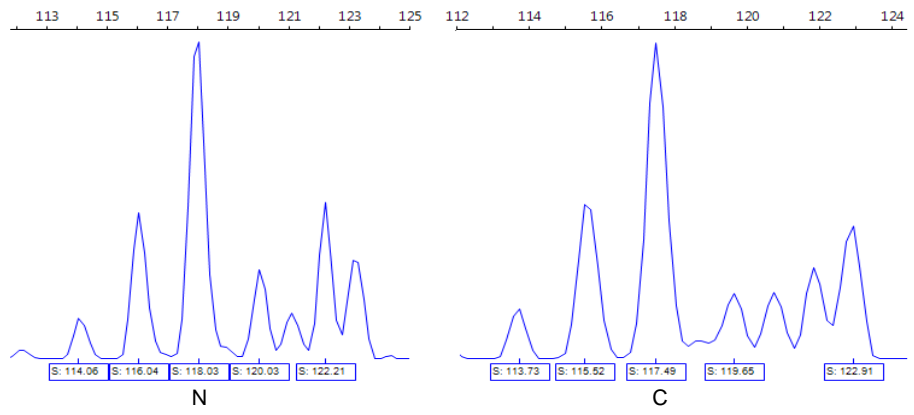
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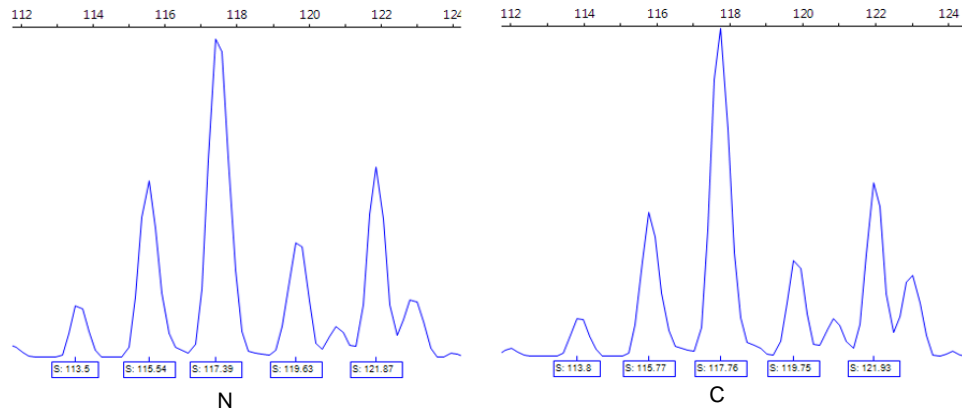
E338_D10Mit2



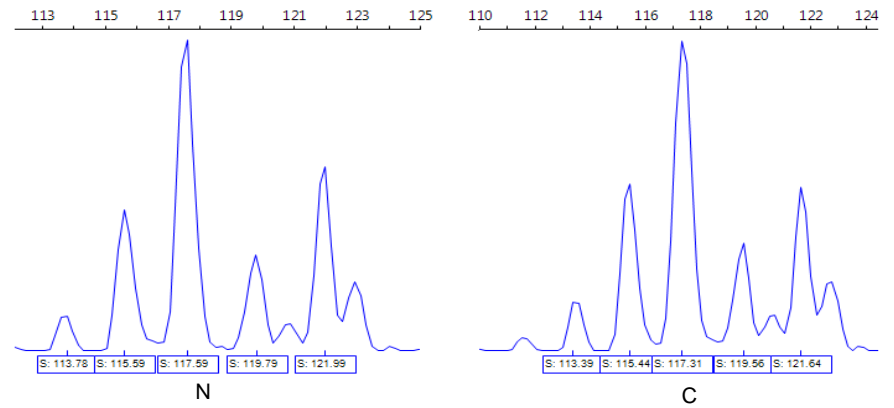
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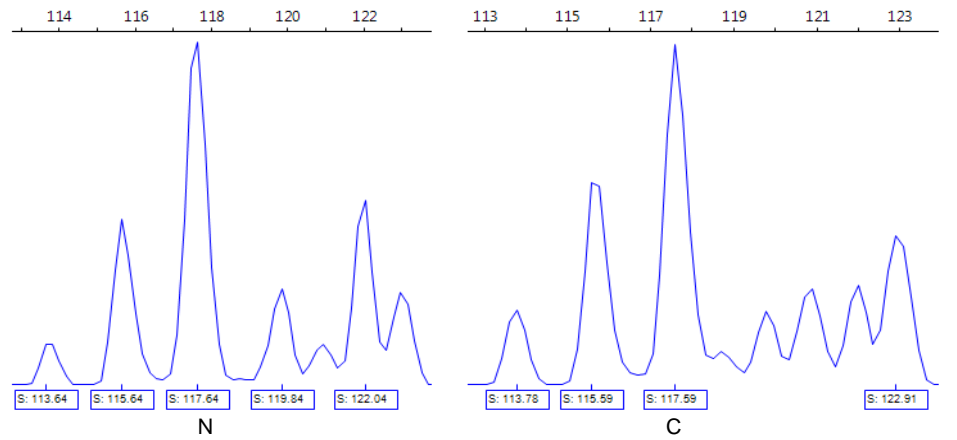
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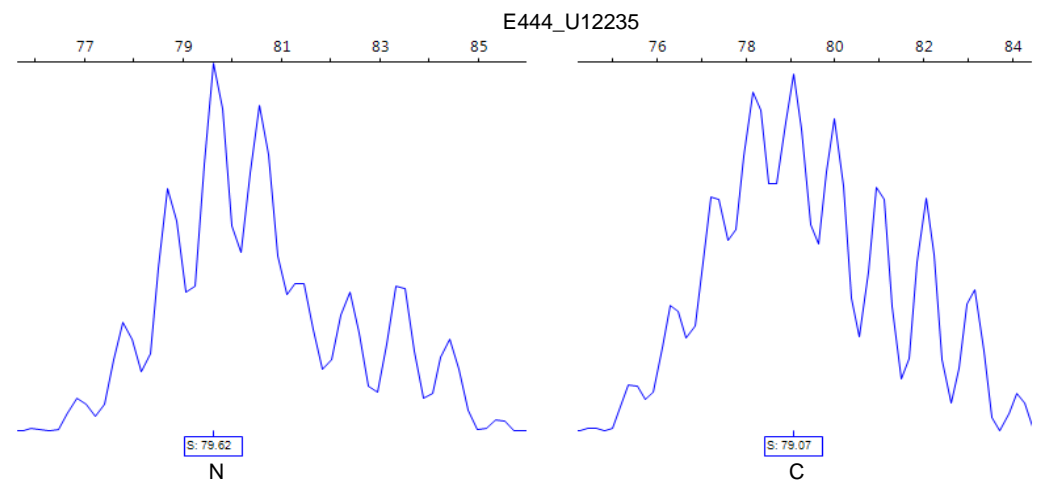
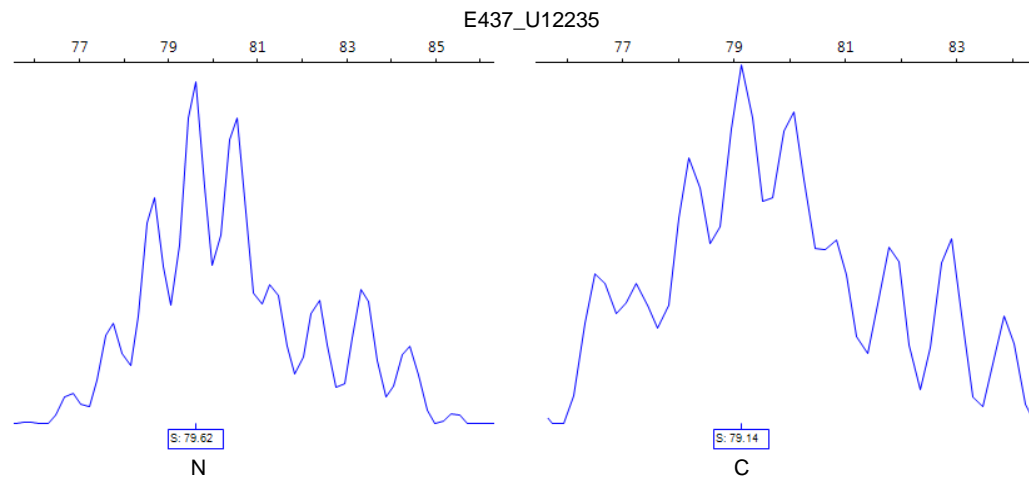
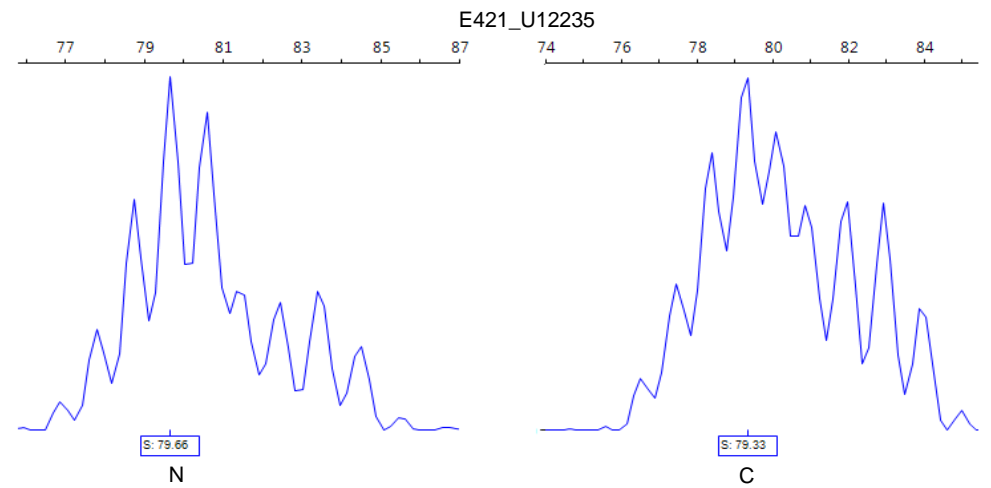
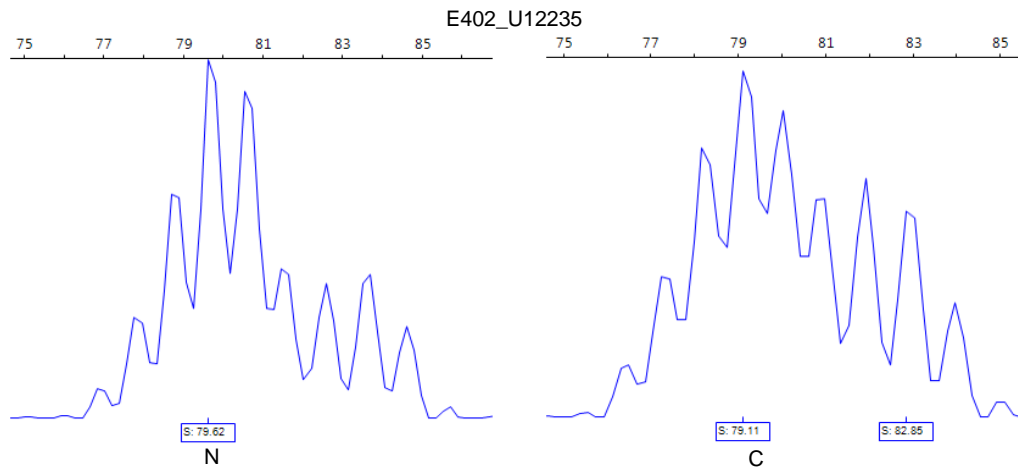
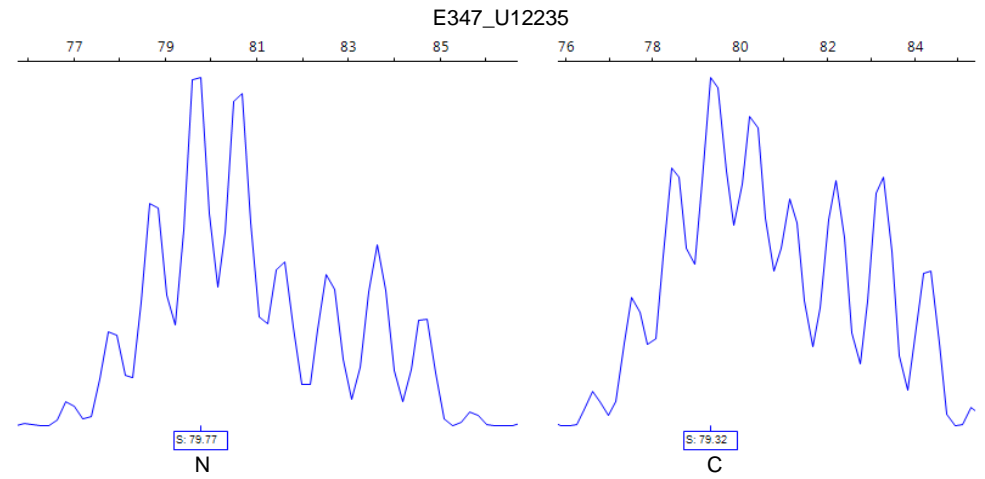
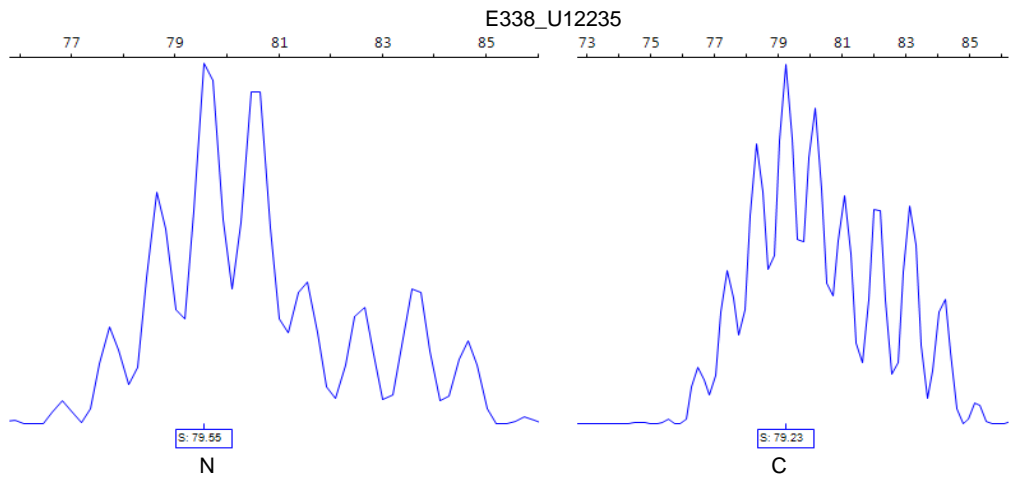


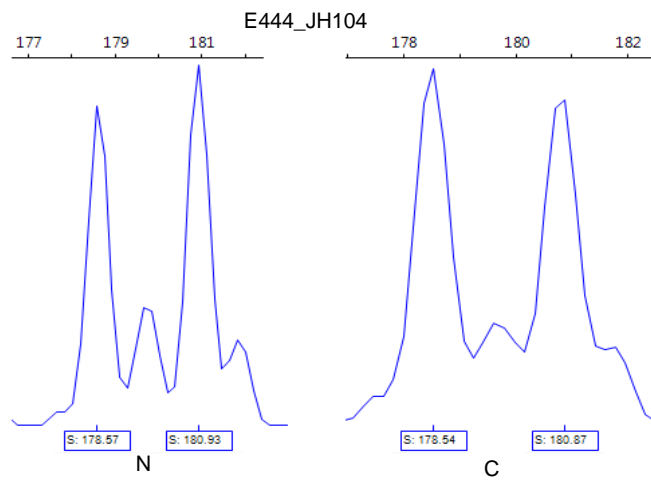
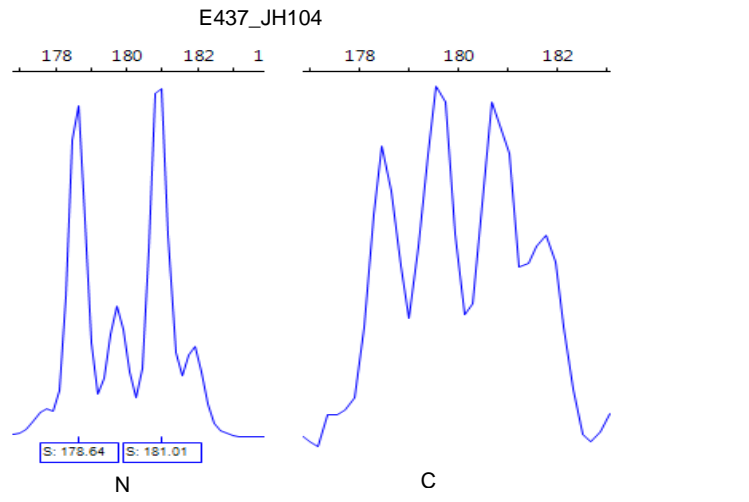
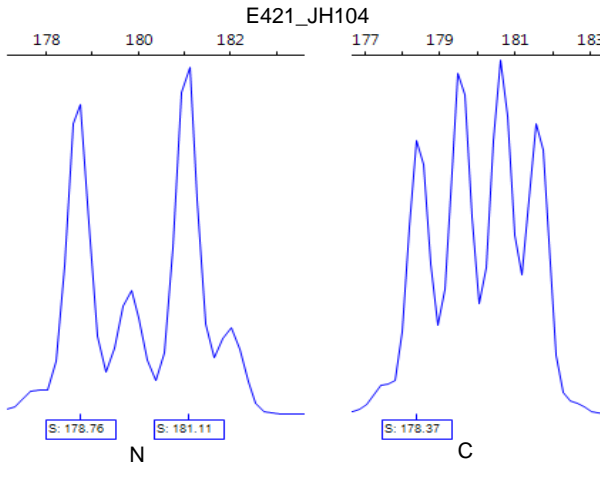
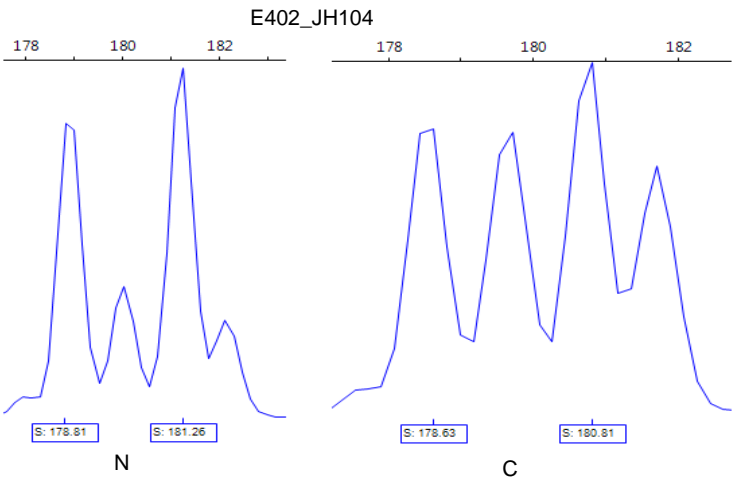
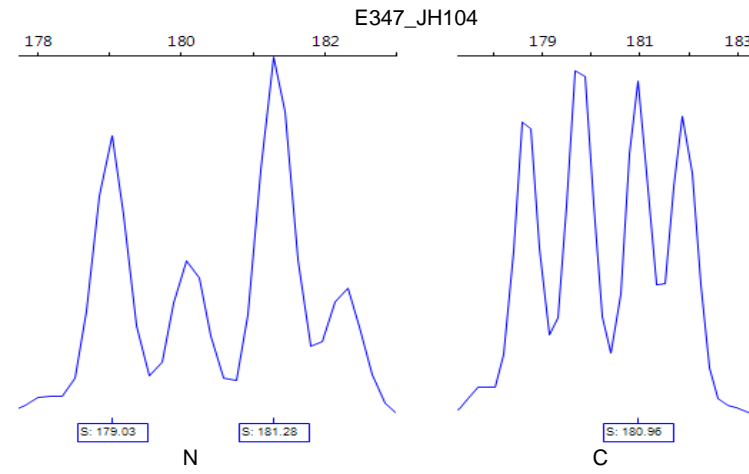
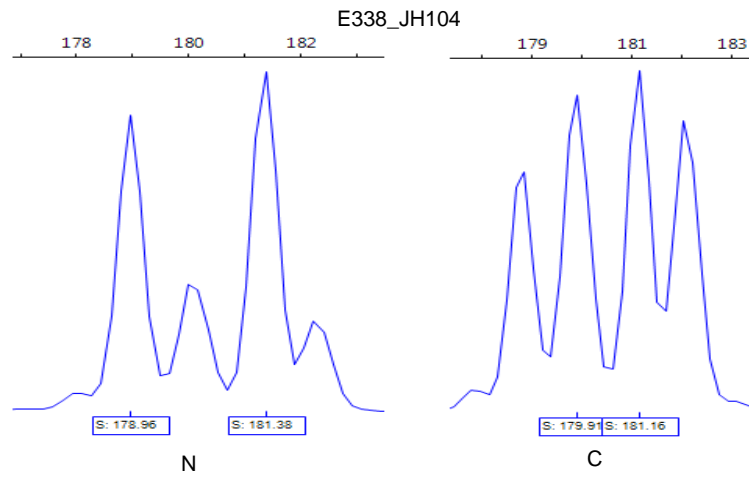
E421_D10Mit2



E444_D10Mit2







Supplementary figure 3. MSI analysis of four dinucleotide and two mononucleotide markers in carcinomas

N = normal, C = carcinoma

Supplementary Table 1: Diet nutritional content

	AIN93-G	WD
Total energy content (kcal/g)	3.8	4.6
Kcal from carbohydrates (%)	63.9	42.3
Kcal from protein (%)	18.8	18.5
Kcal from fat (%)	17.2	39.2
Carbohydrate source (g/kg)		
Starch	397	306
Maltodextrin	132	95
Sucrose	100	116
Protein source (g/kg)	200 (casein)	232 (casein, vitamin free)
Fat source (g/kg)		
Soybean oil	70	-
Anhydrous milkfat	-	133
Canola oil	-	55
Sunflower oil	-	12
Vitamin D (IU/kg)	1000	100
Folic acid (mg/kg)	2	0.2
Calcium (g/kg)	5	0.5
Fiber (cellulose) (g/kg)	50	20

Supplementary Table 2: histopathology grading criteria

Hyperplasia

Epithelial hyperplasia was characterized by localized increase in mucosal thickness, long uniform crypts with increased cell proliferation, and no atypia.

Adenoma

Adenomas were classified either tubular or tubulovillous/papillary adenomas, and the degree of dysplasia was graded in low- and high-grade dysplasia.

In adenomas with low-grade dysplasia, distorted and irregularly distributed crypt structures were composed of proliferating epithelium showing nuclear crowding and pseudostratification. The nuclear features of low-grade dysplasia consisted of mild to moderate increase in nuclear size, granular chromatin and discernible nucleoli.

In adenomas with high-grade dysplasia, the crypt structures were disorganized and often packed, with cribriform areas. The cells showed increased atypia, irregular nuclei with coarse chromatin and enlarged, conspicuous nucleoli.

Carcinoma

In carcinomas, there were signs of invasion. Some of the cases were early cancers, with limited submucosal invasion. Invasion was characterized by displacement of malignant glands between the muscularis mucosa, submucosal vascular structures or by pushing border –type invasion with tumor extending to submucosal level or beyond.

	Architectural disorganization	Nuclear pseudo-stratification	Nuclear atypia	Chromatin	Nucleoli
Normal	none	no	no	even	inconspicuous
Hyperplasia	none	crypt basis	no	even	inconspicuous
Low-grade dysplasia	mild	mild to moderate	mild	granular	present
High-grade dysplasia	moderate to marked	moderate to marked	marked	coarse	conspicuous
Adenocarcinoma	marked to severe	variable	marked	coarse	conspicuous

Evaluation of the RNA-seq preprocessing steps

Data was found to be difficult for preprocessing as it contained surprisingly many zero values (~57%) and many low counts (68% below 4 counts). First evaluation is done by visualizing the percentiles from each library. Data is shown with shifted log ($x_{log} = \log(x + 1)$). The aim of this visualization is to ensure that counts are comparable across the libraries. First we evaluated the raw count data:

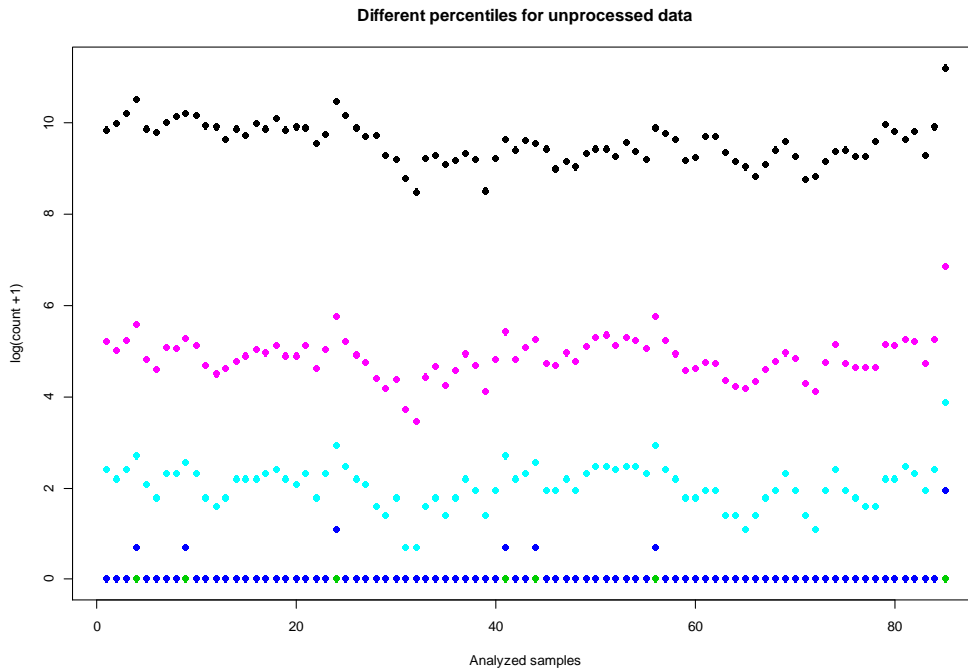


Figure 1: Stability of the raw counts before normalizations. Data is processed with shifted log for visualization. The percentiles shown are 0,5,25,50,75,95, and 100. Four first percentiles are mostly on top of each other.

Figure 1 shows that raw data has significant instabilities in percentiles. This is a well-known artefact of RNA-seq data. However, by using DeSeq style normalization¹, shown in figure 2, we can improve data stability significantly. Third normalization step in our pipeline was ComBat normalization². It altered the behavior of percentiles only little (See figure 3)

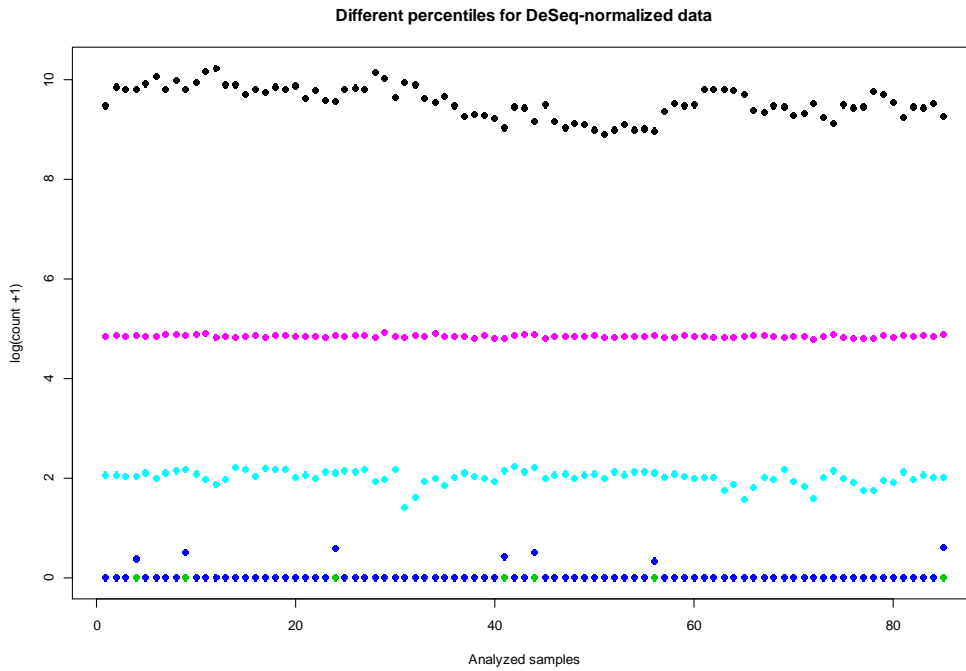


Figure 2: Stability of the data after DeSeq normalization. Notice the improved stability of the percentiles. See figure 1 for more information on visualization.

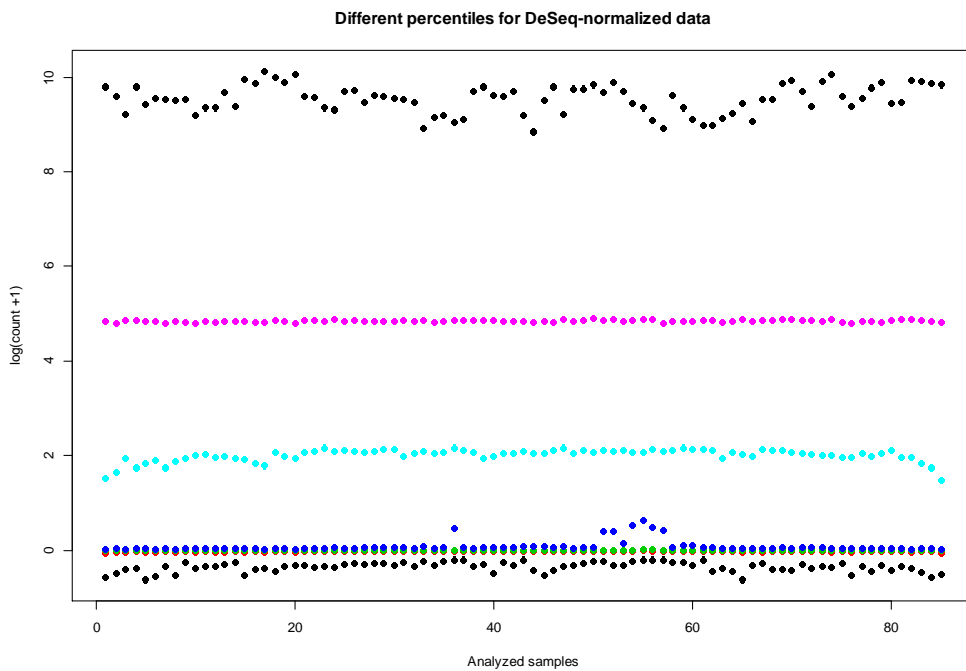


Figure 3: Stability of the data after ComBat normalization. Stability is similar to figure 2. See figure 1 for more information on the visualization.

Another important check on any biological dataset is the similarity of the biological replicates vs. similarity of different sample groups. Here the aim is to see if we can see separation between different sample groups. Another important issue is the check for the potential batch effects. We evaluate these by generating hierarchical clustering trees of samples. We used average methods with Pearson correlation. For

this visualization we show only DeSeq tree and ComBat tree

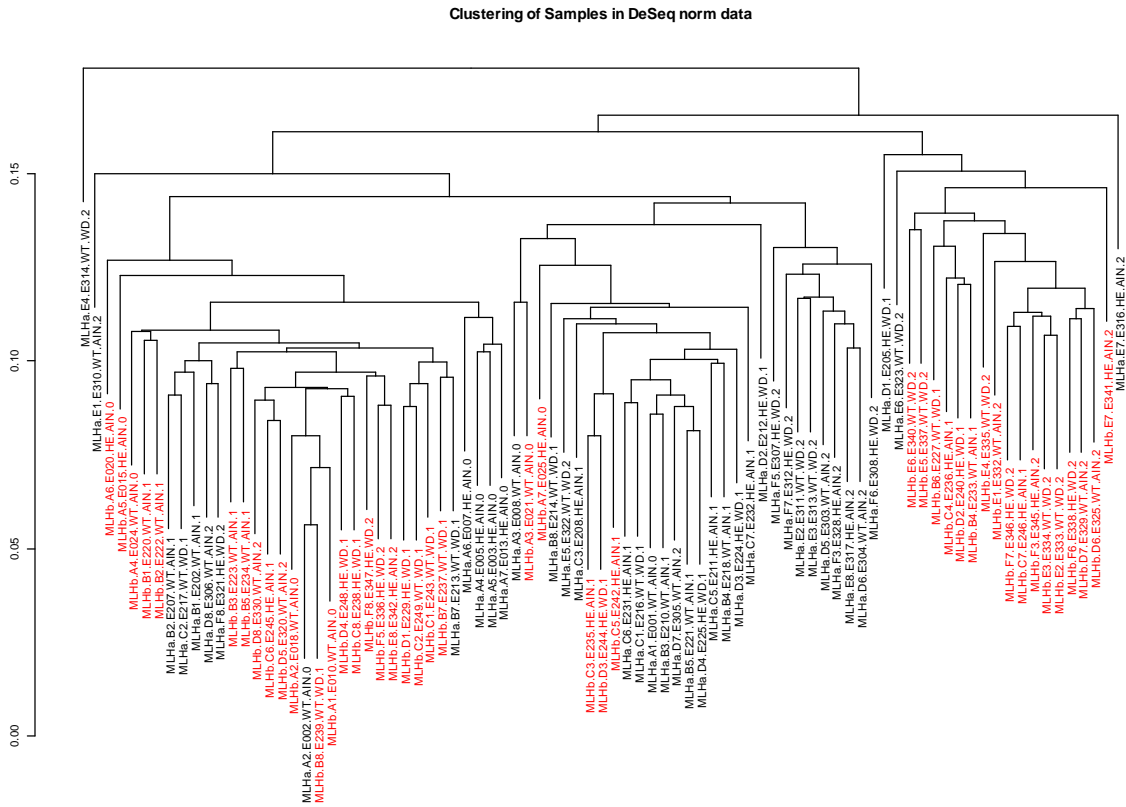


Figure 4: Clustering of samples after DeSeq normalization. Coloring highlights the clustering of two batches. Notice many large batch-related clusters.

Below we show another coloring where we look at the separation of biological sample groups. Samples had three variables: genotype, diet and measurement time point. Here the coloring shows time points, as they showed strongest correlation with RNAseq data.

Clustering of Samples in DeSeq norm data

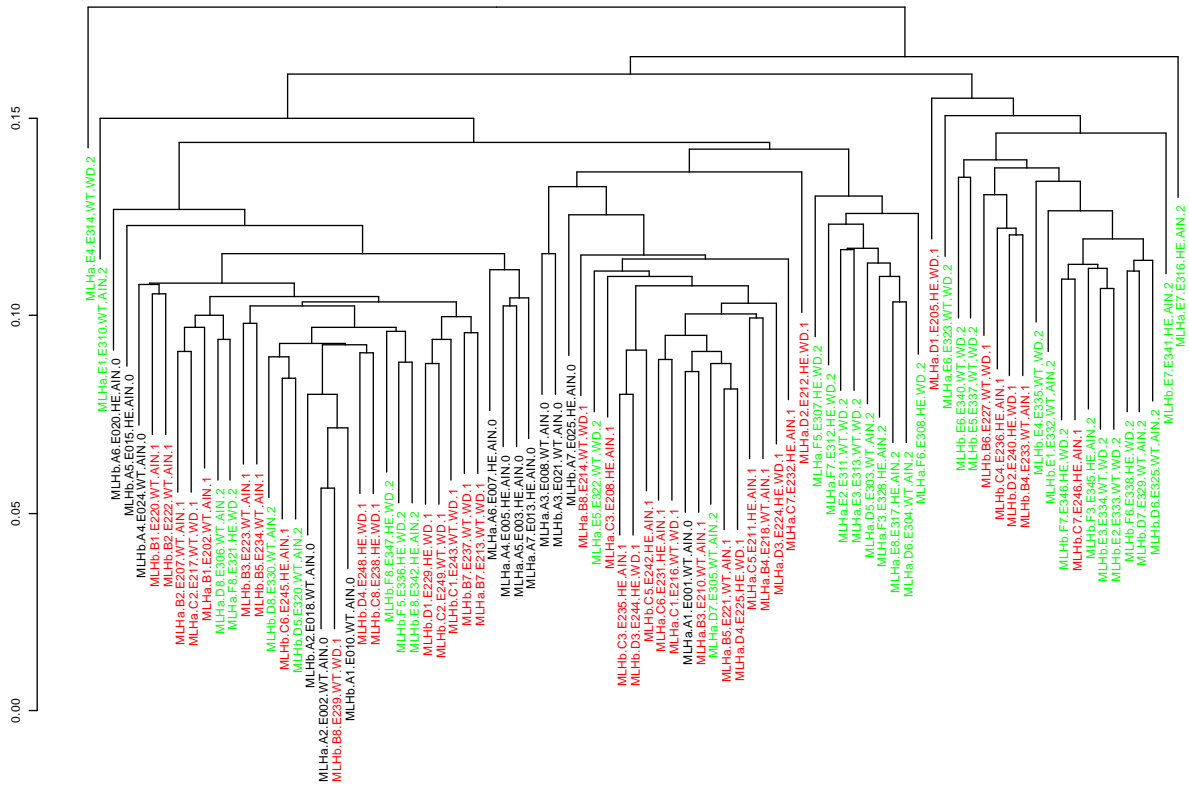


Figure 5: Clustering of DeSeq normalized data. Here the coloring highlights the three different time points. Cluster tree is same as in figure 4. Only label coloring is changed.

Notice that the clustering shows more correlation with the batches (figure 4) than with time points (figure 5). This encouraged us to use ComBat normalization². The resulting clustering is shown in figure 6. Now the correlation of clusters with batches is totally removed. Also the correlation with time points is improved (see figure 7). Based on these visualizations we chose data with DESeq and ComBat normalizations to further analysis.

Clustering of Samples in ComBat norm data

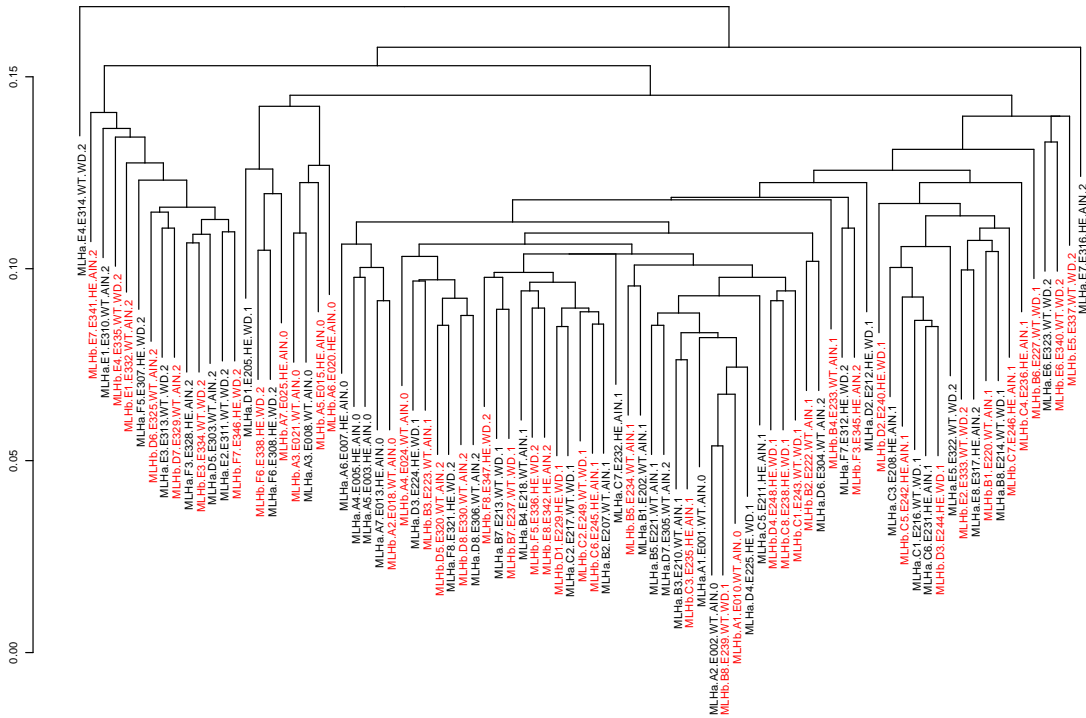
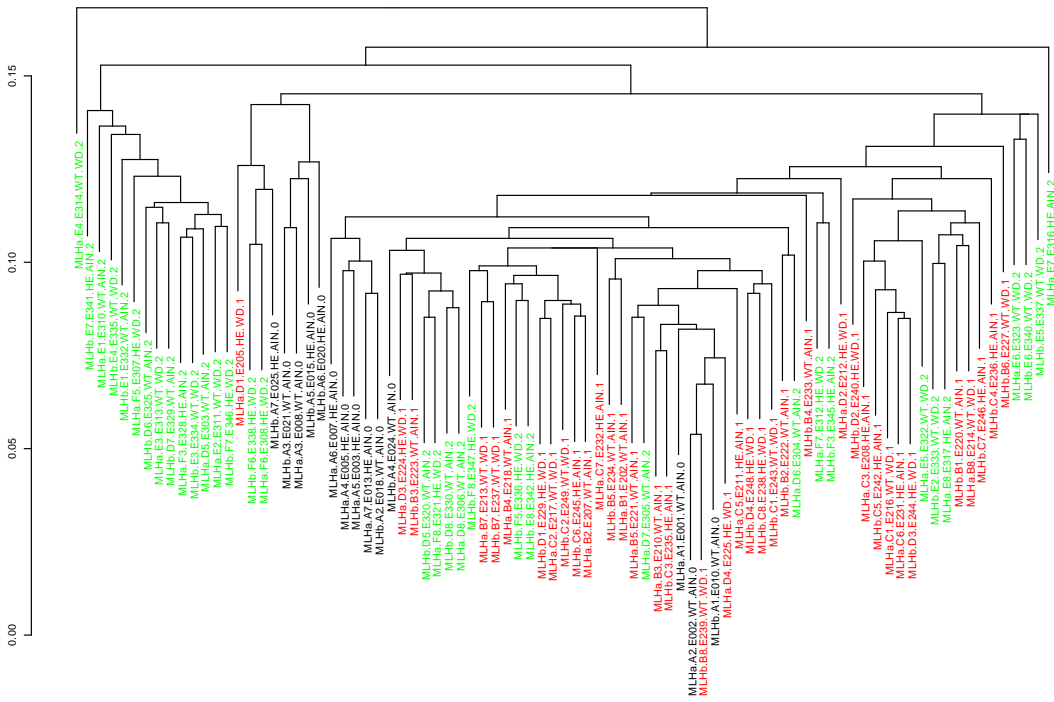


Figure 6: Sample clustering after ComBat normalization with different coloring for batches. Now the correlation of clusters with batches has disappeared.

Clustering of Samples in ComBat norm data



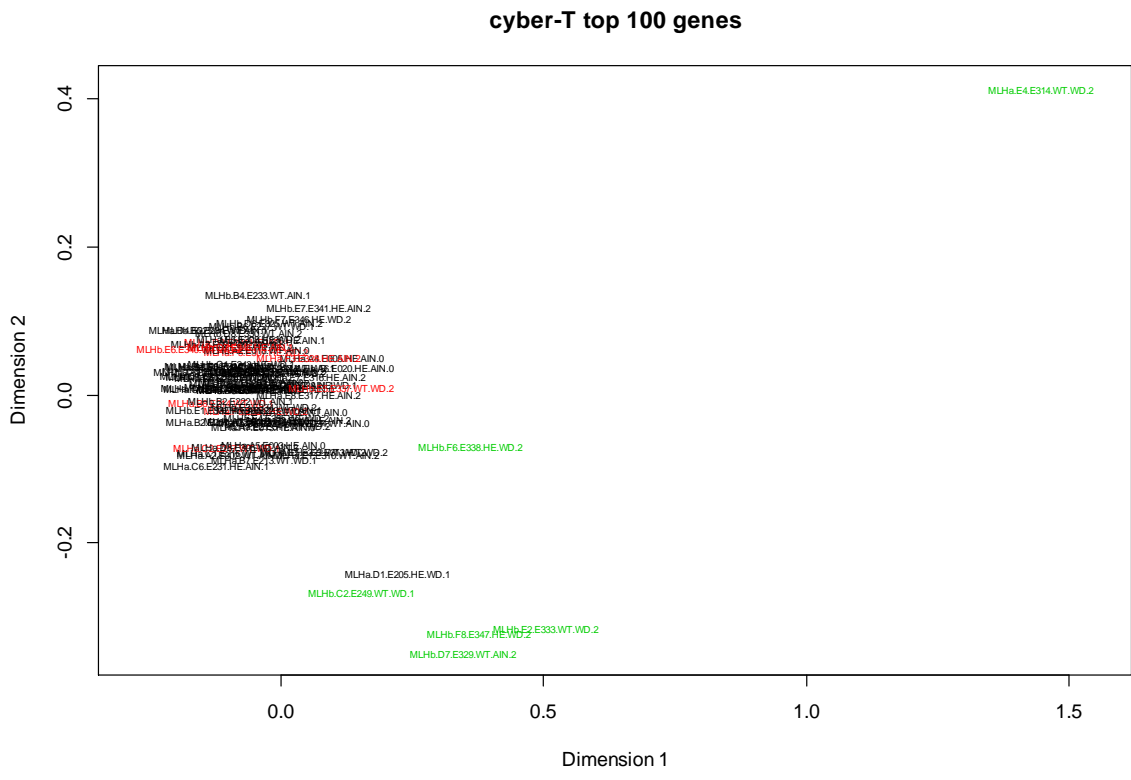


Figure 9: Separation of samples in the MDS plot with top-100 genes selected with cyber-T. Notice the better separation than with Limma, but still quite heterogenous distribution of carcinoma samples

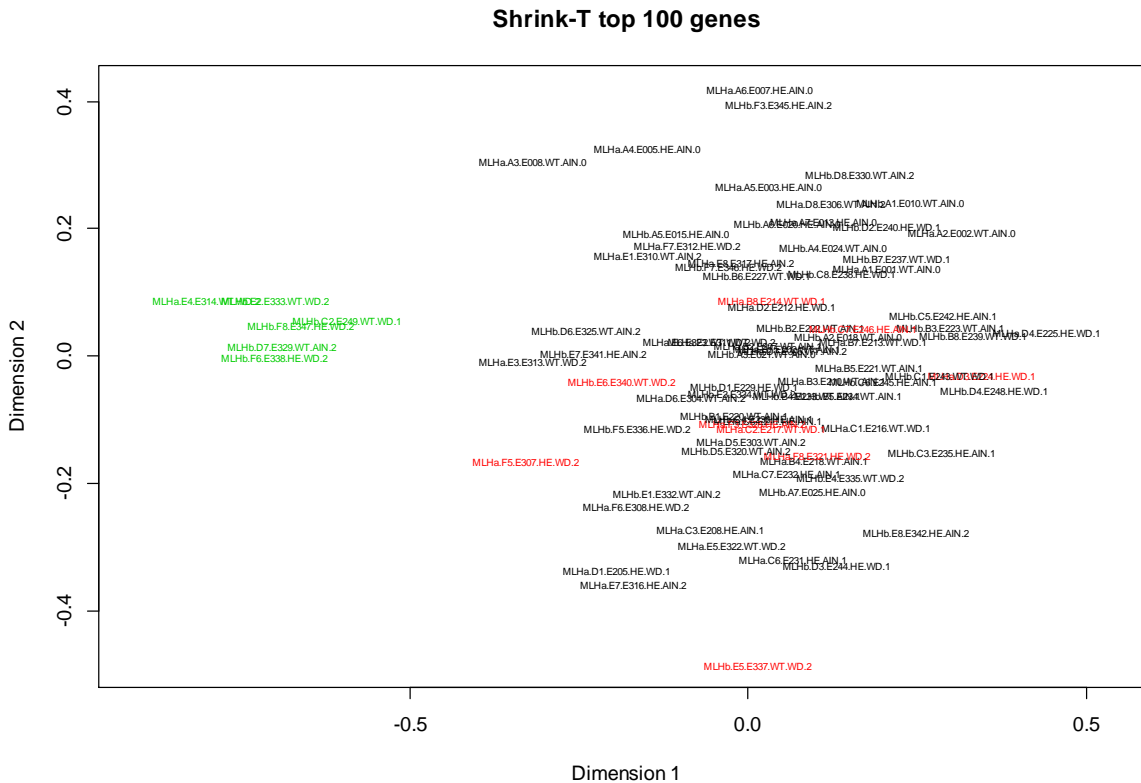


Figure 10: Separation of samples in MDS plot with top-100 genes selected shrinkage t-test (with unequal variance). Here carcinoma samples form a clear separate group.

Figures 8-10 show that shrinkage-t performs best at selecting genes that can separate carcinoma group. This result was obtained with unequal variance setting, where a separate variance estimate for gene is calculated for both groups. With equal variance setting the shrinkage-t performance did not separate from other methods (data not shown). This suggests that it is beneficial to use separate variance estimates in gene expression data, when comparing a small subset of samples to a larger pool of samples.

We furthermore confirmed these results by analyzing the RNA-seq data with in house created Gene Set Enrichment Analysis method (Gene Set Z-score, GSZ³). We ran the GSZ three times, using each of the compared DEA methods in turn as an input to GSZ analysis. Here the stronger signal would suggest stronger correlation between the RNAseq data and gene sets, obtained from Gene Ontology. We obtained stronger p-values with shrinkage-T for the top scoring GO classes (data not shown).

- 1 Anders, S. & Huber, W. Differential expression analysis for sequence count data. *Genome Biol* **11**, R106, doi:10.1186/gb-2010-11-10-r106 (2010).
- 2 Johnson, W. E., Li, C. & Rabinovic, A. Adjusting batch effects in microarray expression data using empirical Bayes methods. *Biostatistics* **8**, 118-127, doi:10.1093/biostatistics/kxj037 (2007).
- 3 Mishra, P., Toronen, P., Leino, Y. & Holm, L. Gene set analysis: limitations in popular existing methods and proposed improvements. *Bioinformatics* **30**, 2747-2756, doi:10.1093/bioinformatics/btu374 (2014).

Supplementary Table 3: The 300 most regulated genes between carcinoma and non-carcinoma mice

Symbol	MGI ID	Name	Shrink-T
Orsl1	MGI:1923813	glutaminyl-tRNA synthase (glutamine-hydrolyzing)-like 1	-7.91
Eftud1	MGI:2141969	elongation factor Tu GTP binding domain containing 1	-7.39
Rad9a	MGI:1328356	RAD9 homolog A	-6.64
Slc10a5	MGI:2685251	solute carrier family 10 (sodium/bile acid cotransporter family), member 5	-6.49
Gpr39	MGI:1918361	G protein-coupled receptor 39	-6.34
Vamp5	MGI:1858622	vesicle-associated membrane protein 5	-6.27
Tmem82	MGI:2384869	transmembrane protein 82	-6.23
Tmem180	MGI:1922396	transmembrane protein 180	-6.20
Preb	MGI:1355326	prolactin regulatory element binding	-6.04
Mtmr9	MGI:2442842	myotubularin related protein 9	-6.03
Ranbp3	MGI:1919060	RAN binding protein 3	-6.03
Pard6a	MGI:1927223	par-6 family cell polarity regulator alpha	-6.01
D6Wsu163e	MGI:107893	DNA segment, Chr 6, Wayne State University 163, expressed	-5.94
Sphk2	MGI:1861380	sphingosine kinase 2	-5.80
Ncapd3	MGI:2142989	non-SMC condensin II complex, subunit D3	-5.73
Sec16b	MGI:2148802	SEC16 homolog B (<i>S. cerevisiae</i>)	-5.64
Triqk	MGI:3650048	triple QxxK/R motif containing	-5.63
Rbfa	MGI:1915981	ribosome binding factor A	-5.61
Pgd	MGI:97553	phosphogluconate dehydrogenase	-5.60
Ms4a10	MGI:1917076	membrane-spanning 4-domains, subfamily A, member 10	-5.58
Tle4	MGI:104633	transducin-like enhancer of split 4, homolog of <i>Drosophila</i> E(spl)	5.57
Mfsd3	MGI:1916822	major facilitator superfamily domain containing 3	-5.53
Tomm40	MGI:1858259	translocase of outer mitochondrial membrane 40 homolog (yeast)	-5.52
Zfp60	MGI:99207	zinc finger protein 60	-5.51
Sf3a2	MGI:104912	splicing factor 3a, subunit 2	-5.47
Tcaf1	MGI:1914665	TRPM8 channel-associated factor 1	-5.43
Zcrb1	MGI:1914447	zinc finger CCHC-type and RNA binding motif 1	-5.36
Car9	MGI:2447188	carbonic anhydrase 9	-5.28
Ankrd27	MGI:2444103	ankyrin repeat domain 27 (VPS9 domain)	-5.27
Ktn1	MGI:109153	kinectin 1	-5.26
Tgds	MGI:1923605	TDP-glucose 4,6-dehydratase	-5.17
Vti1a	MGI:1855699	vesicle transport through interaction with t-SNAREs 1A	-5.15
Kbtbd4	MGI:1914386	kelch repeat and BTB (POZ) domain containing 4	-5.09
Tbrg4	MGI:1100868	transforming growth factor beta regulated gene 4	-5.07
Zkscan5	MGI:107533	zinc finger with KRAB and SCAN domains 5	-5.07
Atl3	MGI:1924270	atlastin GTPase 3	-5.05
Mis18a	MGI:1913828	MIS18 kinetochore protein homolog A (<i>S. pombe</i>)	-5.03
Rnf185	MGI:1922078	ring finger protein 185	-5.02
Odf2	MGI:1098824	outer dense fiber of sperm tails 2	-5.01
Rilpl2	MGI:1933112	Rab interacting lysosomal protein-like 2	-5.00
Lman2	MGI:1914140	lectin, mannose-binding 2	-4.99
Gle1	MGI:1921662	GLE1 RNA export mediator (yeast)	-4.97
Pnck	MGI:1347357	pregnancy upregulated non-ubiquitously expressed CaM kinase	-4.94
Gnb5	MGI:101848	guanine nucleotide binding protein (G protein), beta 5	-4.92
Dlg3	MGI:1888986	discs, large homolog 3 (<i>Drosophila</i>)	-4.91
C4bp	MGI:88229	complement component 4 binding protein	4.91
Rnf123	MGI:2148796	ring finger protein 123	-4.89
Serp2	MGI:1919911	stress-associated endoplasmic reticulum protein family member 2	4.88
Foxa3	MGI:1347477	forkhead box A3	-4.84
Rpusd1	MGI:1919186	RNA pseudouridylate synthase domain containing 1	-4.81
Gm5803	MGI:3645633	predicted gene 5803	-4.80
Fbxl15	MGI:1915681	F-box and leucine-rich repeat protein 15	-4.78
Sfxn3	MGI:2137679	sideroflexin 3	-4.75
Enthd2	MGI:1926027	ENTH domain containing 2	-4.74
Smagp	MGI:2448476	small cell adhesion glycoprotein	4.74

Mt2	MGI:97172	metallothionein 2	4.72
Slc44a2	MGI:1915932	solute carrier family 44, member 2	-4.72
Pla2g4a	MGI:1195256	phospholipase A2, group IVA (cytosolic, calcium-dependent)	-4.71
Bola3	MGI:1925903	bolA-like 3 (E. coli)	-4.68
lfrd1	MGI:1316717	interferon-related developmental regulator 1	-4.68
Dclre1b	MGI:2156057	DNA cross-link repair 1B, PSO2 homolog (S. cerevisiae)	-4.66
C330007P06	MGI:1924894	RIKEN cDNA C330007P06 gene	-4.65
Mospd2	MGI:1924013	motile sperm domain containing 2	-4.64
Hspa13	MGI:1309463	heat shock protein 70 family, member 13	-4.63
Atp6v0e2	MGI:1923502	ATPase, H ⁺ transporting, lysosomal V0 subunit E2	4.63
Cstf2t	MGI:1932622	cleavage stimulation factor, 3' pre-RNA subunit 2, tau	-4.61
Ttll1	MGI:2443047	tubulin tyrosine ligase-like 1	-4.60
Casp12	MGI:1312922	caspase 12	-4.59
Pms2	MGI:104288	postmeiotic segregation increased 2 (S. cerevisiae)	-4.57
Bcl2a1a	MGI:102687	B cell leukemia/lymphoma 2 related protein A1a	-4.56
Trim25	MGI:102749	tripartite motif-containing 25	-4.56
Hist1h2bj	MGI:2448388	histone cluster 1, H2bj	-4.55
Rabgap1	MGI:2385139	RAB GTPase activating protein 1	-4.52
Fkbp8	MGI:1341070	FK506 binding protein 8	-4.49
Creb3l3	MGI:2384786	cAMP responsive element binding protein 3-like 3	4.48
Bub1	MGI:1100510	budding uninhibited by benzimidazoles 1 homolog (S. cerevisiae)	-4.48
Tpx2	MGI:1919369	TPX2, microtubule-associated protein homolog (Xenopus laevis)	-4.47
Ints10	MGI:1918135	integrator complex subunit 10	-4.43
Dph6	MGI:1913882	diphthamine biosynthesis 6	-4.43
Gdpd1	MGI:1913819	glycerophosphodiester phosphodiesterase domain containing 1	4.42
2010003K11	MGI:1917111	RIKEN cDNA 2010003K11 gene	-4.40
Cxcl16	MGI:1932682	chemokine (C-X-C motif) ligand 16	-4.38
Mrpl10	MGI:1333801	mitochondrial ribosomal protein L10	-4.38
Slc25a12	MGI:1926080	solute carrier family 25 (mitochondrial carrier, Aralar), member 12	4.38
Urah	MGI:1916142	urate (5-hydroxyiso-) hydrolase	4.36
Nfyc	MGI:107901	nuclear transcription factor-Y gamma	-4.32
1700037C18	MGI:1920511	RIKEN cDNA 1700037C18 gene	-4.29
Ddx23	MGI:1921601	DEAD (Asp-Glu-Ala-Asp) box polypeptide 23	-4.27
Cenpe	MGI:1098230	centromere protein E	-4.23
P4ha2	MGI:894286	procollagen-proline, 2-oxoglutarate 4-dioxygenase (proline 4-hydroxylase), alpha II polypeptide	4.22
Apol9b	MGI:1919148	apolipoprotein L 9b	-4.21
Ccar2	MGI:2444228	cell cycle activator and apoptosis regulator 2	-4.20
Plscr3	MGI:1917560	phospholipid scramblase 3	-4.20
Slco2b1	MGI:1351872	solute carrier organic anion transporter family, member 2b1	-4.16
Kdm8	MGI:1924285	lysine (K)-specific demethylase 8	-4.15
Tmem164	MGI:2148020	transmembrane protein 164	-4.12
Efcab11	MGI:1926017	EF-hand calcium binding domain 11	-4.12
Wrap53	MGI:2384933	WD repeat containing, antisense to Trp53	-4.10
Cenpn	MGI:1919405	centromere protein N	-4.09
Atf6b	MGI:105121	activating transcription factor 6 beta	-4.09
Hspbbp1	MGI:1913495	HSPA (heat shock 70kDa) binding protein, cytoplasmic cochaperone 1	-4.08
Sfn2	MGI:1313258	schlafen 2	-4.08
Cenpa	MGI:88375	centromere protein A	-4.07
4931414P19	MGI:1921609	RIKEN cDNA 4931414P19 gene	-4.06
Arnt	MGI:88071	aryl hydrocarbon receptor nuclear translocator	-4.06
Dolk	MGI:2677836	dolichol kinase	-4.06
Tlr4	MGI:96824	toll-like receptor 4	-4.04
Dlst	MGI:1926170	dihydrolipoamide S-succinyltransferase (E2 component of 2-oxo-glutarate complex)	-4.04
Vim	MGI:98932	vimentin	4.04
Uprt	MGI:2685620	uracil phosphoribosyltransferase (FUR1) homolog (S. cerevisiae)	-4.03
2210016F16	MGI:1917403	RIKEN cDNA 2210016F16 gene	-4.02
Fahd2a	MGI:1915376	fumarylacetoacetate hydrolase domain containing 2A	-4.02

Ccdc23	MGI:1916466	small vasohibin binding protein	4.01
Pin4	MGI:1916963	protein (peptidyl-prolyl cis/trans isomerase) NIMA-interacting, 4 (parvulin)	3.99
Lxn	MGI:107633	latexin	3.99
Arhgef3	MGI:1918954	Rho guanine nucleotide exchange factor (GEF) 3	-3.99
Zfp748	MGI:1916455	zinc finger protein 748	-3.98
Fubp1	MGI:1196294	far upstream element (FUSE) binding protein 1	-3.98
Ptcd3	MGI:1917206	pentatricopeptide repeat domain 3	-3.97
Pstpip2	MGI:1335088	proline-serine-threonine phosphatase-interacting protein 2	-3.97
Osgin1	MGI:1919089	oxidative stress induced growth inhibitor 1	-3.96
Zfp930	MGI:2675306	zinc finger protein 930	-3.96
Psmg4	MGI:1916916	proteasome (prosome, macropain) assembly chaperone 4	3.95
Cped1	MGI:2444814	cadherin-like and PC-esterase domain containing 1	-3.94
Rnase1	MGI:97919	ribonuclease, RNase A family, 1 (pancreatic)	-3.93
Cpsf6	MGI:1913948	cleavage and polyadenylation specific factor 6	-3.93
Kif4	MGI:108389	kinesin family member 4	-3.92
Traip	MGI:1096377	TRAF-interacting protein	-3.92
Exoc2	MGI:1913732	exocyst complex component 2	-3.92
Hist1h4b	MGI:2448420	histone cluster 1, H4b	-3.92
Fancc	MGI:95480	Fanconi anemia, complementation group C	-3.91
2310007B03	MGI:1919124	RIKEN cDNA 2310007B03 gene	-3.90
Bud13	MGI:2443443	BUD13 homolog (yeast)	-3.90
Wdr12	MGI:1927241	WD repeat domain 12	-3.90
Fadd	MGI:109324	Fas (TNFRSF6)-associated via death domain	-3.90
Stk4	MGI:1929004	serine/threonine kinase 4	-3.89
Lurap1l	MGI:106510	leucine rich adaptor protein 1-like	3.88
Cln8	MGI:1349447	ceroid-lipofuscinosis, neuronal 8	3.87
Btrc	MGI:1338871	beta-transducin repeat containing protein	-3.87
Vps13c	MGI:2444207	vacuolar protein sorting 13C (yeast)	-3.87
Tra2b	MGI:106016	transformer 2 beta homolog (Drosophila)	3.86
AA986860	MGI:2138143	expressed sequence AA986860	3.86
Pak1	MGI:1339975	p21 protein (Cdc42/Rac)-activated kinase 1	-3.85
Letmd1	MGI:1915864	LETM1 domain containing 1	-3.85
Pus1	MGI:3047787	pseudouridylate synthase-like 1	-3.85
Fbxo38	MGI:2444639	F-box protein 38	-3.85
Rad54l	MGI:894697	RAD54 like (S. cerevisiae)	-3.84
Coq10b	MGI:1915126	coenzyme Q10 homolog B (S. cerevisiae)	-3.84
Nme3	MGI:1930182	NME/NM23 nucleoside diphosphate kinase 3	3.83
Ppp1r2	MGI:1914099	protein phosphatase 1, regulatory (inhibitor) subunit 2	-3.83
lkbkg	MGI:1338074	inhibitor of kappaB kinase gamma	-3.83
Trmt1l	MGI:1916185	tRNA methyltransferase 1 like	-3.83
Ddrk1	MGI:1924256	DDRK domain containing 1	3.83
Zc3h12a	MGI:2385891	zinc finger CCCH type containing 12A	-3.82
Zfp65	MGI:107769	zinc finger protein 65	-3.82
Zfp808	MGI:3704127	zinc finger protein 80	-3.82
Nat8	MGI:1915646	N-acetyltransferase 8 (GCN5-related)	-3.81
Slc9a3r2	MGI:1890662	solute carrier family 9 (sodium/hydrogen exchanger), member 3 regulator 2	-3.81
Pls3	MGI:104807	plastin 3 (T-isoform)	-3.80
Hist1h2an	MGI:2448300	histone cluster 1, H2an	-3.79
Ank3	MGI:88026	ankyrin 3, epithelial	-3.75
Cd36	MGI:107899	CD36 antigen	-3.74
Golph3l	MGI:1917129	golgi phosphoprotein 3-like	-3.74
Slc39a7	MGI:95909	solute carrier family 39 (zinc transporter), member 7	-3.74
Stk19	MGI:1860085	serine/threonine kinase 19	-3.74
Gcdh	MGI:104541	glutaryl-Coenzyme A dehydrogenase	-3.74
Tmx3	MGI:2442418	thioredoxin-related transmembrane protein 3	-3.73
Apol10a	MGI:3036238	apolipoprotein L 10A	-3.71
Mmgt1	MGI:2384305	membrane magnesium transporter 1	-3.71

Ptbp2	MGI:1860489	polypyrimidine tract binding protein 2	-3.71
Tuba1b	MGI:107804	tubulin, alpha 1B	-3.70
Egfl7	MGI:2449923	EGF-like domain 7	-3.70
Zfp956	MGI:2141515	zinc finger protein 956	-3.69
Ccnf	MGI:102551	cyclin F	-3.69
9030617003	MGI:2444813	RIKEN cDNA 9030617003 gene	-3.68
Slc39a1	MGI:1353474	solute carrier family 39 (zinc transporter), member 1	-3.68
Myd88	MGI:108005	myeloid differentiation primary response gene 88	-3.67
Ace2	MGI:1917258	angiotensin I converting enzyme (peptidyl-dipeptidase A) 2	-3.67
Kif22	MGI:109233	kinesin family member 22	-3.66
Trmt2a	MGI:96270	TRM2 tRNA methyltransferase 2A	-3.65
Gnb1	MGI:95781	guanine nucleotide binding protein (G protein), beta 1	-3.65
Dnajb1	MGI:1931874	DnaJ (Hsp40) homolog, subfamily B, member 1	-3.65
Creld1	MGI:2152539	cysteine-rich with EGF-like domains 1	-3.64
Gba2	MGI:2654325	glucosidase beta 2	-3.64
Pot1a	MGI:2141503	protection of telomeres 1A	-3.64
Sf3a1	MGI:1914715	splicing factor 3a, subunit 1	-3.63
Tmx2	MGI:1914208	thioredoxin-related transmembrane protein 2	-3.63
Gskip	MGI:1914037	GSK3B interacting protein	3.61
Tnip3	MGI:3041165	TNFAIP3 interacting protein 3	-3.61
Cnot4	MGI:1859026	CCR4-NOT transcription complex, subunit 4	3.60
Uap111	MGI:2443318	UDP-N-acetylglucosamine pyrophosphorylase 1-like 1	-3.60
Ezh1	MGI:1097695	enhancer of zeste 1 polycomb repressive complex 2 subunit	-3.59
Mettl8	MGI:2385142	methyltransferase like 8	-3.59
Mbtps1	MGI:1927235	membrane-bound transcription factor peptidase, site 1	-3.58
Cep95	MGI:2443502	centrosomal protein 95	-3.57
Smg9	MGI:1919247	smg-9 homolog, nonsense mediated mRNA decay factor (C. elegans)	-3.57
Aurkaip1	MGI:1913327	aurora kinase A interacting protein 1	3.56
Ttf2	MGI:1921294	transcription termination factor, RNA polymerase II	-3.56
Adck4	MGI:1924139	aarF domain containing kinase 4	-3.55
Hdgfrp2	MGI:1194492	hepatoma-derived growth factor, related protein 2	-3.55
Csde1	MGI:92356	cold shock domain containing E1, RNA binding	-3.53
Clns1a	MGI:109638	chloride channel, nucleotide-sensitive, 1A	-3.53
Dpf3	MGI:1917377	D4, zinc and double PHD fingers, family 3	-3.52
H1f0	MGI:95893	H1 histone family, member 0	-3.52
Haus5	MGI:1919159	HAUS augmin-like complex, subunit 5	-3.52
Pitx2	MGI:109340	paired-like homeodomain transcription factor 2	-3.51
Wfdc1	MGI:1915116	WAP four-disulfide core domain 1	-3.51
Ubac1	MGI:1920995	ubiquitin associated domain containing 1	-3.51
Abcf1	MGI:1351658	ATP-binding cassette, sub-family F (GCN20), member 1	3.51
Sec24c	MGI:1919746	Sec24 related gene family, member C (S. cerevisiae)	-3.50
Galnt7	MGI:1349449	UDP-N-acetyl-alpha-D-galactosamine: polypeptide N-acetylgalactosaminyltransferase 7	-3.50
Shc1	MGI:98296	src homology 2 domain-containing transforming protein C1	-3.49
P4hb	MGI:97464	prolyl 4-hydroxylase, beta polypeptide	-3.49
Skiv2l	MGI:1099835	superkiller viralicidic activity 2-like (S. cerevisiae)	-3.49
Mlh1	MGI:101938	mutL homolog 1 (E. coli)	-3.49
Gmpr2	MGI:1917903	guanosine monophosphate reductase 2	-3.48
Zfp329	MGI:1921283	zinc finger protein 329	-3.48
Abi3bp	MGI:2444583	ABI gene family, member 3 (NESH) binding protein	-3.47
Pax4	MGI:97488	paired box 4	-3.47
Gnpat	MGI:1343460	glyceronephosphate O-acyltransferase	-3.47
Spdl1	MGI:1917635	spindle apparatus coiled-coil protein 1	-3.46
Eps8l3	MGI:2139743	EPS8-like 3	-3.45
Clcn3	MGI:103555	chloride channel, voltage-sensitive 3	-3.45
Cdk5rap1	MGI:1914221	CDK5 regulatory subunit associated protein 1	3.45
Itgae	MGI:1298377	integrin alpha E, epithelial-associated	-3.44
Rnf121	MGI:1922462	ring finger protein 121	-3.44
Twf2	MGI:1346078	twinfilin, actin-binding protein, homolog 2 (Drosophila)	-3.43

Polr3a	MGI:2681836	polymerase (RNA) III (DNA directed) polypeptide A	-3.43
Tmem176a	MGI:1913308	transmembrane protein 176A	-3.42
Ccnb2	MGI:88311	cyclin B2	-3.42
Mt1	MGI:97171	metallothionein 1	3.42
Pole	MGI:1196391	polymerase (DNA directed), epsilon	-3.40
Bckdk	MGI:1276121	branched chain ketoacid dehydrogenase kinase	-3.40
Clps	MGI:88421	colipase, pancreatic	3.40
Tsr1	MGI:1915061	MGI:: TSR1 20S rRNA accumulation	-3.40
Gpalpp1	MGI:1914717	GPALPP motifs containing 1	-3.39
Stoml2	MGI:1913842	stomatin (Epb7.2)-like 2	3.39
Irgm1	MGI:107567	immunity-related GTPase family M member 1	-3.39
Acox3	MGI:1933156	acyl-Coenzyme A oxidase 3, pristanoyl	-3.39
Rph3al	MGI:1923492	rabphilin 3A-like (without C2 domains)	-3.39
Fam111a	MGI:1915508	family with sequence similarity 111, member A	-3.38
Cit	MGI:105313	citron	-3.37
Slc5a8	MGI:2384916	solute carrier family 5 (iodide transporter), member 8	-3.37
Cacnb3	MGI:103307	calcium channel, voltage-dependent, beta 3 subunit	-3.36
Cox4i2	MGI:2135755	cytochrome c oxidase subunit IV isoform 2	3.36
Dctn2	MGI:107733	dynactin 2	3.36
Mfap2	MGI:99559	microfibrillar-associated protein 2	-3.35
Cc2d2a	MGI:1924487	coiled-coil and C2 domain containing 2A	-3.35
Igf2bp2	MGI:1890358	insulin-like growth factor 2 mRNA binding protein 2	-3.35
Ophn1	MGI:2151070	oligophrenin 1	-3.35
Rcn3	MGI:1277122	reticulocalbin 3, EF-hand calcium binding domain	-3.35
Ppan	MGI:2178445	peter pan homolog (Drosophila)	-3.34
Rcl1	MGI:1913275	RNA terminal phosphate cyclase-like 1	-3.34
Tssc1	MGI:1289332	tumor suppressing subtransferable candidate 1	-3.33
Nnmt	MGI:1099443	nicotinamide N-methyltransferase	-3.33
Slc25a40	MGI:2442486	solute carrier family 25, member 40	-3.32
Srsf10	MGI:1333805	serine/arginine-rich splicing factor 10	-3.32
Jup	MGI:96650	junction plakoglobin	-3.32
Tipin	MGI:1921571	timeless interacting protein	-3.32
Phgr1	MGI:1858382	proline/histidine/glycine-rich 1	3.32
Pcp4	MGI:97509	Purkinje cell protein 4	3.32
Tbl3	MGI:2384863	transducin (beta)-like 3	-3.31
Fancg	MGI:1926471	Fanconi anemia, complementation group G	-3.30
Laptm5	MGI:108046	lysosomal-associated protein transmembrane 5	-3.30
Kpna2	MGI:103561	karyopherin (importin) alpha 2	-3.30
Phlda2	MGI:1202307	pleckstrin homology-like domain, family A, member 2	-3.29
Wdr46	MGI:1931871	WD repeat domain 46	-3.29
Rsrp1	MGI:106498	arginine/serine rich protein 1	3.29
Irf2	MGI:96591	interferon regulatory factor 2	3.29
Zfp426	MGI:1920248	zinc finger protein 426	-3.29
Cdh1	MGI:88354	cadherin 1	-3.28
Leng1	MGI:1917007	leukocyte receptor cluster (LRC) member 1	-3.27
Htr2b	MGI:109323	5-hydroxytryptamine (serotonin) receptor 2B	-3.27
Rhbdd1	MGI:1924117	rhomboid domain containing 1	-3.26
Tbx3	MGI:98495	T-box 3	-3.26
Arhgap6	MGI:1196332	Rho GTPase activating protein 6	-3.26
Chd4	MGI:1344380	chromodomain helicase DNA binding protein 4	-3.25
Gm20594	MGI:5295700	predicted gene, 20594	3.24
Fcrls	MGI:1933397	Fc receptor-like 5, scavenger receptor	-3.23
Slc35b3	MGI:1913978	solute carrier family 35, member B3	-3.23
Pigh	MGI:99463	phosphatidylinositol glycan anchor biosynthesis, class H	-3.23
Tor1aip1	MGI:3582693	torsin A interacting protein 1	-3.22
Grp	MGI:95833	gastrin releasing peptide	-3.22
Mia2	MGI:2159614	melanoma inhibitory activity 2	-3.22
Usb1	MGI:2142454	U6 snRNA biogenesis 1	-3.21
Cyb5r3	MGI:94893	cytochrome b5 reductase 3	-3.21

Arhgef38	MGI:1924919	Rho guanine nucleotide exchange factor (GEF) 38	-3.21
Dhps	MGI:2683592	deoxyhypusine synthase	-3.21
Mt3	MGI:97173	metallothionein 3	3.21
Atxn10	MGI:1859293	ataxin 10	3.21
Dimt1	MGI:1913504	DIM1 dimethyladenosine transferase 1-like (<i>S. cerevisiae</i>)	-3.21
Fcer1g	MGI:95496	Fc receptor, IgE, high affinity I, gamma polypeptide	3.19
Fam49a	MGI:1261783	family with sequence similarity 49, member A	-3.18
Hells	MGI:106209	helicase, lymphoid specific	-3.18
Snrpb2	MGI:104805	U2 small nuclear ribonucleoprotein B	3.18
Kdm5c	MGI:99781	lysine (K)-specific demethylase 5C	-3.18
Mzb1	MGI:1917066	marginal zone B and B1 cell-specific protein 1	3.17
Oma1	MGI:1914263	OMA1 homolog, zinc metallopeptidase (<i>S. cerevisiae</i>)	-3.17
Slc9a8	MGI:1924281	solute carrier family 9 (sodium/hydrogen exchanger), member 8	-3.17
Abcc3	MGI:1923658	ATP-binding cassette, sub-family C (CFTR/MRP), member 3	-3.16

Supplementary Table 4. Pathway analysis

Carcinoma mice vs. non-carcinoma mice

Categories	Diseases or Functions Annotation	p-Value	# Molecules
Cancer, Organismal Injury and Abnormalities, Renal and Urological Disease	tumorigenesis of urinary tract tumor	2,33E-05	3
Inflammatory Response	innate immune response	5,94E-05	12
Cell Death and Survival	cell death of connective tissue cells	7,30E-05	25
Cell Cycle, Cellular Assembly and Organization, DNA Replication, Recombination, and Repair	segregation of chromosomes	9,24E-05	9
Cell Cycle, DNA Replication, Recombination, and Repair	checkpoint control	1,10E-04	8
Cell Death and Survival, Cellular Function and Maintenance	colony survival of pancreatic cancer cell lines	1,79E-04	2
Cell Death and Survival, Cellular Compromise, Hepatic System Development and Function	cytotoxicity of hepatocytes	1,79E-04	2
Cancer, Endocrine System Disorders, Gastrointestinal Disease, Organismal Injury and Abnormalities	early-onset pancreatic cancer	1,79E-04	2
Cell Death and Survival, Cellular Assembly and Organization, Cellular Compromise	formation of lead inclusion bodies	1,79E-04	2
Cell Death and Survival	killing of skin cell lines	1,79E-04	2
Molecular Transport, Small Molecule Biochemistry	release of Zn ²⁺	1,79E-04	2
Organismal Injury and Abnormalities, Renal and Urological Disease	severity of renal lesion	1,79E-04	2
Cell Cycle, DNA Replication, Recombination, and Repair	DNA replication checkpoint	1,88E-04	3
Cellular Function and Maintenance, Hematological System Development and Function, Nervous System Development and Function	function of microglia	1,90E-04	4
Cell Death and Survival	necrosis	2,58E-04	74
Cell Death and Survival	cell death of renal tubule	2,75E-04	6
Cell Death and Survival	apoptosis of tumor cell lines	3,19E-04	40
Cell Morphology, Nervous System Development and Function	morphology of astrocytes	3,63E-04	5
RNA Post-Transcriptional Modification	processing of RNA	3,90E-04	14
Cell Death and Survival	cell death of fibroblast cell lines	4,08E-04	18
Cell-To-Cell Signaling and Interaction	response of macrophage cancer cell lines	4,33E-04	4
Cell Death and Survival	apoptosis of connective tissue cells	4,60E-04	14
Cell Death and Survival, Gastrointestinal Disease, Hepatic System Disease, Organismal Injury and Abnormalities	necrosis of liver	4,74E-04	12
Cell-To-Cell Signaling and Interaction, Inflammatory Response	innate immune response of tumor cell lines	4,78E-04	3
Cell Morphology, Hematological System Development and Function, Nervous System Development and Function	morphology of microglia	5,00E-04	4
Cell Cycle, Connective Tissue Development and Function	aneuploidy of fibroblasts	5,31E-04	2
Cancer, Organismal Injury and Abnormalities, Renal and Urological Disease	formation of renal-cell carcinoma	5,31E-04	2
Amino Acid Metabolism, Post-Translational Modification, Small Molecule Biochemistry	hydroxylation of L-proline	5,31E-04	2
Cell Death and Survival	killing of epithelial cell lines	5,31E-04	2
Organismal Injury and Abnormalities, Renal and Urological Disease	nephromegaly	5,31E-04	2
Cancer, Hematological Disease, Immunological Disease, Organismal Injury and Abnormalities	small B-cell lymphocytic lymphoma	5,74E-04	4
Cellular Function and Maintenance, Molecular Transport, Small Molecule Biochemistry	homeostasis of Zn ²⁺	6,15E-04	3
Cell Death and Survival	apoptosis of renal tubule	6,45E-04	5

Cancer, Organismal Injury and Abnormalities	cancer	6,51E-04	244
Cellular Assembly and Organization	missegregation of chromosomes	6,55E-04	4
Infectious Diseases	protozoan infection	8,16E-04	6
Cell Death and Survival	apoptosis of fibroblasts	8,54E-04	11
Cell Death and Survival	apoptosis of epithelial cells	8,83E-04	13
Cell Death and Survival	cell death	9,43E-04	88
Cell Death and Survival, Cellular Function and Maintenance	colony survival of tumor cell lines	9,48E-04	4
Cell Death and Survival	apoptosis of cervical cancer cell lines	9,55E-04	13
Cell Death and Survival	cell death of tumor cell lines	9,84E-04	46
Cancer, Gastrointestinal Disease, Hereditary Disorder, Organismal Injury and Abnormalities	Turcot syndrome type 1	1,05E-03	2
Neurological Disease	Wallerian degeneration of sciatic nerve	1,05E-03	2
Gastrointestinal Disease	abnormal absorption of mineral in intestine	1,05E-03	2
Cell-To-Cell Signaling and Interaction	aggregation of bone cancer cell lines	1,05E-03	2
Cell-To-Cell Signaling and Interaction	aggregation of sarcoma cell lines	1,05E-03	2
Cellular Assembly and Organization	binding of chromosomes	1,05E-03	2
Cell Death and Survival, Cellular Function and Maintenance	clearance of nontypeable Haemophilus influenzae strain 12	1,05E-03	2
Organismal Survival	death by human herpesvirus 2	1,05E-03	2
Cancer, Gastrointestinal Disease, Hereditary Disorder, Organismal Injury and Abnormalities	hereditary nonpolyposis colorectal cancer type 1	1,05E-03	2
Neurological Disease	neuropathy of brain	1,05E-03	2
Tissue Morphology	quantity of Francisella tularensis	1,05E-03	2
Tissue Morphology	quantity of Salmonella enterica serovar Typhimurium C5 strain	1,05E-03	2
Cellular Development, Cellular Growth and Proliferation, Embryonic Development, Organismal Development, Tissue Morphology	quantity of mesodermal cells	1,05E-03	2
Cell Morphology, Nervous System Development and Function	abnormal morphology of astrocytes	1,06E-03	4
Lipid Metabolism, Small Molecule Biochemistry	synthesis of prostaglandin D2	1,06E-03	4
Cell Cycle	arrest in mitosis of cervical cancer cell lines	1,07E-03	5
Cell Death and Survival	cell death of cervical cancer cell lines	1,08E-03	15
Cell-To-Cell Signaling and Interaction	clustering of cells	1,19E-03	4
Cell Death and Survival, Organismal Injury and Abnormalities, Renal and Urological Disease	necrosis of renal tubule	1,24E-03	5
Cell Death and Survival, Organismal Injury and Abnormalities, Renal and Urological Disease	necrosis of kidney	1,32E-03	15
Cell Morphology	polarization of Th17 cells	1,40E-03	3
Cellular Assembly and Organization, DNA Replication, Recombination, and Repair	quantity of mitotic spindle	1,40E-03	3
Cell Death and Survival	cell death of fibroblasts	1,41E-03	12
Cell Signaling	I-kappaB kinase/NF-kappaB cascade	1,44E-03	9
Cell Cycle	arrest in mitosis	1,49E-03	6
Cell Death and Survival, Connective Tissue Development and Function	cell viability of fibroblast cell lines	1,49E-03	7
Cell Morphology	morphology of antigen presenting cells	1,49E-03	7

Protein Synthesis	quantity of GPT in blood	1,55E-03	5
Cell Morphology, Nervous System Development and Function	morphology of neuroglia	1,56E-03	7
Inflammatory Response	acute inflammatory response of lung	1,74E-03	2
Cell-To-Cell Signaling and Interaction, Cellular Compromise, Neurological Disease, Organismal Injury and Abnormalities	damage of dopaminergic neurons	1,74E-03	2
Cell Death and Survival	killing of gonadal cell lines	1,74E-03	2
Cancer, Gastrointestinal Disease, Organismal Injury and Abnormalities	tumorigenesis of intestinal tissue	1,74E-03	2
Hematological Disease, Infectious Diseases	parasitemia	1,78E-03	5
Cell Death and Survival	apoptosis	1,84E-03	70
Cellular Assembly and Organization	organization of organelle	1,94E-03	20
Tissue Morphology	abnormal morphology of atrioventricular canal cushion	1,96E-03	3
Inflammatory Response	inflammatory response of lung	1,96E-03	3
Hematological System Development and Function, Inflammatory Response, Tissue Morphology	quantity of myeloid dendritic cells	1,96E-03	3
Cell Cycle	cell cycle progression	1,97E-03	33
Hematological System Development and Function, Tissue Morphology	quantity of antigen presenting cells	2,01E-03	12
Cancer, Hematological Disease, Immunological Disease, Organismal Injury and Abnormalities	Waldenstrom's macroglobulinemia	2,38E-03	9
Cancer, Hematological Disease, Immunological Disease, Organismal Injury and Abnormalities	grade 1 lymphocytic cancer	2,47E-03	5
Behavior	sickness behavior	2,59E-03	2
Tissue Morphology	abnormal morphology of abdominal fat pad	2,64E-03	3
Cell Cycle	mitosis	2,86E-03	18
Reproductive System Development and Function	decidualization of uterus	3,03E-03	3
Cell Death and Survival, Organismal Injury and Abnormalities, Renal and Urological Disease	cell death of tubular cells	3,04E-03	4
Developmental Disorder	incomplete turning of embryo	3,04E-03	4
Cell Cycle	formation of mitotic spindle	3,15E-03	5
Cell Death and Survival	apoptosis of intestinal cells	3,57E-03	4
Tissue Morphology	lack of vitelline vessel	3,57E-03	4
Connective Tissue Development and Function, Skeletal and Muscular System Development and Function, Tissue Development	abnormal morphology of secondary center of ossification	3,59E-03	2
Cell-To-Cell Signaling and Interaction, Hematological System Development and Function, Hypersensitivity Response, Immune Cell Trafficking, Inflammatory Response	activation of bone marrow-derived mast cells	3,59E-03	2
Cellular Development, Skeletal and Muscular System Development and Function, Tissue Development	differentiation of skeletal muscle satellite cells	3,59E-03	2
Cell Cycle	length of mitotic spindle	3,59E-03	2
Cellular Compromise, Gastrointestinal Disease, Hepatic System Disease, Organismal Injury and Abnormalities	oxidative stress response of hepatocytes	3,59E-03	2
Cellular Movement, Hematological System Development and Function, Immune Cell Trafficking, Inflammatory Response	sequestration of neutrophils	3,59E-03	2
Developmental Disorder, Endocrine System Disorders, Hereditary Disorder, Organismal Injury and Abnormalities, Reproductive System Disease	globozoospermia	3,90E-03	3
Infectious Diseases	Parasitic Infection	3,92E-03	8
Tissue Morphology	quantity of bacteria	4,15E-03	4
Cell Death and Survival, Organismal Injury and Abnormalities, Renal and Urological Disease	cell death of renal tubular epithelial cells	4,39E-03	3
Lipid Metabolism, Molecular Transport, Small Molecule Biochemistry	release of eicosanoid	4,46E-03	7

Embryonic Development, Tissue Morphology	abnormal morphology of atrioventricular canal	4,74E-03	2
Cell Death and Survival	apoptosis of colonocytes	4,74E-03	2
Neurological Disease	clonic seizure	4,74E-03	2
Cellular Growth and Proliferation, Organismal Development	growth of Chlamydia pneumoniae	4,74E-03	2
Cellular Function and Maintenance, Hematopoiesis	homeostasis of hematopoietic progenitor cells	4,74E-03	2
Infectious Diseases	infection by chlamydia	4,74E-03	2
Cell Signaling	integration of HIV-1	4,74E-03	2
Neurological Disease	preclinical stage amyotrophic lateral sclerosis	4,74E-03	2
Embryonic Development, Tissue Morphology	morphology of yolk sac	4,74E-03	6
Cell Death and Survival, Hematological System Development and Function	cell viability of neutrophils	4,91E-03	3
Digestive System Development and Function, Hepatic System Development and Function, Organ Morphology	regeneration of liver	5,15E-03	5
Nervous System Development and Function, Skeletal and Muscular System Development and Function	motor function	5,15E-03	6
Cell Cycle, Reproductive System Development and Function	meiosis of germ cells	5,37E-03	6
Developmental Disorder	abnormal turning of embryo	5,42E-03	5
Cellular Assembly and Organization, DNA Replication, Recombination, and Repair	alignment of chromosomes	5,47E-03	3
Carbohydrate Metabolism, Lipid Metabolism, Small Molecule Biochemistry	hydrolysis of choline-phospholipid	5,47E-03	3
Cell Death and Survival	cell death of macrophage cancer cell lines	5,50E-03	4
Cell Death and Survival	cell death of epithelial cells	5,75E-03	17
Cellular Function and Maintenance, Hematological System Development and Function	function of macrophages	5,83E-03	8
Cardiovascular Disease, Developmental Disorder, Organismal Injury and Abnormalities	hypoplasia of heart ventricle	5,88E-03	4
Cell Morphology	polarization of cells	6,01E-03	8
Nervous System Development and Function, Organ Morphology, Organismal Development	abnormal morphology of optic tract	6,04E-03	2
Cell-To-Cell Signaling and Interaction	clustering of tumor cell lines	6,04E-03	2
Cell Death and Survival	necroptosis of fibroblasts	6,04E-03	2
Cell-To-Cell Signaling and Interaction, Cellular Function and Maintenance, Inflammatory Response	phagocytosis by dendritic cells	6,04E-03	2
Cell-To-Cell Signaling and Interaction	recognition of bacteria	6,04E-03	2
Lipid Metabolism, Molecular Transport, Small Molecule Biochemistry	release of prostaglandin D2	6,04E-03	2
Cell Death and Survival, Organismal Injury and Abnormalities, Renal and Urological Disease	cell death of kidney cells	6,05E-03	13
Lipid Metabolism, Small Molecule Biochemistry	incorporation of fatty acid	6,07E-03	3
RNA Post-Transcriptional Modification	processing of rRNA	6,28E-03	4
Cancer, Organismal Injury and Abnormalities	malignant solid tumor	6,34E-03	237
Inflammatory Response	acute inflammatory response	6,71E-03	3
Cardiovascular Disease	advanced stage peripheral arterial disease	6,92E-03	7
Tissue Morphology	abnormal morphology of fat pad	7,12E-03	4
Hematological Disease, Infectious Diseases	malaria	7,12E-03	4
Lipid Metabolism, Molecular Transport, Small Molecule Biochemistry	release of prostaglandin	7,12E-03	4

Protein Synthesis	quantity of enzyme	7,32E-03	6
Infectious Diseases	Streptococcal infection	7,38E-03	3
Cell Morphology, Hematological System Development and Function, Inflammatory Response	M1 polarization of macrophages	7,49E-03	2
Cell Death and Survival, Cellular Function and Maintenance	clearance of E. coli	7,49E-03	2
Cellular Function and Maintenance	endocytosis by dendritic cells	7,49E-03	2
Embryonic Development, Gastrointestinal Disease, Hepatic System Development and Function, Hepatic System Disease, Organ Development, Organismal Development, Cell-To-Cell Signaling and Interaction, Cellular Function and Maintenance, Inflammatory Response	fibrogenesis of liver	7,49E-03	2
Cell Morphology, Hematological System Development and Function, Humoral Immune Response	phagocytosis of connective tissue cells	7,49E-03	2
Antigen Presentation, Inflammatory Response	polarization of B lymphocytes	7,49E-03	2
Cardiovascular Disease, Organismal Injury and Abnormalities	processing of antigen	7,49E-03	2
Cancer, Organismal Injury and Abnormalities	systolic heart failure	7,49E-03	2
Organismal Injury and Abnormalities, Reproductive System Disease	tumorigenesis of tissue	7,86E-03	225
Lipid Metabolism, Molecular Transport, Small Molecule Biochemistry	oligozoospermia	7,88E-03	6
Gastrointestinal Disease, Hepatic System Disease, Organismal Injury and Abnormalities	release of arachidonic acid	7,92E-03	5
Cellular Development, Cellular Growth and Proliferation, Nervous System Development and Function, Tissue Development	bleeding of liver	8,09E-03	3
Gastrointestinal Disease, Hepatic System Disease, Organismal Injury and Abnormalities	development of astrocytes	8,09E-03	3
Organismal Injury and Abnormalities, Skeletal and Muscular Disorders	degeneration of liver	8,84E-03	3
Cellular Function and Maintenance, Hematological System Development and Function	atrophy of gastrocnemius	9,07E-03	2
Gastrointestinal Disease, Organismal Injury and Abnormalities	function of natural killer T lymphocytes	9,07E-03	2
DNA Replication, Recombination, and Repair	injury of colon	9,07E-03	2
Hematological Disease, Immunological Disease, Organismal Injury and Abnormalities, Respiratory Disease	mutation of gene	9,07E-03	2
Gene Expression	neutrophilia of airway	9,07E-03	2
Cell Death and Survival	paternal imprinting	9,07E-03	2
Lipid Metabolism, Small Molecule Biochemistry	apoptosis of myeloid cells	9,08E-03	8
Connective Tissue Development and Function, Skeletal and Muscular System Development and Function, Tissue Development	homeostasis of lipid	9,08E-03	8
Cell Death and Survival, Cellular Function and Maintenance	abnormal morphology of compact bone	9,63E-03	3
Cell Death and Survival, Gastrointestinal Disease, Hepatic System Disease, Organismal Injury and Abnormalities	clearance of cells	9,84E-03	5
Organ Morphology, Organismal Development, Renal and Urological System Development and Function	apoptosis of liver cells	9,98E-03	7
Hematological System Development and Function, Inflammatory Response, Tissue Morphology	abnormal morphology of dilated renal tubule	1,01E-02	4
RNA Post-Transcriptional Modification	quantity of dendritic cells	1,04E-02	6
Cellular Function and Maintenance, Hematological System Development and Function	splicing of RNA	1,06E-02	7
Cellular Assembly and Organization, DNA Replication, Recombination, and Repair	function of CD4+ T-lymphocytes	1,07E-02	4
Respiratory Disease	chromosomal congression of chromosomes	1,08E-02	2
Cell-To-Cell Signaling and Interaction, Inflammatory Response	constriction of bronchus	1,08E-02	2
Lipid Metabolism, Small Molecule Biochemistry	immune response of epithelial cells	1,08E-02	2
Nucleic Acid Metabolism, Small Molecule Biochemistry	incorporation of palmitic acid	1,08E-02	2
	metabolism of NADH	1,08E-02	2

Cardiovascular System Development and Function, Embryonic Development, Organismal Development, Tissue Development	vascularization of yolk sac	1,08E-02	2
Cellular Assembly and Organization, Cellular Function and Maintenance	maintenance of telomeres	1,12E-02	4
Cell Cycle, Cell Morphology, Cellular Assembly and Organization, DNA Replication, Recombination, and Repair	abnormal morphology of chromosomes	1,13E-02	3
Cell Morphology, Cellular Assembly and Organization, Cellular Function and Maintenance	reorganization of actin filaments	1,13E-02	3
Energy Production	consumption of oxygen	1,15E-02	7
Organismal Survival	morbidity or mortality	1,15E-02	61
Embryonic Development, Tissue Morphology	abnormal morphology of visceral yolk sac	1,18E-02	4
Cell Morphology, Cellular Assembly and Organization, Cellular Function and Maintenance	reorganization of actin cytoskeleton	1,19E-02	6
Cellular Function and Maintenance	function of phagocytes	1,20E-02	11
Cellular Movement, Reproductive System Development and Function	cell movement of breast cell lines	1,21E-02	5
Cell-To-Cell Signaling and Interaction, Inflammatory Response	immune response of leukocyte cell lines	1,22E-02	3
Protein Synthesis	quantity of aspartate transaminase in blood	1,22E-02	3
Cell Death and Survival, Gastrointestinal Disease, Hepatic System Disease, Organismal Injury and Abnormalities	cell death of liver cells	1,23E-02	8
Organismal Development	abnormal morphology of body cavity	1,26E-02	33
Protein Synthesis	abnormal quantity of enzyme in blood	1,26E-02	2
Cellular Compromise, DNA Replication, Recombination, and Repair	breakdown of chromosomes	1,26E-02	2
Infectious Diseases, Organismal Injury and Abnormalities, Renal and Urological Disease	infection of kidney	1,26E-02	2
Tissue Morphology	morphology of extraembryonic tissue	1,29E-02	8
Organismal Survival	organismal death	1,30E-02	60
Cardiovascular Disease, Developmental Disorder, Organismal Injury and Abnormalities	hypoplasia of trabeculae carne	1,32E-02	3
Protein Synthesis	quantity of alkaline phosphatase in blood	1,32E-02	3
Hematological Disease, Hereditary Disorder, Organismal Injury and Abnormalities	CD36 deficiency	1,34E-02	1
Connective Tissue Disorders, Developmental Disorder, Hereditary Disorder, Organismal Injury and Abnormalities, Skeletal and Muscular Disorders	Catel-Manzke syndrome	1,34E-02	1
Connective Tissue Disorders, Developmental Disorder, Hereditary Disorder, Organismal Injury and Abnormalities, Skeletal and Muscular Disorders	Cole-Carpenter syndrome type 1	1,34E-02	1
Cardiovascular Disease, Developmental Disorder, Hematological Disease, Hereditary Disorder, Organismal Injury and Abnormalities	Fanconi's anemia group G	1,34E-02	1
Developmental Disorder, Endocrine System Disorders, Hematological Disease, Hereditary Disorder, Metabolic Disease, Organismal Injury and Abnormalities	Kenny-Caffey syndrome type 2	1,34E-02	1
Connective Tissue Disorders, Developmental Disorder, Skeletal and Muscular Disorders	Lethal arthrogryposis with anterior horn cell disease	1,34E-02	1
Neurological Disease, Organismal Injury and Abnormalities, Skeletal and Muscular Disorders	Lethal congenital contractural syndrom finnish type	1,34E-02	1
Disorder, Hereditary Disorder, Immunological Disease, Organismal Injury and Abnormalities, Skeletal and Muscular Disorders	OL-EDA-ID syndrome	1,34E-02	1
Cardiovascular Disease, Developmental Disorder, Hematological Disease, Hereditary Disorder, Immunological Disease, Organismal Injury and Abnormalities	T-cell immunodeficiency, recurrent infections, autoimmunity, and cardiac malformations	1,34E-02	1
Developmental Disorder, Hereditary Disorder, Neurological Disease, Organismal Injury and Abnormalities	X linked mental retardation syndromic jarid1c-related	1,34E-02	1
Hereditary Disorder, Immunological Disease, Infectious Diseases, Organismal Injury and Abnormalities	X-linked familial atypical mycobacteriosis 1	1,34E-02	1
Disease, Hereditary Disorder, Immunological Disease, Organismal Injury and Abnormalities	X-linked hyper-IgM syndrome with etodermal dysplasia	1,34E-02	1
Developmental Disorder, Hereditary Disorder, Neurological Disease, Organismal Injury and Abnormalities	X-linked mental retardation type 100	1,34E-02	1
Developmental Disorder, Hereditary Disorder, Neurological Disease, Organismal Injury and Abnormalities	X-linked mental retardation with cerebellar hypoplasia and distinctive facial appearance	1,34E-02	1
Cardiovascular System Development and Function, Tissue Morphology	abnormal morphology of superior vena cava	1,34E-02	1

Small Molecule Biochemistry	absorption of fexofenadine	1,34E-02	1
Lipid Metabolism, Molecular Transport, Small Molecule Biochemistry	absorption of pravastatin	1,34E-02	1
Tissue Development	accumulation of lymphoblastoid cell lines	1,34E-02	1
Organismal Development	accumulation of mucus	1,34E-02	1
Cellular Compromise, Nervous System Development and Function	acidification of synaptic vesicles	1,34E-02	1
Lipid Metabolism, Small Molecule Biochemistry	activation of epoprostenol	1,34E-02	1
Cell-To-Cell Signaling and Interaction, Hematological System Development and Function, Immune Cell Trafficking, Inflammatory Response	activation of follicular dendritic cells	1,34E-02	1
Inflammatory Response, Respiratory System Development and Function	acute inflammatory response of airway	1,34E-02	1
Cell-To-Cell Signaling and Interaction, Hematological System Development and Function, Immune Cell Trafficking, Inflammatory Response	adhesion of Langerhans cells	1,34E-02	1
Embryonic Development, Tissue Development	adhesion of embryoblast	1,34E-02	1
Cell-To-Cell Signaling and Interaction	adhesion of neural stem cells	1,34E-02	1
Ophthalmic Disease, Organismal Injury and Abnormalities	age-related macular degeneration type 10	1,34E-02	1
Cell-To-Cell Signaling and Interaction	aggregation of endothelial cells	1,34E-02	1
Cell Cycle, Hepatic System Development and Function	aneuploidy of hepatocytes	1,34E-02	1
Ophthalmic Disease, Organismal Injury and Abnormalities	anisocoria	1,34E-02	1
Developmental Disorder, Organismal Injury and Abnormalities, Reproductive System Disease	apocrine metaplasia of mammary gland	1,34E-02	1
Cell Death and Survival	apoptosis of B-2 lymphocytes	1,34E-02	1
Cell Death and Survival	apoptosis of fibroblastoids	1,34E-02	1
Cell Death and Survival, Neurological Disease	apoptosis of gonadotropes	1,34E-02	1
Cell Death and Survival, Skeletal and Muscular Disorders	apoptosis of neointimal cells	1,34E-02	1
Cardiovascular System Development and Function, Organismal Development, Tissue Morphology	area of left common carotid artery	1,34E-02	1
Cardiovascular System Development and Function, Organismal Development, Tissue Morphology	area of right common carotid artery	1,34E-02	1
Cell Cycle	arrest in G2/M phase transition of lymphoblasts	1,34E-02	1
Cell Cycle	arrest in cell division of bone cancer cell lines	1,34E-02	1
Cell Cycle	arrest in cell division of sarcoma cell lines	1,34E-02	1
Development and Function, Hematopoiesis, Humoral Immune Response, Lymphoid Tissue Structure and Development, Tissue Development	arrest in development of B-1 lymphocytes	1,34E-02	1
Hematological System Development and Function, Hematopoiesis, Humoral Immune Response, Lymphoid Tissue Structure and Development, Organ Development, Development and Function, Hematopoiesis, Humoral Immune Response, Lymphoid Tissue Structure and Development, Tissue Development	arrest in development of marginal-zone B lymphocytes	1,34E-02	1
Development and Function, Hematopoiesis, Humoral Immune Response, Lymphoid Tissue Structure and Development, Tissue Development	arrest in development of transitional B lymphocytes	1,34E-02	1
Development and Function, Hematopoiesis, Humoral Immune Response, Lymphoid Tissue Structure and Development, Tissue Development	arrest in development of transitional type 1 B lymphocytes	1,34E-02	1
Cellular Development, Embryonic Development, Hematological System Development and Function, Hematopoiesis, Organ Development, Organismal Development	arrest in maturation of thymocytes	1,34E-02	1
Cell Cycle, Reproductive System Development and Function	arrest in meiosis of sperm	1,34E-02	1
Cardiovascular Disease, Organismal Injury and Abnormalities, Skeletal and Muscular Disorders	arrhythmogenic right ventricular dysplasia familial 12	1,34E-02	1
Cell-To-Cell Signaling and Interaction	attachment of blood platelets	1,34E-02	1
Dermatological Diseases and Conditions, Developmental Disorder, Hereditary Disorder, Organismal Injury and Abnormalities	atypical incontinentia pigmenti	1,34E-02	1
Cell Death and Survival, Cell Morphology, Cellular Function and Maintenance	autophagic cell death of cervical cancer cell lines	1,34E-02	1
Cancer, Gastrointestinal Disease, Hereditary Disorder, Organismal Injury and Abnormalities	autosomal dominant hereditary diffuse gastric cancer	1,34E-02	1

Dermatological Diseases and Conditions, Developmental Disorder, Hereditary Disorder, Organismal Injury and Abnormalities	autosomal recessive dyskeratosis congenita type 3	1,34E-02	1
Developmental Disorder, Hereditary Disorder, Neurological Disease, Organismal Injury and Abnormalities	autosomal recessive mental retardation type 37	1,34E-02	1
Hereditary Disorder, Neurological Disease, Organismal Injury and Abnormalities	autosomal recessive spastic paraplegia type 46	1,34E-02	1
Cell-To-Cell Signaling and Interaction	binding of colon cell lines	1,34E-02	1
Cell-To-Cell Signaling and Interaction	binding of colonocytes	1,34E-02	1
Gene Expression	binding of double-stranded DNA	1,34E-02	1
Gene Expression	binding of origin of replication in the short region	1,34E-02	1
Carbohydrate Metabolism, Lipid Metabolism, Small Molecule Biochemistry	binding of phosphatidylinositol 4-phosphate	1,34E-02	1
Cellular Assembly and Organization	biogenesis of lateral plasma membrane	1,34E-02	1
Lipid Metabolism, Small Molecule Biochemistry, Vitamin and Mineral Metabolism	biosynthesis of dolichol monophosphate	1,34E-02	1
Developmental Disorder, Hereditary Disorder, Metabolic Disease, Organismal Injury and Abnormalities	branched-chain ketoacid dehydrogenase kinase deficiency	1,34E-02	1
Cell Morphology, Cellular Development, Cellular Growth and Proliferation, Embryonic Development	branching of breast cancer cell lines	1,34E-02	1
Respiratory Disease	bronchoconstriction of lung	1,34E-02	1
Small Molecule Biochemistry	catabolism of spermidine	1,34E-02	1
Cell Death and Survival	cell death of Fanconi's anemia cell lines	1,34E-02	1
Cellular Movement	cell movement of keratinocyte cancer cell lines	1,34E-02	1
Cell Death and Survival	cell viability of gonadotropes	1,34E-02	1
Cell Death and Survival, Hematological System Development and Function	cell viability of long-term hematopoietic stem cells	1,34E-02	1
Cell-To-Cell Signaling and Interaction	cell-cell contact of breast cell lines	1,34E-02	1
Cell-To-Cell Signaling and Interaction, Embryonic Development	cell-cell contact of embryonic stem cell lines	1,34E-02	1
Cell-To-Cell Signaling and Interaction, Embryonic Development	cell-cell contact of embryonic stem cells	1,34E-02	1
Cell-To-Cell Signaling and Interaction	cell-cell contact of squamous carcinoma cells	1,34E-02	1
Connective Tissue Disorders, Developmental Disorder, Hereditary Disorder, Organismal Injury and Abnormalities, Skeletal and Muscular Disorders	chondrodysplasia of femur	1,34E-02	1
Connective Tissue Disorders, Developmental Disorder, Hereditary Disorder, Organismal Injury and Abnormalities, Skeletal and Muscular Disorders	chondrodysplasia of humerus	1,34E-02	1
Cell Death and Survival, Cellular Function and Maintenance	clearance of Burkholderia pseudomallei strain 1026b	1,34E-02	1
Antimicrobial Response	clearance of human respiratory syncytial virus A2	1,34E-02	1
Function, Humoral Immune Response, Immune Cell Trafficking, Inflammatory Response	clustering of B lymphocytes	1,34E-02	1
Cell-To-Cell Signaling and Interaction, Skeletal and Muscular System Development and Function	clustering of muscle cell lines	1,34E-02	1
Cancer, Gastrointestinal Disease, Organismal Injury and Abnormalities	colorectal cancer with distant metastasis	1,34E-02	1
Developmental Disorder, Hereditary Disorder, Metabolic Disease, Organismal Injury and Abnormalities	congenital disorder of glycosylation type 1m	1,34E-02	1
Carbohydrate Metabolism, Lipid Metabolism, Small Molecule Biochemistry	conjugation of phosphatidylethanolamine	1,34E-02	1
Amino Acid Metabolism, Post-Translational Modification, Small Molecule Biochemistry	conversion of L-lysine	1,34E-02	1
Cell Death and Survival, Cellular Compromise	cytotoxicity of lymphoma cell lines	1,34E-02	1
Cellular Compromise, Neurological Disease, Organismal Injury and Abnormalities	damage of CA3 neurons	1,34E-02	1
Hereditary Disorder, Metabolic Disease, Organismal Injury and Abnormalities	deficiency of group IV A phospholipase A2	1,34E-02	1
Cellular Compromise	deformation of spindle pole	1,34E-02	1

Developmental Disorder, Embryonic Development, Tissue Morphology	degeneration of yolk sac	1,34E-02	1
Cellular Compromise, Inflammatory Response	degranulation of dendritic epidermal T cells	1,34E-02	1
Reproductive System Development and Function	delay in gestation	1,34E-02	1
Cellular Development, Cellular Growth and Proliferation	delay in growth of breast cancer cell lines	1,34E-02	1
Cellular Assembly and Organization, DNA Replication, Recombination, and Repair	delay in initiation of chromosomal congression of chromosomes	1,34E-02	1
Cell Death and Survival, Cellular Function and Maintenance	delay in initiation of clearance of pneumocytes	1,34E-02	1
Cellular Compromise	depletion of hippocampal neurons	1,34E-02	1
Cancer, Dermatological Diseases and Conditions, Organismal Injury and Abnormalities	dermal neurofibroma	1,34E-02	1
Organ Morphology, Respiratory Disease, Tissue Morphology	destruction of lung tissue	1,34E-02	1
Embryonic Development, Hair and Skin Development and Function, Organ Development, Organismal Development, Tissue Development	development of hair cuticle	1,34E-02	1
Nervous System Development and Function	development of limbic system	1,34E-02	1
Growth and Proliferation, Embryonic Development, Organ Development, Organismal Development, Tissue Development	development of pacemaker cells	1,34E-02	1
Cardiovascular System Development and Function, Tissue Morphology	diameter of left common carotid artery	1,34E-02	1
Cardiovascular System Development and Function, Tissue Morphology	diameter of right common carotid artery	1,34E-02	1
Cellular Development, Endocrine System Development and Function	differentiation of enteroendocrine cells	1,34E-02	1
Cellular Compromise, DNA Replication, Recombination, and Repair	disintegration of genomes	1,34E-02	1
Cellular Assembly and Organization, Cellular Compromise	disruption of vimentin filaments	1,34E-02	1
Cardiovascular Disease, Neurological Disease, Organismal Injury and Abnormalities, Skeletal and Muscular Disorders	dystonia progressive cerebellar atrophy and dilated cardiomyopathy	1,34E-02	1
Cardiovascular System Development and Function, Cell Morphology, Skeletal and Muscular System Development and Function	electrical capacitance of ventricular myocytes	1,34E-02	1
Cellular Compromise, Cellular Function and Maintenance	endoplasmic reticulum stress response of melanoma cell lines	1,34E-02	1
Organ Morphology	enlargement of kidney	1,34E-02	1
Cell Cycle	entry into S phase of skin cancer cell lines	1,34E-02	1
Endocrine System Disorders, Gastrointestinal Disease, Hematological Disease, Hereditary Disorder, Organismal Injury and Abnormalities, Skeletal and Muscular	dyserthropoietic anemia, and calvarial hyperostosis	1,34E-02	1
Cellular Development, Cellular Growth and Proliferation	expansion of bladder cancer cell lines	1,34E-02	1
Connective Tissue Development and Function, Tissue Development	expansion of brown adipose tissue	1,34E-02	1
Connective Tissue Development and Function, Organ Development, Reproductive System Development and Function, Tissue Development	expansion of epididymal fat	1,34E-02	1
Connective Tissue Development and Function, Tissue Development	expansion of inguinal fat pad	1,34E-02	1
Connective Tissue Development and Function, Tissue Development	expansion of mesenteric fat	1,34E-02	1
Connective Tissue Development and Function, Tissue Development	expansion of retroperitoneal white adipose tissue	1,34E-02	1
Lipid Metabolism, Molecular Transport, Small Molecule Biochemistry	extrusion of bile acid	1,34E-02	1
Conditions, Developmental Disorder, Hereditary Disorder, Immunological Disease, Organismal Development, Organismal Injury and Abnormalities, Skeletal and Muscular	facial dysmorphism, immunodeficiency, livedo, and short stature syndrome	1,34E-02	1
Hereditary Disorder, Immunological Disease, Infectious Diseases, Organismal Injury and Abnormalities	familial MYD88 deficiency	1,34E-02	1
Cardiovascular Disease, Organismal Injury and Abnormalities	fibrosis of portal artery	1,34E-02	1
Embryonic Development, Organismal Development, Tissue Development	formation of blastocele	1,34E-02	1
Cellular Assembly and Organization	formation of macronuclei	1,34E-02	1
Cancer, Endocrine System Disorders, Organismal Injury and Abnormalities, Reproductive System Disease	formation of ovarian adenocarcinoma	1,34E-02	1

Embryonic Development, Organismal Development, Tissue Development	formation of trophoectoderm	1,34E-02	1
Cardiovascular System Development and Function, Organ Development	function of right ventricle	1,34E-02	1
Neurological Disease	global cerebral hypomyelination	1,34E-02	1
Developmental Disorder, Hereditary Disorder, Metabolic Disease, Organismal Injury and Abnormalities, Renal and Urological Disease	glutaric acidemia type I	1,34E-02	1
Connective Tissue Disorders, Developmental Disorder, Hereditary Disorder, Organismal Injury and Abnormalities, Skeletal and Muscular Disorders	gracile bone dysplasia	1,34E-02	1
Cancer, Organismal Injury and Abnormalities	growth of cardiovascular neoplasm	1,34E-02	1
Cellular Development, Cellular Growth and Proliferation, Connective Tissue Development and Function, Tissue Development	growth of fibroblastoids	1,34E-02	1
Organismal Functions	healing of gastric epithelial cells	1,34E-02	1
Organismal Functions, Tissue Morphology	healing of intestinal epithelium	1,34E-02	1
Disease, Hereditary Disorder, Organismal Development, Organismal Injury and Abnormalities, Skeletal and Muscular Disorders	hereditary diffuse gastric cancer and cleft lip	1,34E-02	1
Cancer, Gastrointestinal Disease, Hereditary Disorder, Organismal Injury and Abnormalities	hereditary nonpolyposis colorectal cancer type 2	1,34E-02	1
Cancer, Gastrointestinal Disease, Hereditary Disorder, Organismal Injury and Abnormalities	hereditary nonpolyposis colorectal cancer type 4	1,34E-02	1
Cellular Function and Maintenance	homeostasis of tumor cells	1,34E-02	1
Carbohydrate Metabolism, Lipid Metabolism, Small Molecule Biochemistry	hydrolysis of sn-2-arachidonylphosphatidylcholine	1,34E-02	1
Cell Death and Survival, DNA Replication, Recombination, and Repair	hypercondensation of chromatin	1,34E-02	1
DNA Replication, Recombination, and Repair	hypercondensation of chromosomes	1,34E-02	1
Cardiovascular Disease, Endocrine System Disorders, Hematological Disease, Metabolic Disease	hyperglycemia of portal vein	1,34E-02	1
Cardiovascular Disease, Endocrine System Disorders, Gastrointestinal Disease, Metabolic Disease	hyperinsulinism of portal vein	1,34E-02	1
Developmental Disorder, Ophthalmic Disease, Organismal Injury and Abnormalities	hypertrophy of cornea	1,34E-02	1
System Development and Function, Endocrine System Disorders, Gastrointestinal Disease, Hereditary Disorder, Neurological Disease, Organismal Development, Hereditary Disorder, Neurological Disease, Organismal Injury and Abnormalities, Psychological Disorders	oligodontia and hypogonadotropic hypogonadism	1,34E-02	1
	hypomyelinating leukodystrophy type 7 without oligodontia or hypogonadotropic hypogonadism	1,34E-02	1
Cell-To-Cell Signaling and Interaction, Inflammatory Response	immune response of renal tubular epithelial cells	1,34E-02	1
Cancer, Hematological Disease, Immunological Disease, Organismal Injury and Abnormalities	immunoglobulin M monoclonal gammopathy of undetermined significance	1,34E-02	1
Lipid Metabolism, Small Molecule Biochemistry	incorporation of 15-(4-iodophenyl)-3-methylpentadecanoic acid	1,34E-02	1
Cell Signaling, Vitamin and Mineral Metabolism	incorporation of Ca ²⁺	1,34E-02	1
Cell-To-Cell Signaling and Interaction, Small Molecule Biochemistry	induction of acetylcholine	1,34E-02	1
Lipid Metabolism, Small Molecule Biochemistry	induction of diacylglycerol	1,34E-02	1
Cell-To-Cell Signaling and Interaction, Cellular Growth and Proliferation, Connective Tissue Development and Function	induction of fibroblast cell lines	1,34E-02	1
Organ Development, Organ Morphology, Reproductive System Development and Function	induction of mammary gland	1,34E-02	1
Infectious Diseases	infection by Streptococcus pyogenes	1,34E-02	1
Infectious Diseases	infection by mouse mammary tumor virus	1,34E-02	1
Infectious Diseases	infection of cholangiocytes	1,34E-02	1
Immunological Disease, Infectious Diseases	infection of thymus gland	1,34E-02	1
Cell Death and Survival	initiation of apoptosis of colorectal cancer cell lines	1,34E-02	1
Function and Maintenance, Cellular Growth and Proliferation, Nervous System Development and Function, Tissue Development	initiation of formation of dendrites	1,34E-02	1
Organismal Injury and Abnormalities, Respiratory Disease	injury of alveolar epithelium	1,34E-02	1

Cellular Compromise, Gastrointestinal Disease, Organismal Injury and Abnormalities	injury of enterocytes	1,34E-02	1
Cell-To-Cell Signaling and Interaction	intercellular communication of peritoneal macrophages	1,34E-02	1
Cellular Movement	invasion of enterocytes	1,34E-02	1
Cancer, Endocrine System Disorders, Organismal Injury and Abnormalities, Tumor Morphology	invasion of papillary thyroid carcinoma	1,34E-02	1
Developmental Disorder, Hereditary Disorder, Ophthalmic Disease, Organismal Injury and Abnormalities	iridogoniodysgenesis syndrome type 2	1,34E-02	1
Hereditary Disorder, Immunological Disease, Organismal Injury and Abnormalities	isolated immunodeficiency	1,34E-02	1
Developmental Disorder, Hereditary Disorder, Neurological Disease, Organismal Injury and Abnormalities, Renal and Urological Disease, Skeletal and Muscular Disorders	joubert syndrome type 9	1,34E-02	1
Endocrine System Disorders, Gastrointestinal Disease, Immunological Disease, Metabolic Disease	ketosis-prone diabetes mellitus	1,34E-02	1
Cardiovascular System Development and Function, Organ Morphology, Organismal Development, Tissue Morphology	lack of coronary sinus	1,34E-02	1
Development, Skeletal and Muscular System Development and Function, Tissue Development	lack of metacarpal bone	1,34E-02	1
Nervous System Development and Function	lateralization	1,34E-02	1
Organismal Injury and Abnormalities	leakage of interstitial fluid	1,34E-02	1
Cell Morphology	length of apical membrane	1,34E-02	1
Cell Morphology	length of basal membrane	1,34E-02	1
Lipid Metabolism, Small Molecule Biochemistry	loss of arachidonic acid	1,34E-02	1
Cellular Compromise	loss of lateral plasma membrane	1,34E-02	1
Cancer, Organismal Injury and Abnormalities, Reproductive System Disease	malignant breast cancer	1,34E-02	1
Cellular Development	maturation of myeloma cell lines	1,34E-02	1
Endocrine System Disorders, Gastrointestinal Disease, Hereditary Disorder, Metabolic Disease, Organismal Injury and Abnormalities	maturity-onset diabetes of the young type 9	1,34E-02	1
Cancer, Endocrine System Disorders, Organismal Injury and Abnormalities	metastasis of papillary thyroid carcinoma	1,34E-02	1
Cancer, Organismal Injury and Abnormalities, Reproductive System Disease	metastatic hydatidiform mole	1,34E-02	1
Cancer, Organismal Injury and Abnormalities, Reproductive System Disease	mixed ductal lobular breast carcinoma in situ	1,34E-02	1
Cell Morphology, Cellular Development, Cellular Growth and Proliferation	morphogenesis of hepatoma cell lines	1,34E-02	1
Cardiovascular System Development and Function, Organismal Development	morphogenesis of superior vena cava	1,34E-02	1
Cell Morphology, Cellular Assembly and Organization, DNA Replication, Recombination, and Repair	morphology of nuclear matrix	1,34E-02	1
Metabolic Disease	multiple mitochondrial dysfunctions syndrome type 2	1,34E-02	1
Hereditary Disorder, Organismal Injury and Abnormalities, Renal and Urological Disease	nephrotic syndrome type 9	1,34E-02	1
Developmental Disorder, Hereditary Disorder, Metabolic Disease, Neurological Disease, Organismal Injury and Abnormalities	neuronal ceroid lipofuscinosis 8 northern epilepsy variant	1,34E-02	1
Developmental Disorder, Hereditary Disorder, Metabolic Disease, Neurological Disease, Organismal Injury and Abnormalities	neuronal ceroid lipofuscinosis-8	1,34E-02	1
Cellular Function and Maintenance, Reproductive System Development and Function	organization of gonadal cell lines	1,34E-02	1
Hematological System Development and Function, Tissue Morphology	oxidation of blood	1,34E-02	1
Cellular Compromise, Skeletal and Muscular Disorders	oxidative stress response of adductor muscle	1,34E-02	1
Cardiovascular Disease, Developmental Disorder, Organismal Injury and Abnormalities	partial atrioventricular septal defect with heterotaxy syndrome	1,34E-02	1
Embryonic Development, Organismal Development, Tissue Development	patterning of sinus venosus	1,34E-02	1
Cellular Function and Maintenance	persistence of Schwann cells	1,34E-02	1
Small Molecule Biochemistry	phosphorylation of phytosphingosine	1,34E-02	1

Dermatological Diseases and Conditions, Hereditary Disorder, Organismal Injury and Abnormalities	poikiloderma with neutropenia	1,34E-02	1
Cell Cycle	polyploidization of epithelial cell lines	1,34E-02	1
Cell Cycle	polyploidization of kidney cell lines	1,34E-02	1
Cancer, Dermatological Diseases and Conditions, Organismal Injury and Abnormalities	poorly differentiated skin squamous cell carcinoma	1,34E-02	1
Cellular Function and Maintenance, Cellular Growth and Proliferation, Hematological System Development and Function, Humoral Immune Response	production of germinal center B lymphocytes	1,34E-02	1
Cellular Function and Maintenance	progression of myoblasts	1,34E-02	1
Neurological Disease	progressive early-onset ataxia	1,34E-02	1
Cancer, Dermatological Diseases and Conditions, Organismal Injury and Abnormalities	progressive epidermal hyperplasia	1,34E-02	1
Tissue Morphology	quantity of Brucella abortus	1,34E-02	1
Cellular Development, Cellular Growth and Proliferation, Embryonic Development, Organismal Development, Tissue Morphology	quantity of embryoid body cells	1,34E-02	1
Organ Morphology, Renal and Urological System Development and Function	quantity of mesangial matrix	1,34E-02	1
Cell Morphology, Nervous System Development and Function, Skeletal and Muscular System Development and Function	re-innervation of skeletal muscle	1,34E-02	1
Carbohydrate Metabolism	recognition of heparan sulfate	1,34E-02	1
Carbohydrate Metabolism	recognition of hyaluronic acid	1,34E-02	1
Lipid Metabolism, Small Molecule Biochemistry	recognition of paclitaxel	1,34E-02	1
Cell-To-Cell Signaling and Interaction, Cell-mediated Immune Response, Cellular Movement, Hematological System Development and Function, Immune Cell Trafficking	recruitment of activated T lymphocyte	1,34E-02	1
System Disease, Hereditary Disorder, Infectious Diseases, Neurological Disease, Organismal Injury and Abnormalities	hepatic dysfunction, and cardiovascular malformations	1,34E-02	1
Hereditary Disorder, Infectious Diseases, Organismal Injury and Abnormalities	recurrent isolated invasive pneumococcal disease type 2	1,34E-02	1
Organ Morphology, Tissue Development	regeneration of adductor muscle	1,34E-02	1
Cellular Function and Maintenance	regulation of enterocytes	1,34E-02	1
Cell Signaling, Small Molecule Biochemistry	regulation of nitric oxide	1,34E-02	1
Cellular Function and Maintenance, Cellular Movement	relocalization of stromal cells	1,34E-02	1
Tissue Morphology	remodeling of left common carotid artery	1,34E-02	1
Infectious Diseases	replication of Human rhinovirus 1B	1,34E-02	1
Respiratory System Development and Function, Tissue Development	response of bronchial tissue	1,34E-02	1
Cellular Assembly and Organization	restoration of actin cytoskeleton	1,34E-02	1
Function and Maintenance, Cellular Movement, Hematological System Development and Function, Immune Cell Trafficking	retention of regulatory T lymphocytes	1,34E-02	1
Connective Tissue Disorders, Developmental Disorder, Hereditary Disorder, Metabolic Disease, Organismal Injury and Abnormalities, Skeletal and Muscular Disorders	rhizomelic chondrodysplasia punctata type 2	1,34E-02	1
Ophthalmic Disease, Organismal Injury and Abnormalities	ring dermoid of cornea	1,34E-02	1
Hematological Disease, Infectious Diseases	severe malaria	1,34E-02	1
Cell Morphology, Skeletal and Muscular System Development and Function	shape of muscle cell lines	1,34E-02	1
Hereditary Disorder, Neurological Disease, Organismal Injury and Abnormalities	spinocerebellar ataxia type 10	1,34E-02	1
Connective Tissue Disorders, Developmental Disorder, Hereditary Disorder, Organismal Injury and Abnormalities, Skeletal and Muscular Disorders	spondyloepimetaphyseal dysplasia with joint laxity type 2	1,34E-02	1
System Development and Function, Hypersensitivity Response, Inflammatory Response	stimulation of BMSC cells	1,34E-02	1
Cardiovascular Disease, Cellular Compromise, Organ Morphology, Organismal Injury and Abnormalities	stress response of ventricular septum	1,34E-02	1
Cancer, Dermatological Diseases and Conditions, Organismal Injury and Abnormalities	susceptibility to cutaneous malignant melanoma type 10	1,34E-02	1

Cancer, Gastrointestinal Disease, Organismal Injury and Abnormalities Inflammatory Disease, Inflammatory Response, Organismal Injury and Abnormalities, Renal and Urological Disease	susceptibility to sporadic colorectal cancer	1,34E-02	1
	swelling of renal glomerulus	1,34E-02	1
Cardiovascular Disease, Organismal Injury and Abnormalities	tachycardia of atrium	1,34E-02	1
Organ Morphology, Tissue Morphology	thickness of glomerular basement membrane	1,34E-02	1
Cancer, Endocrine System Disorders, Organismal Injury and Abnormalities Hereditary Disorder, Immunological Disease, Organismal Injury and Abnormalities, Skeletal and Muscular Disorders	thyroid gland fetal adenoma	1,34E-02	1
	trichohepatoenteric syndrome type 2	1,34E-02	1
Lipid Metabolism, Small Molecule Biochemistry	turnover of arachidonic acid	1,34E-02	1
Developmental Disorder	ulnar-mammary syndrome	1,34E-02	1
DNA Replication, Recombination, and Repair	unwinding of origin of replication in the short region	1,34E-02	1
Infectious Diseases	uptake of Human adenovirus 35	1,34E-02	1
Lipid Metabolism, Molecular Transport, Small Molecule Biochemistry	uptake of omega-(4-iodophenyl)pentadecanoic acid	1,34E-02	1
Cardiovascular System Development and Function, Organ Morphology Developmental Disorder, Hereditary Disorder, Neurological Disease, Organismal Injury and Abnormalities	volume of right ventricle	1,34E-02	1
	x-linked mental retardation type 90	1,34E-02	1
Cellular Function and Maintenance, Hematological System Development and Function Hematological System Development and Function, Inflammatory Response, Tissue Morphology	function of myeloid cells	1,38E-02	9
	quantity of macrophages	1,38E-02	8
Cancer, Organismal Injury and Abnormalities	metastatic carcinoma	1,39E-02	7
Organ Morphology, Reproductive System Development and Function	abnormal morphology of seminiferous tubule	1,39E-02	6
Cell-To-Cell Signaling and Interaction	response of granulocytes	1,41E-02	5
Molecular Transport	transport of transition metal ion	1,42E-02	3
Cell Death and Survival, Gastrointestinal Disease, Hepatic System Disease, Organismal Injury and Abnormalities	apoptosis of hepatocytes	1,44E-02	6
Embryonic Development, Organ Development, Organ Morphology, Organismal Development, Tissue Development, Visual System Development and Function	abnormal morphology of anterior chamber of eye	1,46E-02	2
Lipid Metabolism, Molecular Transport, Small Molecule Biochemistry	abnormal quantity of bile salt	1,46E-02	2
Cell Death and Survival	apoptosis of airway epithelial cells	1,46E-02	2
Infectious Diseases	infection by respiratory syncytial virus	1,46E-02	2
Cell Cycle	metaphase/anaphase transition	1,46E-02	2
Cellular Development, Cellular Growth and Proliferation, Organ Development, Skeletal and Muscular System Development and Function, Tissue Development	proliferation of skeletal muscle satellite cells	1,46E-02	2
Cellular Assembly and Organization, Cellular Function and Maintenance Cell Death and Survival, Organismal Injury and Abnormalities, Renal and Urological Disease	organization of actin filaments	1,51E-02	5
	apoptosis of tubular cells	1,52E-02	3
Cellular Compromise, Hypersensitivity Response, Inflammatory Response	degranulation of mast cells	1,57E-02	6
Cellular Function and Maintenance	function of antigen presenting cells	1,59E-02	9
Molecular Transport	transport of heavy metal	1,62E-02	6
Cell Death and Survival	necrosis of epithelial tissue	1,63E-02	18
Molecular Transport	release of metal ion	1,66E-02	8
Cell Morphology, Cellular Assembly and Organization, DNA Replication, Recombination, and Repair	abnormal morphology of mitotic spindle	1,67E-02	2
Cancer, Organismal Injury and Abnormalities, Respiratory Disease	development of lung tumor	1,67E-02	2
Cellular Function and Maintenance, Molecular Transport	efflux of anion	1,67E-02	2

Organismal Functions, Tissue Morphology	healing of epithelial tissue	1,67E-02	2
Cell-To-Cell Signaling and Interaction, Cellular Function and Maintenance, Hematological System Development and Function, Inflammatory Response	phagocytosis by microglia	1,67E-02	2
Behavior	taste discrimination	1,67E-02	2
Cell Death and Survival	apoptosis of macrophages	1,69E-02	5
Cell Death and Survival	apoptosis of splenocytes	1,74E-02	3
Gene Expression	synthesis of RNA	1,74E-02	3
Cardiovascular Disease	peripheral arterial disease	1,78E-02	8
Cancer, Organismal Injury and Abnormalities	thoracic neoplasm	1,79E-02	38
Organ Morphology, Organismal Development, Renal and Urological System Development and Function	abnormal morphology of renal tubule	1,81E-02	5
Embryonic Development, Tissue Morphology	abnormal morphology of yolk sac	1,81E-02	5
Cancer, Organismal Injury and Abnormalities	epithelial cancer	1,82E-02	219
Molecular Transport	secretion of molecule	1,85E-02	17
Organ Morphology, Organismal Development, Renal and Urological System Development and Function	abnormal morphology of proximal convoluted tubule	1,86E-02	3
Cellular Movement	migration of prostate cancer cell lines	1,87E-02	5
Cell Morphology, Nervous System Development and Function	morphology of central nervous system cells	1,87E-02	6
Gastrointestinal Disease, Hepatic System Disease, Organismal Injury and Abnormalities	liver lesion	1,89E-02	107
Organ Morphology, Organismal Development, Renal and Urological System Development and Function	abnormal morphology of dilated proximal convoluted tubule	1,89E-02	2
Cardiovascular System Development and Function	abnormal morphology of vascular plexus	1,89E-02	2
Cell-To-Cell Signaling and Interaction, Hematological System Development and Function, Immune Cell Trafficking, Inflammatory Response	activation of monocyte-derived dendritic cells	1,89E-02	2
Tissue Development	formation of lumen	1,89E-02	2
Cellular Assembly and Organization	formation of micronuclei	1,89E-02	2
Cell Morphology, Hematological System Development and Function, Hematopoiesis, Lymphoid Tissue Structure and Development, Tissue Morphology	lack of bone marrow cells	1,89E-02	2
Cellular Assembly and Organization, Cellular Function and Maintenance	quantity of lamellipodia	1,89E-02	2
Infectious Diseases	replication of Enterovirus	1,89E-02	2
Cell-To-Cell Signaling and Interaction	response of endothelial cells	1,89E-02	2
Cell Signaling, Molecular Transport, Small Molecule Biochemistry	secretion of nitric oxide	1,89E-02	2
Lipid Metabolism, Small Molecule Biochemistry, Vitamin and Mineral Metabolism	steroidogenesis of cells	1,89E-02	2
Cellular Movement, Reproductive System Development and Function	migration of breast cell lines	1,90E-02	4
Cellular Assembly and Organization, Cellular Function and Maintenance	organization of mitochondria	1,90E-02	4
Cell Morphology, Hematological System Development and Function	morphology of myeloid cells	1,93E-02	6
Cell Death and Survival, Skeletal and Muscular Disorders	apoptosis of smooth muscle cells	1,93E-02	5
Drug Metabolism, Lipid Metabolism, Molecular Transport, Small Molecule Biochemistry	release of prostaglandin E2	1,98E-02	3
Development and Function, Hepatic System Disease, Inflammatory Disease, Inflammatory Response, Metabolic Disease, Organ Development, Organismal Injury	steatohepatitis	1,98E-02	3
Cell Cycle	G2/M phase	1,98E-02	8
Cancer, Organismal Injury and Abnormalities	neoplasia of epithelial tissue	1,98E-02	220

Carcinoma mice vs. non-carcinoma mice: All mice included with no ComBat normalization

Categories	Diseases or Functions Annotation	p-Value	# Molecules
Cancer, Organismal Injury and Abnormalities	cancer	8,50E-09	251
Cancer, Organismal Injury and Abnormalities	malignant solid tumor	1,27E-08	248
Cancer, Organismal Injury and Abnormalities	neoplasia of epithelial tissue	1,65E-08	237
Cancer, Organismal Injury and Abnormalities	epithelial cancer	1,91E-08	236
Cancer, Organismal Injury and Abnormalities	tumorigenesis of tissue	2,25E-08	239
Cancer, Gastrointestinal Disease, Organismal Injury and Abnormalities	digestive organ tumor	4,79E-07	219
Cancer, Organismal Injury and Abnormalities	abdominal cancer	7,10E-07	228
Cancer, Gastrointestinal Disease, Organismal Injury and Abnormalities	digestive system cancer	8,41E-07	217
Cancer, Organismal Injury and Abnormalities	abdominal neoplasm	8,87E-07	229
Cancer, Organismal Injury and Abnormalities	adenocarcinoma	9,34E-06	208
Cell Cycle, Cellular Assembly and Organization, DNA Replication, Recombination, and Repair	segregation of chromosomes	1,03E-05	10
Cell Death and Survival	apoptosis of fibroblasts	5,44E-05	13
Cell Cycle	cell cycle progression	7,22E-05	37
Cellular Assembly and Organization, DNA Replication, Recombination, and Repair	quantity of mitotic spindle	7,80E-05	4
Cell Death and Survival	apoptosis of cervical cancer cell lines	1,10E-04	15
Cancer, Gastrointestinal Disease, Organismal Injury and Abnormalities	gastrointestinal tract cancer	1,23E-04	185
Cancer, Gastrointestinal Disease, Organismal Injury and Abnormalities	Gastrointestinal Tract Cancer and Tumors	1,30E-04	186
Cell Death and Survival	cell death of cervical cancer cell lines	1,48E-04	17
Cell Death and Survival	apoptosis of tumor cell lines	1,49E-04	42
Nervous System Development and Function, Neurological Disease, Organ Morphology, Organismal Development, Organismal Injury and Abnormalities	abnormal morphology of optic tract	1,51E-04	3
Cell Signaling	integration of HIV-1	1,51E-04	3
Cell Death and Survival, Cellular Function and Maintenance	colony survival of pancreatic cancer cell lines	1,54E-04	2
Cancer, Endocrine System Disorders, Gastrointestinal Disease, Organismal Injury and Abnormalities	early-onset pancreatic cancer	1,54E-04	2
Cell Death and Survival	killing of skin cell lines	1,54E-04	2
Cell Morphology, Cellular Assembly and Organization	reorientation of actin cytoskeleton	1,54E-04	2
Cell Death and Survival	apoptosis of connective tissue cells	1,80E-04	15
Cell Death and Survival	cell death of connective tissue cells	2,34E-04	24
Organismal Development	morphology of body cavity	3,01E-04	44
Developmental Disorder, Embryonic Development, Organismal Survival	death of embryo	3,12E-04	9
Cell Morphology	elongation of cells	3,18E-04	6
Cancer, Gastrointestinal Disease, Organismal Injury and Abnormalities	large intestine neoplasm	3,22E-04	177
Cancer, Organismal Injury and Abnormalities	breast or colorectal cancer	3,41E-04	145
Cell Morphology, Cellular Assembly and Organization	morphology of cytoskeleton	3,55E-04	8
Cell Cycle	mitosis	3,73E-04	20

Cancer, Gastrointestinal Disease, Organismal Injury and Abnormalities	malignant neoplasm of large intestine	3,76E-04	176
Cellular Assembly and Organization, DNA Replication, Recombination, and Repair	alignment of chromosomes	3,77E-04	4
Cellular Assembly and Organization, DNA Replication, Recombination, and Repair	chromosomal congression of chromosomes	3,84E-04	3
Cell Cycle, DNA Replication, Recombination, and Repair	checkpoint control	4,29E-04	7
Cell Cycle, Connective Tissue Development and Function	aneuploidy of fibroblasts	4,57E-04	2
Cell Death and Survival	killing of epithelial cell lines	4,57E-04	2
Cellular Assembly and Organization, DNA Replication, Recombination, and Repair	quantity of chromosomes	4,95E-04	4
Cell Death and Survival	cell death of tumor cell lines	5,42E-04	48
Cellular Assembly and Organization	missegregation of chromosomes	6,37E-04	4
Cell Cycle	arrest in mitosis of cervical cancer cell lines	7,64E-04	5
Cell Signaling	I-kappaB kinase/NF-kappaB cascade	7,74E-04	9
Cell-To-Cell Signaling and Interaction	aggregation of bone cancer cell lines	9,07E-04	2
Cell-To-Cell Signaling and Interaction	aggregation of sarcoma cell lines	9,07E-04	2
Cellular Assembly and Organization	binding of chromosomes	9,07E-04	2
Cardiovascular System Development and Function, Cell Cycle, Cell-To-Cell Signaling and Interaction, Cellular Growth and Proliferation	contact growth inhibition of vascular endothelial cells	9,07E-04	2
Cellular Movement	migration of enterocytes	9,07E-04	2
Cellular Movement	migration of squamous carcinoma cells	9,07E-04	2
Cellular Development, Cellular Growth and Proliferation, Embryonic Development, Organismal Development, Tissue Morphology	quantity of mesodermal cells	9,07E-04	2
Cellular Assembly and Organization	trafficking of secretory vesicles	9,07E-04	2
Cellular Movement	migration of prostate cancer cell lines	9,26E-04	7
Digestive System Development and Function, Hepatic System Development and Function, Organ Morphology	regeneration of liver	9,60E-04	6
Cancer, Gastrointestinal Disease, Hepatic System Disease, Organismal Injury and Abnormalities	liver carcinoma	9,77E-04	103
Cell Morphology, Cellular Assembly and Organization, DNA Replication, Recombination, and Repair	morphology of mitotic spindle	1,00E-03	4
Organismal Development	abnormal morphology of body cavity	1,13E-03	36
Cell Morphology, Cellular Assembly and Organization	length of filaments	1,13E-03	3
Cellular Assembly and Organization, Cellular Function and Maintenance	quantity of lamellipodia	1,13E-03	3
Cell Death and Survival	cell death of fibroblast cell lines	1,19E-03	17
Cancer, Organismal Injury and Abnormalities	abdominal adenocarcinoma	1,21E-03	157
Organismal Survival	organismal death	1,29E-03	65
Cancer, Hematological Disease, Immunological Disease, Organismal Injury and Abnormalities	Waldenstrom's macroglobulinemia	1,44E-03	9
Cancer, Gastrointestinal Disease, Hepatic System Disease, Organismal Injury and Abnormalities	hepatobiliary system cancer	1,44E-03	107
Cellular Assembly and Organization	organization of organelle	1,45E-03	20
Cancer, Gastrointestinal Disease, Hepatic System Disease, Organismal Injury and Abnormalities	liver cancer	1,47E-03	105
Nervous System Development and Function, Neurological Disease, Organ Morphology, Organismal Development, Organismal Injury and Abnormalities	abnormal morphology of optic chiasm	1,50E-03	2
Hematological System Development and Function, Hematopoiesis, Tissue Development	accumulation of red blood cells	1,50E-03	2
Cell Cycle	arrest in G2 phase of hematopoietic progenitor cells	1,50E-03	2

Cancer, Hematological Disease, Immunological Disease, Organismal Injury and Abnormalities	latency of lymphoma	1,50E-03	2
Cancer, Organismal Injury and Abnormalities	thoracic cancer	1,59E-03	50
Cell Morphology, Cellular Assembly and Organization, Cellular Function and Maintenance	reorganization of actin filaments	1,64E-03	4
Cancer, Organismal Injury and Abnormalities	abdominal carcinoma	1,70E-03	158
Cancer, Organismal Injury and Abnormalities, Respiratory Disease	carcinoma in lung	1,83E-03	46
Cell-To-Cell Signaling and Interaction, Cellular Function and Maintenance, Hematological System Development and Function, Inflammatory Response	phagocytosis of leukocyte cell lines	1,85E-03	3
Organismal Development, Organismal Injury and Abnormalities	abnormal morphology of thoracic cavity	2,02E-03	20
Cancer, Organismal Injury and Abnormalities	thoracic neoplasm	2,09E-03	51
Gastrointestinal Disease, Hepatic System Disease, Organismal Injury and Abnormalities	liver lesion	2,12E-03	109
Cell Morphology, Hematological System Development and Function, Hematopoiesis, Lymphoid Tissue Structure and Development, Tissue Morphology	morphology of megakaryocytes	2,14E-03	3
Hematological System Development and Function, Hematopoiesis, Lymphoid Tissue Structure and Development, Tissue Morphology	quantity of myeloid progenitor cells	2,14E-03	4
Cell Cycle	formation of mitotic spindle	2,15E-03	5
Cell-To-Cell Signaling and Interaction	adhesion of kidney cancer cell lines	2,23E-03	2
Cancer, Hereditary Disorder, Organismal Injury and Abnormalities	autosomal dominant cancer	2,23E-03	2
Connective Tissue Disorders, Dermatological Diseases and Conditions, Developmental Disorder, Hereditary Disorder, Metabolic Disease, Organismal Injury and Abnormalities	autosomal recessive cutis laxa	2,23E-03	2
Infectious Diseases	infection by vaccinia virus	2,23E-03	2
Cellular Development, Cellular Growth and Proliferation	expansion of tumor cell lines	2,45E-03	3
Cellular Function and Maintenance, Hematological System Development and Function, Nervous System Development and Function	function of microglia	2,45E-03	3
Cellular Assembly and Organization, Cellular Function and Maintenance	endocytosis of vesicles	2,52E-03	4
Cancer, Gastrointestinal Disease, Hepatic System Disease, Organismal Injury and Abnormalities	growth of hepatocellular carcinoma	2,79E-03	3
Cancer, Organismal Injury and Abnormalities	poorly differentiated malignant tumor	2,79E-03	3
Digestive System Development and Function, Hepatic System Development and Function, Organ Development	function of liver	2,90E-03	6
Cell Death and Survival	necrosis	3,03E-03	70
Cell Cycle	arrest in G2 phase of lymphatic system cells	3,10E-03	2
Cellular Development, Digestive System Development and Function	differentiation of enterocytes	3,10E-03	2
Cell Morphology, Cellular Assembly and Organization, Cellular Function and Maintenance	length of microtubules	3,10E-03	2
Cell Cycle, Cell Morphology, Cellular Assembly and Organization, DNA Replication, Recombination, and Repair	length of mitotic spindle	3,10E-03	2
Cellular Movement, Hematological System Development and Function, Immune Cell Trafficking, Inflammatory Response	sequestration of neutrophils	3,10E-03	2
Cellular Movement	transendothelial migration of prostate cancer cell lines	3,10E-03	2
Cancer, Organismal Injury and Abnormalities, Renal and Urological Disease	tumorigenesis of urinary tract tumor	3,10E-03	2
Developmental Disorder, Endocrine System Disorders, Hereditary Disorder, Organismal Injury and Abnormalities, Reproductive System Disease	globozoospermia	3,16E-03	3
Cellular Function and Maintenance, Nervous System Development and Function	function of neuroglia	3,18E-03	4
Cellular Assembly and Organization, Cellular Function and Maintenance	organization of actin filaments	3,45E-03	6
Cancer, Organismal Injury and Abnormalities, Respiratory Disease	lung cancer	3,64E-03	48
Skeletal and Muscular Disorders, Skeletal and Muscular System Development and Function	abnormal morphology of muscle	3,69E-03	12
Cell Death and Survival	apoptosis	3,76E-03	69

Organismal Development	growth of organism	3,82E-03	27
Cell-To-Cell Signaling and Interaction	response of tumor cell lines	3,99E-03	8
Cell-To-Cell Signaling and Interaction, Hair and Skin Development and Function	adhesion of keratinocytes	3,99E-03	3
Developmental Disorder, Embryonic Development, Organismal Development, Tissue Morphology	abnormal morphology of atrioventricular canal	4,10E-03	2
Cell Morphology, Cellular Development	branching of endothelial cell lines	4,10E-03	2
Cellular Development, Skeletal and Muscular System Development and Function, Tissue Development	differentiation of skeletal muscle satellite cells	4,10E-03	2
Cell Morphology, Skeletal and Muscular System Development and Function	elongation of muscle cells	4,10E-03	2
Gastrointestinal Disease, Infectious Diseases	infection of gastrointestinal tract	4,10E-03	2
Neurological Disease	preclinical stage amyotrophic lateral sclerosis	4,10E-03	2
Cell Morphology, Embryonic Development, Tissue Development	stratification of cells	4,10E-03	2
Cancer, Organismal Injury and Abnormalities	growth of tumor	4,11E-03	26
Cancer	cell transformation	4,15E-03	16
Cell Death and Survival	apoptosis of intestinal cells	4,23E-03	4
Embryonic Development, Organismal Development, Tissue Morphology	size of embryo	4,27E-03	13
Cancer, Organismal Injury and Abnormalities, Respiratory Disease	respiratory system tumor	4,28E-03	50
Cancer, Organismal Injury and Abnormalities, Respiratory Disease	lung tumor	4,36E-03	49
Reproductive System Development and Function	decidualization of uterus	4,45E-03	3
Cardiovascular System Development and Function, Tissue Morphology	diameter of blood vessel	4,45E-03	3
Cell Cycle, Cell Morphology, Cellular Assembly and Organization, DNA Replication, Recombination, and Repair	morphology of chromosomes	4,53E-03	4
Cell Cycle, Reproductive System Development and Function	meiosis of germ cells	4,58E-03	6
Cancer, Gastrointestinal Disease, Organismal Injury and Abnormalities	gastrointestinal carcinoma	4,60E-03	127
Cardiovascular Disease, Cardiovascular System Development and Function, Organ Morphology, Organismal Development, Organismal Injury and Abnormalities	abnormal morphology of enlarged heart	4,60E-03	5
Cell Morphology	morphology of cells	4,71E-03	55
Cancer, Gastrointestinal Disease, Organismal Injury and Abnormalities	gastrointestinal adenocarcinoma	4,89E-03	121
Cell Cycle, Reproductive System Development and Function	meiosis of oocytes	4,94E-03	3
Cardiovascular System Development and Function	function of cardiovascular system	4,94E-03	13
Cell Cycle, DNA Replication, Recombination, and Repair	DNA replication checkpoint	5,23E-03	2
Cell Death and Survival, Organismal Injury and Abnormalities	apoptosis of colonocytes	5,23E-03	2
Cell-To-Cell Signaling and Interaction	clustering of tumor cell lines	5,23E-03	2
Cell-To-Cell Signaling and Interaction, Cellular Assembly and Organization	compaction of cells	5,23E-03	2
Cell Death and Survival	necroptosis of fibroblasts	5,23E-03	2
Cell-To-Cell Signaling and Interaction	recognition of bacteria	5,23E-03	2
Carbohydrate Metabolism, Lipid Metabolism, Small Molecule Biochemistry	hydrolysis of choline-phospholipid	5,46E-03	3
Cellular Development, Cellular Growth and Proliferation, Nervous System Development and Function	proliferation of astrocytes	5,49E-03	4
Connective Tissue Disorders, Hematological Disease, Organismal Injury and Abnormalities	thrombocytopenia	5,54E-03	9
Hematological Disease	cytopenia	5,78E-03	12

Cancer, Gastrointestinal Disease, Organismal Injury and Abnormalities	colorectal cancer	6,07E-03	124
Cell Cycle	G2/M phase	6,25E-03	9
Cell Death and Survival	necrosis of prostate cancer cell lines	6,25E-03	9
Cancer, Gastrointestinal Disease, Organismal Injury and Abnormalities	colorectal neoplasia	6,32E-03	125
Cellular Growth and Proliferation	proliferation of cells	6,37E-03	90
Embryonic Development, Organismal Development, Tissue Development	development of epiblast	6,48E-03	2
Tissue Development	development of organoid	6,48E-03	2
Connective Tissue Disorders, Hereditary Disorder, Metabolic Disease, Organismal Injury and Abnormalities	familial partial lipodystrophy	6,48E-03	2
Cell Signaling, Nucleic Acid Metabolism, Small Molecule Biochemistry	loading of GTP	6,48E-03	2
Embryonic Development, Tissue Development	patterning of epithelial tissue	6,48E-03	2
Cell-To-Cell Signaling and Interaction, Cellular Function and Maintenance, Inflammatory Response	phagocytosis by dendritic cells	6,48E-03	2
Cardiovascular Disease, Organismal Injury and Abnormalities	systolic heart failure	6,48E-03	2
Cardiovascular System Development and Function	pressure of heart	6,59E-03	3
Cellular Assembly and Organization	development of cytoplasm	6,88E-03	16
Cell Death and Survival, Connective Tissue Development and Function	cell viability of fibroblast cell lines	6,89E-03	6
Cell Death and Survival	apoptosis of prostate cancer cell lines	7,30E-03	8
Cancer, Gastrointestinal Disease, Organismal Injury and Abnormalities	colorectal carcinoma	7,34E-03	112
Cancer, Gastrointestinal Disease, Organismal Injury and Abnormalities	colon tumor	7,41E-03	114
Cell Morphology	polarization of cells	7,49E-03	8
Cellular Growth and Proliferation	proliferation of central nervous system cells	7,85E-03	7
Cell-To-Cell Signaling and Interaction	cell-cell adhesion of epithelial cells	7,85E-03	2
Cell Death and Survival, Cellular Function and Maintenance	clearance of E. coli	7,85E-03	2
Embryonic Development, Organismal Development, Tissue Development	development of trophoblast	7,85E-03	2
Cell-To-Cell Signaling and Interaction, Cellular Function and Maintenance, Inflammatory Response	phagocytosis of connective tissue cells	7,85E-03	2
Cellular Assembly and Organization, Cellular Function and Maintenance, Cellular Movement, Nervous System Development and Function	endocytosis of synaptic vesicles	7,86E-03	3
Cellular Function and Maintenance	internalization of E. coli	7,86E-03	3
Cardiovascular Disease, Organismal Injury and Abnormalities	systolic dysfunction	7,86E-03	3
Dermatological Diseases and Conditions, Organismal Injury and Abnormalities	ulceration of skin	7,86E-03	3
Cell Signaling	viral life cycle	7,91E-03	5
Hematological Disease	hemorrhagic disease	8,22E-03	10
Cancer, Organismal Injury and Abnormalities, Respiratory Disease	non-small cell lung cancer	8,24E-03	42
Cellular Assembly and Organization, Cellular Function and Maintenance	maintenance of telomeres	8,26E-03	4
Protein Degradation, Protein Synthesis	stabilization of protein	8,31E-03	7
Cell-To-Cell Signaling and Interaction, Inflammatory Response	immune response of tumor cell lines	8,55E-03	7
Developmental Disorder, Hereditary Disorder, Neurological Disease, Organismal Injury and Abnormalities	X-linked mental retardation	8,58E-03	5
Neurological Disease, Organismal Injury and Abnormalities	neurodegeneration of cerebral cortex	8,72E-03	4

Cellular Function and Maintenance	endocytosis	8,72E-03	16
Neurological Disease, Organismal Injury and Abnormalities	abnormality of cerebrum	8,91E-03	10
Cancer, Gastrointestinal Disease, Organismal Injury and Abnormalities	colon cancer	8,91E-03	113
Cancer, Gastrointestinal Disease, Organismal Injury and Abnormalities	colon carcinoma	9,19E-03	109
Lipid Metabolism, Small Molecule Biochemistry	incorporation of fatty acid	9,25E-03	3
Cardiovascular Disease, Developmental Disorder, Organismal Injury and Abnormalities	ventricular hypertrophy	9,33E-03	6
Embryonic Development, Organ Development, Organ Morphology, Organismal Development, Organismal Injury and Abnormalities, Respiratory Disease, Respiratory Cardiovascular Disease	abnormal morphology of lung interstitium	9,35E-03	2
Cellular Function and Maintenance	breakage of blood vessel	9,35E-03	2
Cardiovascular System Development and Function, Embryonic Development, Organismal Development, Tissue Development	endocytosis by dendritic cells	9,35E-03	2
Cell Morphology, Cellular Assembly and Organization	vascularization of yolk sac	9,35E-03	2
Cell Cycle, Cell Morphology, Cellular Assembly and Organization, DNA Replication, Recombination, and Repair	morphology of nucleus	9,55E-03	7
Cell-To-Cell Signaling and Interaction	abnormal morphology of chromosomes	1,00E-02	3
Cellular Assembly and Organization, Cellular Function and Maintenance	clustering of cells	1,00E-02	3
Hematological Disease, Infectious Diseases	quantity of cellular protrusions	1,01E-02	7
Cellular Assembly and Organization, Cellular Function and Maintenance	malaria	1,02E-02	4
Cell Death and Survival, Organismal Injury and Abnormalities	organization of Golgi apparatus	1,02E-02	4
Cellular Development, Cellular Growth and Proliferation, Reproductive System Development and Function	apoptosis of epithelial cells	1,05E-02	11
Cell Death and Survival, Cellular Function and Maintenance	cell proliferation of breast cell lines	1,06E-02	6
Cell Cycle	colony survival of tumor cell lines	1,08E-02	3
Cardiovascular Disease, Organismal Injury and Abnormalities	polyploidization of cells	1,08E-02	3
Cardiovascular System Development and Function, Organ Morphology, Organismal Development	arrhythmia	1,09E-02	9
Cell Death and Survival	morphology of heart ventricle	1,09E-02	9
Cellular Assembly and Organization	apoptosis of pancreatic cancer cell lines	1,09E-02	6
Embryonic Development, Nervous System Development and Function, Organ Development, Organismal Development, Tissue Development	clustering of membrane rafts	1,10E-02	2
Cellular Assembly and Organization	formation of anterior commissure	1,10E-02	2
Cell-To-Cell Signaling and Interaction, Cellular Assembly and Organization, Cellular Function and Maintenance	formation of endosomes	1,10E-02	2
Lipid Metabolism, Small Molecule Biochemistry	formation of focal complexes	1,10E-02	2
Cell Morphology, Hematological System Development and Function	incorporation of palmitic acid	1,10E-02	2
Cell Morphology, Cellular Assembly and Organization, Cellular Function and Maintenance	polarization of leukocyte cell lines	1,10E-02	2
Cellular Assembly and Organization, Cellular Function and Maintenance, Tissue Development	reorganization of actin stress fibers	1,10E-02	2
Cardiovascular Disease, Organismal Injury and Abnormalities	formation of actin filaments	1,12E-02	11
Cellular Growth and Proliferation, Organismal Development	abnormality of ventricular septum	1,13E-02	4
Cell Cycle	growth of yeast	1,13E-02	5
Cardiovascular System Development and Function, Cellular Function and Maintenance, Organ Development, Skeletal and Muscular System Development and Function, Tissue Development	G2 phase	1,15E-02	10
Cell Morphology, Embryonic Development	function of cardiomyocytes	1,16E-02	3
	patterning of cells	1,16E-02	3

Cellular Assembly and Organization, Cellular Function and Maintenance	quantity of filopodia	1,16E-02	3
Cancer, Gastrointestinal Disease, Organismal Injury and Abnormalities	colon adenocarcinoma	1,20E-02	107
Cancer, Organismal Injury and Abnormalities	metastatic carcinoma	1,21E-02	7
Cell Morphology, Cellular Assembly and Organization, Cellular Function and Maintenance	reorganization of actin cytoskeleton	1,23E-02	6
Connective Tissue Disorders, Developmental Disorder, Hereditary Disorder, Organismal Injury and Abnormalities, Skeletal and Muscular Disorders	Catel-Manzke syndrome	1,24E-02	1
Hereditary Disorder, Neurological Disease, Organismal Injury and Abnormalities, Skeletal and Muscular Disorders	Charcot-Marie-Tooth disease axonal type 2D	1,24E-02	1
Cardiovascular Disease, Developmental Disorder, Hematological Disease, Hereditary Disorder, Organismal Injury and Abnormalities	Fanconi's anemia group G	1,24E-02	1
Connective Tissue Disorders, Developmental Disorder, Organismal Injury and Abnormalities, Skeletal and Muscular Disorders	Lethal arthrogryposis with anterior horn cell disease	1,24E-02	1
Connective Tissue Disorders, Developmental Disorder, Hereditary Disorder, Neurological Disease, Organismal Injury and Abnormalities, Skeletal and Muscular	Lethal congenital contractural syndrom finnish type	1,24E-02	1
Cell Morphology, Hematological System Development and Function, Inflammatory Response	M2 polarization of peritoneal macrophages	1,24E-02	1
Connective Tissue Disorders, Dermatological Diseases and Conditions, Developmental Disorder, Hereditary Disorder, Immunological Disease, Organismal Injury and	OL-EDA-ID syndrome	1,24E-02	1
Connective Tissue Disorders, Developmental Disorder, Hereditary Disorder, Neurological Disease, Organismal Injury and Abnormalities, Skeletal and Muscular	Seckel syndrome type 9	1,24E-02	1
Cardiovascular Disease, Developmental Disorder, Hematological Disease, Hereditary Disorder, Immunological Disease, Organismal Injury and Abnormalities	T-cell immunodeficiency, recurrent infections, autoimmunity, and cardiac malformations	1,24E-02	1
Developmental Disorder, Hereditary Disorder, Neurological Disease, Organismal Injury and Abnormalities	X linked mental retardation syndromic jarid1c-related	1,24E-02	1
Hereditary Disorder, Immunological Disease, Infectious Diseases, Organismal Injury and Abnormalities	X-linked familial atypical mycobacteriosis 1	1,24E-02	1
Dermatological Diseases and Conditions, Developmental Disorder, Hematological Disease, Hereditary Disorder, Immunological Disease, Organismal Injury and	X-linked hyper-IgM syndrome with etodermal dysplasia	1,24E-02	1
Developmental Disorder, Hereditary Disorder, Neurological Disease, Organismal Injury and Abnormalities	X-linked mental retardation type 100	1,24E-02	1
Developmental Disorder, Hereditary Disorder, Neurological Disease, Organismal Injury and Abnormalities	X-linked mental retardation with cerebellar hypoplasia and distinctive facial appearance	1,24E-02	1
Cardiovascular Disease, Cardiovascular System Development and Function, Tissue Morphology	abnormal morphology of superior vena cava	1,24E-02	1
Small Molecule Biochemistry	absorption of fexofenadine	1,24E-02	1
Lipid Metabolism, Molecular Transport, Small Molecule Biochemistry	absorption of pravastatin	1,24E-02	1
Cellular Growth and Proliferation	accumulation of lymphoblastoid cell lines	1,24E-02	1
Organismal Development	accumulation of mucus	1,24E-02	1
Cellular Compromise, Nervous System Development and Function	acidification of synaptic vesicles	1,24E-02	1
Lipid Metabolism, Small Molecule Biochemistry	activation of epoprostenol	1,24E-02	1
Cell-To-Cell Signaling and Interaction, Hematological System Development and Function, Immune Cell Trafficking, Inflammatory Response	activation of follicular dendritic cells	1,24E-02	1
Inflammatory Response, Respiratory System Development and Function	acute inflammatory response of airway	1,24E-02	1
Cell-To-Cell Signaling and Interaction, Hematological System Development and Function, Immune Cell Trafficking, Inflammatory Response	adhesion of Langerhans cells	1,24E-02	1
Embryonic Development, Tissue Development	adhesion of embryoblast	1,24E-02	1
Cell-To-Cell Signaling and Interaction, Embryonic Development	adhesion of epiblast cells	1,24E-02	1
Cell-To-Cell Signaling and Interaction	adhesion of neural stem cells	1,24E-02	1
Cell-To-Cell Signaling and Interaction	aggregation of endothelial cells	1,24E-02	1
Cell Morphology, Cellular Assembly and Organization, Nervous System Development and Function	alignment of active zone	1,24E-02	1
Cell Morphology, Cellular Assembly and Organization, Skeletal and Muscular System Development and Function	alignment of junctional folds	1,24E-02	1
Cell Cycle, Hepatic System Development and Function	aneuploidy of hepatocytes	1,24E-02	1
Cancer, Organismal Injury and Abnormalities	angiomatoid fibrous histiocytoma	1,24E-02	1

Ophthalmic Disease, Organismal Injury and Abnormalities	anisocoria	1,24E-02	1
Developmental Disorder, Organismal Injury and Abnormalities, Reproductive System Disease	apocrine metaplasia of mammary gland	1,24E-02	1
Cell Death and Survival	apoptosis of B-2 lymphocytes	1,24E-02	1
Cell Death and Survival	apoptosis of fibroblastoids	1,24E-02	1
Cell Death and Survival, Neurological Disease, Organismal Injury and Abnormalities	apoptosis of gonadotropes	1,24E-02	1
Cell Death and Survival, Skeletal and Muscular Disorders	apoptosis of neointimal cells	1,24E-02	1
Cell Cycle	arrest in G1 phase of megakaryocyte/erythrocyte lineage-restricted progenitor cells	1,24E-02	1
Cell Cycle	arrest in G2 phase of megakaryocyte/erythrocyte lineage-restricted progenitor cells	1,24E-02	1
Cell Cycle	arrest in G2/M phase transition of lymphoblasts	1,24E-02	1
Cell Cycle	arrest in S phase of myeloma cell lines	1,24E-02	1
Cell Cycle	arrest in cell division of bone cancer cell lines	1,24E-02	1
Cell Cycle	arrest in cell division of sarcoma cell lines	1,24E-02	1
Cellular Development, Cellular Growth and Proliferation, Embryonic Development, Hematological System Development and Function, Hematopoiesis, Humoral Immune	arrest in development of B-1 lymphocytes	1,24E-02	1
Cellular Development, Cellular Growth and Proliferation, Embryonic Development, Hematological System Development and Function, Hematopoiesis, Humoral Immune	arrest in development of marginal-zone B lymphocytes	1,24E-02	1
Cellular Development, Cellular Growth and Proliferation, Embryonic Development, Hematological System Development and Function, Hematopoiesis, Humoral Immune	arrest in development of transitional B lymphocytes	1,24E-02	1
Cellular Development, Cellular Growth and Proliferation, Embryonic Development, Hematological System Development and Function, Hematopoiesis, Humoral Immune	arrest in development of transitional type 1 B lymphocytes	1,24E-02	1
Cardiovascular Disease, Organismal Injury and Abnormalities, Skeletal and Muscular Disorders	arrhythmogenic right ventricular dysplasia familial 12	1,24E-02	1
Cell-To-Cell Signaling and Interaction	attachment of blood platelets	1,24E-02	1
Dermatological Diseases and Conditions, Developmental Disorder, Hereditary Disorder, Organismal Injury and Abnormalities	atypical incontinentia pigmenti	1,24E-02	1
Cell Morphology, Cellular Function and Maintenance	autophagy of intestinal cell lines	1,24E-02	1
Cancer, Gastrointestinal Disease, Hereditary Disorder, Organismal Injury and Abnormalities	autosomal dominant hereditary diffuse gastric cancer	1,24E-02	1
Connective Tissue Disorders, Dermatological Diseases and Conditions, Developmental Disorder, Hereditary Disorder, Metabolic Disease, Organismal Injury and Abnormalities	autosomal recessive cutis laxa type IB	1,24E-02	1
Connective Tissue Disorders, Dermatological Diseases and Conditions, Developmental Disorder, Hereditary Disorder, Metabolic Disease, Organismal Injury and	autosomal recessive cutis laxa type IIA	1,24E-02	1
DNA Replication, Recombination, and Repair, Dermatological Diseases and Conditions, Developmental Disorder, Hereditary Disorder, Organismal Injury and Abnormalities	autosomal recessive dyskeratosis congenita type 3	1,24E-02	1
Hereditary Disorder, Neurological Disease, Organismal Injury and Abnormalities, Psychological Disorders, Skeletal and Muscular Disorders	autosomal recessive early-onset parkinson disease 23	1,24E-02	1
Connective Tissue Disorders, Developmental Disorder, Hereditary Disorder, Organismal Injury and Abnormalities, Skeletal and Muscular Disorders	autosomal recessive osteopetrosis type 6	1,24E-02	1
Connective Tissue Disorders, Developmental Disorder, Hereditary Disorder, Neurological Disease, Organismal Injury and Abnormalities, Skeletal and Muscular	autosomal recessive primary microcephaly type 13	1,24E-02	1
Hereditary Disorder, Neurological Disease, Organismal Injury and Abnormalities	autosomal recessive spastic paraplegia type 46	1,24E-02	1
Cell-To-Cell Signaling and Interaction	binding of colon cell lines	1,24E-02	1
Cell-To-Cell Signaling and Interaction	binding of colonocytes	1,24E-02	1
Gene Expression	binding of origin of replication in the short region	1,24E-02	1
Carbohydrate Metabolism, Lipid Metabolism, Small Molecule Biochemistry	binding of phosphatidylinositol 4-phosphate	1,24E-02	1
Developmental Disorder, Hereditary Disorder, Metabolic Disease, Organismal Injury and Abnormalities	branched-chain ketoacid dehydrogenase kinase deficiency	1,24E-02	1
Cellular Development	branching of bone marrow cell lines	1,24E-02	1
Cellular Development	branching of skin cell lines	1,24E-02	1
Small Molecule Biochemistry	catabolism of spermidine	1,24E-02	1

Cell Cycle	cell cycle progression of megakaryocyte/erythrocyte lineage-restricted progenitor cells	1,24E-02	1
Cell Death and Survival	cell death of Fanconi's anemia cell lines	1,24E-02	1
Cellular Movement	cell movement of keratinocyte cancer cell lines	1,24E-02	1
Cell Death and Survival	cell viability of gonadotropes	1,24E-02	1
Cell Death and Survival, Hematological System Development and Function	cell viability of long-term hematopoietic stem cells	1,24E-02	1
Cell-To-Cell Signaling and Interaction, Embryonic Development	cell-cell contact of embryonic stem cell lines	1,24E-02	1
Cell-To-Cell Signaling and Interaction, Embryonic Development	cell-cell contact of embryonic stem cells	1,24E-02	1
Cell-To-Cell Signaling and Interaction	cell-cell contact of squamous carcinoma cells	1,24E-02	1
Antimicrobial Response	clearance of human respiratory syncytial virus A2	1,24E-02	1
Cell-To-Cell Signaling and Interaction, Hematological System Development and Function, Humoral Immune Response, Immune Cell Trafficking, Inflammatory Cellular Growth and Proliferation	clustering of B lymphocytes	1,24E-02	1
Cancer, Gastrointestinal Disease, Organismal Injury and Abnormalities	colony formation of skeletal muscle satellite cells	1,24E-02	1
Developmental Disorder, Hereditary Disorder, Metabolic Disease, Organismal Injury and Abnormalities	colorectal cancer with distant metastasis	1,24E-02	1
Developmental Disorder, Hereditary Disorder, Metabolic Disease, Organismal Injury and Abnormalities	congenital disorder of glycosylation type 1m	1,24E-02	1
Cardiovascular Disease, Organismal Injury and Abnormalities	congenital disorder of glycosylation type 2e	1,24E-02	1
Cell-To-Cell Signaling and Interaction, Hematological System Development and Function	congestion of venous system	1,24E-02	1
Dermatological Diseases and Conditions, Organismal Injury and Abnormalities	conjugation of natural killer T lymphocytes	1,24E-02	1
Organismal Injury and Abnormalities, Tissue Morphology	constriction of hair follicle	1,24E-02	1
Amino Acid Metabolism, Post-Translational Modification, Small Molecule Biochemistry	contraction of wound	1,24E-02	1
Tissue Development	conversion of L-lysine	1,24E-02	1
Hair and Skin Development and Function, Organ Morphology	cross-linkage of elastic fibers	1,24E-02	1
Hair and Skin Development and Function, Organ Morphology	curvature of auchene hair	1,24E-02	1
Hair and Skin Development and Function, Organ Morphology	curvature of awl hair	1,24E-02	1
Hair and Skin Development and Function, Organ Morphology	curvature of guard hair	1,24E-02	1
Hair and Skin Development and Function, Organ Morphology	curvature of zigzag hair	1,24E-02	1
Hereditary Disorder, Metabolic Disease, Organismal Injury and Abnormalities	deficiency of group IV A phospholipase A2	1,24E-02	1
Cellular Compromise	deformation of spindle pole	1,24E-02	1
Developmental Disorder, Embryonic Development, Tissue Morphology	degeneration of yolk sac	1,24E-02	1
Cellular Compromise, Inflammatory Response	degranulation of dendritic epidermal T cells	1,24E-02	1
Cell Morphology, Hair and Skin Development and Function	delay in cell spreading of epithelial cell lines	1,24E-02	1
Cell Morphology, Connective Tissue Development and Function	delay in cell spreading of fibroblast cell lines	1,24E-02	1
Cellular Development, Cellular Growth and Proliferation	delay in growth of breast cancer cell lines	1,24E-02	1
Cellular Assembly and Organization, DNA Replication, Recombination, and Repair	delay in initiation of chromosomal congression of chromosomes	1,24E-02	1
Cell Death and Survival, Cellular Function and Maintenance	delay in initiation of clearance of pneumocytes	1,24E-02	1
Cellular Movement, Nervous System Development and Function	delay in initiation of migration of cortical projection neurons	1,24E-02	1
DNA Replication, Recombination, and Repair, Gene Expression	demethylation of double-stranded DNA	1,24E-02	1
Nervous System Development and Function, Tissue Morphology	density of serotonergic neurons	1,24E-02	1

Cellular Compromise	depletion of hippocampal neurons	1,24E-02	1
Embryonic Development, Nervous System Development and Function, Organ Development, Organismal Development, Tissue Development	development of dorsal lateral geniculate nucleus	1,24E-02	1
Embryonic Development, Hair and Skin Development and Function, Organ Development, Organismal Development, Tissue Development	development of hair cuticle	1,24E-02	1
Embryonic Development, Nervous System Development and Function, Organ Development, Organismal Development, Tissue Development	development of layer IV	1,24E-02	1
Cardiovascular System Development and Function, Organismal Development	development of left common carotid artery	1,24E-02	1
Nervous System Development and Function	development of limbic system	1,24E-02	1
Cardiovascular System Development and Function, Cellular Development, Cellular Growth and Proliferation, Embryonic Development, Organ Development, Organismal Development, Hair and Skin Development and Function, Organ Development, Organismal Development, Tissue Development	development of pacemaker cells	1,24E-02	1
Cellular Development, Endocrine System Development and Function	development of vibrissae	1,24E-02	1
Cardiovascular Disease, Hereditary Disorder, Organismal Injury and Abnormalities, Skeletal and Muscular Disorders	differentiation of enteroendocrine cells	1,24E-02	1
Cell Morphology	dilated cardiomyopathy type 1J1	1,24E-02	1
Cell Morphology	elongation of fibroblasts	1,24E-02	1
Cell Morphology	elongation of neuroblastoma cell lines	1,24E-02	1
Hematopoiesis, Inflammatory Response	emperipolesis of megakaryocytes	1,24E-02	1
Cell Cycle	entry into S phase of skin cancer cell lines	1,24E-02	1
Cellular Development, Cellular Growth and Proliferation	expansion of bladder cancer cell lines	1,24E-02	1
Connective Tissue Development and Function, Tissue Development	expansion of brown adipose tissue	1,24E-02	1
Embryonic Development, Organismal Development, Tissue Development, Tissue Morphology	expansion of epiblast	1,24E-02	1
Connective Tissue Development and Function, Organ Development, Reproductive System Development and Function, Tissue Development	expansion of epididymal fat	1,24E-02	1
Connective Tissue Development and Function, Tissue Development	expansion of inguinal fat pad	1,24E-02	1
Connective Tissue Development and Function, Tissue Development	expansion of mesenteric fat	1,24E-02	1
Connective Tissue Development and Function, Tissue Development	expansion of retroperitoneal white adipose tissue	1,24E-02	1
Cardiovascular Disease, Connective Tissue Disorders, Dermatological Diseases and Conditions, Developmental Disorder, Gastrointestinal Disease, Hereditary Disorder, Cardiovascular Disease, Organismal Injury and Abnormalities	facial dysmorphism, immunodeficiency, livedo, and short stature syndrome	1,24E-02	1
Embryonic Development, Organismal Development, Tissue Development	fibrosis of portal artery	1,24E-02	1
Cellular Development, Cellular Growth and Proliferation, Embryonic Development, Hematological System Development and Function, Hematopoiesis, Lymphoid Tissue	formation of blastocle	1,24E-02	1
Embryonic Development, Organismal Development, Tissue Development	formation of colony forming unit-megakaryocytes	1,24E-02	1
Cell Morphology, Cellular Assembly and Organization, Cellular Function and Maintenance	formation of ectoplacental cone	1,24E-02	1
Cellular Assembly and Organization	formation of filopodial tip	1,24E-02	1
Cancer, Endocrine System Disorders, Organismal Injury and Abnormalities, Reproductive System Disease	formation of macronuclei	1,24E-02	1
Cell Morphology, Cellular Assembly and Organization, Cellular Function and Maintenance	formation of ovarian adenocarcinoma	1,24E-02	1
Embryonic Development, Organismal Development, Tissue Development	formation of peripheral lamellae	1,24E-02	1
Cardiovascular System Development and Function, Organ Development	formation of trophoectoderm	1,24E-02	1
Cancer, Hereditary Disorder, Neurological Disease, Organismal Injury and Abnormalities	function of right ventricle	1,24E-02	1
Developmental Disorder, Hereditary Disorder, Metabolic Disease, Organismal Injury and Abnormalities, Renal and Urological Disease	glioma susceptibility 9	1,24E-02	1
Infectious Diseases, Organismal Development	glutaric acidemia type I	1,24E-02	1
Cancer, Cardiovascular Disease, Organismal Injury and Abnormalities	growth of Sindbis virus	1,24E-02	1
	growth of cardiovascular neoplasm	1,24E-02	1

Cellular Development, Cellular Growth and Proliferation, Connective Tissue Development and Function, Tissue Development	growth of fibroblastoids	1,24E-02	1
Cardiovascular System Development and Function, Cellular Movement	haptotaxis of endothelial cells	1,24E-02	1
Organismal Functions	healing of gastric epithelial cells	1,24E-02	1
Organismal Functions, Tissue Morphology	healing of intestinal epithelium	1,24E-02	1
Cardiovascular Disease, Developmental Disorder, Hereditary Disorder, Neurological Disease, Organismal Injury and Abnormalities	heart and brain malformation syndrome	1,24E-02	1
Cancer, Connective Tissue Disorders, Developmental Disorder, Gastrointestinal Disease, Hereditary Disorder, Organismal Injury and Abnormalities, Skeletal and Hereditary Disorder, Metabolic Disease, Organismal Injury and Abnormalities	hereditary diffuse gastric cancer and cleft lip	1,24E-02	1
	hereditary folate malabsorption	1,24E-02	1
Cancer, Gastrointestinal Disease, Hereditary Disorder, Organismal Injury and Abnormalities	hereditary nonpolyposis colorectal cancer type 4	1,24E-02	1
Hereditary Disorder, Neurological Disease, Organismal Injury and Abnormalities	hereditary sensory neuropathy type IF	1,24E-02	1
Cellular Function and Maintenance	homeostasis of tumor cells	1,24E-02	1
Carbohydrate Metabolism, Lipid Metabolism, Small Molecule Biochemistry	hydrolysis of sn-2-arachidonylphosphatidylcholine	1,24E-02	1
Cell Death and Survival, DNA Replication, Recombination, and Repair	hypercondensation of chromatin	1,24E-02	1
DNA Replication, Recombination, and Repair	hypercondensation of chromosomes	1,24E-02	1
Cardiovascular Disease, Endocrine System Disorders, Hematological Disease, Metabolic Disease	hyperglycemia of portal vein	1,24E-02	1
Cardiovascular Disease, Endocrine System Disorders, Gastrointestinal Disease, Metabolic Disease, Organismal Injury and Abnormalities	hyperinsulinism of portal vein	1,24E-02	1
Developmental Disorder, Ophthalmic Disease, Organismal Injury and Abnormalities	hypertrophy of cornea	1,24E-02	1
Cancer, Developmental Disorder, Endocrine System Disorders, Gastrointestinal Disease, Hematological Disease, Hereditary Disorder, Metabolic Disease, Organismal Injury and Abnormalities	hypoinsulinemic hypoglycemia with hemihypertrophy	1,24E-02	1
Dental Disease, Developmental Disorder, Digestive System Development and Function, Endocrine System Disorders, Gastrointestinal Disease, Hereditary Disorder, Hereditary Disorder, Neurological Disease, Organismal Injury and Abnormalities, Psychological Disorders	hypomyelinating leukodystrophy type 7 with oligodontia and hypogonadotropic hypogonadism	1,24E-02	1
Cell-To-Cell Signaling and Interaction, Inflammatory Response	hypomyelinating leukodystrophy type 7 without oligodontia or hypogonadotropic hypogonadism	1,24E-02	1
Hereditary Disorder, Immunological Disease, Organismal Injury and Abnormalities	immune response of renal tubular epithelial cells	1,24E-02	1
Hereditary Disorder, Immunological Disease, Organismal Injury and Abnormalities	immunodeficiency 28	1,24E-02	1
Behavior	immunodeficiency-centromeric instability-facial anomalies syndrome type 4	1,24E-02	1
Lipid Metabolism, Small Molecule Biochemistry	impulsive behavior	1,24E-02	1
Cell Signaling, Vitamin and Mineral Metabolism	incorporation of 15-(4-iodophenyl)-3-methylpentadecanoic acid	1,24E-02	1
Cellular Function and Maintenance, Connective Tissue Development and Function	incorporation of Ca ²⁺	1,24E-02	1
Cell-To-Cell Signaling and Interaction, Small Molecule Biochemistry	incorporation of fibroblast cell lines	1,24E-02	1
Lipid Metabolism, Small Molecule Biochemistry	induction of acetylcholine	1,24E-02	1
Cell-To-Cell Signaling and Interaction, Cellular Growth and Proliferation, Connective Tissue Development and Function	induction of diacylglycerol	1,24E-02	1
Organ Development, Organ Morphology, Reproductive System Development and Function	induction of fibroblast cell lines	1,24E-02	1
Infectious Diseases	induction of mammary gland	1,24E-02	1
Gastrointestinal Disease, Infectious Diseases, Organismal Injury and Abnormalities	infection by mouse mammary tumor virus	1,24E-02	1
Gastrointestinal Disease, Infectious Diseases, Organismal Injury and Abnormalities	infection of cecum	1,24E-02	1
Infectious Diseases, Organismal Injury and Abnormalities, Respiratory Disease	infection of colon	1,24E-02	1
Cell Death and Survival	infection of pneumocytes	1,24E-02	1
Cell Morphology, Cellular Assembly and Organization, Cellular Development, Cellular Function and Maintenance, Cellular Growth and Proliferation, Nervous System	initiation of apoptosis of colorectal cancer cell lines	1,24E-02	1
	initiation of formation of dendrites	1,24E-02	1

Organismal Injury and Abnormalities, Respiratory Disease	injury of alveolar epithelium	1,24E-02	1
Cellular Compromise, Gastrointestinal Disease, Organismal Injury and Abnormalities	injury of enterocytes	1,24E-02	1
Cell Morphology, Cellular Movement, Nervous System Development and Function	innervation of serotonergic neurons	1,24E-02	1
Cellular Movement	invasion of enterocytes	1,24E-02	1
Developmental Disorder, Hereditary Disorder, Ophthalmic Disease, Organismal Injury and Abnormalities	iridogoniodysgenesis syndrome type 2	1,24E-02	1
Hereditary Disorder, Immunological Disease, Organismal Injury and Abnormalities	isolated immunodeficiency	1,24E-02	1
Developmental Disorder, Hereditary Disorder, Neurological Disease, Organismal Injury and Abnormalities, Renal and Urological Disease, Skeletal and Muscular Disorders	joubert syndrome type 9	1,24E-02	1
Endocrine System Disorders, Gastrointestinal Disease, Immunological Disease, Metabolic Disease, Organismal Injury and Abnormalities	ketosis-prone diabetes mellitus	1,24E-02	1
Cardiovascular Disease, Cardiovascular System Development and Function, Organ Morphology, Organismal Development, Organismal Injury and Abnormalities, Tissue	lack of coronary sinus	1,24E-02	1
Connective Tissue Development and Function, Connective Tissue Disorders, Organ Morphology, Organismal Development, Organismal Injury and Abnormalities, Skeletal	lack of metacarpal bone	1,24E-02	1
Nervous System Development and Function, Neurological Disease, Organ Morphology, Organismal Development, Organismal Injury and Abnormalities	lack of optic tract	1,24E-02	1
Organismal Injury and Abnormalities	leakage of interstitial fluid	1,24E-02	1
Behavior	licking behavior of paw	1,24E-02	1
Cell Death and Survival, Connective Tissue Disorders, Organismal Injury and Abnormalities, Tissue Morphology	loss of adipocytes	1,24E-02	1
Lipid Metabolism, Small Molecule Biochemistry	loss of arachidonic acid	1,24E-02	1
Cellular Function and Maintenance, Hematological System Development and Function	maintenance of long-term culture-initiating cells	1,24E-02	1
Cancer, Organismal Injury and Abnormalities, Reproductive System Disease	malignant breast cancer	1,24E-02	1
Cellular Development	maturation of myeloma cell lines	1,24E-02	1
Endocrine System Disorders, Gastrointestinal Disease, Hereditary Disorder, Metabolic Disease, Organismal Injury and Abnormalities	maturity-onset diabetes of the young type 9	1,24E-02	1
Cancer, Organismal Injury and Abnormalities	metastasis of ovarian cancer cells	1,24E-02	1
Cancer, Organismal Injury and Abnormalities, Reproductive System Disease	metastatic hydatidiform mole	1,24E-02	1
Cellular Movement, Embryonic Development	migration of epiblast cells	1,24E-02	1
Cellular Movement	migration of neuroblastoma cells	1,24E-02	1
Embryonic Development	migration of trophoblast	1,24E-02	1
Connective Tissue Disorders, Inflammatory Disease, Inflammatory Response, Organismal Injury and Abnormalities, Skeletal and Muscular Disorders	mild synovitis	1,24E-02	1
Cancer, Organismal Injury and Abnormalities, Reproductive System Disease	mixed ductal lobular breast carcinoma in situ	1,24E-02	1
Cell Morphology, Cellular Development, Cellular Growth and Proliferation	morphogenesis of hepatoma cell lines	1,24E-02	1
Cardiovascular System Development and Function, Organismal Development	morphogenesis of superior vena cava	1,24E-02	1
Cell Morphology, Cellular Compromise, Hair and Skin Development and Function	multinucleation of epithelial cell lines	1,24E-02	1
Developmental Disorder, Hereditary Disorder, Neurological Disease, Organismal Injury and Abnormalities, Skeletal and Muscular Disorders	multiple congenital anomalies-hypotonia-seizures syndrome type 1	1,24E-02	1
Metabolic Disease	multiple mitochondrial dysfunctions syndrome type 2	1,24E-02	1
Hereditary Disorder, Organismal Injury and Abnormalities, Renal and Urological Disease	nephrotic syndrome type 9	1,24E-02	1
Cellular Function and Maintenance, Reproductive System Development and Function	organization of gonadal cell lines	1,24E-02	1
Hematological System Development and Function, Tissue Morphology	oxidation of blood	1,24E-02	1
Inflammatory Disease, Inflammatory Response, Skeletal and Muscular Disorders	paralytic autoimmune myositis	1,24E-02	1
Cardiovascular Disease, Developmental Disorder, Organismal Injury and Abnormalities	partial atrioventricular septal defect with heterotaxy syndrome	1,24E-02	1

Embryonic Development, Organismal Development, Tissue Development	patterning of sinus venosus	1,24E-02	1
Cellular Compromise, Free Radical Scavenging, Lipid Metabolism, Small Molecule Biochemistry	peroxidation of monohydroperoxy-linoleic acid	1,24E-02	1
Small Molecule Biochemistry	phosphorylation of phytosphingosine	1,24E-02	1
Inflammatory Disease, Organismal Injury and Abnormalities, Reproductive System Disease	placentitis	1,24E-02	1
Cell Cycle	polyploidization of T lymphocytes	1,24E-02	1
Cell Cycle, DNA Replication, Recombination, and Repair	polyploidization of chromosomes	1,24E-02	1
Cell Cycle	polyploidization of epithelial cell lines	1,24E-02	1
Cell Cycle	polyploidization of kidney cell lines	1,24E-02	1
Cancer, Organismal Injury and Abnormalities, Respiratory Disease	poorly differentiated non-small cell lung cancer	1,24E-02	1
Cancer, Dermatological Diseases and Conditions, Organismal Injury and Abnormalities	poorly differentiated skin squamous cell carcinoma	1,24E-02	1
Endocrine System Disorders, Metabolic Disease, Organismal Injury and Abnormalities	primary hyperthyroidism	1,24E-02	1
Cellular Function and Maintenance, Cellular Growth and Proliferation, Hematological System Development and Function, Humoral Immune Response	production of germinal center B lymphocytes	1,24E-02	1
Cellular Function and Maintenance	progression of myoblasts	1,24E-02	1
Cancer, Dermatological Diseases and Conditions, Organismal Injury and Abnormalities	progressive epidermal hyperplasia	1,24E-02	1
Hereditary Disorder, Neurological Disease, Organismal Injury and Abnormalities	progressive myoclonic epilepsy type 9	1,24E-02	1
Cell Morphology, Cellular Assembly and Organization, Nervous System Development and Function	projection of corticothalamic axons	1,24E-02	1
Embryonic Development, Tissue Development	proliferation of ectoplacental cone	1,24E-02	1
Cellular Growth and Proliferation, Connective Tissue Development and Function, Tissue Development	proliferation of non-parenchymal cells	1,24E-02	1
Organ Morphology	quantity of anterior commissure	1,24E-02	1
Nervous System Development and Function, Organ Morphology	quantity of corpus callosum	1,24E-02	1
Cellular Development, Cellular Growth and Proliferation, Embryonic Development, Organismal Development, Tissue Morphology	quantity of embryoid body cells	1,24E-02	1
Organ Morphology, Renal and Urological System Development and Function	quantity of mesangial matrix	1,24E-02	1
Hematological System Development and Function, Tissue Morphology	quantity of nuocytes	1,24E-02	1
Cell Morphology, Nervous System Development and Function, Skeletal and Muscular System Development and Function	re-innervation of skeletal muscle	1,24E-02	1
Carbohydrate Metabolism	recognition of heparan sulfate	1,24E-02	1
Carbohydrate Metabolism	recognition of hyaluronic acid	1,24E-02	1
Lipid Metabolism, Small Molecule Biochemistry	recognition of paclitaxel	1,24E-02	1
Cell-To-Cell Signaling and Interaction, Cell-mediated Immune Response, Cellular Movement, Hematological System Development and Function, Immune Cell Trafficking	recruitment of activated T lymphocyte	1,24E-02	1
Cardiovascular Disease, Developmental Disorder, Gastrointestinal Disease, Hepatic System Disease, Hereditary Disorder, Infectious Diseases, Neurological Disease, Hereditary Disorder, Infectious Diseases, Organismal Injury and Abnormalities	recurrent infections with encephalopathy, hepatic dysfunction, and cardiovascular malformations	1,24E-02	1
Carbohydrate Metabolism, Lipid Metabolism, Molecular Transport, Small Molecule Biochemistry	recurrent isolated invasive pneumococcal disease type 2	1,24E-02	1
Cellular Function and Maintenance	redistribution of phosphatidylinositol-3,4,5-triphosphate	1,24E-02	1
Cellular Assembly and Organization, Cellular Function and Maintenance	regulation of enterocytes	1,24E-02	1
Tissue Morphology	release of microvesicles	1,24E-02	1
Respiratory System Development and Function, Tissue Development	remodeling of left common carotid artery	1,24E-02	1
Cell-To-Cell Signaling and Interaction, Cell-mediated Immune Response, Cellular Function and Maintenance, Cellular Movement, Hematological System Development	response of bronchial tissue	1,24E-02	1
	retention of regulatory T lymphocytes	1,24E-02	1

Connective Tissue Disorders, Developmental Disorder, Hereditary Disorder, Metabolic Disease, Organismal Injury and Abnormalities, Skeletal and Muscular Disorders	rhizomelic chondrodysplasia punctata type 2	1,24E-02	1
Ophthalmic Disease, Organismal Injury and Abnormalities	ring dermoid of cornea	1,24E-02	1
Hematological Disease, Infectious Diseases	severe malaria	1,24E-02	1
Cell Morphology, Cellular Compromise	shrinkage of astrocytes	1,24E-02	1
Nervous System Development and Function, Organ Morphology, Organismal Development	size of optic chiasm	1,24E-02	1
Nervous System Development and Function	specific gravity of brain tissue	1,24E-02	1
Connective Tissue Disorders, Developmental Disorder, Hereditary Disorder, Organismal Injury and Abnormalities, Skeletal and Muscular Disorders	spondyloepimetaphyseal dysplasia with joint laxity type 2	1,24E-02	1
Cell-To-Cell Signaling and Interaction, Cellular Growth and Proliferation, Hematological System Development and Function, Hypersensitivity Response, Inflammatory	stimulation of BMSC cells	1,24E-02	1
Cardiovascular Disease, Cellular Compromise, Organ Morphology, Organismal Injury and Abnormalities	stress response of ventricular septum	1,24E-02	1
Carbohydrate Metabolism, Small Molecule Biochemistry	sulfation of lactose	1,24E-02	1
Cancer, Gastrointestinal Disease, Hereditary Disorder, Organismal Injury and Abnormalities	susceptibility to colorectal cancer type 12	1,24E-02	1
Cancer, Dermatological Diseases and Conditions, Organismal Injury and Abnormalities	susceptibility to cutaneous malignant melanoma type 10	1,24E-02	1
Cardiovascular Disease, Organismal Injury and Abnormalities	tachycardia of atrium	1,24E-02	1
Cell Morphology, Organ Morphology, Organismal Development, Renal and Urological System Development and Function, Tissue Morphology	thickness of glomerular basement membrane	1,24E-02	1
Lipid Metabolism, Molecular Transport, Small Molecule Biochemistry	transport of calcifediol	1,24E-02	1
Lipid Metabolism, Small Molecule Biochemistry	turnover of arachidonic acid	1,24E-02	1
Developmental Disorder	ulnar-mammary syndrome	1,24E-02	1
Auditory Disease, Neurological Disease	unilateral hearing loss	1,24E-02	1
DNA Replication, Recombination, and Repair	unwinding of origin of replication in the short region	1,24E-02	1
Infectious Diseases	uptake of Human adenovirus 35	1,24E-02	1
Lipid Metabolism, Molecular Transport, Small Molecule Biochemistry	uptake of omega-(4-iodophenyl)pentadecanoic acid	1,24E-02	1
Cardiovascular System Development and Function, Organ Morphology, Organismal Development	volume of right ventricle	1,24E-02	1
Dermatological Diseases and Conditions, Developmental Disorder, Hereditary Disorder, Metabolic Disease, Organismal Injury and Abnormalities	wrinkly skin syndrome	1,24E-02	1
Developmental Disorder, Hereditary Disorder, Neurological Disease, Organismal Injury and Abnormalities	x-linked mental retardation type 90	1,24E-02	1
Developmental Disorder, Hereditary Disorder, Neurological Disease, Organismal Injury and Abnormalities	x-linked mental retardation type 96	1,24E-02	1
Cellular Development, Cellular Growth and Proliferation, Embryonic Development, Hematological System Development and Function, Hematopoiesis, Lymphoid Tissue	development of megakaryocytes	1,25E-02	3
Cellular Development, Cellular Growth and Proliferation	cell proliferation of tumor cell lines	1,26E-02	43
Embryonic Development, Ophthalmic Disease, Organ Development, Organ Morphology, Organismal Development, Organismal Injury and Abnormalities, Tissue	abnormal morphology of anterior chamber of eye	1,27E-02	2
Cell Morphology	elongation of tumor cell lines	1,27E-02	2
Cellular Development	epithelial-mesenchymal transition of hepatoma cell lines	1,27E-02	2
Cardiovascular Disease, Hereditary Disorder, Organismal Injury and Abnormalities, Skeletal and Muscular Disorders	familial ventricular fibrillation	1,27E-02	2
Cancer, Organismal Injury and Abnormalities, Reproductive System Disease	tumorigenesis of breast adenocarcinoma	1,27E-02	2
Cancer, Organismal Injury and Abnormalities, Reproductive System Disease	breast adenocarcinoma	1,27E-02	14
Endocrine System Disorders, Organ Morphology, Organismal Injury and Abnormalities, Reproductive System Development and Function, Reproductive System Disease	abnormal morphology of seminiferous tubule	1,27E-02	6

Network analysis	Score	Focus Molecules	ID
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Cell Cycle, Cellular Assembly and Organization, DNA Replication, Recombination, and Repair	47	27	1
Cell Cycle, DNA Replication, Recombination, and Repair, Cancer	31	20	2
Neurological Disease, Carbohydrate Metabolism, Molecular Transport	31	20	3
Cardiovascular Disease, Cell-To-Cell Signaling and Interaction, Cellular Function and Maintenance	29	19	4
Cell Signaling, Molecular Transport, Embryonic Development	29	19	5
Cardiovascular Disease, Connective Tissue Disorders, Developmental Disorder	27	18	6
Amino Acid Metabolism, Post-Translational Modification, Small Molecule Biochemistry	27	18	7
Cell-To-Cell Signaling and Interaction, Cellular Movement, Hematological System Development and Function	25	17	8
Cellular Assembly and Organization, Cell-To-Cell Signaling and Interaction, Inflammatory Response	25	17	9
Cell Death and Survival, Renal Necrosis/Cell Death, Cell Morphology	23	16	10
Carbohydrate Metabolism, Energy Production, Lipid Metabolism	21	15	11
Inflammatory Disease, Inflammatory Response, Organismal Injury and Abnormalities	21	15	12
RNA Post-Transcriptional Modification, Cellular Assembly and Organization, Connective Tissue Development and Function	21	15	13
Connective Tissue Disorders, Developmental Disorder, Gastrointestinal Disease	19	14	14
Carbohydrate Metabolism, Lipid Metabolism, Small Molecule Biochemistry	19	14	15
Cell Morphology, Hematological System Development and Function, Inflammatory Response	19	14	16
Cancer, Neurological Disease, Organismal Injury and Abnormalities	17	13	17
Cellular Function and Maintenance, Cellular Growth and Proliferation, Hematological System Development and Function	15	12	18
Hematological Disease, Hereditary Disorder, Organismal Injury and Abnormalities	14	11	19
Gastrointestinal Disease, Hereditary Disorder, Inflammatory Disease	2	1	20
Respiratory Disease, Nervous System Development and Function, Organ Morphology	2	1	21

Categories (Network 1)	Diseases or Functions Annotation relevant to Top network	p-Value
Cancer, Organismal Injury and Abnormalities, Renal and Urological Disease	tumorigenesis of urinary tract tumor	2,33E-05
Cell Morphology, Cellular Assembly and Organization, DNA Replication, Recombination, and Repair	morphology of mitotic spindle	6,45E-05
Cell Cycle, Cellular Assembly and Organization, DNA Replication, Recombination, and Repair	segregation of chromosomes	9,24E-05
Cell Morphology, Cellular Assembly and Organization	morphology of cytoskeleton	1,87E-04
Cell Death and Survival	necrosis	2,58E-04
Cell Death and Survival	apoptosis of tumor cell lines	3,19E-04
Neurological Disease, Organismal Injury and Abnormalities, Skeletal and Muscular Disorders	autosomal recessive primary microcephaly	3,39E-04
Cell Cycle, Connective Tissue Development and Function	aneuploidy of fibroblasts	5,31E-04
Cellular Function and Maintenance, Molecular Transport, Small Molecule Biochemistry	homeostasis of Zn2+	6,15E-04
Cell Death and Survival	apoptosis of fibroblasts	8,54E-04
Cell Death and Survival	cell death	9,43E-04
Cell Death and Survival	cell death of tumor cell lines	9,84E-04
Cellular Assembly and Organization	binding of chromosomes	1,05E-03

Cell Cycle	arrest in mitosis of cervical cancer cell lines	1,07E-03
Dermatological Diseases and Conditions, Hair and Skin Development and Function, Organ Morphology, Organismal Injury and Abnormalities	abnormal morphology of sparse hair	1,22E-03
Cellular Assembly and Organization, DNA Replication, Recombination, and Repair	quantity of mitotic spindle	1,40E-03
Protein Synthesis	quantity of GPT in blood	1,55E-03
Neurological Disease, Organismal Injury and Abnormalities, Skeletal and Muscular Disorders	autosomal recessive primary microcephaly type 13	1,56E-03
Cell Death and Survival	apoptosis	1,84E-03
Dermatological Diseases and Conditions, Hair and Skin Development and Function, Organ Morphology, Organismal Injury and Abnormalities	abnormal morphology of hair	1,96E-03
Cell Cycle	cell cycle progression	1,97E-03
Neurological Disease, Organismal Injury and Abnormalities	seizures	2,50E-03
Cell Cycle	mitosis	2,86E-03
Cell Cycle	formation of mitotic spindle	3,15E-03
Cellular Development, Skeletal and Muscular System Development and Function, Tissue Development	differentiation of skeletal muscle satellite cells	3,59E-03
Cell Cycle, Cell Morphology, Cellular Assembly and Organization, DNA Replication, Recombination, and Repair	length of mitotic spindle	3,59E-03
Lipid Metabolism, Small Molecule Biochemistry	binding of tricaprilin	3,75E-03
Cellular Assembly and Organization, Cellular Function and Maintenance	formation of midbody	3,75E-03
Cell Cycle, DNA Replication, Recombination, and Repair	DNA replication checkpoint of cells	4,06E-03
Skeletal and Muscular System Development and Function	isometric tetanic force of skeletal muscle	4,06E-03
Connective Tissue Disorders, Organismal Injury and Abnormalities, Tissue Morphology	abnormal morphology of mesenteric fat pad	4,37E-03
Tissue Development	delay in regeneration of muscle	4,37E-03
Organ Development, Skeletal and Muscular System Development and Function	isometric twitch force of skeletal muscle	4,37E-03
Embryonic Development, Organ Development, Organismal Development, Reproductive System Development and Function, Tissue Development	development of female genital organ	4,69E-03
Cellular Development, Tissue Development	fate determination of myoblasts	4,69E-03
Cellular Assembly and Organization	formation of midzone	4,69E-03
Cell Death and Survival	apoptosis of pancreatic cancer cell lines	4,73E-03
Developmental Disorder, Embryonic Development, Organismal Development, Tissue Morphology	abnormal morphology of atrioventricular canal	4,74E-03
Cell Death and Survival, Organismal Injury and Abnormalities	apoptosis of colonocytes	4,74E-03
Neurological Disease, Organismal Injury and Abnormalities	epileptic seizure	4,94E-03
Developmental Disorder, Embryonic Development, Organismal Development, Tissue Morphology	abnormal morphology of thin apical ectodermal ridge	5,00E-03
Hair and Skin Development and Function, Organ Development	pigmentation of epidermis	5,00E-03
Digestive System Development and Function, Hepatic System Development and Function, Liver Regeneration, Organ Morphology	regeneration of liver	5,15E-03
Cancer, Organismal Injury and Abnormalities, Reproductive System Disease	formation of uterine carcinoma	5,31E-03
Cardiovascular System Development and Function	hypoperfusion of brain	5,31E-03
Cardiovascular System Development and Function, Organismal Development	vascularization of aorta	5,31E-03
Cardiovascular System Development and Function, Embryonic Development, Organismal Development, Tissue Development	vascularization of somites	5,31E-03
Cellular Assembly and Organization, DNA Replication, Recombination, and Repair	alignment of chromosomes	5,47E-03
Cell Death and Survival, Cellular Compromise, Nervous System Development and Function	cytotoxicity of medium spiny neurons	5,62E-03

Cell Cycle, Embryonic Development	polyploidization of embryonic cell lines	5,62E-03
Cellular Compromise	damage of endothelial cell lines	5,93E-03
Digestive System Development and Function, Organ Morphology, Organismal Development	mass of small intestine	5,93E-03
Digestive System Development and Function, Endocrine System Development and Function, Organ Morphology, Tissue Morphology	quantity of enteroendocrine L cells	5,93E-03
Cell Death and Survival	necroptosis of fibroblasts	6,04E-03
Organ Morphology, Skeletal and Muscular System Development and Function	isometric tension of skeletal muscle	6,24E-03
Cell Morphology, Cellular Assembly and Organization, DNA Replication, Recombination, and Repair	abnormal morphology of meiotic spindles	6,56E-03
Developmental Disorder	developmental delay of cardiac loop	6,56E-03
Cell Morphology, Cellular Assembly and Organization, Tissue Development	tubulation of mitochondria	6,56E-03
Cell Death and Survival	cell death of pancreatic cancer cell lines	6,72E-03
Neurological Disease, Organismal Injury and Abnormalities	limbic seizure	6,87E-03
Nervous System Development and Function, Neurological Disease, Organ Morphology, Organismal Development, Organismal Injury and Abnormalities	abnormal morphology of Ammon's horn	7,18E-03
Cellular Function and Maintenance	endocytosis by dendritic cells	7,49E-03
Neurological Disease, Psychological Disorders	sporadic schizophrenia	7,49E-03
Gene Expression	expression of RNA	7,63E-03
Organ Morphology, Organismal Injury and Abnormalities, Reproductive System Development and Function, Reproductive System Disease	abnormal morphology of clitoris	7,80E-03
Developmental Disorder, Embryonic Development, Organismal Development, Tissue Morphology	abnormal morphology of foot plate	7,80E-03
Cell Cycle, Reproductive System Development and Function	meiosis of male germ cells	7,80E-03
Gastrointestinal Disease, Hepatic System Disease, Liver Hemorrhaging, Organismal Injury and Abnormalities	bleeding of liver	8,09E-03
Function, Hematopoiesis, Lymphoid Tissue Structure and Development, Organismal Injury and Abnormalities, Tissue Morphology	lack of megakaryocytes	8,11E-03
Embryonic Development, Organismal Development, Tissue Development	development of neuroectoderm	8,42E-03
Embryonic Development, Tissue Development	accumulation of embryonic cell lines	9,04E-03
Tissue Development	accumulation of kidney cell lines	9,04E-03
Cellular Compromise	fragmentation of spindle pole	9,04E-03
Cellular Assembly and Organization, Cellular Function and Maintenance, Tissue Development	formation of filament barbed ends	9,35E-03
Cancer, Organismal Injury and Abnormalities, Renal and Urological Disease	urothelial cancer	9,38E-03
Cellular Development, Skeletal and Muscular System Development and Function, Tissue Development	differentiation of muscle	9,38E-03
Cell Cycle	ploidy	9,52E-03
Embryonic Development, Organ Development, Organ Morphology, Organismal Development, Reproductive System Development and Function, Tissue Development	morphology of mammary gland	9,58E-03
Cell Cycle	mitotic index of tumor cell lines	9,66E-03
Gastrointestinal Disease, Hepatic System Disease, Organismal Injury and Abnormalities	severe jaundice	9,66E-03
Lipid Metabolism, Small Molecule Biochemistry, Vitamin and Mineral Metabolism	hydrolysis of retinyl ester	9,97E-03
Cell-To-Cell Signaling and Interaction, Skeletal and Muscular System Development and Function	fusion of skeletal muscle satellite cells	1,03E-02
Morphology, Organismal Development, Organismal Injury and Abnormalities, Skeletal and Muscular Disorders, Skeletal and Muscular System Development and Function, Development, Organismal Injury and Abnormalities, Reproductive System Development and Function, Reproductive System Disease, Tissue Development	lack of carpal bone	1,03E-02
	lack of mammary gland	1,03E-02
Vitamin and Mineral Metabolism	abnormal quantity of mineral	1,06E-02

Cellular Assembly and Organization, DNA Replication, Recombination, and Repair	chromosomal congression of chromosomes	1,08E-02
Cardiovascular System Development and Function, Embryonic Development, Organismal Development, Tissue Development	vascularization of yolk sac	1,08E-02
Cellular Assembly and Organization	movement of chromosomes	1,09E-02
Hair and Skin Development and Function, Tissue Development	accumulation of epithelial cell lines	1,12E-02
Energy Production	consumption of oxygen	1,15E-02
Cell Death and Survival	cell death of retinoblastoma cell lines	1,15E-02
Cell Morphology, Hematological System Development and Function	polarization of B-lymphocyte derived cell lines	1,15E-02
Digestive System Development and Function, Organ Development	function of salivary gland	1,18E-02
Cancer, Gastrointestinal Disease, Organismal Injury and Abnormalities	tumorigenesis of intestinal adenoma	1,21E-02
Protein Synthesis	quantity of aspartate transaminase in blood	1,22E-02
Neurological Disease	demyelination of white matter	1,25E-02
Cell Morphology, Cellular Assembly and Organization, Cellular Function and Maintenance	length of microtubules	1,25E-02
Disorder, Hereditary Disorder, Immunological Disease, Organismal Injury and Abnormalities, Skeletal and Muscular Disorders	OL-EDA-ID syndrome	1,34E-02
Hematological Disease, Hereditary Disorder, Immunological Disease, Organismal Injury and Abnormalities	T-cell immunodeficiency, recurrent infections, autoimmunity, and cardiac malformations	1,34E-02
Developmental Disorder, Hereditary Disorder, Neurological Disease, Organismal Injury and Abnormalities	X linked mental retardation syndromic jarid1c-related	1,34E-02
Hereditary Disorder, Immunological Disease, Infectious Diseases, Organismal Injury and Abnormalities	X-linked familial atypical mycobacteriosis 1	1,34E-02
Disease, Hereditary Disorder, Immunological Disease, Organismal Injury and Abnormalities	X-linked hyper-IgM syndrome with etodermal dysplasia	1,34E-02
Developmental Disorder, Hereditary Disorder, Neurological Disease, Organismal Injury and Abnormalities	X-linked mental retardation type 100	1,34E-02
Cell Cycle, Hepatic System Development and Function	aneuploidy of hepatocytes	1,34E-02
Cell Death and Survival, Skeletal and Muscular Disorders	apoptosis of neointimal cells	1,34E-02
Hematological System Development and Function, Hematopoiesis, Humoral Immune Response, Lymphoid Tissue Structure and Development, Organ Development,	arrest in development of B-1 lymphocytes	1,34E-02
Hematological System Development and Function, Hematopoiesis, Humoral Immune Response, Lymphoid Tissue Structure and Development, Organ Development,	arrest in development of marginal-zone B lymphocytes	1,34E-02
Hematological System Development and Function, Hematopoiesis, Humoral Immune Response, Lymphoid Tissue Structure and Development, Organ Development,	arrest in development of transitional B lymphocytes	1,34E-02
Hematological System Development and Function, Hematopoiesis, Humoral Immune Response, Lymphoid Tissue Structure and Development, Organ Development,	arrest in development of transitional type 1 B lymphocytes	1,34E-02
Dermatological Diseases and Conditions, Developmental Disorder, Hereditary Disorder, Organismal Injury and Abnormalities	atypical incontinentia pigmenti	1,34E-02
Gene Expression	binding of origin of replication in the short region	1,34E-02
Small Molecule Biochemistry	catabolism of spermidine	1,34E-02
Amino Acid Metabolism, Post-Translational Modification, Small Molecule Biochemistry	conversion of L-lysine	1,34E-02
Cellular Compromise, Neurological Disease, Organismal Injury and Abnormalities	damage of CA3 neurons	1,34E-02
Cellular Compromise	deformation of spindle pole	1,34E-02
Developmental Disorder, Embryonic Development, Tissue Morphology	degeneration of yolk sac	1,34E-02
Cellular Assembly and Organization, DNA Replication, Recombination, and Repair	delay in initiation of chromosomal congression of chromosomes	1,34E-02
Cellular Compromise	depletion of hippocampal neurons	1,34E-02
Nervous System Development and Function	development of limbic system	1,34E-02
Growth and Proliferation, Embryonic Development, Organ Development, Organismal Development, Tissue Development	development of pacemaker cells	1,34E-02
Cellular Development, Endocrine System Development and Function	differentiation of enteroendocrine cells	1,34E-02

Cancer, Endocrine System Disorders, Organismal Injury and Abnormalities, Reproductive System Disease	formation of ovarian adenocarcinoma	1,34E-02
DNA Replication, Recombination, and Repair	hypercondensation of chromosomes	1,34E-02
Organ Development, Organ Morphology, Reproductive System Development and Function	induction of mammary gland	1,34E-02
Hereditary Disorder, Immunological Disease, Organismal Injury and Abnormalities	isolated immunodeficiency	1,34E-02
Endocrine System Disorders, Gastrointestinal Disease, Immunological Disease, Metabolic Disease, Organismal Injury and Abnormalities	ketosis-prone diabetes mellitus	1,34E-02
Morphology, Organismal Development, Organismal Injury and Abnormalities, Skeletal and Muscular Disorders, Skeletal and Muscular System Development and Function, Endocrine System Disorders, Gastrointestinal Disease, Hereditary Disorder, Metabolic Disease, Organismal Injury and Abnormalities	lack of metacarpal bone	1,34E-02
Cell Cycle	maturity-onset diabetes of the young type 9	1,34E-02
Cell Cycle	polyploidization of epithelial cell lines	1,34E-02
Cell Cycle	polyploidization of kidney cell lines	1,34E-02
Cell Morphology, Nervous System Development and Function, Skeletal and Muscular System Development and Function	re-innervation of skeletal muscle	1,34E-02
Hereditary Disorder, Infectious Diseases, Organismal Injury and Abnormalities	recurrent isolated invasive pneumococcal disease type 2	1,34E-02
Connective Tissue Disorders, Developmental Disorder, Hereditary Disorder, Organismal Injury and Abnormalities, Skeletal and Muscular Disorders	spondyloepimetaphyseal dysplasia with joint laxity type 2	1,34E-02
Cardiac Stress Response, Cardiovascular Disease, Cellular Compromise, Organ Morphology, Organismal Injury and Abnormalities	stress response of ventricular septum	1,34E-02
Cancer, Endocrine System Disorders, Organismal Injury and Abnormalities	thyroid gland fetal adenoma	1,34E-02
Developmental Disorder	ulnar-mammary syndrome	1,34E-02
DNA Replication, Recombination, and Repair	unwinding of origin of replication in the short region	1,34E-02
Developmental Disorder, Hereditary Disorder, Neurological Disease, Organismal Injury and Abnormalities	X-linked mental retardation	1,34E-02
Cancer, Endocrine System Disorders, Organismal Injury and Abnormalities	Hurthle cell adenoma	1,37E-02
Cell Morphology, Humoral Immune Response, Immunological Disease, Lymphoid Tissue Structure and Development, Tissue Morphology	abnormal morphology of marginal-zone B lymphocytes	1,37E-02
Organismal Development, Skeletal and Muscular System Development and Function	morphology of hindlimb	1,40E-02
Infectious Diseases, Inflammatory Response, Organismal Injury and Abnormalities, Respiratory Disease	Pneumocystosis jiroveci pneumonia	1,40E-02
Endocrine System Development and Function, Organ Development	proliferation of islets of Langerhans	1,43E-02
Cell Death and Survival, Gastrointestinal Disease, Hepatic System Disease, Liver Necrosis/Cell Death, Organismal Injury and Abnormalities	apoptosis of hepatocytes	1,44E-02
Organ Morphology, Organismal Injury and Abnormalities, Reproductive System Development and Function, Reproductive System Disease	abnormal morphology of vaginal opening	1,46E-02
Cell Cycle	metaphase/anaphase transition	1,46E-02
Cellular Assembly and Organization	chromosomal congression of metaphase plate	1,49E-02
Dermatological Diseases and Conditions, Organismal Injury and Abnormalities	disorder of hair	1,54E-02
Embryonic Development, Organismal Development, Tissue Development	morphogenesis of mesoderm	1,55E-02
Gastrointestinal Disease, Inflammatory Disease	severe inflammatory bowel disease	1,55E-02
Cell Cycle	interaction of DNA	1,58E-02
Cancer, Organismal Injury and Abnormalities	adenoma	1,59E-02
Cancer, Organismal Injury and Abnormalities, Reproductive System Disease	female genital tract serous carcinoma	1,64E-02
Cell Morphology, Cellular Assembly and Organization, DNA Replication, Recombination, and Repair	abnormal morphology of mitotic spindle	1,67E-02
Cancer, Organismal Injury and Abnormalities, Respiratory Disease	development of lung tumor	1,67E-02
Cell Death and Survival	apoptosis of placenta	1,68E-02
Dermatological Diseases and Conditions, Inflammatory Disease, Inflammatory Response, Organismal Injury and Abnormalities	erythroderma	1,71E-02

Organ Morphology, Respiratory System Development and Function, Tissue Morphology	quantity of alveolar type I cells	1,71E-02
Gastrointestinal Disease, Organismal Injury and Abnormalities	steatorrhea	1,71E-02
Cell Morphology, Skeletal and Muscular System Development and Function	elongation of muscle cells	1,80E-02
Cellular Assembly and Organization	formation of mitochondrial cristae	1,83E-02
Dermatological Diseases and Conditions, Organ Morphology, Organismal Injury and Abnormalities	abnormal morphology of suprabasal layer of epidermis	1,86E-02
Gene Expression	binding of androgen-responsive element	1,86E-02
Cell-To-Cell Signaling and Interaction, Cell-mediated Immune Response, Hematological System Development and Function, Inflammatory Response	cytotoxic reaction of natural killer cells	1,92E-02
Immunological Disease, Lymphoid Tissue Structure and Development, Organ Morphology, Organismal Injury and Abnormalities, Tissue Morphology	abnormal morphology of T-cell zone	1,95E-02
Cancer, Dermatological Diseases and Conditions, Organismal Injury and Abnormalities Development and Function, Hepatic System Disease, Inflammatory Disease, Inflammatory Response, Liver Inflammation/Hepatitis, Liver Steatosis, Metabolic	hyperplasia of keratinocytes	1,95E-02
	steatohepatitis	1,98E-02
Cell Cycle	M phase	2,09E-02
Gene Expression	transcription of RNA	2,09E-02
Drug Metabolism, Endocrine System Development and Function, Lipid Metabolism, Small Molecule Biochemistry	binding of progesterone	2,14E-02
Cardiovascular System Development and Function, Organismal Development	vascularization of blood vessel	2,14E-02
Dermatological Diseases and Conditions, Hair and Skin Development and Function, Organ Morphology, Organismal Injury and Abnormalities	abnormal morphology of fur	2,17E-02
Organ Development, Organ Morphology, Organismal Development, Skeletal and Muscular System Development and Function	mass of soleus muscle	2,23E-02
Cellular Assembly and Organization	attachment of spindle fibers	2,38E-02
Cardiovascular Disease, Neurological Disease, Organismal Injury and Abnormalities	damage of blood-brain barrier	2,38E-02
Cell Cycle, Reproductive System Development and Function	meiosis of spermatocytes	2,38E-02
Molecular Transport	transport of Zn ²⁺	2,38E-02
Digestive System Development and Function, Hepatic System Development and Function, Organ Development	function of liver	2,42E-02
Post-Translational Modification, Protein Synthesis	tetramerization of protein	2,43E-02
Lipid Metabolism, Small Molecule Biochemistry, Vitamin and Mineral Metabolism	catabolism of cholesterol	2,44E-02
Cell Death and Survival	loss of exocrine cells	2,44E-02
Lipid Metabolism, Small Molecule Biochemistry	binding of lipid	2,46E-02
Connective Tissue Disorders, Organismal Injury and Abnormalities, Tissue Morphology	lack of subcutaneous fat	2,48E-02
Developmental Disorder, Organismal Injury and Abnormalities, Reproductive System Disease	hypoplasia of mammary gland	2,54E-02
Embryonic Development, Organ Development, Organismal Development, Respiratory System Development and Function, Tissue Development	maturation of lung	0,03
Cellular Movement	translocation of bacteria	2,72E-02
Cancer	sphere formation of breast cancer cell lines	2,84E-02
Cardiovascular System Development and Function, Embryonic Development, Organ Development, Organismal Development, Tissue Development	formation of endocardium	2,87E-02
Reproductive System Development and Function	morphology of reproductive system	3,02E-02
Cell Cycle, Connective Tissue Development and Function	ploidy of fibroblast cell lines	3,02E-02
Cell Morphology, Nervous System Development and Function, Neurological Disease, Tissue Morphology	abnormal morphology of mossy fibers	3,05E-02
Cell-To-Cell Signaling and Interaction, Hematological System Development and Function	binding of B-lymphocyte derived cell lines	3,08E-02
Cell Morphology, Lymphoid Tissue Structure and Development	morphology of lymphatic system cells	3,12E-02

Cancer, Gastrointestinal Disease, Hepatic System Disease, Hepatocellular Carcinoma, Liver Hyperplasia/Hyperproliferation, Organismal Injury and Abnormalities	growth of hepatocellular carcinoma	3,17E-02
Cell Cycle, Cellular Assembly and Organization, DNA Replication, Recombination, and Repair	segregation of mitotic sister chromatids	3,18E-02
Developmental Disorder, Embryonic Development, Organismal Development, Tissue Morphology	abnormal morphology of vitelline vessel	3,22E-02
Cellular Assembly and Organization	attachment of kinetochores	3,33E-02
Cell Cycle, DNA Replication, Recombination, and Repair	spindle checkpoint of mitotic cells	3,39E-02
Developmental Disorder, Embryonic Development, Organismal Development, Tissue Morphology	abnormal morphology of neural plate	3,48E-02
Cardiovascular System Development and Function, Cell Morphology, Embryonic Development	branching morphogenesis of vasculature	3,54E-02
Embryonic Development, Tissue Development	proliferation of embryoblast	3,54E-02
Cancer, Organismal Functions, Organismal Injury and Abnormalities, Tumor Morphology	suppression of malignant tumor	3,54E-02
Connective Tissue Disorders, Organismal Injury and Abnormalities, Tissue Morphology	abnormal morphology of adipose tissue	3,57E-02
Embryonic Development, Organ Development, Organ Morphology, Organismal Development, Reproductive System Development and Function, Tissue Development	morphogenesis of male genital organ	3,57E-02
Development and Function, Skeletal and Muscular System Development and Function, Tissue Development	osteoclastogenesis of osteoclast precursor cells	3,60E-02
Hereditary Disorder, Organismal Injury and Abnormalities	X-linked hereditary disease	3,62E-02
Organ Morphology, Respiratory System Development and Function, Tissue Morphology	quantity of type II pneumocytes	3,63E-02
Energy Production, Nucleic Acid Metabolism, Small Molecule Biochemistry	binding of ATP	3,66E-02
Cardiovascular System Development and Function	ejection fraction of left ventricle	3,81E-02
Cancer, Gastrointestinal Disease, Hepatic System Disease, Liver Hyperplasia/Hyperproliferation, Organismal Injury and Abnormalities	liver cancer	3,92E-02
Cardiac Enlargement, Cardiovascular System Development and Function, Organ Morphology, Organismal Development	enlargement of left ventricle	3,96E-02
Gene Expression	transcription of DNA	4,00E-02
Cellular Development, Skeletal and Muscular System Development and Function, Tissue Development	differentiation of myoblasts	4,01E-02
Cancer, Organismal Injury and Abnormalities, Renal and Urological Disease	transitional cell bladder cancer	4,04E-02
Cellular Assembly and Organization, Cellular Compromise, DNA Replication, Recombination, and Repair	formation of nuclear inclusions	4,05E-02
Cell Cycle, Respiratory System Development and Function	arrest in cell cycle progression of lung cell lines	4,08E-02
Cancer, Organismal Injury and Abnormalities, Reproductive System Disease	tumorigenesis of breast adenocarcinoma	4,08E-02
Cardiovascular System Development and Function, Hematological System Development and Function	end diastolic pressure of left ventricle	4,17E-02
Cellular Development, Skeletal and Muscular System Development and Function, Tissue Development	differentiation of muscle cells	4,20E-02
Embryonic Development, Organ Development, Organ Morphology, Organismal Development, Reproductive System Development and Function, Tissue Development	morphology of mammary alveolus	4,20E-02
Dermatological Diseases and Conditions, Organismal Injury and Abnormalities	parakeratosis	4,20E-02
Dermatological Diseases and Conditions, Hair and Skin Development and Function, Organ Morphology, Organismal Injury and Abnormalities	abnormal appearance of fur	4,32E-02
Post-Translational Modification	ubiquitination of protein	4,33E-02
Organismal Development, Reproductive System Development and Function	development of reproductive system	4,34E-02
Gastrointestinal Disease, Hepatic System Disease, Organismal Injury and Abnormalities	jaundice	4,38E-02
Lipid Metabolism, Molecular Transport, Small Molecule Biochemistry	accumulation of fat	4,44E-02
Cardiovascular Disease, Organismal Injury and Abnormalities	atrial ventricular block	4,44E-02
Organismal Development	development of genitourinary system	4,50E-02
Cell Morphology, Cellular Function and Maintenance	autophagy of fibroblasts	4,62E-02

DNA Replication, Recombination, and Repair	condensation of chromosomes	4,68E-02
Developmental Disorder, Embryonic Development, Organismal Survival	death of embryo	4,82E-02
Embryonic Development, Organismal Development, Tissue Development	development of heart tube	4,83E-02
Endocrine System Disorders, Gastrointestinal Disease, Hereditary Disorder, Metabolic Disease, Organismal Injury and Abnormalities	familial non-insulin-dependent diabetes mellitus	4,83E-02
Embryonic Development, Organismal Development	specification of rostrocaudal axis	4,86E-02
Cellular Development	immortalization of fibroblast cell lines	4,95E-02
Cell Cycle	delay in mitosis of cervical cancer cell lines	4,98E-02
Cell Death and Survival, Cellular Development, Cellular Function and Maintenance, Cellular Growth and Proliferation, Embryonic Development, Organismal Development	self-renewal of embryonic stem cells	4,98E-02
Cell Death and Survival, Organismal Injury and Abnormalities, Renal Necrosis/Cell Death, Renal and Urological Disease	cell death of kidney cell lines	6,29E-02
Cardiac Dysfunction, Cardiac Fibrosis, Cardiovascular Disease, Organismal Injury and Abnormalities	interstitial fibrosis of left ventricle	9,00E-02
Liver Hyperplasia/Hyperproliferation, Organismal Injury and Abnormalities, Tissue Morphology	quantity of hepatocellular carcinoma	9,00E-02
Cancer, Gastrointestinal Disease, Hepatic System Disease, Hepatocellular Carcinoma, Liver Hyperplasia/Hyperproliferation, Organismal Injury and Abnormalities	hepatocellular carcinoma	9,73E-02
Cardiovascular Disease, Heart Failure, Organismal Injury and Abnormalities	failure of heart	1,12E-01
Gastrointestinal Disease, Hepatic System Disease, Liver Fibrosis, Organismal Injury and Abnormalities	fibrosis of liver	1,12E-01
Cardiac Necrosis/Cell Death, Cardiovascular Disease, Cell Death and Survival, Organismal Injury and Abnormalities, Skeletal and Muscular Disorders	apoptosis of cardiomyocytes	1,50E-01
Cancer, Gastrointestinal Disease, Hepatic System Disease, Liver Hyperplasia/Hyperproliferation, Organismal Injury and Abnormalities	liver carcinoma	1,86E-01
Hepatic System Development and Function, Liver Proliferation, Organ Morphology, Tissue Morphology	quantity of hepatocytes	2,15E-01
Cardiac Arrhythmia, Cardiovascular Disease, Organismal Injury and Abnormalities	arrhythmia	2,35E-01
Cardiovascular Disease, Congenital Heart Anomaly, Developmental Disorder, Organismal Injury and Abnormalities	congenital heart disease	2,42E-01
Gastrointestinal Disease, Hepatic System Disease, Liver Steatosis, Metabolic Disease, Organismal Injury and Abnormalities	hepatic steatosis	2,89E-01
Cell Death and Survival, Organismal Injury and Abnormalities, Renal Necrosis/Cell Death, Renal and Urological Disease	apoptosis of kidney cell lines	3,29E-01
Cardiac Necrosis/Cell Death, Cardiovascular Disease, Cell Death and Survival, Organismal Injury and Abnormalities, Skeletal and Muscular Disorders	apoptosis of ventricular myocytes	3,42E-01
Cardiovascular Disease, Congenital Heart Anomaly, Developmental Disorder, Organismal Injury and Abnormalities	failure of heart looping	3,42E-01
Cardiac Arrhythmia, Cardiovascular Disease, Organismal Injury and Abnormalities	long-QT syndrome	3,59E-01
Gastrointestinal Disease, Hepatic System Disease, Liver Cholestasis	cholestasis	3,93E-01
Cancer, Gastrointestinal Disease, Hepatic System Disease, Liver Hyperplasia/Hyperproliferation, Organismal Injury and Abnormalities	tumorigenesis of liver tumor	4,25E-01
Cancer, Gastrointestinal Disease, Hepatic System Disease, Hepatocellular Carcinoma, Liver Hyperplasia/Hyperproliferation, Organismal Injury and Abnormalities	incidence of hepatocellular carcinoma	5,17E-01