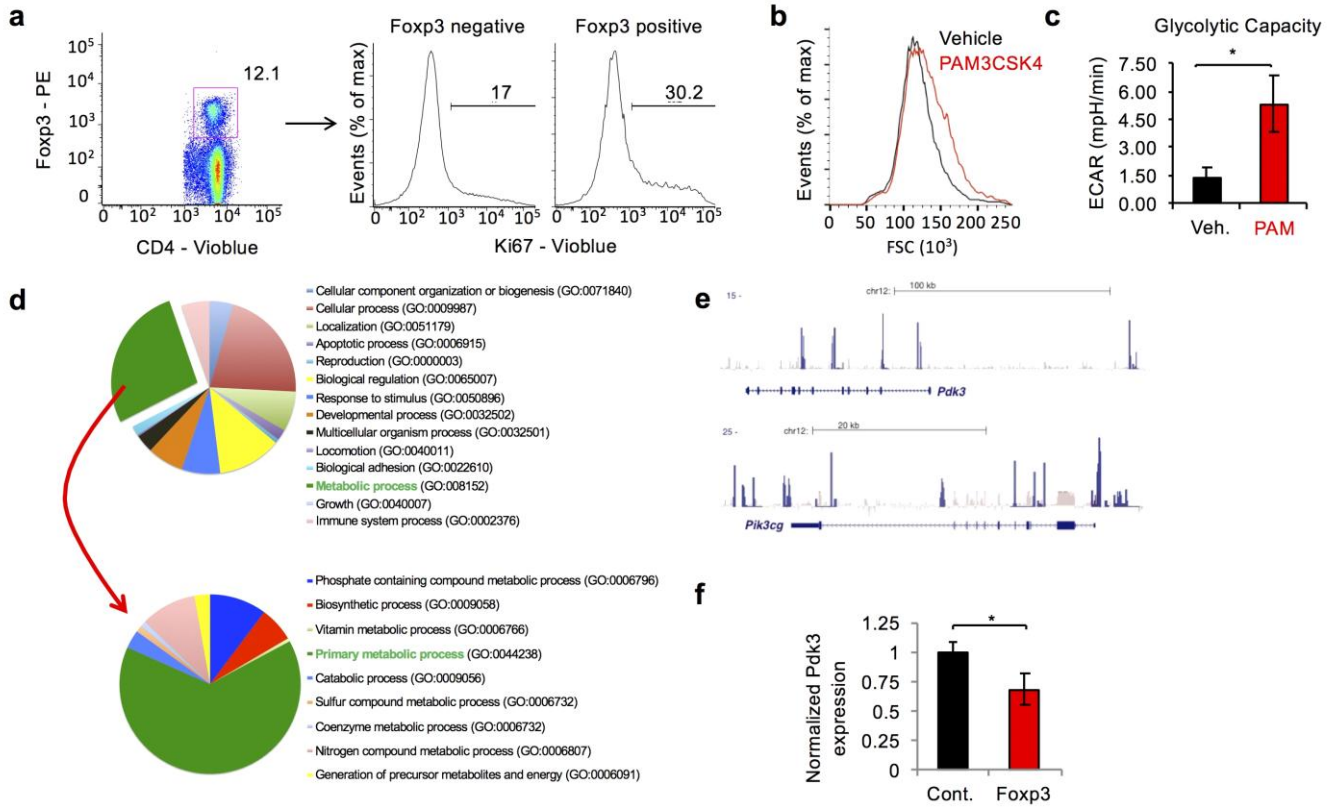
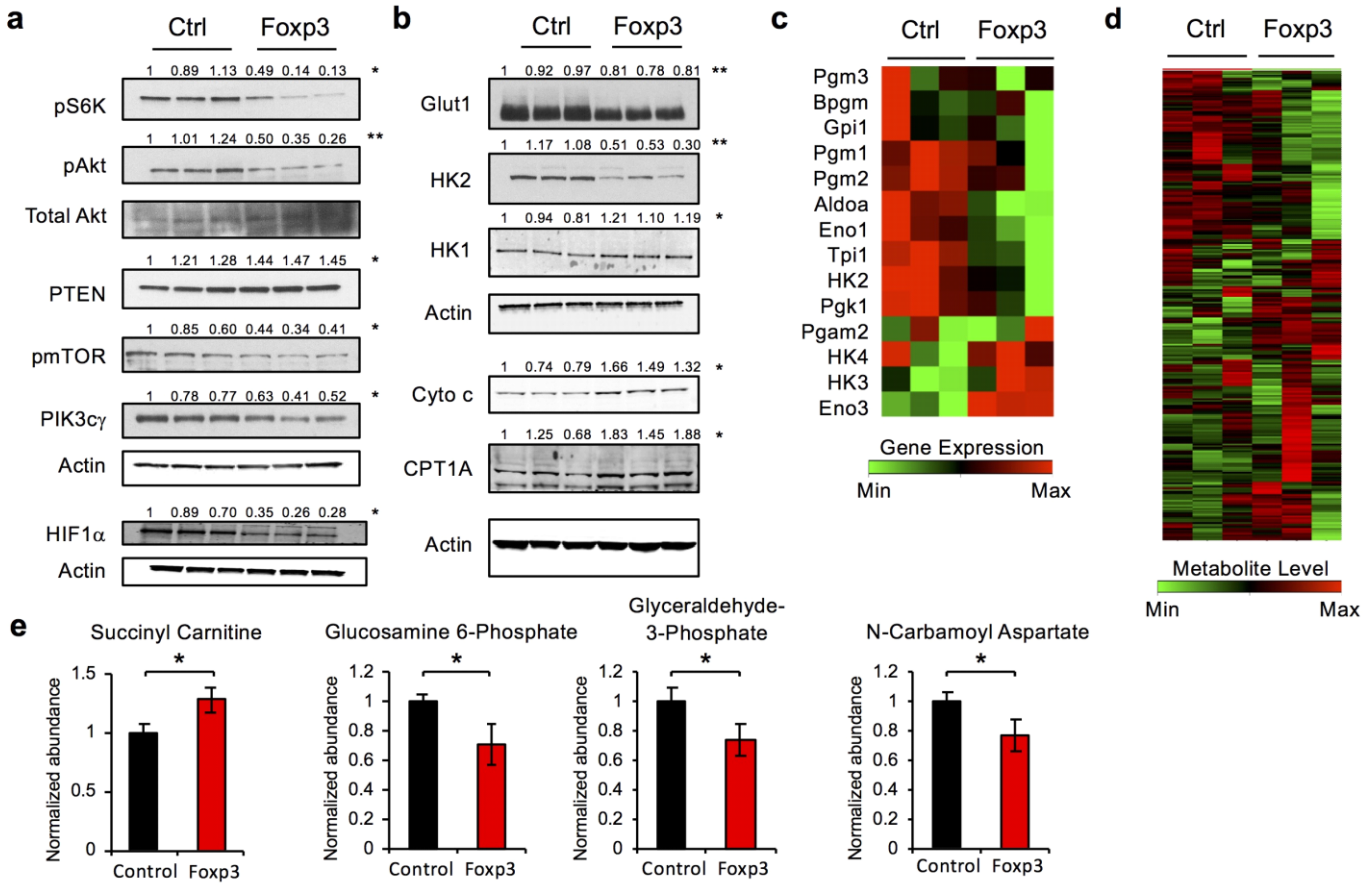


Supplementary Figure 1

T_{reg} cell metabolism is regulated by Foxp3 and inflammatory signals.

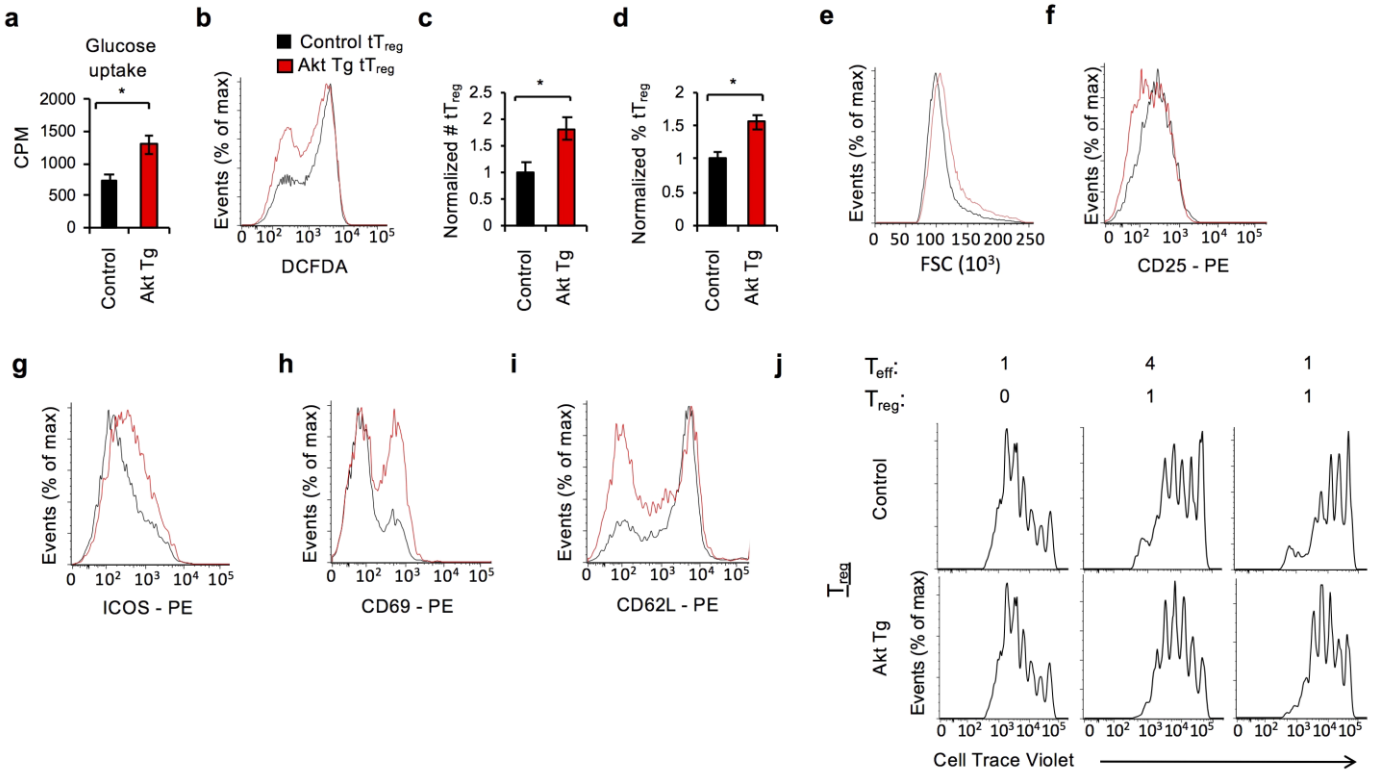
(a) $CD4^+Foxp3^+$ T cells and $CD4^+Foxp3^-$ T cells were analyzed by flow cytometry for Ki67 expression levels. **(b-c)** $CD4^+CD25^-$ T cells were isolated from the spleens of WT mice, polarized under T_{reg} skewing conditions for 5 days and treated with vehicle (H_2O) or 5 µg/mL Pam3CSK4 for the final 24 hrs. Cells were re-isolated by magnetic separation and analyzed for **(b)** forward scatter (FSC) and **(c)** glycolytic capacity using the Seahorse Extracellular Flux Analyzer. **(d)** Gene ontology analysis using PANTHER of pathways altered by Foxp3 deletion using gene expression data published by Williams and Rudensky (*Nat. Immunol* 8:277). **(e-f)** Primary murine $CD4^+CD25^-$ T cells were activated and transduced with control or Foxp3 expressing retrovirus and **(e)** analyzed by chromatin immunoprecipitation-sequencing showing Foxp3 associated sites in the *pyruvate dehydrogenase kinase 3* (*PDK3*) and *PIK3cg* loci or **(f)** analyzed by QPCR for expression of *PDK3* mRNA. Data are representative of biological triplicate experiments **(a-b, e-f)**, two independent experiments **(c)**, or an analysis of previously published datasets with biological duplicates **(d).** Means and standard deviations are shown, * $p<0.05$.



Supplementary Figure 2

Foxp3 expression in non–T cell lineage inhibits anabolic growth signaling and gene expression.

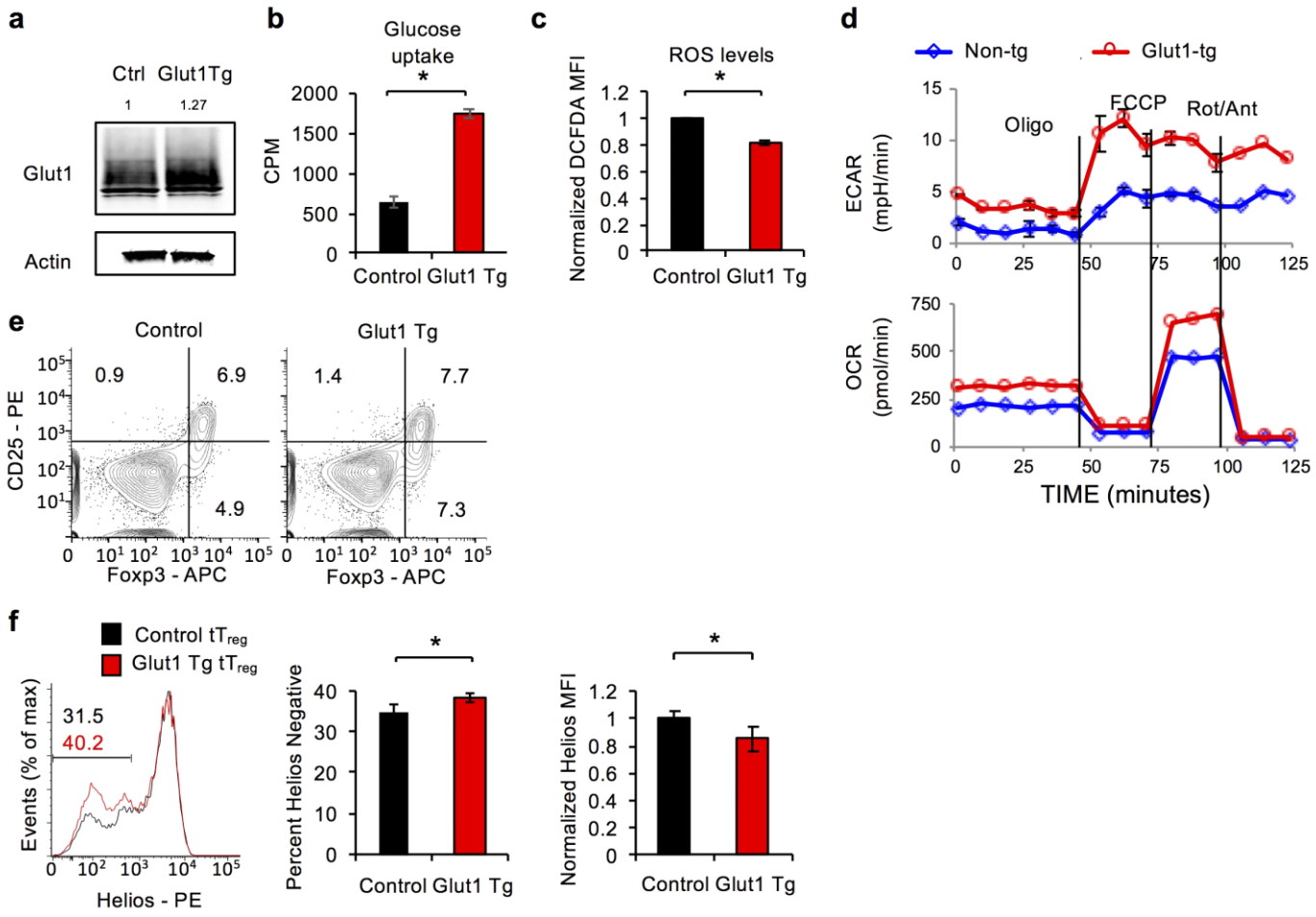
a-e. Three individual clones of control and Foxp3-ER expressing FL5.12 cells were treated with 4OHT to activate Foxp3 and examined for **(a-b)** the expression of metabolic and related proteins, **(c)** select glycolytic gene expression by QPCR or **(d-e)** were extracted and analyzed using high-resolution LC-QE-MS. **(d)** A heat map with relative levels of metabolites using unsupervised hierarchical clustering or **(e)** select metabolite levels are shown. Data are representative of three independent experiments **(a-b)** or an analysis of three independent clones **(c-e)**. **(a-b)** Gel bands are quantified, * p<0.05, **p<0.005.



Supplementary Figure 3

Constitutive Akt expression increases the number and frequency of T_{reg} cells but diminishes suppressive function.

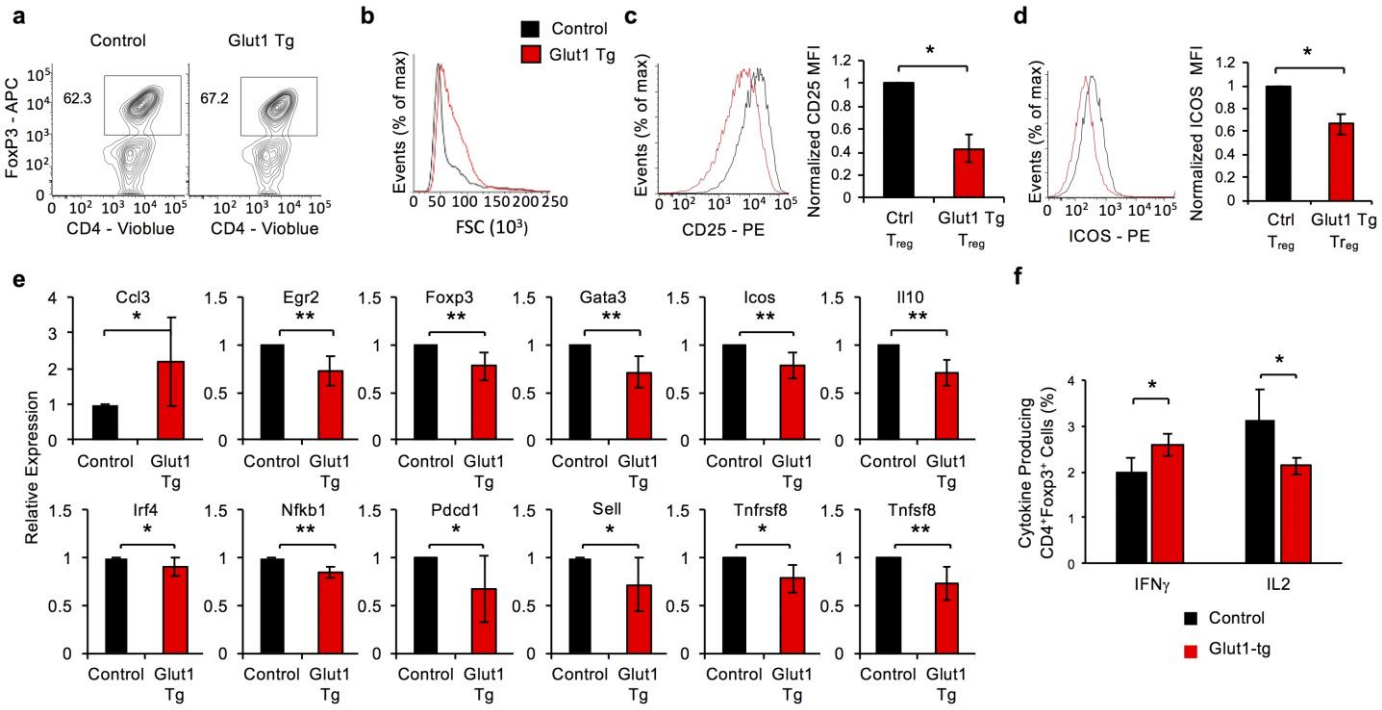
a-**b**. $CD4^+CD25^-$ T cells were isolated from the spleens of control and mAkt-Tg mice and polarized under T_{reg} skewing conditions. Cells were examined for **(a)** glucose uptake and **(b)** ROS levels as measured by DCFDA. **c-i.** $Foxp3^+$ tTreg from the spleen of control and mAkt-Tg mice were examined for **(c)** tTreg number, **(d)** percentage and **(e)** cell size determined by forward scatter and were measured by flow cytometry. **(f)** CD25, **(g)** ICOS, **(h)** CD69 and **(i)** CD62L protein expression in $CD4^+Foxp3^+$ control and mAkt-Tg cells were measured by flow cytometry. **(j)** $CD4^+CD25^-$ T cells were isolated from the spleens of control and mAkt-Tg mice and were polarized under T_{reg} skewing conditions to measure inhibition of effector T cell (T_{eff}) proliferation in an *in vitro* suppression assay. Data are representative of two independent experiments **(a, b)**, three independent experiments **(c, d, f-i)**, four independent experiments **(e)**, or two experiments **(f, j)**. Means and standard deviations are shown, * $p<0.05$.



Supplementary Figure 4

Transgenic expression of Glut1 results in altered metabolic and immune phenotypes in T_{reg} cells.

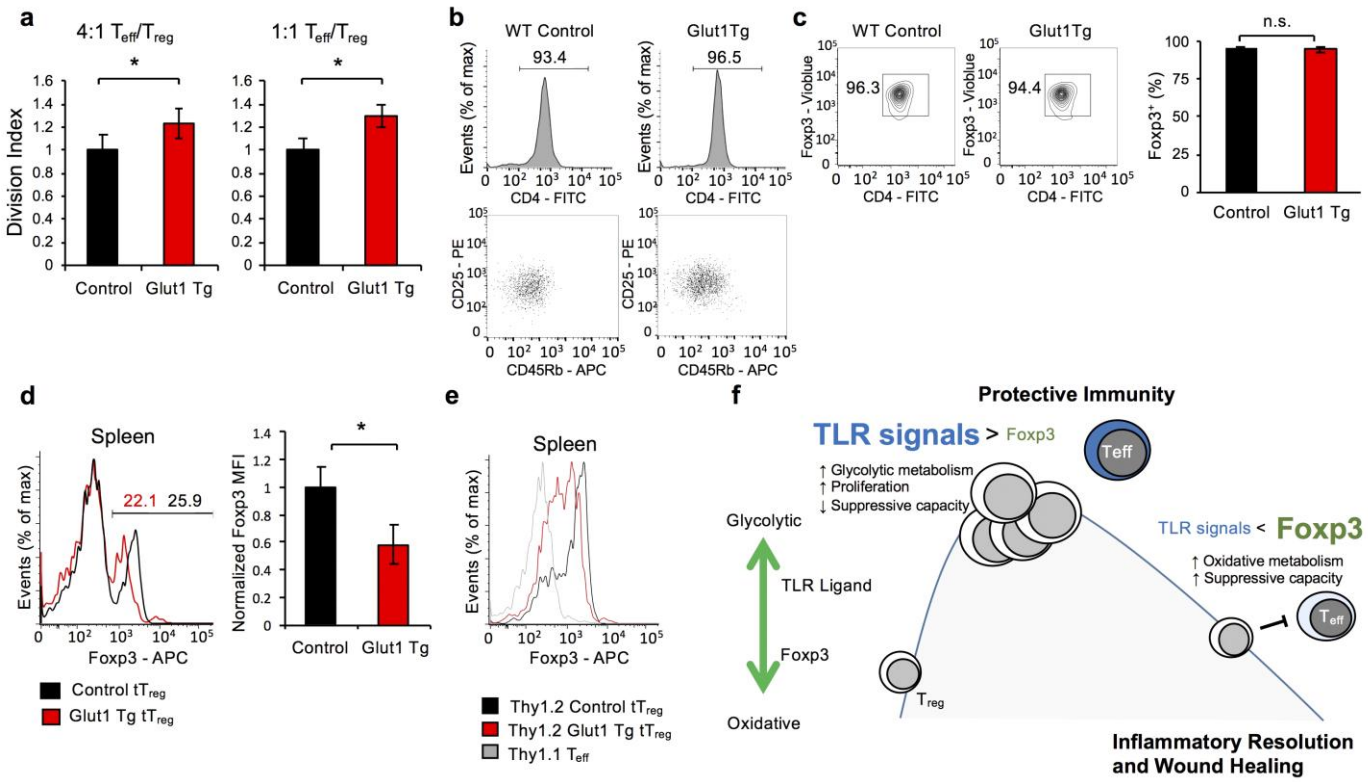
a-d. $CD4^+CD25^-$ T cells were isolated from the spleens of control and Glut1-Tg mice and polarized under T_{reg} skewing conditions. Cells were examined for **(a)** Glut1 expression levels by immunoblot, **(b)** glucose uptake, **(c)** ROS production as measured by DCFDA and **(d)** ECAR and OCR levels were measured using the Seahorse Extracellular Flux Analyzer before and after the addition of the specified inhibitors. **e-f.** $CD4^+Foxp3^+$ T cells from the spleens of control and Glut1-Tg mice were examined for expression of **(e)** CD25 and **(f)** Helios proteins. Data are representative of three independent experiments **(a-b, d, e)** or compiled data from three independent experiments **(c, f)**. Means and standard deviations are shown, * $p<0.05$.



Supplementary Figure 5

Transgenic Glut1 expression alters the immunological phenotype of T_{reg} cells.

a-f. $CD4^+CD25^-$ T cells were isolated from the spleens of control and Glut1-Tg mice and polarized under T_{reg} skewing conditions. Skewed cells were analyzed for **(a)** Foxp3 expression by flow cytometry, **(b)** cell size by FSC analysis, **(c)** CD25 and **(d)** ICOS protein expression by flow cytometry. **(e)** RNA expression levels of a panel of immunosuppressive related genes by QPCR and **(f)** percentage of IFNγ and IL-2 producing $CD4^+Foxp3^+$ cells by flow cytometry are shown. Data are representative of three independent experiments (**a-d)** or the average of six biological replicates **(e)** or four biological replicates **(f)**. Means and standard deviations are shown, * $p<0.05$.



Supplementary Figure 6

Transgenic expression of Glut1 diminishes the suppressive ability of T_{reg} cells *in vitro* and *in vivo.*

a. $CD4^+CD25^-$ T cells were isolated from the spleens of control and Glut1-Tg mice and polarized under T_{reg} skewing conditions. Control and Glut1-Tg T_{reg} were functionally examined in an *in vitro* suppression assay to measure inhibition of effector T cells (T_{eff}) proliferation and the T_{eff} division index was calculated by Flowjo flow cytometry analysis software. **b-d.** $RAG1^{-/-}$ mice were injected with naïve effector ($CD4^+CD25^-CD45RB^{hi}$) T cells to induce colitis. After weight loss indicated active disease was apparent, control or Glut1-Tg $CD4^+CD25^+CD45RB^{lo}$ T_{reg} were sorted and analyzed by flow cytometry to assess sorted T_{reg}. **(b)** The expression of CD25 and CD45Rb and **(c)** Foxp3 protein of sorted rescue T_{reg} are shown. (**d**) At the termination of the experiment Foxp3 levels were assessed on $CD4^+$ gated T cells in the spleens of recipient animals. **(e)** Thy1.1 naïve effector ($CD4^+CD25^-CD45RB^{hi}$) T cells were adoptively transferred into $RAG1^{-/-}$ mice to initiate IBD. Thy1.2 control or Glut1-tg tT_{reg} ($CD4^+CD25^+CD45RB^{lo}$) T cells were sorted and injected after disease was apparent Foxp3 levels were then assessed by flow cytometry on adoptively transferred Thy1.1 effectors and Thy1.2 CD4 control and Glut1-tg T_{reg} from mesenteric lymph nodes and spleens. Data are the result of three independent experiments **(a)**, representative of three independent experiments **(b)** or is representative of two independent experiments with at least 5 mice per group **(c, d).** Means and standard deviations are shown, * $p<0.05$. **(f)** Model of our findings. Our findings show that T_{reg} are metabolically heterogeneous and depend on activating and inflammatory signals as well as Foxp3 itself to coordinate metabolism. In the presence of inflammatory stimuli, such as TLR ligands, T_{reg} increase mTORC1 signaling, Glut1, and glycolysis, which results in increased cell growth and proliferation. Suppressive capacity, however, can be impaired. As inflammatory signals are reduced, Foxp3 can tilt the balance away from mTORC1 signaling to favor oxidative metabolism that lowers proliferative ability but enhances suppression to promote inflammatory resolution. Metabolic transitions are critical in this process as increased Glut1 expression is sufficient to promote T_{reg} growth while reducing suppression and stability.

Supplementary Table 1. **Genes in Primary Metabolic Process with altered expression upon Foxp3 deletion**. Microarray data from Foxp3 gene targeted T_{reg} was analyzed using Geo Dataset browser of GDS2525 ($p<0.1$) and genes with 1.5-fold change from control were analyzed using PANTHER gene ontology analysis classification system (pantherdb.org). Genes in Primary Metabolic Processes (GO:0044238; as shown in Supplementary Fig. 1d) are indicated.

Slc25a44	Solute carrier family 25 member 44;Slc25a44;ortholog
Pten	Phosphatidylinositol 3,4,5-trisphosphate 3-phosphatase and dual-specificity protein phosphatase PTEN;Pten;ortholog
Gfpt1	Glutamine--fructose-6-phosphate aminotransferase [isomerizing] 1;Gfpt1;ortholog
Ucp2	Mitochondrial uncoupling protein 2;Ucp2;ortholog
Pfkfb1	6-phosphofructo-2-kinase/fructose-2,6-bisphosphatase 1;Pfkfb1;ortholog
Slc35c1	GDP-fucose transporter 1;Slc35c1;ortholog
Eno2	Gamma-enolase;Eno2;ortholog
Tkt	Transketolase;Tkt;ortholog
Gapdh	Glyceraldehyde-3-phosphate dehydrogenase;Gapdh;ortholog
Prps1	Ribose-phosphate pyrophosphokinase 1;Prps1;ortholog
Atp5e	ATP synthase subunit epsilon, mitochondrial;Atp5e;ortholog
Slc35e1	Solute carrier family 35 member E1;Slc35e1;ortholog
Ahr	Aryl hydrocarbon receptor;Ahr;ortholog
Acoxl	Acyl-coenzyme A oxidase-like protein;Acoxl;ortholog
Foxp3	Forkhead box protein P3;Foxp3;ortholog
Cpt1a	Carnitine O-palmitoyltransferase 1, liver isoform;Cpt1a;ortholog
Slc25a29	Mitochondrial carnitine/acylcarnitine carrier protein CACL;Slc25a29;ortholog
Faah	Fatty-acid amide hydrolase 1;Faah;ortholog
Rraga	Ras-related GTP-binding protein A;Rraga;ortholog
Acat2	Acetyl-CoA acetyltransferase, cytosolic;Acat2;ortholog
Pfkp	6-phosphofructokinase type C;Pfkp;ortholog
Acss1	Acetyl-coenzyme A synthetase 2-like, mitochondrial;Acss1;ortholog
Txnrd2	Thioredoxin reductase 2, mitochondrial;Txnrd2;ortholog
Mgll	Monoglyceride lipase;Mgll;ortholog
Acss2	Acetyl-coenzyme A synthetase, cytoplasmic;Acss2;ortholog
Ogdh	2-oxoglutarate dehydrogenase, mitochondrial;Ogdh;ortholog
Slc7a5	Large neutral amino acids transporter small subunit 1;Slc7a5;ortholog
Gpd2	Glycerol-3-phosphate dehydrogenase, mitochondrial;Gpd2;ortholog
Slc27a4	Long-chain fatty acid transport protein 4;Slc27a4;ortholog
Pik3c2a	Phosphatidylinositol 4-phosphate 3-kinase C2 domain-containing subunit alpha;Pik3c2a;ortholog
Slc25a36	Solute carrier family 25 member 36;Slc25a36;ortholog
Elovl1	Elongation of very long chain fatty acids protein 1;Elovl1;ortholog

Pfkl	6-phosphofructokinase, liver type;Pfkl;ortholog
Txnrd1	Thioredoxin reductase 1, cytoplasmic;Txnrd1;ortholog
Ggt1	Gamma-glutamyltranspeptidase 1;Ggt1;ortholog
Xdh	Xanthine dehydrogenase/oxidase;Xdh;ortholog
Slc45a4	Solute carrier family 45 member 4;Slc45a4;ortholog
Pprc1	Peroxisome proliferator-activated receptor gamma coactivator-related protein 1;Pprc1;ortholog
Alox8	Arachidonate 8S-lipoxygenase;Alox8;ortholog
Gsk3b	Glycogen synthase kinase-3 beta;Gsk3b;ortholog
Slc25a30	Kidney mitochondrial carrier protein 1;Slc25a30;ortholog
Odc1	Ornithine decarboxylase;Odc1;ortholog
Tpi1	Triosephosphate isomerase;Tpi1;ortholog
Gclc	Glutamate--cysteine ligase catalytic subunit;Gclc;ortholog

Supplementary Table 2. Overlapping genes with Foxp3 deletion or overexpression. Microarray data from Foxp3 gene targeted T_{reg} was analyzed using Geo Dataset browser of GDS2525 ($p<0.1$) and genes with 1.5-fold change from control were compared to genes altered by retroviral Foxp3 overexpression (ArrayExpress E-MTAB-4561; $p<0.05$). Overlapping genes that increased or decreased with modulation of Foxp3 expression are shown.

Genes Lower with FoxP3 Deletion and Increased with FoxP3 Expression	Genes Increased with FoxP3 Deletion and Decreased with FoxP3 Expression
Arl5a	2610018G03Rik
Arrdc4	Acpp
Atp6v0d2	Ar
Ccrl2	Arhgap26
Ccs	Auh
Cd72	B4galnt1
Cd81	Bcl2
Crem	Bdh1
Crim1	Bhlhe40
Ctla4	Btg2
Cxcl2	Cd160
Cyfip1	Cd96
Dusp4	Cdyl2
Ebi3	Dap
Entpd1	Dusp6
Epcam	Ehd3
Foxp3	Gab3
Gem	Ggt1
Glrx	Golm1
Gpr83	Gpr171
Hgfac	Gramd1a
Hspbap1	Grap2
Icos	Higd2a
Ighm	Il1rl2
Ikzf2	Kcnk5
Il10	Klrb1f
Il1r2	Ldlr
Il1rl1	Lgals3
Itgae	Lgals3bp
Itgav	Lmo4
Itgb8	Mfsd6
Klrg1	Mgll
Mab21l1	Ms4a6d
Micall1	Nebl

Naip5	Nqo2
Neb	Pde3b
Nrn1	Pde7a
Nucb2	Phf6
Odc1	Pim2
Pde2a	Pltp
Pdzk1ip1	Rab4b
Phlpp1	Rnf19a
Plxnc1	Runx2
Plxnd1	Satb1
Prdm1	Sco1
Prdx4	Sema4a
Ptprj	Slco3a1
Rab6b	Snai3
Rrad	Sorl1
Rxra	Ssrp1
Samsn1	Stat4
Slc14a1	Stk39
Slc45a4	Tab2
Snx9	Tcf7
Tcn2	Themis
Tjp3	Tnfsf8
Tlr1	Tomm22
Tns1	Topors
Tspan17	Trim36
Tspan32	Xdh
Vamp5	
Vav2	
Zbtb10	
Zfp612	

Supplementary Table 3. Gene ontology analysis of pathways altered based on shared gene expression changes with modulation of Foxp3 expression. Genes identified in Supplementary Table 2 as overlapping between Foxp3 gene deletion or overexpression were analyzed by DAVID Gene Functional Classification Tool and sorted by fold-enrichment for the pathway.

Pathway	Fold-Enrichment	Genes
GO:0006687~glycosphingolipid metabolic process	23.32036613	ITGB8, CREM, B4GALNT1
GO:0046632~alpha-beta T cell differentiation	23.32036613	SATB1, BCL2, FOXP3
GO:0006664~glycolipid metabolic process 3	20.14031621	ITGB8, CREM, B4GALNT1
GO:0046631~alpha-beta T cell activation	19.26465028	SATB1, BCL2, FOXP3
GO:0007160~cell-matrix adhesion	8.86173913	ITGB8, BCL2, RAB4B
GO:0050864~regulation of B cell activation	8.056126482	CD81, FOXP3, IL10
GO:0030217~T cell differentiation	7.773455378	SATB1, THEMIS, BCL2, FOXP3
GO:0031589~cell-substrate adhesion	7.773455378	ITGB8, BCL2, RAB4B
GO:0006665~sphingolipid metabolic process	7.146563815	ITGB8, CREM, B4GALNT1
GO:0045454~cell redox homeostasis	7.146563815	PRDX4, SCO1, GLRX
GO:0006643~membrane lipid metabolic process	6.923233696	ITGB8, CREM, B4GALNT1
GO:0007229~integrin-mediated signaling pathway	5.830091533	ITGB8, ITGAE, ITGAV
GO:0031401~positive regulation of protein modification process	5.680602007	BCL2, CD81, FOXP3
GO:0002521~leukocyte differentiation	5.200551133	SATB1, THEMIS, GAB3, BCL2, FOXP3
GO:0030098~lymphocyte differentiation	5.182303585	SATB1, THEMIS, BCL2, FOXP3
GO:0006470~protein amino acid dephosphorylation	5.182303585	PTPRJ, DUSP4, BCL2, DUSP6
GO:0042110~T cell activation	5.092953523	SATB1, THEMIS, BCL2, FOXP3
GO:0001763~morphogenesis of a branching structure	4.72626087	AR, BCL2, PLXND1, IL10
GO:0010876~lipid localization	4.61548913	LDLR, SORL1, PLTP, B4GALNT1
GO:0016311~dephosphorylation	4.189947579	PTPRJ, DUSP4, BCL2, DUSP6

GO:0001655~urogenital system development	4.046456224	ODC1, AR, RXRA, BCL2
GO:0048732~gland development	3.748620614	XDH, AR, RXRA, BCL2, PLXND1
GO:0032535~regulation of cellular component size	3.669457197	NEB, BCL2, CD81, CYFIP1
GO:0001775~cell activation	3.60233298	SATB1, THEMIS, BCL2, TLR1, ENTPD1, FOXP3
GO:0007264~small GTPase mediated signal transduction	3.434782609	ARL5A, RAB4B, RRAD, RAB6B, GEM, VAV2
GO:0045321~leukocyte activation	3.372046853	SATB1, THEMIS, BCL2, TLR1, FOXP3
GO:0006955~immune response	3.135788794	MFSD6, IL1RL1, THEMIS, IL1RL2, CXCL2, TLR1, CTLA4, FOXP3, IL10, TNFSF8
GO:0008284~positive regulation of cell proliferation	3.12033068	ODC1, BCL2, CD81, MAB21L1, FOXP3, RUNX2
GO:0048729~tissue morphogenesis	3.102849836	AR, LMO4, RXRA, BCL2, PLXND1
GO:0030097~hemopoiesis	2.942144466	SATB1, THEMIS, GAB3, BCL2, FOXP3
GO:0043085~positive regulation of catalytic activity	2.829418624	BCL2, CD81, TLR1, CCS, VAV2
GO:0042127~regulation of cell proliferation	2.745272345	ODC1, TCF7, AR, BCL2, CD81, TOPORS, MAB21L1, FOXP3, RUNX2, IL10
GO:0010604~positive regulation of macromolecule metabolic process	2.566591112	AR, IKZF2, RXRA, BCL2, CD81, TLR1, TOPORS, PRDM1, FOXP3, RUNX2, IL10
GO:0042592~homeostatic process	2.276131626	XDH, LDLR, BCL2, NUCB2, PRDX4, PDE3B, FOXP3, SCO1, GLRX
GO:0010557~positive regulation of macromolecule biosynthetic process	2.229368335	AR, IKZF2, RXRA, TLR1, TOPORS, FOXP3, RUNX2, IL10
GO:0006915~apoptosis	2.223375409	PHLPP1, 2610018G03RIK, BCL2, NAIP5, DAP, TOPORS, PIM2
GO:0012501~programmed cell death	2.185770751	PHLPP1, 2610018G03RIK, BCL2, NAIP5, DAP, TOPORS, PIM2
GO:0009891~positive regulation of biosynthetic process	2.121302006	AR, IKZF2, RXRA, TLR1, TOPORS, FOXP3, RUNX2, IL10

Supplementary Table 4. Glucose metabolism QPCR Array Ct values for Foxp3 expressing cells. Control and Foxp3-ER expressing FL5.12 cells were treated with 4-OHT and metabolic gene expression was determined by QPCR array. Ct values for each cell line are provided.

Gene Symbol	Control line 1	Control line 2	Control line 3	FoxP3 line 1	FoxP3 line 2	FoxP3 line 3
Acly	24.16	25.54	23.55	24.43	24.28	23.54
Aco1	35	35	35	35	35	35
Aco2	27.25	28.08	26.25	26.99	27.06	25.83
Agl	26.69	27.45	25.47	25.47	25.69	24.95
Aldoa	21.05	22.1	19.83	20.65	21.04	20.01
Aldob	35	35	35	35	35	35
Aldoc	35	34.16	33.46	33.89	33.04	32.53
Bpgm	29.18	30.16	27.69	28.32	28.17	27.47
Cs	29.66	30.56	27.92	28.31	28.38	27.64
Dlat	26.84	27.51	25.32	26	26.06	25.23
Dld	24.53	25.48	23.39	24.03	23.98	23.12
Dlst	25.02	25.67	23.59	23.85	24.08	23.63
Eno1	21.3	22.26	19.97	20.92	21.22	20.44
Eno2	35	35	35	35	35	35
Eno3	27.23	28.4	25.68	26.04	25.36	24.27
Fbp1	35	35	35	35	35	35
Fbp2	35	35	35	35	35	35
Fh1	24.53	25.48	23.92	24.38	24.42	23.76
G6pc	35	35	35	35	35	35
G6pc3	26.19	27.09	25.22	25.18	25.14	24.19
G6pdx	25.4	26.43	23.89	24.13	24.08	23.23
Galm	35	35	35	35	35	35
Gapdhs	35	35	35	35	35	35
Gbe1	29.1	30.24	28.13	28.44	28.6	28.23
Gck	35	31.9	31.17	34.62	31.42	28.62
Gpi1	23.38	24.38	22.08	22.53	22.64	21.72
Gsk3a	26	27.02	24.26	25.08	24.88	23.93
Gsk3b	26.53	27.59	25.52	25.89	25.66	24.92
Gys1	26.9	28.04	25.69	26.02	26.22	25.36
Gys2	35	35	35	35	35	35
H6pd	28.45	29.11	26.61	27.15	27.28	26.14
Hk2	26.52	27.31	25.21	26.06	26.12	25.81
Hk3	31.48	32.01	28.88	29.33	29.08	28.25
Idh1	26.9	27.92	25.66	26.1	26.02	25.44

Idh2	25.1	26.09	24.04	24.39	24.31	23.72
Idh3a	24.44	25.26	22.77	23.59	23.52	22.56
Idh3b	24.87	25.5	23.25	23.97	24.09	23.27
Idh3g	23.85	24.8	22.7	23.18	23.22	22.4
Mdh1	25.54	26.22	24.49	25.16	25.21	24.12
Mdh1b	35	35	35	35	35	35
Mdh2	23.59	24.1	22.55	23	23.12	22.33
Ogdh	25.28	26.34	23.88	24.64	24.62	23.44
Pck1	35	35	35	35	35	35
Pck2	26.11	27.04	24.75	25.24	25.65	24.82
Pcx	28.19	28.86	26.27	26.67	27.29	26
Pdha1	25.54	26.33	24.01	24.52	24.62	23.85
Pdhb	25.57	26.68	24.59	25.07	25.01	24.25
Pdk1	27.21	28.04	25.76	26.92	26.81	26.64
Pdk2	35	35	35	35	35	35
Pdk3	25.11	25.81	24.26	24.81	25.05	23.95
Pdk4	35	35	35	35	35	35
Pdp2	28.08	28.63	26.7	27.11	27.49	26.65
Pdpr	29.29	29.94	27.6	28.08	28.28	26.98
Pfkl	24.38	25.41	22.81	23.75	24.08	23.25
Pgam2	31.13	32.1	30.05	29.95	29.94	28.81
Pgk1	22.41	23.25	21.17	21.82	22.11	21.66
Pgk2	35	35	35	35	35	35
Pgm1	25.58	26.58	24.61	24.92	25.02	24.15
Pgm2	26.08	27.05	25.07	25.52	25.45	25.08
Pgm3	28.45	29.61	27.28	27.72	27.85	26.54
Phka1	35	35	35	35	35	35
Phkb	27.26	28.46	26.05	26.38	26.17	25.26
Phkg1	34.73	35	33.48	34.3	34.18	32.66
Phkg2	27.66	28.71	26.44	26.83	26.88	25.51
Pklr	35	35	35	35	35	35
Prps1	24.71	25.81	23.58	23.86	23.73	23.05
Prps1l1	35	35	35	35	35	35
Prps2	26.28	27.23	25.02	25.27	25.23	24.57
Pygl	35	35	35	33.65	35	35
Pygm	34.02	35	33.68	33.78	34.12	33.63
Rbks	28	29	27.44	27.66	27.9	26.94
Rpe	26.07	26.56	24.7	25.23	25.37	24.29
Rpia	24.54	25.49	23.64	24.31	24.17	23.54
Sdha	24.33	25.35	23.13	23.65	23.64	22.9
Sdhb	25.36	26.38	24.5	25.25	25.15	24.37

Sdhc	24.19	25.39	23.26	23.82	23.67	22.9
Sdhd	28.41	29.62	27.49	27.86	27.85	27.17
Sucla2	26.05	27.02	25.01	25.53	25.63	24.71
Suclg1	28.42	29.63	26.53	27.26	27.09	26.77
Suclg2	25.36	26.35	24.22	24.9	24.83	24.21
Taldo1	25.74	26.71	24.73	27.4	25.07	24.31
Tkt	22.23	23.37	21.16	21.56	21.5	20.69
Tpi1	22.8	23.69	21.64	22.47	22.53	22.04
Ugp2	26.77	27.76	25.46	25.85	25.94	24.67
Actb	19.7	20.95	18.45	18.68	18.58	17.31
B2m	23.53	24.64	22.97	23.1	23.02	21.41
Gapdh	21.21	22.61	19.85	20.62	20.94	19.65
Gusb	26.02	26.83	25.07	25.33	25.27	24.35
Hsp90ab1	21.16	22.13	19.81	20.28	20.39	19.57

Supplementary Table 5. Metabolomic analysis of control and Foxp3 activated FL5.12 cells. Control (C) and Foxp3-ER (F) FL5.12 cells were treated with tamoxifen for 24 hours and subject to non-targeted mass spectrometry-based metabolomics. Data were range scaled using Metabolanalyst.

	Control (C) or FoxP3 (F) Cell Line Clone						Average		Fold	
Metabolite	C2	C4	C5	F1	F6	F9	Control	FoxP3	change	ttest
(R)-mevalonate	14363765	13518540	14575580	18549269	20320374	19183979	14152628.33	19351207.33	1.367322513	0.001043053
caprate	216522150	226110516	223807189	261369017	260620930	250817857	222146618.3	257602601.3	1.159606224	0.001357798
Pyridoxal	15961160	21044246	21436412	32345244	30823379	31580745	19480606	31583122.67	1.621259763	0.002640621
4-hydroxy-2-nonenal_3_4-epoxynonanal	27781337	29615289	29378881	32263050	33545891	32755711	28925169	32854884	1.135857979	0.004611089
dopaminochrome	5558710	9244650	10313400	18387313	17871902	15936284	8372253.333	17398499.67	2.078114335	0.005106955
L-glutamine_3-Ureidoisobutyrate_Glycylsarcosine	2096718143	2077948508	2233923992	2651589887	3156018634	2963609596	2136196881	2923739372	1.368665687	0.007072753
nonanoate	258233127	291235956	288752608	329567195	341344884	328493631	279407230.3	333135236.7	1.192292827	0.009168043
UDP-alpha-D-xylose(2-)	4191590	5248152	4113675	2987286	2637301	2376433	4517805.667	2667006.667	0.590332313	0.010386294
gamma-L-Glutamyl-L-cysteine	67376025	61473024	51933133	41039523	34783016	28792617	60260727.33	34871718.67	0.57868068	0.011359863
(S)-dihydroorotate	21918487	23249121	23469589	14406407	17194915	10264753	22879065.67	13955358.33	0.609961899	0.012551139
L-cysteine	6113776	5540684	4950631	4070595	2647685	2647293	5535030.333	3121857.667	0.564018168	0.014235322
UDP-D-glucose_UDP-D-galactose	330186586	355821148	324324141	290968558	238595389	255353826	336777291.7	261639257.7	0.776891032	0.014567058
UDP-N-acetyl-D-galactosamine_UDP-N-acetyl-alpha-D-glucosamine	387197896	397560889	394125250	366363141	328662474	332740634	392961345	342588749.7	0.871812849	0.015023874
succinyl carnitine	4112806	4555640	3921174	4859728	5477452	5741045	4196540	5359408.333	1.277101692	0.02246761
leukoaminochrome_dopamine o-quinone-1	16275350	22774020	23967427	28314677	31317341	31214921	21005599	30282313	1.441630539	0.022983806
N-acetyl-L-aspartate_2-Amino-3-oxoadipate	12606438	10464191	9175817	14525082	17175144	19634902	10748815.33	17111709.33	1.591962351	0.023389861
cytosine	74869344	108826287	119682374	161112361	160800130	140447078	101126001.7	154119856.3	1.524037871	0.024838632
O-acetylcarnitine	435862396	355362819	386520559	309897476	317481723	283872759	392581924.7	303750652.7	0.773725517	0.025425098
D-Glucosamine 6-phosphate	21325963	23205819	20914862	18809350	14331923	13186435	21815548	15442569.33	0.707869879	0.026393631
(S)-2-[5-Amino-1-(5-phospho-D-ribosyl)imidazole-4-carboxamido]succinate	1652387.96	1778604.07	1953747.74	1249841.06	393563.05	87493.46	1794913.257	576965.8567	0.32144498	0.027380577
N-acetyl-glutamate	3320537	2755512	2503398	2162264	1974684	1944850	2859815.667	2027266	0.708879955	0.02945717
Pyridoxine	126949787	203967103	210824843	252621180	280853515	290644872	180580577.7	274706522.3	1.521240689	0.032189491
N-Carbamoyl-L-aspartate	40253102	42872668	46248282	36936579	34336453	28276077	43124684	33183036.33	0.76946735	0.032599641
L-alanyl-L-leucine	5082334	4042386	4909283	3880271	3100177	3352598	4678001	3444348.667	0.736286432	0.03551692
Dihydroxyacetone phosphate_D-glyceraldehdye-3-phosphate	16405603	18972934	19796435	15848258	13039243	11857441	18391657.33	13581647.33	0.738467833	0.037033815
3-carboxy-alpha-chromanol	1858277	2185349	2266942	1753278	1666816	1718531	2103522.667	1712875	0.814288825	0.037397624
(R)-carnitine	1488423422	1451892341	1365694917	1526102699	1561812154	1569537006	1435336893	1552483953	1.081616421	0.039085236
(2R)-2-hydroxy-3-(phosphonatooxy)propanoate_D-Glycerate 2-phosphate	25532993	32843505	31205631	39352909	53910687	41730799	29860709.67	44998131.67	1.506934436	0.039421019
3-phosphoglycerate	25245663	32497268	30794173	38873684	53291253	41241124	29512368	44468687	1.506781394	0.039620741
perillyl aldehyde	8587254	8425272	8092421	7802293	7526842	8003369	8368315.667	7777501.333	0.929398656	0.042249283
methyl indole-3-acetate	2396124	2657735	2371810	2775438	3021409	2745133	2475223	2847326.667	1.150331371	0.042430589
UDP(3-)	58636547	60847539	55589794	53113621	37902532	39730448	58357960	43582200.33	0.746808153	0.042524666
L-threonate	284360802	277649654	241632797	222853367	222840966	172448451	267881084.3	206047594.7	0.769175603	0.044626114
5-oxoprolinate_L-1-Pyrroline-3-hydroxy-5-carboxylate_Pyroglutamic acid	1810038449	2405884615	2496854358	2803283177	3135094061	2844972370	2237592474	2927783203	1.308452382	0.044840121
L-arabinitol_xylitol_D-ribitol	45953410	47203403	48428050	33545884	43714441	28375917	47194954.33	35212080.67	0.746098416	0.058383349
L-glutamate(1-)	5106543142	4874619176	4696929109	4497700101	4368819841	3728724428	4892697142	4198414790	0.858098237	0.059235252
2-Aminooctanoic acid	198420774	200503487	182491510	210457012	212464288	205573698	193805257	209498332.7	1.080973426	0.06031264
Aminobutanoate_NN-dimethylglycine	243106951	241636852	238923877	205786913	235556327	205477930	241222560	215607056.7	0.89380967	0.063385525
S-adenosyl-L-methionine	80070610	60261068	65965261	58948085	32088860	39679069	68765646.33	43572004.67	0.63363041	0.064145148
L-methionine	107063108	130003046	109170870	133992067	166383605	139725222	115412341.3	146700298	1.271097149	0.064808242
6(R_S)-hydroxy-tetradeca-2_4E8Z-dienoate	1635860	1578991	1553567	1333982	1516487	1469752	1589472.667	1440073.667	0.906007191	0.067178025
L-phenylalanine	414349690	473629024	415799999	484640628	531537290	477068543	434592904.3	497748820.3	1.145322014	0.071399114
4-oxo-2-nonenal	10969758	10630040	10326340	11034434	11270581	11076669	10642046	11127228	1.045591045	0.071875872
thiosulfate(2-)	4194821	5256072	6166955	4355366	2880493	2972536	5205949.333	3402798.333	0.653636468	0.072267427
UDP-D-glucuronate	34088479	22647344	19754075	18817366	8653322	9879256	25496632.67	12449981.33	0.488299043	0.073905829
glutamate (total)	9554845349	9012430857	8648919634	8343192785	8053624331	6848550382	9072065280	7748455833	0.854100538	0.066262293
glutamate_O-acetyl-L-serine	4448302207	4137811681	3951990525	3845492684	3684804490	3119825954	4179368138	3550041043	0.849420517	0.075232639
(R)-S-lactoylglutathionate(1-)	29233311	29602064	21342711	17078557	15639984	22791429	26726028.67	18503323.33	0.692333439	0.076725188
2-phenylethanaminium	43383016	45868981	28578844	16075505	14912971	32374461	39276947	21120979	0.537744927	0.080557136
L-palmitoylcarnitine	10772471	6556928	13910945	13002438	20716575	19512293	10413448	17743768.67	1.703928292	0.084202286
choline phosphate(1-)	2605173541	2471900755	2207810592	2293846697	1772620268	1630416342	2428294963	1898961102	0.782014183	0.085581864
L-valine	4267442194	4583336902	4161204728	4061321454	4011650556	3571093033	4337327941	3881355014	0.894872388	0.0857102
D-glucarate	442536.1	756857	899360	2210561.3	865750.3	1949919.7	699584.3667	1675410.433	2.394865456	0.087449597
glycine betaine	4329846957	4644881876	4241814165	4143344122	4083042785	3644393793	4405514333	3956926900	0.898175923	0.08748858
NADH_pos	2543244	2192870.3	1292383.1	1598243.3	286300.8	10000	2009499.133	631514.7	0.314264729	0.088726873
5-Methylthio-5-deoxy-D-ribulose 1-phosphate_5-Methylthio-5-deoxy-D-ribose 1-phosphate	2173252.5	1718063	890547.4	585879	546068.8	993388.5	1593954.3	708445.4333	0.444457807	0.092219472
NADH(2-)	13947757	8267470	11339346	7862357	7522193	2656177	11184857.67	6013575.667	0.537653303	0.092595223
(S)-3-sulfonatolactate(2-)	1471268	1227551	1018762	1754797	1502489	1487490	1239193.667	1581592	1.276307362	0.094497279
L-cysteinylglycine	68321101	66176239	61639173	60411697	58344692	46728962	65378837.67	55161783.67	0.843725365	0.094999032
4-hydroxybenzoate_Gentisate aldehyde	137863885	121779905	124358250	141462401	138953961	136889623	128000680	139101995	1.086728563	0.097813017
lipoate_(2S3R)-3-hydroxybutane-123-tricarboxylate_2-methylcitrate	5601802	5893101	6727613	7225720	6684962	8673142	6074172	7527941.333	1.239336215	0.100265189
gama-L-glutamyl-L-alpha-aminobutyrate	1395717	1377906	1434064	1929716	1479551	2290605	1402562.333	1899957.333	1.35463308	0.101927756
tetradecanoyl carnitine_myristoyl carnitine	13452297	11618922	23768177	20298400	33228682	29305931	16279798.67	27611004.33	1.696028612	0.102957253
propionate_(S)-lactaldehyde_(R)-lactaldehyde_hydroxyacetone	61935097	66501677	65671668	61992866	62265371	58834604	64702814	61030947	0.943250273	0.108750751
adipic acid	430311450	375341761	390571305	433980965	497488750	429694643	398741505.3	453721452.7	1.137883683	0.1149257
hydroxyproline	2168710744	2057303458	2163495069	1986519241	1909671783	1439048227	2129836424	1778413084	0.834999845	0.114943717
N-acetylputrescinium	131812247	129523236	138763718	185572429	152592423	142182238	133366400.3	160115696.7	1.200569981	0.116027929
3-hydroxypropionate_D-glyceraldehyde_glycerone	5479095595	6383064563	5823397100	5114826818	5591445793	4452148537	5895185753	5052807049	0.857107352	0.116947478
(R_s)-lactate	5479095595	6383064563	5823397100	5114826818	5591445793	4452148537	5895185753	5052807049	0.857107352	0.116947478
glutathionate(1-)	6792104517	6626579560	6167124256	6185301877	5880672123	4793170966	6528602778	5619714989	0.860783721	0.120564186
limonene_(+)-alpha-pinene	2639581	2442459	2702049	3327473	3223862	2610433	2594696.333	3053922.667	1.176986543	0.124750297
choline	705391636	790752006	738479585	888957427	1480638563	2432797328	744874409	1600797773	2.149084132	0.130175204
Biotin	21879181	31927256	33278633	22704263	23636028	18474570	29028356.67	21604953.67	0.744270642	0.131983454
propionyl-carnitine	114295440	125183340	93706512	102197371	87678198	76722874	111061764	88866147.67	0.800150695	0.133516083
NADP+(3-)	15216745	10549661	7663255	8402596	4411765	6664056	11143220.33	6492805.667	0.582668697	0.134661353
N-acetyl-L-glutamate(2-)	24765554	18559047	19458004	18078526	17658125	14399418	20927535	16712023	0.798566243	0.135401934
Sedoheptulose 7-phosphate	11824758	9721842	9985200	9091768	8340227	3272910	10510600	6901635	0.656635682	0.136857903

phenylacetaldehyde	7372374	7335214	6616427	6324415	6825816	6589804		7108005	6580011.667	0.925718492	0.138075424
UDP_neg	580800075	459485210	363247443	418187524	284576470	257468536		467844242.7	320077510	0.684154	0.139132087
putreanine	160211814	149295486	136274717	156874320	166258722	192087666		148594005.7	171740236	1.155768264	0.140042468
1-Pyrroline-5-carboxylate	57406084	57916695	52532902	53168448	47975206	34188467		55951893.67	45110707	0.806240934	0.140885134
cis-aconitate_dehydroascorbide	44746759	31298851	34389246	33502169	24237866	25140168		36811618.67	27626734.33	0.750489528	0.141492636
itaconate_Mesaconate_Citraconic acid	170239859	118826625	108793577	107333170	92540724	89429421		132620020.3	96434438.33	0.727148421	0.141883379
Cytidine	190253072	275927825	308477304	214626402	192119158	144445519		258219400.3	183730359.7	0.711528101	0.142523392
L-tryptophan	61977370	61699468	58012388	64958764	66658137	61248230		60563075.33	64288377	1.061511105	0.142680336
citrate_isocitrate_Diketogulonic acid	4074278087	3131804871	3248414480	3321926636	2370750561	2474619930		3484832479	2722432376	0.781223313	0.145676908
dopaminium(1+)	2523419	3101265	3093905	4357592	4114598	2885274		2906196.333	3785821.333	1.302672256	0.149745115
butyryl carnitine	744088346	917046720	801359201	807986260	568395666	604933877		820831422.3	660438601	0.804597123	0.150104644
inosine	173886551	153849933	102453704	130789560	80409612	59035089		143396729.3	90078087	0.62817393	0.151015607
L-isoleucine_L-leucine	1639044528	1799341131	1626457062	1812089606	2103138646	1774540647		1688280907	1896589633	1.12338511	0.151770347
glutathione_neg	8178295391	7820324547	7529148006	7566220051	7205068473	5793286185		7842589315	6854858236	0.874055489	0.159601041
25-hydroxyvitamin D3-26-23-lactone	319443.6	285036.9	411332.8	316220	225414.5	111623.3		338604.4333	217752.6	0.643088449	0.160129284
NN-dimethyldopaminequinone_(-)-Salsolinol-1	1263120	2345667	2940384	4418030	5875140	2210080		2183057	4167750	1.909134759	0.165926916
thromboxane A2(1-)	2340163	3430790	4419702	2067491	2877748	1771390		3396885	2238876.333	0.659096888	0.166465058
4(R)-hydroxy-dodec-6Z-enoate_4(S)-hydroxy-dodec-6Z-enoate	44919418	41470963	40425161	46996529	44667374	43631730		42271847.33	45098544.33	1.066869493	0.168402183
CDP_neg	110862651	71965355	62839191	73685807	41633865	34818787		81889065.67	50046153	0.611145732	0.16877517
Glycerol 3-phosphate	51367857	45642891	63521533	43007379	47513565	42248523		53510760.33	44256489	0.827057749	0.169028808
serine	89469874	85617581	105478710	115933400	126071601	94395018		93522055	112133339.7	1.199004231	0.170247736
NgNGdimethylLarginine	72668810	73892037	67924337	62150662	69208021	43220195		71495061.33	58192959.33	0.813943764	0.170404643
tryptophan	88670500	96352197	84533401	93986944	96080598	97512055		89852032.67	95859865.67	1.066863629	0.171464101
N6N6N6-Trimethyl-L-lysine	236141224	247128867	218387127	211582914	227920078	176755707		233885739.3	205419566.3	0.878290258	0.174355489
N-acetyl-L-asparagine	2826319	3225317	2995321	2587348	2918010	1783736		3015652.333	2429698	0.805695661	0.175204675
succinate(2-)_Methylmalonic acid	2044178735	2214495476	2185242802	2070889812	2083016874	1896373260		2147972338	2016759982	0.938913387	0.176318874
4-(trimethylammonio)butanoate_acetylcholine	793621522	828018491	777783206	853594645	848038122	803822152		799807739.7	835151639.7	1.044190495	0.177580398
citrulline	16972542	19547518	24112161	19133111	15211704	12471326		20210740.33	15605380.33	0.772133038	0.180828874
Xanthine	6746809	10658464	13411728	16585067	105672876	38819189		10272333.67	53692377.33	5.22689187	0.181038864
w-hydroxydecanoicacid	25491524	22502549	24553507	28108271	25651104	25031419		24182526.67	26263598	1.08605682	0.181731981
CDP-ethanolamine(1-)	664723.9	569483.1	903616.5	829668.9	1543274.9	3258007.8		712607.8333	1876983.867	2.633964684	0.184691758
N(omega)-(L-Arginino)succinate	44905223	38212480	46683480	43438362	31943195	20885829		43267061	32089128.67	0.741652609	0.185682085
N-acetyl-glutamine	13284116	10486669	12244910	11774633	9647971	7229982		12005231.67	9550862	0.795558325	0.187570927
L-proline	5261338536	5202303240	4952870829	5042506916	4485788487	3095201644		5138837535	4207832349	0.818829613	0.187752899
Glycylleucine	11346240	11396293	12533111	11291474	11156701	9410232		11758548	10619469	0.90312758	0.188416844
Citicoline	11346240	11396293	12533111	11291474	11156701	9410232		11758548	10619469	0.90312758	0.188416844
1-deoxy-1-(N6-lysino)-D-fructose	506889.3	897581.2	673852.5	739411	1532817.1	1027980.5		692774.3333	1100069.533	1.58791901	0.189562618
cytidine	107961922	148655337	197891957	119795388	119298005	71353267		151503072	103482220	0.683037107	0.191223754
sphingosine_(2S)-1-hydroxy-3-oxooctadecan-2-aminium	45358810	39030708	41676009	51724051	68724114	42606338		42021842.33	54351501	1.293410712	0.192259196
5-S-glutathionyl-dopamine	1305460	1415326	1338707	2428555	2308897	1186759		1353164.333	1974737	1.45934751	0.192334815
hexose-phosphate	40479614	45274916	39632104	40990608	37761178	33224446		41795544.67	37325410.67	0.893047595	0.192665553
Ascorbic acid	24979393	24788064	27711431	25002950	24139253	20224739		25826296	23122314	0.895301208	0.196624177
CDP-ethanolamine	1067712.3	723571.5	1264820.4	1236364.4	2163463.7	5152212		1018701.4	2850680.033	2.798347026	0.19913572
L-Iditol_D-glucitol_galactitol	28349708	33320788	30640699	31161456	39175402	34544920		30770398.33	34960592.67	1.136176149	0.199747069
N-acetyl-L-alanine_5-amino-2-oxopentanoic acid_5-Amino-4-oxopentanoate_L-Glutamate 5-semialdehyde_trans-4-hydroxy-L-proline	574623603	517264943	554760482	510128124	525573192	366473943		548883009.3	467391753	0.851532558	0.201519363
glyoxylate	12289026	11778491	11637593	12155475	10360275	10061645		11901703.33	10859131.67	0.912401474	0.20168857
D-glucuronolactone_L-ascorbate	24424178	24080772	27110932	24448485	23652360	19635697		25205294	22578847.33	0.895797817	0.212189563
O-Phospho-L-serine	30365194	32221638	23486736	22198870	28367980	14877609		28691189.33	21814819.67	0.760331662	0.21873801
UTP(4-)	522195844	239024453	181774713	270152434	56940018	109063382		314331670	145385278	0.46252189	0.242365701
2-keto-3-deoxy-D-glycero-D-galactononic acid 9-phosphate	108977259	95420190	86659099	80424931	97431554	47379522		97018849.33	75078669	0.773856519	0.243764393
Elaidic carnitine_Vaccenyl carnitine	1794330	1167689	2704480	2244711	11715426	3755283		1888833	5905140	3.126343091	0.247862229
Coenzyme A	12027122	14864089	11257826	13827159	6838042	7710506		12716345.67	9458569	0.743811882	0.255524245
L-histidine	69967695	79079824	80317548	89122513	77553220	81361513		76455022.33	82679082	1.08140812	0.257342801
N(2)-acetyl-L-ornithine	6104505	8462348	9365022	8806838	9510143	9579440		7977291.667	9298807	1.165659648	0.257975178
GDP-alpha-D-mannose(2-)	9796557	10464887	13942466	11592435	6988663	8269142		11401303.33	8950080	0.785004989	0.262222788
GDP_neg	89590589	54728771	49560070	63175364	30759048	39165422		64626476.67	44366611.33	0.68650828	0.271222799
Succinic semialdehyde_2-oxobutanoate_2-methyl-3-oxopropanoate	235822033	264207033	226253185	245735879	257187899	300194230		242094083.7	267706002.7	1.105793246	0.271916316
L-lysinium(1+)	111648995	125255962	109585343	118442543	152579608	120932770		115496766.7	130651640.3	1.131214701	0.276489211
(S)-malate(2-)	7088299471	7335914824	7496382436	7607072807	6474674869	5576332253		7306865577	6552693310	0.896785802	0.276744991
indole-3-acetate_(5-hydroxyindol-3-yl)acetaldehyde	8504580	10925988	5248016	2874134	4336517	8561281		8226194.667	5257310.667	0.63909388	0.278421862
7alpha-hydroxy-3-oxo-4-cholestenoic acid anion_24-oxo-1alpha-25-dihydroxyvitamin D3_25-hydroxyvitamin D3-26-23-lactol	956890.7	610449.2	702523.4	671027.6	688843.6	309447.9		756621.1	556439.7	0.735427151	0.282345955
o-methylhippurate	447982505	436624560	399641148	453126289	493180540	426728318		428082737.7	457678382.3	1.069135338	0.288649927
3-hydroxy butyryl carnitine	36988322	33132340	35578453	39466883	24829965	17410304		35233038.33	27235717.33	0.773016425	0.290852726
quinonoid dihydrobiopterin_67-dihydrobiopterin_6-Lactoyl-5678-tetrahydropterin_O2-4a-cyclic-tetrahydrobiopterin	413576330	481760183	407376469	431367488	497207060	487933835		434237660.7	472169461	1.087352627	0.294672348
Hypoxanthine	1963745613	1976749232	1393041991	1426969600	1824937978	828565844		1777845612	1360157807	0.765059574	0.295874565
ATP_dGTPneg	1056056838	622080803	391691868	651456867	232119625	355620546		689943169.7	413065679.3	0.598695222	0.297035391
tetradecenoyl carnitine	696106.4	615046.2	1403489.6	879716	2558817.3	1281434.4		904880.7333	1573322.567	1.738707112	0.302107043
dGMP_AMP_3-AMP	212116339	238330881	304242092	243757076	605707748	307355303		251563104	385606709	1.532842865	0.308131875
pristanic acid_pristanate	3455633	3021572	4005285	3891696	5263652	3446777		3494163.333	4200708.333	1.202207205	0.315615647
suberic acid	14095711	18284508	27695588	10682118	19784400	12939664		20025269	14468727.33	0.722523494	0.317039316
dGTP_ATP	503570514	322889351	223831096	359734274	127974083	199202209		350096987	228970188.7	0.654019307	0.320049036
lysine	257585251	348166520	326757315	299037914	418737936	363920493		310836362	360565447.7	1.159984776	0.322435892
S-[2-carboxy-1-(1 H-imidazol-4-yl)ethyl]-L-cysteine	3463432	2565695	2812528	2425331	3017523	2156297		2947218.333	2533050.333	0.859471558	0.324888705
IMP	220844080	240592202	293786968	241474231	569222410	292520876		251741083.3	367739172.3	1.460783307	0.327660102
AMP_dGMP	220854740	240605440	293800879	241474231	569222410	292520876		251753686.3	367739172.3	1.460710179	0.327707004
coumarin	4091226	4229513	3662743	3721354	3895613	3772185		3994494	3796384	0.950404231	0.328769158
malonic dialdehyde_acrylate_methylglyoxal	54171344	57664054	54192530	53620111	55813223	47056504		55342642.67	52163279.33	0.942551292	0.330876546
2-Hydroxybutyrate_3-Hydroxybutyrate_3-hydroxy-2-methylpropanoate	413884747	435775514	407083933	443330215	413246256	444444248		418914731.3	433673573	1.035231136	0.332287758
L-pipecolic acid	84324832	90663872	85696395	89407989	104675324	86358692		86895033	93480668.33	1.075788398	0.332900905
histamium	2154346	1884064	7331816	4177694	10654413	5286204		3790075.333	6706103.667	1.769385323	0.336523138
NAD(1-)	167272478	180854726	159384519	177556926	149926777	133580190		169170574.3	153687964.3	0.908479296	0.339349042
indole	7985994	9179435	8609131	8817624	8872550	9309459		8591520	8999877.667	1.047530317	0.340934643
D-Fructose 16-bisphosphate	16046573	18684249	16945590	19275726	10951228	12994580		17225470.67	14407178	0.83638806	0.342891441
Nicotinamide	91255303	154646214	143370436	144236132	186401535	138029057		129757317.7	156222241.3	1.20395708	0.345013612
dCTP	6884082	4220225	4014181	5636573	2260815	2814941		5039496	3570776.333	0.708558224	0.351874528
arachidonate_eicosatetranoic acid	4128411	5355554	6661431	4327363	22292074	7223261		5381798.667	11280899.33	2.096120653	0.352839473
NN-dimethyldopaminequinone_(-)-Salsolinol-2	415849574	574480466	483452112	469010198	390946284	451347824		491260717.3	437101435.3	0.889754503	0.353793149

glutathione disulfide_pos	214527208	179670652	189988804	224365312	232740813	184111555		194728888	213739226.7	1.097624646	0.355803619
erythro-5-hydroxy-L-lysinium(1+)	413885.7	477560.6	429901.9	456138.1	597045.9	436870.6		440449.4	496684.8667	1.127677474	0.356398689
3-dehydro-L-gulonate_D-glucuronate_L-iduronate	8257837	9825363	5583985	9860173	7870898	10544269		7889061.667	9425113.333	1.19470651	0.356533519
hexadecanediocacid	3275172	3520885	4230677	2773360	3786305	3205771		3675578	3255145.333	0.885614544	0.363216155
cervonic acid C22-6 n-3_docosahexaenoate	1323938	1153467	1544447	1170769	6232704	1605008		1340617.333	3002827	2.239883765	0.363850856
(R)-2-hydroxy-4-methylpentanoate_Hydroxyisocaproic acid	137228751	149495606	136986934	143797855	143523004	151182414		141237097	146167757.7	1.034910521	0.365227679
CMP-N-acetyl-beta-neuraminate(2-)	21167910	18538721	18982307	22592344	22639679	18411133		19562979.33	21214385.33	1.084414852	0.36571482
CTP(4-)	107591327	22474761	30323975	49236850	6169101	12548065		53463354.33	22651338.67	0.423679714	0.366611862
12S-HHT	1681282	1721217	2144820	2056653	1859441	2152301		1849106.333	2022798.333	1.093932943	0.368565909
ADPmannose_GDP-L-fucose_ADP alpha-D-glucoside	6878483	7191913	5434233	6715570	5306381	5316620		6501543	5779523.667	0.888946465	0.370043983
glutathione disulfide_neg	235238701	208365163	225717469	234786999	278005045	216441626		223107111	243077890	1.089512068	0.371778695
3-Sulfino-L-alanine	136493054	159805617	148216710	218694818	161684570	138649848		148171793.7	173009745.3	1.167629419	0.371930987
D-glycerate	7875080	9033083	11298081	7093056	9589469	7772451		9402081.333	8151658.667	0.867005759	0.374200581
N-acetyl-D-glucosamine 6-phosphate_N-Acetyl-D-glucosamine 1-phosphate_N-Acetyl-D-galactosamine 1-phosphate_N-acetyl-D-mannosamine 6-phosphate	11144457	8892008	10152079	10718005	10159707	11653635		10062848	10843782.33	1.077605697	0.375606948
bilirubin(2-)	265065	213571	229622.6	283328.1	151036.9	117806.6		236086.2	184057.2	0.779618631	0.380159958
Perillic acid	2519173	2513871	2755156	2417970	2365281	2653320		2596066.667	2478857	0.954851057	0.380550813
6-phosphonatooxy-D-gluconate	5436032	5695032	6016114	7085146	4513153	11863540		5715726	7820613	1.368262404	0.385001292
2-aminoacrylic acid	74360146	76456263	71317222	69853117	77872036	47601867		74044543.67	65109006.67	0.879322141	0.385325893
Fumarate_Maleic acid	700652851	692713786	696157713	736660895	653115307	488022834		696508116.7	625933012	0.898672962	0.388912266
D-Erythrose 4-phosphate	1605517	1508697	1089024	1126527	1441501	1083180		1401079.333	1217069.333	0.868665538	0.397936389
N2-Formyl-N1-(5-phospho-D-ribosyl)glycinamide	2233611	3580965.1	4330277.6	2708128	3681324.8	824086.5		3381617.9	2404513.1	0.711054049	0.400266159
alpha-D-Ribose 1-phosphate_alpha-D-Ribose 5-phosphate_D-xylulose 5-phosphate_D-ribulose 5-phosphate_D-Xylulose 1-phosphate	16859903	14803143	13379605	13222556	19865630	18068017		15014217	17052067.67	1.135728068	0.411781742
3-methyl-2-oxobutanoate_2-keto-isovalerate	166583072	161911291	188669862	200461805	170166622	179095718		172388075	183241381.7	1.06295857	0.423987953
aspartate	452434757	458825946	410416642	408244405	475086214	284373106		440559115	389234575	0.883501355	0.425427053
UMP_3-UMP	139936868	202308618	273003476	199802292	492601203	199879120		205082987.3	297427538.3	1.450278944	0.428340082
UMP	24669287	33023721	48972490	34373576	75582142	36338533		35555166	48764750.33	1.37152363	0.433762063
xanthosine	1261076.7	1063201.9	1081391.1	1179167.7	1068398.8	876502.3		1135223.233	1041356.267	0.91731409	0.436336074
Hydroxyphenylacetic acid	11896179	11404895	10668994	11129661	16059221	11020349		11323356	12736410.33	1.124791125	0.452479705
creatine	336110547	357835644	302824760	338111938	342036793	359265115		332256983.7	346471282	1.042781037	0.456603388
phytanate_arachidate	5130955	4042061	5850853	4485693	5368391	3133625		5007956.333	4329236.333	0.864471662	0.462367649
ADP_dGDP_neg	917778169	826934822	726793664	861545785	729954206	699829192		823835551.7	763776394.3	0.927098124	0.463734482
gulonate	138454387	143989550	126213399	151008953	121389072	95648842		136219112	122682289	0.900624642	0.466398991
L-tyrosine	131184690	138019976	118165252	130369105	138456213	133491754		129123306	134105690.7	1.038586254	0.472066247
omega hydroxy hexadecanoate (n-C16-0)	14222289	16229750	16970933	12912814	16202839	15291614		15807657.33	14802422.33	0.936408351	0.47585718
clupanodonic acid_docosa-4_7_10_13_16-pentaenoic acid	840738.4	535484.8	1224818.6	503151.3	3202005.7	917719		867013.9333	1540958.667	1.777317073	0.478225622
5-Methylthioadenosine	139925288	157408173	238014006	289542679	225632809	142427658		178449155.7	219201048.7	1.22836697	0.478720239
tyraminium	196206283	329556699	160210413	21349982	15806815	359327664		228657798.3	132161487	0.577988103	0.482312551
L-argininium_D-argininium	504127586	569904003	523328458	543924534	641380543	512646849		532453349	565983975.3	1.062973829	0.482929572
trans-45-epoxy-2(E)-decenal	1846951	2117131	1947610	1737649	1673323	2131202		1970564	1847391.333	0.937493699	0.492884568
L-aspartate(1-)	1664918428	1900551022	1647631182	1640605508	1900978069	1129042676		1737700211	1556875418	0.895940167	0.494735131
CMP(2-)	19112573	19567578	27419842	22469232	52094223	16873838		22033331	30479097.67	1.383317741	0.494756124
Oxaloacetate	2576123	2360180	2192300	2481323	2211797	2067474		2376201	2253531.333	0.94837572	0.497192881
NAD+_neg	85521949	74331269	78258934	86700212	68874843	66985759		79370717.33	74186938	0.93468902	0.504898256
4-Imidazolone-5-propanoate	13828345	12294058	11396025	12417737	12736477	9828788		12506142.67	11661000.67	0.932421849	0.507573466
6(S)-hydroxy-tetradeca-2E4E8Z-trienoate_6(R)-hydroxy-tetradeca-2E4E8Z-trienoate	2234789	2379343	2895761	2477017	2191181	2369708		2503297.667	2345968.667	0.937151302	0.50904164
uridine	216708297	259828288	288167971	208155201	278196941	212149803		254901518.7	232833981.7	0.913427205	0.513039404
2-methylglutaconic acid	30514828	40458762	32177824	27826052	43258108	45539366		34383804.67	38874508.67	1.130605209	0.518883811
D-glucose	113200292	107967483	115097067	117076396	107909102	100184762		112088280.7	108390086.7	0.967006417	0.525768234
L-threonine	254720421	253775067	279557706	300274786	320745764	227841565		262684398	282954038.3	1.077163473	0.528717063
Urocanate	5608738	15505846	16534867	8069969	13920065	7271746		12549817	9753926.667	0.777216645	0.529400231
stearoylcarnitine	952307.7	1939833.6	2064251.3	665044.1	2226706.1	827282.7		1652130.867	1239677.633	0.750350749	0.534652846
Dodecanedioic acid	7832318	8354013	8561354	8336846	8739280	8213628		8249228.333	8429918	1.021903827	0.53821321
lipoamide	1686564	1887314	1799607	2159545	2602482	1355170		1791161.667	2039065.667	1.138404034	0.539198338
homoserine	254537666	253554556	279299375	299828578	319602270	226976871		262463865.7	282135906.3	1.074951425	0.540012549
ecgonine	8189039	13555714	13081271	9903121	6692772	13191993		11608674.67	9929295.333	0.855334103	0.544962206
8(R)-hydroxy-hexadeca-2E4E6E10Z-tetraenoate_8(S)-hydroxy-hexadeca-2E4E6E10Z-tetraenoate	284530.1	357011.8	473604.5	351385.7	275652.2	367505.7		371715.4667	331514.5333	0.891850254	0.551621281
Diphosphate	718798328	733185845	638669431	531826018	729033706	697706536		696884534.7	652855420	0.936820072	0.551959246
benzoate	8236354	8832619	6878547	7687359	7714143	7410216		7982506.667	7603906	0.952571206	0.553621585
3-hydroxyanthranilate	3331949	3595209	3671111	3287680	3514030	3543895		3532756.333	3448535	0.97615988	0.554653581
cholesterol sulfate	11262038	7524368	9216492	9131730	9907705	5722109		9334299.333	8253848	0.884249337	0.555012859
uracil	58134138	70944962	68407483	70935140	61399739	52315683		65828861	61550187.33	0.935003073	0.55504216
glycine	222862607	217246988	225554211	281727202	278353988	173852070		221887935.3	244644420	1.102558459	0.556324208
pentadecanoate	60067497	54538585	84887958	67434911	89154983	65618507		66498013.33	74069467	1.113859848	0.562666205
gama-L-glutamyl-L-alanine_5-L-Glutamyl-L-alanine-1	3632348	4088286	4100506	2961585	4806466	2840008		3940380	3536019.667	0.897380371	0.570179948
palmitoleate	16300373	22603299	32903400	17532712	74421807	16442268		23935690.67	36132262.33	1.509555869	0.57028324
pyruvate	147080607	175888327	163569587	168353398	159728895	176188623		162179507	168090305.3	1.036446025	0.571543355
NADPH(4-)	66579.31	555377.81	2582987.35	2772283.69	2516241.94	47415.12		1068314.823	1778646.917	1.664908956	0.573759834
salsolinol 1-carboxylate	6819325	7935195	6914481	7575176	7162207	5749545		7223000.333	6828976	0.945448662	0.581596315
CDPcholine	6558019	5361766	5562125	4137512	7618392	3238862		5827303.333	4998255.333	0.85773042	0.581899763
stearate	210744314	208951854	304033020	202965306	275434633	164157007		241243062.7	214185648.7	0.887841691	0.582230848
Riboflavin	2582286	3578363	2315586	2148366	3582097	3923280		2825411.667	3217914.333	1.138918753	0.587222827
agmatinium(2+)	1386732	1582285	1564745	1587370	1598912	1474965		1511254	1553749	1.028119032	0.596184952
creatinine	18102508	21525737	22680127	30512196	21502536	17365023		20769457.33	23126585	1.113490094	0.597633541
3-oxo-6(R)-hydroxy-tetradec-8-cis-enoate_3-oxo-6(S)-hydroxy-tetradec-8Z-enoate	4966575	5137273	4951638	4729057	5239805	5468625		5018495.333	5145829	1.025372877	0.604109968
2-oxoglutarate(2-)	293848219	314755846	229585035	382117269	170590674	424389899		279396366.7	325699280.7	1.165724825	0.604940896
guanosine	15842505	14367455	9807608	17594311	12026653	14420480		13339189.33	14680481.33	1.100552737	0.610196119
Guanine	72625527	87421501	70633727	58649146	113122558	85714251		76893585	85828651.67	1.116200417	0.618807735
N-methyl-467-trihydroxy-1234-tetrahydroisoquinoline	71988781	90953153	97090506	126927581	116380630	54901088		86677480	99403099.67	1.146815755	0.619709134
Hypotaurine	56503833	51544316	42219511	46280496	52199015	44329078		50089220	47602863	0.950361435	0.632448793
N-Formimidoyl-L-glutamate	27593795	24895172	23984893	23831702	28714717	19615187		25491286.67	24053868.67	0.943611399	0.639807502
spermidine dialdehyde-1	19740567	20461551	20189809	18784352	21767038	18149623		20130642.33	19567004.33	0.972000993	0.645472795
trans-4-coumarate_keto-phenylpyruvate_cis-2-coumarate	24193077	23714936	21156192	22593015	24619407	23495906		23021401.67	23569442.67	1.023805718	0.64740977
sn-Glycero-3-phosphocholine	2215365408	2076603250	1419604906	2214784748	1834002852	2059060342		1903857855	2035949314	1.069380946	0.649303209

912-Oct-13-diepoxy-octadecanoate_11-HpODE_13(S)-HPODE	5120233	6326932	6038274	4375349	11736574	4852411		5828479.667	6988111.333	1.198959546	0.654993817
sarcosine	1554985592	1803718863	1929530569	1849563317	1890634034	1179336652		1762745008	1639844668	0.930279002	0.655600912
leucine-isoleucine	64932947	66844333	63411510	61232336	70650280	57499331		65062930	63127315.67	0.97025012	0.656631732
phenylacetate_(4-hydroxyphenyl)acetaldehyde	19976203	20201667	17896685	16828633	18935000	20467016		19358185	18743549.67	0.968249331	0.657330497
D-fructose	107776204	141887111	97646087	80635361	136467633	172244490		115769800.7	129782494.7	1.121039286	0.662958361
tetradecenoate (n-C14-1)	4883923	5733622	5482469	4889737	7750924	4845916		5366671.333	5828859	1.086121851	0.666012104
(R)-Pantothenate	1121580483	1150414940	1215157785	1384632789	1055730273	815903838		1162384403	1085422300	0.933789457	0.66912755
adenosine 3-5-bismonophosphate(PAP)_Dgdp_ADP	334839634	369358450	345179520	387558307	341040172	345255599		349792534.7	357951359.3	1.023324754	0.674428071
Carbamoyl phosphate	2169906	1924068	2656663	2645372	2498515	1977309		2250212.333	2373732	1.054892449	0.69757406
5-methoxytryptophol	8973795	8819977	6781212	7171906	7403729	8896805		8191661.333	7824146.667	0.955135515	0.700711602
omega hydroxy tetradecanoate (n-C14-0)	2099206	2544727	2415121	1921667	2638350	2195006		2353018	2251674.333	0.956930348	0.702843367
laurate	203398983	222477469	251704577	214653904	343354504	182045178		225860343	246684528.7	1.092199389	0.70507349
1011-dihydro-12-epi-leukotriene B4	1500721	1578216	3751377	1764747	2503498	1600902		2276771.333	1956382.333	0.859279237	0.705180767
4-hydroperoxy-2-nonenal	90769265	93048771	77340920	81821199	91243564	95591887		87052985.33	89552216.67	1.028709312	0.714663861
2-methylbutyrylglycine_isovalerylglycine	8168050	8858918	8726532	8702078	8908149	7642085		8584500	8417437.333	0.980539034	0.726812943
Alanine	2121676921	2498177309	2608406853	2626401225	2519763097	1721745051		2409420361	2289303124	0.950146833	0.727434885
Phosphoenolpyruvate	5767910	10022646	6416276	5099197	6121081	9022125		7402277.333	6747467.667	0.911539431	0.73014489
35-dihydroxy-34-dihydro-14-benzothiazine	6555114	9615125	8941536	6142115	2127401	13166960		8370591.667	7145492	0.853642405	0.733634043
omega hydroxy dodecanoate (n-C12-0)	8091262	8133183	8760826	7669158	9312559	8535633		8328423.667	8505783.333	1.021295707	0.750987285
Methionine sulfoxide	13640072	16227113	16682710	18267414	16735099	13320139		15516631.67	16107550.67	1.038082943	0.751552488
palmitate	522697088	529127244	921360000	524482521	818240666	458220176		657728110.7	600314454.3	0.912709134	0.75542927
dTMP_neg	7006522	6670692	9387914	6899867	12437573	5899829		7688376	8412423	1.094174244	0.759183138
sebacicacid	10203413	12967399	19838472	9099666	18601670	11346411		14336428	13015915.67	0.90789112	0.760890696
L-xylonate_L-lyxonate	33063653	30380053	33878708	30993523	33975443	30979809		32440804.67	31982925	0.985885687	0.768334442
N-acetyl-seryl-aspartate	6062283	4872818	5238863	5808975	5605269	5128303		5391321.333	5514182.333	1.022788662	0.776982154
2-oxoglutaramate	12957231	16368024	14515224	15100797	15411241	12066068		14613493	14192702	0.97120531	0.786479933
Atrolactic acid_Phenyllactic acid	12867224	12318228	12824076	11761150	13418855	13306147		12669842.67	12828717.33	1.012539593	0.791819372
(4-hydroxy-3-methoxyphenyl)acetaldehyde	14092322	13647753	14162767	12974292	14848763	14583678		13967614	14135577.67	1.012025223	0.795858008
imidazol-4-ylacetate_thymine	5850418	5658088	4435983	6798917	5245373	2922736		5314829.667	4989008.667	0.938695872	0.80107623
NADPH	10000	826433.1	1726963.9	1821846.7	1154433.2	136560.3		854465.6667	1037613.4	1.214341828	0.805738319
dTMP	723108.7	819243.3	1232942.8	823097.6	1449037.6	715255.9		925098.2667	995797.0333	1.07642298	0.811202341
trans-vaccenate_elaidate_oleate	77151829	85481424	173105416	80622322	242563304	61937769		111912889.7	128374465	1.147092756	0.812679456
Galactosylglycerol	16260408	23943603	27434841	8971898	59692379	11189368		22546284	26617881.67	1.180588414	0.821207496
timnodonic acid C20-5n-3_1314-epoxy-retinol_4-hydroxyvitamin A1_14-hydroxy-414-retro-retinol	1643876	1553989	3043446	1415370	2578648	1835544		2080437	1943187.333	0.934028444	0.827490019
9(10)-EpOME_12(13)-EpOME	3738882	4760939	6654232	3518990	9945903	3295866		5051351	5586919.667	1.106024837	0.830313928
myristate	89087273	97931219	131492980	92594851	148292596	92842456		106170490.7	111243301	1.047779852	0.833275799
Phosphodimethylethanolamine	3209856	2507713	4081773	5732424	2353434	2500352		3266447.333	3528736.667	1.080298045	0.836740361
3-oxo-10(R)-hydroxy-octadeca-6E8E12Z-trienoate_3-oxo-10(S)-hydroxy-octadeca-6E8E12Z-trienoate	1546044	1764486	3318024	2326317	2345367	2314196		2209518	2328626.667	1.053907081	0.841382192
decanoyl carnitine	866877.8	1160845	1336392.5	1077789.9	1599493.8	852039.1		1121371.767	1176440.933	1.049108751	0.842785422
margarate	15040677	14789608	25315112	15837840	23253409	13205951		18381799	17432400	0.948351138	0.846248025
5-amino-1-(5-phospho-D-ribosyl)imidazole	15750763	21120907	9011644	10924821	18134691	19327150		15294438	16128887.33	1.054559006	0.858098537
(-)-trans-carveol_alpha-pinene oxide_perillyl alcohol	4161858	4146507	4120088	4178519	3835375	4338236		4142817.667	4117376.667	0.99385901	0.872585026
allantoin	18251360	17626468	15179966	12187804	21421423	16209992		17019264.67	16606406.33	0.975741706	0.891159641
11-cis-eicosenoate	2992378	2674145	4953445	2593462	6253366	2381914		3539989.333	3742914	1.057323525	0.895086355
5-guanidino-2-oxopentanoic acid	3608712	4032120	6019506	5462057	4677869	3844250		4553446	4661392	1.023706441	0.908054425
Adrenaline	18961577	28846400	15554345	10479249	31678949	18676675		21120774	20278291	0.960111168	0.914235128
linoelaidic acid (all trans C18-2)_linoleate_octadecadienoate (n-C18-2)	62685027	102502369	215127932	74654241	289730802	46656707		126771776	137013916.7	1.080791963	0.914242861
Ornithine	44318305	51228817	51581252	50667182	54654597	43156419		49042791.33	49492732.67	1.009174464	0.91824411
9_10-hydroxyoctadec-12(Z)-enoate_12_13-hydroxyoctadec-9(Z)-enoate	3737838	4102313	4395076	3290369	5373444	3779274		4078409	4147695.667	1.016988651	0.921090582
L-3-Cyanoalanine_56-dihydrouracil	43445985	41769497	50407048	47605039	52812712	36853636		45207510	45757129	1.012157692	0.923712391
shikimate	51240906	63953136	61163518	49671437	58079457	70732856		58785853.33	59494583.33	1.012056132	0.926678132
dihomo-gamma-linolenic acid (n-6)	2117812	1593527	3715447	1791430	4274661	1650132		2475595.333	2572074.333	1.03897204	0.932153679
thiamine(1+)	30017132	39911869	33574221	23181721	44056400	37609287		34501074	34949136	1.0129869	0.950740422
3(S)10(R)-OH-octadeca-6-trans-412-cis-trienoate	2168252	2162872	2642728	2243126	2122514	2645557		2324617.333	2337065.667	1.005355003	0.958400483
Flavin adenine dinucleotide oxidized	1640960	1528937.5	1303542.1	2034702.5	987861.2	1410705.6		1491146.533	1477756.433	0.991020265	0.968611793
2-Deoxyribose	2723295	2723092	3623247	3325780	3505695	2292977		3023211.333	3041484	1.006044125	0.971603399
orotate	41095198	53823833	45086357	38665416	61679348	40389042		46668462.67	46911268.67	1.005202785	0.978065025
gama-glutamylglutathione	1832448.3	1592251	1187566.4	424558.2	3846204.8	442493		1537421.9	1571085.333	1.021896028	0.978107154
5-hydroxytryptophol_12-dehydrosalsolinol_NN-dimethylindoliumolate-1	1596752	2191818	1683841	1183352	2352202	1969200		1824137	1834918	1.005910192	0.979317327
Taurine	4169110330	4232012395	3573224824	3907412061	4005276823	4078571257		3991449183	3997086714	1.001412402	0.980398529
L-asparagine	469992025	460461252	579468025	549531476	559719346	396216582		503307100.7	501822468	0.997050245	0.982930941
56-dihydrothymine	138950924	146000185	137114769	139444239	137036193	145842908		140688626	140774446.7	1.000610004	0.982944816
anthranilate	39557014	48532146	49713165	25092230	85779877	25907806		45934108.33	45593304.33	0.99258059	0.987439725
arginine	3488131023	3626162938	3356554766	3648141670	3810228619	3020070982		3490282909	3492813757	1.000725113	0.992504099
4-nitrophenolate	17865054	18965598	18385751	17277041	18272227	19655117		18405467.67	18401461.67	0.999782347	0.996042882
L-Prolinylglycine_Glycylproline	9930400	11924184	12740402	11767023	14071623	8748590		11531662	11529078.67	0.999775979	0.998894554

Supplementary Table 6. Gene ontology analysis of pathways altered based on shared gene expression changes between age-matched Glut1 and control T_{reg} cohorts. Genes identified in RNAseq (Geo accession GSE84919) as $p<0.05$, $\log_2$ 0.3-fold different between normalized cohorts of control and Glut1-tg T_{reg} were analyzed by DAVID Gene Functional Classification Tool. Pathways were sorted by fold-enrichment as increased (positive Fold-Enrichment) or decreased (negative Fold-Enrichment) in Glut1-tg T_{reg}.

Pathway	Fold-Enrichment	Genes
GO:0033138~positive regulation of peptidyl-serine phosphorylatio	18.97765	OSM, LIF, IFNG
GO:0002763~positive regulation of myeloid leukocyte differentiation	8.758917	LIF, TNFSF11, ID2
GO:0007259~JAK-STAT cascade	5.422187	OSM, LIF, IFNG, SOCS1
GO:0008213~protein amino acid alkylation	4.413408	PRMT1, PRMT7, GSPT1, PRMT5, EZH2
GO:0006730~one-carbon metabolic process	3.892852	MTHFD1, MTHFD2, PRMT1, SHMT2, AHCY, PRMT7, GSPT1, GM9826, PRMT5, EZH2, DNMT1, FPGS
GO:0016570~histone modification	3.300462	KAT2A, HDAC2, PRMT7, EZH2, RUVBL2, MBD3, RUVBL1, RBM14
GO:0043414~biopolymer methylation	3.207491	PRMT1, PRMT7, GSPT1, PRMT5, EZH2, DNMT1
GO:0016569~covalent chromatin modification	3.162942	KAT2A, HDAC2, PRMT7, EZH2, RUVBL2, MBD3, RUVBL1, RBM14
GO:0006325~chromatin organization	2.77134	HIST1H2AG, EZH2, CBX5, SET, PRMT7, PRMT5, HIST1H2BJ, HIST1H4F, H2AFX, HIST1H4C, HIST1H4D, HIST1H4I, ASF1B, ASF1A, HIST1H4H, KAT2A, HIST1H2BB, HIST1H1E, MBD3, HDAC2, NPTXR, HIST1H3A, HIST1H2AI, DNMT1, HIST1H3C, RUVBL2, HIST1H3E, RUVBL1, RBM14
GO:0051276~chromosome organization	2.724515	RAD51C, HIST1H2AG, EZH2, CBX5, NCAPH, SET, PRMT7, PRMT5, HIST1H2BJ, HIST1H4F, HIST1H4C, H2AFX, HIST1H4D, HIST1H4I, ASF1B, TOP2A, ASF1A,

		BUB3, HIST1H4H, KAT2A, HIST1H2BB, HIST1H1E, MBD3, RAD54L, MIS12, HDAC2, NPTXR, HIST1H3A, HIST1H2AI, HIST1H3C, DNMT1, RUVBL2, RUVBL1, HIST1H3E, RBM14
GO:0033554~cellular response to stress	2.442668	KIF22, APEX2, MRE11A, ROMO1, HMOX1, IFNG, H2AFX, POLQ, ASF1A, EIF2B5, RAD51AP1, NUDT1, LIG1, EME1, GTF2H4, BRIP1, RAD54L, EEPD1, RAD51, NUPR1, TIMELESS, TDP1, POLD1, RUVBL2, RAD54B, CHAF1A
GO:0016568~chromatin modification	2.090758	KAT2A, HDAC2, NPTXR, PRMT7, PRMT5, EZH2, DNMT1, RUVBL2, MBD3, RUVBL1, RBM14, ASF1B, ASF1A
GO:0006955~immune response	-2.22662	IL18R1, IL1R1, H2-Q5, HC, SLA2, TLR1, GBP9, CD1D1, FOXP3, H2-Q6, TLR6, TRAT1, CD1D2, H60B, CCR7, CBLB, H2-EB2, BNIP3L, GBP10, OAS1B, BCL6, H2-T24, GBP4, CD27
GO:0031327~negative regulation of cellular biosynthetic process	-2.22685	SATB1, SLA2, HR, SMAD3, TTF1, MAF1, FOXP3, ZFP128, NRIP1, CITED2, EPC1, CIR1, RNF2, TIA1, TRPS1, TGIF1, ZFP281, PER1, BCL6, EIF2AK3, NR1H3
GO:0002684~positive regulation of immune system process	-2.43481	GM614, CBLB, HC, BCL6, CD1D1, H2-Q6, FOXP3, GM5511, TRAT1, CD27, CLEC2I, CD1D2
GO:0009725~response to hormone stimulus	-2.48713	IRS2, FOXO1, PDE3B, JAK2, LPIN1, PIK3R1, HMGB1-PS5, ACVR1C, NR1H3
GO:0051249~regulation of lymphocyte activation	-2.53318	GM614, CBLB, BCL6, CD1D1, FOXP3, GM5511, CD27, CLEC2I, CD1D2
GO:0045087~innate immune response	-2.55686	IL18R1, IL1R1, HC, TLR1, TLR6, CD1D1, CD1D2
GO:0050865~regulation of cell activation	-2.63061	GM614, CBLB, BCL6, RORA, CD1D1, FOXP3, GM5511, CD27, CLEC2I, CD1D2
GO:0002694~regulation of leukocyte activation	-2.66478	GM614, CBLB, BCL6, RORA, CD1D1, FOXP3, GM5511, CD27, CLEC2I, CD1D2

GO:0045321~leukocyte activation	-2.70669	SATB1, SLA2, TLR1, JAG2, SMAD3, FOXP3, CD1D1, CD1D2, H60B, CBLB, CXCR4, BCL6, PIK3R1, CD27
GO:0009719~response to endogenous stimulus	-2.72593	GNAL, IRS2, FOXO1, PDE3B, JAK2, LPIN1, PIK3R1, DDIT3, HMGB1-PS5, ACVR1C, NR1H3
GO:0044092~negative regulation of molecular function	-2.76347	ADRB2, SPRY1, S1PR1, CDKN1B, ZFYVE28, JAK2, FOXP3, DDIT3
GO:0051094~positive regulation of developmental process	-2.76993	GM614, FGFR1, EPC1, ADRB2, ETS1, PLXNB1, BTG1, TGIF1, CD1D1, FOXP3, GM5511, CD27, HMGB1-PS5, CD1D2
GO:0046649~lymphocyte activation	-2.86475	H60B, SATB1, CBLB, CXCR4, SLA2, JAG2, SMAD3, BCL6, CD1D1, FOXP3, PIK3R1, CD27, CD1D2
GO:0045597~positive regulation of cell differentiation	-2.86612	GM614, EPC1, ETS1, PLXNB1, BTG1, TGIF1, CD1D1, FOXP3, GM5511, CD27, HMGB1-PS5, CD1D2
GO:0001817~regulation of cytokine production	-2.95234	TIA1, TLR1, BCL6, TLR6, CD1D1, H2-Q6, FOXP3, CD27, CLEC2I, CD1D2
GO:0042110~T cell activation	-3.14464	SATB1, CBLB, CXCR4, SLA2, JAG2, SMAD3, CD1D1, FOXP3, CD1D2
GO:0050863~regulation of T cell activation	-3.37758	GM614, CBLB, BCL6, CD1D1, FOXP3, GM5511, CD27, CLEC2I, CD1D2
GO:0032318~regulation of Ras GTPase activity	-3.4198	SPRY1, S1PR1, ASAP1, BCL6, RICTOR, ARAP2
GO:0043087~regulation of GTPase activity	-3.43206	SPRY1, S1PR1, RASGRP3, ASAP1, BCL6, RICTOR, ARAP2
GO:0051098~regulation of binding	-3.54646	ADRB2, SMAD3, JAK2, FOXP3, EIF2AK3, DDIT3, JMY
GO:0043434~response to peptide hormone stimulus	-3.83977	IRS2, FOXO1, PDE3B, JAK2, LPIN1, PIK3R1, ACVR1C, NR1H3
GO:0045619~regulation of lymphocyte differentiation	-4.71696	GM614, BCL6, CD1D1, FOXP3, GM5511, CD27, CD1D2
GO:0030335~positive regulation of cell migration	-4.92944	IRS2, S1PR1, PIK3R1, HMGB1-PS5
GO:0042035~regulation of cytokine biosynthetic process	-4.98721	TIA1, TLR1, TLR6, CD1D1, FOXP3, CD27, CLEC2I, CD1D2

GO:0032868~response to insulin stimulus	-5.40985	IRS2, FOXO1, PDE3B, LPIN1, PIK3R1, ACVR1C, NR1H3
GO:0032870~cellular response to hormone stimulus	-5.50312	IRS2, FOXO1, PDE3B, JAK2, LPIN1, PIK3R1, NR1H3
GO:0045580~regulation of T cell differentiation	-5.69966	GM614, BCL6, CD1D1, FOXP3, GM5511, CD27, CD1D2
GO:0032649~regulation of interferon-gamma production	-5.69966	CD1D1, H2-Q6, FOXP3, CD27, CD1D2
GO:0051100~negative regulation of binding	-6.07964	ADRB2, JAK2, FOXP3, DDIT3
GO:0032869~cellular response to insulin stimulus	-6.36242	IRS2, FOXO1, PDE3B, LPIN1, PIK3R1, NR1H3
GO:0008286~insulin receptor signaling pathway	-6.5139	IRS2, FOXO1, PIK3R1, NR1H3
GO:0046634~regulation of alpha-beta T cell activation	-6.70549	GM614, CBLB, BCL6, CD1D1, FOXP3, CD1D2
GO:0045621~positive regulation of lymphocyte differentiation	-6.70549	GM614, CD1D1, FOXP3, GM5511, CD27, CD1D2
GO:0045582~positive regulation of T cell differentiation	-7.12458	GM614, CD1D1, FOXP3, GM5511, CD27, CD1D2
GO:0046637~regulation of alpha-beta T cell differentiation	-8.29042	GM614, BCL6, CD1D1, FOXP3, CD1D2
GO:0045076~regulation of interleukin-2 biosynthetic process	-9.77085	CD1D1, FOXP3, CLEC2I, CD1D2
GO:0002711~positive regulation of T cell mediated immunity	-10.5225	CD1D1, H2-Q6, FOXP3, CD1D2
GO:0043370~regulation of CD4-positive, alpha beta T cell differentiation	-12.4356	GM614, BCL6, FOXP3
GO:0045072~regulation of interferon-gamma biosynthetic process	-12.4356	CD1D1, FOXP3, CD27, CD1D2