

SUPPLEMENTAL INFORMATION

Material and Methods

Primers used for RT-PCRs: *mGapdh* forward 5'GGTGAAGGTCGGTGTGAA3', reverse 5'GTGTAGTCACGAAGGCATTGA3'; *mNphs1* forward 5'AAAATGTGACCCTTTGCTGC3', reverse 5'CAATGGCCAAGCATAACCAG3'; *mSulf1* forward 5'GGACCTTTGCTGTGTATCTCAA3', reverse 5'CCGAGCCATTCTCGCCATG3'; *mSulf2* forward 5'CATCCGGCCCAACATCATCTT3', reverse 5'GTGTAGTCACGAAGGCATTGA3'; *mWt1* forward 5'GAGAGCCAGCCTACCATCC3', reverse 5'GGGTCCTCGTGTGTTGAAGGAA3'; *mVegfa* forward 5'GAGATGAGGTTCTACAGCAC3', reverse 5'CACCGCCTTGGCTTGTCACAT3'; *hACTN4* forward 5'GAGGCCAGAGGATCGCT3', reverse 5'ACTTGGAGTTGATGATTTGCGG3'; *hCD2AP* forward 5'GAGGAATGTTCCCTGACAAT3', reverse 5'GTCCATAGGTGCTTATTCGT3'; *hGAPDH* forward 5'GGCTCTCCAGAACATCATCCCTGC3', reverse 5'GGGTGTCGCTGTTGAAGTCAGAGG3'; *hNPHS1* forward 5'CAACTGGGAGAGACTGGGAGAA3', reverse 5'AATCTGACAACAAGACGGAGCA3'; *hNPHS2* forward 5'AAGAGTAATTATATTCCGACTGGGACAT3', reverse 5'TGGTCACGATCTCATGAAAAGG3'; *hPODI* forward 5'ATGCGAGTGCTGAGCAAGGCCTTC3', reverse 5'ACCATAAAGGGCCACGTCAGGTTG3'; *hSynpo* forward 5'CCCAAGGTGACCCCGAAT3', reverse 5'CTGCCGCCGCTTCTCA3'; *hWt1* forward 5'CCGGTGCTTCTGGAAACTACCAGGTG3', reverse 5'GGCTGACCTCGGGAATGTTAGACAAGAT3'.

Antibodies used for immunofluorescence and Western blots: α -Actinin4: Dr. Martin Pollak, Brigham and Women's Hospital Boston, MA, USA; Collagen IV α 4: Dr. Jeffrey Miner, Washington University in St. Louis, MO, USA; α 3-Integrin: Dr. Jordan Kreidberg, Children's Hospital Boston, MA, USA; Nephtrin: Dr. Lawrence Holzman,

University of Michigan, Ann Arbor, MI, USA and Progen, Heidelberg, Germany; Nidogen: Chemicon; p44/42 MAPK: Cell Signaling Technology, Inc., MA, USA; Phospho-p44/42 MAPK: Cell Signaling Technology, Inc., MA, USA; PECAM: clone MEC 13.3, BD Pharmingen; SULF1 and SULF2: Dr. Xingbin Ai, Boston University, MA, USA; Synaptopodin: Dr. Peter Mundel, University of Miami, Miami, FL, USA; α -Tubulin: clone DM 1A, Sigma, Saint Louis, MO, USA; VEGFA (A-20): Santa Cruz Biotechnology, Inc., Santa Cruz, CA, USA; Vimentin: clone LN-6, Sigma, Saint Louis, MO, USA; WT1 (C-19): Santa Cruz Biotechnology, Inc., Santa Cruz, CA, USA; Gold-conjugated anti-rabbit (10 μ m): BioCell, Cardiff, Wales, UK.

siRNAs and StealthTM RNAi: *Sulf1*-specific siRNA was directed against the sequence CACAATGTTGGTGGTAAGAAA and *Sulf2* against TGCAACCGGCTTCATAGAATA. As a negative control the “All stars negative control siRNA” (Qiagen) was used. StealthTM RNAi duplexes were synthesized commercially by Invitrogen Life Technologies, Inc. *mWt1* RNAi (5'-CCCAGCUUGAAUGCAUGACCUGGAA-3'), scramble control RNAi (5'-CCCUCGUAAGUACGUCAUCGGAGAA-3').

Figure Legends

Figure S1. Decreased expression of *Sulf1* in *Wt1* +/- mice. By immunofluorescence staining, *Sulf1* protein levels but not *Sulf2* protein levels are decreased in *Wt1* +/- mice. Pictures for the *Wt1*+/+ and *Wt1*+/- mice were taken with the same exposure time. Nidogen served as a control to demonstrate the integrity of the tissue.

Figure S2. Characteristics of our newly established murine immortalized podocyte cell line. (A) Morphology of podocytes grown at 33°C or at non-permissive 37°C to induce

differentiation. (B) Immunofluorescence on differentiated podocytes using antibodies against WT1, α -Tubulin, Vimentin, α -Actinin4, α 3-Integrin, Synaptopodin, Nephrin and Phalloidin to detect F-actin. (C) Western blot with anti-WT1 antibody. LB22: murine metanephric mesenchymal cell line, HEK293: human embryonic kidney cell line, Podo: our murine immortalized podocyte cell line. (D) RT-PCR to detect *Nphs1* mRNA. M: marker, NTC: no template control, P33: podocytes grown at 33°C, P37: podocytes grown at 37°C, +RT: cDNA synthesis in presence of RT, -RT: cDNA synthesis in absence of RT.

Figure S3. *Sulf1* and *Sulf2* expression in immortalized podocytes. Expression of *Sulf1* and *Sulf2* mRNA detected by RT-PCR in immortalized human and mouse podocytes grown at 33°C or 37°C for 14 days.

Figure S4. Immunofluorescence for WT1, Nephrin, Collagen IV α 4 and PECAM on control kidneys (n=5) and *Sulf1*^{-/-};*Sulf2*^{-/-} mutant kidneys (n=5).

Figure S5. VEGFA expression in glomeruli and in immortalized podocytes. (A) The VEGF-A antibody used for immunogold staining specifically stains podocytes within the glomerulus and by Western blot (B) detects a single band in total protein extracts. HUVEC: human endothelial cells as a VEGF-A-positive control and HEK293: human embryonic kidney cells as a cell line with low levels of VEGF-A. Podo33 and Podo37: immortalized podocytes grown at either 33°C or 37°C. E18.5: embryonic mouse kidney (day E18.5).

Figure S6. VEGFA isoforms expressed in podocytes. (A) Immortalized podocytes cultured at 33°C and 37°C express the three alternative VEGF-A mRNA transcripts encoding VEGF120, 164 and 188. (B) Expression of *Sulf1* and *Sulf2* measured by quantitative RT-PCR 48 hours after transfection of differentiated mouse podocytes with either a scramble siRNA as a control or siRNAs against *Sulf1* or *Sulf2* or both simultaneously. Knockdown experiments were performed independently twice.

Figure S7. Disaccharide analysis of heparin sulfate extracted from immortalized podocytes transfected with either a scramble siRNA or siRNAs against *Sulf1* and *Sulf2*. Disaccharides were generated by exhaustive digestion with heparin lyases I, II, and III and subsequently analyzed by SEC LC/MS. Disaccharides were shown in codes adapted from Lawrence *et al.* (14) and aligned along the X axis by increasing levels of sulfation. Specifically, D0S6 and D2S0 are N-sulfated disaccharides and contain one additional sulfate group at 6-*O*- and 2-*O*-positions of glucosamine, respectively; D2S6 represents the trisulfated disaccharide with N-, 2-*O*- and 6-*O*-sulfate groups. All detected ion species that originate from Δ -unsaturated disaccharides were summed. The standard deviation was calculated from the relative percentages of each Δ -unsaturated disaccharides from triplicate SEC LC/MS runs. Due to detection limit, the saturated disaccharides, which reside on the non-reducing end of the HS chain, were not counted.

Figure S8. *Vegfa* expression in *Sulf* knockdown podocytes. Top panels: qRT-PCR for *Sulf1* and *Sulf2* after knockdown using siRNA. Lower left panel: qRT-PCR for *Vegfa* after knockdown of *Sulf2* and *Sulf1*. Lower right panel: VEGFA protein levels measured

by Western blot after knockdown of *Sulf2* and *Sulf2*. This experiment was done in duplicates. *Error bars*: \pm SEM.

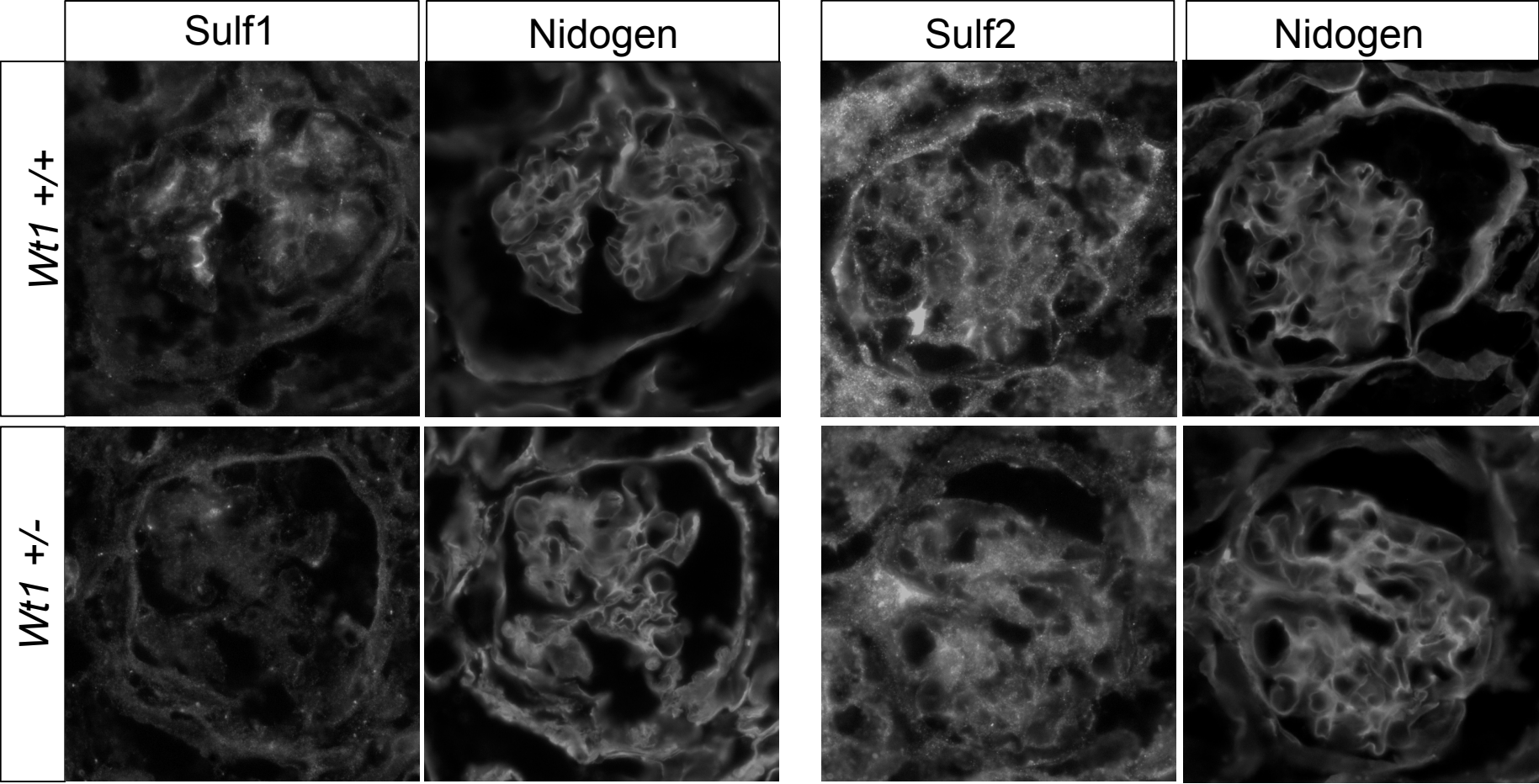


Figure S1

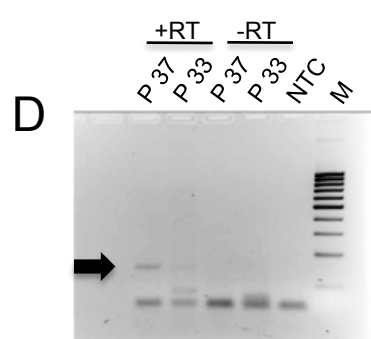
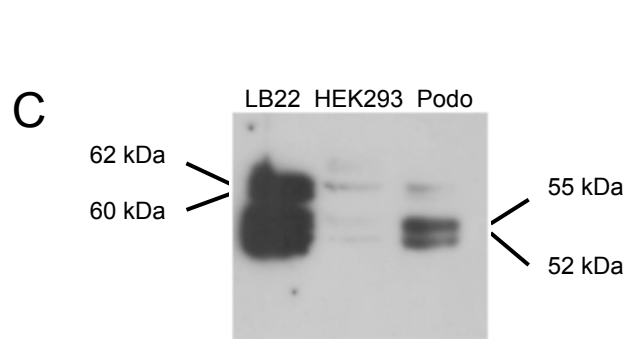
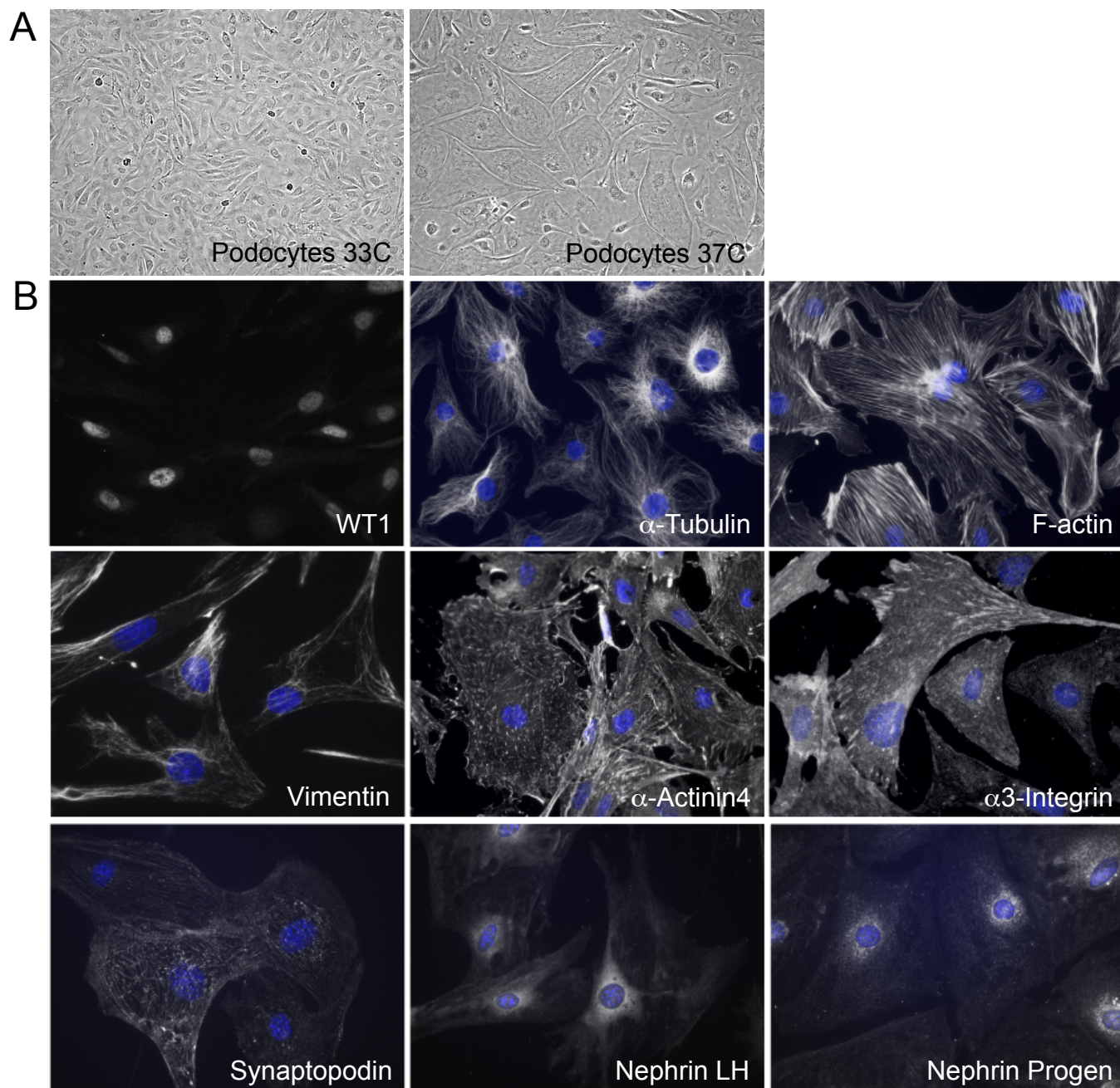


Figure S2



Figure S3

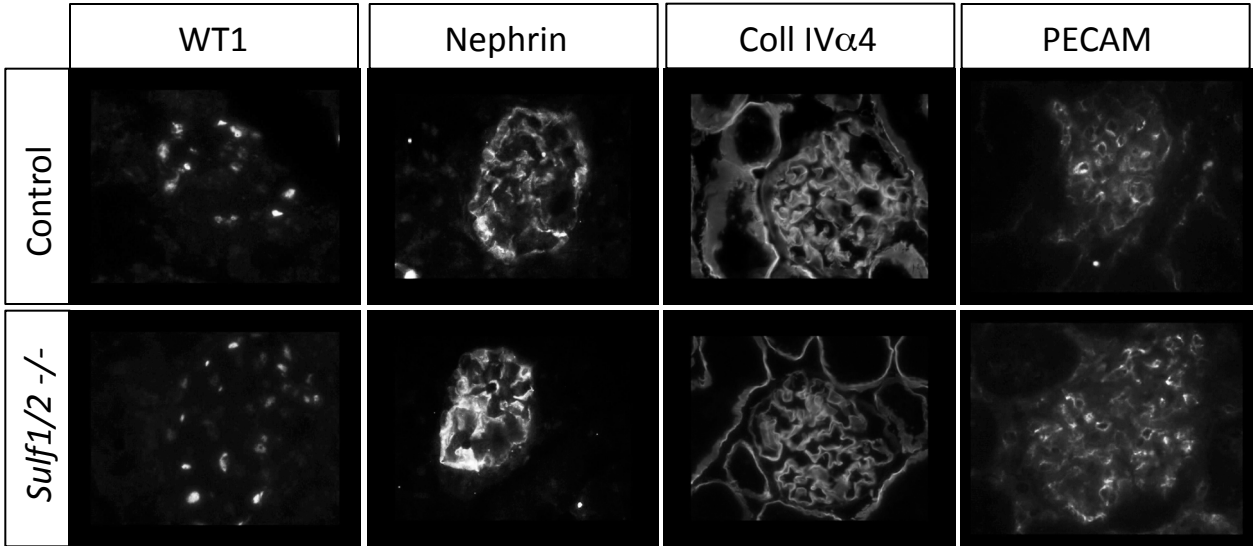


Figure S4

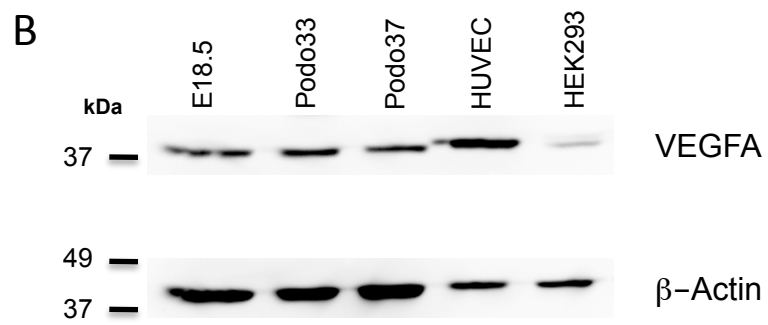
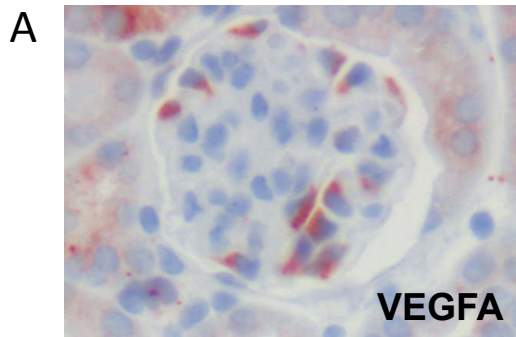


Figure S5

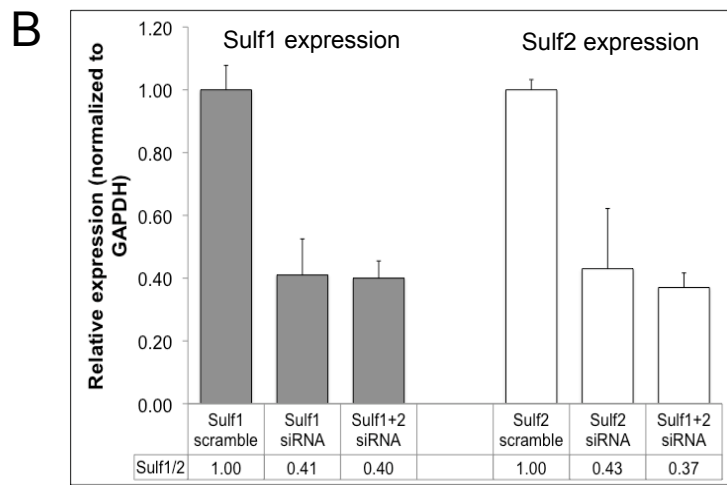
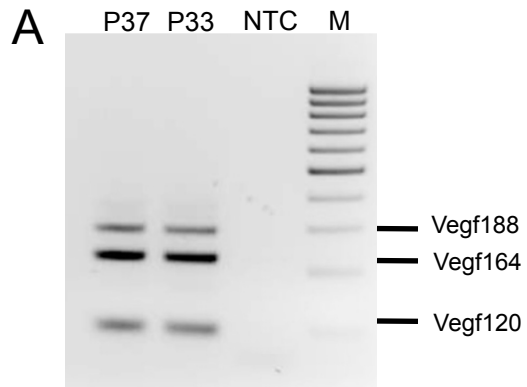


Figure S6

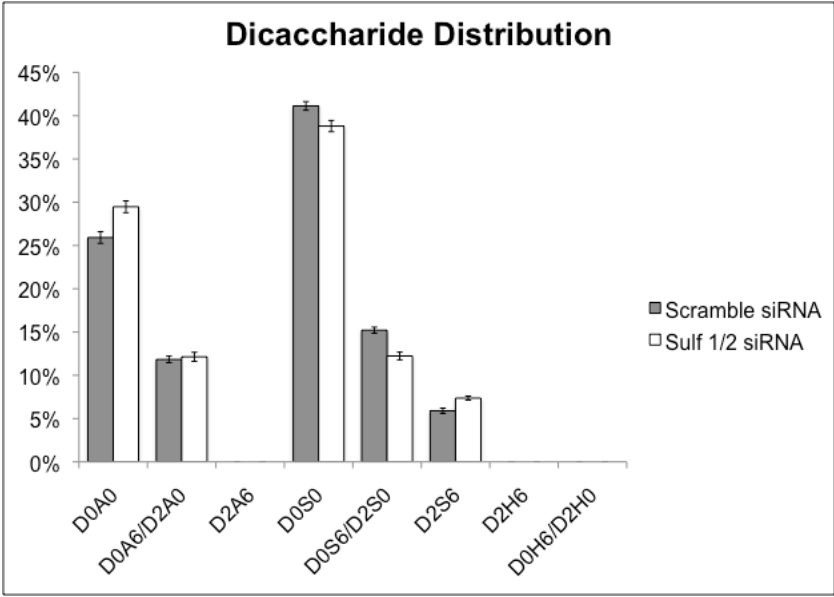


Figure S7

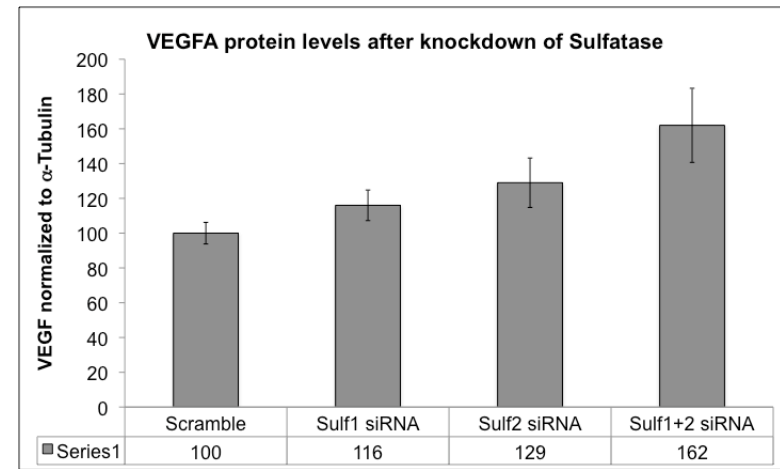
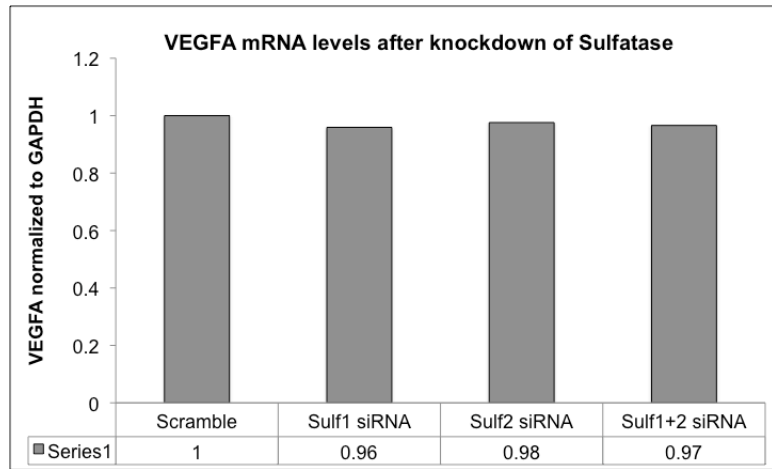
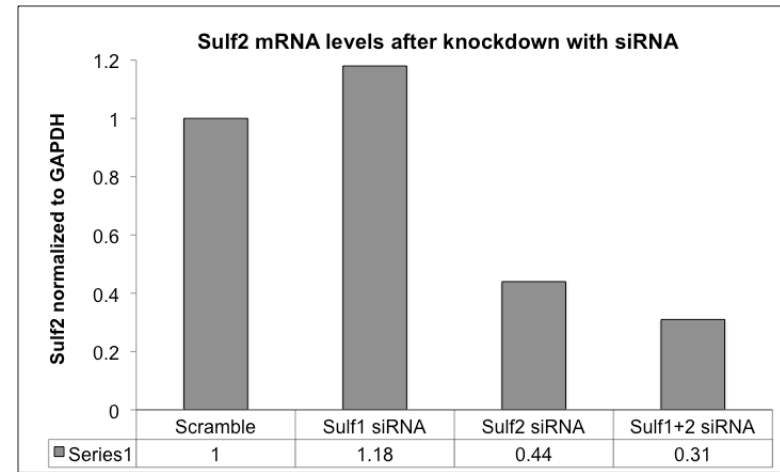
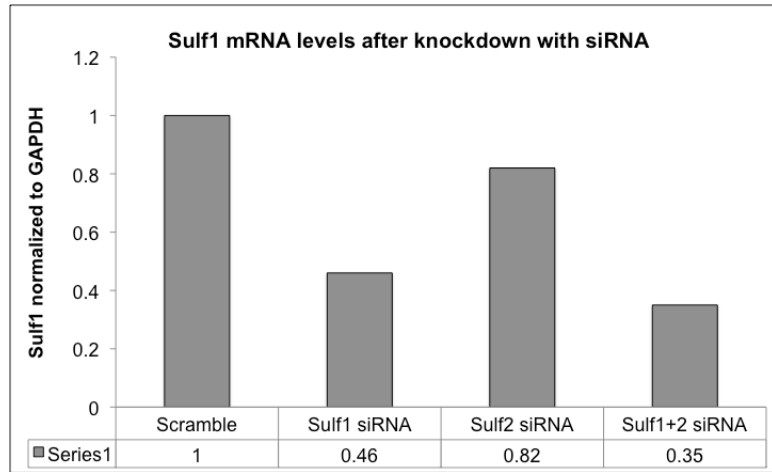


Figure S8

Table S1: Clinical and mutational data of patients and controls and characteristics of the primary human podocyte cell cultures

	DDS1 (NS18)	DDS2 (NS21)	DDS3	Control child	Control adult
Age at Nx (mo)	9	21	13	84	n/n
Indication	DDS	DDS	DDS	Wilms' tumor	Tumor nephrectomy
WT1 mutation	Arg366His	Cys388Arg	Arg394Trp	---	
RT-PCR					
<i>WT1</i>	+	+	+	+	+
<i>Synpo</i>	+	+	+	+	+
<i>POD-1</i>	+	+	+	+	+
<i>NPHS1</i>	+	+	+	+	+
<i>NPHS2</i>	+	+	+	+	+
<i>ACTN4</i>	+	+	n/a	n/a	+
<i>CD2AP</i>	+	+	n/a	n/a	+
Expression array					
<i>WT1</i>	+	+	+	+	+
<i>Synpo</i>	+	+	+	+	+
<i>NPHS1</i>	+	+	+	+	+
<i>NPHS2</i>	+	+	+	+	+
<i>ACTN4</i>	+	+	+	+	+
<i>CD2AP</i>	+	+	+	+	+

NS18, NS21 refer to the patients described in Schumacher et al, 2007. Nx: nephrectomy; Synpo: Synaptopodin; n/n: not known; n/a: not analyzed because we ran out of material.

Table S2: Genes differentially expressed between *Wt1* mutant and control samples

Probe Set Mouse Array	Gene Symbol	p-value	Fold change Het/WT	Probe Set Human Array	p-value	Fold change DDS/Control
1455494_at	Col1a1	1.78E-02	5.73			
1433715_at	Cpne7	1.09E-02	4.00			
1435418_at	Slc22a8	3.00E-02	3.99			
1416342_at	Tnc	1.10E-02	3.85			
1422789_at	Aldh1a2	4.78E-02	3.52			
1427883_a_at	Col3a1	2.95E-02	3.49			
1428572_at	Basp1	1.86E-02	3.40			
1416271_at	Perp	1.45E-02	3.35			
1450757_at	Cdh11	1.27E-04	3.29			
1418866_at	Cyp24a1	1.85E-02	3.27			
1449494_at	Rab3c	6.38E-05	3.11	n/p		
1416658_at	Frzb	3.70E-03	2.97			
1423037_at	Aplnr	6.24E-04	2.91			
1420992_at	Ankrd1	2.78E-02	2.85			
1417378_at	Cadm1	5.61E-03	2.83			
1424525_at	Grp	3.35E-02	2.83			
1439109_at	Ccdc68	3.46E-04	2.73			
1456264_at	Commd7	1.83E-02	2.73	n/p		
1418090_at	Plvap	1.58E-04	2.73			
1423774_a_at	Prc1	2.01E-02	2.71			
1450047_at	Hs6st2	3.91E-02	2.66	n/p		
1450648_s_at	H2-Ab1	3.78E-02	2.66	n/p		
1449368_at	Dcn	2.75E-02	2.65			
1448594_at	Wisp1	1.99E-03	2.64			
1424278_a_at	Birc5	5.94E-03	2.59			
1440955_at	Kcp	3.51E-02	2.53	n/p		
1448194_a_at	H19	4.40E-02	2.48	n/p		
1435792_at	Csprs	2.57E-03	2.48	n/p		
1435370_a_at	Ces3	3.36E-02	2.44			
1457058_at	Adamts2	2.77E-02	2.41			
1454694_a_at	Top2a	4.82E-02	2.39			
1418726_a_at	Tnnt2	4.24E-02	2.31			
1427537_at	Eppk1	1.68E-02	2.31			
1448205_at	Ccnb1	1.09E-02	2.29			
1456144_at	Nav3	7.36E-03	2.27			
1453022_at	Gpihbp1	3.88E-02	2.27	n/p		
1449863_a_at	Dlx5	1.76E-02	2.27			
1434465_x_at	Vldlr	4.16E-02	2.27	209822_s_at	2.79E-02	1.75
1448314_at	Cdc2a	2.07E-02	2.26	n/p		
1424451_at	Acaa1b	4.20E-02	2.23	n/p		
1416612_at	Cyp1b1	4.88E-03	2.23			
1434437_x_at	Rrm2	1.13E-04	2.22			
1420838_at	Ntrk2	2.90E-02	2.21			
1449152_at	Cdkn2b	5.13E-03	2.18			
1424853_s_at	Cyp4a10	3.94E-02	2.16	n/p		
1426278_at	Ifi2712a	3.50E-02	2.15	n/p		
1457266_at	Slc38a6	1.71E-02	2.14			
1436134_at	Scn2b	1.37E-02	2.11			
1430130_at	Vvce	3.48E-02	2.11	n/p		
1415949_at	Cpe	2.07E-03	2.11			
1449740_s_at	Dsg2	3.81E-02	2.11			
1459318_at	Sema6d	4.78E-02	2.11			
1429111_at	Tln2	4.55E-02	2.09			
1452981_at	Cntn1	1.94E-02	2.08			
1436920_at	Pcdh17	6.23E-03	2.08			
1421477_at	Cplx2	1.03E-02	2.07			
1435290_x_at	H2-Aa	3.23E-02	2.07	n/p		
1429051_s_at	Sox11	1.65E-02	2.06	204914_s_at	3.48E-03	1.57
1449151_at	Pctk3	2.25E-02	2.05			
1439827_at	Adamts12	1.67E-03	2.04			
1453102_at	Flrt3	3.58E-02	2.03	219250_s_at	2.42E-02	2.06
1457434_s_at	Ptpla	1.20E-02	2.03			
1421009_at	Rsad2	2.81E-05	2.02			
1419692_a_at	Ltc4s	8.26E-03	2.01			
1451453_at	Dapk2	3.26E-02	1.99			
1444073_at	Maf	4.28E-02	1.98			
1434728_at	Gria3	4.54E-02	1.98			
1418294_at	Epb4.1l4b	3.34E-02	1.97	n/p		

Probe Set Mouse Array	Gene Symbol	p-value	Fold change Het/WT	Probe Set Human Array	p-value	Fold change DDS/Control
1426511_at	Susd2	7.41E-03	1.96	n/p		
1417928_at	Pdlim4	4.32E-02	1.96			
1421712_at	Sele	3.47E-02	1.95			
1426642_at	Fn1	4.59E-02	1.94			
1416321_s_at	Prelp	2.13E-02	1.94			
1455393_at	Cp	1.44E-02	1.94			
1454926_at	Sphkap	4.84E-02	1.93	n/p		
1419675_at	Ngf	7.31E-04	1.93	206814_at	2.90E-04	2.28
1450652_at	Ctsk	4.43E-02	1.92			
1416136_at	Mmp2	2.52E-02	1.92			
1436236_x_at	Cotl1	4.86E-02	1.91			
1417130_s_at	Angptl4	4.18E-02	1.91			
1419518_at	Tuba8	2.59E-02	1.90			
1452464_a_at	Metap11	1.34E-02	1.90	n/p		
1437785_at	Adamts9	1.92E-03	1.90			
1424882_a_at	Nt5dc2	1.11E-02	1.89	218051_s_at	1.82E-02	2.00
1428758_at	Tmem86a	4.00E-02	1.88	n/p		
1418440_at	Col8a1	1.31E-03	1.87			
1431057_a_at	Prss23	2.57E-02	1.87			
1430811_a_at	Nuf2	8.10E-03	1.87	n/p		
1438009_at	Hist1h2ad	2.98E-02	1.85			
1460412_at	Fbln7	2.51E-02	1.85	n/p		
1421032_a_at	Dnajb12	3.37E-02	1.85			
1416854_at	Slc34a2	2.97E-03	1.84	204124_at	1.78E-02	1.54
1416178_a_at	Plekhb1	4.90E-02	1.83			
1433947_at	Rab37	3.74E-02	1.83	n/p		
1429014_at	Ankzf1	4.18E-02	1.82			
1449865_at	Sema3a	4.16E-02	1.82			
1456137_at	Nrxn3	3.81E-03	1.81			
1419687_at	MacroD1	3.49E-02	1.79			
1439049_at	Dph5	3.54E-03	1.79			
1424671_at	Plekhhf1	3.54E-02	1.79			
1452881_at	Gins2	2.23E-02	1.79			
1437240_at	Pgm2	2.33E-02	1.78	n/p		
1429443_at	Cpne4	4.48E-02	1.78	n/p		
1419393_at	Abcg5	3.80E-02	1.77			
1430047_at	Ankrd32	3.49E-02	1.77	n/p		
1449141_at	Fblim1	1.01E-03	1.77	n/p		
1424051_at	Col4a2	8.99E-03	1.76			
1436313_at	Scyl2	2.05E-02	1.76			
1451038_at	Apln	4.34E-04	1.76	n/p		
1418086_at	Ppp1r14a	3.61E-02	1.75	n/p		
1434748_at	Ckap2	4.73E-02	1.75			
1437698_at	Myo5b	4.20E-02	1.75	n/p		
1416258_at	Tk1	3.90E-02	1.74			
1455154_at	Gli3	5.25E-03	1.74			
1429856_at	Tspan18	1.13E-02	1.73	n/p		
1429171_a_at	Ncapg	4.77E-02	1.73			
1441315_s_at	Slc19a2	3.23E-02	1.72			
1436513_at	Tanc2	2.01E-02	1.72			
1437932_a_at	Cldn1	4.10E-02	1.72			
1436480_at	Dpp7	4.84E-02	1.72	n/p		
1450584_at	Hoxd11	2.10E-02	1.72			
1423748_at	Pdk1	1.77E-02	1.72	206686_at	2.52E-02	1.95
1419906_at	Hpgd	4.53E-02	1.71			
1456475_s_at	Prkar2b	5.65E-03	1.71			
1417894_at	Gpr97	1.78E-02	1.70			
1429273_at	Bmper	4.92E-03	1.70	n/p		
1452035_at	Col4a1	1.65E-02	1.70	211981_at	2.73E-02	2.32
1438217_at	A2bp1	2.88E-02	1.70			
1423557_at	Ifngr2	3.48E-02	1.69	201642_at	3.50E-02	1.69
1457433_x_at	Zfp120	3.62E-02	1.69	n/p		
1422545_at	Tbx2	3.27E-02	1.69			
1417160_s_at	Expi	4.85E-02	1.69	n/p		
1423344_at	Epor	4.33E-02	1.69			
1436617_at	Cetn4	2.83E-02	1.69	n/p		
1436002_at	Scube3	3.54E-02	1.69			
1428744_s_at	Bri3bp	3.61E-02	1.69	n/p		
1419933_at	Pdrg1	1.84E-02	1.68	n/p		
1434129_s_at	Lhfp12	1.93E-02	1.68			

Probe Set Mouse Array	Gene Symbol	p-value	Fold change Het/WT	Probe Set Human Array	p-value	Fold change DDS/Control
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1437370_at	Sgol2	4.71E-02	1.68	n/p		
1416740_at	Col5a1	3.14E-02	1.68			
1427313_at	Ptgir	1.79E-02	1.67			
1422527_at	H2-DMa	3.42E-02	1.67	n/p		
1449125_at	Tnfaip8l1	4.10E-02	1.67	n/p		
1418359_at	Wbscr27	1.95E-02	1.67	n/p		
1419149_at	Serpine1	1.64E-02	1.67			
1424726_at	Tmem150	3.51E-02	1.67	n/p		
1438010_at	Tmem201	1.92E-02	1.67	n/p		
1455885_at	Amz1	2.22E-02	1.67	n/p		
1458054_at	Ext1	4.29E-02	1.66			
1448378_at	Fscn1	3.06E-02	1.66			
1437343_x_at	Atad3a	1.26E-02	1.65			
1418905_at	Nubp1	1.19E-02	1.65			
1449464_at	Kcnq1	1.33E-02	1.65			
1419758_at	Abcb1a	2.03E-02	1.65	n/p		
1418795_at	Cds2	5.53E-04	1.65			
1416531_at	Gsto1	1.63E-02	1.64			
1434190_at	Sms	4.70E-02	1.64	202043_s_at	1.84E-02	1.61
1459838_s_at	Btbd11	2.19E-02	1.64	n/p		
1423630_at	Cygb	2.89E-02	1.63	n/p		
1434575_at	Epb4.1l1	1.02E-02	1.63	n/p		
1421709_a_at	Fmo5	4.77E-02	1.63			
1419573_a_at	Lgals1	5.53E-03	1.63			
1439773_at	Ly6e	1.47E-02	1.63			
1431079_at	C1qtnf2	2.00E-02	1.62	n/p		
1425264_s_at	Mbp	3.17E-02	1.62			
1425601_a_at	Rtkn	2.28E-02	1.62	n/p		
1441259_s_at	Ift122	2.81E-02	1.62			
1460719_a_at	P2rx1	2.63E-02	1.61			
1438244_at	Nfib	1.57E-03	1.61			
1421679_a_at	Cdkn1a	2.97E-02	1.61			
1448964_at	S100g	3.10E-02	1.61			
1449246_at	Rundc3a	3.55E-02	1.60			
1433781_a_at	Cldn12	4.52E-02	1.60	n/p		
1434695_at	Dtl	1.29E-02	1.60			
1419589_at	Cd93	4.81E-02	1.60			
1449049_at	Tlr1	4.23E-02	1.59			
1448823_at	Cxcl12	8.75E-03	1.59			
1434153_at	Shb	4.37E-02	1.59			
1437886_at	Klh6	2.88E-02	1.58	n/p		
1417026_at	Pfdn1	1.51E-02	1.58	201507_at	2.43E-03	1.57
1441214_at	Expn5	4.47E-03	1.58			
1416118_at	Trim59	1.84E-02	1.58	n/p		
1422524_at	Abcb6	2.60E-02	1.58			
1442267_at	Stxbp4	4.10E-02	1.58	n/p		
1455027_at	Rufy3	3.20E-02	1.58			
1424086_at	Oaf	1.23E-02	1.58	n/p		
1425484_at	Tox	1.09E-02	1.58			
1450140_a_at	Cdkn2a	8.20E-04	1.58			
1418778_at	Ccdc109b	1.02E-02	1.58			
1417599_at	Cd276	2.86E-02	1.58	n/p		
1433684_at	Chmp6	2.20E-02	1.57			
1453067_at	Apitd1	1.16E-02	1.57			
1439766_x_at	Vegfc	1.09E-02	1.57			
1449903_at	Crtam	3.07E-02	1.57			
1417227_at	Mccc1	4.85E-02	1.57			
1428928_at	Cacnb4	4.41E-02	1.57			
1456735_x_at	Acpi2	8.33E-03	1.56	n/p		
1424131_at	Col6a3	2.51E-02	1.56			
1418606_at	Hoxd10	3.81E-02	1.56			
1438953_at	Figf	1.39E-02	1.56			
1438466_at	Dnahc7b	1.16E-03	1.56	n/p		
1458097_at	Cobll1	1.60E-02	1.55			
1460227_at	Timp1	1.31E-02	1.55			
1438319_x_at	Fastkd2	6.76E-03	1.55			
1450923_at	Tgfb2	1.85E-04	1.55			
1451978_at	Loxl1	4.62E-02	1.55			
1456728_x_at	Aco1	3.01E-02	1.55			

Probe Set Mouse Array	Gene Symbol	p-value	Fold change Het/WT	Probe Set Human Array	p-value	Fold change DDS/Control
1429466_s_at	Aph1c	1.43E-02	1.54	n/p		
1448690_at	Kcnk1	2.41E-02	1.54			
1417439_at	Cd248	2.55E-02	1.54			
1418862_at	Echdc3	4.15E-02	1.54	219298_at	3.62E-02	1.93
1433436_s_at	Thtpa	4.59E-03	1.54			
1420715_a_at	Pparg	2.17E-02	1.53	208510_s_at	2.29E-03	1.53
1447780_x_at	Tufm	4.24E-02	1.53			
1449040_a_at	Sephs2	4.54E-02	1.53			
1449221_a_at	Rrbp1	7.48E-03	1.53			
1417323_at	Psrc1	3.22E-03	1.53			
1418076_at	St14	2.98E-02	1.53	202005_at	2.16E-02	1.79
1416591_at	Rab34	7.36E-03	1.53	n/p		
1422084_at	Bmx	4.95E-02	1.53			
1442623_at	Mef2a	3.42E-02	1.53			
1415810_at	Uhrf1	1.59E-02	1.53	n/p		
1451968_at	Xrcc5	4.74E-02	1.52			
1423551_at	Cdh13	3.50E-02	1.52			
1419130_at	Adat2	4.66E-02	1.52	n/p		
1457587_at	Kcnq5	2.20E-02	1.52	n/p		
1455841_s_at	Grwd1	4.84E-02	1.52			
1448383_at	Mmp14	1.45E-02	1.52	202827_s_at	1.42E-02	1.98
1425182_x_at	Klk1b22	1.26E-02	1.52	n/p		
1448501_at	Tspan6	1.12E-02	1.52			
1439550_at	Tnrc18	2.36E-02	1.52	n/p		
1418186_at	Gstt1	1.73E-02	1.52			
1424418_at	Slc25a38	3.31E-02	1.52			
1450718_at	Sh2b2	4.03E-02	1.52			
1448404_at	Scamp2	1.59E-02	1.52			
1418796_at	Clec11a	2.08E-02	1.52			
1417591_at	Ptges2	4.88E-03	1.51			
1428427_at	Fbxl2	5.78E-03	1.51			
1435720_at	Kcnd3	2.10E-03	1.51			
1438517_at	Wwox	2.25E-03	1.50			
1438060_at	Npas3	5.95E-03	1.50			
1424542_at	S100a4	4.00E-02	1.50			
1439155_at	Mettl1	2.73E-02	1.50			
1457736_at	Vps37d	4.58E-02	1.50	n/p		
1424059_at	Suv420h2	3.16E-03	1.50	n/p		
1427387_a_at	Itgb4	1.08E-03	1.50			
1455396_at	Atp8b1	2.09E-02	-1.50			
1433623_at	Zfp367	2.45E-02	-1.50	n/p		
1449337_at	Tdo2	4.78E-02	-1.50			
1434776_at	Sema5a	2.14E-02	-1.50			
1455083_at	Atp11c	1.32E-02	-1.50	n/p		
1435556_at	Zfp597	1.64E-02	-1.50	n/p		
1448780_at	Slc12a2	2.48E-02	-1.50	204404_at	9.60E-03	-2.78
1415728_at	Pabpn1	4.67E-02	-1.50			
1431066_at	Fut11	1.45E-02	-1.50	n/p		
1434833_at	Map4k2	3.17E-02	-1.50			
1424595_at	F11r	6.41E-03	-1.50			
1450676_at	Tceb3	4.22E-02	-1.51			
1425376_at	Alox8	2.98E-02	-1.51	n/p		
1452391_at	Cxadr	3.31E-02	-1.51			
1425974_a_at	Trim25	3.69E-02	-1.51			
1450227_at	Ankrd6	3.66E-02	-1.51			
1427567_a_at	Tpm3	4.09E-02	-1.51			
1418663_at	Mpdz	1.24E-02	-1.51			
1426583_at	Atf2	2.43E-02	-1.51			
1438129_at	Wsb2	1.68E-02	-1.51	213734_at	3.27E-03	-1.89
1430205_a_at	Cdc37l1	4.30E-02	-1.51			
1448309_at	Ap3m1	1.73E-02	-1.51	n/p		
1437513_a_at	Serinc1	3.94E-03	-1.51			
1453853_a_at	Arhgef12	8.20E-03	-1.51			
1434476_at	Crtc1	2.43E-02	-1.51			
1422792_at	Pafah1b2	2.53E-02	-1.51			
1435320_at	Ctdspl2	4.55E-02	-1.51	n/p		
1442007_at	Zmym5	1.10E-02	-1.51			
1423280_at	Stmn2	2.03E-02	-1.51			
1423112_at	Ube2d3	1.51E-02	-1.52			
1425670_at	Rfxank	3.33E-02	-1.52			

Probe Set Mouse Array	Gene Symbol	p-value	Fold change Het/WT	Probe Set Human Array	p-value	Fold change DDS/Control
1441993_at	Ap3s2	9.71E-03	-1.52			
1423117_at	Pum1	2.14E-02	-1.52			
1423452_at	Stk17b	1.22E-02	-1.52			
1455300_at	Tet2	4.08E-02	-1.52			
1436405_at	Dock4	2.76E-02	-1.52	n/p		
1449029_at	Mknk2	2.58E-02	-1.52	205003_at	4.78E-02	-2.56
1421957_a_at	Pcyt1a	6.60E-03	-1.52			
1436616_at	Inpp4a	2.82E-03	-1.52			
1434628_a_at	Rhpn2	2.70E-02	-1.52	n/p		
1450378_at	Tapbp	1.68E-02	-1.52			
1452519_a_at	Zfp36	1.05E-02	-1.52			
1436089_at	Ints6	4.83E-02	-1.52			
1431760_a_at	Sdccag3	2.11E-02	-1.52			
1430856_at	Pex11c	4.51E-02	-1.52	n/p		
1452140_at	Tbc1d20	2.73E-02	-1.52	n/p		
1453997_a_at	Nes	2.50E-02	-1.52			
1451010_at	Nol11	4.04E-02	-1.52			
1451761_at	Hoxb4	3.22E-02	-1.52	n/p		
1420951_a_at	Son	1.05E-02	-1.53			
1419101_at	Sin3a	2.25E-03	-1.53	n/p		
1427969_s_at	Zfp654	3.78E-02	-1.53	n/p		
1430064_at	Ttll11	6.52E-03	-1.53	n/p		
1455140_at	Pitpnm3	3.72E-02	-1.53			
1455764_at	Vprbp	1.60E-02	-1.53			
1422018_at	Hivep2	3.64E-02	-1.53			
1417755_at	Topors	1.00E-02	-1.53			
1429686_at	Polr3f	3.32E-03	-1.53			
1440022_at	Poldip3	5.31E-04	-1.53			
1439037_at	Ddx17	1.58E-02	-1.54			
1426610_a_at	Ttf1	4.54E-02	-1.54			
1452857_at	Crebzf	2.26E-02	-1.54	202978_s_at	3.38E-02	-2.22
1454831_at	Foxn2	2.64E-02	-1.54			
1418513_at	Stk3	1.04E-02	-1.54			
1426360_at	Zc3h11a	9.77E-03	-1.54			
1426349_s_at	Tmpo	3.61E-02	-1.54			
1419250_a_at	Pftk1	1.11E-02	-1.54			
1452228_at	Tbc1d23	8.45E-03	-1.54	n/p		
1420615_at	Ash2l	5.87E-03	-1.54			
1418114_at	Rbpj	1.56E-02	-1.54			
1457400_at	Snx19	2.12E-02	-1.54			
1434602_at	Med13l	2.71E-02	-1.54			
1442186_at	Atxn7	3.99E-02	-1.54			
1418246_at	Rbm9	1.33E-02	-1.54			
1417539_at	Slc35a1	4.49E-02	-1.54			
1431385_a_at	Mbtps1	9.34E-03	-1.54			
1453623_a_at	Rad23a	1.21E-03	-1.54			
1420918_at	Sgk3	2.79E-02	-1.54	n/p		
1415823_at	Scd2	6.41E-03	-1.55			
1416201_at	Crk	1.12E-03	-1.55			
1416292_at	Prdx3	2.96E-02	-1.55			
1429776_a_at	Dnajb6	9.08E-03	-1.55	208810_at	1.04E-02	-1.82
1451494_at	Wac	1.29E-02	-1.55			
1431746_a_at	Uba3	6.74E-03	-1.55			
1425497_a_at	Prpf4b	8.60E-03	-1.55			
1455335_at	Xrcc2	3.56E-03	-1.55			
1460665_a_at	Cnot7	1.63E-02	-1.55			
1423174_a_at	Pard6b	2.13E-02	-1.55			
1419361_at	Ss18	3.84E-03	-1.55			
1439938_at	Stk38	5.93E-03	-1.55			
1433632_at	Irf2bp2	4.85E-02	-1.55	n/p		
1436070_at	Glo1	1.80E-02	-1.55			
1427367_at	Efcab4a	1.31E-02	-1.55	n/p		
1452783_at	Fndc3b	2.79E-02	-1.55			
1431686_a_at	Gmfb	1.94E-02	-1.56			
1421889_a_at	Ap1p2	2.22E-02	-1.56			
1417261_at	Mbtd1	2.09E-02	-1.56			
1454951_at	Zfp606	4.28E-02	-1.56	n/p		
1452766_at	Tppp	2.69E-02	-1.56			
1426221_at	Vwa5a	2.14E-02	-1.56			
1416732_at	Top2b	7.46E-03	-1.56			

Probe Set Mouse Array	Gene Symbol	p-value	Fold change Het/WT	Probe Set Human Array	p-value	Fold change DDS/Control
1436354_at	Dzip1l	3.49E-02	-1.56	n/p		
1421550_a_at	Trim34	1.65E-02	-1.56			
1455683_a_at	Tbc1d8	3.65E-03	-1.56			
1418898_at	Lin7c	3.68E-02	-1.56			
1425845_a_at	Shoc2	5.04E-03	-1.56			
1425995_s_at	Wt1	3.76E-02	-1.56	206067_s_at	5.98E-03	-3.03
1440195_at	Serbp1	6.64E-04	-1.56			
1428402_at	Zcchc3	2.36E-02	-1.56	n/p		
1452077_at	Ddx3y	1.66E-03	-1.56			
1458233_at	Fryl	2.90E-02	-1.56			
1437477_at	Lrrfip1	8.63E-03	-1.56			
1428117_x_at	Dynlt1	4.55E-02	-1.56			
1423054_at	Wdr1	2.77E-02	-1.56			
1450874_at	Matr3	5.86E-03	-1.56			
1459951_at	Rps6kb1	2.57E-02	-1.56			
1424390_at	Nupl1	1.85E-02	-1.56			
1452449_at	Hmbox1	1.70E-02	-1.57			
1450396_at	Stag2	9.42E-03	-1.57			
1450916_at	Stau2	3.84E-02	-1.57			
1417163_at	Dusp10	8.04E-03	-1.57			
1419356_at	Klf7	1.13E-02	-1.57			
1448444_at	Rpe	1.98E-02	-1.57			
1436982_at	Tnrc6b	1.02E-02	-1.57			
1449515_at	Zfp292	3.04E-02	-1.57	n/p		
1425487_at	Slu7	1.10E-02	-1.57	n/p		
1449999_a_at	Cacna2d1	5.00E-03	-1.57			
1421139_a_at	Zfp386	1.64E-02	-1.57	n/p		
1460213_at	Golga4	8.30E-03	-1.57			
1416123_at	Ccnd2	5.71E-03	-1.57	200953_s_at	2.62E-04	-3.03
1443142_at	Btrc	3.74E-02	-1.57			
1433925_at	Dync1li2	2.80E-02	-1.57			
1449069_at	Zfp148	5.79E-03	-1.58	n/p		
1452385_at	Usp53	4.98E-03	-1.58			
1427489_at	Itga8	3.08E-02	-1.58			
1436325_at	Rora	1.98E-02	-1.58			
1440543_at	Heatr5a	9.01E-03	-1.58	n/p		
1430057_s_at	Lrrc57	9.17E-03	-1.58	n/p		
1415729_at	Pdpk1	2.44E-02	-1.58			
1460331_at	Tm9sf2	3.23E-02	-1.58			
1420479_a_at	Nap1l1	6.75E-03	-1.58			
1418819_at	Arl8b	2.60E-02	-1.58			
1439503_at	Zfp28	4.83E-02	-1.58	n/p		
1427189_at	Arih1	2.26E-03	-1.59			
1425755_at	Mtcp1	2.97E-03	-1.59			
1459034_at	Wdr19	1.48E-02	-1.59			
1430827_a_at	Ptk2	1.23E-02	-1.59			
1437568_at	Mmp16	3.86E-02	-1.59	n/p		
1448793_a_at	Sdc4	4.46E-02	-1.59			
1449414_at	Zfp53	3.81E-02	-1.59	n/p		
1423994_at	Kif1b	3.82E-02	-1.59	209234_at	2.85E-03	-1.51
1460662_at	Per3	4.74E-02	-1.59			
1456407_a_at	Tlk1	2.20E-02	-1.59			
1421069_at	Phf2	2.65E-02	-1.59			
1418258_s_at	Dynll2	8.62E-04	-1.59	n/p		
1420547_at	Galc	2.19E-02	-1.59			
1439555_at	Rlf	4.31E-02	-1.60			
1435152_at	Leng8	2.83E-02	-1.60	n/p		
1424483_at	Mobkl1b	4.17E-03	-1.60			
1422321_a_at	Sf1	1.33E-02	-1.60			
1453413_at	Gnas	7.40E-03	-1.60			
1437476_at	Rrm2b	1.15E-02	-1.60	n/p		
1421338_at	Elf4	1.16E-02	-1.60			
1453160_at	Med13	3.81E-02	-1.60			
1423490_at	Fbxo3	3.29E-02	-1.60			
1429655_at	Nudcd1	4.27E-02	-1.60	n/p		
1417502_at	Tspan7	2.41E-02	-1.60			
1438397_a_at	Rbm39	1.49E-02	-1.60			
1448781_at	Nab1	1.90E-02	-1.60	209272_at	7.14E-03	-1.54
1450478_a_at	Ptpn12	1.97E-02	-1.61			
1451800_at	Gcc2	1.53E-02	-1.61			

Probe Set Mouse Array	Gene Symbol	p-value	Fold change Het/WT	Probe Set Human Array	p-value	Fold change DDS/Control
1420990_at	Chd1	3.04E-02	-1.61			
1424287_at	Prkx	2.36E-02	-1.61	204060_s_at	1.05E-02	-1.61
1450207_at	Lifr	3.10E-02	-1.61			
1429144_at	Prei4	7.70E-03	-1.61	n/p		
1422901_at	Mgea5	4.86E-02	-1.61			
1436224_at	Kif1c	5.88E-03	-1.61			
1430700_a_at	Pla2g7	1.04E-02	-1.61			
1434395_at	Man1a2	2.03E-02	-1.62			
1426191_a_at	Bcl2l1	4.69E-02	-1.62			
1449157_at	Nr2c1	1.15E-02	-1.62			
1457780_at	Stx11	3.23E-02	-1.62			
1422938_at	Bcl2	2.84E-02	-1.62			
1433944_at	Hectd2	1.79E-02	-1.62	n/p		
1457948_at	Gas7	9.03E-03	-1.63			
1457359_at	Inpp4b	1.48E-02	-1.63			
1416986_a_at	Sirpa	4.93E-02	-1.63			
1417724_at	Thoc4	6.61E-03	-1.63	n/p		
1425074_at	Wrn	4.87E-02	-1.63			
1423852_at	Shisa2	4.55E-02	-1.63	n/p		
1417307_at	Dmd	1.87E-02	-1.63	203881_s_at	8.93E-03	-2.38
1452336_at	Zfp395	1.36E-02	-1.63	n/p		
1427673_a_at	Sema3e	1.80E-02	-1.63			
1450917_at	Myom2	4.80E-02	-1.63			
1432155_at	Wasl	1.32E-02	-1.63			
1453920_a_at	Mospd2	8.51E-03	-1.64			
1452163_at	Ets1	1.07E-02	-1.64			
1456088_at	Xiap	7.54E-03	-1.64			
1438713_at	Rassf8	1.86E-02	-1.64			
1434957_at	Cdon	4.36E-02	-1.64			
1450710_at	Jarid2	2.50E-03	-1.64			
1433491_at	Epb4.112	2.45E-03	-1.64	n/p		
1426622_a_at	Qpct	5.53E-03	-1.64			
1438306_at	Rnf180	1.64E-02	-1.64	n/p		
1426849_at	Sec24b	4.40E-02	-1.64			
1459896_at	Pogk	2.52E-02	-1.64			
1427831_s_at	Zfp260	3.43E-02	-1.65	n/p		
1460510_a_at	Coq10b	4.43E-03	-1.65			
1424568_at	Tspan2	2.46E-02	-1.65			
1417358_s_at	Sorbs1	9.04E-03	-1.65	218087_s_at	2.86E-04	-1.61
1420866_at	Zfp161	2.67E-02	-1.65			
1428514_at	Cpne3	3.27E-02	-1.65			
1417570_at	Anapc1	3.87E-02	-1.65			
1433739_at	Nol10	1.68E-02	-1.65			
1421545_a_at	Syne1	1.30E-02	-1.66			
1422974_at	Nt5e	3.78E-02	-1.66	203939_at	6.67E-03	-4.17
1436551_at	Fgfr1	9.46E-03	-1.66			
1448348_at	Caprin1	4.00E-04	-1.66			
1427122_at	Copg2as2	3.17E-02	-1.66	n/p		
1443554_at	Ssbp3	2.84E-02	-1.66			
1458887_at	Tcf21	2.51E-02	-1.66			
1448851_a_at	Dnajc5	3.78E-03	-1.66	n/p		
1436067_at	Zbtb10	1.56E-03	-1.66			
1421121_at	Akap10	3.79E-03	-1.66			
1456150_at	Jhdm1d	1.44E-03	-1.66			
1416157_at	Vcl	1.49E-03	-1.67			
1426571_at	Ano1	4.31E-03	-1.67			
1433514_at	Etnk1	3.27E-03	-1.67			
1416318_at	Serpinb1a	1.70E-02	-1.67	n/p		
1424158_at	Ehd2	4.62E-03	-1.67			
1427468_at	Ppp3cb	6.04E-03	-1.67			
1436299_at	Gls	3.41E-02	-1.67	203159_at	1.75E-02	-1.61
1456890_at	Ddx58	4.35E-02	-1.67			
1423364_a_at	Aktip	3.06E-02	-1.68			
1427562_a_at	Prkca	4.04E-02	-1.68			
1422551_at	Zkscan3	7.49E-03	-1.68			
1431592_a_at	Sh3kbp1	3.86E-04	-1.68	n/p		
1426090_a_at	Fert2	7.95E-03	-1.68	n/p		
1423599_a_at	Pdcl	1.15E-02	-1.68			
1453628_s_at	Lrrc2	1.80E-02	-1.68			
1448219_a_at	Ywhaz	4.84E-02	-1.68	200640_at	1.80E-02	1.57

Probe Set Mouse Array	Gene Symbol	p-value	Fold change Het/WT	Probe Set Human Array	p-value	Fold change DDS/Control
1439604_at	Adamts16	1.54E-02	-1.68	n/p		
1455095_at	Hist2h2be	3.71E-03	-1.68			
1435220_s_at	Cdc42se2	5.45E-03	-1.68	n/p		
1432411_a_at	Fbxw2	3.73E-03	-1.68			
1422896_at	Vamp4	3.86E-02	-1.68			
1421383_at	Ccdc82	4.60E-03	-1.68			
1421916_at	Pdgfra	4.03E-02	-1.69			
1416525_at	Spop	8.68E-03	-1.69			
1436343_at	Chd4	3.21E-02	-1.69			
1455026_at	Sbno1	2.19E-02	-1.69			
1435877_at	Stk38l	1.59E-02	-1.69			
1423387_at	Psmc9	3.51E-02	-1.69			
1452398_at	Plice1	2.16E-02	-1.69			
1450379_at	Msn	1.41E-02	-1.69			
1418632_at	Ube2h	4.55E-03	-1.70			
1422119_at	Rab5b	2.90E-02	-1.70			
1424621_at	Krcc1	2.75E-03	-1.70			
1420931_at	Mapk8	9.52E-03	-1.70			
1456145_at	Dleu2	1.59E-02	-1.70			
1417765_a_at	Amy1	3.63E-02	-1.70	n/p		
1427580_a_at	Rian	4.63E-02	-1.70	n/p		
1435325_at	Usp46	3.99E-02	-1.71			
1420980_at	Pak1	2.65E-02	-1.71	209615_s_at	1.73E-02	-1.59
1420849_at	Crnk1l1	1.10E-03	-1.71			
1437500_at	Noc3l	1.42E-02	-1.71			
1452862_at	Rreb1	4.75E-02	-1.71			
1445521_at	Elavl1	9.88E-04	-1.71			
1427565_a_at	Abcc5	2.61E-02	-1.71			
1423861_at	Plekhf2	9.68E-03	-1.71			
1416034_at	Cd24a	5.91E-03	-1.71	n/p		
1418823_at	Arf6	1.69E-02	-1.71			
1437081_at	Timp2	5.12E-05	-1.72			
1428523_at	Lphn3	3.23E-02	-1.72	209867_s_at	3.36E-02	-2.08
1420839_at	Plekha3	6.87E-03	-1.72	n/p		
1438661_a_at	Arf2	3.08E-02	-1.72	n/p		
1440489_at	Zbtb46	2.14E-03	-1.72			
1425181_at	Sgip1	3.00E-02	-1.73	n/p		
1427963_s_at	Rdh9	2.32E-02	-1.73	n/p		
1448510_at	Efna1	8.23E-03	-1.73			
1455886_at	Cbl	1.40E-02	-1.73			
1433477_at	Abr	6.59E-03	-1.73			
1438069_a_at	Rbm5	3.63E-02	-1.73			
1417811_at	Slc24a6	2.61E-02	-1.73			
1422192_at	Gja5	1.96E-03	-1.73			
1435249_at	Btaf1	1.67E-02	-1.73			
1417517_at	Plagl2	7.05E-03	-1.73			
1453741_x_at	Angel2	1.35E-02	-1.74			
1426498_at	Kdm5c	4.58E-03	-1.74			
1419073_at	Tmeff2	2.76E-02	-1.74	n/p		
1427048_at	Smo	2.97E-02	-1.74			
1446990_at	Nfia	2.43E-02	-1.74	n/p		
1441693_at	Adamts3	3.95E-02	-1.74			
1455412_at	Sfmbt1	3.90E-02	-1.74			
1421194_at	Itga4	1.32E-02	-1.75			
1453622_s_at	Milt3	1.50E-03	-1.75			
1433956_at	Cdh5	4.38E-02	-1.75	204677_at	4.20E-02	-5.88
1449948_at	Ero1lb	2.50E-02	-1.75			
1425597_a_at	Qk	2.76E-02	-1.75	n/p		
1441200_at	Klf3	4.60E-02	-1.75			
1435818_at	Klhl15	6.17E-03	-1.75	n/p		
1438070_at	Phf3	4.52E-03	-1.75			
1454631_at	Gtf2a1	1.23E-02	-1.76			
1417396_at	Podxl	1.17E-02	-1.76	201578_at	2.30E-03	-2.70
1420896_at	Snap23	2.09E-02	-1.76			
1421504_at	Sp4	7.79E-03	-1.76			
1423675_at	Usp1	2.43E-02	-1.76			
1424030_at	Grhl1	1.55E-02	-1.76	n/p		
1425466_at	Senp2	1.81E-02	-1.77			
1451716_at	Mafb	2.19E-02	-1.77			
1416211_a_at	Ptn	1.26E-02	-1.77	209466_x_at	3.99E-03	-1.64

Probe Set Mouse Array	Gene Symbol	p-value	Fold change Het/WT	Probe Set Human Array	p-value	Fold change DDS/Control
1437079_at	Slc18a2	4.53E-03	-1.77			
1453771_at	Gulp1	1.83E-02	-1.77			
1425368_a_at	Numb	3.44E-02	-1.77			
1416702_at	Serpini1	1.59E-02	-1.78			
1450731_s_at	Tnfrsf21	2.21E-02	-1.78			
1429649_at	Slc35a3	4.20E-02	-1.78			
1417430_at	Cdr2	8.14E-03	-1.78			
1417297_at	Itrp3	1.20E-02	-1.78			
1435635_at	Pcmtd1	4.37E-03	-1.78	n/p		
1422135_at	Zfp146	1.66E-02	-1.79	n/p		
1440009_at	Olf78	1.66E-02	-1.79	n/p		
1440681_at	Chrna7	1.76E-02	-1.79			
1427672_a_at	Kdm6a	2.22E-03	-1.79			
1434629_at	Zbtb26	4.29E-02	-1.79	n/p		
1416162_at	Rad21	5.93E-03	-1.79	200607_s_at	1.48E-02	-1.54
1435742_at	Smek1	4.95E-02	-1.79			
1441772_at	P2rx4	2.61E-02	-1.79			
1445027_at	Cdr2l	2.56E-02	-1.80			
1451569_at	Nr2c2	8.14E-03	-1.80			
1460062_at	Plekhh2	1.83E-02	-1.80	n/p		
1455121_at	Lcor	1.90E-02	-1.80	n/p		
1430747_at	Pqlc1	2.28E-03	-1.80			
1452411_at	Lrrc1	7.12E-03	-1.80	218816_at	1.73E-02	-2.00
1420909_at	Vegfa	2.66E-03	-1.81			
1429274_at	Lypd6b	4.61E-02	-1.81	n/p		
1449551_at	Myo1c	5.30E-03	-1.81			
1456494_a_at	Trim30	1.92E-02	-1.81	n/p		
1417595_at	Meox1	1.03E-02	-1.81			
1450437_a_at	Ncam1	4.36E-02	-1.81	212843_at	3.12E-03	-2.22
1449682_s_at	Tubb2b	3.21E-02	-1.81			
1425008_a_at	Ifi203	4.42E-03	-1.81	n/p		
1442223_at	Enah	1.52E-02	-1.81			
1421622_a_at	Rapgef4	7.56E-03	-1.82			
1456975_at	Taok1	5.61E-03	-1.82			
1418020_s_at	Cpd	4.82E-02	-1.82			
1429778_at	Optn	2.90E-02	-1.83	202073_at	5.80E-03	-1.75
1426720_at	Apbb2	8.84E-03	-1.83			
1429233_at	Sept11	1.10E-02	-1.83			
1424180_a_at	Med24	4.85E-02	-1.83			
1448375_at	Tm9sf3	3.16E-02	-1.83			
1421702_at	Rdh1	2.91E-03	-1.84	n/p		
1422264_s_at	Klf9	3.86E-03	-1.84			
1427579_at	Rhbdl3	1.46E-02	-1.84	n/p		
1434178_at	Mil3	1.78E-02	-1.84	n/p		
1437387_at	Susd5	3.13E-02	-1.84			
1452492_a_at	Slc37a2	4.14E-02	-1.84	n/p		
1440065_at	Polr2j	4.74E-02	-1.84			
1425504_at	Mylk	2.15E-02	-1.84	202555_s_at	3.26E-03	-1.89
1426226_at	Dyrk1a	1.83E-02	-1.85			
1451060_at	Gpr146	1.00E-02	-1.85	n/p		
1437638_at	Srrm2	2.15E-02	-1.85			
1417172_at	Ube2l6	1.68E-02	-1.85			
1418762_at	Cd55	4.58E-02	-1.85			
1458381_at	Clic5	2.45E-03	-1.86			
1458870_x_at	Mycbp2	2.25E-02	-1.86			
1450512_at	Ntn4	1.07E-03	-1.86	n/p		
1460717_at	Tspyl1	1.07E-02	-1.86			
1439035_at	Zfp322a	4.41E-02	-1.86	n/p		
1418471_at	Pgf	1.65E-02	-1.87			
1444141_at	Snx13	3.89E-02	-1.87			
1436961_at	Hspa12a	1.38E-04	-1.87			
1450403_at	Stat2	5.60E-03	-1.87			
1428799_at	Lca5	3.99E-03	-1.87	n/p		
1440868_at	Gabpb2	2.07E-02	-1.88	n/p		
1421333_a_at	Mynn	4.64E-04	-1.88			
1451691_at	Ednra	3.70E-02	-1.88	204464_s_at	4.60E-02	-3.70
1455857_a_at	Rab2b	6.42E-03	-1.88	n/p		
1427146_at	Atpgd1	2.85E-02	-1.88	n/p		
1426259_at	Pank3	2.75E-02	-1.88			
1420906_at	Cd2ap	8.85E-03	-1.89			

Probe Set Mouse Array	Gene Symbol	p-value	Fold change Het/WT	Probe Set Human Array	p-value	Fold change DDS/Control
1424101_at	Hnrnp1	1.13E-02	-1.89			
1449113_at	Gpbp11	4.04E-02	-1.89			
1453267_at	Zfx3	2.58E-03	-1.90			
1438033_at	Tef	8.20E-03	-1.90			
1426208_x_at	Plagl1	5.82E-03	-1.91			
1423089_at	Tmod3	9.00E-04	-1.92			
1420976_at	Man1a2	1.74E-02	-1.92			
1427933_at	Vps33b	1.56E-02	-1.93			
1450124_a_at	Atp2a3	1.86E-02	-1.93			
1424176_a_at	Anxa4	4.77E-04	-1.94	201302_at	4.31E-02	-1.72
1424653_at	Tspan15	2.02E-02	-1.94			
1420944_at	Zfp185	2.02E-02	-1.94	n/p		
1415944_at	Sdc1	4.05E-03	-1.94			
1437208_at	Sept10	3.95E-02	-1.95			
1444075_at	Filip1	1.50E-03	-1.95	n/p		
1427711_a_at	Ceacam1	6.41E-04	-1.95			
1455747_at	Ggt5	2.38E-02	-1.95			
1417014_at	Hspb8	5.28E-03	-1.96			
1441266_at	Strn3	1.54E-02	-1.96			
1450224_at	Col4a3	8.35E-03	-1.96	222073_at	1.40E-02	-1.67
1420928_at	St6gal1	1.83E-02	-1.97			
1457209_at	Ddhd2	4.63E-02	-1.97			
1434407_at	Srgap2	1.11E-02	-1.98			
1448423_at	Tmed4	3.87E-02	-1.98	n/p		
1450125_at	Gata5	4.52E-02	-1.98	n/p		
1452328_s_at	Pja2	6.06E-03	-1.99			
1426641_at	Trib2	2.14E-03	-1.99	202479_s_at	2.93E-02	-1.50
1421271_at	Sh3rf1	2.82E-02	-1.99	n/p		
1422009_at	Atp1b2	1.30E-02	-1.99			
1447415_at	Bdp1	3.56E-02	-2.00	n/p		
1441096_at	Tusc5	3.20E-02	-2.00	n/p		
1459331_at	Surf6	1.56E-02	-2.01	n/p		
1431999_at	Polr3f	2.19E-03	-2.01			
1433756_at	S100pbbp	6.89E-03	-2.01			
1421954_at	Crkl	3.91E-02	-2.01			
1422975_at	Mme	4.76E-02	-2.01	203435_s_at	1.11E-02	-3.22
1435749_at	Gda	9.53E-03	-2.02	n/p		
1420923_at	Usp9x	4.00E-02	-2.02			
1448069_at	Tm4sf1	1.66E-02	-2.04	215034_s_at	9.82E-04	-2.86
1456721_at	Thsd7a	1.64E-02	-2.04			
1433828_at	Atp8a1	1.02E-03	-2.05			
1430177_at	Ube2b	6.76E-03	-2.05			
1418911_s_at	Acs14	1.04E-03	-2.05			
1453721_a_at	Slc31a2	2.64E-03	-2.05			
1433804_at	Jak1	2.51E-02	-2.05			
1426960_a_at	Fa2h	2.98E-02	-2.06	219429_at	2.74E-02	-1.96
1460509_at	B3galt1	3.25E-02	-2.06			
1434742_s_at	Aifm3	7.32E-04	-2.07	n/p		
1422528_a_at	Zfp3611	2.05E-02	-2.07			
1420942_s_at	Rgs5	1.15E-02	-2.07	209070_s_at	8.10E-04	-4.35
1430291_at	Dock5	1.72E-03	-2.07			
1427201_at	Mustn1	5.15E-04	-2.08	n/p		
1448607_at	Nampt	7.21E-03	-2.08			
1453201_at	Rassf10	1.88E-02	-2.09	n/p		
1454734_at	Lef1	7.23E-03	-2.09			
1418643_at	Tspan13	1.48E-03	-2.10			
1444924_at	N4bp2l2	2.75E-02	-2.10			
1438327_at	Zfp385b	1.87E-02	-2.11	n/p		
1456080_a_at	Serinc3	1.14E-02	-2.11			
1444347_at	Mgat4a	1.73E-02	-2.12			
1438540_at	Col25a1	7.16E-04	-2.14	n/p		
1436891_at	Usp15	2.42E-02	-2.14			
1421845_at	Golph3	3.21E-03	-2.15			
1436833_x_at	Ttll1	2.79E-02	-2.16			
1443719_x_at	Ddx42	6.12E-03	-2.16			
1453760_at	Mier1	1.50E-02	-2.17	n/p		
1438055_at	Rarres1	3.12E-02	-2.17	221872_at	4.63E-04	-2.56
1427328_a_at	Clasp2	4.48E-03	-2.17			
1429538_a_at	Sfrs18	1.57E-02	-2.18			
1423554_at	Ggcx	2.54E-03	-2.19			

Probe Set Mouse Array	Gene Symbol	p-value	Fold change Het/WT	Probe Set Human Array	p-value	Fold change DDS/Control
1425863_a_at	Ptpro	1.46E-02	-2.20			
1434474_at	Abca5	2.65E-03	-2.22			
1426314_at	Ednrb	4.66E-03	-2.23			
1450821_at	Kat2b	1.11E-02	-2.24			
1419380_at	Zfp423	4.51E-03	-2.25	n/p		
1416862_at	Stam	2.21E-02	-2.25			
1438081_at	Mcc	1.62E-02	-2.25			
1455496_at	Pfas	1.41E-02	-2.28			
1429105_at	Dlgap1	2.22E-02	-2.28			
1449310_at	Ptger2	1.59E-02	-2.29			
1434109_at	Sh3bgrl2	5.21E-03	-2.30	n/p		
1418753_at	Gfpt2	1.73E-03	-2.31			
1433707_at	Gabra4	2.18E-02	-2.32			
1436866_at	Efna5	2.93E-03	-2.32			
1455188_at	Ephb1	1.94E-03	-2.32			
1426218_at	Gccci1	1.56E-03	-2.33	n/p		
1456121_at	Cep97	4.02E-02	-2.33			
1428820_at	Mapre1	3.73E-03	-2.35			
1421102_a_at	Vamp3	1.15E-02	-2.36			
1420695_at	Dach1	1.33E-03	-2.37			
1421851_at	Mtap1b	4.51E-02	-2.38	n/p		
1423290_at	Hyou1	3.72E-02	-2.39			
1435292_at	Tbc1d4	1.85E-02	-2.39			
1418250_at	Arl4d	4.42E-02	-2.40	203586_s_at	3.16E-02	-1.56
1425620_at	Tgfb3	1.22E-02	-2.40			
1430463_a_at	Sncaip	5.57E-03	-2.41			
1451257_at	Acsf6	2.14E-02	-2.41			
1425329_a_at	Cyb5r3	2.87E-02	-2.43			
1426296_at	Rad52	8.18E-03	-2.44			
1422556_at	Gna13	2.92E-02	-2.44			
1425071_s_at	Ntrk3	4.94E-03	-2.45			
1423433_at	Trove2	3.49E-02	-2.46			
1439026_at	Trpm3	2.78E-02	-2.47			
1420772_a_at	Tsc22d3	3.57E-02	-2.47			
1423025_a_at	Schip1	1.59E-03	-2.47			
1450582_at	H2-Q5	1.65E-02	-2.50	n/p		
1447264_at	Rab11fip1	6.59E-03	-2.51			
1425208_at	Lbh	3.25E-02	-2.53	221011_s_at	3.88E-02	-2.04
1446331_at	Ptgfr	2.53E-02	-2.55			
1415997_at	Txnip	2.79E-02	-2.56			
1434469_at	Otud4	1.90E-02	-2.58			
1436279_at	Slc26a7	1.97E-02	-2.61	n/p		
1437492_at	Mkx	1.49E-02	-2.62	n/p		
1437074_at	Snx5	1.97E-02	-2.62			
1421064_at	Mpp5	2.12E-03	-2.63			
1428392_at	Rassf2	1.30E-02	-2.65			
1435998_at	Ccnb1ip1	9.29E-04	-2.76			
1438884_at	Shisa3	2.36E-03	-2.76	n/p		
1421344_a_at	Jub	2.95E-02	-2.76	n/p		
1423495_at	Decr2	4.35E-02	-2.79			
1448414_at	Rad1	4.47E-02	-2.82			
1431804_a_at	Sp3	2.96E-02	-2.83			
1451846_at	Neb1	1.00E-02	-2.97			
1450309_at	Astn2	1.28E-02	-3.00			
1453177_at	Snx31	3.68E-02	-3.06	n/p		
1453524_at	Kif5b	4.98E-02	-3.07			
1440246_at	Lass6	2.08E-04	-3.15	212442_s_at	1.33E-02	-1.96
1435126_at	Dusp15	1.52E-02	-3.18	n/p		
1428283_at	Cyp2s1	1.54E-02	-3.24	n/p		
1443002_at	Zfr	3.80E-02	-3.27			
1453826_at	Pard3b	5.28E-05	-3.28	n/p		
1439101_at	Mylk3	2.16E-02	-3.41			
1428759_s_at	Ccdc49	2.70E-02	-3.51			
1422010_at	Tlr7	6.37E-03	-3.52			
1454791_a_at	Rbbp4	8.51E-03	-4.04			
1422837_at	Scel	1.15E-02	-5.43			
1436319_at	Sulf1	5.87E-08	-8.45	212354_at	5.70E-05	-4.35
1436850_at	Creg2	1.54E-02	-8.73	n/p		

n/p: genes not present on human array (HG U133A 2.0); empty cells: genes are not differentially expressed in human samples

Table S3: Urine albumin/creatinine ratio in *Sulf* mutant mice

Genotype	Age (months)	Alb/Crea (mg/mmol)
<i>Sulf1</i> ^{+/-} ; <i>Sulf2</i> ^{+/+} <i>Sulf1</i> ^{+/-} ; <i>Sulf2</i> ^{+/-}	9	1.7
	2	1.9
	7	1.8
	7	1.7
	7	1.4
	7	1.9
	<i>Sulf1</i> ^{-/-} ; <i>Sulf2</i> ^{+/-}	5.5
7		1.2
8		0.8
8		1.2
9		1.5
<i>Sulf1</i> ^{+/-} ; <i>Sulf2</i> ^{-/-}	7	6.0
	7	1.9
	7	8.4
	9	1.8
<i>Sulf1</i> ^{-/-} ; <i>Sulf2</i> ^{-/-}	1	2.4
	3	3.3
	5	11.5
	5.5	14.1
	5.5	0.9
	7	14.7
	7	14.8
	7	7.0
	9	12.7