

Supplementary Tables

#Gene	Indels	SNVs	Tot Muts	Covd Bps	Muts pMbp	P-value LRT	P-value CT	FDR LRT
Sub1	3	3	6	25530	235.02	1.11E-16	4.67E-18	2.27E-12
Trp53	0	5	5	71696	69.74	1.13E-12	8.13E-14	7.75E-09
Ces1c	0	4	4	95152	42.04	7.85E-12	2.01E-10	4.02E-08
Tead2	4	0	4	74211	53.9	2.80E-11	2.10E-09	1.15E-07
Nt5c2	0	4	4	108022	37.03	1.95E-10	1.40E-08	6.66E-07
Apol7a	0	3	3	46603	64.37	6.04E-10	1.18E-08	1.77E-06
Gm10696	0	4	4	44400	90.09	8.90E-10	7.98E-11	2.02E-06
Tcp10a	0	4	4	325160	12.3	8.80E-10	9.10E-08	2.02E-06
Tmsb15l	0	3	3	26472	113.33	1.52E-09	4.70E-08	3.11E-06
Mrpl47	0	3	3	48840	61.43	2.05E-09	2.77E-09	3.82E-06
Pabpc4	0	3	3	114225	26.26	7.28E-09	1.25E-07	1.24E-05
Skint6	0	4	4	231575	17.27	9.29E-09	3.71E-07	1.46E-05
1110059E24Rik	2	1	3	25361	118.29	1.57E-08	3.32E-08	2.30E-05
Uimc1	3	0	3	140324	21.38	1.39E-07	3.94E-06	0.00019017
Atp5e	0	2	2	11546	173.22	1.98E-07	3.35E-06	0.00025286
Itga6	3	0	3	174365	17.21	2.70E-07	8.65E-06	0.00032504
Nckap5	0	2	2	263359	7.59	6.15E-07	2.15E-05	0.00069978
Sypl2	0	2	2	47299	42.28	6.65E-07	3.96E-06	0.00071637
Mrgprb5	0	2	2	39627	50.47	7.98E-07	2.81E-06	0.00081766
Gpr85	0	2	2	44395	45.05	1.03E-06	1.15E-05	0.00100761
Olfr955	2	0	2	26521	75.41	1.26E-06	1.35E-05	0.00116895
H2-Q7	0	2	2	64637	30.94	1.37E-06	2.09E-06	0.00122437
Olfr514	2	0	2	35388	56.52	2.28E-06	2.29E-05	0.00188394
Olfr907	2	0	2	35520	56.31	2.30E-06	2.47E-05	0.00188394
4930433111Rik	0	2	2	75964	26.33	3.06E-06	1.94E-05	0.00222737
Vmn2r111	0	2	2	88800	22.52	3.36E-06	2.08E-05	0.00222737
Olfr812	0	2	2	35431	56.45	3.14E-06	3.61E-05	0.00222737
Olfr1032	0	2	2	35484	56.36	3.11E-06	4.15E-05	0.00222737
Olfr1484	0	2	2	35508	56.33	3.37E-06	4.05E-05	0.00222737
Olfr213	0	2	2	39958	50.05	3.32E-06	4.25E-05	0.00222737
Vmn1r234	0	2	2	39790	50.26	4.27E-06	5.11E-05	0.00273133
Dagla	0	2	2	153765	13.01	6.46E-06	4.84E-05	0.00389161
Adipor1	2	0	2	58441	34.22	6.45E-06	0.00011924	0.00389161
Nfs1	2	0	2	72239	27.69	1.00E-05	0.00016899	0.0058524

Wsb1	0	2	2	70047	28.55	1.23E-05	0.00018179	0.00701854
Esyt2	0	2	2	140442	14.24	1.32E-05	0.00014772	0.00715512
Fntb	2	0	2	82846	24.14	1.33E-05	0.00025383	0.00715512
Gpbp1l1	0	2	2	78604	25.44	1.55E-05	0.00019417	0.00816374
Ccnb3	1	2	3	172134	17.43	1.68E-05	2.06E-05	0.00836098
Nlrp1b	0	3	3	226414	13.25	1.63E-05	2.99E-05	0.00836098
Olfr1076	0	2	2	35482	56.37	1.76E-05	1.10E-05	0.00836098
Olfr1286	1	1	2	31080	64.35	1.74E-05	1.07E-05	0.00836098
Cyp4a32	0	2	2	91020	21.97	1.86E-05	0.00024916	0.00866047
Ptp4a2	1	1	2	30811	64.91	2.02E-05	2.10E-05	0.00918145
Rpl32	1	1	2	28860	69.3	2.13E-05	3.27E-05	0.0094831
Zfp598	2	0	2	107068	18.68	2.26E-05	0.00035395	0.00984101
Olfr1000	0	2	2	35520	56.31	2.73E-05	1.49E-05	0.01142181
Nom1	2	0	2	116822	17.12	2.70E-05	0.00036471	0.01142181
Caprin1	2	0	2	119599	16.72	2.84E-05	0.00036603	0.01162296
Apbb2	2	0	2	132178	15.13	3.49E-05	0.00049655	0.01400698
Tgs1	0	2	2	113059	17.69	3.66E-05	0.00043003	0.01441445
Kdm1b	2	0	2	147574	13.55	4.38E-05	0.00052031	0.01660815
Arid5b	2	0	2	149964	13.34	4.52E-05	0.00075984	0.01682885
Prex2	2	1	3	271570	11.05	5.20E-05	8.41E-05	0.01868531
Cul2	0	2	2	135008	14.81	5.82E-05	0.00062372	0.01988478
Fstl5	0	2	2	137289	14.57	5.72E-05	0.00062049	0.01988478
Plk4	0	2	2	141761	14.11	5.83E-05	0.00062697	0.01988478
Ppp4r4	0	2	2	159182	12.56	7.19E-05	0.00087433	0.02375467
Vmn2r96	0	2	2	84360	23.71	7.88E-05	4.80E-05	0.02547925
Aurkc	1	1	2	43207	46.29	8.34E-05	8.50E-05	0.02547925
Fbxo22	1	1	2	59719	33.49	8.09E-05	0.00013616	0.02547925
Baz1b	2	0	2	198592	10.07	8.07E-05	0.00088071	0.02547925
Impg2	0	2	2	177319	11.28	8.25E-05	0.00094519	0.02547925
Cxadr	1	1	2	63453	31.52	9.27E-05	0.00013583	0.02793116
Vmn2r88	1	1	2	82116	24.36	0.0001093	6.79E-05	0.03244239
Magee2	1	1	2	67273	29.73	0.00011598	0.0001904	0.03393455
Cd244	0	2	2	68544	29.18	0.00012714	0.00015919	0.03667443
BC003331	1	1	2	83050	24.08	0.0001344	0.00010416	0.03801668
Nek10	0	2	2	222035	9.01	0.0001355	0.00145896	0.03801668
Sap30bp	1	1	2	63825	31.34	0.00017558	0.00019716	0.04670197
Psat1	1	1	2	66414	30.11	0.00020339	0.00021631	0.05340473
Plch1	1	1	2	248379	8.05	0.00023522	0.00019936	0.05947572

Pes1	1	1	2	104269	19.18	0.00023501	0.00029769	0.05947572
Slfn9	0	2	2	111000	18.02	0.00025808	0.00020231	0.06368252
Muc2	0	2	2	375826	5.32	0.00025523	0.00214414	0.06368252
Sp140	0	2	2	123007	16.26	0.00031697	0.00026102	0.07728325
Itgam	1	1	2	212715	9.4	0.00038295	0.00042823	0.08912649
Ccar1	1	1	2	160908	12.43	0.00051532	0.00045236	0.11472068
4930595M18Rik	1	1	2	96686	20.69	0.00053353	0.00042076	0.11749746
Dgkb	1	1	2	158915	12.59	0.00067434	0.00075238	0.13950718
Pclo	2	0	2	607388	3.29	0.00076614	0.00780049	0.1508779
Pign	0	2	2	185089	10.81	0.00084595	0.00082038	0.15750831
Zfp106	0	2	2	262045	7.63	0.00087769	0.00099362	0.16079591
Tex16	1	1	2	134405	14.88	0.00099529	0.00080426	0.16535887
Nf1	0	2	2	598238	3.34	0.00104908	0.01126867	0.16535887

Supplementary Table 1. Significantly mutated genes in *EGFRvIII*-only tumors.

Gene name	Source	Base Mean	log ₂ FoldChange	lfcSE	stat	p value, adjusted
Hoxa3	ensembl_havana	278.619316	9.39986332	0.94367147	9.96094894	1.5194E-21
Hoxa5	ensembl_havana	477.364085	9.28232077	0.83501008	11.1164176	1.1646E-26
Hoxd8	ensembl_havana	667.194941	8.86533997	0.72585202	12.2137016	4.9868E-32
Hoxc8	ensembl_havana	379.165958	8.84546772	0.95090811	9.30212667	6.6276E-19
Gm12688	havana	285.799904	8.70303756	1.02854526	8.46150181	7.7193E-16
Hoxa7	ensembl_havana	745.345625	8.65253777	0.73188103	11.8223282	4.909E-30
Nkx3-2	ensembl_havana	144.096303	8.55650963	0.95135725	8.99400263	9.676E-18
Irx2	ensembl_havana	312.594203	8.42995929	0.81195854	10.3822533	2.4669E-23
Gm13394	havana	823.394729	8.28018082	0.48669292	17.0131524	5.5164E-62
Hoxa2	ensembl_havana	114.987993	8.27825959	0.95132149	8.70185281	1.1033E-16
Hoxc4	ensembl_havana	229.118566	8.26549812	0.8710818	9.48877377	1.2203E-19
En1	ensembl_havana	146.963741	8.24012842	1.02912461	8.00692971	2.7198E-14
Hoxc5	ensembl_havana	172.510409	8.17259608	0.93944569	8.69938108	1.1255E-16
Hoxd9	ensembl_havana	75.5440359	7.80131307	0.93853964	8.31218285	2.5251E-15
Foxd3	ensembl_havana	78.5205631	7.75481063	0.9671947	8.01783819	2.5036E-14
Hoxc9	ensembl_havana	133.809793	7.74510984	0.96574263	8.01984877	2.4678E-14
Hoxc6	ensembl_havana	216.077503	7.72351624	0.8745156	8.83176501	3.7549E-17
Hoxa1	ensembl_havana	67.6822943	7.71842263	0.92145725	8.37632203	1.5178E-15
Runx3	ensembl_havana	277.411973	7.67767557	0.75117855	10.2208397	1.2266E-22
Hoxd3os1	ensembl_havana	60.5469758	7.51684258	0.94188607	7.98062828	3.3212E-14
Tmem26	ensembl	221.928053	7.37459785	0.76080373	9.69316737	1.9311E-20
Irx5	ensembl_havana	247.156103	7.33399821	0.75691577	9.68931883	2.0002E-20
Hoxc10	ensembl_havana	133.163785	7.30981784	0.93750462	7.79710057	1.3291E-13
Hoxb3os	havana	65.390674	7.29297236	1.03441067	7.05036461	2.5051E-11
Hoxb3	ensembl_havana	114.264545	7.19355565	0.92350521	7.78940454	1.4014E-13
Top2a	ensembl_havana	1390.25087	7.18853792	0.8100619	8.87406	2.6651E-17
Hoxb4	ensembl_havana	65.0687333	7.17614058	0.93018682	7.71473042	2.4188E-13
Hotairm1	havana	44.2520468	7.17170634	0.92728551	7.73408646	2.1046E-13
Foxa3	ensembl_havana	54.1219821	7.03580637	1.04322064	6.74431284	1.8327E-10
Hoxa6	ensembl_havana	41.1412123	6.99500031	0.95673845	7.31129839	4.2691E-12
2810417H13Rik	ensembl_havana	299.922819	6.92903069	0.87338938	7.93349546	4.7544E-14
Pnlip	ensembl	2059.06639	6.92088489	0.58750725	11.7800842	7.8121E-30
Mmp3	ensembl	98.1334985	6.90273503	1.04076939	6.63233866	3.7361E-10
Hoxb2	ensembl_havana	85.6186247	6.89935571	0.92368175	7.46940786	1.4142E-12
Gm42909	havana	29.7030621	6.87832966	0.84601209	8.13029711	1.0546E-14
Rps2-ps10	havana	130.788751	6.86533583	1.01396852	6.77075834	1.553E-10

Hoxd4	ensembl_havana	34.4287872	6.85429504	0.92903854	7.37783711	2.6976E-12
Hoxa4	ensembl_havana	97.2925925	6.84629221	0.85847054	7.97498797	3.463E-14
Pbk	ensembl_havana	331.443199	6.84535611	0.78498875	8.72032386	9.5061E-17
C1ql2	ensembl_havana	1167.04811	6.82834509	0.58451716	11.6820267	2.3921E-29
Meox1	ensembl_havana	1310.01564	6.79808426	0.62127091	10.942222	7.4602E-26
Hoxaas2	ensembl_havana	30.2070096	6.74409868	0.90958342	7.41449164	2.0965E-12
Cdk1	ensembl_havana	361.301216	6.63727972	0.80466839	8.24846583	4.1736E-15
Mki67	ensembl	888.742681	6.62808981	0.77817333	8.51749805	4.9398E-16
H19	ensembl_havana	792.555329	6.61084878	0.82957249	7.96898263	3.625E-14
Bricd5	ensembl	539.499634	6.51187305	0.59424866	10.958162	6.3251E-26
Cdkn2a	ensembl_havana	429.49757	6.501445	0.76049482	8.5489668	3.837E-16
Fam64a	ensembl_havana	212.381259	6.47323083	0.88457545	7.31789565	4.084E-12
Gm27477	ensembl	32.4524792	6.46207508	0.88958325	7.26416005	5.9109E-12
Itih5l-ps	havana	99.5372195	6.44883644	1.09602192	5.88385719	3.105E-08
Otos	ensembl_havana	123.706083	6.44324339	0.82239049	7.83477374	9.9976E-14
Gsx1	ensembl_havana	386.554017	6.37712526	0.61098899	10.4373816	1.4072E-23
Ube2c	ensembl_havana	337.358203	6.3525281	0.77740051	8.17149975	7.6281E-15
Irx1	ensembl_havana	628.108931	6.32608261	0.59084659	10.7068107	8.6623E-25
Kif18b	ensembl_havana	245.240142	6.2810011	0.85385742	7.35603032	3.1428E-12
5730596B20Rik	ensembl	19.8677121	6.27449212	0.88617854	7.08039278	2.051E-11
Gm10260	ensembl	201.322175	6.26873541	0.8109035	7.73055663	2.1545E-13
Ccdc178	ensembl	25.6149288	6.21099515	1.02465706	6.06153552	1.1442E-08
Mroh3	havana	440.162975	6.19885584	0.59786151	10.3683809	2.813E-23
Stk19-ps1	havana	20.2168019	6.19030885	0.92981673	6.65755803	3.1875E-10
Pdx1	ensembl_havana	26.3671588	6.18838281	1.04231393	5.93715831	2.3057E-08
Fam89a	ensembl	759.103403	6.17195203	0.54201548	11.3870401	6.4171E-28
Hmga2	ensembl_havana	149.985294	6.1681856	1.01161674	6.09735424	9.2756E-09
Col20a1	ensembl_havana	5750.03172	6.14368683	0.69633696	8.8228648	4.0346E-17
Gdf3	ensembl_havana	23.2854993	6.11767411	1.01823222	6.0081325	1.5421E-08
Hoxaas3	havana	17.6441879	6.05863275	0.91471836	6.62349532	3.9402E-10
A930009A15Rik	ensembl_havana	331.153537	6.05269226	0.54870978	11.0307715	2.9056E-26
Piwil4	ensembl_havana	46.7599306	6.02970066	0.84766109	7.11333894	1.6481E-11
Nxf3	ensembl_havana	180.268561	6.0102255	0.91978723	6.53436503	6.8953E-10
Neil3	ensembl_havana	95.2373242	6.00804275	0.88227561	6.80971195	1.2041E-10
Cxcl13	ensembl_havana	37.829686	6.00504176	1.15514146	5.19853366	1.137E-06
Lbx1	ensembl_havana	162.320467	5.99610607	1.11449172	5.38012615	4.5479E-07
Troap	ensembl	161.105017	5.99042085	0.80792845	7.4145438	2.0965E-12
Gata6	ensembl	256.76976	5.97655969	0.6404476	9.33184803	5.0816E-19

Ticrr	ensembl_havana	60.680563	5.9740599	0.86307043	6.92186836	5.8556E-11
Ctse	ensembl_havana	32.7112022	5.97078066	0.8723589	6.84440852	9.6728E-11
Gm8909	ensembl_havana	20.1871416	5.96865792	1.01076463	5.90509178	2.764E-08
Serpina3f	ensembl_havana	30.8922472	5.96081484	1.0205813	5.84060756	3.9549E-08
Cd300lf	ensembl_havana	86.870023	5.9564507	0.67169845	8.86774514	2.8071E-17
Gm20554	havana	14.4395288	5.91830037	0.864223	6.84811715	9.4456E-11
Hils1	ensembl_havana	15.2788491	5.89221197	0.90817515	6.48796874	9.1478E-10
Cnpy1	ensembl_havana	53.7763457	5.89145194	0.94360736	6.24354175	3.9821E-09
C4b	ensembl_havana	13627.4982	5.87681987	0.43518764	13.5041055	4.5814E-39
Gsc	ensembl_havana	18.6462006	5.87503029	1.01020496	5.81568149	4.5405E-08
Prc1	ensembl_havana	567.625033	5.83958908	0.72470462	8.05788856	1.8384E-14
Nr5a2	ensembl_havana	38.6359898	5.79293143	0.83927497	6.90230456	6.6476E-11
Mmp13	ensembl	138.986174	5.78830511	1.03856267	5.57338064	1.6772E-07
Gm8210	ensembl_havana	43.3266638	5.76545434	0.90575031	6.36539043	1.9212E-09
Klra2	ensembl_havana	117.665062	5.76391779	0.64093698	8.99295555	9.7351E-18
Cenpf	ensembl_havana	288.733202	5.759621	0.71997139	7.99979151	2.8709E-14
Snx22	ensembl	4617.46451	5.7505615	0.51755015	11.1111194	1.23E-26
Frmf7	ensembl_havana	415.987103	5.74870418	0.6196834	9.27684067	8.3029E-19
Depdc1a	ensembl_havana	54.4349378	5.74707166	0.97560575	5.89077265	2.9896E-08
Epyc	ensembl_havana	37.6134225	5.71493396	0.85610787	6.67548352	2.834E-10
Prokr1	ensembl_havana	75.9953108	5.70832169	0.81286163	7.02250111	3.0251E-11
Irx3os	ensembl_havana	36.4313808	5.70665201	0.85243049	6.69456585	2.521E-10
Gm27861	ensembl	13.9635608	5.69710323	0.94453899	6.03162316	1.3546E-08
Mis18bp1	ensembl_havana	133.236281	5.69460596	0.77421006	7.35537583	3.1542E-12
Slamf7	ensembl_havana	21.109607	5.68201926	0.98645796	5.76002172	6.1547E-08
5033426007Rik	havana	152.51473	5.66820211	0.7022111	8.0719347	1.6421E-14

Supplementary Table 2. Top 100 most upregulated genes in brain tumors.

gene_name	source	Base Mean	log2FoldChange	lfcSE	stat	p value, adjusted
9130024F11Rik	havana	328.610907	-10.401713	0.50638195	-20.541239	1.9728E-90
Tmem215	ensembl_havana	285.466843	-9.7092875	0.4679682	-20.747751	3.0243E-92
Igfn1	ensembl_havana	489.933872	-9.2893857	0.50674272	-18.331562	5.4547E-72
Gm37717	havana	48.5168346	-8.8808101	0.61334563	-14.479292	7.7113E-45
Ovol2	ensembl_havana	62.2791155	-8.7457129	0.60037269	-14.56714	2.2767E-45
Gm28928	havana	32.4046988	-8.578732	0.61395873	-13.972816	8.9622E-42
Gm38073	havana	48.7213996	-8.0716613	0.6329517	-12.752413	7.3355E-35
Mal2	ensembl	2227.29391	-7.8094117	0.88107925	-8.8634612	2.9032E-17
Gm765	ensembl_havana	220.771733	-7.4360853	0.79855128	-9.3119696	6.066E-19
Satb2	ensembl_havana	645.087444	-7.3525292	0.22088118	-33.28726	1.39E-238
Cldn22	ensembl	15.039166	-7.3236912	0.73933194	-9.9058227	2.6044E-21
Olfra464	ensembl_havana	16.2173934	-7.3074347	0.66273018	-11.026259	3.0412E-26
Myh2	ensembl_havana	12.0967219	-7.2398328	0.610278	-11.863172	3.1368E-30
Gpr88	ensembl_havana	1164.46617	-7.1744123	0.60730169	-11.813589	5.3547E-30
Tbata	ensembl_havana	21.5448992	-7.0267155	0.59627953	-11.784264	7.4843E-30
4921539H07Rik	havana	25.7827694	-6.8266217	0.5523346	-12.359576	8.93E-33
Alox12b	ensembl_havana	57.5131834	-6.6584513	0.38624833	-17.238783	1.2302E-63
Neurod6	ensembl_havana	507.595925	-6.61052	1.07181118	-6.1676162	6.1887E-09
Chat	ensembl	12.0514092	-6.5893376	0.84440625	-7.803516	1.2655E-13
Gm13446	havana	53.856653	-6.5694146	0.3839547	-17.109869	1.0924E-62
Panct2	havana	32.5265576	-6.5311441	0.45893453	-14.231102	2.5612E-43
Gm4081	havana	7.09886203	-6.4737879	0.6391159	-10.129286	2.9581E-22
Rspo2	ensembl	92.4052375	-6.4705881	0.47357406	-13.663308	5.6557E-40
Slc26a4	ensembl	14.6712495	-6.4697873	0.61540997	-10.512971	6.5159E-24
Gm13306	ensembl_havana	22.383638	-6.4184695	0.53786178	-11.933306	1.4153E-30
Gm42954	havana	16.4668927	-6.4111641	0.5759231	-11.131979	1.0019E-26
Scn4b	ensembl_havana	2353.5171	-6.4110256	0.84916408	-7.5498078	7.955E-13
Vmn2r84	ensembl_havana	33.138937	-6.4053594	0.46568193	-13.754795	1.6501E-40
Tmco5	ensembl_havana	9.40040904	-6.3614254	0.62932755	-10.10829	3.6214E-22
Gm17916	havana	7.76238383	-6.3460325	0.63746995	-9.9550299	1.6035E-21
Gm12300	havana	6.55185734	-6.3329083	0.66560871	-9.5144613	9.6415E-20
Gm14340	ensembl_havana	9.25109693	-6.3235291	0.64077561	-9.8685546	3.7056E-21
Robo3	ensembl_havana	628.23625	-6.3179646	0.93534211	-6.7547099	1.7156E-10
Gm13601	havana	40.9837028	-6.2908201	0.65930069	-9.5416555	7.5041E-20
Gm20752	havana	9.01796956	-6.2842346	0.64209679	-9.7870518	7.9283E-21
Sstr2	ensembl_havana	187.069725	-6.269868	0.40205665	-15.594489	5.0492E-52
Dmrt2	ensembl	6.90271924	-6.201255	0.62399487	-9.9379905	1.8921E-21

Gm14015	havana	5.88461944	-6.1998208	0.65640023	-9.4451837	1.7973E-19
Prss16	ensembl_havana	23.4789309	-6.1670186	0.52173669	-11.820174	4.9852E-30
Kcnk4	ensembl	211.144494	-6.1595356	0.79246683	-7.77261	1.5802E-13
Gm16339	havana	17.036485	-6.0432789	0.53023358	-11.39739	5.763E-28
Mas1	ensembl_havana	156.725968	-6.0336456	0.85041697	-7.0949262	1.8589E-11
Caln1	ensembl_havana	1372.99913	-6.0192308	0.7847716	-7.6700416	3.3592E-13
Gm14317	havana	8.75801049	-6.0173202	0.61918142	-9.7181859	1.5226E-20
Gm12930	havana	5.07236216	-5.9976188	0.65696903	-9.1292261	3.0133E-18
Clnka	ensembl_havana	24.049661	-5.9682864	0.91400711	-6.5298031	7.0956E-10
Olf316	ensembl_havana	7.28392461	-5.9552591	0.66924662	-8.8984522	2.1643E-17
1700047F07Rik	havana	13.7723385	-5.9351954	0.55905442	-10.616489	2.219E-24
Tfap2d	ensembl_havana	6.29426849	-5.8654154	0.77347454	-7.5832042	6.274E-13
Gm12576	havana	6.44866974	-5.8253243	0.63764919	-9.1356257	2.8456E-18
Agmat	ensembl_havana	25.6188271	-5.8226655	0.4446211	-13.095792	9.2058E-37
9130227L01Rik	havana	4.37178497	-5.8022518	0.65418659	-8.869414	2.7697E-17
Gm12371	havana	63.7687672	-5.7843243	0.67484552	-8.5713309	3.211E-16
6530403H02Rik	havana	6.82852983	-5.7390602	0.76140799	-7.5374309	8.7002E-13
Gm15870	havana	7.58701115	-5.7245204	0.68942882	-8.3032798	2.6971E-15
RP23-458C8.3	havana	5.03258244	-5.7092276	0.67166408	-8.5001234	5.6653E-16
1700007P06Rik	havana	4.15958154	-5.709198	0.6750915	-8.4569246	7.9985E-16
Gm10334	ensembl_havana	4.1919787	-5.7020411	0.68610702	-8.3107168	2.5535E-15
A330070K13Rik	ensembl_havana	4.20444028	-5.6853874	0.70096219	-8.1108332	1.2189E-14
Chn1os1	havana	12.1718984	-5.5925965	0.52094929	-10.735395	6.4597E-25
Npy2r	ensembl_havana	17.6308782	-5.5684039	0.76021047	-7.3248188	3.9001E-12
Efcab6	ensembl_havana	54.8492386	-5.5545705	0.57619614	-9.6400689	3.1094E-20
2900064K03Rik	havana	6.39360551	-5.5545432	0.64204537	-8.6513251	1.6691E-16
Gm5912	havana	7.64709081	-5.5495569	0.64139353	-8.6523431	1.6566E-16
Tex40	ensembl	121.129807	-5.5421331	0.421603	-13.145383	5.0099E-37
Kcnk9	ensembl	7.46334135	-5.5179004	0.95170339	-5.7979203	5.0084E-08
RP24-134N2.1	havana	186.219208	-5.5175771	0.44066699	-12.520968	1.3104E-33
Ascl5	havana	9.00003831	-5.5146192	0.6147465	-8.9705581	1.1653E-17
Allc	ensembl_havana	4.28148292	-5.4974355	0.66690624	-8.2431909	4.3331E-15
A830029E22Rik	havana	3.4916202	-5.4711358	0.67575957	-8.0962757	1.3613E-14
Gm15997	havana	4.2527376	-5.4666571	0.68135751	-8.0231846	2.4089E-14
Gm15645	havana	4.99026312	-5.4490303	0.66040474	-8.2510467	4.0933E-15
Theg	ensembl_havana	3.43825102	-5.4362416	0.68550607	-7.9302604	4.8707E-14
Rph3a	ensembl_havana	4564.25757	-5.4216625	0.84432074	-6.4213304	1.3708E-09
Sh3rf2	ensembl_havana	31.6797315	-5.4094324	0.79547436	-6.8002598	1.2791E-10

Neurod2	ensembl_havana	1052.92045	-5.3636111	1.09502475	-4.8981643	4.7975E-06
Cd6	ensembl_havana	69.9281626	-5.3084948	0.66018553	-8.0409136	2.0972E-14
RP23-16L19.5	havana	3.69455063	-5.2900458	0.66545594	-7.9495057	4.2145E-14
Myoc	ensembl_havana	288.396047	-5.2848198	0.73232726	-7.2164729	8.183E-12
Gm42730	havana	37.2603256	-5.2804433	0.71484637	-7.3868226	2.5378E-12
Gm9946	ensembl_havana	7.48787626	-5.2792114	0.60523416	-8.7225932	9.3311E-17
Glt8d2	ensembl_havana	162.263962	-5.2742957	0.51322057	-10.276859	7.0547E-23
Gm17751	havana	4.45235218	-5.2639116	0.68803747	-7.6506177	3.8533E-13
Hkdc1	ensembl_havana	148.950718	-5.2622023	0.31022343	-16.962621	1.2604E-61
A530021J07Rik	ensembl_havana	3.29985213	-5.2514687	0.78320743	-6.7050803	2.3577E-10
Btn2a2	ensembl_havana	14.3005286	-5.2460264	0.44356746	-11.826896	4.7089E-30
Mfsd4	ensembl_havana	779.63276	-5.2102415	0.58803911	-8.8603656	2.9755E-17
Gm27004	havana	24.9763285	-5.2062776	0.4665565	-11.158943	7.547E-27
Gm10421	havana	7.08083562	-5.1960701	0.61056108	-8.5103199	5.2151E-16
Gm11549	havana	497.922529	-5.1873423	0.99966602	-5.1890753	1.1906E-06
Nhlh1	ensembl_havana	5.89861678	-5.1863525	0.63813756	-8.1273268	1.0785E-14
Bglap3	ensembl_havana	16.2151169	-5.1818598	0.55687104	-9.3053137	6.445E-19
1700108N11Rik	havana	3.01402095	-5.1814133	0.7484718	-6.9226567	5.8296E-11
Myh1	ensembl_havana	8.14133133	-5.1789594	0.57716254	-8.9731385	1.1422E-17
AI593442	ensembl	3002.7825	-5.1777766	0.54452988	-9.5087098	1.0144E-19
Gm22389	ensembl	2.91647092	-5.1562054	0.73722438	-6.9940788	3.6272E-11
Klhdc7b	ensembl_havana	8.69089108	-5.1517311	0.66461751	-7.7514225	1.8521E-13
Gng13	ensembl_havana	149.35804	-5.1408605	0.77595323	-6.6252195	3.9E-10
1700048F04Rik	havana	2.74397198	-5.1333382	0.68657508	-7.4767325	1.3436E-12
Kctd16	ensembl	52.0300938	-5.115876	0.54053923	-9.4643936	1.5139E-19

Supplementary Table 3. Top 100 most downregulated genes in brain tumors.

Gene name	source	Base Mean	log ₂ FoldChange	lfcSE	stat	p value adjusted
Pnlip	ensembl	2122.17388	9.11722837	0.43335277	21.0388141	1.8435E-95
Gm13394	havana	530.838672	8.63230606	0.48070325	17.957661	8.4148E-70
Nkx3-2	ensembl_havana	115.220138	8.24714202	0.77302513	10.6686596	3.4546E-25
Nxf3	ensembl_havana	209.615669	7.73140566	0.82239877	9.4010423	8.9323E-20
Foxa3	ensembl_havana	45.0894673	7.12157996	0.90780186	7.84486164	4.4792E-14
Gsx1	ensembl_havana	378.301174	7.1044325	0.40660711	17.4724747	3.8949E-66
Fgb	ensembl_havana	52.847471	6.78044122	1.00767674	6.72878609	1.2559E-10
Cdkn2a	ensembl_havana	475.57514	6.77288936	0.3660268	18.5038075	4.8406E-74
Gm10260	ensembl	144.548889	6.7093184	0.77610038	8.64491059	7.0915E-17
Apoc4	ensembl_havana	22.7722698	6.5671452	0.81465657	8.06124377	8.3141E-15
Stk19-ps1	havana	20.1555172	6.41862304	0.81350134	7.89011982	3.1554E-14
Bricd5	ensembl	544.73407	6.11740057	0.38711281	15.8026303	3.1559E-54
Gm12128	havana	19.0077542	6.11294048	0.89607395	6.82191518	6.8078E-11
Btnl2	ensembl_havana	23.6375275	6.07211866	0.84961787	7.14688203	7.4651E-12
Postn	ensembl_havana	3843.55416	6.05630423	0.50470529	11.9996844	1.3122E-31
Otos	ensembl_havana	244.262635	6.0323201	0.63543501	9.49321328	3.8047E-20
Gbp2b	ensembl_havana	18.6069028	6.0221023	0.91695815	6.56747782	3.5774E-10
Rps2-ps10	havana	112.434467	5.97119624	1.00424348	5.94596464	1.6332E-08
Pdx1	ensembl_havana	29.4843967	5.95316832	1.04708172	5.68548588	7.2285E-08
H2-M2	ensembl_havana	37.4922996	5.95021181	0.74769094	7.95811677	1.867E-14
H2-Ea-ps	havana	19.9094435	5.86080867	0.98606384	5.9436402	1.6553E-08
Gm8909	ensembl_havana	26.5792426	5.80674115	0.95759619	6.06387243	8.1659E-09
Clec4n	ensembl_havana	150.582035	5.7803685	0.62332295	9.27347288	2.8696E-19
Gm42909	havana	27.4235865	5.68392074	0.69775212	8.14604581	4.2306E-15
3100002H09Rik	ensembl	56.3111606	5.60308853	0.58312398	9.60874315	1.296E-20
Adamdec1	ensembl	41.3453354	5.58852252	0.68718183	8.13252375	4.7185E-15
Gm14165	havana	52.3439979	5.56588245	0.75195394	7.40189279	1.2194E-12
Meox1	ensembl_havana	1939.20496	5.56393942	0.28089208	19.8081033	1.0009E-84
Adh6b	ensembl_havana	45.6285809	5.55052392	0.85697183	6.47690358	6.386E-10
Ccdc178	ensembl	36.106715	5.48208783	0.65693439	8.34495482	8.4737E-16
1010001N08Rik	ensembl	11.0013494	5.47045619	0.88761631	6.1630866	4.4974E-09
Tlx1	ensembl_havana	24.8802609	5.46577543	1.08598033	5.03303354	2.2454E-06
Cd5l	ensembl_havana	52.9462173	5.45953538	0.79925352	6.83079306	6.4181E-11
Gm18734	havana	13.1076946	5.45531311	0.96311392	5.6642449	8.1329E-08
Kng1	ensembl_havana	66.0618916	5.42865253	0.89808334	6.0447091	9.1512E-09
Xcr1	ensembl_havana	15.9916877	5.41971456	0.90728548	5.97354935	1.3915E-08
Gm34342	havana	27.6670873	5.41175914	0.6565954	8.24215207	1.953E-15

Gm25631	ensembl	9.10154128	5.39097758	0.82509907	6.53373366	4.4466E-10
BC023719	havana	70.7329181	5.36206439	0.7610698	7.0454305	1.4967E-11
Mroh3	havana	489.854356	5.34046957	0.32135636	16.6185277	6.9719E-60
Col20a1	ensembl_havana	2695.03076	5.33316667	0.38533503	13.8403369	9.1168E-42
Trav3-3	ensembl_havana	11.3550994	5.31321601	0.9551315	5.56281098	1.4199E-07
Rlbp1	ensembl_havana	3597.93164	5.29753416	0.29323101	18.0660773	1.2201E-70
5730559C18Rik	ensembl_havana	1911.49676	5.2931441	0.27807683	19.034826	2.659E-78
Il1f10	ensembl_havana	13.2409243	5.28041484	1.01543949	5.20012755	9.6826E-07
Gm6614	ensembl_havana	45.6973149	5.26837287	0.93593612	5.62898769	9.8768E-08
Mir6358	mirbase	11.2192421	5.25722025	0.81055016	6.48599004	6.0338E-10
Gata6	ensembl	176.101804	5.24649651	0.48058844	10.916818	2.5221E-26
1700040K01Rik	havana	11.7557732	5.22128656	0.85425119	6.11212089	6.1164E-09
Runx3	ensembl_havana	251.798295	5.21854155	0.43843487	11.9026609	4.1014E-31
B9d1os	ensembl_havana	243.343729	5.19377983	0.40624028	12.7849947	9.2608E-36
Rbpjl	ensembl_havana	607.428104	5.18717996	0.31858654	16.2818554	1.6374E-57
Gm42825	havana	8.35557643	5.17049351	0.87225947	5.92770117	1.8159E-08
A930009A15Rik	ensembl_havana	413.233455	5.16413175	0.32194221	16.0405552	7.5785E-56
Matn4	ensembl_havana	6785.71567	5.13279963	0.26327656	19.4958475	4.0378E-82
Gm8730	ensembl	226.505443	5.09169865	0.54121576	9.4078906	8.4049E-20
Gucy2f	ensembl_havana	130.06289	5.08456417	0.51070865	9.95589987	4.7049E-22
Itih5l-ps	havana	86.7494075	5.08340469	0.99821305	5.09250475	1.6701E-06
Mmp3	ensembl	61.8930553	5.07136885	1.02546752	4.94542126	3.4671E-06
Gsc	ensembl_havana	12.6765523	5.04171382	0.94600764	5.32946414	4.9592E-07
Gm9008	ensembl_havana	30.5747769	5.03763879	0.96295762	5.23142315	8.2502E-07
RP23-152B12.3	havana	6.92336909	5.01717497	0.83758841	5.99002432	1.2642E-08
Itgax	ensembl_havana	593.5313	4.95649333	0.43324351	11.4404331	8.2497E-29
Prok2	ensembl_havana	138.456647	4.93714982	1.02771532	4.80400528	6.8562E-06
Adam12	ensembl_havana	1621.46038	4.92051801	0.36997515	13.2995906	1.2563E-38
Rep15	ensembl_havana	355.802841	4.91749334	0.27925246	17.60949	3.7567E-67
Gm8210	ensembl_havana	29.8284576	4.89887213	0.95238947	5.14376974	1.2897E-06
Vmn1r181	ensembl_havana	19.3547533	4.89205671	0.84680795	5.7770557	4.3209E-08
Snx22	ensembl	6030.65755	4.88863783	0.27675016	17.6644445	1.4374E-67
Fbp1	ensembl_havana	30.5256944	4.88183094	0.59502323	8.20443753	2.6495E-15
Gm15698	ensembl_havana	11.4454052	4.85851875	0.95935653	5.0643516	1.9226E-06
Nr2e1	ensembl_havana	8.37847756	4.85740055	0.98643703	4.92418715	3.8431E-06
Klk13	ensembl_havana	9.92132172	4.83529834	0.92099329	5.25009073	7.4941E-07
Ascl1	ensembl_havana	1469.64274	4.82351761	0.30618842	15.7534294	6.7882E-54
RP23-52F4.1	havana	168.938605	4.81865162	0.40005942	12.0448397	7.6964E-32

C1ql2	ensembl_havana	1273.65558	4.8150795	0.37977152	12.6788854	3.5059E-35
Ms4a7	ensembl_havana	397.027474	4.8073631	0.42544817	11.299527	3.9501E-28
Sapcd2	ensembl_havana	1023.58856	4.79971641	0.32183065	14.913795	2.2666E-48
BC018473	havana	41.291218	4.79584984	0.91817359	5.22324959	8.5973E-07
Sox3	ensembl_havana	863.529978	4.7813043	0.32523831	14.7009258	5.0222E-47
C1rb	havana	11.8119049	4.76470104	0.8330362	5.71968067	5.9683E-08
6030408B16Rik	ensembl_havana	22.2362551	4.76239755	0.91761295	5.18998511	1.0198E-06
Tsga13	ensembl_havana	21.4489709	4.76229631	0.6750352	7.05488591	1.4053E-11
Fam89a	ensembl	762.382645	4.75309406	0.31276814	15.1968612	3.2975E-50
Fcgr4	ensembl_havana	162.69426	4.74833026	0.36604548	12.9719681	8.6963E-37
Gm3375	havana	54.8469014	4.73649036	0.8512257	5.56431786	1.4086E-07
Gm1821	havana	378.140291	4.72232109	0.60750262	7.77333453	7.7161E-14
Ccnd1	ensembl_havana	23307.8869	4.7020004	0.26341091	17.8504393	5.4555E-69
Gm42803	havana	7.01984644	4.69635779	0.79364053	5.91748736	1.9261E-08
Vcan	ensembl_havana	10739.2669	4.69224123	0.29780292	15.7561962	6.5193E-54
C6	ensembl_havana	75.9044713	4.6907965	0.67219108	6.97836763	2.378E-11
Gm43820	havana	42.8684932	4.68963662	0.43349553	10.818189	7.1606E-26
Aldh1a3	ensembl_havana	954.672108	4.68127071	0.69455846	6.73992327	1.1672E-10
Pbk	ensembl_havana	276.360959	4.67886584	0.50826086	9.20563873	5.2904E-19
Pdgfra	ensembl_havana	15744.0023	4.66121349	0.31608789	14.7465742	2.596E-47
Neu4	ensembl_havana	4267.26649	4.66057454	0.31606148	14.7457847	2.6198E-47
Emx2	ensembl_havana	17.4713707	4.65062	0.97832144	4.7536728	8.6871E-06
Kng2	ensembl_havana	288.760238	4.64849735	0.73669655	6.3099214	1.8264E-09
Epyc	ensembl_havana	116.767151	4.62464243	1.09643195	4.21790193	9.3512E-05
Timp1	ensembl_havana	383.271413	4.60615938	0.57541756	8.00489885	1.2957E-14

Supplementary Table 4. Top 100 genes most upregulated in spinal tumors.

Gene name	source	Base Mean	log ₂ FoldChange	lfcSE	stat	p value adjusted
Chat	ensembl	168.142906	-9.9307336	0.65125954	-15.248504	1.5189E-50
Slc6a5	ensembl_havana	2400.88165	-9.7705032	0.88078998	-11.092886	3.7737E-27
Htr2c	ensembl_havana	702.867929	-9.7401835	0.600382	-16.22331	4.173E-57
Lamp5	ensembl_havana	1936.54273	-9.4728419	0.53596459	-17.67438	1.2124E-67
Gm14204	havana	135.08327	-9.4648371	0.59884455	-15.805165	3.0418E-54
Otp	ensembl_havana	75.0771559	-9.4548965	0.62546163	-15.116669	1.1082E-49
Slc30a3	ensembl_havana	347.996674	-9.3048006	0.37857126	-24.578729	3.025E-130
Gm42756	havana	67.6884279	-9.1936669	0.67501628	-13.619919	1.7915E-40
Glr1	ensembl_havana	934.03217	-9.0497987	0.73393324	-12.330548	2.5131E-33
Slc32a1	ensembl_havana	1909.41572	-9.027482	0.86645191	-10.418907	4.599E-24
Slc18a3	havana	394.057024	-9.0052437	0.46015442	-19.570047	9.9846E-83
Lhx5	ensembl_havana	76.4710846	-8.9569354	0.61915764	-14.466325	1.4586E-45
Trhr	ensembl	95.6679787	-8.702169	0.58727331	-14.81792	9.2366E-48
Gm42500	havana	38.895394	-8.5643227	0.6284921	-13.626779	1.637E-40
Magel2	ensembl_havana	78.8094562	-8.4777144	0.57310014	-14.792728	1.326E-47
Nkx2-9	ensembl_havana	47.7728891	-8.454287	0.67849364	-12.460378	5.2192E-34
Pnoc	ensembl	89.509404	-8.4505798	0.53447059	-15.811122	2.7863E-54
Cck	ensembl	176.459164	-8.4388602	0.39394707	-21.421305	6.283E-99
Gpr101	ensembl_havana	101.673629	-8.427774	0.51099541	-16.492856	5.4362E-59
Gm42495	havana	32.8287183	-8.3427731	0.62429245	-13.363566	5.4225E-39
Pax2	ensembl_havana	354.690736	-8.2214517	0.26603278	-30.903904	1.101E-205
Tekt5	ensembl_havana	241.057451	-8.0587408	0.3095274	-26.03563	4.697E-146
Slc10a4	ensembl_havana	204.21927	-8.0306858	0.37517745	-21.405033	8.702E-99
Fam216b	ensembl_havana	63.3211298	-7.983239	0.66005441	-12.09482	4.2284E-32
Ermn	ensembl_havana	2122.74596	-7.9070057	0.45040187	-17.555446	9.472E-67
Neurod2	ensembl_havana	57.0146531	-7.8408933	0.5335539	-14.695597	5.4196E-47
Foxb1	ensembl	30.4023426	-7.7084397	0.62341113	-12.364938	1.6563E-33
Uts2	ensembl_havana	55.7462305	-7.6641837	0.61372302	-12.488017	3.7452E-34
Sst	ensembl	526.739301	-7.6345822	0.73598966	-10.373219	7.3104E-24
Neurod6	ensembl_havana	28.274478	-7.6194762	0.61708845	-12.347462	2.0423E-33
Aqp6	ensembl	60.0190457	-7.5293579	0.49845814	-15.105296	1.3096E-49
Mobp	ensembl_havana	27101.6308	-7.470311	0.66449279	-11.242125	7.4669E-28
RP23-5307.3	havana	15.875006	-7.3812213	0.62134356	-11.879452	5.3783E-31
Oprk1	ensembl_havana	71.994221	-7.3777862	0.43703755	-16.881355	9.0392E-62
Gm13112	havana	47.2586371	-7.3739839	0.5150509	-14.317	1.2096E-44
Gm27199	havana	15.4763399	-7.3472801	0.62246811	-11.803464	1.2985E-30
Slc27a2	ensembl_havana	127.825247	-7.2903468	0.42968325	-16.966793	2.1797E-62

Hsd17b2	ensembl	22.7452619	-7.2850421	0.63458937	-11.479931	5.3087E-29
Nmur2	ensembl_havana	26.9660517	-7.2715069	0.62240322	-11.682952	5.1984E-30
B230323A14Rik	ensembl	22.3733119	-7.2692702	0.63547442	-11.439123	8.3584E-29
Gm37111	havana	109.029451	-7.2261236	0.43507761	-16.608815	8.1266E-60
Tfap2b	ensembl_havana	41.7032549	-7.1903365	0.52196768	-13.775444	2.2041E-41
Ghsr	ensembl_havana	17.2407408	-7.1800658	0.64310118	-11.164753	1.7252E-27
Gm28322	havana	22.1545533	-7.1729369	0.67657234	-10.601877	6.9504E-25
Tmem215	ensembl_havana	24.6771263	-7.1576716	0.6176296	-11.588939	1.5303E-29
Fndc9	ensembl_havana	16.1556394	-7.1191409	0.62230488	-11.439957	8.2868E-29
Mnx1	ensembl_havana	19.4123437	-7.0700692	0.63536422	-11.127585	2.5909E-27
A730046J19Rik	havana	22.9949422	-7.0531294	0.62235191	-11.333024	2.73E-28
Grm1	ensembl_havana	262.687086	-7.0517268	0.40136351	-17.569427	7.4881E-67
Doc2a	ensembl_havana	306.893653	-7.0330003	0.19933711	-35.281942	1.733E-268
Gm27544	ensembl	18.2146526	-6.9994484	0.63252391	-11.065903	5.038E-27
Lhx1	ensembl_havana	63.1582101	-6.9793515	0.40607871	-17.187189	5.1667E-64
Cdh7	ensembl_havana	113.542787	-6.974702	0.37919959	-18.393221	3.5746E-73
Nrsn2	ensembl_havana	1015.87245	-6.953626	0.61945725	-11.225352	8.9522E-28
Dmrt3	ensembl	14.3995235	-6.9479374	0.63435423	-10.952772	1.7218E-26
A530058N18Rik	havana	60.9901103	-6.9408801	0.39568586	-17.54139	1.1997E-66
Rmst	ensembl_havana	68.4081864	-6.887144	0.39697518	-17.349055	3.2754E-65
Klhl14	ensembl_havana	59.3001024	-6.8800468	0.41343618	-16.641134	4.8018E-60
Ccdc108	ensembl_havana	136.396446	-6.8656725	0.52391713	-13.104501	1.587E-37
Dao	ensembl_havana	260.240716	-6.8438062	0.48214726	-14.194431	6.8615E-44
Evx1	ensembl_havana	16.3501841	-6.8335151	0.64525689	-10.590379	7.8294E-25
Nxph2	ensembl_havana	36.0551604	-6.8301077	0.48918486	-13.962222	1.7191E-42
Gm38103	havana	14.1943485	-6.8246265	0.68614708	-9.9463027	5.1583E-22
Gpr12	ensembl_havana	27.4537955	-6.8137635	0.55286639	-12.324431	2.7007E-33
Klk6	ensembl_havana	830.777346	-6.8082237	0.62760994	-10.847858	5.2208E-26
Sp8	ensembl	13.9386855	-6.8055559	0.69040714	-9.8573082	1.2222E-21
Pax8	ensembl_havana	137.312869	-6.7684095	0.62869896	-10.76574	1.2459E-25
Gng13	ensembl_havana	65.2511109	-6.7467524	0.37345042	-18.065992	1.2201E-70
Vip	ensembl	15.1951773	-6.7441492	0.6361585	-10.601366	6.9778E-25
Slc12a5	ensembl_havana	5395.9174	-6.7151909	0.3513302	-19.113617	6.0684E-79
Klhl1	ensembl_havana	133.839853	-6.7142321	0.47174368	-14.232797	4.0202E-44
Zdbf2	ensembl_havana	178.739057	-6.6912669	0.22370153	-29.911583	8.68E-193
Hapln2	ensembl_havana	1362.4187	-6.6719764	0.36030768	-18.517442	3.8198E-74
Sox1	havana	186.723314	-6.6651267	0.38188454	-17.453251	5.368E-66
Fam163b	ensembl_havana	464.282384	-6.649801	0.49525061	-13.427144	2.3612E-39

Zfp474	ensembl	10.4302905	-6.6371604	0.71901761	-9.2308733	4.2106E-19
Smim17	ensembl_havana	498.004305	-6.6218026	0.13767059	-48.098892	0
4930426D05Rik	ensembl_havana	41.5479576	-6.6194345	0.42677729	-15.510278	2.8203E-52
Slc24a4	ensembl_havana	67.247096	-6.6179646	0.35966696	-18.400257	3.1868E-73
Evx2	ensembl_havana	9.09624536	-6.6121201	0.63720692	-10.376724	7.0521E-24
Ctxn2	ensembl	69.7984577	-6.5960689	0.35617523	-18.519168	3.7299E-74
A930006I01Rik	havana	27.2227317	-6.5942421	0.66338727	-9.9402603	5.4637E-22
Uncx	ensembl_havana	34.5454092	-6.5626998	0.51326472	-12.786189	9.1333E-36
D930020B18Rik	ensembl_havana	9.07059971	-6.5623834	0.65440167	-10.028066	2.3185E-22
Crhbp	ensembl	33.2384462	-6.5602595	0.47174778	-13.906286	3.7014E-42
Grm2	ensembl_havana	29.4831589	-6.5566565	0.49025626	-13.373937	4.7334E-39
Tac2	ensembl	169.987917	-6.5485075	0.93793523	-6.9818334	2.323E-11
Slc26a3	ensembl_havana	21.0524574	-6.5418704	0.66376191	-9.8557485	1.2405E-21
Sox14	ensembl_havana	8.75494631	-6.5299443	0.65519653	-9.9663902	4.2553E-22
Cacng3	ensembl_havana	158.687756	-6.5253917	0.26441866	-24.678258	2.856E-131
Gm29771	havana	10.4678782	-6.4784763	0.78838426	-8.2174095	2.3878E-15
Gabra5	ensembl_havana	536.483552	-6.4700451	0.29209795	-22.150259	1.011E-105
Bbox1	ensembl_havana	181.276625	-6.4619396	0.43815431	-14.748091	2.5449E-47
Wnt8b	ensembl	9.99048976	-6.4494139	0.64218032	-10.042995	2.0021E-22
Gm8104	havana	20.8801195	-6.4092578	0.57072872	-11.229955	8.5059E-28
Alox8	ensembl_havana	118.867046	-6.4016411	0.31312561	-20.444323	3.4517E-90
Gm15478	havana	10.6350465	-6.3959331	0.71739635	-8.9154804	6.9671E-18
Chodl	ensembl_havana	277.124519	-6.3717871	0.49190971	-12.953164	1.1043E-36
Olfm3	ensembl_havana	309.651061	-6.3620131	0.29562281	-21.520711	7.581E-100
Pkd2l1	ensembl_havana	232.450411	-6.351742	0.35557474	-17.863311	4.3856E-69

Supplementary Table 5. Top 100 most downregulated genes in spinal tumors.

gene	chromosome	start	end	total IS	total samples	total reads	corrected p value	Shared IS	Brain only IS	Spine only IS
Cdkn2a	4	89096058	89489079	99	47	233719	0	1		
Nf1	11	79287193	79619803	47	29	18100	0	1		
Ppp1r14c	10	3309887	3724803	43	29	3155	0	1		
Pten	19	32678851	32905851	30	20	110519	0	1		
Sox6	7	115548304	115871683	29	19	8971	0	1		
Map7	10	20073797	20308872	22	20	15183	0	1		
Adgrl3	5	81048981	81303956	20	19	6741	5.5511E-16	1		
Asap1	15	64110005	64371418	20	17	2096	1.1102E-16	1		
Sox5	6	143942931	144227797	20	19	9252	3.3694E-07	1		
Csmd3	15	47486085	47660361	18	18	21497	0	1		
Exosc9	3	36447497	36668433	18	18	9996	0	1		
Spred1	2	117042029	117209386	18	13	3570	0	1		
Clcn3	8	60850884	61027199	17	14	1925	0	1		
Ctnnd2	15	30484570	30707255	17	15	9065	0	1		
Pik3r1	13	101593163	101847492	17	16	2457	0	1		
Ust	10	8261283	8476769	17	16	2330	0	1		
Snx29	16	11314621	11548051	16	15	10056	0	1		
Dmd	X	84744328	85004890	15	15	14998	0	1		
Slc8a1	17	81501469	81695955	15	15	5217	0	1		
Tcf12	9	71862595	72068316	15	13	1263	1.6817E-05	1		
Zfat	15	67719615	67820188	15	11	14253	0	1		
Zfhx4	3	5239819	5286895	15	8	12633	0	1		
Csnk1g3	18	53839007	54013921	14	13	805	2.2196E-05	1		
Nova1	12	46671946	46867497	14	14	11444	2.8796E-08	1		
Nrip1	16	76237345	76451322	14	14	10157	0	1		
Phlda1	10	111429778	111566905	14	14	4974	0	1		
Tnr	1	159624066	159831238	14	13	2494	0	1		
Asb16	11	102211607	102341521	13	10	16049	0	1		
Epn2	11	61453428	61639298	13	12	1885	0	1		
Nav3	10	109682551	109747074	13	13	20475	2.4789E-06	1		
Ptprj	2	90471620	90658666	13	13	2422	0	1		
Qk	17	10222528	10426738	13	13	1014	9.0392E-05	1		
Tcf4	18	69435503	69610417	13	12	1290	1.8171E-05	1		
Tmub2	11	102200050	102358455	13	10	16049	0	1		
Zcchc11	4	108393432	108530990	13	12	15557	0	1		
9430076C15Rik	6	53537831	53688058	12	12	1163	2.7605E-12	1		

Crebbp	16	4068564	4214458	12	11	5279	3.2305E-05	1		
Klhl13	X	23136091	23319449	12	11	819	2.6341E-09	1		
Myo7b	18	31867868	32062217	12	12	1054	2.2919E-12	1		
Rad51b	12	79201818	79368036	12	11	9554	0	1		
Tmtc2	10	105535455	105582382	12	11	13401	7.6176E-05	1		
Trio	15	27734894	27938215	12	11	1577	7.6712E-07	1		
Zeb2	2	45034252	45184826	12	10	917	5.3173E-06	1		
Zfyve26	12	79249807	79335580	12	11	9554	0	1		
Ankrd28	14	31613680	31756906	11	10	1364	3.9097E-06	1		
Decr1	4	15817126	16013637	11	11	11166	4.4614E-06	1		
Diaph3	14	86812929	86994349	11	11	4533	1.8874E-15	1		
Gtdc1	2	44505726	44600169	11	11	10641	3.4515E-06	1		
Nlgn1	3	25889316	26066141	11	10	615	2.6795E-05	1		
Zwint	10	72630894	72673870	11	11	8769	0	1		
1110015018Rik	3	4782549	4808029	10	7	1071	2.7404E-06	1		
Btd	14	31618262	31738328	10	9	1336	0	1		
Ddah1	3	145717448	145923743	10	10	2287	0	1		
Fam118b	9	35165806	35312750	10	10	3708	8.121E-06	1		
Lims2	18	31892312	32026045	10	10	713	0	1		
Map2	1	66248995	66367379	10	9	483	1.7548E-05	1		
Mmp16	4	18018049	18135955	10	9	682	3.6597E-05	1		
Pcdh7	5	57807058	57954158	10	10	1901	0.00011275	1		
Usp9y	Y	1069938	1414895	10	5	1517	1.1102E-16	1		
Zfhx3	8	108708891	108849884	10	10	12239	0	1		
Cask	X	13649735	13833093	9	9	3131	1.2054E-07	1		
Ddx3y	Y	1073714	1340359	9	4	1488	0	1		
Gria4	9	4591680	4709235	9	8	2077	3.5137E-05	1		
lyd	10	3490141	3557502	9	8	459	5.0069E-07	1		
Map3k1	13	111776572	111817509	9	7	487	7.9972E-07	1		
Mir6400	4	15893410	15989584	9	9	11116	3.0865E-07	1		
Mir99ahg	16	77404495	77521210	9	8	2600	0.00014562	1		
Mis18bp1	12	65102607	65219938	9	9	16655	7.57E-08	1		
Mtus1	8	40937098	41035051	9	9	4923	7.2205E-10	1		
Pias1	9	62859832	62967591	9	7	1070	2.9582E-05	1		
Ptpro	6	137401664	137472271	9	8	15780	1.0596E-05	1		
Selenok	14	29907290	29987375	9	8	14224	6.3017E-09	1		
Sema3d	5	12349761	12473276	9	9	620	5.6819E-06	1		
1810041L15Rik	15	84413067	84519569	8	7	11988	0	1		

Abhd2	7	79251458	79369051	8	8	831	8.4939E-07	1		
Al838599	4	3232361	3251950	8	6	4280	0	1		
Cdc14a	3	116380149	116450767	8	8	23872	0	1		
Cngb3	4	19320602	19346068	8	7	992	1.6934E-07	1		
Cypt15	X	39373938	39400880	8	5	11211	0	1		
Dner	1	84588589	84697108	8	7	3180	6.4798E-05	1		
Dync1li2	8	104401780	104454576	8	8	2293	0	1		
Esr1	10	4889977	4965291	8	6	1025	0.00016908	1		
Gna14	19	16529747	16580612	8	7	7927	0	1		
Gpc5	14	115389812	115458420	8	8	1184	0	1		
Nbn	4	15926454	15973486	8	8	11022	3.3307E-16	0	1	
Plekhg1	10	3685807	3726789	8	8	484	1.585E-09	1		
Rpusd4	9	35214146	35308006	8	8	3329	1.3735E-05	1		
Sat1	X	155153743	155259897	8	7	1419	0	1		
St7	6	17677810	17766179	8	8	14717	1.2536E-05	1		
Stxbp6	12	44803650	44838720	8	7	23157	0	1		
Trpm8	1	88230156	88333646	8	8	397	2.3633E-05	1		
Ttc28	5	111155608	111341936	8	8	914	0	1		
Zfp458	13	67209802	67278275	8	7	657	0	1		
0610040J01Rik	5	63808770	63946064	7	7	6545	5.5218E-06	1		
Abca13	11	9295201	9309824	7	6	8545	1.1102E-16	1		
Akap13	7	75585763	75656199	7	7	390	0	1		
Asb3	11	30978506	30990192	7	5	351	2.6685E-06	0		1
Atp10a	7	58756137	58810945	7	7	4857	0	0	1	
Bmper	9	23528352	23536154	7	4	28034	6.4819E-06	0		1
Cdh11	8	102627714	102706076	7	7	267	6.5793E-05	1		
Dcc	18	72055466	72089361	7	7	8252	4.6028E-05	1		
Dlgap4	2	156676140	156745052	7	7	74607	0	1		
Gsap	5	21160657	21182161	7	6	541	2.9413E-10	0		1
Kpna2	11	106987525	107011871	7	6	56059	0	1		
Map3k4	17	12261677	12319793	7	7	1528	0	1		
Mb21d2	16	28859776	28903405	7	7	1238	0	1		
Musk	4	58304960	58337294	7	7	11817	0	1		
Nbea	3	55753466	55797616	7	7	1116	5.1135E-06	1		
Nek7	1	138489579	138532906	7	7	1436	1.2947E-06	1		
Nemp2	1	52564794	52635692	7	7	787	5.6224E-09	1		
Prex2	1	11266542	11282297	7	7	1703	4.2391E-05	1		
Rbm7	9	48447489	48509113	7	7	11035	2.5167E-08	1		

Rexo2	9	48459906	48499052	7	7	11035	0.0001147	1		
Sorcs1	19	50406272	50485396	7	7	291	3.9339E-08	1		
Tank	2	61595336	61644477	7	7	17183	5.845E-06	1		
Tdrd3	14	87554499	87579225	7	6	3877	4.1233E-05	1		
Tenm3	8	48485013	48543675	7	7	542	9.9238E-06	1		
AA545190	6	10957359	10980856	6	6	969	2.9153E-05	1		
Actbl2	13	111243423	111292208	6	6	918	1.0811E-05	1		
Bcas3	11	85666582	85686068	6	6	1666	4.7744E-05	1		
Bicc1	10	70974373	71033030	6	6	166	1.4156E-05	1		
Caln1	5	130537072	130563475	6	6	1095	1.1262E-05	1		
Ccser1	6	62151190	62162936	6	5	631	7.432E-06	1		
Clasrp	7	19553438	19629745	6	6	8970	0	0	1	
Dach1	14	97945559	97963618	6	6	8107	0	1		
Dleu2	14	61630762	61651684	6	6	1333	0	1		
Gpr155	2	73340199	73369663	6	6	5732	2.9318E-06	1		
Htr1f	16	64944590	64961997	6	6	486	1.1109E-05	1		
Ifitm1	7	140929084	140999580	6	6	9729	0	1		
Kcnh8	17	52597828	52617174	6	6	2624	1.7509E-05	1		
Nalcn	14	123620476	123636635	6	5	2352	5.473E-05	1		
Nell2	15	95415889	95433245	6	6	891	1.6427E-05	1		
Prr30	14	101048943	101064151	6	5	1301	6.6744E-05	1		
Relb	7	19558441	19628937	6	6	8970	3.6673E-05	0	1	
RP23-456L15.3	9	35249367	35312883	6	6	3239	4.9873E-08	1		
Setd5	6	113069053	113104327	6	6	1859	8.1915E-05	1		
Sp3	2	72947644	72979083	6	6	317	8.8572E-05	1		
Tbc1d8b	X	139680170	139722540	6	6	1566	5.4165E-05	1		
Tmem132b	5	125501839	125560585	6	6	1373	7.9314E-06	1		
Tspan7	X	10474178	10503045	6	6	2095	1.2259E-05	1		
1700080O16Rik	X	51992179	52026832	5	5	8557	0	1		
2610307P16Rik	13	28873488	28887127	5	5	31546	3.8598E-11	0		1
2700049A03Rik	12	71135349	71242902	5	5	302	7.1532E-06	1		
5730585A16Rik	15	103052314	103065813	5	5	477	3.8761E-09	1		
Alg14	3	121262154	121293565	5	5	4630	5.3824E-13	0	1	
Arap1	7	101359693	101418390	5	4	315	0	0		1
Baz1a	12	54883543	54900087	5	5	870	5.9099E-08	1		
Cbl	9	44179325	44192979	5	5	743	2.1882E-06	1		
Celf3	3	94468695	94490255	5	5	1295	0	0		1
Crem	18	3286413	3356329	5	5	345	8.7353E-05	1		

Eif3e	15	43258513	43264295	5	5	17142	4.0492E-05	1		
Fam46d	X	107866517	107870364	5	4	287	3.797E-14	1		
Gpc4	X	51994154	52021117	5	5	8557	3.6327E-05	1		
Gt(ROSA)26Sor	6	113068020	113080745	5	5	1735	3.2E-06	1		
Hcrtr2	9	76214423	76225151	5	5	315	2.532E-06	1		
Ighv1-53	12	115150972	115167516	5	5	5760	5.9603E-09	1		
Iqgap1	7	80731162	80829156	5	5	579	5.6024E-05	1		
Nrd1	4	108991346	109006031	5	5	2394	4.8571E-07	0		1
Olfr1385	11	49484110	49495796	5	5	2554	1.1538E-06	0	1	
Pdzrn4	15	92588555	92603009	5	5	253	2.0612E-06	1		
Pkd1l1	11	8949602	8965183	5	5	558	0	1		
Ptbp2	3	119733935	119748629	5	5	780	3.8601E-09	1		
Robo2	16	74394673	74407244	5	5	6884	1.1833E-07	1		
RP24-260O23.1	9	9455457	9470085	5	5	1040	1.1486E-06	1		
Rps18-ps2	4	9017185	9034808	5	5	275	0	0		1
Smarcc1	9	110201976	110214654	5	5	259	2.6937E-06	1		
Spag17	3	100013554	100028248	5	5	11933	4.8054E-09	1		
Tex11	X	100955040	100978133	5	4	429	1.445E-05	1		
Tmeff1	4	48590114	48609703	5	5	197	1.8149E-06	1		
Tmem56	3	121277829	121295504	5	5	4630	0.00018597	0	1	
Tomm7	5	23838187	23853820	5	5	360	1.8496E-05	1		
Tox	4	6834873	6848580	5	5	897	2.9907E-06	1		
Tpt1-ps2	4	54590149	54611696	5	5	290	2.4568E-08	1		
Vps54	11	21235629	21261949	5	5	506	4.3764E-05	1		
1700014L14Rik	8	18349901	18356728	4	4	22455	1.0031E-05	0	1	
4933439N14Rik	8	12462246	12521017	4	4	246	0.00010552	1		
A4gnt	9	99604881	99612683	4	4	820	6.5177E-06	0	1	
Agbl1	7	76174911	76188584	4	4	468	7.6613E-06	1		
Atoh8	6	72201041	72215724	4	4	2604	0	0		1
Atp2a2	5	122494917	122502734	4	4	8776	4.7205E-06	0	1	
Bcl10	3	145920673	145927530	4	4	9541	4.0375E-06	0	1	
Begain	12	109024710	109042236	4	4	6415	0	0	1	
Ccdc62	5	123948827	123958598	4	4	1939	1.0121E-05	1		
Csmd1	8	16027601	16034428	4	4	3948	2.5882E-06	0		1
Dgkb	12	38640104	38651782	4	4	29771	1.1652E-05	1		
Eif2ak3	6	70844355	70851207	4	4	16991	1.062E-05	0		1
Enc1	13	97241603	97251340	4	4	1006	2.8697E-06	1		
Enpp2	15	54889275	54892166	4	4	6147	4.5508E-05	0	1	

Erap1	13	74636251	74644041	4	4	5699	9.752E-06	0		1
F630206G17Rik	11	45776757	45784547	4	4	1321	2.8702E-05	1		
Frmpd4	X	167597497	167612893	4	4	3528	1.1607E-05	0	1	
Glp2r	11	67707304	67717043	4	4	4436	3.7951E-06	1		
Gpam	19	54943295	54953602	4	4	456	2.287E-06	0		1
Gripap1	X	7787619	7810712	4	4	502	0	1		
Hdac9	12	34524503	34530342	4	4	540	2.7449E-05	1		
Hipk2	6	38865332	38874142	4	4	640	2.3848E-06	1		
Invs	4	48285090	48288027	4	4	12184	4.0042E-05	1		
Krtap7-1	16	89528150	89532018	4	4	188	3.8388E-05	1		
Lama3	18	12549492	12559150	4	4	401	1.3944E-05	1		
Lhfp12	13	94126746	94136483	4	4	11636	3.6042E-06	1		
Lmntd1	6	145429773	145440541	4	4	34869	8.0881E-06	0		1
Lrrc8d	5	105699725	105710473	4	4	279	5.1012E-07	1		
Magi2	5	19904424	19913218	4	4	191	1.4119E-05	0		1
Myo10	15	25703687	25726841	4	3	406	6.3252E-05	1		
Nampt	12	32821428	32830187	4	4	2596	1.1603E-05	1		
Nkain3	4	20308617	20317428	4	4	1028	1.6207E-05	1		
Pakap	4	57778979	57790727	4	4	1561	5.7348E-09	0	1	
Pde4b	4	102563855	102573645	4	4	12230	5.0818E-06	1		
Pdgfra	5	75143204	75158838	4	4	438	3.652E-07	0	1	
Picalm	7	90191959	90204650	4	4	29655	2.011E-06	1		
Pla2g2d	4	138761447	138776132	4	4	548	0	0		1
Prcc	3	87860603	87871379	4	4	11675	1.1487E-05	1		
Prdm16	4	154433167	154447853	4	4	679	2.4425E-15	1		
Prdm5	6	65850086	65869691	4	4	5111	2.4531E-05	1		
Prkca	11	108256420	108260315	4	4	318	3.8866E-05	0		1
Rab27b	18	70050432	70053329	4	4	190	5.0411E-05	1		
Rpl10l	12	66046953	66059605	4	4	1037	3.5302E-07	1		
Sel1l3	5	53113743	53123514	4	4	217	1.3822E-05	0		1
Ska1	18	74129842	74135636	4	4	2957	3.1329E-05	0		1
Slc7a11	3	49985247	49997002	4	4	3008	1.9128E-06	1		
Smarca2	19	26712545	26722852	4	4	249	1.4439E-05	0		1
Smoc1	12	81134247	81147872	4	4	16193	2.2767E-08	0		1
Snd1	6	28837016	28848762	4	4	523	1.0384E-05	0	1	
Stox2	8	47236736	47246490	4	4	546	4.7938E-06	1		
Tenm2	11	36046293	36054084	4	4	1156	9.9283E-06	1		
Tm4sf1	3	57282307	57290144	4	4	1379	2.3639E-06	0		1

Tmc1	19	20962010	20975129	4	4	872	7.2815E-06	0	1	
Ttc39b	4	83272917	83302311	4	4	899	9.4283E-06	1		
Usp1	4	98918836	98923731	4	4	1140	2.6525E-05	1		
Vmn2r-ps3	3	64036667	64042545	4	4	1013	1.2578E-05	0		1
Vps53	11	76034485	76043250	4	4	429	4.1726E-06	0		1
Wdr36	18	32838374	32848032	4	4	1350	1.7072E-05	0	1	
Whsc1l1	8	25687432	25697186	4	4	102	1.2495E-05	1		
Ybx3	6	131380342	131389152	4	4	2746	1.6807E-05	1		
Yy1	12	108788286	108798991	4	4	410	9.319E-07	1		
Ankrd40	11	94323900	94329743	3	3	512	4.4229E-05	0		1
Btbd9	17	30519503	30534022	3	3	949	4.5949E-05	1		
Cacul1	19	60529850	60540158	3	3	554	4.247E-05	1		
Dusp16	6	134756395	134761289	3	3	1791	2.5904E-05	0		1
Dync2li1	17	84644856	84655489	3	3	625	1.8176E-05	0		1
Fat3	9	16408032	16410958	3	3	1896	3.8904E-05	0	1	
Galnt16	12	80526006	80529899	3	3	1069	3.3152E-05	1		
Gria3	X	41398480	41415800	3	3	22863	3.1738E-05	0	1	
Hpf1	8	60879883	60889636	3	3	636	1.1064E-05	0		1
Il1rapl1	X	87436221	87449687	3	3	183	0	0		1
Itga1	13	115036892	115044681	3	3	124	2.7668E-05	1		
Jdp2	12	85616740	85620632	3	3	1137	2.4645E-05	1		
Kcnj16	11	110991895	110998712	3	3	187	1.8284E-05	1		
Lyzl1	18	4125086	4132813	3	3	213	2.615E-05	1		
Magi1	6	93692667	93696582	3	3	720	2.7975E-05	0	1	
Mbp	18	82534932	82538795	3	3	262	5.1967E-05	1		
Pabpc6	17	9760726	9770393	3	3	443	2.4046E-05	1		
Pappa	4	65239372	65244267	3	3	330	2.0161E-05	1		
Parp8	13	116970654	116974549	3	3	626	3.4426E-05	1		
Pebp4	14	69966628	69970430	3	3	847	4.4883E-05	0	1	
Pisd-ps2	17	3080063	3086830	3	3	149	2.6555E-05	1		
Ppfibp2	7	107694551	107699432	3	3	1125	4.3106E-05	0	1	
Ppp2r2b	18	42803182	42805114	3	3	845	5.181E-05	0		1
Rps18-ps1	4	71478884	71488675	3	3	1214	1.1936E-05	0	1	
Ruvbl2	7	45428511	45438273	3	3	728	2.41E-05	0		1
Slc48a1	15	97786263	97790117	3	3	162	4.3113E-05	0		1
Trim27	13	21158858	21167622	3	3	266	2.0745E-05	0	1	
Zc3hav1l	6	38281937	38294663	3	3	19447	3.934E-07	0		1
Zfp473	7	44748088	44750040	3	3	760	5.495E-05	1		

1700018G05Rik	X	102931119	102934005	2	2	80	7.0959E-06	0		1
Basp1	15	25389106	25423940	2	2	61	0.0002068	0		1
Erdr1	Y	90706026	90854162	2	2	60	0	1		
Mtcl1	17	66393658	66432503	2	2	217	0.00014725	0		1
Myt1	2	181772347	181813638	2	2	68	1.3798E-05	0		1
Plxna1	6	89341680	89345595	2	2	605	8.4903E-07	0	1	
Acp7	7	28595604	28600485	1	1	17	3.287E-05	0		1
App	16	85050861	85094602	1	1	11	0.00014838	0	1	
Arhgef28	13	97895928	97899823	1	1	70	2.992E-05	0	1	
Htr2a	14	74642139	74644991	1	1	21	5.4403E-05	0		1
Ptk2	15	73227545	73256488	1	1	255	2.7657E-05	0	1	
Cox11	11	90635666	90642504	11	10	0	0.00015471	0	1	
Gmnc	16	26950849	26952783	4	4	0	2.0535E-05	0	1	
Tom11	11	90633751	90651324	9	8	0	6.0095E-05		1	
Grm3	5	9563886	9568771	4	4	0	3.4468E-05	0	1	
Pik3c3	18	29756604	29758536	4	4	0	5.6515E-05	0		1
Xylt1	7	117422552	117424504	3	3	0	5.4756E-05	0	1	

Supplementary Table 6. All *piggyBac* common integration sites (CIS) across 96 brain and spinal gliomas.

name	Chromosome	position	feature_name	gene_name	Total read counts
Apc2_sense-10:80302495	10	80302495	CbASA	Apc2	356
Cdkn2a_sense-4:89294333	4	89294333	CbASA	Cdkn2a	325
Dmd_sense-X:84848795	X	84848795	CbASA	Dmd	261
Pten_sense-19:32818061	19	32818061	CbASA	Pten	230
Afap1l2_sense-19:56944704	19	56944704	CbASA	Afap1l2	119
Pcdh15_sense-10:74230381	10	74230381	CbASA	Pcdh15	112
Ubap1_sense-4:41371850	4	41371850	CbASA	Ubap1	93
Rad51b_sense-12:79300541	12	79300541	SD	Rad51b	72
Cdkn2a_sense-4:89281985	4	89281985	CbASA	Cdkn2a	69
Ebf1_sense-11:44618193	11	44618193	SD	Ebf1	59
Ebf1_sense-11:44620413	11	44620413	SD	Ebf1	56
App_sense-16:84978063	16	84978063	CbASA	App	54
Ptpro_sense-6:137441144	6	137441144	CbASA	Ptpro	52
noGene_-6:113076212	6	113076212	En2SA	noGene	43
noGene_-6:113076491	6	113076491	En2SA	noGene	43
Prdm5_sense-6:65857818	6	65857818	CbASA	Prdm5	41
Golph3_sense-15:12321957	15	12321957	CbASA	Golph3	40
Nf1_sense-11:79340060	11	79340060	CbASA	Nf1	34
Exosc9_sense-3:36553130	3	36553130	CbASA	Exosc9	33
Qk_sense-17:10273946	17	10273946	CbASA	Qk	33
Sox5_sense-6:144116443	6	144116443	CbASA	Sox5	32
Zfhx3_sense-8:108715331	8	108715331	CbASA	Zfhx3	32
Myt1_sense-2:181807661	2	181807661	CbASA	Myt1	31
Gpm6a_sense-8:54955316	8	54955316	CbASA	Gpm6a	26
noGene_-8:69716767	8	69716767	CbASA	noGene	18
Epha4_sense-1:77444864	1	77444864	CbASA	Epha4	17
Xylt1_sense-7:117381521	7	117381521	CbASA	Xylt1	17
Myt1_sense-2:181815614	2	181815614	CbASA	Myt1	16
Zfhx3_sense-8:108704236	8	108704236	CbASA	Zfhx3	14
Ctnnd2_sense-15:30634817	15	30634817	CbASA	Ctnnd2	13
Lhfpl2_sense-13:94120836	13	94120836	CbASA	Lhfpl2	13
St7_sense-6:17694363	6	17694363	CbASA	St7	13
Trip12_sense-1:84814822	1	84814822	CbASA	Trip12	13
Asap1_sense-15:64312348	15	64312348	CbASA	Asap1	12
Slc8a1_sense-17:81647808	17	81647808	CbASA	Slc8a1	12
3110035E14Rik_sense-1:9607030	1	9607030	CbASA	3110035E14Rik	11
Eif2ak3_sense-6:70845022	6	70845022	CbASA	Eif2ak3	11

Lin52_sense-12:84462453	12	84462453	CbASA	Lin52	11
Adam12_sense-7:133929892	7	133929892	CbASA	Adam12	10
Cask_sense-X:13846007	X	13846007	CbASA	Cask	10
Csmd1_sense-8:16033503	8	16033503	CbASA	Csmd1	10
Dmxl1_sense-18:49939610	18	49939610	CbASA	Dmxl1	10
Thsd7a_sense-6:12748796	6	12748796	CbASA	Thsd7a	10
Mmp16_sense-4:18112115	4	18112115	CbASA	Mmp16	9
Asrgl1_sense-19:9118528	19	9118528	CbASA	Asrgl1	8
Ehbp1_sense-11:22285487	11	22285487	CbASA	Ehbp1	8
Kit_sense-5:75575119	5	75575119	CbASA	Kit	8
Lncpint_sense-6:31139728	6	31139728	CbASA	Lncpint	8
noGene_-15:51652158	15	51652158	SD	noGene	8
noGene_-2:50636953	2	50636953	SD	noGene	8
Qk_sense-17:10238892	17	10238892	CbASA	Qk	8
Unc5c_sense-3:141465838	3	141465838	CbASA	Unc5c	8
Inpp5f_sense-7:128664306	7	128664306	CbASA	Inpp5f	7
noGene_-8:123041948	8	123041948	CbASA	noGene	7
Slc25a38_sense-9:120110573	9	120110573	CbASA	Slc25a38	7
Utrn_sense-10:12475270	10	12475270	CbASA	Utrn	7
Erbp4_sense-1:68250579	1	68250579	CbASA	Erbp4	6
Nf1_sense-11:79475884	11	79475884	CbASA	Nf1	6
noGene_-15:95668776	15	95668776	SD	noGene	6
Plppr1_sense-4:49206496	4	49206496	CbASA	Plppr1	6
Spag9_sense-11:94013744	11	94013744	CbASA	Spag9	6
Ust_sense-10:8390887	10	8390887	CbASA	Ust	6
App_sense-16:84971407	16	84971407	CbASA	App	5
Col11a1_sense-3:114124353	3	114124353	CbASA	Col11a1	5
Fndc4_sense-5:31295663	5	31295663	SD	Fndc4	5
Gria4_sense-9:4664767	9	4664767	CbASA	Gria4	5
Kif1b_sense-4:149307428	4	149307428	CbASA	Kif1b	5
Mmp16_sense-4:17987721	4	17987721	CbASA	Mmp16	5
Ndufs4_sense-13:114316856	13	114316856	CbASA	Ndufs4	5
noGene_-1:139474960	1	139474960	CbASA	noGene	5
noGene_-8:54779651	8	54779651	CbASA	noGene	5
noGene_-8:69716283	8	69716283	CbASA	noGene	5
noGene_-X:102950132	X	102950132	CbASA	noGene	5
Pde4b_sense-4:102570879	4	102570879	CbASA	Pde4b	5
Ptprt_sense-2:162238006	2	162238006	CbASA	Ptprt	5

Rgcc_sense-14:79300714	14	79300714	CbASA	Rgcc	5
Usp24_sense-4:106371096	4	106371096	CbASA	Usp24	5
Xylt1_sense-7:117549098	7	117549098	CbASA	Xylt1	5
Zeb2_sense-2:45110015	2	45110015	CbASA	Zeb2	5
1110038B12Rik_sense-17:34951884	17	34951884	CbASA	1110038B12Rik	4
Aig1_sense-10:13690523	10	13690523	CbASA	Aig1	4
Arap1_sense-7:101404426	7	101404426	CbASA	Arap1	4
Col11a1_sense-3:114090258	3	114090258	CbASA	Col11a1	4
Derl1_sense-15:57875496	15	57875496	CbASA	Derl1	4
Dscam_sense-16:97038897	16	97038897	CbASA	Dscam	4
Gm10184_antisense-17:89910340	17	89910340	En2SA	Gm10184	4
Gmids_sense-13:32225134	13	32225134	CbASA	Gmids	4
Itpr1_sense-6:108391970	6	108391970	CbASA	Itpr1	4
Lcorl_sense-5:45795292	5	45795292	CbASA	Lcorl	4
Man1a2_sense-3:100578475	3	100578475	CbASA	Man1a2	4
Map3k4_sense-17:12318497	17	12318497	CbASA	Map3k4	4
Myt1_sense-2:181822760	2	181822760	CbASA	Myt1	4
Nav1_sense-1:135532348	1	135532348	CbASA	Nav1	4
Nav3_sense-10:109714232	10	109714232	CbASA	Nav3	4
Ncam1_sense-9:49798677	9	49798677	CbASA	Ncam1	4
noGene_-15:51663808	15	51663808	SD	noGene	4
noGene_-3:113600371	3	113600371	CbASA	noGene	4
noGene_-6:113076759	6	113076759	En2SA	noGene	4
Pcdhgb4_sense-18:37722918	18	37722918	CbASA	Pcdhgb4	4
Pde4b_sense-4:102255457	4	102255457	CbASA	Pde4b	4
Sept7_sense-9:25265497	9	25265497	CbASA	43350	4
Sox6_sense-7:115701695	7	115701695	CbASA	Sox6	4
Tcf4_sense-18:69564685	18	69564685	CbASA	Tcf4	4
Tnr_sense-1:159524216	1	159524216	CbASA	Tnr	4
Ube3c_sense-5:29619788	5	29619788	CbASA	Ube3c	4
Xylt1_sense-7:117667619	7	117667619	CbASA	Xylt1	4
Abca1_sense-4:53127596	4	53127596	CbASA	Abca1	3
Abhd2_sense-7:79297208	7	79297208	CbASA	Abhd2	3
Agap1_sense-1:89789325	1	89789325	CbASA	Agap1	3
Amy1_sense-3:113605571	3	113605571	CbASA	Amy1	3
Anks1b_sense-10:90680920	10	90680920	CbASA	Anks1b	3
Arhgap31_sense-16:38712573	16	38712573	CbASA	Arhgap31	3
Arid2_sense-15:96289153	15	96289153	CbASA	Arid2	3

Brinp1_sense-4:68954013	4	68954013	CbASA	Brinp1	3
Btd_sense-14:31662326	14	31662326	CbASA	Btd	3
Cdc5l_sense-17:45427938	17	45427938	CbASA	Cdc5l	3
Clk1_sense-1:58423919	1	58423919	CbASA	Clk1	3
Col9a1_sense-1:24230955	1	24230955	CbASA	Col9a1	3
Diaph2_sense-X:130109382	X	130109382	CbASA	Diaph2	3
Dpp10_sense-1:123854165	1	123854165	CbASA	Dpp10	3
Dync1h1_sense-12:110601855	12	110601855	CbASA	Dync1h1	3
Fam126b_sense-1:58556508	1	58556508	CbASA	Fam126b	3
Gm10259_antisense-3:25212629	3	25212629	En2SA	Gm10259	3
Gria3_sense-X:41478800	X	41478800	CbASA	Gria3	3
Hnrnpa2b1_sense-6:51463410	6	51463410	CbASA	Hnrnpa2b1	3
Itga9_sense-9:118672905	9	118672905	CbASA	Itga9	3
Kcnh5_sense-12:75087404	12	75087404	CbASA	Kcnh5	3
Kiz_sense-2:146861183	2	146861183	CbASA	Kiz	3
Klhl9_sense-4:88722161	4	88722161	CbASA	Klhl9	3
Lbh_sense-17:72921291	17	72921291	CbASA	Lbh	3
Lclat1_sense-17:73196796	17	73196796	CbASA	Lclat1	3
Lyrm4_sense-13:36092805	13	36092805	CbASA	Lyrm4	3
Map4_sense-9:110063124	9	110063124	CbASA	Map4	3
Map4k3_sense-17:80649526	17	80649526	CbASA	Map4k3	3
Megf11_sense-9:64544687	9	64544687	CbASA	Megf11	3
Mex3c_sense-18:73573777	18	73573777	CbASA	Mex3c	3
Mmp16_sense-4:18054579	4	18054579	CbASA	Mmp16	3
Nlgn1_sense-3:26153264	3	26153264	CbASA	Nlgn1	3
noGene_-15:47586613	15	47586613	CbASA	noGene	3
noGene_-19:22040987	19	22040987	SD	noGene	3
noGene_-2:44565811	2	44565811	CbASA	noGene	3
noGene_-4:32321264	4	32321264	SD	noGene	3
noGene_-6:113076539	6	113076539	En2SA	noGene	3
noGene_-6:31126448	6	31126448	CbASA	noGene	3
noGene_-9:68427694	9	68427694	SD	noGene	3
Nxph1_sense-6:8950308	6	8950308	CbASA	Nxph1	3
Pcdh15_sense-10:74626843	10	74626843	CbASA	Pcdh15	3
Pde7a_sense-3:19256777	3	19256777	CbASA	Pde7a	3
Plekha5_sense-6:140426556	6	140426556	CbASA	Plekha5	3
Ptprj_sense-2:90452059	2	90452059	CbASA	Ptprj	3
Qk_sense-17:10318731	17	10318731	CbASA	Qk	3

Rnpc3_sense-3:113605571	3	113605571	CbASA	Rnpc3	3
Sccpdh_sense-1:179670696	1	179670696	CbASA	Sccpdh	3
Slco3a1_sense-7:74504176	7	74504176	CbASA	Slco3a1	3
Sorcs1_sense-19:50378896	19	50378896	CbASA	Sorcs1	3
Spink8_sense-9:109816751	9	109816751	SD	Spink8	3
Tcf4_sense-18:69564164	18	69564164	CbASA	Tcf4	3
Tmem132b_sense-5:125698751	5	125698751	CbASA	Tmem132b	3
Utrn_sense-10:12455362	10	12455362	CbASA	Utrn	3
Utrn_sense-10:12478412	10	12478412	CbASA	Utrn	3
2810410L24Rik_sense-11:120188488	11	120188488	CbASA	2810410L24Rik	2
Adam23_sense-1:63545595	1	63545595	CbASA	Adam23	2
Adamts1_sense-16:85795905	16	85795905	CbASA	Adamts1	2
Adgrl3_sense-5:81197632	5	81197632	CbASA	Adgrl3	2
Adgrl3_sense-5:81560944	5	81560944	CbASA	Adgrl3	2
Afap1l2_sense-19:56943540	19	56943540	SD	Afap1l2	2
Agrn_sense-4:156195243	4	156195243	CbASA	Agrn	2
Aifm2_sense-10:61725855	10	61725855	SD	Aifm2	2
Anks1b_sense-10:90042703	10	90042703	CbASA	Anks1b	2
App_sense-16:85030366	16	85030366	SD	App	2
Arsb_sense-13:93794219	13	93794219	CbASA	Arsb	2
Aspm_sense-1:139474374	1	139474374	CbASA	Aspm	2
Astn2_sense-4:65911659	4	65911659	CbASA	Astn2	2
Atcay_sense-10:81210523	10	81210523	CbASA	Atcay	2
Atxn10_sense-15:85393507	15	85393507	CbASA	Atxn10	2
Brinp1_sense-4:68792824	4	68792824	CbASA	Brinp1	2
Brinp3_sense-1:146751992	1	146751992	CbASA	Brinp3	2
Cadm2_sense-16:66882732	16	66882732	CbASA	Cadm2	2
Cdc37l1_sense-19:28999352	19	28999352	CbASA	Cdc37l1	2
Cdh11_sense-8:102647462	8	102647462	CbASA	Cdh11	2
Cdh20_sense-1:104768899	1	104768899	CbASA	Cdh20	2
Chd7_sense-4:8690776	4	8690776	CbASA	Chd7	2
Chmp2b_sense-16:65546848	16	65546848	CbASA	Chmp2b	2
Chsy3_sense-18:59179549	18	59179549	CbASA	Chsy3	2
Chtop_sense-3:90507544	3	90507544	CbASA	Chtop	2
Clock_sense-5:76226932	5	76226932	CbASA	Clock	2
Cntn1_sense-15:92318074	15	92318074	CbASA	Cntn1	2
Cntn4_sense-6:106550517	6	106550517	CbASA	Cntn4	2
Col11a1_sense-3:114066575	3	114066575	CbASA	Col11a1	2

Col11a1_sense-3:114147824	3	114147824	CbASA	Col11a1	2
Col11a1_sense-3:114213287	3	114213287	CbASA	Col11a1	2
Cpne8_sense-15:90679167	15	90679167	CbASA	Cpne8	2
Creb5_sense-6:53610533	6	53610533	CbASA	Creb5	2
Csmd1_sense-8:16271521	8	16271521	CbASA	Csmd1	2
Csmd1_sense-8:17027224	8	17027224	CbASA	Csmd1	2
Ctnna2_sense-6:77845477	6	77845477	CbASA	Ctnna2	2
Ctnnd2_sense-15:30332147	15	30332147	CbASA	Ctnnd2	2
Cux1_sense-5:136304722	5	136304722	CbASA	Cux1	2
Dcn_sense-10:97483338	10	97483338	SD	Dcn	2
Ddx39b_sense-17:35249070	17	35249070	CbASA	Ddx39b	2
Diaph2_sense-X:130259242	X	130259242	CbASA	Diaph2	2
Dock10_sense-1:80648212	1	80648212	CbASA	Dock10	2
Erb3_sense-10:128578099	10	128578099	CbASA	Erb3	2
Ext1_sense-15:53083084	15	53083084	CbASA	Ext1	2
Fam63a_sense-3:95283626	3	95283626	CbASA	Fam63a	2
Fchs2_sense-7:101139197	7	101139197	CbASA	Fchs2	2
Fgfr1_sense-5:108695119	5	108695119	CbASA	Fgfr1	2
Gab1_sense-8:80879531	8	80879531	CbASA	Gab1	2
Gm31266_sense-3:41562419	3	41562419	SD	Gm31266	2
Gna12_sense-5:140785396	5	140785396	CbASA	Gna12	2
Gpc6_sense-14:117624551	14	117624551	CbASA	Gpc6	2
Gphn_sense-12:78454852	12	78454852	CbASA	Gphn	2
Grid2_sense-6:64094440	6	64094440	CbASA	Grid2	2
Grik4_sense-9:42808492	9	42808492	CbASA	Grik4	2
Gys1_sense-7:45435171	7	45435171	CbASA	Gys1	2
Hivep2_sense-10:14066685	10	14066685	CbASA	Hivep2	2
Hspa4_sense-11:53284099	11	53284099	CbASA	Hspa4	2
Il1rap1_sense-X:87419303	X	87419303	SD	Il1rap1	2
Impad1_sense-4:4769311	4	4769311	CbASA	Impad1	2
Itga9_sense-9:118698475	9	118698475	CbASA	Itga9	2
Kat6a_sense-8:22914388	8	22914388	CbASA	Kat6a	2
Khdrbs2_sense-1:32310797	1	32310797	SD	Khdrbs2	2
Kif1b_sense-4:149247227	4	149247227	CbASA	Kif1b	2
Lama4_sense-10:39017402	10	39017402	CbASA	Lama4	2
Lhfp3_sense-5:22746626	5	22746626	CbASA	Lhfp3	2
Lims2_sense-18:31944557	18	31944557	CbASA	Lims2	2
Lrrtm3_sense-10:64087847	10	64087847	CbASA	Lrrtm3	2

Lsamp_sense-16:39984728	16	39984728	CbASA	Lsamp	2
Lypd1_sense-1:125910390	1	125910390	CbASA	Lypd1	2
March11_sense-15:26310970	15	26310970	SD	43170	2
Megf10_sense-18:57133731	18	57133731	CbASA	Megf10	2
Mgat5_sense-1:127320766	1	127320766	CbASA	Mgat5	2
Micu2_sense-14:57945384	14	57945384	CbASA	Micu2	2
Mnat1_sense-12:73123927	12	73123927	CbASA	Mnat1	2
Mtmr12_sense-15:12266769	15	12266769	CbASA	Mtmr12	2
Mtss1l_sense-8:110732179	8	110732179	CbASA	Mtss1l	2
Ncam2_sense-16:81517618	16	81517618	CbASA	Ncam2	2
Neto1_sense-18:86473844	18	86473844	CbASA	Neto1	2
noGene_-13:89633247	13	89633247	SD	noGene	2
noGene_-14:100482191	14	100482191	CbASA	noGene	2
noGene_-16:23257311	16	23257311	CbASA	noGene	2
noGene_-16:45413414	16	45413414	SD	noGene	2
noGene_-16:85043575	16	85043575	CbASA	noGene	2
noGene_-6:146891519	6	146891519	CbASA	noGene	2
noGene_-7:76858317	7	76858317	SD	noGene	2
noGene_-8:69716384	8	69716384	CbASA	noGene	2
noGene_-X:72770542	X	72770542	SD	noGene	2
Nova1_sense-12:46816885	12	46816885	CbASA	Nova1	2
Nup93_sense-8:94243772	8	94243772	CbASA	Nup93	2
Omg_sense-11:79503902	11	79503902	CbASA	Omg	2
P2rx7_sense-5:122664675	5	122664675	CbASA	P2rx7	2
Pcdh10_sense-3:45392875	3	45392875	CbASA	Pcdh10	2
Pcdhga6_sense-18:37709653	18	37709653	CbASA	Pcdhga6	2
Pcsk6_sense-7:65959310	7	65959310	CbASA	Pcsk6	2
Pdgfra_sense-5:75170952	5	75170952	CbASA	Pdgfra	2
Pdgfra_sense-5:75189337	5	75189337	CbASA	Pdgfra	2
Pdlim5_sense-3:142391712	3	142391712	CbASA	Pdlim5	2
Phlpp1_sense-1:106173448	1	106173448	CbASA	Phlpp1	2
Phlpp1_sense-1:106380423	1	106380423	CbASA	Phlpp1	2
Phtf2_sense-5:20801901	5	20801901	CbASA	Phtf2	2
Plxna2_sense-1:194712319	1	194712319	CbASA	Plxna2	2
Ppfibp1_sense-6:146938990	6	146938990	CbASA	Ppfibp1	2
Ppp2r2b_sense-18:43059161	18	43059161	CbASA	Ppp2r2b	2
Prdm5_sense-6:65831372	6	65831372	CbASA	Prdm5	2
Prex1_sense-2:166713514	2	166713514	CbASA	Prex1	2

Prkg1_sense-19:31302285	19	31302285	CbASA	Prkg1	2
Prkg1_sense-19:31663970	19	31663970	CbASA	Prkg1	2
Psm7_sense-2:38613431	2	38613431	CbASA	Psm7	2
Ptk2_sense-15:73242365	15	73242365	CbASA	Ptk2	2
Ptprk_sense-10:28569974	10	28569974	CbASA	Ptprk	2
Ptprm_sense-17:66890923	17	66890923	CbASA	Ptprm	2
Ptprt_sense-2:162253752	2	162253752	CbASA	Ptprt	2
R3hdm1_sense-1:128169058	1	128169058	CbASA	R3hdm1	2
Rab14_sense-2:35189899	2	35189899	CbASA	Rab14	2
Rabep1_sense-11:70925913	11	70925913	CbASA	Rabep1	2
Rapgef6_sense-11:54642952	11	54642952	CbASA	Rapgef6	2
Rars2_sense-4:34623514	4	34623514	CbASA	Rars2	2
Rasa3_sense-8:13631774	8	13631774	CbASA	Rasa3	2
Rev3l_sense-10:39732614	10	39732614	CbASA	Rev3l	2
Rev3l_sense-10:39859222	10	39859222	CbASA	Rev3l	2
Ripk1_sense-13:34002707	13	34002707	CbASA	Ripk1	2
S100a3_sense-3:90560558	3	90560558	SD	S100a3	2
Sash1_sense-10:8780518	10	8780518	CbASA	Sash1	2
Sash1_sense-10:8850362	10	8850362	CbASA	Sash1	2
Scn3a_sense-2:65472278	2	65472278	CbASA	Scn3a	2
Sgip1_sense-4:102760566	4	102760566	CbASA	Sgip1	2
Sh3rf1_sense-8:61226319	8	61226319	CbASA	Sh3rf1	2
Sorcs3_sense-19:48206798	19	48206798	CbASA	Sorcs3	2
Sox5_sense-6:143861383	6	143861383	CbASA	Sox5	2
Sox6_sense-7:115580564	7	115580564	CbASA	Sox6	2
Sox6_sense-7:115943893	7	115943893	CbASA	Sox6	2
Spon1_sense-7:113788553	7	113788553	CbASA	Spon1	2
Stxbp5_sense-10:9841870	10	9841870	CbASA	Stxbp5	2
Tcf4_sense-18:69349145	18	69349145	CbASA	Tcf4	2
Tmem9_sense-1:136019750	1	136019750	CbASA	Tmem9	2
Tox3_sense-8:90274631	8	90274631	CbASA	Tox3	2
Tpm1_sense-9:67047785	9	67047785	CbASA	Tpm1	2
Txndc12_sense-4:108834857	4	108834857	CbASA	Txndc12	2
Ywhae_sense-11:75733092	11	75733092	CbASA	Ywhae	2
Zbtb38_sense-9:96728981	9	96728981	CbASA	Zbtb38	2
Zc3h13_sense-14:75339473	14	75339473	CbASA	Zc3h13	2

Supplementary Table 7. Top fusion transcripts, ranked according to RNA-seq read counts from 36 brain and spinal gliomas.