

Supplementary Table 1. Differentially expressed genes in the CA1 of the hippocampus between control and Hdac3 cKO mice

Gene	Locus	Expression (a.u.)		Fold change (log2)	p value
		Control	Hdac3 cKO		
Gm9047	chr6:29421436-29423429	0.253377	0	-1.79769e+308	0.0307299
Neurog2	chr3:127336062-127338549	0.130821	0	-1.79769e+308	0.00742109
Olf1128	chr2:87384763-87385699	0.173502	0	-1.79769e+308	0.0257747
Slco1b2	chr6:141578038-141635156	0.0480124	0	-1.79769e+308	0.0266557
Ttll10	chr4:155408945-155424926	0.0526758	0	-1.79769e+308	0.030758
G530011O06Rik	chrX:166123178-166428729	24.7911	1.63959	-3.91841	0
Stbd1	chr5:93032076-93035605	1.13386	0.126729	-3.16142	5.93E-07
4930564K09Rik	chr3:82680626-82747560	0.50806	0.0680669	-2.89997	3.12E-05
Apol10b	chr15:77414587-77426555	0.179057	0.0258848	-2.79024	0.0307421
Col6a4	chr9:105892648-105999022	0.136642	0.021694	-2.65503	0.0003928
Gm13483	chr2:50152329-50289487	1.53687	0.321792	-2.2558	0.0163718
H2-Aa	chr17:34419695-34424716	0.370856	0.084519	-2.13351	0.0497275
Adcyap1	chr17:93598761-93604829	0.847596	0.209724	-2.01489	0.00052621
Svep1	chr4:58055667-58219468	0.2211	0.0593402	-1.89762	6.85E-05
Gbp4	chr5:105544785-105568571	0.987096	0.266411	-1.88954	2.62E-06
Wnt2	chr6:17938939-17980445	2.05363	0.583824	-1.81457	6.01E-06
Grem1	chr2:113588831-113598805	1.63309	0.474395	-1.78344	0.00016425
Iigp1	chr18:60535682-60552283	0.453673	0.13275	-1.77294	0.0117275
Gm12250	chr11:57997344-58003700	0.371471	0.119099	-1.64108	0.0139637
Plcz1	chr6:139938242-139989938	0.502678	0.16758	-1.58479	0.0135234
Cyp26b1	chr6:84521407-84543902	1.42464	0.479889	-1.56983	2.55E-06
B4galnt3	chr6:120153827-120244577	0.27536	0.0950562	-1.53447	0.0210999
Gm606	chr16:26957320-26990060	0.156468	0.0542668	-1.52773	0.0444235
Igtp	chr11:58013057-58021094	0.931314	0.330901	-1.49287	0.00284438
Npsr1	chr9:23902461-24120842	0.424882	0.153465	-1.46915	0.00567113
Ptch2	chr4:116768960-116787436	0.172615	0.0647314	-1.41502	0.0495407
Cd74	chr18:60963502-60972306	1.17259	0.440184	-1.41352	0.0497352
Xdh	chr17:74233247-74299522	1.51275	0.589949	-1.35851	1.76E-05
1700007F19Rik	chr3:57945628-57967729	2.29353	0.902122	-1.34618	0.00087505
Rsl1	chr13:67274117-67284434	0.451626	0.178467	-1.33947	0.0370869
Cldn1	chr16:26356731-26371925	0.314598	0.130039	-1.27457	0.0407326
Ano5	chr7:58766398-58854079	0.339917	0.141138	-1.26808	0.00382654
Stac	chr9:111463937-111592720	1.44375	0.617595	-1.22509	0.00158342
Nlrc5	chr8:96996662-97051172	0.152742	0.0654019	-1.22369	0.0348794
Alox12b	chr11:68970573-68983293	1.26432	0.588097	-1.10424	0.00731421
Spink8	chr9:109719140-109729141	19.3652	9.09984	-1.08955	7.75E-05
Gbp2	chr3:142283626-142300972	1.00418	0.47365	-1.08412	0.0137881
Htr1f	chr16:64924554-65105610	1.37296	0.650001	-1.07877	0.006681
Wfs1	chr5:37357342-37380221	14.4793	6.95251	-1.05839	7.95E-08
Gbp3	chr3:142223015-142236176	1.10073	0.528941	-1.05728	0.010212
Doc2b	chr11:75582591-75609559	7.08362	3.4245	-1.0486	6.84E-07
Htr5b	chr1:123406349-123425042	1.68437	0.81884	-1.04056	0.00995313
Ryr1	chr7:29788358-29910170	1.29764	0.633824	-1.03373	7.95E-06
Gm12824	chr4:114079328-114287703	0.210467	0.102919	-1.03208	0.0406832
Nts	chr10:101944389-101953052	3.50322	1.73016	-1.01778	0.00772354
H2-K1	chr17:34132956-34137278	4.37543	2.16594	-1.01443	0.00108162
Ly6a	chr15:74825306-74828318	9.16689	4.63849	-0.982776	0.00182951

Ccnd1	chr7:152115835-152125830	5.72179	2.89834	-0.981238	1.21E-05
Hunk	chr16:90386641-90499798	5.42041	2.76234	-0.972514	5.01E-06
Kl	chr5:151755181-151796392	2.37679	1.22269	-0.958962	0.00025319
Myoc	chr1:164569280-164588350	2.27554	1.17281	-0.956233	0.00476512
Cntnap5b	chr1:101669341-102382519	3.12769	1.63528	-0.935558	0.00010527
Ccdc37	chr6:90353729-90378474	3.15532	1.64975	-0.935537	0.00264658
Mc4r	chr18:67017361-67020126	1.70306	0.894332	-0.929245	0.00769164
Plin4	chr17:56219079-56249225	3.51643	1.85335	-0.923976	0.00573505
Arl4d	chr11:101526854-101529146	3.88418	2.07596	-0.903829	0.00663193
Cpne9	chr6:113232300-113255565	1.19932	0.644123	-0.896807	0.020203
Arc	chr15:74499512-74503000	31.2118	16.8685	-0.887759	1.85E-06
Glt8d2	chr10:82092582-82153395	3.25088	1.77001	-0.877074	0.0368844
Krt12	chr11:99276977-99283573	1.48121	0.8105	-0.869889	0.034773
Ndst4	chr3:125107008-125427904	7.23094	3.96734	-0.866009	6.03E-05
Fos	chr12:86814850-86818219	2.91176	1.60561	-0.858774	0.0065798
Chrna5	chr9:54828686-54855586	1.41323	0.781255	-0.855133	0.0197225
Cntnap5c	chr17:57908992-58549765	4.90806	2.71592	-0.853714	0.00015297
H2-D1	chr17:35400038-35462354	3.1425	1.73905	-0.853616	0.00899753
Metrn1	chr11:121563740-121578703	1.06892	0.597816	-0.83838	0.040329
Unc13c	chr9:73327230-73781374	1.4118	0.799996	-0.819474	0.00174402
Dsp	chr13:38243162-38290446	2.04039	1.16466	-0.808932	0.0003885
Ddit4l	chr3:137286635-137291296	1.21783	0.695287	-0.808636	0.0338086
Ucp2	chr7:107641853-107650682	1.23301	0.705549	-0.80537	0.0114356
Drd5	chr5:38710747-38713549	3.39087	1.94037	-0.805323	0.00314213
Cntn4	chr6:105627738-106649299	4.388	2.51104	-0.80528	0.00654208
Lypd1	chr1:127573572-127808791	13.4008	7.68325	-0.802535	0.00019948
Prkcd	chr14:31408539-31439394	3.85284	2.21218	-0.800454	0.00314223
Htr1a	chr13:106233772-106238213	5.41936	3.13294	-0.790607	0.00032772
Cdhr1	chr14:37891034-37911497	0.924718	0.535212	-0.788902	0.0233072
Ramp2	chr11:101107647-101109564	8.68341	5.05041	-0.781861	0.0117994
Irgm1	chr11:48678750-48684848	2.16954	1.26709	-0.77587	0.0202803
Lpl	chr8:71404453-71430831	4.5933	2.69988	-0.766636	0.00081479
Arrdc2	chr8:73359036-73363619	3.88638	2.29154	-0.76211	0.0058822
Tpd52l1	chr10:31052185-31165727	3.71468	2.23563	-0.732554	0.0377279
Ism1	chr2:139503913-139584317	1.40096	0.844165	-0.730817	0.0375936
Dusp5	chr19:53603807-53615812	7.35032	4.44581	-0.72536	0.0139052
Rprl3	chr8:3803124-3803361	562.71	340.479	-0.724826	0.00639217
Nr4a1	chr15:101097276-101105225	8.77692	5.32833	-0.720031	0.00105124
Alad	chr4:62170203-62181097	6.48828	3.94001	-0.719635	0.0109098
Plekhg1	chr10:6379238-6606164	1.93939	1.18107	-0.71551	0.0218547
Htr2a	chr14:75040646-75106666	2.52894	1.54471	-0.711199	0.0150959
Cd34	chr1:196765014-196803153	7.35989	4.49707	-0.710698	0.014615
Slc17a6	chr7:58877199-58926496	3.61301	2.21373	-0.706723	0.00315407
Klhl13	chrX:22796396-22942179	5.26105	3.24393	-0.697609	0.00291635
Itga7	chr10:128370868-128398044	4.5953	2.8353	-0.696656	0.00244998
Tmem158	chr9:123168174-123169907	9.65419	5.96576	-0.694448	0.00445626
Cdh24	chr14:55250828-55260201	2.30446	1.42928	-0.689141	0.0218264
Olfml2b	chr1:172574662-172612920	6.23851	3.88951	-0.681613	0.00219503
Neurod6	chr6:55627812-55631257	34.5016	21.5528	-0.678786	0.00029882
Amigo2	chr15:97074504-97216122	4.84123	3.03425	-0.674036	0.0182946
B2m	chr2:121945843-122011925	25.6083	16.0551	-0.67358	0.00349208
Cd109	chr9:78463352-78564067	0.761383	0.478202	-0.671003	0.0495962

Pcdh20	chr14:88864553-88871203	15.0586	9.46374	-0.670109	0.00033422
Trib1	chr15:59480208-59488654	1.1126	0.699398	-0.669746	0.0469164
Nbl1	chr4:138638206-138648885	10.4642	6.58743	-0.66767	0.00296967
Sgk1	chr10:21601989-21719708	22.0591	13.9303	-0.663143	0.00461297
Thbs4	chr13:93521540-93564773	1.92617	1.21834	-0.660824	0.0274636
Fam40b	chr6:29867012-29909680	6.63448	4.19811	-0.660243	0.00085053
Fam84b	chr15:60650550-60662955	1.65788	1.04931	-0.659896	0.0230856
Nptx2	chr5:145306755-145318347	6.1523	3.89873	-0.658122	0.00544332
Gpr101	chrX:54749844-54756934	0.974628	0.62107	-0.650096	0.0467444
Trpc5	chrX:140816213-141122723	4.90945	3.14459	-0.642687	0.0048142
Dusp4	chr8:35870663-35882948	5.68789	3.64713	-0.641131	0.00843187
Nfkbia	chr12:56590395-56593634	6.48068	4.18225	-0.631868	0.0188605
Echdc2	chr4:107838070-107851913	5.90923	3.81818	-0.630084	0.0303897
Thsd4	chr9:59814737-60358842	4.00579	2.60122	-0.622899	0.0122421
Lct	chr1:130181340-130224895	3.88027	2.53175	-0.616021	0.00680321
Penk	chr4:4060682-4065592	4.68939	3.06657	-0.612774	0.0420103
Cacng5	chr11:107735918-107776369	1.59932	1.04618	-0.612331	0.0430111
Kcnv1	chr15:44937829-44946480	5.36968	3.51606	-0.610876	0.00432558
Cpne5	chr17:29293465-29374735	1.22111	0.800867	-0.608564	0.0478277
Txnip	chr3:96359690-96370724	4.73832	3.1117	-0.606674	0.00879494
Bdnf	chr2:109514856-109567200	4.48723	2.96051	-0.59998	0.0218111
2610017109Rik	chr1:42705044-42751670	31.7062	20.9551	-0.597464	0.0179469
Folh1	chr7:93867485-93924374	2.25105	1.49705	-0.588476	0.0463415
Dtx4	chr19:12540825-12576486	3.93816	2.61933	-0.588323	0.00600868
Sema5b	chr16:35541447-35664344	1.5119	1.02376	-0.56248	0.0489697
Sccpdh	chr1:181598361-181617315	11.5054	7.80112	-0.560558	0.0108306
Kcnk2	chr1:191031808-191168071	4.22562	2.8727	-0.556753	0.0356491
Crhbp	chr13:96201330-96214786	7.88049	5.37019	-0.553312	0.0251241
Hdac9	chr12:35056361-35213754	4.39927	3.00103	-0.551808	0.013059
Dnahc9	chr11:65644825-65982053	2.86504	1.95721	-0.549763	0.00454048
Npy	chr6:49772727-49779504	24.5562	16.8464	-0.543649	0.0394032
Osbpl11	chr16:33185156-33243398	3.83923	2.63705	-0.54189	0.017013
Hapln1	chr13:89680240-89751437	2.20034	1.51317	-0.540153	0.0332966
Aph1b	chr9:66623293-66643230	5.04744	3.48218	-0.535559	0.0121202
Gabra5	chr7:64642641-64765379	29.4543	20.3596	-0.53277	0.00448791
Thrb	chr14:18493473-18870602	4.857	3.36605	-0.529009	0.0232497
Slc30a3	chr5:31388478-31395900	6.90414	4.79531	-0.525839	0.0277468
Galnt16	chr8:60252848-61390424	3.9872	2.77435	-0.523224	0.0208555
Etv5	chr16:22381385-22439643	11.2915	7.86449	-0.52181	0.00759135
Cadps2	chr6:23212837-23789300	15.6575	10.9399	-0.51726	0.00656365
Lrrn1	chr6:107479719-107520222	12.0193	8.40118	-0.516692	0.00737265
Me3	chr7:96781327-97002869	5.47023	3.82366	-0.516646	0.0150924
Il16	chr7:90791572-90884000	3.60161	2.5179	-0.51642	0.0189709
Dio2	chr12:91962991-91976878	6.40356	4.47762	-0.516144	0.00887135
Nov	chr15:54577482-54585316	31.7378	22.1973	-0.515814	0.00808398
C1ql3	chr2:12845667-12932491	15.8289	11.0761	-0.515111	0.00949463
Tbc1d1	chr5:64551449-64742725	5.78328	4.04786	-0.514729	0.0103499
Epha7	chr4:28740294-28894649	27.6496	19.4037	-0.510926	0.0291026
Tle1	chr4:71778175-71861953	8.66846	6.0887	-0.509642	0.00944196
Rhbdl3	chr11:80114413-80169488	3.6507	2.57146	-0.505586	0.0327547
Cck	chr9:121398941-121404807	160.132	112.835	-0.505039	0.00665462
Pdia6	chr12:17273400-17331536	16.9865	12.0238	-0.4985	0.0128331

Bhlhe22	chr3:17954324-17957514	12.2954	8.70445	-0.498293	0.012102
Fam84a	chr12:14154403-14158844	15.9073	11.2726	-0.496864	0.00910599
Zfp189	chr4:49534088-49544417	5.63527	4.00254	-0.493568	0.031492
Bcl6	chr16:23965137-23988698	5.55681	3.9491	-0.492732	0.027199
Slc9a2	chr1:40738556-40825730	5.27773	3.75221	-0.492177	0.0301196
Prmt2	chr10:75669966-75700610	12.1981	8.71543	-0.485017	0.030366
Klf10	chr15:38224167-38230462	4.51029	3.22373	-0.484489	0.0442111
Pkp2	chr16:16213437-16272805	7.7607	5.55908	-0.481341	0.0243749
Bpnt1	chr1:187156037-187181648	11.4929	8.23461	-0.480975	0.022517
Ptpn3	chr4:57203712-57314709	4.90524	3.51559	-0.480557	0.0162665
Nell1	chr7:57230719-58118659	8.98845	6.45485	-0.47769	0.0232686
Man2a1	chr17:64950988-65104450	3.07654	2.20936	-0.477681	0.0320852
Crym	chr7:127329897-127345502	64.5716	46.5192	-0.473072	0.0156467
Map3k5	chr10:19654331-19862556	2.89538	2.09274	-0.468362	0.0424926
Dzip1	chr14:119274741-119322389	11.6547	8.46878	-0.46069	0.0159174
Mdga1	chr17:29964902-30024827	4.36127	3.17714	-0.457018	0.0214273
Dmd	chrX:80194208-82450389	8.71806	6.36962	-0.452799	0.0158251
Sorcs3	chr19:48280514-48879995	5.78466	4.24716	-0.445735	0.0246887
Rgnf	chr13:98668549-98976120	8.21327	6.03368	-0.44492	0.0208959
Rab9b	chrX:133392689-133403079	5.09577	3.74548	-0.44415	0.0433914
Plxnd1	chr6:115904828-115945023	2.98285	2.19528	-0.442287	0.042737
Fosl2	chr5:32438844-32460212	4.57563	3.3718	-0.440452	0.0345557
Marcks1	chr4:129190824-129193225	14.919	10.9966	-0.440092	0.0404546
Fat4	chr3:38785861-38910905	3.18806	2.3608	-0.433403	0.0237824
Kcnd2	chr6:21166108-21679805	20.158	14.9346	-0.432695	0.0202573
3110047P20Rik	chr5:64040341-64201782	2.25042	1.66773	-0.432302	0.0479188
Fibcd1	chr2:31668809-31701525	16.1716	12.0142	-0.42872	0.0238668
Tsc22d3	chrX:137074067-137135061	19.4604	14.4613	-0.428341	0.0300996
Bmi1	chr2:18598644-18608256	7.25555	5.3931	-0.42797	0.0424233
Alcam	chr16:52249108-52453110	11.7716	8.77328	-0.424122	0.0253608
Cabp7	chr11:4638823-4646781	65.9221	49.1499	-0.423573	0.0331168
Slc24a3	chr2:145068346-145467675	17.598	13.1575	-0.419531	0.0268007
Brd9	chr13:74075285-74098343	22.171	16.6256	-0.415265	0.0284381
Zfp831	chr2:174469034-174536331	3.19118	2.39892	-0.411705	0.037483
Tmem181b-ps	chr17:6438149-6450142	11.2592	8.50423	-0.40485	0.0327196
Dusp6	chr10:98725864-98730123	14.9285	11.287	-0.403404	0.0387437
Sst	chr16:23889666-23890930	98.6986	74.6723	-0.402455	0.0400673
Dhx33	chr11:70797592-70817934	7.44267	5.63738	-0.400797	0.0391752
Gpt2	chr8:88016515-88051457	14.308	10.9544	-0.385309	0.0427714
Pds5b	chr5:151476401-151613245	11.0559	8.46936	-0.384492	0.0387242
Iqgap2	chr13:96397131-96661877	17.771	13.6691	-0.37861	0.0468092
Man1a2	chr3:100366126-100489396	9.56177	7.36017	-0.377539	0.0424597
Tmem151b	chr17:45660382-45686626	16.9862	13.0932	-0.37555	0.0463895
Camk4	chr18:33098694-33355421	5.26318	6.82752	0.375426	0.044851
Zbtb7a	chr10:80599015-80614402	7.0601	9.1862	0.37978	0.0456917
Camk2n1	chr4:138011062-138016041	29.0944	37.9574	0.383636	0.0446636
Plch2	chr4:154357223-154385093	8.00283	10.4943	0.391021	0.041553
Grik5	chr7:25794869-25857388	14.3447	18.8218	0.39189	0.0376694
Nr1d1	chr11:98629248-98636556	12.4283	16.3382	0.394623	0.040967
Efr3a	chr15:65618602-65705374	16.3466	21.5091	0.395954	0.0354824
Srcin1	chr11:97370653-97436440	12.3338	16.264	0.399059	0.0343512
Prrt2	chr7:134161055-134164725	21.2088	28.0106	0.401309	0.0337754

Atf4	chr15:80085613-80087971	15.1763	20.0717	0.403337	0.0418077
Pde1b	chr15:103333728-103360483	11.0937	14.6986	0.405935	0.035947
Snph	chr2:151416285-151458269	32.8894	43.7247	0.410826	0.039625
Pip5k1c	chr10:80755716-80782719	24.549	32.6385	0.410913	0.0323541
Plekha6	chr1:135142673-135200012	4.33733	5.77908	0.414031	0.0366571
Hlf	chr11:90197848-90252231	6.9373	9.25511	0.415876	0.0290813
Arpp19	chr9:74885420-74908120	8.92351	11.9076	0.416201	0.0455408
Tspan5	chr3:138405158-138567388	27.5241	36.8234	0.419926	0.0287708
Ndst3	chr3:123229083-123375310	5.58246	7.469	0.420016	0.0299559
Stac2	chr11:97897937-97914776	4.9718	6.6602	0.421796	0.0490878
Kcna1	chr6:126586480-126595819	13.3553	17.8998	0.422535	0.0292901
Prosapip1	chr2:130458574-130468539	18.9959	25.4873	0.424091	0.0257772
Sncb	chr13:54860220-54867801	34.1316	45.9179	0.427947	0.0243989
Camk2g	chr14:21554096-21613310	16.1573	21.7432	0.428379	0.0465627
Al414108	chr9:27160269-27165128	3.90223	5.26	0.430764	0.0361402
Lzts1	chr8:71659401-71664852	10.3352	13.969	0.434659	0.0364232
Insig1	chr5:28397951-28405202	9.34544	12.6531	0.437155	0.0288777
Slc25a22	chr7:148615647-148623773	19.8429	27.0289	0.445885	0.0162566
Rasl11b	chr5:74591350-74595502	11.0364	15.0737	0.449763	0.035645
Hivep3	chr4:119487282-119808016	1.66617	2.2787	0.45167	0.0321123
2900092E17Rik	chr7:134158564-134160866	8.57409	11.729	0.452029	0.0483499
Fam135b	chr15:71276107-71558268	8.71382	11.9533	0.456028	0.0159439
Atp1a3	chr7:25763187-25790914	113.674	156.093	0.457502	0.0480574
Dbpht2	chr12:75398460-75401455	5.37598	7.3954	0.4601	0.0301383
Stmn4	chr14:66963211-66980517	17.9997	24.7797	0.461187	0.0247818
Gfap	chr11:102748649-102758514	52.3239	72.1248	0.463024	0.024935
Miat	chr5:112642247-112657968	31.5604	43.7311	0.470542	0.031416
Kcnj9	chr1:174251163-174259394	8.06385	11.1971	0.473584	0.0154099
Kcnj4	chr15:79314143-79335671	13.5306	18.9588	0.48664	0.0130166
Pitpnm2	chr5:124568698-124666427	10.2048	14.3485	0.491652	0.010114
Rps27	chr3:90016588-90017570	180.764	254.854	0.495565	0.0263028
Kcnh7	chr2:62541002-63022344	8.86432	12.5768	0.504686	0.0102317
4930572J05Rik	chr15:74551663-74554803	6.39497	9.08671	0.506822	0.0393477
Dot1l	chr10:80217950-80257092	3.05442	4.35098	0.510441	0.013885
Ckb	chr12:112907565-112910549	274.762	392.07	0.51293	0.0223939
Cnih3	chr1:183282758-183390772	8.38351	11.9717	0.513997	0.0135433
Eno2	chr6:124710072-124719527	105.587	151.171	0.517743	0.0164779
Myo7a	chr7:105199569-105268003	0.965852	1.38752	0.522637	0.0414203
Zfp59	chr7:28623602-28641793	1.84416	2.653	0.524662	0.0439616
Dagla	chr19:10319754-10379367	10.2291	14.7233	0.525415	0.00793463
Cdh2	chr18:16747385-16967558	7.48163	10.7987	0.529431	0.00565348
Unc5a	chr13:55050792-55122746	9.03927	13.0893	0.534113	0.00530759
Mirg	chr12:110973190-110987667	5.97271	8.6612	0.536183	0.0385725
Syt14	chr1:194723500-194861892	4.0793	5.93706	0.541428	0.0407562
Prnp	chr2:131735663-131764167	120.619	176.821	0.551835	0.00932459
Syn1	chrX:20425668-20498044	17.7707	26.1738	0.558627	0.0421664
Mapk3	chr7:133903139-133909330	7.97504	11.7485	0.558908	0.0101809
Rab26	chr17:24665998-24670692	6.00033	8.84341	0.55956	0.0229214
Fmn1	chr2:113167892-113556924	2.94446	4.34733	0.562126	0.00410823
AI593442	chr9:52481146-52487534	9.73216	14.5733	0.582495	0.00302629
Jun	chr4:94715726-94718913	4.65561	6.98982	0.586286	0.00708759
Zfyve28	chr5:34537542-34630973	3.07542	4.62391	0.588328	0.00696741

Nefm	chr14:68737601-68743061	13.4824	20.3949	0.597132	0.00163668
Mef2d	chr3:87946316-87973089	10.3083	15.6682	0.604037	0.002203
Atp2b2	chr6:113695661-113992074	39.8529	60.7618	0.608477	0.022366
Sema7a	chr9:57787941-57810672	10.0293	15.2931	0.608655	0.00240486
Dgki	chr6:36796021-37249976	13.728	21.1131	0.621018	0.00121406
Snap25	chr2:136539185-136608164	252.878	397.695	0.653221	0.00702273
Fbxl16	chr17:25946029-25958210	66.9434	105.368	0.654418	0.00241393
Rgs4	chr1:171671607-171677773	22.456	35.3701	0.655429	0.0005664
Sox11	chr12:28019132-28027583	1.27556	2.05702	0.68942	0.0030592
Kcnip3	chr2:127282233-127347106	6.31039	10.2385	0.69821	0.00077736
Nrgn	chr9:37352077-37360330	121.151	196.935	0.700917	0.00066019
Sun2	chr15:79554497-79572966	3.10094	5.05515	0.705045	0.0061233
Flywch2	chr17:23913884-23923044	4.25829	7.10113	0.737775	0.0413311
Necab3	chr2:154370140-154384589	3.1698	5.31482	0.745628	0.00803816
Vsig2	chr9:37346839-37351790	1.88551	3.165	0.747247	0.0475216
Rbfox3	chr11:118351073-118770886	10.9375	18.4439	0.753868	0.00032141
Nlrx1	chr9:44060795-44076682	0.949695	1.61545	0.7664	0.0398717
Cdk5r2	chr1:74901602-74904306	4.27739	7.32031	0.775175	0.00066246
Dcn	chr10:96942133-96980796	2.65982	4.56241	0.778466	0.0456805
Nptx1	chr11:119400032-119409134	27.1432	46.7112	0.783176	0.00014653
Mobkl2c	chr4:115500696-115508788	0.633368	1.10244	0.799585	0.0366376
Hr	chr14:70953862-70973349	0.808352	1.49127	0.883483	0.00153054
Hspb8	chr5:116858503-116872873	0.681098	1.31367	0.947673	0.0299808
Acvr1c	chr2:58119863-58210169	1.13824	2.22939	0.969844	3.53E-05
Gm10789	chr16:90142481-90147072	0.175283	0.350522	0.999823	0.0415311
Dnahc6	chr6:72967600-73171625	0.193558	0.38861	1.00556	0.00424842
Ppp1r1b	chr11:98210051-98219109	3.21591	6.8168	1.08387	8.04E-05
Epor	chr9:21763342-21768020	0.416917	0.889421	1.09311	0.0317604
Scn4b	chr9:44947124-44962144	2.89007	6.19369	1.0997	7.48E-07
Gm14378	chr8:4248213-4251423	0.88995	1.90899	1.10102	0.0269673
Slc39a2	chr14:52513284-52516420	0.272409	0.603329	1.14717	0.032628
E2f1	chr2:154385374-154395588	0.369127	0.845078	1.19497	0.0110423
Gm7120	chr13:120276063-120284312	4.60994	11.6434	1.33669	2.88E-05
Ifi30	chr8:73286671-73290562	0.431574	1.14347	1.40574	0.0244002
Arsi	chr18:61071893-61077422	0.173721	0.470781	1.43828	0.0319407
Hrh3	chr2:179834177-179838927	4.32203	13.343	1.6263	1.12E-13
Icam4	chr9:20833816-20834975	0.25792	0.810436	1.65177	0.0306275
Itk	chr11:46138651-46203017	0.0458805	0.147127	1.68111	0.029102
Atf3	chr1:192994175-193007212	0.0792863	0.27227	1.77989	0.0310844
Dlk1	chr12:110691032-110701546	0.0592348	0.205083	1.79169	0.0151163
Pbld2	chr10:62487259-62521560	0.0585541	0.209408	1.83847	0.0373499
Loxhd1	chr18:77520696-77680996	0.010181	0.0549506	2.43225	0.0321661
Gm14379	chrX:6953050-6955168	0.0362495	0.21145	2.54429	0.0246221
Eps8l1	chr7:4416343-4430844	0.136692	0.802087	2.55283	0.00302438
Ccl3	chr11:83461344-83462880	0	0.160242	1.79769e+308	0.0412881
Chrdl2	chr7:107154913-107183236	0	0.0693004	1.79769e+308	0.0418596
Hba-a2	chr11:32196488-32197310	0	2.52376	1.79769e+308	0.038652
Upb1	chr10:74869778-74902940	0	0.0739197	1.79769e+308	0.0412881

Supplementary Table 2. Genes differentially expressed in the hippocampus of both *Hdac3* cKO mice and *Mecp2* KO mice

Downregulated genes	Upregulated genes
Adcyap1	Nr1d1
Wnt2	Efr3a
B4galnt3	Plekha6
Ptch2	Hlf
Spink8	Ndst3
Htr1f	Prosapip1
Wfs1	Kcnj9
Doc2b	Rps27
Htr5b	Kcnh7
Ryr1	Fmn1
Cpne9	Dgki
Glt8d2	Rgs4
Chrna5	Kcnip3
Metrn1	Dlk1
Unc13c	Hba-a2
Htr1a	
Cdhr1	
Lpl	
Tpd52l1	
Ism1	
Klhl13	
Tmem158	
Trpc5	
Sema5b	
Dnahc9	
Hapln1	
Gabra5	
Slc30a3	
Il16	
Dio2	
Rhbdl3	
Pkp2	
Crym	
Plxnd1	
3110047P20Rik	
Fibcd1	
Dhx33	

Supplementary Table 3. Genes differentially expressed in *Hdac3* cKO hippocampus and *MECP2* KO human induced neurons

Genes with 1.5 fold change in <i>MECP2</i> KO human neurons		Genes with 1.2 fold change in <i>MECP2</i> KO human neurons	
Downregulated genes	Upregulated genes	Downregulated genes	Upregulated genes
ALOX12B	ATP2B2	ADCYAP1	ATP2B2
APH1B	C11orf87	ALAD	C11orf87
ARC	NDST3	ALOX12B	FAM135B
ARL4D	SCN4B	APH1B	NDST3
ARRDC2		ARC	SCN4B
B2M		ARL4D	SOX11
BPNT1		ARRDC2	
CD109		B2M	
CLDN1		BCL6	
DDIT4L		BPNT1	
DHX33		BRD9	
DMD		C1QL3	
DUSP5		CABP7	
ETV5		CACNG5	
FOS		CCK	
FOSL2		CD109	
GBP2		CDH24	
HDAC9		CLDN1	
HLA-A		CPNE9	
IQGAP2		CRYM	
KLF10		DDIT4L	
MAN1A2		DHX33	
MAN2A1		DMD	
METRNL		DTX4	
NFKBIA		DUSP4	
NOV		DUSP5	
NR4A1		ECHDC2	
OLFML2B		ETV5	
PDIA6		FAM84B	
PLXND1		FIBCD1	
PRMT2		FOS	
PTPN3		FOSL2	
SCCPDH		GBP2	
SEMA5B		GLT8D2	
SGK1		GPR101	
SST		GPT2	
THSD4		HAPLN1	
TLE1		HDAC9	
TSC22D3		HLA-A	
TXNIP		IQGAP2	
WFS1		KLF10	
		KRT12	

		LPL MAN1A2 MAN2A1 MARCKSL1 METRNL NFKBIA NLRC5 NOV NR4A1 OLFML2B OSBPL11 PDIA6 PDS5B PLCZ1 PLIN4 PLXND1 PRMT2 PTPN3 RAB9B SCCPDH SEMA5B SGK1 SLC17A6 SST STBD1 TBC1D1 THBS4 THRB THSD4 TLE1 TPD52L1 TSC22D3 TTLL10 TXNIP UCP2 WFS1 WNT2 XDH ZNF189	
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Supplementary Table 4. Summary of MeCP2 KO models used in this study

Figure	MeCP2 KO Model	Species	Age	Reference
Fig. 2f	Hippocampus	mouse	9-weeks	Baker et al. 2013
Fig. 2g	Induced neurons	human	4-weeks	Li et al 2013
Supplementary Fig. 6b	Hippocampus	mouse	9-weeks	Baker et al. 2013
Supplementary Fig. 6b	Hippocampus	mouse	9-weeks	Baker et al. 2013
Supplementary Fig. 7a	Hippocampus	mouse	9-weeks	Baker et al. 2013
Supplementary Fig. 7a	Hypothalamus	mouse	6-weeks	Chahrour et al. 2008
Supplementary Fig. 7a	Cerebellum	mouse	6-weeks	Ben-Shachar et al. 2009