Gene	Description	H1-EBdCas9	H1-EBdCas9/ NGN3 gRNA	H1-EBdCas9/ PDX/NGN3 gRNA	MEL-EBdCas9	MEL-EBdCas9/ NGN3 gRNA	MEL-EBdCas9/ PDX/NGN3 gRNA
	Exocytosis/Insulin Secretion	Gene Counts	Gene Counts	Gene Counts	Gene Counts	Gene Counts	Gene Counts
CLVS1	Vesicles budding	2	5	0	4	11	15
TBCEL	Cytoskeleton organization	1089	830	1217	749	1142	1043
ATP6V1G2	V-ATPase component/protein sorting	12	44	29	40	78	90
GRIA1	Glutamate receptor/Circadian rhythm/secretion	3	46	5	60	123	65
KIF6	Vesicular transport along microtubules	11	27	17	106	138	160
SYT3	Ca^{+}-dependent exocytosis	47	30	64	41	73	64
SSTR5	Somatostatin receptor / secretion	14	57	66	81	156	75
SSTR1	Somatostatin receptor / secretion	35	240	33	1813	2620	1786
ACTN3	Cytoskeleton organization	3	33	1	11	29	13
CCDC88B	Cytoskeleton organization	14	24	10	30	49	49
COMMD9	Sodium ion transport	584	694	666	953	1267	1210
KCNK9	Potassium channel	14	36	11	20	44	36
SYNPR	Synaptic transmission	0	21	0	25	29	32
AHCYL1	Ca^{+} metabolism/ER-mitochondria crosstalk	5053	5830	5821	6453	8452	7499
ANGPT2	Angiogenesis	22	38	10	165	241	186
AQP4	Water transport/control of insulin release	46	68	63	80	100	111
CACNB2	Ca channel/secretion	24	46	36	97	239	175
BAIAP3	Maturation of secretory vesicles	75	113	72	224	432	300
GABBR2	GABA signaling/secretion	35	186	82	229	455	269
NPTX2	Stabilizers of AMPA receptors	106	154	84	143	239	152
OPRK1	Opioid receptor	92	138	115	142	238	152
CHGA	Secretory granules biogenesis	5025	50742	4423	178879	281895	206714
CPE	Hormone processing	15825	14281	17322	22104	30687	28455
DDC	Serotonin synthesis/secretion	1242	1687	1190	5448	7505	6764
BLOC1S3	Secretory granules biogenesis	234	268	213	294	431	400
C2CD4C	Ca ions binding/secretion	86	250	45	467	705	563
KIF19	Vesicles transport	9	75	6	680	1117	668
GPR142	G-protein coupled receptor/secretion	21	123	23	786	1218	526
CACNA1C	Voltage-dependent Ca channel	16	125	23	499	678	276
KCNB2	Voltage-gated potassium channel	9	110	8	480	764	316
ARVCF	Gap junction complexes	955	1241	929	1352	1939	1311
GRK6	GPCR-insulin processing	840	1130	885	1364	1908	1749
STXBP1	Exocytosis-secretion	330	693	394	2522	3262	2579
CACNA1A	Calcium channel-secretion	19	263	24	1594	2302	1060
CCZ1B	Vesicle-mediated transport	299	295	401	783	962	1086
KCNJ11	Potassium channel-insulin secretion	20	182	48	1493	2022	1375
KATNB1	Microtubules organization	281	358	265	893	1335	1154
MZT2A	Microtubules organization	383	511	331	594	1071	1064
KLC1	Insulin granules dynamic	443	754	595	889	1425	999

PER1	Circadian rhythm/secretion	446	543	498	1004	1450	1015
ARAP1	Actin cytoskeleton organization	1124	1418	1095	2116	3128	2059
MICALL1	Plasma membrane recycling	2858	3191	2871	1267	1901	1496
C1QL3	Synapsis organization	104	424	134	636	899	847
FIG4 "	Vesicular trafficking	273	331	312	636	899	847
QPCTL	Glucose sensing	463	490	521	408	627	676
CORO2B	Actin cytoskeleton organization	94	241	86	699	1127	816
SGCD	Membrane stabilization	43	235	30	877	1218	630
ABCC8	ABC transporter-secretion	24	554	48	4096	6016	4090
SYT7	Vesicular trafficking/exocytosis	726	1084	804	3623	5312	3400
GAD2	Glutamic acid decarboxylase/GABA production	26	362	39	2211	3269	2234
SIPA1L3	Cell polarization	2190	3465	2675	5507	7648	4289
KCNB2	Voltage-gated potassium channel /secretion	9	110	8	480	764	316
DLG5	Cell polarization	1738	2742	2264	3728	5121	2632
GOLPH3L	Sorting of intra-Golgi transport vesicles	593	651	738	854	1040	1076
RABL3	Exocytosis	426	579	520	839	1036	1029
ITPRIP	Inositol 1,4,5-trisphosphate receptor/ secretion	133	156	133	236	331	296
	SYNAPSYS FORMATION / NEUROTRASMISSION						
FAM90a1	Synaptic function	0	0	5	3	10	11
GAP43	Pre-synaptic protein	5	75	3	123	182	169
NTNG1	Axon guidance	4	67	27	97	151	155
C1QL1	Formation of excitatory synapsis	183	2052	152	4357	6487	5593
DCC	Axon guidance	57	537	71	3181	4302	2022
SEZ6L	Neuronal development	55	1114	84	2547	3605	1943
SDK2	Synapsys formation	826	1387	1041	357	537	282
SYNGAP1	Synapsys formation	189	357	245	678	1005	677
SRGAP2	Synapsys formation	188	415	330	438	629	446
CADM4	Axon extension	933	1165	935	2351	3528	2712
CHRNB4	Nicotinic acetylcholine receptor	0	89	3	455	704	496
ZKSCAN1	GABA receptor transcription	256	2896	3281	6382	8631	4586
	MITOCHONDRIAL FUNCTIONS/ METABOLISM						
SLC16A8	Lactate/pyruvate exporter	5	7	11	6	16	8
SLC8B1	Sodium/Calcium antiporter	234	345	296	287	372	369
SLC16A2	Thyroid hormone's transporter	625	979	712	628	894	642
SLC25A42	Coenzyme A importer	387	478	383	446	607	539
SLC44A3	Choline transporter	2821	2098	3207	2185	2626	2752
ATP2B4	Calcium homeostasis	1639	2930	2325	4178	5854	3245
CYP212	Arachidonic acid epoxygenase/PPARg activator	13	17	15	63	94	80
PDEA	Mitochondrial respiration	10	40	24	121	249	164

ADCY2	Adenyl cyclase	42	158	42	209	291	237
PLA2G6	Negative control of lipid peroxidation	77	151	103	192	323	290
SARDH	Mitochondrial oxidoreductase	46	87	62	264	385	312
DLST	Mitochondrial production of succinyl Co-A	1	2	6	0	10	6
TXNRD2	Mitochondrial ROS scavenger	251	399	207	220	406	395
ATP5S	Mitochondrial ATP synthase subunit	156	183	163	290	400	394
IMMP1L	Mitochondrial membrane peptidase	108	143	122	241	427	478
FTCD	Histidine catabolism	112	129	68	310	520	368
SMPD3	Ceramide biosynthesis	32	139	26	343	649	371
CLPB	Mitochondrial ATP-dependent chaperone	283	395	364	729	1061	801
COX10	Mitochondrial Respiratory Complex	462	528	579	872	1208	1011
HSD17B7	Cholesterol biosynthesis	488	363	593	859	1129	1198
ISCA1	Biogenesis/assembly of iron-sulfur clusters	1179	1021	1326	1959	2482	2655
SENP2	Protein SUMOylation	1010	1048	1171	1654	2279	1996
AKT2	Glucose transport	1715	1999	1849	2736	4424	3455
CIC	Mitochondrial exchanger of citrate	1644	2015	1813	2899	4158	2601
GPT2	Mitochondrial TCA cycle	2539	2750	2725	1983	2702	2551
GCK	Glucose metabolism	7	70	6	871	1360	883
ATG7	Autophagy	246	316	300	402	571	498
TMEM65	Mitochondrial respiration	2219	2299	2392	3139	4000	3770
TMEM70	ATP synthase assembly	615	617	717	893	1039	1233
TMEM74B	Autophagy	175	242	179	203	324	293
C16orf72	Response to metabolic stress	2662	2623	2835	2548	3070	3109
GLRX	Antioxidant functions	2313	2328	2332	1958	2381	2730
ASNA1	Protein transfer to ER	1233	1541	1234	1555	2412	2181
MSRA	Protein oxidation repair enzyme	2361	3212	2504	3874	5247	5297
FKBP4	Protein folding						
	CILIOGENESIS/ CELL SIGNALING						
LRGUK	Cilia kinesis	0	2	1	1	13	17
CDKL1	Ciliogenesis	28	22	39	14	22	24
CFAP65	Cilia kinesis	1	2	3	15	58	40
FAM92B	Ciliogenesis	0	6	2	11	48	29
CROCC	Cilium assembly	35	99	38	393	542	494
BAIAP2L2	Cilia stabilization	16	370	27	1900	2651	1840
NEURL1	Notch suppressor	728	847	834	1439	1869	1826
ARGLU1	Glucocorticoid receptor co-activator	8374	7390	9407	3464	4197	4275
ERRFL1	Kinase regulator	2576	3457	3026	5438	8239	3735
MEGF8	Negative regulation of HHG signaling	876	1162	710	1433	2373	1871
SHC2	Signaling adapter of growth factor receptors	347	547	353	644	909	570
KSR1	Binder of MAP kinase	18	193	20	651	1158	752
AMER3	Wnt signaling	179	223	205	772	868	954

SPAG16	Ciliogenesis	246	316	300	402	571	498
	IMMUNOREGULATION						
CD83	Treg Development	23	43	27	81	107	148
SOCS1	Anti-inflammatory responses	44	65	24	107	162	146
IL15	Regulation of innate/adaptive immunity	40	71	90	44	81	102
NFKBIL1	Regulation of innate immunity	0	4	1	25	38	30
ABHD8	Negative regulation of inflammation	236	343	237	264	491	434
CD99L2	Leukocyte extravasation	179	226	205	317	503	405
PELI2	Negative regulator of STING signaling	260	370	212	1395	2028	1424
NLRP1	Inflammasome component	444	614	553	1036	1377	1318
CARD8	Inflammasome sensor	41	411	32	1191	2116	1612
HSPA1B	Heat shock protein/NOS resistance	279	344	384	575	861	774
DUSP10	Immunoregulation	1875	2101	1921	937	1353	1239
SPATA2	Regulation of Necroptosis	703	636	802	792	1065	1019
	DEVELOPMENT/ TRANSCRIPTION FACTORS						
PAX4	Beta cell commitment	11	512	23	1501	2141	1975
NEUROG3	Endocrine cell specification	18	297	5	1592	2197	2012
SOX1	Neurogenesis	0	72	1	86	133	81
ZNF157	Transcriptional regulation	0	4	1	25	38	30
FOXA1	Pancreas organogenesis	4855	4574	5580	6241	8020	7610
RUNX1T1	Endocrine cell differentiation	22	104	25	382	544	389
SIX5	Organogenesis	227	329	298	315	383	388
ETS2	Development	1934	2217	1897	2295	3241	2822
TFDP1	Development	1385	1749	1537	3092	4029	4055
LMX1A	Development/Insulin transcription	40	178	16	923	1356	1021
ISX	Development	247	177	301	805	1124	979
DUSP4	MAP Kinase inhibitor	6120	6751	6377	3522	4888	4158
MYCL	Cell proliferation	174	240	217	459	628	631
LRRC45	Cell survival	201	244	193	465	831	430
EGLN3	Cell survival	120	225	119	277	467	496
GFRA1	GDNF receptor/cell proliferation	4	105	1	432	726	501
PARD3	Asymmetric Cell Division	1032	1265	1064	1583	2220	1722
TP53L11	Cell differentiation	2321	2618	2430	2323	3232	2781
CDK17	Cell survival/Proliferation	426	461	480	636	757	774
FBXO46	Inhibitor of cellular senescence	521	627	547	717	976	767
CBFA2T2	Cell differentiation	958	1321	1169	2249	3018	1852
FZD1	WNT signaling/development	219	353	244	820	1373	956
RPS6KA2	Cell growth/Differentiation	1534	1810	1737	1308	2102	1402
TINAGL1	Tumor suppressor	214	287	227	1487	2027	1688
CABIN1	Cell survival	894	1481	1172	3500	4785	2898
E4F1	Cell proliferation	461	521	437	490	866	673
TFDP1	Development	1385	1749	1537	3092	4029	4055

TLE3	Transcriptional repressor/ Beta cell identity	1211	1392	1085	3066	4404	3168
APIP	Cell survival	212	225	240	781	944	1020
KCTD9	Cell differentiation	457	538	636	572	783	742
SMAD9	Cell differentiation	122	403	135	867	1173	908
AREL1	Cell survival	1337	1557	1570	2558	3459	2639
GSK3A	Cell survival	1264	1508	1345	2057	2848	2943
	DNA BINDING / RNA PROCESSING						
CMTR1	mRNA Translation	624	764	673	1619	1956	2001
HNRNPUL1	RNA binding	4089	4949	4541	7554	10121	7838
HIST1H2BJ	Histone	108	104	129	205	315	287
LENG1	RNA Processing	83	116	118	136	239	224
HNRNPL	RNA Processing	2108	2510	2041	5263	6946	601191
CELF4	RNA Processing	48	127	66	316	469	410
KDM6B	Histone Demethylation	2751	3630	3301	3287	4641	2669
JARID2	Histone Methylation	2432	2574	2861	2904	3839	2558
CNOT3	Post-transcription mRNA stability	798	924	722	1790	2522	2128
FBXL19	CpG islands binding protein	823	1114	760	1687	2780	1897
ANKZF1	mRNA translation	557	626	514	665	931	760
PRR14	DNA Binding	398	499	331	797	1067	1161
RMI1	DNA Repair	437	452	621	669	801	827
KMT5	Histone Methyltransferase	321	377	295	566	899	790
RBM15	RNA binding-m6A methylation	471	581	594	380	530	453
DPF1	RNA transcription	17	54	15	50	75	90
ZCCHC2	RNA translation	276	458	349	622	893	583
MPND	Histone binding/chromatin remodeling	287	385	296	358	752	654
ELL	RNA transcription	281	326	306	451	636	395
VRK1	Cell cycle entry/chromatin condensation	117	185	156	578	813	812
TSR3	18S modification	681	867	602	849	1253	1222
KHSRP	mRNA transcription and splicing	4862	6136	5209	3821	4325	4350
ILF3	RNA binding	4281	5744	4522	10110	13275	10406
CELF5	Pre-mRNA Splicing	12	17	9	36	65	39
TDRKH	piRNA processing	142	185	221	475	715	589
KAT2B	Histone acetyl Transferase	10	77	37	387	538	433
	OTHER						
OARD1	Deacylation of O-acetyl-ADP-ribose	654	704	754	1013	1023	1341
UBE2QL1	Protein Ubiquitination	162	470	180	1502	2150	2023
CPA1	Pancreatic carboxypeptidase	0	9	0	126	174	148
DIRAS2	GTPase	2	12	3	20	19	49
ANAPC15	Cell cycle regulation	51	87	82	85	144	159
NTNG1	Neurite outgrowth and patterning	40	67	27	97	151	155
CRYBA2	Beta cystallin	127	901	92	6615	11029	99998
FKBP4	Protein folding	2361	3212	2504	3874	5247	5297

RNF187	Protein Ubiquitination	3154	3906	3174	3593	5294	4971
ZNF703	Transcriptional co-repressor	100	157	131	167	228	190
AGFG2	Nucleocytoplasmic transfer of proteins	177	232	285	406	585	383
ANGPTL2	Vascular sprouting	197	402	301	252	360	278
EEF2KMT	Protein methylation	207	278	233	213	424	485
EVI5L	GTPase	108	186	104	434	760	493
RPS6KL1	Ribosomal protein	223	350	234	263	482	297
ZNF414	Transcription regulation	204	240	185	270	378	412
WSCD1	Sulfotransferase	162	313	145	479	823	458
HCFC2	VP16 binding	71	96	106	302	437	359
LTBP2	Cell adhesion	142	202	201	262	463	265
ZNF331	Transcriptional regulation	169	180	198	345	464	430
MEX3C	Post-transcriptional regulation of HLA mRNA	2494	2552	2752	2514	3302	3273
PPP1R10	Regulation of RNA polymerase activity	2426	2725	2641	2956	3826	3047
PTPRS	Cell growth	1739	2273	2153	3881	5697	3185
PCMTD1	Protein Ubiquitination	1235	1081	1514	1107	1473	1382
PTER	Taurine metabolism/cell differentiation	842	1081	1049	1722	2086	2160
B3GNT7	N-acetyl-glucosyl transferase	52	111	69	1041	1650	1387
BTBD17	Viral genome replication	22	218	15	1126	1856	1362
GGPS1	Protein prenylation	515	533	645	517	667	808
MVB12B	Protein Ubiquitination and sorting	314	557	353	868	1207	735
NBPF12	Cell growth	670	860	983	547	875	613
DCAF11	Protein metabolism	1044	1145	1257	1916	2716	2095
KLHDC3	protein ubiquitination	1305	1801	1327	2600	4106	3728
PCNX3	Cell growth	1846	2347	2003	2770	3683	2264
BORCS5	Lysosome transport	419	494	439	421	608	483
XYLT1	Biosynthesis of glycosaminoglycans	277	389	449	569	788	520
C14orf132	Unknown function	240	1306	279	2330	2959	2397
USP11	Protein Ubiquitination	980	1213	930	2932	3868	3196