

**Supplementary Table 2. List of R-mAbs successfully cloned via sequence-based cloning.**

R-mAb	Target	R-mAb	Target	R-mAb	Target	R-mAb	Target
1D8	LRRK2/Dardarin-pSer910	L114/3	Parvalbumin	N133/35	RGS14	N358/68	5-formylcytidine
1F1	TrpC1	L114/38	Parvalbumin	N134/12	Nav1.8 Na <sup>+</sup> channel	N360A/24	ATF4
62-3G1	GABA(A)R, Beta2/3	L114/81	Parvalbumin	N138/6	LRRK2/Dardarin, N-terminus	N363/71	Kir6.2 K <sup>+</sup> channel
8G10	LRRK2/Dardarin, N-terminus	L115/13	NPY Neuropeptide Y	N140A/12	SALM5/LRFN5	N364/10	Bral1
A12/18	Pan-Neurofascin (extracellular)	L117/1	IRSp53/BAIAP2	N141/21	HCN3	N364/42	Bral1
D4/11	Kv2.1 K <sup>+</sup> channel	L117/52	IRSp53/BAIAP2	N141/28	HCN3	N366/60	Kir6.1 K <sup>+</sup> channel
D4/154	Kv2.1 K <sup>+</sup> channel	L118/14	VGAT	N142/28	GRK6A/B	N367/51	Shank1 and Shank3
D4/40	Kv2.1 K <sup>+</sup> channel	L118/80	VGAT	N143/36	CDY1/2/L1/L2	N367/62	Shank3
K14/39	Kv1.2 K <sup>+</sup> channel	L118/135	VGAT	N143/38	CDY1/2	N372A/1	Kv2.2 K <sup>+</sup> channel
K19/46	Kv1.6 K <sup>+</sup> channel	L119/106	NPY2R Neuropeptide Y receptor type 2	N144/14	6xHis	N372B/1	Kv2.2 K <sup>+</sup> channel
K28/25	PSD-95 + PSD-93	L119/134*	NPY2R Neuropeptide Y receptor type 2	N144/17	Gamma-protocadherin-A3	N372B/60	Kv2.2 K <sup>+</sup> channel
K28/27	PSD-95	L120/12	Collybistin	N144/32	Pan-Gamma-protocadherin-A	N372C/51	Kv2.2 K <sup>+</sup> channel
K28/38	PSD-95	L120/30	Collybistin	N145/20	Pan-GRK	N374/48	TASK1 K <sup>+</sup> channel
K28/42	PSD-95 + PSD-93	L121/25	nNOS/NOS1	N148/30	Gamma-protocadherin-B2	N375/67	Kv3.3 K <sup>+</sup> channel
K28/58	PSD-95	L121/42	nNOS/NOS1	N152B/23	VDAC1	N377/20	MAP3K12
K28/74	PSD-95	L121/133	nNOS/NOS1	N154/32	JMJD2A	N377/83	MAP3K12
K28/86	Pan-MAGUK	L121/136	nNOS/NOS1	N155/9	Uncx	N37A/10	Kv7.1/KCNQ1 K <sup>+</sup> channel
K28/94	PSD-95	L122/6	Calretinin	N158/28	Histone H3.3	N380/87	CLN3
K40/17	Pan-Kvbeta K <sup>+</sup> channel	L122/68	Calretinin	N159/5	Pan-Gamma-protocadherin-Constant	N382/14	MFF
K47/9	Kvbeta1.2/KCNA B1 K <sup>+</sup> channel	L122/144	Calretinin	N160/21	SynDIG3/Tmem91	N382/69	MFF (exon 1)
K47/42	Kvbeta1.2/KCNA B1 K <sup>+</sup> channel	L123/46	GABA(A)R, Theta	N161/20	NKCC1	N384/63	Miro2
K55/7*	KChIP1 K <sup>+</sup> channel	L124/59	Bassoon	N165/38	LAR/PTPRF	N385/21	Beta1-spectrin
K55/29	KChIP1 K <sup>+</sup> channel	L125/121	Synapsin-3	N165/43	Pan-PTPR	N388A/27	Ankyrin-R/G
K55/82	Pan-KChIP K <sup>+</sup> channel	L125/129	Pan-Synapsin	N166A/26	OCRL/INPP5b	N389/9	TRAK1
K56A/50	CASK	L125/76	SAPAP3	N170A/26	Neurexin-1-Beta	N390/43	TRAK2
K56A/57	CASK	L126/93	SAPAP3	N173B/13	Tafazzin	N391/68	WNK1
K57/27	Kv4.2 K <sup>+</sup> channel (external)	L127/8	GAD67	N180/41	EAAC1	N393/2	Beta4-spectrin
K57/41	Kv4.2 K <sup>+</sup> channel (external)	L127/12	GAD65/67	N183/15	QKI-7	N393/76	Beta4-spectrin
K60/73	KChIP2b K <sup>+</sup> channel	L130/1	Tiam1	N185/7	NALCN	N395/68	Navbeta2 Na <sup>+</sup> channel
K60/87**	KChIP2b K <sup>+</sup> channel	L131/17	SPHKAP	N186/29	Dopamine D2 receptor	N396/29	Navbeta3 Na <sup>+</sup> channel
K65/35	CASPR/Neurexin IV	L131/20	SPHKAP	N191/7	Fratxin	N397/19	Nav1.5 Na <sup>+</sup> channel
K65A/2	CASPR/Neurexin IV	L131/27	SPHKAP	N192/12	Gs protein, alpha subunit	N398A/34	GABA(A)R, Alpha4
K66/27	KChIP3 K <sup>+</sup> channel	L132/18	Cav1.2 Ca <sup>2+</sup> channel pS1928	N194/11	QKI-7b	N399/19	GABA(A)R, Alpha2
K66/59	KChIP3 K <sup>+</sup> channel	L132/37	Cav1.2 Ca <sup>2+</sup> channel pS1928	N202/7	Fig4/Sac3	N400/24	CLN6
K67/11	CASPR2	N1/12	KCC2	N206A/8	GFAP	N402/13	Thyroid hormone receptor beta1

K67/25	CASPR2	N4/15	PINK1	N207/27	LRP4 (extracellular)	N402/46	Thyroid hormone receptor beta1
K69/3*	Nav1.2 Na+ channel	N4/49	PINK1	N209C/35	LRRTM2	N403/63	Pan-Thyroid hormone receptor
K69/33	Nav1.2 Na+ channel	N6/38	VACHT	N210/5	PhyH/PAHX	N405/74	Navbeta1 Na+ channel
K73/20	Contactin/F3	N10/7	Cavbeta4 Ca2+ channel	N212/7	TRIP8b (constant)	N406/47	Cln5
K74/53	Nav1.1 Na+ channel	N15/4	TrpV3	N212A/34	TRIP8b (exon 1b)	N408/79	Npas4
K75/18	Kv4.3 K+ channel	N15/39	TrpV3	N219/5	RBM17/SPF45	N410/17	Kv3.2 K+ channel
K75/30	Kv4.3 K+ channel	N18/28	PSD-93/Chapsyn-110	N221/12	TrpV1	N411/51	Arx
K78/29	SK2 K+ channel	N18/30	PSD-93/Chapsyn-110	N221/17	TrpV1	N414/25	NCKX4
K87A/10	Nav1.6 Na+ channel	N19/2	SAP102	N225A/10	FGF13/FHF2, B isoform	N416/57	GluN3A/NR3A glutamate receptor
K89/41	Kv2.1 K+ channel	N22/21	Shank1	N227/21	MECP2	N420/24	EAAC1
K96/7	Pancortin	N23B/6	Shank2	N228A/16	Lhx6.1	N421A/85	ANO5/TMEM16E
L6/48	Slo1/BKAlpha maxi-K+ channel	N25/35	Kir2.3 K+ channel	N229A/32	GABA(A)R, Alpha6	N422/18	GluN2C/NR2C glutamate receptor
L6/60	Slo1/BKAlpha maxi-K+ channel	N26A/23	Kv7.2/KCNQ2 K+ channel	N231B/34	LRRK2/Dardarin, N3 (non-mouse-reactive)	N423/75	KChIP4 K+ channel
L21/32	GluA2/GluR2 glutamate receptor	N38/8	Cav1.3 Ca2+ channel	N232/9	PEX7	N424/45	Glycine receptor Alpha3
L23/27	Kv1.3 K+ channel	N39B/8	GIT1	N233/8	PEX6	N424/48*	Glycine receptor Alpha3L
L24/1	IP3 receptor, type 1	N43/6	Kv7.4/KCNQ4 K+ channel	N238/29	SAPAP1	N425/45	VACHT
L24/11	IP3 receptor, type 1	N46/30	ADAM22 (cytoplasmic)	N238/30	SAPAP1	N428/12	WRN
L24/18	IP3 receptor, type 1	N49A/21	NGL-1/LRRC4C	N238/31	SAPAP1/2	N429/19	ANO6/TMEM16F
L24/19	IP3 receptor, type 1	N50/36	NGL-2/LRRC4	N241A/34	LRRK2/Dardarin, C-terminus	N431/64	GABA(A)R, Pi
L24/21	IP3 receptor, type 1	N52B/27	SALM2/LRFN1	N241A/72	LRRK2/Dardarin, C-terminus	N432/21	VSP
L28/36	Kv4.2 K+ channel	N53/32	BKbeta2 K+ channel	N245/1	TARPGamma2/Stargazin	N432/63	VSP
L45/30	SynCAM1	N55/10	Cav3.2 Ca2+ channel	N245/36	TARPGamma2/4/8	N440/21	VMAT1
L48A/9	Cav1.3 Ca2+ channel	N56/9	S-tag	N245/44	Thioredoxin	N440/61	VMAT1
L48A/29	Cav1.3 Ca2+ channel	N56/21	FGF14/FHF4	N250/21	DNAH7	N441/35	ADAM11
L48A/31	Cav1.3 Ca2+ channel	N57/2	ADAM22 (extracellular)	N251/14	DNAH1	N442/28	Alg13
L57/23	Cav1.2/1.3 Ca2+ channel	N59/20	GluN2B/NR2B glutamate receptor	N253/32	Notch1	N444/63	AGPS neo-epitope
L57/46	Cav1.2/1.3 Ca2+ channel	N64A/36	TrpC7	N255/38	Nav1.4 Na+ channel	N445/27	TRAAK K+ channel
L57/47	Cav1.2/1.3 Ca2+ channel	N67/15	TrpC5	N263/31	Cav1.2 Ca2+ channel	N446/80	CELF4/BRUNO L4
L58A/6	Kv2.1 K+ channel	N68/6	Nav1.7 Na+ channel	N270/47	Synaptotagmin-6	N447/24	Kv11.3 K+ channel
L61C/30	Kv2.1 K+ channel	N71/37	HCN2	N271/44	ASIC1	N448/88	Kv8.2 K+ channel
L62/29	Copper ATPase 2 (Wilson's disease protein)	N72/16	Kv3.4 K+ channel	N274/8	Synaptotagmin-5	N449/73	VMAT2
L64/32	Kv1.2 K+ channel	N74/25	TrpM7	N275/14	Synaptotagmin-7	N450/53*	BDNF
L71/5	Kv1.4 K+ channel (extracellular)	N75/3	mGluR1/5 (Group I) glutamate receptor	N276A/15	Synaptotagmin-9	N451/73	ICK
L71/22	Kv1.4 K+ channel (extracellular)	N75/33	mGluR1/5 (Group I) glutamate receptor	N283/7	Lgi1	N452/30	GABA(A)R, Gamma2L/S
L76/36	Kv1.2 K+ channel	N77/15	TrpC4	N286/74	Zebrafish PSD Marker	N452/69	GABA(A)R, Gamma2L

L80/21	Kv2.1 K+ channel	N81/2	GABA(B)R2	N290B/25	ARHGAP4	N452/73	GABA(A)R, Gamma2L/S
L83/11	Kv2.1 K+ channel	N86/20	GFP	N294A/10	Brevican	N452/81	GABA(A)R, Gamma2L/S
L83/81	Kv2.1 K+ channel	N86/44	GFP	N294A/6	Brevican	N454/91	ANO3/TMEM16C
L86/2	AMIGO-1	N86/8	GFP	N295B/54	Arl13b	N455/15	Kir3.3 K+ channel
L86/14	AMIGO-1	N87/25	GABA(A)R, Beta3	N302/10	BBS3/Arl6	N456/39	Proser1
L86/33*	AMIGO-1	N92/14	FGF11/FHF3	N304B/115	BBS5	N458/10	Kv6.4 K+ channel
L86/36	AMIGO-1	N95/35	GABA(A)R, Alpha1	N307/12	Histone H3-acetyl-Lys56	N459/84	SAPAP2
L100/1	Kv2.1 K+ channel pS586	N98/47	Neuroigin-4	N308/48	GluN1/NR1 glutamate receptor	N460/19	Kv9.2 K+ channel
L102/45	SynDIG4/Prnt1	N100/13	GST	N309A/21	Histone H4-dimethyl-Arg3	N461/19	Kv9.1 K+ channel
L106/4	Gephyrin	N104/37	SNAT1	N312/10	NSD1	N463/52*	DEPDC5
L106/22	Gephyrin	N105/13	Ankyrin-B	N319A/14	SUR2A	N465/11	Kir2.4 K+ channel
L106/23	Gephyrin	N105/17	Ankyrin-B	N323A/31	SUR1 and SUR2B	N467/1	TRESK potassium channel
L106/83	Gephyrin	N106/20	Ankyrin-G	N324/2	Rem2	N468/37	THIK-2 potassium channel
L107/39	Neuroigin-2	N106/36*	Ankyrin-G	N325B/65	THAP1	N470/22	TRPM6
L107/90*	Neuroigin-2	N106/65	Ankyrin-G (staining)	N326D/2	REEP2	N471/27	Kv1.7 K+ channel
L107/93	Neuroigin-2	N112/16	Kir2.1 K+ channel	N326D/13	REEP	N472/88	MIRP4 K+ channel
L107/95	Neuroigin-2	N112B/14	Kir2.1 K+ channel	N327/95	GluN2A/NR2A glutamate receptor	N473/36	Cavbeta3 Ca2+ channel
L109/39	Calbindin	N112B/29	Kir2.1 K+ channel	N327A/38	GluN2A/NR2A glutamate receptor	N476/9	ZIP3
L109/57	Calbindin	N119/44	MPP8	N330A/80	Alpha-2C adrenergic receptor	N479/107	VAPA/B
L109/62	Calbindin	N121A/1	Pannexin-2	N332B/15	BAF53b	N479/12	VAPA
L113/13	Homer1L	N123/19	Histone H3-pThr11	N336B/83	BAF53a	N479/22	VAPA
L113/26	Homer1L	N123/48	Histone H3-pThr11	N341/12	LRRK1	N483/26	Rufy3
L113/27	Homer1L	N125/10	Thorase/Atad1	N343/26	NrCAM	N483/84	Rufy3
L113/28	Homer1L	N126B/31	Neuregulin-CRD (Cysteine-rich domain, Type III)	N345/51	REEP1	N483/126	Rufy3
L113/29	Homer1L	N128A/2	Haspin/GSG2	N347/42	ATAT1	N485/22	Prnt2
L113/44	Homer1L	N128A/4	Maltose binding protein (MBP)	N349/96	Foxi2	N486/25	c-Fos
L113/62	Homer1L/S	N129/15	Mad3 (human)	N356/9	SVOP	N486/32	c-Fos
L113/130	Homer1L/S	N132A/12	KLH	N357/6*	PINK1	N486/76	c-Fos

**Supplementary Table 2.** List of R-mAbs and their targets that were successfully cloned into the IgG2a mammalian expression plasmid using the sequence-based Gibson Assembly cloning method. \* cloned from hybridomas with more than two V<sub>L</sub> sequences. \*\* cloned from a hybridoma with two V<sub>L</sub> and two V<sub>H</sub> sequences.