

Table S1 Sequences of organelle-targeting signals used for MR organelle targeting

Organelle	Article	Genetic construction	Targeting signal	Links
Plasma membrane	(Donahue <i>et al.</i> , 2021)	pcDNA3.1-ArchT-BFP2-TS-ER _{ex}	TS_ER _{ex} KSRITSEGEYIPLDQIDINVGGFCYENE	https://www.addgene.org/123312/
	(Nakao <i>et al.</i> , 2022)	pCMV* _{Arch3} / <i>RmXeR</i> _TS_eYFP_ER _e x	TS+ER _{ex} TS: KSRITSEGEYIPLDQIDINV ER _{ex} : FCYENEV	Arch3 (WP_092921078), <i>RmXeR</i> (WP_094549673)
	(Vlasova <i>et al.</i> , 2023)	pcDNA3.1_HA-tag_Flag-tag_Arch3/ <i>NsXeR</i> _TS_p2a_RFP	TS: KSRITSEGEYIPLDQIDINV p2a: ATNFSLLKQAGDVEENPGP	<i>NsXeR</i> (genbank ID EGQ43296)
Endoplasmic reticulum	(Asano <i>et al.</i> , 2018)	ChRGR_RYR2 (4765-4866 a.a.) _Venus	Mus musculus ryanodine receptor 2 RYR 2 (4765-4866a.a.): QLVLTVGLLAVVVYLYTVVAFNFFRKFY NKSEGDTPDMKCDMLTCYMFHMY VGVRRAGGGIGDEIEDPAGDEYEIYRIIFI TFFFVIVILLAIQGLII	RYR 2 (NM_023868.2)
	(Eria-Oliveira A. S. <i>et al.</i> , 2023)	OLPVR1_eGFP	Inner OLPVR1 signal (unknown till now)	
Lysosomes	(Rost <i>et al.</i> , 2015)	pCMV_CD63(1-42a.a.)_pHluorin_Arch3_mKate_βHK_CD63(43-238a.a.)	CD63 (CD63 antigen (<i>Arvicanthis niloticus</i>), 1-42 a.a.): MAVEGGMKCVKFLLYVLLLAFCACAVG LIAIGVAVQVVLKQA	pCMV-lyso-pHoenix https://www.addgene.org/70112/
	(Ilyinsky <i>et al.</i> , 2023)	pCMV_CD63(1-42a.a.)_pHluorin_NsXeR_mKate_βHK_CD63(43-238a.a.)	βHK (potassium-transporting ATPase subunit beta (<i>Rattus norvegicus</i>), 2-105 a.a.): AALQEKKSCSQRMAEFRQYCWNPDGTG QMLGRTPARVWVWISLYAAFYVVMGTG LFALCIYVLMQITIDPYTPDYQDQLKSPG VTLRPDVYGERGLQISYNISENSS CD63(43-238 a.a.): ITHETTAGSLLPVVIIAVGAFLLVAFVGC CGACKENYCLMITFAVFLSLIMLVEVAV AIAGYVFRDQVKSEFNKSFRRQMMENYL KDNKTATILDKLQKENNCCGASNYTDW ESIPGMGKDRVPDSCCVNITAGCGNNF KESTIHTQGCLTITTWLRKNVLLVAAAA LGIAFVEVLGVIFSCCLVKSIRSGYEVMI	

Endosomes	(Kakegawa <i>et al.</i> , 2018)	ASR(D217E)_CIC5(565-816a.a.)	mouse chloride channel protein 5 Clc5(565-816 a.a.) : DCITPGLYAMVGAACLGGVTRMTVSL VVIMFELTGGLEYIVPLMAAAMTSKWV ADALGREGIYDAHIRLNGYPFLEAKEEFA HKTLAMDVMKPRRNDPLLTVLTQDSM TVEDVETISETTYSGFVVSRESQRLV GFVLRRLIISIENARKKQDGVVSTSIYFT EHSPMPPTYPTLKLRLNILDSPFTVTD LTPMEIVVDIFRKLGLRQCLVTHNGRLL GIITKKDVLKHIAQMANQDPDSILFN	Clc5 (NP_001230691.1)
Synaptic vesicles	(Rost <i>et al.</i> , 2015)	Synaptophysin(1-180a.a.)_pHluorin_Arch3_mKate_βHK_Synaptophysin(184-308a.a.)	Synaptophysin [Mus musculus] (1-180a.a.) <u>MDVVNQLVAGGQFRVVKEPLGFVKVL</u> <u>QWVFAIFAFATCGSYTGELRLSVECAN</u> <u>TESALNIEVEFEYPFRLHQVYFDAPSCVK</u> <u>GGTTKIFLVGDYSSSGEFFVTVAVFAFLY</u> <u>SMGALATYIFLQNKYRENNKGPMMDF</u> <u>LATAVF AFMWLVSSSAWAKGLSDVKM</u> <u>ATDPENI IKEMPMCRQ</u> βHK (potassium-transporting ATPase subunit beta (<i>Rattus norvegicus</i>), 2-105 a.a.): AALQEKKSCSQRMAEFRQYCWNPD TG QMLGRTPARWVWISLYAAFYVVM TG LFALCIYVLMQ TIDPYTPDYQDQLKSPG VTLRPDVYGERGLQISYNISENSS Synaptophysin(184-308a.a.): TCKELRDPVTSGLNTSVVFGFLNLV LWV GNLWFVFKETGWAAPFMRAPPGAPEK QPAPGDAGYDAGYGQGGYGPQDSY GPQGGYQPDYGPASGGGGYGPQG DYGQQGYGQQGAPTSFSNQM	pLenti-Synapsin-pHoenix-WPRE https://www.addgene.org/70111/
	(Hoffmann <i>et al.</i> , 1994)	COX4_MTS (1-22 a.a.)_HsBR	COX4 cytochrome c oxidase subunit IV [<i>Saccharomyces cerevisiae</i> S288C] 1-22 a. a. <u>MTS</u> <u>MLSLRQSIRFFKPATRTLCSRR</u>	NP_011328.1
Mitochondria	(Hara <i>et al.</i> , 2013), (Imai <i>et al.</i> , 2019)	COX8A MTS(1-29 a.a.)_dR_myc	<u>COX8A MTS</u> (1-29 a.a.): <u>MSVLTPLLLRGLTGSARRLPVPRAKIHSL</u>	pCMV-myc-mito https://www.addgene.org/71542/
	(Tkatch <i>et al.</i> , 2017)	pcDNA3.1_4XMTS_Δ24ChR2(mut)_eYFP	4X COX8A (cytochrome c oxidase subunit 8A (<i>Homo sapiens</i>) <u>MTS</u> : (1-32 a.a.): <u>MSVLTPLLLRGLTGSARRLPVPRAKIHSL</u> PPE	NP_004065.1
	(Ernst <i>et al.</i> , 2019)	pcDNA3.1_ABCB10 (1-140 a.a.)_ChR2(mut)_Dendra2	ABCB10 (1-140 a.a., ATP-binding cassette sub-family B member 10 (<i>Mus musculus</i>)), <u>MTS</u> : <u>MRAPSARALLLIPRRGPAVRAWAPAVS</u> <u>SRIWLASEWTPLVRAWTSLIHKPGSGLR</u> <u>FPAPLSGLPGGVGQWATSSGARRCWV</u>	NP_062425.1

			LAGPRAAHPLFARLQGAAATGVRDLGN DSQRRPAATGRSEVWKLGLVRRPERGR LSAAV	
(Berry <i>et. al.</i> , 2020), (Amitrano <i>et. al.</i> , 2021), (Berry <i>et. al.</i> , 2022)	pcDNA3.1_Mitofilin (1-187a.a.)_ MAC_eYFP	Mitofilin (1-187 a.a., MICOS complex subunit Mic60 isoform X1 (<i>Mus musculus</i>)) MTS:	MLRACQLSGVTVAAQSCLCGKFLRPL RPCRRYSTSSSSGLTAGKIAGAGLLFVGG GIGGTILYAKWDSHFRESVEKTIPYSDKL FGMVLGSAPYTVPLPKPVQSGPLKISS VSEVMKDSKLPVAQSQKTKGDTPASAA STGAAQIISAAGDTLSVPAPAVQHEDTI KTECPNTNEGKSTSETTEE	XP_017177312.1