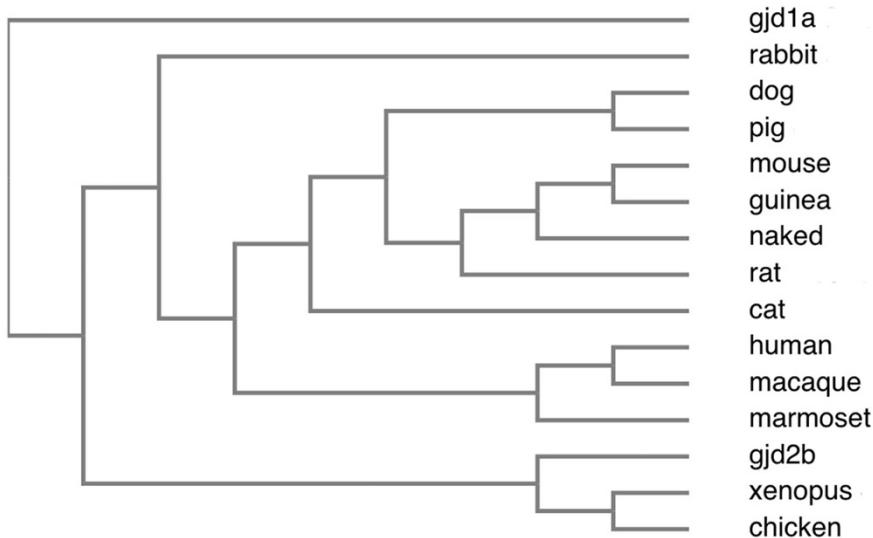


Supplementary Figure S1: Top) Cladogram of Cx35/36 protein sequences representing mammalian and lower vertebrates used as animal models in neurobiology research. **Bottom)** Multiple sequence alignment using Clustal Omega with default settings at the European Bioinformatics Institute (EBI). Homology regions for CaM/CaMKII-binding and S110/T111 phosphorylation in red.



gjd1a	MGEWTILERLLEAAVQHQHSTMIGRILLTVVVIFRILIVGIVGEKVYEDEQIMFICNTLQP	60
rabbit	MGEWTILERLLEAAVQHQHSTMIGRILLTVVVIFRILIVAVGETVYDDEQTMFCVNTLQP	60
dog	-----ERLLEAAVQHQHSTMIGRILLTVVVIFRILIVAVGETVYDDEQTMFCVNTLQP	53
mouse	MGEWTILERLLEAAVQHQHSTMIGRILLTVVVIFRILIVAVGETVYDDEQTMFCVNTLQP	60
rat	MGEWTILERLLEAAVQHQHSTMIGRILLTVVVIFRILIVAVGETVYDDEQTMFCVNTLQP	60
human	MGEWTILERLLEAAVQHQHSTMIGRILLTVVVIFRILIVAVGETVYDDEQTMFCVNTLQP	60
macaque	MGEWTILERLLEAAVQHQHSTMIGRILLTVVVIFRILIVAVGETVYDDEQTMFCVNTLQP	60
marmoset	MGEWTILERLLEAAVQHQHSTMIGRILLTVVVIFRILIVAVGETVYDDEQTMFCVNTLQP	60
cat	MGEWTILERLLEAAVQHQHSTMIGRILLTVVVIFRILIVAVGETVYDDEQTMFCVNTLQP	60
pig	MGEWTILERLLEAAVQHQHSTMIGRILLTVVVIFRILIVAVGETVYDDEQTMFCVNTLQP	60
guinea	MGEWTILERLLEAAVQHQHSTMIGRILLTVVVIFRILIVAVGETVYDDEQTMFCVNTLQP	60
naked	MGEWTILERLLEAAVQHQHSTMIGRILLTVVVIFRILIVAVGETVYDDEQTMFCVNTLQP	60
gjd2b	MGEWTILERLLEAAVQHQHSTMIGRILLTVVVIFRILIVAVGETVYDDEQSMFVCNTLQP	60
xenopus	MGEWTILERLLEAAVQHQHSTMIGRILLTVVVIFRILIVAVGETVYDDEQTMFCVNTLQP	60
chicken	MGEWTILERLLEAAVQHQHSTMIGRILLTVVVIFRILIVAVGETVYDDEQTMFCVNTLQP	60

S110/T111

1

gjd1a	GCNQACYDKAFFFISHIRYWVFQIILVCTPSLCFITYSVHQSAKHKDQRYTLLHGPY----	116
rabbit	GCNQACYDRAFFISHIRYWVFQIIMVCTPSLCFITYSVHQSAKQRERRYSTVFLSLDRDP	120
dog	GCNQACYDRAFFISHIRYWVFQIIMVCTPSLCFITYSVHQSAKQRERRYSTVFLALDRREP	113
mouse	GCNQACYDRAFFISHIRYWVFQIIMVCTPSLCFITYSVHQSAKQRERRYSTVFLALDRDP	120
rat	GCNQACYDRAFFISHIRYWVFQIIMVCTPSLCFITYSVHQSAKQRERRYSTVFLALDRDP	120
human	GCNQACYDRAFFISHIRYWVFQIIMVCTPSLCFITYSVHQSAKQRERRYSTVFLALDRDP	120
macaque	GCNQACYDRAFFISHIRYWVFQIIMVCTPSLCFITYSVHQSAKQRERRYSTVFLALDRDP	120
marmoset	GCNQACYDRAFFISHIRYWVFQIIMVCTPSLCFITYSVHQSAKQRERRYSTVFLALDRDP	120
cat	GCNQACYDRAFFISHIRYWVFQIIMVCTPSLCFITYSVHQSAKQRERRYSTVFLALDRDP	120

T-site homology region

gjd1a	VTYSKSAKIRQQEGISRFYVIQVVFRNVLEIGFLAGQYFLYGFNVPAMFECDRYPCVKEV	217
rabbit	MRTAAKSKLRRQEGISRFYIIQVVFNRNALEIGFLVGQYFLYGFSPVGLYECNRYPCKEV	240
dog	LRTAARSKLRRQEGISRFYIIQVVFNRNALEIGFLVGQYFLYGFSPVGLYECDRYPCIKEV	233
mouse	LRTAARSKLRRQEGISRFYIIQVVFNRNALEIGFLVGQYFLYGFSPVGLYECNRYPCKEV	240
rat	LRTAARSKLRRQEGISRFYIIQVVFNRNALEIGFLVGQYFLYGFSPVGLYECNRYPCKEV	240
human	LRTASKSKLRRQEGISRFYIIQVVFNRNALEIGFLVGQYFLYGFSPVGLYECNRYPCKEV	240
macaque	LRTASKSKLRRQEGISRFYIIQVVFNRNALEIGFLVGQYFLYGFSPVGLYECNRYPCKEV	240
marmoset	LRTASKSKLRRQEGISRFYIIQVVFNRNALEIGFLVGQYFLYGFSPVGLYECNRYPCKEV	240
cat	LRTAARSKLRRQEGISRFYIIQVVFNRNALEIGFLVGQYFLYGFSPVGLYECDRYPCIKEV	240
pig	LRTAARSKLRRQEGISRFYIIQVVFNRNALEIGFLVGQYFLYGFSPVGLYECDRYPCIKEV	240
guinea	LRTAARSKLRRQEGISRFYIIQVVFNRNALEIGFLVGQYFLYGFSPVGLYECNRYPCKEV	240
naked	LRTAARSKLRRQEGISRFYIIQVVFNRNALEIGFLVGQYFLYGFSPVGLYECNRYPCKEV	240
gjd2b	AMRTTTSKMRQQEGISRFYIIQVVFNRNALEIGFLVGQYFLYGFNVPAVYECDRYPCIKDV	223
xenopus	SIRTTTSKMRQQEGISRFYIIQVVFNRNALEIGFLVGQYFLYGFNVPMSYECDRYPCIKEV	223
chicken	AIRTTTSKMRQQEGISRFYIIQVVFNRNALEIGFLVGQYFLYGFNVPMSYECDRYPCIKEV	223

S-site homology region

gjd1a	ECYVSRPTEKTVFLVFMFAVSGICVVNLAEHLHGLWRKIKTAIRGVQARRKSICEIRKK	277
rabbit	ECYVSRPTEKTVFLVFMFAVSGICVVNLAEHLHGLWRKIKLAVRGAQAKRKSVYEIRNK	300
dog	ECYVSRPTEKTVFLVFMFAVSGICVVNLAEHLHGLWRKIKLAVRGAQAKRKSVYEIRNK	293
mouse	ECYVSRPTEKTVFLVFMFAVSGICVVNLAEHLHGLWRKIKLAVRGAQAKRKSVYEIRNK	300
rat	ECYVSRPTEKTVFLVFMFAVSGICVVNLAEHLHGLWRKIKLAVRGAQAKRKSVYEIRNK	300
human	ECYVSRPTEKTVFLVFMFAVSGICVVNLAEHLHGLWRKIKLAVRGAQAKRKSIYEIRNK	300
macaque	ECYVSRPTEKTVFLVFMFAVSGICVVNLAEHLHGLWRKIKLAVRGAQAKRKSIYEIRNK	300
marmoset	ECYVSRPTEKTVFLVFMFAVSGICVVNLAEHLHGLWRKIKLAVRGAQAKRKSIYEIRNK	300
cat	ECYVSRPTEKTVFLVFMFAVSGICVVNLAEHLHGLWRKIKLAVRGAQAKRKSIYEIRNK	300
pig	ECYVSRPTEKTVFLVFMFAVSGICVVNLAEHLHGLWRKIKLAVRGAQAKRKSVYEIRNK	300
guinea	ECYVSRPTEKTVFLVFMFAVSGICVVNLAEHLHGLWRKIKLAVRGAQAKRKSVYEIRNK	300
naked	ECYVSRPTEKTVFLVFMFAVSGICVVNLAEHLHGLWRKIKLAVRGAQAKRKSVYEIRNK	300
gjd2b	ECYVSRPTEKTVFLVFMFAVSGICVVNLAEHLHGLWRKIKTAIRGVQARRKSIEIRNK	283
xenopus	ECYVSRPTEKTVFLVFMFAVSGLCVVNLAEHLHGLWRKIKMAVRGVQAKRKSIYEIRNK	283
chicken	ECYVSRPTEKTVFLVFMFAVSGICVVNLAEHLHGLWRKIKMAVRGVQAKRKSIYEIRNK	283

gjd1a	DVSHLSSVPNLGRTQSSSESAYV	299
rabbit	DLPRV-SVPNFGRTQSSDSAYV	321
dog	DLPRV-SVPNFGRT-----	306
mouse	DLPRV-SVPNFGRTQSSDSAYV	321
rat	DLPRV-SVPNFGRTQSSDSAYV	321
human	DLPRV-SVPNFGRTQSSDSAYV	321
macaque	DLPRV-SVPNFGRTQSSDSAYV	321
marmoset	DLPRV-SVPNFGRTQSSDSAYV	321
cat	DLPRV-SVPNFGRTQSSDSAYV	321
pig	DLPRV-SVPNFGRTQSSDSAYV	321
guinea	DLPRV-SVPNFGRTQSSDSAYV	321
naked	DLPRV-SVPNFGRTQSSDSAYV	321
gjd2b	DLPRM-SMPNFGRTQSSDSAYV	304
xenopus	DLPRM-GVPNFGRTQSSDSAYV	304
chicken	DLPRM-SMPNFGRTQSSDSAYV	304
	*: :: .:***:***	

Protein sequences were retrieved from the NCBI Protein Database. Human (NP_065711.1), Mouse NP_034420.2; Rat NP_062154.1, Macaque XP_001087723.1, Marmoset JAB32260.1 Xenopus XP_002932880, Chicken NP_989913, Dog XP_038297692.1, Pig XP_020953959.1, Guinea pig XP_003475711, Naked mole (rat) XP_004861563.1, gjd2b/Cx35.1/Cx35b NP_919401.1, gjd1a/Cx34.1 NP_001122238.

Supplementary Table S1: *Cx36 mRNA expression during early development of the mouse brain*

Structure	Stage	Assay Type	Reference
brain	E14, E16, E18	NB	[1]
future brain	E7.5	RT-PCR	[2]
optic cup	E8.5	ISH	[2]
optic stalk	E8.5	ISH	[2]
forebrain	E10.5	ISH	[2]
midbrain	E10.5	ISH	[2]
thalamus	E12.5	ISH	[2]
telencephalon	E12.5	ISH	[2]
midbrain-hindbrain junction	E12.5	ISH	[2]
spinal cord	E12.5	ISH	[2]
spinal ganglion	E12.5	ISH	[2]
midbrain roof plate	E13.5	ISH	[2]
diencephalon	E13.5	ISH	[2]
main olfactory bulb	E13.5	ISH	[2]
cerebellum	E13.5	ISH	[2]
diencephalon lateral wall mantle layer	E14.5	ISH	[3]
olfactory cortex marginal layer	E14.5	ISH	[3]
telencephalon mantle layer	E14.5	ISH	[3]
metencephalon rest of alar plate mantle layer	E14.5	ISH	[3]
pons mantle layer	E14.5	ISH	[3]
ventral grey horn	E14.5	ISH	[3]
intermediate grey horn	E14.5	ISH	[3]
cervical ganglion	E14.5	ISH	[3]
cervico-thoracic ganglion	E14.5	ISH	[3]
thoracic ganglion	E14.5	ISH	[3]
spinal cord	E17.5	ISH	[2]

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Supplementary Table S2: Cx36 mRNA and protein expression in the adult rodent nervous system

Tissue	Subdivision	RNA	Protein	reference
Telencephalon	cortex	high density labelling in layers IV, V and VI	pyramidal neurons, GABAergic interneurons PV positive interneurons	[1] [2] [3-5]
	olfactory system including olfactory epithelium, accessory systems	mitral cell layer, glomerular layer, external plexiform layer, periglomerular cells, tufted cells, granular cell layer, olfactory epithelial layer	olfactory nerve bundles underlying the olfactory epithelium, olfactory nerve layer, glomerular layer of the olfactory bulb, accessory olfactory bulb, vomeronasal nerve, gap junctions between mitral cells	[1] [2, 6-9]
	hippocampus	all regions of the hippocampal formation, including the entorinal cortex	CA3/4, mossy fiber terminals	[1, 2, 6, 7, 10-12]
	amygdala	medial amygdaloid nucleus, the anterior and posteromedial cortical amygdaloid nucleus, the amygdalo-hippocampal transition area, medial and lateral part of the central nucleus	basomedial nuclei basolateral nuclei	[7, 13]
	basal ganglia	caudate putamen, globus pallidus and nucleus accumbens labeling was localized in a subpopulation of scattered cells with large pale nuclei.		[1, 14]
Diencephalon	thalamus	all major nuclei, reticular thalamic nucleus, including subthalamic nucleus	reticular thalamic nucleus	[13, 15]
	hypothalamus	lateral and anterior arcuate nucleus		[15] [7]

	other midbrain structures	nuclei of the preoptic region, of the anterior region of the paraventricular nucleus, anterior hypothalamic nucleus, lateral hypothalamic area, supraoptic nucleus, of the tuberal region such as arcuate nucleus, ventromedial and dorsomedial nucleus, perifornical nucleus. Mammillary region.		[7, 15]
	habenular nuclei, pineal gland	medial habenular nucleus, scattered in the lateral nucleus. intense signal in the pineal gland	tryptophan hydroxylase-positive and 5-hydroxytryptamine-positive pinealocytes	[1, 6, 16]
	pituitary gland	no data	anterior pituitary gland	[1, 17]
	retina	ganglion cell layer and in the inner border of the inner nuclear layer	All amacrine cells; ganglion cells, bipolar cells, photoreceptor	[1] [2, 6, 18-24] [25-28]
Hindbrain	cerebellum	molecular layer, granular layer, deep nuclei	molecular layer Purkinje neurons	[29] [1, 2, 6]
	inferior olive	all olivary neurons	all olivary neurons	[1] [2, 6, 18, 22]
	pons	raphe, trochlear, reticulotegmental motor trigeminal basilar pontine	trigeminal ganglion	[30]
	medulla	most nuclei such as the red, pararubral and oculomotor nuclei, the periaqueductal grey and the superior and inferior colliculi	lacZ transgenic	[31]

Spinal cord	spinal cord	all the lamina of the gray matter of the spinal cord, with the highest grain density in the motor neurons of the anterior horn	detected in the IML, IC and CA and in laminae VIII and IX ventral horn	[18]
	ganglions	dorsal root ganglia	dorsal root ganglia lumbar dorsal root; trigeminal sensory ganglia	[32, 33]
Other	neural crest-derived neuroendocrine organ	carotid body	carotid body	[34]
	neural crest-derived neuroendocrine organ	myenteric plexus	myenteric plexus	[34]

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