

**Supplementary Table 2. Summary of monosynaptic rabies tracing data.**

Cortex (Bregma +2.2 → -0.3 mm)				Pons (-4.7 → -5.7 mm)			
Ipsilateral		Contralateral		Ipsilateral		Contralateral	
M1	+++	M1	+++	PnC	++	PnC	+
S1HL/FL	+++	S1HL/FL	+++	Irt	++	Irt	++
S1DZ-J	++	S1DZ-J	++	PCRtA	+	PCRtA	+
M2	+	M2	+	MveMC	+	MveMC	+
Fr3	+	Fr3	+	SubCD	+	SubCD	+
<b>Amygdala (-0.2 → -1.8 mm)</b>				PnO			
Ipsilateral		Contralateral		Ipsilateral		Contralateral	
CeL/C/M	++			mRt	+++	mRt	+
BLA	+			PrCnF	++	PrCnF	+
EAC	+	EAC	+			5N	+
AA	+			<b>Cerebellum (-5.7 → -6.8 mm)</b>			
<b>Zona Incerta (-1.8 → -2.8 mm)</b>				Ipsilateral			
Ipsilateral		Contralateral		Ipsilateral		Contralateral	
ZID	+++	ZID	+	Med	+	Med	+++
ZIV	+			Lat	+++	Lat	+++
<b>Midbrain/Superior Colliculus (-3.1 → -4.2 mm)</b>				<b>Medulla (-5.7 → -7.8 mm)</b>			
Ipsilateral		Contralateral		Ipsilateral		Contralateral	
InG	+	InG	+++	MdV	+	MdV	++
InW	++	InW	+++	Irt	++	Irt	+++
		DpW	++	MdD	+	MdD	+
mRt	++	mRt	+	LRt	+	LRt	++
PrCnF	+			*Gi	+++	Gi	+
		RMC	+	PCRt/A	++	PCRt/A	+
				LPGi	+	LPGi	+
						DPGi	++
						GiA	+

\*site of primary infection

+ denotes presence of rabies mCherry<sup>+</sup> neurons

++ small/intermediate number of mCherry<sup>+</sup> neurons

+++ significant population of mCherry<sup>+</sup> neurons

See also, Fig. 7 and Extended Data Fig. 7. Qualitative analysis is based on curation of rabies retrograde tracing data from  $n = 6$  mice (one experiment). Coordinates represent the rostrocaudal extent to which mCherry<sup>+</sup> neurons were observed in each corresponding structure (e.g. Cortex, Amygdala, etc.). Coordinates and abbreviations are based on Paxinos and Franklin's reference atlas<sup>55</sup>.

Abbreviations: 5N, motor trigeminal nucleus; AA, anterior amygdaloid area; BLA, basolateral amygdaloid nucleus, anterior part; CeC/L/M, central amygdaloid nucleus, capsular/lateral//medial

division; DPGi, dorsal paragigantocellular nucleus; DpW, deep white layer of the superior colliculus; EAC, extended amygdala, central part; Fr3, frontal cortex, area 3; Gi/A, gigantocellular reticular nucleus, alpha part; InG/W, intermediate grey/white layer of the superior colliculus; IRt, intermediate reticular nucleus; Lat, lateral cerebellar nucleus; LPGi, lateral paragigantocellular nucleus; LRt, lateral reticular nucleus; M1, primary motor cortex; M2, secondary motor cortex; MdD/V, medullary reticular nucleus, dorsal/ventral part; Med, medial cerebellar nucleus; mRt, mesencephalic reticular formation; MVeMC, medial vestibular nucleus, magnocellular part; PCRt/A, parvicellular reticular nucleus, alpha part; PnC/O, pontine reticular nucleus, caudal/oral part; PrCnF, precuneform area; RMC, red nucleus, magnocellular part; S1 DZ/J/HL/FL, primary somatosensory cortex, dysgranular zone/jaw region/hindlimb region/forelimb region, SubCD, subcoeruleus nucleus, dorsal part; ZID/V, zona incerta, dorsal/ventral part.