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Probing the Neural Circuits of Anxiety in Nlgn2 Knockout Mice using Whole-Brain Activity Mapping

Neuroligin-2 global knockout shows strong anxiety behaviour caused by altered neuronal wiring in amygdala circuit, but the exact map of the anxiety circuit remains unclear. Here in this project, the pipeline of whole brain activity mapping is successfully established - whole-mount c-Fos immunofluorescence in mouse brain combined with optical tissue clearing, light sheet microscopy and advanced image informatics. By examining open field test-induced anxiety behaviour between wild-type C57BL/6J and Neuroligin-2 KO mice in this novel approach, it is shown that Nlgn2 deletion leads to elevated excitation/inhibition balance in basolateral amygdala and centromedial amygdala, thus provoking anxiety behaviour. On this foundation, analysis can be extended from amygdaloid complex to entire brain. In due course, this behaviour-specific, whole brain map of neural activity can decipher the neural correlate of anxiety.