Reduced TrkB signalling in Parvalbumin and Somatostatin positive interneurons have opposite effects on Sensorimotor Gating

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Abstract

Parvalbumin-positive interneurons (PV-INs) and Somatostatin-positive interneurons (SST-INs) have emerged as key players in regulating network activity and plasticity in both healthy and diseased states. In particular, research has highlighted the involvement of interneurons in the development of various psychiatric disorders. We previously showed that TrkB activity in PV-INs plays a central role in the regulation of neuronal plasticity. This study investigates the role of TrkB in PV and SST interneurons and explores the validity of an interneuron-specific TrkB knockout mouse model. Mice with reduced TrkB expression in either PV-INs or SST-INs were generated to simulate an abnormal but not completely absent BDNF/TrkB pathway. By conducting behavioural battery, we observed that mice with impaired TrkB expression PV-INs exhibited a significant deficit in the Prepulse inhibition test (PPI), indicating altered sensorimotor gating. Conversely, TrkB knockout in SST-INs resulted in an opposite enhanced PPI effect, as well as a significantly shorter latency to enter the open arm in the elevated plus maze test, suggesting altered decision-making behaviour. These findings provide insights into the involvement of the BDNF/TrkB pathway in PV-INs and SST-INs, supporting the use of heterozygous TrkB knockout models in studying interneuron plasticity and network dynamics. Moreover, the altered sensorimotor gating observed in PV-INs highlights the potential of this model in understanding the sensorimotor abnormalities observed in schizophrenia.

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