

CNS Neuroscience and Therapeutics 2015 vol.21 N2, pages 83-91

Depolarizing GABA and developmental epilepsies

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Abstract

© 2014 John Wiley & Sons Ltd. Early in development, GABA, which is the main inhibitory neurotransmitter in adult brain, depolarizes immature neurons and exerts dual-excitatory and shunting/inhibitory-effects in the developing neuronal networks. The present review discusses some general questions, including the properties of excitation at depolarizing GABAergic synapse and shunting inhibition by depolarizing GABA; technical issues in exploration of depolarizing GABA using various techniques and preparations, including the developmental aspects of traumatic injury and what is known (or rather unknown) on the actions of GABA in vivo; complex roles of depolarizing GABA in developmental epilepsies, including a contribution of depolarizing GABA to enhanced excitability in the immature networks, caused by repetitive seizures accumulation of intracellular chloride concentration that increases excitatory GABA power and its synchronizing proconvulsive effects, and correction of chloride homeostasis as a potential strategy to treat neonatal seizures.

<http://dx.doi.org/10.1111/cns.12353>

Keywords

Development, GABA, Neonate, Seizure