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Poster Sessions

The effects of GABA_A receptor modulators on experimental febrile seizures.

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Hyperthermia-induced febrile seizures (FSs) are the most common seizures during childhood, and prolonged complex FSs can result in the development of epilepsy. Currently, GABA_A receptor modulators such as benzodiazepines and barbiturates are used as medications for FSs with the aim of enhancing GABA-mediated inhibition of neuronal activity. However, it is still up for debate whether these enhancers of GABAergic neurotransmission are effective for FSs because GABA can depolarize immature neurons with relatively higher levels of the intracellular Cl⁻ that overwhelms mature neurons in the developing brain. Here, we performed simultaneous video-local field potential (LFP) monitoring to determine whether benzodiazepines and barbiturates affected the phenotypes of FSs in postnatal mice. We found that both benzodiazepines and barbiturates exacerbated the behavioural and electrophysiological phenotypes of the induction phase of experimental FSs. We further found that the deteriorated phenotypes were suppressed when Na⁺K⁺2Cl⁻ co-transporter isoform 1 (NKCC1), which mediates Cl⁻ influx, was blocked by treatment with the diuretic bumetanide. Thus, our findings suggest that pharmacological enhancement of GABAergic signalling could aggravate seizure activity in the early phase of FSs, phenomena preventable with the use of NKCC1 blockers.