How an Atkins-like diet can treat epilepsy: Leptin attenuates rodent seizure severity

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Not all individuals who have epilepsy respond to traditional treatments and these individuals are said to have medically refractory epilepsy. Strict use of a ketogenic diet high in fats and extremely low in carbohydrates is sometimes used for treatment of refractory epilepsy, and is effective about half of the time.

However, the mechanisms whereby ketogenic diets suppress epileptic symptoms have long been a mystery. New data generated by Kelvin Yamada and colleagues at the Washington University School of Medicine, St. Louis, has revealed that intranasal delivery of leptin, a hormone important in feeding and energy metabolism, delayed the onset of convulsions in a rodent model of seizures.

As indicated by Tamas Horvath and Sabrina Diano in an accompanying commentary, these data suggest that leptin-triggered signaling may be a key to how a ketogenic diet combats epilepsy.

In the study, when focal seizures were induced by injection of the chemical 4AP into rat brains, co-injection of leptin reduced both the length and the frequency of these seizures. Intranasal administration permitted leptin to cross the blood-brain barrier and delay the onset of chemical-induced generalized seizures in mice.

Additional experiments revealed that leptin may assert these antiseizure effects via interaction with the JAK2/PI3K signaling pathway. The authors concluded that successful epilepsy treatments may include

dietary changes to increase leptin levels, intranasal administration of the compound, and pharmacological targeting of JAK2/PI3K signaling pathways.

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