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214 | Effect of a ketogenic diet on the expression of potassium channels controlling neuronal excitability

Neurochemistry and Neuropharmacology

Author: Sofia Stupniki | email: sofistupniki@gmail.com

Sofia Stupniki [1°2°], Eugenio Aztiria [1°2°], Guillermo Spitzmaul [1°2°]

1° Instituto de Investigaciones Bioquímicas de Bahía Blanca (INIBIBB)-CONICET/UNS.
2° Departamento de Biología, Bioquímica y Farmacia (BByF), UNS.

The ketogenic diet (KD) contains a high amount of fat and very low carbohydrates which leads to ketone bodies (KB) synthesis as an energy source. In our laboratory, we elaborated a KD (70% fat, 25% proteins, <1% carbohydrates) to evaluate if KB modify the gene expression of Kv channels that regulate neuronal excitability, and the social behavior. KD was administered to P21 C57BL/6 male mice after weaning for 3 weeks with ad libitum intake. We kept a control group (CG) with normal diet. The blood KB and glucose levels were measured on days (D) 0, D7, D14 and D21. After one week of KD administration, the animals reached the highest amount of blood KB (2.81 ± 0.69 mmol/L) while the CG remained at 0.71 ± 0.13 mmol/L. KB levels in the CG did not change during the assay while decreased to 1.44 ± 0.43 mmol/L in the KD group. The body weight of KD mice was 25% lower than CG up to D14 reaching similar values thereafter. Using qPCR, we analyzed the expression of Kcnq2-5 mRNA in different brain regions. We found a significant increase of Kcnq3 in cerebellum and Kcnq4 in cortex. We performed behavioral tests after 3 weeks of KD consumption. The self-grooming behavior and thigmotaxis as well as the sociability and the social novelty presented no differences between KD group and CG. Our results suggest that KB modify Kcnq expression, then could modulate neuronal excitability, and may contribute to explaining the clinical effects of KD in refractory epilepsy and autism spectrum disorders.

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