High-fat diet induces hippocampal dysfunction: evidence of cognitive impairment, depressive like-behavior and blood-brain barrier permeability

Gabriela Cristina de Paula
Federal University of Santa Catarina, Brazil

Excessive intake of saturated fat and refined sugar in Western diets leads to weight gain, progression into obesity, metabolic changes and increased risk of cardiovascular diseases. Recent evidence suggests that the hippocampus may also be particularly susceptible to disruption by dietary factors. The consumption of a high saturated fat diet (HFD) is associated with not only weight gain and metabolic/cardiovascular diseases, but also with impaired hippocampal-dependent memory and the emergence of hippocampal pathologies. There are also gaps in knowledge about the neurophysiological mechanisms underlying the effects of HFD on cognitive function. The goal of the present research was to assess the effects of maintenance on a HFD on hippocampal-dependent learning and memory performance, patterns of emotionality, on the integrity of blood-brain barrier (BBB) and neuroinflammation. For this purpose, 40-day-old male Swiss mice were fed a HFD (60% calories from fat) for 7, 14 and 28 consecutive days. Student t-test was used to compare the difference between the control group (Lean) and diet-induced obese (DIO) group. Cognition and emotionality assays, as well as assessment of the BBB function were performed after the experimental periods. Astrocyte activation was assessed by GFAP immunohistochemistry. The set of our results showed that even in a small period of diet exposure, 7 days, DIO leads to spatial memory impairment and depressive-like behavior, a condition that persisted up to 28 days of obesity. These behavioral changes were accompanied by the increase in BBB permeability at 7 days after diet induction. In addition, we observed the astrocytic activation in mice hippocampus after the 28-day period of diet consumption, showing that the HFD causes behavioral and BBB integrity alterations that culminate in neuroinflammation.

Speaker Biography

Gabriela Cristina de Paula holds a master's degree in Neurosciences and is a PhD student in the Graduate Program in Biochemistry at the Federal University of Santa Catarina, Brazil. Her research line is based on the study of the consequences of high-fat diets consumption in the Central Nervous System, focusing on brain areas more affected by the cognitive damage observed in Alzheimer's Disease.

e: depaula.gabrielac@gmail.com

Notes: