6 - Neurobiology

OC-020 - (24000) - EARLY-LIFE HIGH-CALORIC DIETS IMPAIR HIPPOCAMPAL NEUROGENESIS AND GABAERGIC INTERNEURONS: IMPLICATIONS FOR BRAIN DEVELOPMENT AND VULNERABILITY

B. Caetano-Mota (Portugal)[1,2,3]; M. Correia (Portugal)[1]; S. Sousa (Portugal)[1]; A. Rogeiro (Portugal)[1]; A. Silva (Portugal)[1,2,3]; P.A. Pereira (Portugal)[1,2,3]; M.D. Madeira (Portugal)[1,2,3]; A. Cardoso (Portugal)[1,2,3]

1 - Anatomy Unit, Biomedicine Department, Faculty of Medicine, University of Porto, Porto, Portugal; 2 - NeuroGen Research Group, CINTESIS – Centro de Investigação em Tecnologias e Serviços de Saúde, Porto, Portugal; 3 - CINTESIS@RISE, Faculty of Medicine, University of Porto, Porto, Portugal

Bárbara Caetano-Mota
Porto

Miguel Correia
Porto

Sara Sousa
Porto

Ana Rogeiro
Porto

Ana Silva
Porto

Pedro A. Pereira
Porto

M. Dulce Madeira
Porto

Armando Cardoso
Porto

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Consumption of high-caloric diets (HCD), rich in saturated fats and refined sugars, is becoming predominant and has been linked not only to overweight and obesity but also to cognitive deficits, often preceding noticeable changes in body weight. This is particularly concerning during early-life stages, when neurodevelopment and hippocampal maturation are most active and susceptible to external factors. Despite rising concerns, the specific effects of HCD on distinct neuronal populations in the developing hippocampus remain underexplored.

This study aimed to investigate the impact of two HCDs — high-fat (HF) and high-fat-high-sugar (HFHS) — on hippocampal neurogenesis and gamma-aminobutyric acid (GABA)ergic interneurons in young male Wistar rats.

Three-month-old animals were fed either a control (CT), HF, or HFHS diet for 12 weeks. Brain tissue was collected for immunohistochemical analysis of doublecortin (DCX), somatostatin (SS), neuropeptide Y (NPY), calbindin (CB), calretinin (CR), and parvalbumin (PV).

Both HF and HFHS diets significantly reduced DCX-immunoreactive cell density in the subgranular zone, suggesting impaired neurogenesis, and lead to a reduction in SS-immunoreactive cells in the dentate hilus. Additionally, CR-positive cells were significantly reduced by HFHS, while CB expression increased following HF but not HFHS intake. Both PV and NPY expression remained unchanged across groups, indicating selectivity in interneuron vulnerability.

These results suggest that early exposure to HCD, particularly HFHS, adversely affects neurogenic and GABAergic circuits in the hippocampus. Our findings emphasize the vulnerability of the young brain to dietary insults and highlight the importance of early, targeted nutritional strategies to prevent long-term cognitive and emotional dysfunction.

Palavras-chave : High-Caloric Diets, Neurogenesis, GABAergic Interneurons