

SESSIONE: Neuroscienze

IMPACT OF HONEY REGULAR INTAKE ON NEURODEGENERATION IN AN ANIMAL MODEL WITH DIET-INDUCED OBESITY

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The use of natural honey as a nutraceutical agent is associated with nutritional benefits and therapeutic promises. Honey flavonoids and phenolic acids can play a key role on health, due to the high antioxidant and anti-inflammatory properties. Up to date, it is unclear the effect of consumption of honey in obesity-related disorders, including neurodegeneration. The aim of the present study was to analyse the preventive effects of sicilian black bee chestnut honey daily intake on glucose dysmetabolism and neurodegeneration in mice fed high-fat diet (HFD). Three groups of mice were fed with standard diet (STD), HFD or HFD supplemented with honey (HFD-H) for 16 weeks. Glucose metabolism parameters, neuronal apoptosis (TUNEL assay and brain genes expression of Fas-L, Bim and P27) and central insulin resistance (cerebral cortex protein expression of pAKT, pERK and pGSK3 and microarray analysis) were analysed and compared between the different groups of animals. Fasting glucose, insulin levels, glucose tolerance and insulin sensitivity were significantly ameliorated in HFD-H mice compared to HFD, although the values were different from STD mice. Honey intake significantly reduced the HOMA index, which indeed was increased in HFD mice, suggesting a beneficial effect on insulin resistance. In addition, HFD mice showed a reduction in brain weight/body weight ratio, a significantly higher number of apoptotic nuclei in cerebral cortex, a higher gene expression of Fas-L, Bim and P27 (marker of neuronal apoptosis) in comparison with STD- and HFD-H mice, providing evidence for honey neuroprotective action. Moreover, honey intake significantly improved brain insulin resistance as demonstrated by PCR-array analysis showing upregulation of genes involved in insulin signalling (InsR, AdipoR and Irs1) and downregulation of genes involved in pro-inflammatory response (Rbp4, Cd36 and Stat3). In addition, in HFD-H mouse cortex, p-AKT and p-ERK protein expression was increased, while p-GSK3 was reduced in comparison with HFD cortex suggesting the ability of honey regular intake of protecting brain neurons from insulin resistance. In conclusion, the present results suggest a beneficial effect of the sicilian chestnut honey regular consumption on central nervous system in obesity conditions, by preventing onset of neurodegeneration and central insulin resistance.