

Protective effect of lycopene on high-fat diet-induced cognitive impairment in rats.

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Abstract

A Western diet, high in saturated fats, has been linked to the development of cognitive impairment. Lycopene has recently received considerable attention for its potent protective properties demonstrated in several models of nervous system dysfunction. However, it remains unclear whether lycopene exerts protective effects on cognition. The present study aimed to investigate the protective effects of lycopene on learning and memory impairment and the potential underlying mechanism in rats fed a high-fat diet (HFD). One-month-old male rats were fed different diets for 16 weeks (n=12 per group), including a standard chow diet (CD), a HFD, or a HFD plus lycopene (4mg/kg, oral gavage in the last three weeks). Behavioral testing, including the Morris water maze (MWM), object recognition task (ORT), and anxiety-like behavior in an open field (OF), were assessed at week 16. The dendritic spine density and neuronal density in the hippocampal CA1 subfield were subsequently measured. The results indicate that HFD consumption for 16 weeks significantly impaired spatial memory (P<0.001), working memory (P<0.01), and object recognition memory (P<0.01), decreased the dendritic spine density (P<0.001), damaged pyramidal neurons in the CA1 subfield (P<0.001) compared with the CD group. However, lycopene significantly attenuated learning and memory impairments and prevented the reduction in dendritic spine density (P<0.001). Thus, this study indicated that lycopene helps to protect HFD induced cognitive dysfunction.

KEYWORDS: Cognitive disease; High fat diet; Hippocampus; Hyperlipidemia; Lycopene