CONY
APRIL 4-7, 2019
MADRID, SPAIN

IMPACT OF SEPARATED FIBER FRACTIONS FROM LINGONBERRIES ON THE SYNAPTIC PLASTICITY OF THE HIPPOCAMPUS IN APOE-/- MICE

Galyna Skibo [1], Nittaya Marungruang [3], Tetiana Kovalenko [1], Iryna Osadchenko [1], Dmytro Shepilov [1], Galyna Ushakova [2], Margareta Nyman[3], Olena Prykhodko[3], Frida Fåk Hållenius[3]

[1]Bogomolez Institute of Physiology, Kiev, Ukraine; (gskibo@biph.kiev.ua)
[2]Oles Honchar Dnipro National University, Ukraine;
[3]Department of Food Technology, Engineering and Nutrition, Lund University, Lund, Sweden (frida.hallenius@food.lth/se)

INTRODUCTION

ApoE-/- mouse model is widely used to study atherosclerosis but it has been reported that *ApoE -/-* mice also show signs of cognitive deficiency with age. High-fat (HF) diet has been shown to alter gut microbiota composition, associated with increase of brain markers of inflammation. This matter may result in neural alterations and contribute to impairment in learning and memory.

Lingonberries (*Vaccinium vitis-idaéa*, LB) have previously been shown to prevent diet-induced obesity, improve insulin resistance, and reduce inflammation and atherosclerosis in both animals and humans (1). The beneficial metabolic effects of LB have been associated with an altered of gut microbiota (2). In the present study, we aimed to explore whether LB and their two separated fiber fractions could affect memory functions and neuroinflammation.

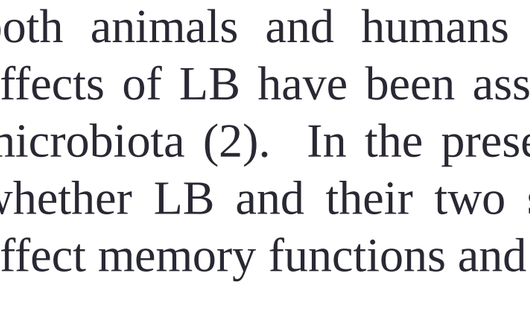
METHODS

Eight weeks-old male *ApoE-/-* mice fed HF diet (38% kcal) supplemented totally with 60 g/kg of fiber contained either only cellulose (control), soluble (solLB) or insoluble (insLB) fiber fractions of LB or whole LB (wLB) respectively (10 animals in each group). All mice were 16-week-old at the end of the experiment.

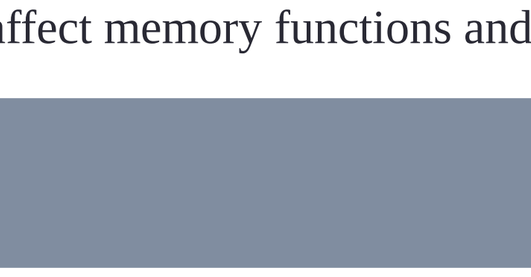
Behavioral tests, enzyme immunoassay, immunohistochemical and ultrastructural studies of the hippocampus involved in the formation of memory and learning, were analyzed. The number of astrocytes and microglial cells, synaptic and mitochondrial density in the hippocampal CA1 zone were estimated.

RESULTS

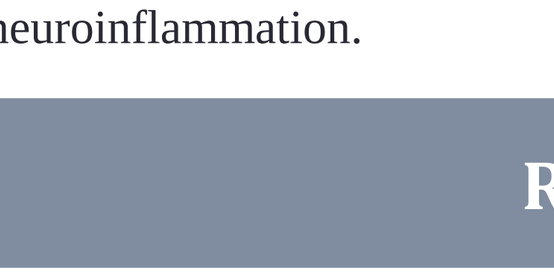
The wLB and insLB significantly increased the density of synaptic terminals (↖) in the hippocampal CA1 zone (15%) with a simultaneous increase of mitochondria (*) in this area (12.8%).



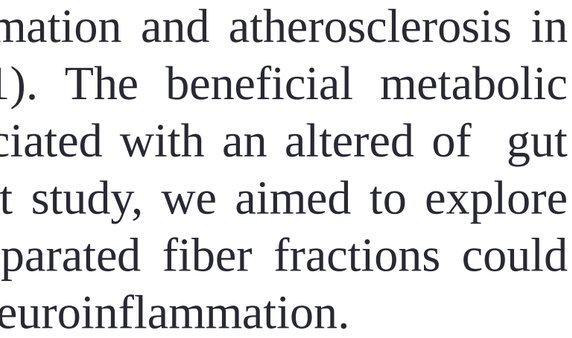
control

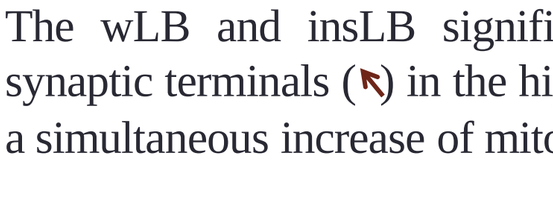


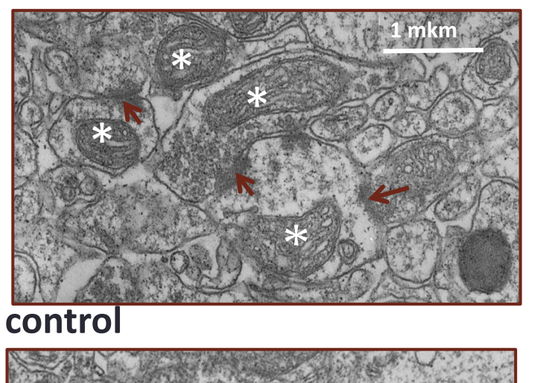
wLB



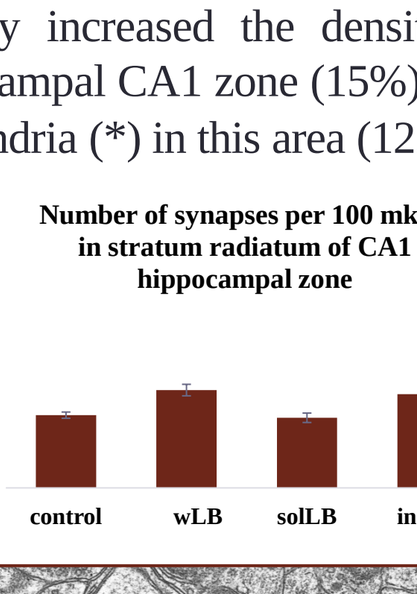
insLB



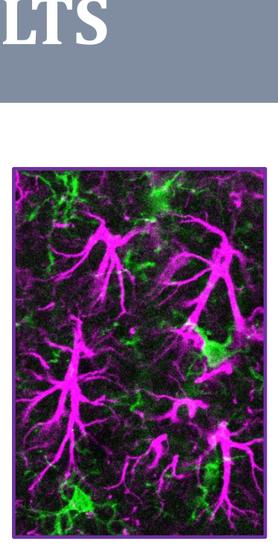




wLB

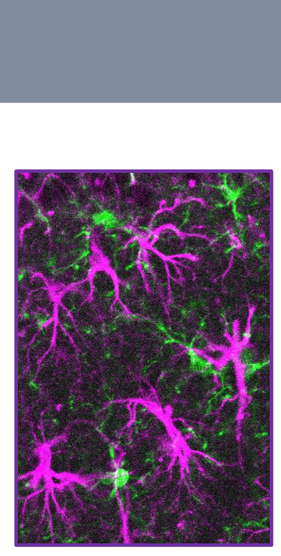


insLB



control

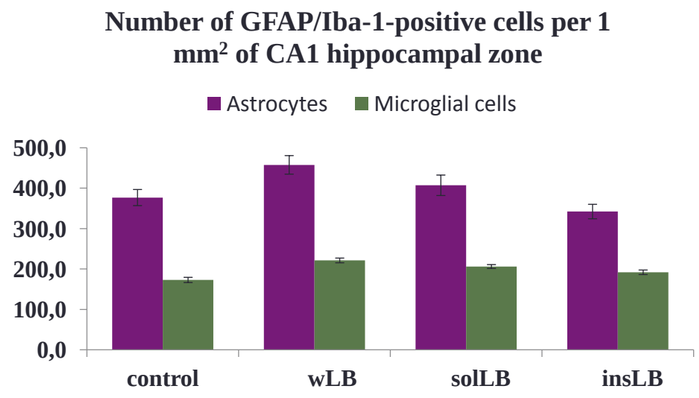
wLB



solLB

insLB

The glial reaction to the wLB diet was expressed by an increase of the number of astrocytes (12.4%) and microglial (17.4%) cells. Obtained morphological data was supported by enzyme immunoassay.



Spontaneous T-maze test showed trend to increase in the rate of alternation and shortened time for making the decision in a wLB and insLB groups compared to the HF control.

CONCLUSIONS

Results from this study suggests that intake of wLB as well as the insLB fiber fraction can prevent the negative effect of HF diet on the hippocampus in *ApoE -/-* mice and activate the synaptic plasticity in the hippocampus.

REFERENCES

(1) Mol. Nutr. Food Res. 2016; 60, P. 1150-1160.
(2) Food & Nutrition Research. 2016; 60:10.3402/fnr.v60.29993.