Study in mice suggests that regular physical activity may prevent obesity-induced cognitive decline

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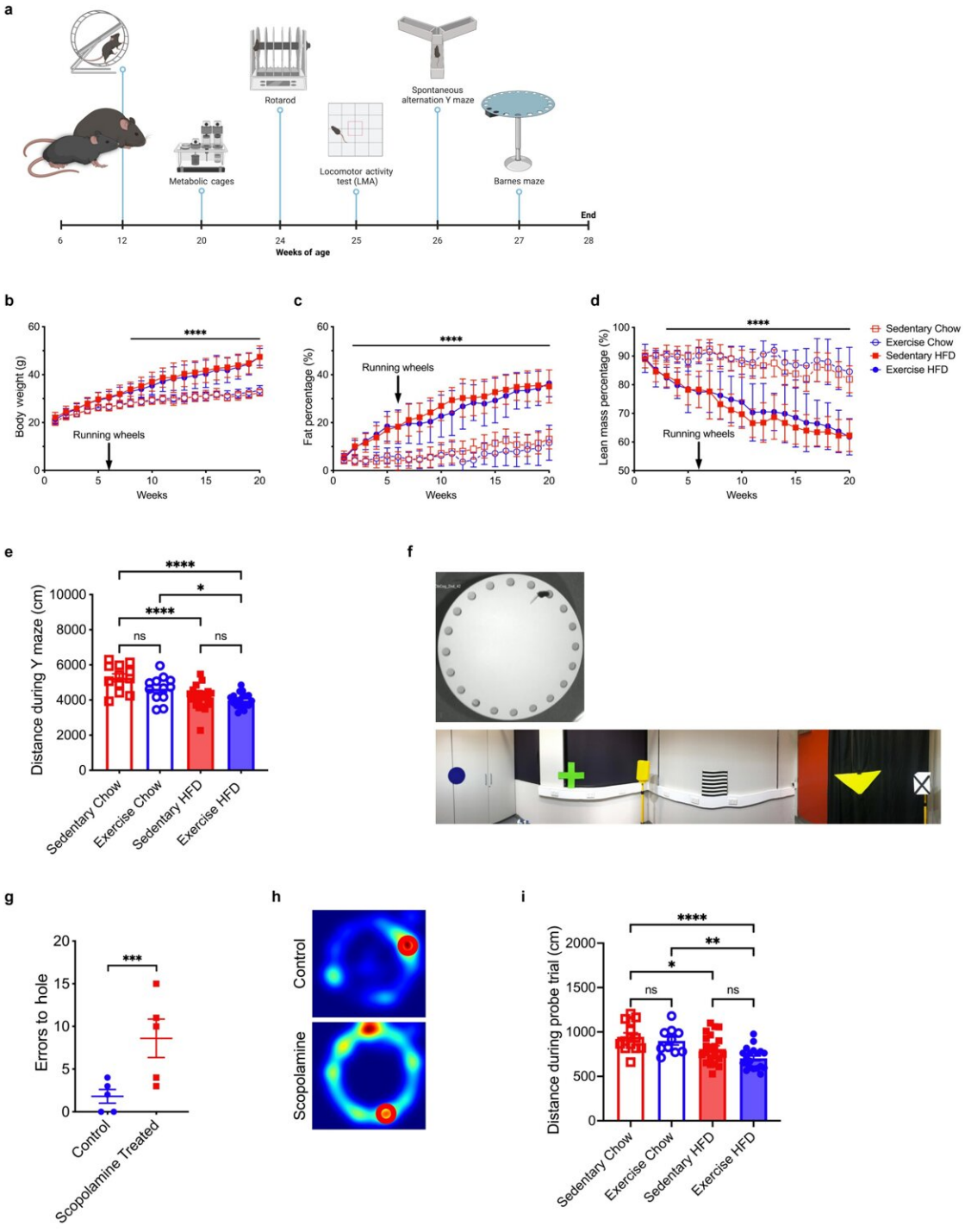
a
Rotarod
Spontaneous alternation Y maze
Metabolic cages
Locomotor activity test (LMA)
Barnes maze
End
6
12
20
24
25
26
27
28
Weeks of age
b
Body weight (g)
Running wheels
Weeks
c
Fat percentage (%)
Running wheels
Weeks
d
Lean mass percentage (%)
Running wheels
Weeks
Sedentary Chow
Exercise Chow
Sedentary HFD
Exercise HFD
e
Distance during Y maze (cm)
ns
ns
Sedentary Chow
Exercise Chow
Sedentary HFD
Exercise HFD
f
g
Errors to hole
Control
Scopolamine Treated
h
Control
Scopolamine
i
Distance during probe trial (cm)
ns
ns
Sedentary Chow
Exercise Chow
Sedentary HFD
Exercise HFD

Credit: *Life Metabolism* (2023). DOI: 10.1093/lifemeta/load043

Obesity is a major risk factor for cardiovascular metabolic diseases and neurodegenerative diseases such as dementia. Long-term exercise improves memory and spatial cognition, reduces age-related cognitive decline, and maintains brain volume, but the mechanisms are not fully understood.

A study from Febbraio lab at Monash University reported that voluntary exercise training (VET) improves long-term memory in high-fat diet (HFD)-induced obese mice, increases hippocampal neurogenesis and the expression of the neurotrophic factor BDNF in the hippocampus, and decreases the expression of the inflammatory factor TNF, suggesting that long-term physical activity can prevent obesity-induced cognitive decline.

The study is published in the journal *Life Metabolism*.

Particularly, their results showed that VET upregulated Bdnf mRNA levels in the hippocampus of obese mice, but had no significant effect on BDNF protein levels in the hippocampus and blood, consistent with previous reports that the increase in BDNF expression in the hippocampus is transient and occurs only within a limited time window.

The downregulation of TNF expression after exercise training suggests that exercise may induce a mild inflammatory stimulus in the brain, contributing to mouse memory improvement.

In summary, this study reveals the crucial role of exercise training in prevention of obesity-induced cognitive dysfunction and neurodegenerative diseases.

More information: Oliver K Fuller et al, Exercise training improves long-term memory in obese mice, *Life Metabolism* (2023). DOI: 10.1093/lifemeta/load043