

# How do two types of intense exercise affect a brain neurotrophic factor?

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<b>Registration date</b> 03/07/2025	<b>Overall study status</b> Completed	<input type="checkbox"/> Statistical analysis plan <input type="checkbox"/> Results
<b>Last Edited</b> 03/07/2025	<b>Condition category</b> Other	<input type="checkbox"/> Individual participant data <input checked="" type="checkbox"/> Record updated in last year

## Plain English summary of protocol

### Background and study aims

Exercise is linked to neuroplasticity, our brain's ability to adapt to different environments and experiences. When we exercise, various brain health protective neurotrophic factors are released that improve brain functioning and health. Therefore, it is important to research the optimal exercise protocols, in terms of intensity, type and goal, to promote this neuroplasticity. This study aimed to test two high-intensity exercise protocols and how they affect a specific neurotrophic factor, brain-derived neurotrophic factor, as well as lactate concentration (an indicator of fatigue and metabolism).

### Who can participate?

Young healthy adults aged 20-30 years, with both females and males included

### What does the study involve?

Participants were randomly allocated into three groups. One experimental exercise group completed a 15-minute high-intensity protocol, while another one had a 15-minute maximum intensity protocol. The control group watched a 15-minute educational video. Brain-derived neurotrophic factor was measured in saliva with participants passively drooling into a specific tube. Lactate concentration was measured from capillary blood.

### What are the possible benefits and risks of participating?

There is a possibility that the exercise will be tiring or cause physical or psychological fatigue. The tests can cause psychological fatigue. During the exercise, heart rate will be monitored to control the intensity, and a team of sports scientists will be present to monitor the process and stop the study if necessary. The risk will be reduced by warming up so that the exercise load increases gradually.

### Where is the study run from?

Sports Physiology Laboratory, Faculty of Biology, University of Latvia (Latvia)

### When is the study starting and how long is it expected to run for?

November 2023 to February 2025

Who is funding the study?

We acknowledge the donation of SIA "Mikrotīkls" (MikroTik) administered by the University of Latvia Foundation, project no. 2322

Who is the main contact?

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## Contact information

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## Additional identifiers

### Clinical Trials Information System (CTIS)

Nil known

### ClinicalTrials.gov (NCT)

Nil known

**Protocol serial number**

Nil known

## **Study information**

**Scientific Title**

Effects of high-intensity training and reduced exertion high-intensity training on brain-derived neurotrophic factor: a block randomized controlled trial

**Study objectives**

H1: Lactate and brain-derived neurotrophic factor (BDNF) will increase after acute exercise, compared to baseline, but will not increase in the control group.

H2: Brain-derived neurotrophic factor (BDNF) will increase with increased lactate.

Q1: Will the reduced-exertion high-intensity training (REHIT) load lead to a higher BDNF post-exercise increase than high-intensity training (HIIT)?

**Ethics approval required**

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**Ethics approval(s)**

approved 12/01/2024, Life science and medicine scientific research ethics committee of the University of Latvia (Raiņa bulvāris 19, Riga, LV-1586, Latvia; +371 (0)67033881; lu@lu.lv), ref: No. 71-35/2

**Study design**

Three-group pre-post block randomized controlled trial

**Primary study design**

Interventional

**Study type(s)**

Efficacy

**Health condition(s) or problem(s) studied**

Acute exercise effect on brain-derived neurotrophic factor

**Interventions**

Block randomization was used to assign participants to three groups. One experimental exercise group completed a 15-minute HIIT protocol, while another one had a 15-minute REHIT protocol, and the control group watched a 15-minute educational video.

**Intervention Type**

Behavioural

**Primary outcome(s)**

Brain-derived neurotrophic factor (BDNF) measured in saliva using an ELISA kit pre-exercise and directly after the main part of the exercise (before cooldown)

**Key secondary outcome(s)**

1. Lactate measured pre-exercise and directly after the main part of the exercise (before cooldown)
2. Glucose measured pre-exercise and directly after the main part of the exercise (before cooldown)

Both measured in capillary blood samples using a Biosen Lactate and Glucose Analyser

**Completion date**

12/02/2025

**Eligibility****Key inclusion criteria**

1. Young adults, aged 20 - 30 years, without any medical conditions that would limit their ability to exercise
2. No colourblind vision, as some of the cognitive tests (not included in the analysis) were in various colour forms
3. Non-smokers
4. Exercise up to three times a week.

**Participant type(s)**

Healthy volunteer

**Healthy volunteers allowed**

No

**Age group**

Adult

**Lower age limit**

20 years

**Upper age limit**

30 years

**Sex**

All

**Total final enrolment**

60

**Key exclusion criteria**

1. Athletes
2. People who have health conditions that do not allow them to exercise

**Date of first enrolment**

11/03/2024

**Date of final enrolment**

12/02/2025

## Locations

### Countries of recruitment

Latvia

### Study participating centre

**Sports Physiology Laboratory, Faculty of Biology, University of Latvia**

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## Sponsor information

### Organisation

University of Latvia

### ROR

<https://ror.org/05g3mes96>

## Funder(s)

### Funder type

Industry

### Funder Name

SIA "Mikrotīkls" (MikroTik)

## Results and Publications

### Individual participant data (IPD) sharing plan

The datasets generated and/or analysed during the current study will be published as a supplement to the results publication.

### IPD sharing plan summary

Published as a supplement to the results publication

### Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
<a href="#">Participant information sheet</a>	Participant information sheet	11/11/2025	11/11/2025	No	Yes