

# Influence of high dose cocoa-flavanol intake on factors affecting exercise performance and recovery

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<b>Registration date</b> 28/04/2017	<b>Overall study status</b> Completed	<input type="checkbox"/> Statistical analysis plan <input type="checkbox"/> Results
<b>Last Edited</b> 28/04/2017	<b>Condition category</b> Other	<input type="checkbox"/> Individual participant data <input type="checkbox"/> Record updated in last year

## Plain English summary of protocol

### Background and study aims

Cocoa flavanols (CF) are a supplement made from cocoa beans. They have several beneficial health effects and can stimulate blood flow to provide the body with sufficient oxygen and nutrients when exercising. After exercise, the body needs to recover. The aim of this study is to find out whether taking this CF supplement can help to improve exercise performance and help recovery from exercise.

### Who can participate?

Well-trained male cyclists aged 20 to 35

### What does the study involve?

Participants undergo a cycling test on the first occasion. On two separate occasions, participants undergo two 30-min all-out cycling exercises (time trials), 1.5 and 3 hours after taking either CF or a placebo (dummy supplement), with a rest in between. Blood samples are taken at the start of the study and before and after each time trial and tested for several markers.

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

The possible benefits include improved performance and recovery from exercise. The study does not involve any risks, as the participants are used to heavy exercise and perform cycling training at least 10 hours per week.

### Where is the study run from?

Vrije Universiteit Brussel (Belgium)

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

March 2015 to July 2015

### Who is funding the study?

Vrije Universiteit Brussel (Belgium)

Who is the main contact?

Lieselot Decroix

## Contact information

### Type(s)

Scientific

### Contact name

Mrs Lieselot Decroix

### Contact details

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## Additional identifiers

### Protocol serial number

CFEX

## Study information

### Scientific Title

Effect of acute cocoa flavanols intake on exercise-induced oxidative stress, inflammation and nitric oxide production in healthy athletes: a randomized controlled trial

### Study objectives

It is hypothesized that cocoa flavanol (CF) intake:

1. Will have little or no effect on indirect markers of NO production and exercise performance in healthy, well-trained, subjects
2. Will decrease exercise-induced oxidative stress and inflammation, leading to an improved recovery

### Ethics approval required

Old ethics approval format

### Ethics approval(s)

Medical ethics committee UZ Brussel-VUB, 28/01/2015, ref: B.U.N. 143201523265

### Study design

Randomized double-blind interventional placebo-controlled cross-over single-centre study

### Primary study design

Interventional

### Study type(s)

Other

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

Exercise performance and recovery

## **Interventions**

Participants perform an incremental cycling test on the first occasion. On two separate occasions, subjects perform two 30-min time trials on an indoor cycle-ergometer, interposed by passive rest, 1.5 and 3 hours after drinking a single dose of either:

1. Chocolate drink with high cocoa flavanol content (900 mg flavanols) (brandname: acticoa)
2. Placebo chocolate drink (13 mg flavanols)

The drinks are matched in caffeine, theobromine, calories, carbohydrates, fat and proteins.

Lactate, glucose, heart rate, rating of perceived exertion (RPE) and power output were measured during the time trials. Blood will be drawn at baseline and before and after each time trial and analyzed for several markers.

## **Intervention Type**

Supplement

## **Primary outcome(s)**

1. Epicatechin serum concentration
2. Trolox equivalent antioxidative capacity (TEAC)
3. Uric acid (UA) plasma concentration
4. Malonaldehyde (MDA) plasma concentration
5. L-arginine/ADMA plasma concentration
6. Citrulline plasma concentration
7. Interleukin (IL)-1 plasma concentration
8. IL-6 plasma concentration
9. Tumor necrosis factor (TNF)- $\alpha$  plasma concentration

Measured at baseline and before and after each time trial (pre-TT1, post-TT1, pre-TT2, post-TT2) by HPLC, ELISA and spectrophotometry of plasma and serum (blood)

## **Key secondary outcome(s)**

1. Time trial performance; time to complete a certain predefined workload during time trial 1 (90-120 min after cocoa intake) and during time trial 2 (210-240 min after cocoa intake)
2. Physiological parameters during time trial:
  - 2.1. Lactate concentration, glucose concentration and rate of perceived exertion at start, after 10 min, after 20 min and at the end of each time trial
  - 2.2. Heart rate and power output at start, after 5, 10, 15, 20, 25 minutes and at the end of each time trial

## **Completion date**

01/07/2015

## **Eligibility**

### **Key inclusion criteria**

1. Age: between 20 years and 35 years
2. No severe head injuries in the past
3. No intake of neurological or psychological medication

4. Healthy
5. No hypertension
6. No cardiovascular disease
7. Cycling training of at least 10 hours per week for the last 2 years

**Participant type(s)**

Healthy volunteer

**Healthy volunteers allowed**

No

**Age group**

Adult

**Sex**

Male

**Key exclusion criteria**

1. Age: younger than 20 years or older than 35 years
2. Severe head injuries in the past
3. Intake of neurological or psychological medication which might alter cognitive function (psychotropic drugs, beta adrenergic blockers, steroids)
4. Hypertension
5. Cardiovascular disease
6. Other diseases which can alter cognitive function (diabetes, depression)

**Date of first enrolment**

15/03/2015

**Date of final enrolment**

01/05/2015

**Locations****Countries of recruitment**

Belgium

**Study participating centre**

Vrije Universiteit Brussel

Belgium

1050

**Sponsor information****Organisation**

Vrije Universiteit Brussel

**ROR**

<https://ror.org/006e5kg04>

## **Funder(s)**

**Funder type**

University/education

**Funder Name**

Vrije Universiteit Brussel

## **Results and Publications**

**Individual participant data (IPD) sharing plan**

The datasets generated during and/or analysed during the current study will be available upon request from Lieselot Decroix.

**IPD sharing plan summary**

Available on request