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Oral hydroxycitric acid (HCA) supplementation enhances glycogen synthesis in exercised human skeletal 1 muscle

Submission date	Recruitment status	[ ] Prospectively registered
20/12/2010	No longer recruiting	[ ] Protocol
Registration date	**Overall study status**	[ ] Statistical analysis plan
21/01/2011	Completed	[ ] Results
Last Edited	**Condition category**	[ ] Individual participant data
21/01/2011	Nutritional, Metabolic, Endocrine	[ ] Record updated in last year

Plain English summary of protocol
Not provided at time of registration

Contact information

Type(s)
Scientific

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Additional identifiers

Protocol serial number
IRB951222

Study information

Scientific Title
Oral hydroxycitric acid (HCA) supplementation enhances glycogen synthesis in exercised human skeletal 1 muscle: a randomised placebo-controlled cross-over trial

Acronym

HCA, GLUT4,FAT/CD36

Study objectives
In this study, we tested the hypothesis that oral hydroxycitric acid (HCA) supplementation might increase muscle glycogen stores and increase insulin sensitivity after exercise in humans, based on the evidence from mice studies.

Ethics approval required
Old ethics approval format

Ethics approval(s)
National Taiwan Sport University Ethics Committee approved on the 12th December 2006

Study design
Randomised placebo controlled crossover trial

Primary study design
Interventional

Study type(s)
Treatment

Health condition(s) or problem(s) studied
Glycogen synthesis in human skeletal muscle

Interventions
Since we aimed to determine the HCA effect on recovery, HCA and placebo meals were provided to the subjects immediately after exercise. HCA trial provided a meal containing 70% carbohydrate content with 500 mg HCA in half litre of drinking water for a 3-hour recovery, whereas the placebo trial (placebo, eight comparisons) provided a diet containing 70% carbohydrate content plus same volume of drinking water. In particular, carbohydrate meal contained 2 g carbohydrate per kilogram of body weight. The decision for HCA dosage was based on previous human report which demonstrated positive ergogenic effect on endurance performance.

Subjects performed a 60-mins cycling at 75% VO2max. Muscle biopsy samples, blood samples and gaseous samples were obtained immediately after exercise and during 3 hours after exercise.

Intervention Type
Drug

Phase
Not Applicable

Drug/device/biological/vaccine name(s)
Hydroxycitric acid

Primary outcome(s)
Glycogen assay. Approximately 25 mg of skeletal muscle from the deep portion of the vastus lateralis was dissolved in 1 N KOH at 75°C for 30 minutes. Dissolved homogenate was

neutralised by glacial acetic acid and incubated overnight in acetate buffer (0.3 M sodium acetate, pH to 4.8) containing amyloglucosidase (Boehringer Mannheim, Indianapolis, IN). The reaction mixture was neutralised with 1 N NaOH. Samples were then analysed by measuring glucosyl units by the Trinder reaction (Sigma, St. Louis, MO).

Key secondary outcome(s))
Molecular expressions of GLUT4, FAT/CD36, measured with reverse transcription-polymerase chain reaction (RT-PCR) and western blotting

Completion date
30/04/2007

Eligibility

Key inclusion criteria
1. Healthy male volunteers
2. Aged 22.0 +/- 0.3 years
3. Height 171.3 +/- 0.7 cm
4. Weight 73.7 +/- 1.1 kg
5. Body mass index (BMI) 25.2 +/- 0.5 kg/m2
6. Ventilatory equivalent for oxygen (VEO2) 108
7. Peak 45.7 +/- 1.5 ml/kg/min

Participant type(s)
Patient

Healthy volunteers allowed
No

Age group
Adult

Sex
Male

Key exclusion criteria
Male volunteer's VO2max less than 30 ml/kg/min

Date of first enrolment
01/08/2006

Date of final enrolment
30/04/2007

Locations

Countries of recruitment
Taiwan

Study participating centre
140, Ming Sheng Road
Taichung City
Taiwan
403

Sponsor information

Organisation
National Science Council (Taiwan)

ROR
https://ror.org/02kv4zf79

Funder(s)

Funder type
Government

Funder Name
National Science Council (Taiwan) (ref: NSC 97-2140-H-166-007-MY2)

Results and Publications

Individual participant data (IPD) sharing plan

IPD sharing plan summary
Not provided at time of registration

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Participant information sheet	Participant information sheet	11/11/2025	11/11/2025	No	Yes