Fysiological determinants of oxygen uptake kinetics in patients with chronic heart failure

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The purpose of this study is to investigate the physiological determinants of O2 onset and recovery kinetics during and after submaximal exercise in CHF patients by assessing oxygen uptake, muscle blood flow, cardiac output and skeletal muscle…

Ethical review	Approved WMO
Status	Recruitment stopped
Health condition type	Heart failures
Study type	Observational invasive

Summary

ID

NL-OMON31396

Source
ToetsingOnline

Brief title
O2 determinants in CHF

Condition

- Heart failures

Synonym
heart failure, left ventricular dysfunction

Research involving
Human

Sponsors and support

Primary sponsor: Máxima Medisch Centrum
Source(s) of monetary or material Support: Wetenschapsfonds MMC;Stichting Cardio-Educatie

Intervention

Keyword: exercise testing, heart failure, oxygen kinetics, Oxygen uptake

Outcome measures

Primary outcome

Correlation's between the time constants of oxygen uptake, cardiac output,

oxygenated hemoglobin (O2Hb) and phosphocreatin (PCr) resynthesis.

Secondary outcome

Differences between the time constants of oxygen uptake, cardiac output,

oxygenated hemoglobin (O2Hb) and phosphocreatin (PCr) resynthesis.

Study description

Background summary

Oxygen uptake kinetics describe the rate of change of oxygen uptake during or after constant-load exercise (O2 onset and recovery kinetics, resp.) and correlate well with exercise capacity of patients with chronic heart failure (CHF). Compared to peak oxygen uptake, O2 kinetics have the advantage of being objective and more indicative of daily physical activity. However, little is known about the physiological determinants of O2 kinetics in CHF patients. In theory, a delay of O2 onset and recovery kinetics can be determined by a slower increase/decrease of cardiac output, a decline of local muscle blood flow or abnormalities of skeletal muscle metabolism. More knowledge on the limiting factors of oxygen kinetics may contribute to a better understanding of the physiological mechanisms underlying the decrease of exercise tolerance of these patients. Furthermore this knowledge is necessary for a wider implementation of oxygen kinetics in clinical practice, for instance for predicting the effects therapeutic interventions like exercise training.

Study objective

The purpose of this study is to investigate the physiological determinants of O2 onset and recovery kinetics during and after submaximal exercise in CHF patients by assessing oxygen uptake, muscle blood flow, cardiac output and skeletal muscle metabolism.

Study design

19 patients perform 3 exercise tests. The first 2 tests are performed in the MR scanner and 1 on a cycle ergometer.
During both tests in the MR scanner 31P-spectroscopy is used to estimate the oxidative capacity of skeletal muscle. The first test is used to determine maximal exercise capacity. During the second test, a constant-load test at 50% of PCr depeletion, muscle blood flow is assessed simultaneously by Near Infrared Spectroscopy (NIRS), which measures changes in oxygenated and de-oxygenated hemoglobin.
During the exercise test on the cycle ergometer (constant load exercise test at 50% of maximal workload) oxygen uptake is measured breath by breath, with simultaneous NIRS and cardiac output measurements (pulse contour analysis, LiDCO).

Study burden and risks

Burden: 3 exercise tests, insertion of peripheral arterial and venous cannula.
Risk: hematoma due to cannulae

Contacts

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Trial sites

Listed location countries

Netherlands

Eligibility criteria

Age
Adults (18-64 years)
Elderly (65 years and older)

Inclusion criteria

- Heart Failure, New York Heart Association (NYHA) Class II of III, > 6 months, > 3 months stable
- Ejection fraction <40%
- ischaemic cardiomyopathy or dilating cardiomyopathy

Exclusion criteria

- Pacemaker, ICD
- Unstable AP, myocardial infarction < 3 months before inclusion
- Atrial fibrillation or flutter
- Intracardial shunts of other congenital heart disease
- COPD with FEV1/FVC < 60%
- Pulmonary hypertension
- Negative Allen test on both sides

Study design

Design

Study type: Observational invasive

Masking:	Open (masking not used)
Control:	Uncontrolled
Primary purpose:	Diagnostic

Recruitment

NL

Recruitment status:	Recruitment stopped
Start date (anticipated):	28-09-2008
Enrollment:	19

Type:	Actual

Ethics review

Approved WMO Date:	27-08-2007
Application type:	First submission
Review commission:	METC Maxima Medisch Centrum (Veldhoven)

Study registrations

Followed up by the following (possibly more current) registration

No registrations found.

Other (possibly less up-to-date) registrations in this register

No registrations found.

In other registers

Register	ID
CCMO	NL18319.015.07