Analysing cEllular bioenergetics aNd structural aDaptations in the qUadriceps muscle befoRe and After endobroNChial valve treatmEnt.

Published: 20-06-2024
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To investigate the physiological and structural adaptations of peripheral muscle function at a cellular level in response to EBV treatment.

Ethical review	Approved WMO
Status	Recruiting
Health condition type	Respiratory disorders NEC
Study type	Observational invasive

Summary

ID

NL-OMON56839

Source
ToetsingOnline

Brief title
ENDURANCE-study

Condition

- Respiratory disorders NEC

Synonym
COPD, emphysema

Research involving
Human

Sponsors and support

Primary sponsor: Universitair Medisch Centrum Groningen
Source(s) of monetary or material Support: Ministerie van OC&W

Intervention

Keyword: COPD, Lung volume reduction, Quadriceps muscle

Outcome measures

Primary outcome

The primary endpoint of this study is to assess the physiological adaptations, in terms of cellular bioenergetics, of the quadriceps muscle in patients with severe COPD in response to EBV treatment. This will be done by performing 31P-MRS during exercise testing in a MR-compatible ergometer at baseline and at 6 months follow-up, for which the following outcomes will be assessed:

- Quadriceps phosphocreatine concentration (PCr) at rest and during progressive exercise;

- Quadriceps inorganic phosphorus concentration (Pi) at rest and during progressive exercise;

- Quadriceps pH at rest and during progressive exercise;

- Post-exercise recovery rate of quadriceps PCr, Pi and pH.

Secondary outcome

The secondary endpoint of this study is to investigate in muscle biopsies the following outcomes:

- Change in muscle fiber type composition 6 months after EBV treatment.

- Change in mitochondrial density 6 months after EBV treatment.

- Change in master regulators of muscle oxidative programming 6 months after EBV treatment.

- Change in mitochondrial respiration 6 months after EBV treatment.

- Change in lipid droplets 6 months after EBV treatment.

- Change in mRNA and protein expression of markers of inflammation and hypoxia

induced signalling 6 months after EBV treatment.

- Change in regulators of muscle protein turnover 6 months after EBV treatment.

Study description

Background summary

Chronic obstructive pulmonary disease (COPD) is characterised by a high prevalence of peripheral muscle dysfunction, which can have significant clinical consequences, including decreased exercise capacity, reduced quality of life, and even a higher mortality rate. Reduction of lung hyperinflation using bronchoscopic lung volume reduction treatment with Pulmonx Zephyr one-way endobronchial valves (EBV) is a minimally invasive intervention which improves exercise capacity and physical activity in patients with severe emphysema. This positive effect is also related to weight gain and alterations in body composition. To our knowledge, the physiologic and structural adaptations of skeletal muscle function after EBV treatment has never been investigated before.

Study objective

To investigate the physiological and structural adaptations of peripheral muscle function at a cellular level in response to EBV treatment.

Study design

A single center, exploratory, prospective clinical study with a single-arm pretest-posttest design. Patients with severe emphysema who will receive a bronchoscopic lung volume reduction treatment are asked to undergo additional in-magnet exercise testing and muscle biopsies before and after placement of EBVs.

Study burden and risks

This study has no specific benefits for the participating patients and the study also has no major risks. The patients will be exposed to additional exercise capacity and physical activity measurements. Imaging by means of 31P-MRS has previously been shown to be safe and is already widely used in different studies. Patients are not exposed to any radiation and/or contrast agents. Moreover, patients will undergo two muscle biopsies. Muscle biopsy can cause a small local haematoma or infection, however, the occurrence of both is

very low and the risks will be minimalized.

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

1. Patient is scheduled for a bronchoscopic lung volume treatment using Pulmonx Zephyr one-way endobronchial valves;
2. Patient read, understood and signed the Informed Consent Form.

Exclusion criteria

1. Inability to perform a cycle ergometry test;

2. Contraindications for undergoing a magnetic resonance imaging scan (e.g. claustrophobia, implanted cardiac devices);
3. Body length >190cm;
4. Use of any anticoagulant therapy;
5. COPD exacerbation 4 weeks prior to testing.

Study design

Design

Study type: Observational invasive

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

Recruitment

NL

Recruitment status:	Recruiting
Start date (anticipated):	14-01-2025
Enrollment:	18
Type:	Actual

Ethics review

Approved WMO

Date:	20-06-2024
Application type:	First submission
Review commission:	METC Universitair Medisch Centrum Groningen (Groningen)

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
ClinicalTrials.gov	NCT06025500
CCMO	NL85100.042.23