

Muscle wasting in chronic obstructive pulmonary disease (COPD): the role of resistance training and protein supplementation

Submission date 21/10/2009	Recruitment status No longer recruiting	☐ Prospectively registered ☐ Protocol
Registration date 09/12/2009	Overall study status Completed	☐ Statistical analysis plan ☒ Results
Last Edited 25/02/2015	Condition category Respiratory	☐ Individual participant data

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
MRC ref: G0501985; UHL 10146

Study information

Scientific Title

Molecular approaches to reversing skeletal muscle wasting in chronic obstructive pulmonary disease (COPD): the role of resistance training and protein supplementation - a double-blind randomised placebo-controlled trial

Study objectives

This project will test the following principal hypotheses:

1. That muscle wasting in chronic obstructive pulmonary disease (COPD) is characterised by alterations in the expression of catabolic and anabolic genes (mRNA) and signalling pathways (protein and protein phosphorylation) that have been implicitly associated with the regulation of skeletal muscle protein degradation and synthesis when compared with non-wasted COPD patients, and similar aged healthy controls.
2. That a carefully controlled resistance training programme known to restore muscle mass in immobilised young healthy humans will have similar restorative effects in COPD patients and that these benefits will be mediated through changes in these candidate gene and signalling pathways. We will also determine how these effects differ between wasted and non wasted COPD patients and between patients and healthy controls.
3. That changes in the expression and activation of these regulatory pathways occurs early (within 24 hours) from the onset of rehabilitation as was seen following limb immobilisation in young healthy subjects.
4. That the positive effects of resistance training on skeletal muscle mass in COPD patients can be augmented when training is combined with dietary protein supplementation.

More details can be found at the following links:

UK Clinical Research Network Study Portfolio: <http://public.ukcrn.org.uk/Search/StudyDetail.aspx?StudyID=4049>

MRC research portfolio: <http://www.mrc.ac.uk/ResearchPortfolio/Grant/Record.htm?GrantRef=G0501985&CaseId=6937>

Ethics approval required

Old ethics approval format

Ethics approval(s)

1. Leicestershire, Northamptonshire & Rutland Research Ethics Committee 1, 26/09/2006, ref: 06/Q2501/138
2. University Hospitals of Leicester (UHL) NHS Trust R&D, 05/01/2007, ref: 10146
3. Leicester City Primary Care Trust (PCT), 12/02/2008, ref: LNR PCRA 0696

Primary study design

Interventional

Study design

Double-blind randomised placebo-controlled single-centre trial

Study type(s)

Treatment

Health condition(s) or problem(s) studied

Chronic obstructive pulmonary disease (COPD)

Interventions

1. Resistance training: The training programme will last 8 weeks and comprise three supervised half-hour lower limb resistance training sessions per week. Training will take place on an isokinetic dynamometer (Cybex II Norm: CSMi, USA). Subjects will perform 5 sets of 30 maximal knee extensions performed at 180 degrees/sec. Sets will be separated by 1 minute rest. Both legs will be trained.

2. Protein supplementation: COPD patients will be randomly allocated to receive a dietary protein (with carbohydrate) supplement or placebo throughout training. Healthy volunteers will receive a placebo. The supplement will contain 19 g protein and 49 g carbohydrate (Vitargo® Gainers Gold: Swecarb, Sweden) made up to 500 ml of water. The placebo will be an identical volume non-nutritive and non-caloric drink. Supplementation will take place immediately following each training session, as the timing of protein intake appears to be critical.

Intervention Type

Mixed

Primary outcome(s)

Muscle gene and protein expression (vastus lateralis needle biopsy samples) at baseline, 24 hours, 4 weeks and 8 weeks.

Key secondary outcome(s)

1. Muscle strength (isometric and isokinetic quadriceps strength) at baseline, 4 weeks, 8 weeks and 6 months
2. Total body and quadriceps fat-free (muscle) mass (dual energy X-ray absorptiometry [DEXA]) at baseline, 4 weeks and 8 weeks
3. Circulating inflammatory cytokines (blood tests) at baseline, 24 hours, 4 weeks and 8 weeks
4. Whole-body exercise performance (incremental cycle ergometry test) at baseline and 8 weeks
5. Physical activity (questionnaire and activity monitor) at baseline and 8 weeks
6. Lung function and capillary blood gas tensions at baseline

Completion date

31/10/2010

Eligibility

Key inclusion criteria

For both COPD subjects and healthy control subjects:

1. Both males and females, aged between 50-85 years

COPD subjects:

1. Moderate-severe airflow obstruction (Forced expiratory volume in one second [FEV1] <50% predicted, FEV1/forced vital capacity [FVC] ratio <70%)
2. Reduced exercise tolerance (MRC grades III-V)
3. Stable
4. Able to carry out lower-limb resistance training

Healthy age-matched control subjects:

1. No evidence of airflow obstruction (FEV1 >80% predicted)
2. Able to carry out lower-limb resistance training

Participant type(s)

Mixed

Healthy volunteers allowed

No

Age group

Adult

Sex

All

Key exclusion criteria

COPD subjects:

1. Long-term oral corticosteroids
2. Anticoagulant therapy or disorders
3. long term oxygen therapy (LTOT)
4. Diabetes
5. Co-morbid conditions preventing exercise training
6. Subjects who have completed pulmonary rehabilitation in the previous 12-months

Healthy age-matched controls:

Same as for COPD subjects, also those who meet the criteria for fat-free mass depletion are excluded.

Date of first enrolment

14/02/2007

Date of final enrolment

31/10/2010

Locations

Countries of recruitment

United Kingdom

England

Study participating centre

Glenfield Hospital

Leicester

United Kingdom

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Sponsor information

Organisation

University Hospitals of Leicester NHS Trust (UK)

ROR

<https://ror.org/02fha3693>

Funder(s)

Funder type

Government

Funder Name

Medical Research Council (ref: G0501985; grant ID: 77170)

Alternative Name(s)

Medical Research Council (United Kingdom), UK Medical Research Council, Medical Research Committee and Advisory Council, MRC

Funding Body Type

Government organisation

Funding Body Subtype

National government

Location

United Kingdom

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?
Results article	results (inflammatory and satellite cells in the quadriceps)	01/11/2012		Yes	No
Results article	results (ultrasound assessment of lower limb muscle mass)	28/12/2012		Yes	No
Results article	results (ventilatory requirements of quadriceps resistance training)	05/06/2014		Yes	No

