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EFFect Of exercise on insulin ResisTance

Submission date	Recruitment status	[ ] Prospectively registered
01/07/2014	Stopped	[ ] Protocol
Registration date	**Overall study status**	[ ] Statistical analysis plan
21/07/2014	Stopped	[ ] Results
Last Edited	**Condition category**	[ ] Individual participant data
30/07/2019	Nutritional, Metabolic, Endocrine	[ ] Record updated in last year

Plain English summary of protocol

Background and study aims
Insulin is a hormone made by the pancreas. It helps us to take up glucose from the blood and into our body cells for energy. Insulin resistance happens when the amount of insulin is too high for a long period of time, causing the body to become more resistant to its effects. This means that the pancreas needs to produce an ever increasing amount of insulin in order to help glucose enter cells. People with insulin resistance (pre-diabetes) are at an increased risk of developing type 2 diabetes as the pancreas may eventually become unable to produce enough insulin to keep blood glucose levels at a healthy level. This causes excess glucose to build up in the blood, which, in turn, causes the disease. Exercise has been shown to lower insulin resistance, and therefore prevent people from developing type 2 diabetes, as it helps the body to use up excess insulin in the blood. The American Diabetes Association recommends at least 150 minutes per week of moderate to vigorous exercise to help prevent type 2 diabetes. The purpose of this study is to test the effect of exercise based on these recommendations on insulin resistance. The effect of a high intensity workout on insulin resistance will also be tested.

Who can participate?
People aged 18 to 75 years who do not routinely exercise and who are at risk of developing type 2 diabetes.

What does the study involve?
Participants are randomly allocated into one of two groups a current recommendations exercise group and or an intensive exercise group. Both groups of participants have 4 sessions of exercise over five days. Participants in the current recommendations exercise group walk for 40 minutes per session. Participants in the intensive exercise group walk for 10 minutes, then do some upper body resistance exercises for 10 minutes, repeating both steps 4 times. Fasting blood samples (blood taken after not eating or drinking anything other than water for 8 hours or more) are taken a few days before the exercise sessions start, the days of the exercise sessions themselves, and a few days afterwards. These blood samples are then analysed to see what effects the different types of exercises have on insulin resistance.

What are the possible benefits and risks of participating?
Exercise is in general considered low risk and is typically well tolerated. Most side effects from exercise are minor. However, for people who do not usually exercise, some of the risks can be larger. There is also a risk of undetected underlying medical conditions or disease, for example

heart disease, that might lead to more serious side effects of exercise; this is minimised as participants are checked for this before they start to exercise. Participants who have conditions that may make exercise unsafe do not take part in the study. All exercise sessions are supervised and occur at a clinical research facility.

Where is the study run from?
The Newcastle Upon Tyne Hospitals NHS Foundation Trust and the Central Manchester University Hospitals NHS Foundation Trust (UK)

When is the study starting and how long is it expected to run for?
May 2014 to November 2014

Who is funding the study?
Alere San Diego Inc. (USA)

Who is the main contact?
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Contact information

Type(s)
Scientific

Contact name
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Additional identifiers

EudraCT/CTIS number

IRAS number

ClinicalTrials.gov number
NCT01941277

Secondary identifying numbers
BSTE-0902

Study information

Scientific Title
Effect of exercise on insulin resistance: A multi-centre randomized interventional trial

Acronym
EFFORT

Study objectives
People with insulin resistance (IR) are at increased risk for developing type 2 diabetes; the condition is commonly referred to as pre-diabetes. Lifestyle changes, incorporating increased physical activity and weight loss can increase insulin sensitivity, with a corresponding decrease in IR, and prevent the development of type 2 diabetes. The American Diabetes Association (ADA) recommends at least 2.5 hours (150 minutes) per week of moderate to vigorous exercise to help prevent the onset of type 2 diabetes. Research supports that 30 minutes per day of moderate to high intensity exercise will prevent type 2 diabetes. This study will explore the immediate effects of four accumulative bouts of exercise (consistent with current recommendations), and higher levels of exercise on IR as measured by standard laboratory measures.

Ethics approval required
Old ethics approval format

Ethics approval(s)
NRES Committee North East - Newcastle & North Tyneside 1, 31/01/2014, Ref. 13/NE/0287

Study design
Multi-centre randomized interventional trial

Primary study design
Interventional

Secondary study design
Randomised controlled trial

Study setting(s)
Other

Study type(s)
Treatment

Participant information sheet
Not available in web format, please use the contact details below to request a patient information sheet

Health condition(s) or problem(s) studied
Insulin resistance (pre-diabetes)

Interventions
As of 03/09/2014 the status of this record was changed to 'stopped' due to sponsor strategic re-organisation. This study was officially stopped on the 22/08/2014.

This study will evaluate the effects of exercise consistent with current recommendations, and the effects of a more intense exercise intervention, on insulin resistance (IR). Subjects will be

randomized to the current recommendations exercise group or to the intensive exercise group in a 2:1 ratio. All participants will undertake four exercise sessions over five days. The current recommendation exercise group will undertake 40 minutes exercise at 50% VO2 Peak per session. The intensive exercise group will in each session undertake four bouts of ten minutes exercise at 50% VO2 Peak, with each bout interspersed by 10 minutes of upper body resistance exercises. Fasting blood draws will be obtained on a few days prior to the exercise sessions, on the days of the exercise sessions and on a few days after the exercise sessions. The total study participation is expected to last 4-6 weeks for each subject.

Intervention Type
Other

Phase
Not Applicable

Primary outcome measure
The primary objective of this study is to determine whether exercise consistent with current recommendations, in terms of weekly intensity and duration, can have a positive effect on insulin resistance (IR) in subjects with IR as measured by the Homeostasis Model of Assessment - Insulin Resistance (HOMA-IR). For the primary outcome, pre-exercise or baseline IR will be contrasted with post-exercise IR measurements within each subject. Up to six pre-exercise or baseline measurements, and up to four post-exercise IR measurements per subject will be obtained. The pre-exercise blood draws are obtained prior to the first exercise session and the post-exercise blood draws are obtained in the morning after an exercise session the previous day.

Secondary outcome measures
There are also research objectives in the study, including defining the day to day variability in measures of fasting IR and evaluating the effects of duration and/or intensity of exercise on changes in IR. These measures will be based on the pre- and post-exercise blood draws

Overall study start date
28/05/2014

Completion date
28/11/2014

Reason abandoned (if study stopped)
Lack of funding/sponsorship

Eligibility

Key inclusion criteria
1. Aged 18 to 75 years
2. Meets one of the three diagnostic criteria listed below (based on screening results or recorded result within one week of enrollment)
2.a. Fasting plasma or whole blood glucose (fasting defined as no caloric intake for at least 8 hours): 100 ¡Ü 125 mg/dL (6.0-6.9 mmol/L)
2.b. HbA1c of 5.7% - 6.4% (39 - 46 mmol/mol)
2.c. 2-hour plasma glucose of 140-199 mg/dL (7.8-11.0 mmol/L) during an OGTT (as described by

the WHO using a glucose load of 75 g anhydrous glucose dissolved in water)
3. No clinically significant adverse exercise response during the maximal graded exercise test

Participant type(s)
Patient

Age group
Adult

Lower age limit
18 Years

Sex
Both

Target number of participants
30

Key exclusion criteria
1. Weight loss diet program or weight change (>10%) within the past 6 months
2. Daily physical activity of >10,000 steps per day (as measured during the interval between visits 1 and 2)
3. Participates in deliberate structured exercise
4. Pregnant or intending to become pregnant
5. Cognitive or intellectual disability that prevents subject from providing informed consent or following protocol instructions.
6. Unwillingness to participate in all study procedures
7. Inability to give blood through multiple venous phlebotomies or to have an intravenous catheter
8. BMI greater than 40 kg/m2
9. Concurrent participation in another lifestyle modification trial
10. Diagnosis of diabetes based on any one of the following criteria:
10.a. Fasting plasma or whole blood glucose ¡Ý 126 mg/dL (7 mmol/L)
10.b. HbA1c of >6.5% (>47 mmol/mol)
10.c. 2-hour plasma glucose ¡Ý 200 mg/dL (11.1 mmol/L) during an OGTT
11. Any pre-existing or newly discovered medical condition that is deemed likely to put the subject at risk of injury during this trial. This may include but is not limited to:
11.a. Clinically relevant vascular or cerebrovascular event (e.g. stroke, recurrent transient ischemic attack (TIA), deep venous thrombosis or intracardiac thrombi, clinically significant edema within the previous 6 months
11.b. Current use of anti-psychotic, anti-convulsant, anti-coagulant, sedative medication, or cognition-enhancing medications
11.c. Current use of beta blockers (beta-adrenergic blocking agents)
11.d. Current or previous use (within the past year) of the following medications: diabetes related medications or insulin; metformin; growth hormone; glucagon; dipeptidyl peptidase-4 (DPP-4) inhibitors (saxagliptin, stigagliptin); glucagon-Like Peptide-1(GLP-1) mimetics (exenatide, liraglutide); sulfonylurea medication or other potential confounding medications
11.e. Medical conditon which predetermines insulin resistance (e.g. Marfan syndrome / severe Polycystic ovary syndrome (PCOS) / Cushing syndrome etc.).
11.f. Fasting triglycerides > 1000 mg/dL

Date of first enrolment
28/05/2014

Date of final enrolment
28/11/2014

Locations

Countries of recruitment
England

United Kingdom

Study participating centre
MoveLab, 4th Floor, William Leech Building
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Sponsor information

Organisation
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Sponsor type
Industry

ROR
https://ror.org/01zt0tq34

Funder(s)

Funder type
Industry

Funder Name
Alere

Alternative Name(s)

Funding Body Type
Private sector organisation

Funding Body Subtype
For-profit companies (industry)

Location
United States of America

Results and Publications

Publication and dissemination plan
Not provided at time of registration

Intention to publish date

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?
HRA research summary			28/06/2023	No	No