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Ingrained health

Submission date
11/07/2014

Recruitment status
No longer recruiting

Registration date
13/08/2014

Overall study status
Completed

Last Edited
13/08/2020

Condition category
Circulatory System

[ ] Prospectively registered
[ ] Protocol
[ ] Statistical analysis plan
[ ] Results
[ ] Individual participant data
[ ] Record updated in last year

Plain English summary of protocol

Background and study aims
There is a lot of evidence to suggest that eating more wholegrain foods, for example millet, brown rice and oatmeal, reduces the risk of developing several diseases including cardiovascular disease (e.g. heart disease), type 2 diabetes and some cancers. This had led to a dietary recommendation of eating 48g of whole grains being suggested in the United States and 75g per day being recommended in Denmark. In other European countries, there is no specific dietary recommendation, but it is recognized that whole grains should be an important part of a healthy diet. Although the epidemiological evidence is strong, results from studies that compare different diets (intervention studies) have been more varied. Some studies have shown a whole grain diet as beneficial, others have not. This means that, at the moment, no definite conclusions regarding the protective role of whole grains against disease can be made. In particular, the amount of whole grains that should be eaten in order to get any health benefits is not proven, with estimates ranging from as little as one to more than three servings per day. We have already carried out two large intervention studies looking at including whole grains in the diet. One study, the WHOLEheart study, showed no beneficial effects of eating whole grains, but the amount of whole grain being eaten was not well controlled and the participants ate mixtures of grains (wheat, rice and rye). In our second study, the GrainMark study, the amount of whole grain being eaten was much better controlled and the participants ate only wholegrain wheat or wholegrain rye foods. This time, there was significant improvements in cholesterol levels and blood pressure, but, as the study did not include a control group (a group of participants that did not eat a whole grain diet) we cannot say for sure that these improvements were due to the whole grains. This study is a third whole grain intervention study, building on previous experiences, using a gold standard experimental design developed to reduce the variability of the whole grains being eaten, to ensure a substantial increase in the amount of whole grains being eaten compared to the average in the UK and to improve statistical robustness.

Who can participate?
Generally healthy nonsmoking men and women aged between 40-70, with a BMI between 25 and 35 kg/m2, slightly increased blood pressure and slightly increased cholesterol levels.

What does the study involve?
Participants are asked not to eat any wholegrain foods for the four weeks leading up to the start of the study. After this washout period they are randomly allocated into one of two groups. Those in group 1 are given a wholegrain bread and breakfast cereal to eat in place of that they

normally eat and asked to eat 4 servings per day if a woman and 6 servings a day if a man for 4 weeks. One serving is equal to one slice of bread or half a bowl of cereal. Those participants in group 2 are given similar instructions but are given bread and breakfast cereal made from refined wheat. After the 4 weeks, all participants are asked to not eat wholegrain foods for a further 4 weeks before swapping diets. This means that those in group 1 now eat the refined bread and cereal and group 2 the wholegrain foods for the last 4 weeks of the study. Urine and blood samples from each participant are taken at 4-weekly intervals throughout the trial. On the evening before samples are collected, each participant is asked to eat a supplied standard meal and then fast from 9pm. Height, weight, waist, hip, body fat and blood pressure measurements are also taken throughout the trial and the participant asked to fill in questionnaires.

What are the possible benefits and risks of participating?
If any abnormalities of significance are discovered while measuring their cholesterol, blood pressure or blood glucose levels, the participant and their GP are told so that appropriate steps can be made. Taking blood samples can cause minor discomfort and bruising. If a new diagnosis of high blood pressure is made, however, this could affect a person's future life or private medical insurance.

Where is the study run from?
The Clinical Research Facility, Royal Victoria Infirmary (Newcastle)

When is the study starting and how long is it expected to run for?
June 2014 to June 2015

Who is funding the study?
Cereal Partners Worldwide (Switzerland)

Who is the main contact?
Prof. Chris Seal
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Contact information

Type(s)
Scientific

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Additional identifiers

Protocol serial number
013.WG wheat and heart health.UK.2013

Study information

Scientific Title
Wholegrain wheat and cardiovascular health

Study objectives
The proposed research is a dietary intervention study to investigate the health benefits of increased consumption of wholegrain wheat. There is strong evidence from observational (epidemiological) studies to suggest that consumption of wholegrain foods is beneficial in reducing the risk of heart disease, although evidence from intervention studies is more mixed. The aim of this study is to investigate the impact of consuming whole and refined wheat products on markers of cardiovascular disease. The objective is to carry out a controlled 16 week dietary intervention in crossover design to investigate the effects of consuming whole and refined grain wheat products in equal amounts on cardiovascular disease risk factors, in particular LDL cholesterol concentration. The purpose is to provide evidence to support public health messages to increase consumption of wholegrain foods.

Ethics approval required
Old ethics approval format

Ethics approval(s)
London city and east NHS research committee, 20/12/2013, ref. 13/LO/1883

Primary study design
Interventional

Study design
Randomised crossover dietary intervention

Study type(s)
Prevention

Health condition(s) or problem(s) studied
Cardiovascular health

Interventions
Participants will first be asked to avoid wholegrain foods for 4 weeks. They will then be randomly allocated into one of two groups.
1. Participants will be provided with wholegrain bread and cereals to consume for 4 weeks.
2. Participants will be provided refined grain bread and cereals to consume for 4 weeks.
They will then be a "wash out" period, where participants are asked to avoid whole grain foods for another 4 weeks. They then "swap over" to the other group - so that group 1 now eats the refined grain foods and group 2, the wholegrain foods, for a further 4 weeks.

Intervention Type
Other

Phase
Not Applicable

Primary outcome(s)
1. Resting blood pressure, measured at screening visit and 0, 4, 6, 8, 12, 14, 16 weeks
2. 24 hour blood pressure, measured at screening visit and 0, 4, 8, 12, 16 weeks
3. Lipid profile, measured at screening visit and 0, 4, 8, 12, 16 weeks

Key secondary outcome(s)
1. Metabolites of alkylresorcinols in urine as biomarkers of whole grain intake:
1.1. Venous blood samples for C17, C19, C21, C23, C24 alkylresorcinols at screening visit and 0, 4, 8, 12, 16 weeks
1.2. 24 hour urine and spot urine samples for 3,5 dihydroxybenzoic acid (DHBA) and 3,5-dihydroxyphenylpropionoic acid (DHPPA) at screening visit and 0, 4, 8, 12, 16 weeks
2. Plasma concentrations of alkylresorcinols as biomarkers for whole grain intake:
2.1. Venous blood samples at screening visit and 0, 4, 8, 12, 16 weeks
3. The impact on plasma biomarkers of CVD risk:
3.1. Intercellular adhesion molecule-1, vascular cell adhesion molecule-1, E-selectin at screening visit and 0, 4, 8, 12, 16 weeks
3.2. Anthropometric measures including weight, waist circumference, body composition and BMI
3.3. Anthropometric measurements: height (at screening visit only), weight, body mass index, body composition by bioelectrical impedance, waist and hip measurements at screening visit and 0, 4, 8, 12, 16 weeks
4. Diet acceptance:
4.1. Digestive health questionnaire at screening visit and 0, 4, 8, 12, 16 weeks
4.2. Food frequency questionnaire at screening visit and 0, 2, 4, 6, 8, 10, 12, 14, 16 weeks

Completion date
01/06/2015

Eligibility

Key inclusion criteria
1. Aged 40-70 years
2. Generally healthy subjects, as determined by clinical examination and medical history
3. BMI between 25 and 35 kg/m2
4. Slightly elevated blood pressure after 5 minutes supine position (systolic blood pressure >120mmHg)
5. Mildly elevated plasma cholesterol (> 5.5mM)
6. Non smoking

Participant type(s)
Patient

Healthy volunteers allowed
No

Age group
Adult

Sex
All

Key exclusion criteria
1. Known allergy to study (wheatbased) foods
2. History of metabolic disease (i.e.diabetes, cardiovascular disease) relevant for drug treatment
3. Chronic renal insufficiency
4. Local or general treatment (i.e. prescription medications, overthecounter medications, dietary supplements or herbal supplements) known to interfere with the evaluation of the studied parameters
5. Subject having had a general anaesthesia in the month preceding inclusion, or gastrointestinal surgery
6. Pregnant or breastfeeding subject
7. Use of laxatives
8. Known allergies to cereals
9. Dislike of provided study foods

Date of first enrolment
01/06/2014

Date of final enrolment
01/06/2015

Locations

Countries of recruitment
United Kingdom

England

Study participating centre
Nu Food
Newcastle Upon Tyne
United Kingdom
NE1 7RU

Sponsor information

Organisation
Cereal Partners Worldwide (Switzerland)

Funder(s)

Funder type

Industry

Funder Name
Cereal Partners Worldwide (Switzerland)

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?
HRA research summary			28/06/2023	No	No
Participant information sheet	Participant information sheet	11/11/2025	11/11/2025	No	Yes
Study website	Study website	11/11/2025	11/11/2025	No	Yes