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WHolegrain and IMmunity study

Submission date
11/04/2013

Recruitment status
No longer recruiting

Registration date
20/05/2013

Overall study status
Completed

Last Edited
24/03/2015

Condition category
Circulatory System

[ ] Prospectively registered
[ ] Protocol
[ ] Statistical analysis plan
[X] Results
[ ] Individual participant data

Plain English summary of protocol

Background and study aims
Whole grain (WG) cereals are foods that include all three parts of the grain, i.e. the germ, which contains the seed, the endosperm, which contains starch and the outer hull, which contains the bran, in the same relative proportions as they exist in the intact grain. Examples of such foods are WG breakfast cereals, breads, pasta, rice and snacks (e.g. biscuits, crisp bread, oatcakes, and rice cakes).Studies have shown that WG cereals may reduce the risk of cardiovascular diseases, certain cancers, metabolic syndrome and type 2 diabetes. They have also been associated with reductions in BMI (Body Mass Index). Recent research has suggested that WG improves gut health by increasing the numbers of good bacteria in the gut. Increasing the numbers of good bacteria may have a beneficial impact on the immune system (protects the body against diseases). This is potentially important because as we get older, our immune system becomes weaker. Improving the number of good bacteria in the gut in middle-aged individuals may therefore make up for the age-related decline in immunity. The WHIM (Wholegrain and Immunity) study investigates the effect of consuming at least 80 g of WG per day on immune function and on the gut microbial population, in healthy, middle-aged men and women. This will tell us whether individuals gain any benefit from WG consumption in terms of the immune system and digestive health.

Who can participate?
Healthy, middle-aged (40-65 years old) men and women with a BMI ranging between 20 and 35, who have a habitual diet low in WG (i.e. less than 24 g per day).

What does the study involve?
Potential subjects will be asked to complete a dietary history questionnaire (Whole Grain Food Frequency Questionnaire) and have their height, weight, waist circumference, and blood pressure measured. A blood sample will be taken to check full blood count and haemoglobin to ensure they are not anaemic. Subjects who meet the study criteria will be enrolled into the study. Two weeks before the start of the study and throughout the study, they will be asked to refrain from consuming probiotic and prebiotic containing products, such as some dietary supplements, breakfast cereals and yoghurts. They will also be asked to keep a 3-Day Food Diary prior to starting the study so that we can assess normal diet in more detail. The design of the study is such that half of the participants will start with the WG diet for 6 weeks, followed by a 4-week washout and then followed by the refined grain diet for another 6 weeks. The other half will have the 6-week refined grain diet first followed by a 4-week washout and then by the 6-

week WG diet. This study involves 4 main visits over a 16-week period to the Hugh Sinclair Nutrition Unit at the University of Reading (week 0, 6, 10 and 16).
1. Intervention period of 6 weeks, during which subjects will be either asked to consume WG products and achieve a daily intake of at least 80 g of WG per day or to consume refined-grain products and maintain a daily intake of less than 16 g of WG per day.
2. A washout period of 4 weeks where subjects will consume their normal diet.
3. A second intervention period of 6 weeks, during which subjects will be either asked to consume refined-grain products and maintain a daily intake of less than 16 g of WG per day or to consume WG products and achieve a daily intake of at least 80 g of WG per day.
A blood sample (60 ml, which is 4 tablespoonfuls) will be collected, and subjects will be asked to provide a sample of saliva and faeces. The faecal sample is ideally collected on-site in purpose built facilities, but subjects will also have the option of collecting the sample at home on the morning of the study visit in a special container. Weight, blood pressure and waist circumference will also be measured. A 24-hour urine sample and a 24-hour faecal sample is also requested (unless there are practical or personal reasons why the latter would be difficult), which will have been collected during the day before the visit, in special containers, kept along with ice packs in isothermic bags. Subjects will also be required to visit the Hugh Sinclair Unit of Human Nutrition once every fortnight during each of the two 6-week intervention periods to collect the study foods. During those visits they will not be asked to give any biological samples, but to show the Diet Compliance Diary to the nutritionist, who in turn will offer advice on how to achieve and maintain a WG intake either higher than 80 g per day or lower than 16 g per day. During each of the two intervention periods of the study, subjects will be asked to complete a 3-Day Food Diary, a Diet Compliance Diary and a Gastrointestinal Wellbeing Diary (also used to record any use of medication, or adverse events). Diaries are provided at weeks 0 and 10 (i.e. at the beginning of each intervention period) and returned on visits at weeks 6 and 16 (i.e. at the end of each intervention period).The samples collected will be used by trained researchers to assess markers of immune function. The antibody content of saliva samples will be measured. Faecal samples will be assessed for changes in gut bacteria.

What are the possible benefits and risks of participating?
The foods which will be used for the study are all commercially available and thus do not pose any risks. However, foods rich in WG also have high fibre content. Generally, dietary fibre in the gut absorbs water and increases the bulk and softness of the stools. Some people find that increased fibre intake results in more than usual flatulence, bloating, diarrhoea, or possibly constipation. The latter is usually noted when fluid intake is low. Thus, constipation can be minimised or avoided if the increase in fibre intake is accompanied by an increase in fluid intake.

Where is the study run from?
Hugh Sinclair Nutrition Unit at the University of Reading.

When is the study starting and how long is it expected to run for?
The study started in March 2011 and is expected to finish in May 2013.

Who is funding the study?
Cereal Partners, Switzerland

Who is the main contact?
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Contact information

Type(s)
Scientific

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Additional identifiers

Protocol serial number
11/07

Study information

Scientific Title
Effect of a wholegrain diet on markers of immune function, inflammation, glucose metabolism and gut health

Acronym
WHIM

Study objectives
Consumption of a wholegrain-rich diet by habitual non-consumers of wholegrain will have a beneficial effect on markers of immune function, inflammation, glucose metabolism and gut health.

Ethics approval required
Old ethics approval format

Ethics approval(s)
University of Reading Research Ethics Committee (11/07), approved 1st March 2011

Study design
Randomised placebo-controlled crossover study

Primary study design
Interventional

Study type(s)
Screening

Health condition(s) or problem(s) studied
Cardiovascular health, gut health, inflammation

Interventions
Wholegrain foods vs refined grain foods

1. Intervention period of 6 weeks, during which subjects will be either asked to consume WG products and achieve a daily intake of at least 80 g of WG per day or to consume refined-grain products and maintain a daily intake of less than 16 g of WG per day
2. A washout period of 4 weeks where subjects will consume their normal diet.
3. A second intervention period of 6 weeks, during which subjects will be either asked to consume refined-grain products and maintain a daily intake of less than 16 g of WG per day or to consume WG products and achieve a daily intake of at least 80 g of WG per day.

Intervention Type
Other

Phase
Not Applicable

Primary outcome(s)
1. Dietary intake assessed by questionnaire (daily during intervention)
2. Gut health assessed by questionnaire and microbiological analysis of stool samples (beginning and end of each arm of intervention)
3. Immune cell function (phagocytosis, natural killer cell activity, T cell activation) assessed by flow cytometry (beginning and end of each arm of intervention)

Key secondary outcome(s))
1. Salivary IgA levels assessed by ELISA (beginning and end of each arm of intervention)
2. Blood lipids, glucose and insulin assessed by automatic analyser (beginning and end of each arm of intervention)
3. Plasma alkylresorcinols analysed by sponsor (beginning and end of each arm of intervention)
4. Inflammatory and metabolic markers analysed by Luminex (beginning and end of each arm of intervention)

Completion date
31/05/2013

Eligibility

Key inclusion criteria
1. Healthy
2. Age 40-65y
3. Not on prescribed medication
4. Body mass index between 20 and 35
5. Low habitual consumption of wholegrain (<24g/d or 1.5 servings)

Participant type(s)
Patient

Healthy volunteers allowed
No

Age group
Adult

Sex
All

Key exclusion criteria
1. Diabetes, heart problems, stroke, vascular disease, inflammatory disease, renal/bowel/liver disease, pancreatitis
2. Any prescribed medication (including aspirin)
3. Asthma
4. Allergies
5. Smoking
6. Vegan
7. Eating out >3 times per week
8. On fish oil or other supplements
9. History of alcohol misuse
10. Consumption of alcohol of >21 units for men or >15 units for women
11. On weight-reducing diets
12. Intense aerobic exercise more than 3x per week
13. Participating in another clinical trial
12. Regular travel
13. Flu vaccination in previous 12 months or planned vaccination during next 12 months
14. Prebiotic or probiotics or antibiotics for 3 months prior

Date of first enrolment
14/03/2011

Date of final enrolment
31/05/2013

Locations

Countries of recruitment
United Kingdom

England

Study participating centre
Department of Food & Nutritional Sciences
Reading
United Kingdom
RG6 6AP

Sponsor information

Organisation
Cereal Partners Worldwide (Switzerland)

Funder(s)

Funder type
Industry

Funder Name
Cereal Partners (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?
Results article	results	01/02/2015		Yes	No