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Evaluation of a urinary test to assess vitamin B12 status in older people

Submission date
07/10/2011

Recruitment status
No longer recruiting

Registration date
28/11/2011

Overall study status
Completed

Last Edited
17/07/2015

Condition category
Nutritional, Metabolic, Endocrine

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

Plain English summary of protocol

Background and study aims
Surveys of the diets and nutritional well-being of the UK population show that vitamin B12 status, measured as plasma B12 concentration, deteriorates as people age. Poor vitamin B12 status has various adverse health outcomes, including anaemia, impaired functioning of the nervous system and cognitive impairment (increased absent-mindedness that is related to age), all of which are a particular concern among the elderly. In an aging population these numbers are destined to increase, with consequences on healthcare and society. An additional public health concern relates to the fact that poor vitamin B12 status may not be so readily detected should the fortification of flour with folic acid be made a legal requirement in the UK. Vitamin B12 status is usually determined by measuring plasma B12 concentration and many studies have suggested that this has important limitations. Low plasma vitamin B12 concentrations are not always reflective of poor B12 status, and patients with clinical evidence of B12 deficiency do not always have low plasma B12 concentrations. It is important to have a robust system in place for monitoring B12 insufficiency, particularly of the elderly population, and therefore it is timely to re-examine the limitations of the method in current use. Methylmalonic acid (MMA) is a compound that is produced in cells when there is inadequate vitamin B12 available for the normal functioning of the cell. This is reflected in an increased concentration of MMA in the plasma and the urine. This compound is excreted very efficiently by the kidney, which concentrates the metabolite in the urine, making it a potentially more sensitive indicator of low tissue levels than plasma concentration. Therefore urinary MMA may be a good early indicator of poor vitamin B12 status.
Despite the potential value of urinary MMA, this measurement has never been rigorously evaluated as a functional biomarker of vitamin B12 status. In particular there has been no attempt to examine how the amount of MMA in the urine changes when vitamin B12 in the diet increases. The objective of our study is to look at those factors which may influence the amount of MMA in the urine in an elderly population.

Who can participate?
You can take part if you are aged 65-85 and are healthy.

What does the study involve?
You will be asked to attend the Clinical Research Facility on one occasion and give a small sample

of blood and urine. Your height and weight will also be measured. You will be visited in your home to complete a lifestyle questionnaire and food diary.

What are the possible benefits and risks of participating?
There is no intended personal benefit from taking part in the study, although the results will be extremely important to help develop a better measure of vitamin B12. You may experience some brief discomfort during the blood collection.

Where is the study run from?
Human Nutrition Unit, University of Sheffield (UK).

When is the study starting and how long is it expected to run for?
The study will be running for two years starting in January 2008. It is anticipated that recruitment will be complete by October 2009.

Who is funding the study?
The Food Standards Agency (FSA), London (UK).

Who is the main contact?
Prof Hilary Powers
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Contact information

Type(s)
Scientific

Contact name
Prof Hilary Powers

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Additional identifiers

Protocol serial number
N05077

Study information

Scientific Title

Urinary MethylMalonic Acid (MMA): a functional biomarker of B12 status applicable to large scale surveys: Part 1 - the cross sectional study

Acronym
UMMA 1

Study objectives
Urinary methylmalonic acid (MMA) is a robust, sensitive functional biomarker of vitamin B12 status that can be used in large scale surveys

Ethics approval required
Old ethics approval format

Ethics approval(s)
South Sheffield Research Ethics Committee (NHS), 07/04/2008, ref: 08/H1309/4

Study design
Cross-sectional study

Primary study design
Observational

Study type(s)
Diagnostic

Health condition(s) or problem(s) studied
Public health/nutrition particularly in older people; B12 deficiency

Interventions
Men and women aged 65 to 85, with no clinical evidence of vitamin B12 deficiency, will be recruited from GP practices in the Sheffield area. They will be asked to supply a small blood sample for the measurement of plasma B12, plasma cystatin, pepsinogen and plasma transcobalamin, as well as a full blood count. Urine samples will be collected for methylmalonic acid (MMA) and creatinine measurements. Participants will also complete a lifestyle questionnaire and four day food diary. The purpose of the study is to assess the demographic, clinical and lifestyle determinants of urinary MMA concentrations. This study will also identify participants eligible for the intervention study.

Intervention Type
Other

Phase
Not Applicable

Primary outcome(s)
Urinary methylmalonic acid corrected for urinary creatinine

Key secondary outcome(s))
1. Serum holotranscobalamin
2. Plasma vitamin B12

3. Plasma pepsinogen I
4. Full Blood Count
5. Plasma cystatin
6. Dietary assessment
7. Lifestyle questionnaire

Completion date
30/12/2009

Eligibility

Key inclusion criteria
1. Men and women (aged 65 to 85)
2. Healthy

Participant type(s)
Patient

Healthy volunteers allowed
No

Age group
Senior

Sex
All

Key exclusion criteria
1. Severe cognitive impairment
2. Gastric or ileal surgery
3. Regular vitamin B12 injections

Date of first enrolment
01/01/2008

Date of final enrolment
01/10/2009

Locations

Countries of recruitment
United Kingdom

England

Study participating centre
University of Sheffield
Sheffield

United Kingdom
S10 2RX

Sponsor information

Organisation
University of Sheffield (UK)

ROR
https://ror.org/05krs5044

Funder(s)

Funder type
Government

Funder Name
Food Standards Agency

Alternative Name(s)
The Food Standards Agency, FSA

Funding Body Type
Private sector organisation

Funding Body Subtype
Other non-profit organizations

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				

Results article		01/03/2012		Yes	No
Participant information sheet	Participant information sheet	11/11/2025	11/11/2025	No	Yes