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# Ketogenic diets as an adjuvant therapy in glioblastoma (the KEATING trial)

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|---|---|---|
| **Submission date**<br>13/03/2017 | **Recruitment status**<br>No longer recruiting | [X] Prospectively registered<br>[X] Protocol<br>[_] Statistical analysis plan<br>[X] Results<br>[_] Individual participant data |
| **Registration date**<br>13/03/2017 | **Overall study status**<br>Completed | |
| **Last Edited**<br>14/04/2021 | **Condition category**<br>Cancer | |

**Plain English summary of protocol**
https://www.cancerresearchuk.org/about-cancer/find-a-clinical-trial/a-study-comparing-types-of-ketogenic-diet-in-people-with-glioblastoma-keating

## Contact information

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Public

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# Additional identifiers

### EudraCT/CTIS number

### IRAS number

### ClinicalTrials.gov number
NCT03075514

### Secondary identifying numbers
33354

# Study information

### Scientific Title
Ketogenic diets as an adjuvant therapy In glioblastoma: a randomised pilot study

### Acronym
KEATING

### Study objectives
The aim of this study is to investigate protocol feasibility and patient impact by comparing two ketogenic diets in an NHS setting, with a view to informing future phase III clinical trials.

### Ethics approval required
Old ethics approval format

### Ethics approval(s)
North West, Greater Manchester West Research Ethics Committee, 13/01/2017, ref: 17/NW/0013

### Study design
Randomised; Interventional; Design type: Treatment, Dietary

### Primary study design
Interventional

### Secondary study design
Randomised controlled trial

### Study setting(s)
Hospital

### Study type(s)
Treatment

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

## Health condition(s) or problem(s) studied
Glioblastoma

## Interventions
Added 04/01/2018:
An information study is embedded into KEATING, with the aim of identifying recruitment challenges and aid understanding of the patients' recruitment experience, by interviewing a sub-sample of patients and their relatives/ carers. This will enable the design of bespoke strategies to optimise recruitment to future trials related to ketogenic diets and gliomas.

From 31/08/2017:
Two types of ketogenic diets will be compared: the Modified Ketogenic Diet (MKD) and the Medium Chain Triglyceride (MCT) Ketogenic Diet. Patients will be randomly assigned to a diet via a permuted block randomisation method.
Both diets are high in fat and low in carbohydrates, but contain different types and amounts of fat. The MKD is 80% fat (predominantly long chain fatty acids) and 5% carbohydrate, whilst the MCT diet is 75% fat (30% of which is from medium chain fatty acids) and 10% carbohydrate. The MCT fats in this case are to be consumed through the inclusion of a nutritional supplement/ drink (Betaquik, Vitaflo International Ltd). Both diets will be calculated and supervised by a dietitian.
Patients will commence the diet up to four months post surgical resection or biopsy, prior to receiving/ whilst receiving/ after receiving oncological treatments (radiotherapy, chemotherapy or chemoradiotherapy) and follow the diet for 3 months initially (primary completion). After this period if they wish to continue with the diet follow up will be offered for 12 months (secondary completion).

Before 31/08/2017:
Two types of ketogenic diets will be compared: the Modified Ketogenic Diet (MKD) and the Medium Chain Triglyceride (MCT) Ketogenic Diet. Patients will be randomly assigned to a diet via a permuted block randomisation method.
Both diets are high in fat and low in carbohydrates, but contain different types and amounts of fat. The MKD is 80% fat (predominantly long chain fatty acids) and 5% carbohydrate, whilst the MCT diet is 75% fat (30% of which is from medium chain fatty acids) and 10% carbohydrate. The MCT fats in this case are to be consumed through the inclusion of a nutritional supplement/ drink (Betaquik, Vitaflo International Ltd). Both diets will be calculated and supervised by a dietitian.
Patients will commence the diet post surgery, prior to commencing chemo/radiotherapy and follow the diet for 3 months initially (primary completion). After this period if they wish to continue with the diet follow up will be offered for 12 months (secondary completion).

## Intervention Type
Other

## Primary outcome measure
Retention rate is measured by recording:
1. The number of patients who start randomized treatment as a proportion of the number

randomized a 12 weeks
2. The number of patients who complete 12 months as a proportion of the number randomized
3. The time to dietary discontinuation
4. A description of barriers and facilitators to data collection and participant retention

## Secondary outcome measures

From 31/08/2017:

1. Recruitment rate is assessed by actual recruitment compared to proposed recruitment at 12 months
2.1 Enrolment of patients (consent, randomisation, baseline screening) prior to receiving oncological treatment(s) is assessed by number of patients initiated on diet prior to starting oncological treatment at 12 months
2.2 Enrolment of patients (consent, randomisation, baseline screening) whilst receiving oncological treatment(s) is assessed by number of patients initiated on diet whilst receiving oncological treatment at 12 months
Enrolment of patients (consent, randomisation, baseline screening) after receiving oncological treatment(s) is assessed by number of patients initiated on diet after completing oncological treatment at 12 months
3. Long term retention is assessed by time to dietary discontinuation after week 12
4. Dietary adjustments required to achieve ketosis is assessed by number of dietary adjustments to macronutrient composition of MCT and MKD diets required to achieve ketosis at 12 months
5. Dietary compliance is assessed by a self reported by compliance rate at 2 years and Analysed by comparing macronutrient content assessed via 3 day food diaries to advised macronutrient content at 12 months
6. MCT supplement compliance is assessed by dose of MCT taken compared to dose advised at 12 months
7. Ketosis levels are assessed by self reported urinary ketone levels twice daily for first 6 weeks then once per week thereafter and blood ketone and glucose levels weekly at 12 months
8. Dietetic time required for each intervention is assessed by dietetic time spent on clinical and non clinical activities relating to the trial at 12 months
9. Protocol refinements required are assessed by number of deviations from the protocol including reasons for deviations at 12 months
10. Data to inform sample size calculations of future trials is assessed by retention rates at 12 months
11. Completeness of data for all trial outcomes is assessed by number of complete data sets for all trial outcomes at 12 months

Patient impact objectives
1. Quality of life is assessed by change in quality of life assessed through EORTC QLQ C30 and BN 20 questionnaires at baseline and 12 months
2. Food acceptability is assessed by change in food acceptability assessed through food acceptability questionnaire at baseline and 12 months
3. Gastrointestinal side effects are assessed by number of reported gastrointestinal side effects assessed through EORTC QLQ C30 questionnaire and Common Terminology Criteria for Adverse Events at baseline and 12 months
4. Changes in biochemical markers are assessed by changes to biochemical markers (renal, bone, LFT, lipid profiles) during the duration of the diet at baseline and 12 months
5. Anthropometric changes are assessed by changes to anthropometry (weight, body mass index, fat mass, muscle circumference, hand grip strength) at baseline and 12 months

Before 31/08/2017:

1. Recruitment rate is assessed by actual recruitment compared to proposed recruitment at 12 months
2. Enrolment of patients (consent, randomisation, baseline screening) pre-chemoradiation is assessed by number of patients initiated on diet prior to starting chemoradiation treatment at 12 months
3. Long term retention is assessed by time to dietary discontinuation after week 12
4. Dietary adjustments required to achieve ketosis is assessed by number of dietary adjustments to macronutrient composition of MCT and MKD diets required to achieve ketosis at 12 months
5. Dietary compliance is assessed by a self reported by compliance rate at 2 years and Analysed by comparing macronutrient content assessed via 3 day food diaries to advised macronutrient content at 12 months
6. MCT supplement compliance is assessed by dose of MCT taken compared to dose advised at 12 months
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10. Data to inform sample size calculations of future trials is assessed by retention rates at 12 months
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Patient impact objectives
1. Quality of life is assessed by change in quality of life assessed through EORTC QLQ C30 and BN 20 questionnaires at baseline and 12 months
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### Overall study start date
01/07/2016

### Completion date
05/03/2019

# Eligibility

### Key inclusion criteria
From 31/08/2017:
1. Age 16 years and over
2. Patient at The Walton Centre NHS Foundation Trust
3. Performance status ≤2 (Sørensen et al., 1993)

4. Confirmed histological diagnosis of GB (WHO grade IV)
5. Undergone surgical resection or biopsy within the last 4 months and will go onto receive/ is currently receiving/ has received oncological treatment

Before 31/08/2017:
1. Age 16 years and over
2. Patient at The Walton Centre NHS Foundation Trust
3. Performance status ≤2 (Sørensen et al., 1993)
4. Confirmed histological diagnosis of GB (WHO grade IV)
5. Undergone surgical resection and will go onto receive chemoradiotherapy

## Participant type(s)
Patient

## Age group
Adult

## Lower age limit
16 Years

## Sex
Both

## Target number of participants
Planned Sample Size: 12; UK Sample Size: 12

## Total final enrolment
12

## Key exclusion criteria
From 31/08/2017:
1. Having prior use of a ketogenic diet
2. Kidney dysfunction
3. Liver dysfunction
4. Gall bladder dysfunction
5. Metabolic disorder
6. Eating disorder
7. Diabetes (requiring medication)
8. Body mass index (BMI) ≤18.5kg/m2
9. Weight loss medications
10. Currently pregnant or breastfeeding
11. Performance status ≥3

Before 31/08/2017:
1. Having prior use of a ketogenic diet
2. Kidney dysfunction
3. Liver dysfunction
4. Gall bladder dysfunction
5. Metabolic disorder
6. Eating disorder
7. Diabetes (requiring medication)

8. Body mass index (BMI) ≤18.5kg/m2
9. Weight loss medications
10. Pregnancy
11. Performance status ≥3

### Date of first enrolment
01/04/2017

### Date of final enrolment
09/02/2018

## Locations

### Countries of recruitment
England

United Kingdom

### Study participating centre
**The Walton Centre NHS Foundation Trust**
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## Sponsor information

### Organisation
University of Liverpool

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### Sponsor type
University/education

### ROR

https://ror.org/04xs57h96

# Funder(s)

**Funder type**
Industry

**Funder Name**
Vitaflo

**Alternative Name(s)**

**Funding Body Type**
Private sector organisation

**Funding Body Subtype**
For-profit companies (industry)

**Location**
United Kingdom

# Results and Publications

**Publication and dissemination plan**
The trial will be undertaken as part of a PhD programme at the University of Liverpool. Completion of a thesis is proposed for July 2019. Results of the trial will be published as soon as possible, in an appropriate peer reviewed journal and presented at appropriate conferences. The financial sponsor Vitaflo International Ltd will be acknowledged, however they will have no part in conducting or analysing the trial. A newsletter detailing the findings of the trial will be circulated to patients.

**Intention to publish date**
05/03/2020

**Individual participant data (IPD) sharing plan**
The current data sharing plans for the current study are unknown and will be made available at a later date.

**IPD sharing plan summary**
Data sharing statement to be made available at a later date

**Study outputs**

| Output type | Details | Date created | Date added | Peer reviewed? | Patient-facing? |
|---|---|---|---|---|---|
| Protocol article | protocol<br><br>results | 28/11/2017 | | Yes | No |

| | | | | |
|---|---|---|---|---|
| Results article | 01/03/2020 | 18/03/2020 | Yes | No |
| Plain English results | | 14/04/2021 | No | Yes |
| HRA research summary | | 28/06/2023 | No | No |