

HMB to improve functional status in people with liver cirrhosis

Submission date 25/01/2025	Recruitment status Recruiting	<input checked="" type="checkbox"/> Prospectively registered <input type="checkbox"/> Protocol
Registration date 08/05/2025	Overall study status Ongoing	<input type="checkbox"/> Statistical analysis plan <input type="checkbox"/> Results
Last Edited 08/12/2025	Condition category Digestive System	<input type="checkbox"/> Individual participant data <input checked="" type="checkbox"/> Record updated in last year

Plain English summary of protocol

Background and study aims

Cirrhosis is liver scarring, caused mainly by alcohol or fatty liver in the UK. People with cirrhosis have a poorer quality of life than healthy people. As cirrhosis worsens, they develop more symptoms and require hospital admissions. Cirrhosis causes over 75,000 admissions and costs the NHS £17 billion annually. A leaky gut, due to the breakdown of the gut lining, drives liver damage in cirrhosis. Changes in gut bacteria mean there are fewer bacteria that can break down fibre into short-chain fatty acids (SCFAs). SCFAs are important for the proper function of cells lining the gut. Without them the gut becomes leaky, letting parts of bacteria into the bloodstream leading directly to the liver. This triggers liver inflammation and scar formation. There are no treatments for liver scarring or leaky gut. Increasing gut SCFAs may be effective in treating cirrhosis by restoring the gut lining. HMB, a naturally occurring substance that is already available as a dietary supplement to increase muscle strength, also increases SCFA levels in the gut. In small test trials, HMB was safe and had only minor side effects in people with cirrhosis. We will conduct a trial of HMB compared to a dummy treatment (placebo) in 124 patients with cirrhosis from four hospital outpatient clinics in England.

Who can participate?

Patients aged 18 to 85 years with cirrhosis

What does the study involve?

Patients will be randomly allocated to HMB or placebo twice daily for 12 weeks and followed up for another 12 weeks. At the start and during the trial we will measure the Liver Frailty Index, a combination of strength and function tests, and measures of liver disease, quality of life and mental wellbeing. The researchers will consider the treatment effective if there is meaningful improvement in the Liver Frailty Index after 12 weeks of HMB compared to placebo.

What are the possible benefits and risks of participating?

If the study shows HMB is effective, the researchers will work with national societies and healthcare professionals to encourage the regular use of HMB in routine patient care without delay as it is cheap and widely available. If participants are allocated to the HMB group they might experience an improvement in their physical wellbeing, but they might not. If they are in the placebo group or do not benefit directly, their participation will help us learn more about

HMB as a treatment for liver cirrhosis. In this way, participation may benefit people with advanced cirrhosis in the future.

This trial is categorised as: Type A: No higher than the risk of standard medical care. HMB is a nutritional supplement that is available to the public for purchase without prescription or restriction at health food shops or online vendors. Participants will be monitored for adverse events during trial participation.

There is a risk of bleeding, infection and discomfort from additional blood samples being taken that are not standard of care. Venepuncture is a common procedure that will be carried out by appropriately trained staff at site only. Where routine bloods have been carried out in the 4 weeks before a visit to calculate Child-Pugh and MELD scores, these results may be used for trial data to minimise the amount of blood taken at each visit, where possible. Participants will be informed of risks associated with venepuncture in the PIS (e.g., discomfort, bruising, redness, fainting, vein puncture and swelling at the site where the needle goes in).

Where is the study run from?

Peninsula Clinical Trials Unit (UK)

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

January 2025 to January 2027

Who is funding the study?

Research for Patient Benefit Programme (UK)

Who is the main contact?

Kayle Sands, boost.penctu@plymouth.ac.uk

Contact information

Type(s)

Scientific

Contact name

Dr Muchineripi Kanengoni

Contact details

1 Roscoff Rise
Derriford
United Kingdom
PL6 5FP
+44 (0)1752 01752 432842
m.kanengoni1@nhs.net

Type(s)

Principal investigator

Contact name

Prof Ashwin Dhanda

Contact details

South West Liver Unit
Level 7

Derriford Hospital
Plymouth
United Kingdom
PL6 8DH
+44 (0)1752 432 723
ashwin.dhanda@plymouth.ac.uk

Type(s)

Public

Contact name

Ms Kayle-Anne Sands

Contact details

Peninsula Clinical Trials Unit
Faculty of Health
University of Plymouth
Express Diagnostics
6 Research Way
Plymouth Science Park
Plymouth
United Kingdom
PL6 8BU
+44 (0)1752 437513
boost.penctu@plymouth.ac.uk

Additional identifiers

Clinical Trials Information System (CTIS)

Nil known

Integrated Research Application System (IRAS)

1010060

Protocol serial number

23HEP856, CPMS 64115

Study information

Scientific Title

β -hydroxy β -methylbutyrate (HMB) supplementation to improve functional status in people with advanced liver cirrhosis: a multicentre double blind placebo-controlled randomised trial: BOOST

Acronym

BOOST

Study objectives

Current study objectives:

Primary objective:

Determine the clinical effectiveness of HMB supplementation to improve physical function as measured by the Liver Frailty Index.

Secondary objectives:

1. To determine the effect of HMB supplementation on:
 - 1.1. Liver disease severity measured by model for end-stage liver disease (MELD) score and Child-Pugh score
 - 1.2. Quality of life and mental wellbeing measured by Short Form-36 (SF-36) and Warwick-Edinburgh Mental Wellbeing Scale (WEMWBS)
 - 1.3. Rate of hospitalisation
 - 1.4. Rate of infections
 - 1.5. Cognitive function, measured by the Animal Naming Test
 - 1.6. Serum short-chain fatty acid concentrations
 - 1.7. Markers of gut permeability (LPS, LBP and D-lactate)
 - 1.8. Muscle mass measured by calf muscle circumference
2. To evaluate participant engagement with trial procedures and adherence to the intervention
3. To assess for contamination, measured by HMB supplement use
4. To assess the safety of intervention
5. To monitor changes in macronutrient intake, via 24-hour dietary recall

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 - 1.8. Muscle mass measured by calf muscle circumference
2. To evaluate participant engagement with trial procedures and adherence to the intervention
3. To assess for contamination, measured by dietary intake (macronutrient intake over the preceding 24 hours at baseline, week 12 and week 24) via Intake24 tool and HMB supplement use.
4. To assess the safety of intervention.

Ethics approval required

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Ethics approval(s)

approved 06/05/2025, North East - Newcastle & North Tyneside 1 Research Ethics Committee (2nd Floor, 2 Redman Place, Stratford, London, E20 1JQ, United Kingdom; +44 (0)207 104 8384; newcastlenorthtyneside1.rec@hra.nhs.uk), ref: 25/NE/0028

Study design

Double-blind randomized placebo-controlled trial

Primary study design

Interventional

Study type(s)

Efficacy, Safety

Health condition(s) or problem(s) studied

Advanced liver cirrhosis

Interventions

Current interventions as of 09/05/2025:

Intervention: 3 g of HMB (nutritional supplement) daily for 12 weeks, oral administration of 2 x 750 mg capsules twice daily

Matched placebo (maltodextrin)

Randomisation is via an online tool

Follow-up is 24 weeks post-baseline (12 weeks post-treatment).

Previous interventions:

Intervention: 3 g of HMB (nutritional supplement) daily for 12 weeks, oral administration of 3 x 500 mg capsules twice daily

Matched placebo (maltodextrin)

Randomisation is via an online tool

Follow-up is 24 weeks post-baseline (12 weeks post-treatment).

Intervention Type

Drug

Phase

Phase IV

Drug/device/biological/vaccine name(s)

Calcium beta-hydroxy-beta-methylbutyrate (CaHMB)

Primary outcome(s)

Clinical effectiveness of HMB to improve physical function measured by change in Liver Frailty Index at 12 weeks post-baseline*

*Note, LFI is measured at baseline, week 12 and week 24 but the primary outcome is baseline vs week 12

Key secondary outcome(s)

1. Quality of life measured using the SF-36 questionnaire at Baseline, Weeks 12 and 24
2. Mental wellbeing measured using the WEMWBS at Baseline, Weeks 12 and 24
3. Liver disease severity measured using the Child-Pugh score at Baseline, Weeks 12 and 24
4. Liver disease severity measured using the MELD score at Baseline, Weeks 12 and 24

5. Cognitive function measured using the animal naming test at Baseline, Weeks 12 and 24
6. Serum SCFA concentrations at Baseline, Weeks 12 and 24
7. LPS, LBP and D-lactate concentrations measured using blood test at Baseline, Weeks 12 and 24
8. Muscle mass measured by calf circumference, corrected for BMI and oedema, at Baseline, Weeks 12 and 24
9. Number, duration and diagnosis of any hospital admissions (self-reported) at Weeks 4, 12 and 24
10. Infections (self-reported and by primary/secondary care records) at Weeks 4, 12 and 24
11. Attendance to and completion of the final study visit (Week 24)
12. Self-report of medication adherence at Weeks 4 and 12
13. Medication adherence measured by pill count measured at Week 12
14. Dietary intake measured using a 24-hour food recall (total macronutrient intake/24 hours - protein, carbohydrate, fat, and fibre) at Baseline, Weeks 12 and 24
15. Contamination assessed by checking HMB supplement use at Baseline, Weeks 4, 12 and 24
16. Safety of intervention measured by adverse reactions and serious adverse events measured at Weeks 4, 12 and 24

Completion date

31/01/2027

Eligibility

Key inclusion criteria

Current inclusion criteria as of 09/05/2025:

1. Cirrhosis diagnosed by any of the following:
 - 1.1. Clinical features of cirrhosis as determined by an experienced clinician
 - 1.2. Radiological features on ultrasound or cross-sectional imaging
 - 1.3. Histological evidence of cirrhosis
 - 1.4. Fibrosis assessment by transient elastography with stiffness >15 kPa
2. Advanced cirrhosis defined as Child Pugh score of 7 or more (based on laboratory values and clinical assessment within the previous 6 months)
3. Evidence of portal hypertension within the previous 6 months defined by:
 - 3.1. Presence of ascites
 - 3.2. Presence of oesophageal or gastric varices
 - 3.3. Splenomegaly >13 cm in maximum diameter
 - 3.4. Episode of hepatic encephalopathy
4. Ability to provide informed consent to participate
5. Participant is ≥ 18 years and ≤ 85 years of age

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3.4. Episode of hepatic encephalopathy

4. Ability to provide informed consent to participate or, where the participant has hepatic encephalopathy, agreement is provided by a personal or professional representative

5. Participant is ≥ 18 years and ≤ 85 years of age

Participant type(s)

Patient

Healthy volunteers allowed

No

Age group

Mixed

Lower age limit

18 years

Upper age limit

85 years

Sex

All

Total final enrolment

0

Key exclusion criteria

Current exclusion criteria as of 09/05/2025:

1. Estimated prognosis limited to less than 6 months
2. Advanced hepatocellular carcinoma
3. The consumption of HMB, or products containing HMB, within the previous 4 weeks
4. Inability to complete the Liver Frailty Index
5. Liver transplant recipient
6. On the liver transplant waiting list or being considered or under assessment for liver transplant
7. Participant in any other interventional trial within previous 4 weeks
8. Previous history of poor engagement with clinical services, at the discretion of local PI
9. Previous history of hypersensitivity reactions or allergy to exogenous HMB supplements or any of its excipients

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Date of first enrolment

14/08/2025

Date of final enrolment

31/05/2026

Locations

Countries of recruitment

United Kingdom

England

Study participating centre**University Hospitals Plymouth NHS Trust**

Derriford Hospital

Derriford Road

Derriford

Plymouth

England

PL6 8DH

Study participating centre**Hull University Teaching Hospitals NHS Trust**

Hull Royal Infirmary

Anlaby Road

Hull

England

HU3 2JZ

Study participating centre**Liverpool University Hospitals NHS Foundation Trust**

Aintree University Hospital

Lower Ln

Fazakerley

Liverpool

England

L9 7AL

Study participating centre**Nottingham University Hospitals NHS Trust**

Trust Headquarters

Queens Medical Centre

Derby Road
Nottingham
England
NG7 2UH

Study participating centre
Royal Devon University Healthcare NHS Foundation Trust
Royal Devon University NHS Ft
Barrack Road
Exeter
England
EX2 5DW

Study participating centre
St George's University Hospitals NHS Foundation Trust
St George's Hospital
Blackshaw Road
Tooting
London
England
SW17 0QT

Study participating centre
NHS Greater Glasgow and Clyde
J B Russell House
Gartnavel Royal Hospital
1055 Great Western Road Glasgow
Glasgow
Scotland
G12 0XH

Study participating centre
The Royal Wolverhampton NHS Trust
New Cross Hospital
Wolverhampton Road
Heath Town
Wolverhampton
England
WV10 0QP

Study participating centre

Gateshead Health NHS Foundation Trust
Queen Elizabeth Hospital
Sheriff Hill
Gateshead
England
NE9 6SX

Study participating centre
Northern Lincolnshire and Goole NHS Foundation Trust
Diana Princess of Wales Hospital
Scartho Road
Grimsby
England
DN33 2BA

Sponsor information

Organisation

University Hospitals Plymouth NHS Trust

ROR

<https://ror.org/05x3jck08>

Funder(s)

Funder type

Government

Funder Name

Research for Patient Benefit Programme

Alternative Name(s)

NIHR Research for Patient Benefit Programme, Research for Patient Benefit (RfPB), The NIHR Research for Patient Benefit (RfPB), RfPB

Funding Body Type

Government organisation

Funding Body Subtype

National government

Location

United Kingdom

Results and Publications

Individual participant data (IPD) sharing plan

IPD sharing plan summary

Data sharing statement to be made available at a later date