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Safety, colonisation and immunogenicity following nasal inoculation with genetically modified Neisseria lactamica expressing Factor H binding protein and Neisseria adhesin A - a pilot controlled human infection study

Submission date 23/04/2026	**Recruitment status** Not yet recruiting	[X] Prospectively registered [X] Protocol [_] Statistical analysis plan [_] Results [_] Individual participant data [X] Record updated in last year
Registration date 08/05/2026	**Overall study status** Ongoing	
Last Edited 08/05/2026	**Condition category** Infections and Infestations	

Plain English summary of protocol

Background and study aims
This study is part of a research programme that aims to improve ways of protecting people from meningitis and sepsis caused by a bacterium called Neisseria meningitidis (Nmen). These are serious illnesses which mainly affect young children and adolescents both in the UK and globally, particularly in areas of Sub-Saharan Africa. Nmen meningitis and sepsis can rapidly cause death or serious disability, and improving strategies to prevent these illnesses is one pillar of the World Health Organisation vision “Defeating meningitis by 2030”.

Who can participate?
1. Challenge participants: Healthy adult volunteers aged 18-45 years
2. Contact participants: Bedroom sharers of challenge participants – healthy adult volunteers aged 18-55 years

What does the study involve?
This study involves a screening visit and then 7 study visits over 5 weeks. This is a controlled human infection study, which means that participants will be given a small dose of live bacteria, which are expected to be harmless. Participants (and contact participants, if applicable) will be required to follow infection control rules throughout the study and will be given a dose of antibiotic treatment at the end of the study.

What are the possible benefits and risks of participating?
It is unlikely that participants will benefit directly from this study. We hope that the information gained from this study will help inform the development of strategies to prevent meningitis and the associated serious illnesses in the future. Participants may gain some general information about their health as part of this study. Anticipated risks are bruising and tenderness at the site where the blood samples are taken from; inoculation may cause some irritation of the nose that

will disappear within a few seconds, and the antibiotic treatment (ciprofloxacin) may cause some side effects such as abdominal ache, diarrhoea, nausea, tiredness and headaches.

Where is the study run from?
The NIHR Clinical Research Facility at Southampton General Hospital (UK)

When is the study starting and how long is it expected to run for?
May 2025 to April 2036

Who is funding the study?
Medical Research Council (UK)

Who is the main contact?
Andrew Procter, andrew.procter@uhs.nhs.uk

Contact information

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Scientific, Public, Principal investigator

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Additional identifiers

Integrated Research Application System (IRAS)
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73046

Grant Code
MR/X019284/1

Study information

Scientific Title
Safety, colonisation and immunogenicity following nasal inoculation with genetically modified Neisseria lactamica expressing Factor H binding protein and Neisseria adhesin A - a pilot controlled human infection study

Acronym
GM-Nlac Study - Pilot

Study objectives
The co-primary objectives are:
1. To establish the safety of nasal inoculation of healthy adult participants with four strains of genetically modified Neisseria lactamica expressing FHbp and NadA
2. To demonstrate successful induction of nasopharyngeal colonisation following nasal inoculation with genetically modified Neisseria lactamica expressing FHbp and NadA

Ethics approval required
Ethics approval required

Ethics approval(s)

approved 15/04/2026, South Central - Oxford A Research Ethics Committee (2 Redman Place, Stratford, London, E20 1JQ, United Kingdom; -; oxforda.rec@hra.nhs.uk), ref: 26/SC/0072

Primary study design
Interventional

Allocation
N/A: single arm study

Masking
Open (masking not used)

Control
Uncontrolled

Assignment
Single

Purpose
Basic science

Study type(s)

Health condition(s) or problem(s) studied
Neisseria meningitidis, meningococcal meningitis, Neisseria lactamica

Interventions
This is a prospective, single-arm, open-label, controlled human infection model experiment in which 10 healthy adult volunteers will be nasally inoculated with 4xrNlac. This is a multi-strain challenge agent containing approximately equal doses of four genetically modified (GM) strains of Neisseria lactamica (Nlac), each expressing the meningococcal antigen Neisseria adhesin A (NadA) and one of four variants of the meningococcal antigen Factor H binding protein (FHbP) on its surface.

Following inoculation, participants will be followed up over 28 days to review safety, nasopharyngeal colonisation with the GM-Nlac strains and immunogenicity. A single dose of oral ciprofloxacin will be administered at day 28 with a final visit at day 30 to confirm clearance of colonisation. Bedroom contacts will be enrolled to look for transmission of the GM-Nlac strains.

Volunteers who receive an intranasal inoculum of 4xrNlac will be enrolled as "challenge participants”. Challenge participants will attend a screening visit to complete informed consent and medical screening; a pre-challenge visit approximately 5 days prior to inoculation; and a challenge visit at which they will receive the intranasal inoculum of 4xrNlac. Following inoculation, they will attend regular outpatient visits over 30 days to assess safety, colonisation and immunogenicity, with antibiotic administration to clear colonisation at day 28 post-inoculation, regardless of colonisation status.

To assess for any onward transmission of the GM strains, individuals who share a bedroom with challenge participants will be enrolled as "contact participants”. Contact participants will be screened and consented prior to inoculation of the challenge participant, with a maximum of one contact participant per challenge participant. Contact participants will attend for a single

visit at day 28 post-inoculation of the challenge participant, at which a throat swab will be taken to assess for colonisation with the GM-Nlac strains. Contact participants will also be screened for GM-Nlac colonisation at an additional visit if symptoms suggestive of respiratory or systemic infection occur during the study period or if they, or their corresponding challenge participant, withdraw prior to the end of the study. A single dose of ciprofloxacin will be administered for the contact participant to take home, and if the throat swab is positive for GM-Nlac then the contact participant will be instructed to take the ciprofloxacin and invited to a further visit to confirm clearance of colonisation.

The duration of involvement of challenge and contact participants in the study will be from the screening visit (up to 90 days prior to inoculation) until 30 days after inoculation.

Intervention Type
Biological/Vaccine

Phase
Not Applicable

Drug/device/biological/vaccine name(s)
Genetically modified Neisseria lactamica expressing Factor H binding protein and Neisseria adhesin A

Primary outcome(s)
1. Occurrence of solicited and unsolicited adverse events measured using participant reporting at throughout the study period

2. Occurrence of serious adverse event (SAEs) measured using participant reporting at throughout the study period

3. The proportion of challenge participants who have positive colonisation with any of the GM-Nlac strains measured using culture of N. lactamica from nasal wash and throat swab samples at days 4, 7, 14 and 28 post challenge

Key secondary outcome(s))
1. The proportion of previously colonised challenge or contact participants who have colonisation cleared by a single dose of ciprofloxacin, assessed by culture of N. lactamica from nasal wash and throat swab samples taken 24-48 hours following antibiotic administration
2. The proportion of contact participants of colonised challenge participants who become colonised with any of the GM-Nlac strains, assessed by culture of throat swab samples at the day 28 visit or any additional visits prior to the day 28 visit

Completion date
30/04/2036

Eligibility

Key inclusion criteria
The challenge participant must satisfy all the following inclusion criteria to be eligible for the study:
1. Healthy adults aged 18 to 45 years inclusive on the day of enrolment
2. Fully conversant in the English language

3. Able and willing (in the investigator's opinion) to comply with all study requirements
4. Able to correctly answer all questions in the pre-consent questionnaire
5. Provide written informed consent to participate in the study including agreement to abide by infection control guidelines during the study period
6. Provide written consent to allow the study team to discuss the participant's medical history with the General Practitioner and access electronic medical records
7. Written informed consent provided by any bedroom sharer who is eligible to be enrolled as a contact participant (if applicable)
8. For females of child-bearing potential, a negative pregnancy test on the days of screening and challenge
9. Use of continuous effective contraception during the study
10. Agreement to take antibiotic eradication therapy according to the study protocol
11. TOPS registration completed and no conflict found

The contact participant must satisfy all the following inclusion criteria to be eligible for the study:
1. Healthy adults aged 18 to 55 years inclusive on the day of enrolment
2. Fully conversant in the English language
3. Able and willing (in the investigator's opinion) to comply with all study requirements
4. Able to correctly answer all questions in the pre-consent questionnaire
5. Provide written informed consent to participate in the study including agreement to abide by infection control guidelines during the study period
6. Provide written consent to allow the study team to discuss the participant's medical history with the General Practitioner and access electronic medical records
7. For females of child-bearing potential, a negative pregnancy test on the days of screening and challenge
8. Use of continuous effective contraception during the study
9. Agreement to take antibiotic eradication therapy according to the study protocol
10. TOPS registration completed and no conflict found

Healthy volunteers allowed
Yes

Age group
Adult

Lower age limit
18 years

Upper age limit
55 years

Sex
All

Total final enrolment
0

Key exclusion criteria
The challenge participant may not enter the study if any of the following criteria apply:
1. Individuals who have a current infection at the time of inoculation

2. Use of systemic antibiotics within the period 30 days prior to inoculation
3. Current active smokers defined as having smoked or vaped in the week prior to inoculation
4. N. lactamica or N. meningitidis detected on throat swab or nasal wash taken at screening or at the pre-challenge visit
5. Individuals who have been challenged with wild-type or GM-Nlac in a previous controlled human infection study
6. Individuals who have received one or more doses of a meningococcus B vaccine (Bexsero or Trumenba)
7. History of allergy or intolerance to any component of the inoculum
8. Contraindications to the use of ciprofloxacin, specifically hypersensitivity to quinolones, a history of tendon disorders related to quinolone use, epilepsy, a personal or family history of aneurysm or congenital heart valve disease, and prolonged QT interval
9. Contraindications to the use of ceftriaxone, specifically known hypersensitivity to cephalosporins or severe penicillin allergies (e.g. anaphylaxis or Stevens Johnson Syndrome)
10. Any confirmed or suspected immunosuppressive or immune-deficient state, specifically terminal complement component deficiencies, eculizumab use, known HIV infection, malignancy, asplenia, recurrent severe infections and chronic (more than 14 days) immunosuppressant medication within the past 6 months (topical steroids are allowed)
11. Use of immunoglobulins or blood products within 3 months prior to enrolment
12. Household, close social or regular occupational contact with persons known to be immunosuppressed, specifically HIV infection with a CD4 count < 200 cells/mm^3, asplenia; any malignancy, recurrent, severe infections and chronic (more than 14 days) immunosuppressant medication within the past 6 months (topical steroids are allowed)
13. Household or regular occupational contact with children under 5 years or an older child with a tendency to co-sleep with the participant
14. Any abnormal finding on clinical examination or screening investigations assessed by the investigator to be clinically significant. In the event of abnormal test results, confirmatory repeat tests may be requested.
15. Pregnancy, lactation or intention to become pregnant during the study
16. Any other significant disease, disorder, or finding which may significantly increase the risk to the participant, affect their participation in the study or impair interpretation of the study data, for example recent surgery to the nasopharynx.

The contact participant may not enter the study if any of the following criteria apply:
1. Contraindications to the use of ciprofloxacin, specifically hypersensitivity to quinolones, a history of tendon disorders related to quinolone use, epilepsy, a personal or family history of aneurysm or congenital heart valve disease, and prolonged QT interval
2. Contraindications to the use of ceftriaxone, specifically known hypersensitivity to cephalosporins or severe penicillin allergies (e.g. anaphylaxis or Stevens Johnson Syndrome)
3. Any confirmed or suspected immunosuppressive or immune-deficient state, specifically terminal complement component deficiencies, eculizumab use, known HIV infection, malignancy, asplenia, recurrent severe infections and chronic (more than 14 days) immunosuppressant medication within the past 6 months (topical steroids are allowed)
4. Use of immunoglobulins or blood products within 3 months prior to enrolment
5. Household, close social or regular occupational contact with persons known to be immunosuppressed, specifically HIV infection with a CD4 count < 200 cells/mm^3, asplenia; any malignancy, recurrent, severe infections and chronic (more than 14 days) immunosuppressant medication within the past 6 months (topical steroids are allowed)
6. Household or regular occupational contact with children under 5 years or an older child with a tendency to co-sleep with the participant
7. Any abnormal finding on clinical examination or screening investigations, assessed by the investigator to be clinically significant. In the event of abnormal test results, confirmatory repeat

tests may be requested.
8. Pregnancy, lactation or intention to become pregnant during the study
9. Any other significant disease, disorder, or finding which may significantly increase the risk to the participant, affect their participation in the study or impair interpretation of the study data

Date of first enrolment
18/05/2026

Date of final enrolment
01/10/2026

Locations

Countries of recruitment
United Kingdom

England

Study participating centre
University Hospital Southampton NHS Foundation Trust
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Sponsor information

Organisation
University of Southampton

ROR
https://ror.org/01ryk1543

Funder(s)

Funder type
Government

Funder Name
Medical Research Council

Alternative Name(s)
Medical Research Council (United Kingdom), UK Medical Research Council, Medical Research Committee and Advisory Council, MRC

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

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Protocol file	version 1.2	29/03/2026	01/05/2026	No	No