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A trial of indocyanine green and near-infrared fluorescence in paediatric oncology surgery

Submission date
10/05/2024

Recruitment status
Recruiting

Registration date
10/09/2024

Overall study status
Ongoing

Last Edited
16/04/2025

Condition category
Cancer

[X] Prospectively registered
[_] Protocol
[_] Statistical analysis plan
[_] Results
[_] Individual participant data
[X] Record updated in last year

Plain English summary of protocol

Background and study aims
Surgery is a vital part of the treatment for many young people with cancer but does not always go as planned. Parts of the tumour can be left behind or missed and other organs can be damaged as the surgeon tries to get all the tumour out. The cancer may have also spread to the lymph nodes, which can be removed to look for disease. However, lymph nodes can be difficult to find. Sometimes tissue which looks like lymph nodes is removed but turns out not to be when checked under the microscope. This study aims to test if using a dye called Indocyanine Green (ICG) can help surgeons identify the tumour and lymph nodes during surgery. This is called fluorescent-guided surgery (FGS). ICG is a dye which becomes fluorescent when looked at with near-infrared light (NIR) from special cameras. It can be injected into the bloodstream before surgery and collects within the tumour. This means the surgeon can see exactly where the tumour is making it easier to remove all of it and limit damage to normal organs. ICG can also be injected directly into the tissue where the tumour is growing to see if it appears in lymph nodes nearby. This makes them easier to see and remove.

Who can participate?
Children and adults with a tumour located in their chest area, or in their abdomen (tummy), or a tumour which has spread to the lungs (pulmonary metastasis) which needs surgery.

What does the study involve?
Half of the patients will receive ICG, and half will not. The decision who gets the dye will be made at random by a computer. This is so that the results can show a difference (if there is one) which is not influenced by anyone. Patients with para-testicular rhabdomyosarcoma (pt-RMS) will all receive the ICG as this is a rare type of cancer and there will not be enough patients to split between two groups.

What are the possible benefits and risks of participating?
The results will show if using the dye (ICG) makes surgery easier, better, and safer. As ICG has been used in patients for over 65 years, it has a well-known pharmaceutical profile with allergic reaction being the main risk, however, this is a very low risk at less than 1 in 10,000 and patients with a known allergy to ICG will be excluded from entering the study. ICG is contraindicated in patients with hyperthyroidism and there is increased evidence of adverse events in patients with

renal insufficiency, therefore these patients are excluded from entering the study. There have also been reports of coronary artery spasm, for which the protocol contains the instruction to never inject ICG into the central line to mitigate. The effects of ICG on the unborn child and during breastfeeding are not known. Breastfeeding patients are excluded and patients must have a negative pregnancy test within 7 days of trial entry. Sexually active male and female patients of childbearing potential must agree to use adequate and highly effective contraception whilst on study.

Where is the study run from?
University of Birmingham (UK)

When is the study starting and how long is it expected to run for?
May 2024 to November 2026

Who is funding the study?
Little Princess Trust (UK)

Who is the main contact?
glosurgery@trials.bham.ac.uk

Contact information

Type(s)
Public

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Additional identifiers

Clinical Trials Information System (CTIS)
2024-514089-37

Integrated Research Application System (IRAS)
1008320

ClinicalTrials.gov (NCT)
Nil known

Protocol serial number
RG_23-026, CPMS 58544

Study information

Scientific Title
Indocyanine Green and near-infrared fLuorescence in paediatric Oncology surgery (GLO-Surgery)

Acronym
GLO-Surgery

Study objectives
Primary objectives:
1. To compare rates of microscopically negative margins (or volume of residual disease following neuroblastoma resection) in patients who have had surgery using indocyanine green and near-infrared fluorescence (ICG/NIRF) against those who have not had ICG/NIRF
2. To identify the number of lymph nodes removed in patients having a nephroureterectomy for renal cancer where surgery includes the use of ICG/NIRF for lymph node harvest and compare this data to those who have had the same surgery but without the use of ICG/NIRF
3. To identify the number of lymph nodes removed during retroperitoneal lymph node dissection (RPLND) for ptRMS in patients having ICG-guided nodal harvest

Secondary objectives:
1. Establish the safety of the dose
2. To identify the number and histopathological status of lymph nodes
3. Establish the efficacy of the dosing regimen with respect to degrees of fluorescence brightness in relation to non-fluorescent tissue
4. To compare rates of macroscopically negative margins in patients
5. To compare rates of surgical complications
6. To record surgeon satisfaction scores in patients randomised to receive ICG/NIRF

Ethics approval required
Ethics approval required

Ethics approval(s)
approved 24/07/2024, 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, +44 (0)2071048061, +44 (0)207 104 8077; newcastlenorthtyneside1.rec@hra.nhs.uk), ref: 24/NE/0098

Study design
Interventional randomized parallel-group controlled trial

Primary study design
Interventional

Study type(s)
Safety, Efficacy

Health condition(s) or problem(s) studied
Non-central nervous system solid tumours, or pulmonary metastasis, where complete resection by keyhole or open surgery is planned

Interventions
For patients having tumour margin analysis (Cohort 1): 0.5mg/kg of ICG will be injected intravenously during induction of anaesthesia, preferably immediately after the airway has been secured and with the agreement of the anaesthetist.

For patients having renal tumour lymph node assessment (cohort 2): 1 ml of 5 mg/mL ICG will be injected into normal renal parenchyma intra-operatively at a single point. The position of normal renal parenchyma can be defined by cognisance of the imaging, palpation and the use of ultrasound (where available) to guide the operator as to the injection site.

For patients having ptRMS nodal clearance (cohort 3): 2 ml of 5 mg/mL ICG will be injected into the remnant of the spermatic cord and vessels prior to proceeding with the nodal clearance surgery.

Control arm: Surgery performed as per standard of care using white light.

Patients in Cohorts 1 and 2 will be randomised to undergo surgery using ICG and NIRF (experimental arm) or to undergo surgery using standard white light conditions (standard arm). Patients in Cohort 3 undergoing retroperitoneal lymph node dissection (RPLND) will not be randomised because there are not enough patients undergoing this procedure to compare outcomes. Patients in this group will all receive surgery using ICG and NIRF. Follow-up will end 28 days following surgery.

Intervention Type
Drug

Phase
Phase II

Drug/device/biological/vaccine name(s)
Indocyanine green

Primary outcome(s)
Cohort 1: Microscopic margin status (positive/negative) as assessed by the local histopathologist
Microscopic positive margin: This is defined as the presence of tumour cells at the edge of the

resected specimen
Microscopic negative margin: This is defined as the absence of tumour cells at the edge of the resected specimen

For neuroblastoma:
Clearance will be assessed by volume (≤5 cc or >5 cc) of residual disease on routine post-operative cross-sectional imaging

Cohorts 2 and 3: Total number of nodes sampled

The evaluations will be done following surgery

Key secondary outcome(s))
Cohort 1: Macroscopic margin status (positive/negative) as assessed by the surgeon
Macroscopic positive margin: This is defined as the presence of viable disease at the edge of the resected specimen when viewed with the naked eye
Macroscopic negative margin: This is defined as the absence of viable disease at the edge of the resected specimen when viewed with the naked eye

Cohort 1: Volume (cc) of residual disease (neuroblastoma patients only)

Cohorts 2 and 3: Location of nodes sampled and results of histopathological assessment of lymph nodes

The evaluations will be done following surgery.

Completion date
01/11/2026

Eligibility

Key inclusion criteria
1. Intra-thoracic or intra-abdominal solid tumour or pulmonary metastasis planned to undergo complete surgical resection by keyhole (minimally invasive surgery/MIS) or open surgery
2. Documented negative pregnancy test for female patients of childbearing potential within 7 days of trial entry
3. Sexually active male and female patients of childbearing potential must agree to use adequate and highly effective contraception while on study drug up until discharge
4. Written informed consent from the patient, parent or guardian

Participant type(s)
Patient

Healthy volunteers allowed
No

Age group
Mixed

Sex
All

Key exclusion criteria
1. Allergic to ICG
2. Allergic to iodine or iodides
3. Due to receive radioactive iodine as part of treatment
4. Known hyperthyroidism
5. eGFR <15 ml/min/1.73 m²
6. Female patients who are breastfeeding
7. Neonates requiring exchange transfusion

Date of first enrolment
28/03/2025

Date of final enrolment
01/08/2026

Locations

Countries of recruitment
United Kingdom

England

Study participating centre
Birmingham Childrens Hospital
Steelhouse Lane
Birmingham
United Kingdom
B4 6NH

Sponsor information

Organisation
University of Birmingham

ROR
https://ror.org/03angcq70

Funder(s)

Funder type
Charity

Funder Name
Little Princess Trust

Alternative Name(s)
The Little Princess Trust, LPT

Funding Body Type
Private sector organisation

Funding Body Subtype
Trusts, charities, foundations (both public and private)

Location
United Kingdom

Results and Publications

Individual participant data (IPD) sharing plan
The CRCTU is committed to responsible and controlled sharing of anonymised clinical trial data with the wider research community to maximise potential patient benefit while protecting the privacy and confidentiality of trial participants. Data anonymised in compliance with the Information Commissioners Office requirements, using a procedure based on guidelines from the Medical Research Council (MRC) Methodology Hubs and Information Commissioners Office, will be available for sharing with researchers outside of the trials team within 6 months of the primary publication.
More detailed information on the CRCTU's Data Sharing Policy and the mechanism for obtaining data can be found on the CRCTU website: https://www.birmingham.ac.uk/research/activity/mds/trials/crctu/index.aspx.

The datasets generated during and/or analysed during the current study are/will be available upon request from glosurgery@trials.bham.ac.uk. Data anonymised in compliance with the Information Commissioners Office requirements, using a procedure based on guidelines from the Medical Research Council (MRC) Methodology Hubs and Information Commissioners Office, will be available for sharing with researchers outside of the trials team within 6 months of the primary publication. More information can be found here: https://www.birmingham.ac.uk/research/crctu/Data-sharing-policy.

IPD sharing plan summary
Available on request

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Participant information sheet	Participant information sheet	11/11/2025	11/11/2025	No	Yes