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Analysis of tissue samples from gastrointestinal disease screening patients using optical methods for development of a rapid-bedside sample triaging system to reduce pathology workloads

Submission date 14/06/2017	**Recruitment status** No longer recruiting	[ ] Prospectively registered [ ] Protocol
Registration date 20/06/2017	**Overall study status** Completed	[ ] Statistical analysis plan [ ] Results
Last Edited 13/03/2020	**Condition category** Digestive System	[ ] Individual participant data [ ] Record updated in last year

Plain English summary of protocol

Background and Study aims.
Pathology (the study of bodily tissues) forms a vital element of both cancer diagnostic and treatment pathways. An increasing demand, aging workforce, and lack of trainee professionals meet that pathology laboratories nationwide increasingly struggling to meet demand. At least 90% of cancer biopsy specimens (samples) collected are healthy or benign (harmless), with analysis of healthy tissue samples contributing to 75% of the pathology workflow. BeamLine is developing a biopsy triaging system, Solas, which aims to reduce the total number of samples within the pathological workflow. Solas uses a technique called infrared spectroscopy (which uses infrared light to analyse cells) analysis to predict the likelihood of whether a sample is healthy or diseased. Solas has been developed for gastroenterology (gut) pathology and can identify healthy samples with high accuracy within seconds. The aim of this study is to find out whether Solas can be used to distinguish healthy and benign tissue specimens from diseased tissue specimens, specifically from the food pipe (oesophagus) and intestine (colon).

Who can participate?
Patients who are undergoing an endoscopy (procedure where a tube is inserted into the stomach via the mouth) for suspected or confirmed Barrett’s oesophagus(where the cells of the oesophagus grow abnormally) or colonoscopy after being referred from bowel cancer screening.

What does the study involve?
Tissue samples taken during the colonoscopy or endoscopy are immediately scanned on an infrared (IR) spectrometer at the patient's bedside, before being transferred to the tissue analysis laboratory (histopathology) for analysis. Scanning the biopsy sample on the IR spectrometer does not damage the sample is any way. It produces a biochemical profile, which can be used to detect the differences between different disease stages. These differences can then be used to predict whether a sample is healthy, benign (harmless) or diseased. Up to four

extra research specimens may be collected from each patient, but most patients only have routine specimens taken. The samples are not damaged in anyway and all are analysed by the using current best practice techniques.

What are the possible benefits and risks of participating?
This study may not directly benefit participants, but it may help future patients by giving an immediate result, and minimise the waiting time for results. As the IR spectrometer is not damaging to the sample, and the study involves taking any other type of samples from the patient, there are very few risks. If additional samples are taken from the patient, there is a very small chance that the procedure will be extended by 1-2 minutes.

When is the study starting and how long is it expected to run for?
December 2016 to June 2018

Where is the study run from?
University College London Hospital (UK)

Who is funding the study?
1. Small Business Research Initiative (UK)
2. BeamLine Diagnostics Ltd (UK)

Who is the main contact?
Professor Laurence Lovat
l.lovat@ucl.ac.uk

Contact information

Type(s)
Scientific

Contact name
Dr Katherine Willetts

Contact details
BeamLine Diagnostics Ltd
39 Church Street
Didcot
United Kingdom
OX11 8DG

Type(s)
Scientific

Contact name
Prof Laurence Lovat

ORCID ID
https://orcid.org/0000-0003-4542-3915

Contact details

University College London
Gower Street
London
United Kingdom
WC1E 6BT

Additional identifiers

Protocol serial number
ORBiT Version 4

Study information

Scientific Title
Optical Research for Biopsy Triaging (ORBiT): infrared analysis of gastrointestinal tract tissue specimens

Acronym
ORBiT

Study objectives
Study aim:
This study aims to establish whether an algorithm (Solas), which uses infrared spectroscopy data, can be used to distinguish healthy/benign tissue specimens from diseased tissue specimens, specifically using gastrointestinal tissue specimens.

Hypothesis:
There is a quantifiable biochemical difference between non-dysplastic and dysplastic Barrett's oesophageal tissue and between hyperplastic and adenomatous polyp samples, that can be detected in IR spectra of the tissue specimens.

Ethics approval required
Old ethics approval format

Ethics approval(s)
1. London - South East Research Ethics Committee, 23/02/2017, ref: REC reference: 17/LO/0253
2. Health Research Authority, 07/03/2017, ref: REC reference: 17/LO/0253

Study design
Prospective multi-centre single-arm cross-sectional blinded study

Primary study design
Observational

Study type(s)
Diagnostic

Health condition(s) or problem(s) studied
Barrett's oesophagus/oesophageal adenocarcinoma, colorectal adenocarcinoma/polyps

Interventions
Participants are recruited from patients attending clinic for an endoscopy or colonscopy. Biopsy /polyp samples taken for analysis by histopathology, are first be scanned on an infrared spectrometer. This is a completely non-damaging technique that records a biochemical profile of a sample that can be used to distinguish healthy/benign tissue from diseased tissue. Once an IR measurement has been recorded the samples re-enter the routine clinical pathway and be placed into formalin and sent for histopathological analysis. Additionally, up to 4 specimens may be taken from each patient for research purposes. All other specimens are routine and most patients do not have additional research biopsies.

The IR results are analysed by Solas, which produces a measure of the probability that the the sample is healthy. This result is compared to the histopathology result.

The study is multi-centre and aims to recruit 400 (200 oesophageal and 200 colon) patients over a 12 month period. Within each of these groups it is expected to have an equal number of healthy/benign and diseased samples.

Intervention Type
Device

Primary outcome(s)
The sensitivity and specificity of the Solas algorithm is measured by comparing the number of true negatives versus false positives as determined by histopathology result at study completion (average two weeks)

The Solas algorithm will produce a measure of the probability (p-value) that the the sample is healthy. By varying the p-value threshold - the value used to determine the p-value at which a sample should be classed as either healthy/benign or diseased - a Receiver Operating Characteristic (ROC) curve will be produced. From this the most effective combination of sensitivity and specificity can be determined.

Key secondary outcome(s))
1. The sensitivity of Solas compared to the biopsy result is measured using the percentage of False positive and false negative rate as determined by histopathology at the time of study completion (on average two weeks)
2. The positive predictive value (PPV) of Solas compared to the biopsy result is measured using the percentage of true positives versus false positives identified as determined by histopathology at study completion (on average two weeks)
3. The negative predictive value (NPV) of Solas compared to the biopsy result is measured using the percentage of trust negatives versus the percentage of false negatives identified as determined by histopathology at study completion (on average two weeks)

Completion date
30/09/2018

Eligibility

Key inclusion criteria
1. Confirmed or suspected Barrett’s oesophagus, undergoing endoscopy
2. Being admitted for general colonoscopy, referred from the bowel cancer screening

programme or the flexi-sigmoidoscopy screening programme
3. Patients without Barrett's oesophagus attending for a clinically indicated endoscopy may be recruited as controls
4. Signing of an informed consent form

Participant type(s)
Patient

Healthy volunteers allowed
No

Age group
Adult

Sex
All

Key exclusion criteria
1. Patients in whom endoscopy/colonoscopy and biopsy is contraindicated
2. Patients who are unable to give informed consent
3. Pregnant women
4. Under the age of 18 years
5. Non-English speakers

Date of first enrolment
05/05/2017

Date of final enrolment
29/09/2018

Locations

Countries of recruitment
United Kingdom

England

Study participating centre
University College London Hospital
235 Euston Road
London
United Kingdom
NW1 2BU

Study participating centre
Manchester Royal Infirmary
Oxford Road

Manchester
United Kingdom
M13 9WL

Study participating centre
Glenfields Hospital
Groby Road
Leicester
United Kingdom
LE3 9QP

Study participating centre
Queen Alexandra Hospital
Southwick Hill Road
Cosham
Portsmouth
United Kingdom
PO6 3LY

Sponsor information

Organisation
BeamLine Diagnostics

Funder(s)

Funder type
Industry

Funder Name
Small Business Research Initiative (SBRI)

Funder Name
BeamLine Diagnostics Ltd

Results and Publications

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?
HRA research summary			28/06/2023	No	No
Participant information sheet	Participant information sheet	11/11/2025	11/11/2025	No	Yes