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Novel technologies in diagnosing and monitoring lung disease

Submission date 06/12/2016	**Recruitment status** Recruiting	[ ] Prospectively registered [ ] Protocol
Registration date 07/03/2017	**Overall study status** Ongoing	[ ] Statistical analysis plan [ ] Results
Last Edited 16/02/2026	**Condition category** Respiratory	[ ] Individual participant data [X] Record updated in last year

Plain English summary of protocol

Background and study aims
It is believed that lung diseases can change certain chemicals in people's blood, saliva, urine and chest fluids. These chemicals or 'biomarkers' may be detectable even before a patient develops symptoms or changes are seen on hospital scans and chest X-rays. Non-invasive tests are much more preferred by patients so a great deal of focus is being applied to discovering early detection biomarkers in biofluids that are easy to access, such as saliva or urine. Quick, objective tests that are simple for patients would allow more rapid and earlier diagnosis at scale allowing for more timely interventions. A better understanding of the molecules in these diseases also opens up potential new
treatments. In this study, new gene and protein technologies currently only available in Universities will be used to measure combinations of the most promising molecules and microbes(biomarkers) from sputum (a mixture of saliva and mucus coughed up from the chest), blood, saliva, urine, pleural (lung) fluid and any biopsy samples from people attending hospital with lung diseases and compare them with samples from people with other lung diseases and healthy volunteers.

Who can participate?
Adults with COPD, adults suspected of having lung cancer and healthy volunteers and people with other lung diseases of the same age.

What does the study involve?
Participants attend an appointment at which they are asked some questions about their health. They are then asked to breathe deeply into a tube measuring the amount of carbon monoxide in your breath and spit into a collection container. Finally, a blood sample and sample of urine are collected. If the participant is having a sample taken of the lung or of fluid from the lung as part of their normal care, an extra one may be taken.
Over the next 10 years, when a participant goes into hospital, further sputum, urine and blood samples are taken.

What are the possible benefits and risks of participating?
The results will not affect direct care so there are no direct benefits of taking part but it should improve understanding of the diseases and help diagnose them earlier and more accurately in

the future.
There are no direct risks of participating apart from the discomfort of a blood test and inconvenience of providing a spit and urine test.

Where is the study run from?
Participants are recruited from Prince Philip Hospital, Glangwili Hospital and Bronglais General Hospital and analysis of samples takes place in the Institute of Biological Environmental and Rural Sciences, Aberystwyth University (UK)

When is the study starting and how long is it expected to run for?
February 2016 to February 2028

Who is funding the study?
1. TENOVUS Wales (UK)
2. Knowledge Economy Skills Scholarships (KESS) ERDF via Aberystwyth University (UK)
3. Knowledge Without Borders Exchange Scholarships (Brazil)

Who is the main contact?
Professor Keir Lewis

Contact information

Type(s)
Public

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Integrated Research Application System (IRAS)
187325

Study information

Scientific Title
Application of metabolomics and microbiome sequencing in diagnosing and monitoring lung disease (COPD, Lung cancer, asthma, infections)

Study objectives
There are non-invasive biomarkers which may be used as measurable indicators of the presence or severity of pulmonary diseases. These biomarkers may include changes in the metabolome, lipidome, proteome or in the microbiome of various human biofluids.

Literature review:
Oâ€™Shea K, Cameron SJS, Lewis K E, Liu C, Mur LAJ. Metabolomic-based biomarker discovery for lung cancer diagnosis: A case study. Biochimica et Biophysica Acta. 2016 Jul 14. pii: S0304-4165(16)30246-X. doi: 10.1016/j.bbagen.2016.07.007

Cameron SJ, Lewis KE, Beckmann M, Allison GG, Ghosal R, Lewis PD, Mur LA. The metabolomic detection of lung cancer biomarkers in sputum Lung Cancer. Lung Cancer; 2016; 94:88-95. doi: 10.1016/j.lungcan.2016.02.006.

Cameron SJ, Lewis KE, Huws SA, Lin W, Hegarty MJ, Lewis PD, Mur LA, Pachebat JA. Metagenomic Sequencing of the Chronic Obstructive Pulmonary Disease Upper Bronchial Tract Microbiome Reveals Functional Changes Associated with Disease Severity. PLoS One. 2016;11(2): e0149095. doi: 10.1371/journal.pone.0149095

Mironas A, Cameron S, Oâ€™Shea K, Lewis P, Mur L, Lewis KE. Exploiting metabolomic approaches to aid in the diagnosis of lung cancer. Proc European Resp Society. 2016

Cameron S, Lewis KE, Beckman M, Allsion G, Ghosal R, Lewis P, Mur I. Metabolomic profiling of clinical sputum samples reveals novel biomarkers for the early identification of lung cancer patients. Proc European Resp Society. 2014;43 (Suppl 58): 504

Ethics approval required
Ethics approval required

Ethics approval(s)
approved 02/02/2016, Wales REC7 (-, Carmarthen, CF11 9AB, United Kingdom; +44 (0) 2920230457; wales.rec7@wales.nhs.uk), ref: 16/WA/0036

Study design
Multi-centre observational longitudinal case-control study

Primary study design
Observational

Study type(s)
Screening

Health condition(s) or problem(s) studied
Pulmonary diseases (COPD, lung cancer, asthma and others)

Interventions
Following provision of written, informed consent, participants attending hospital or their GP for their respiratory condition will be asked questions regarding their age, illness and treatments. They will be asked to provide a sputum / saliva sample, venous blood and urine sample. If they

are having another procedure as part of routine care (e.g pleural aspiration, bronchoscopy etc) an additional sample of that tissue (pleural fluid or bronchial ashing / biopsy) will be taken for research purposes at the same time.

Participants will be requested to provide sputum, urine and blood samples whenever they attend hospital Including if they become unwell) i.e. opportunistic sampling for up to 10 years. We don't have specific time points.

Intervention Type
Other

Primary outcome(s)
1. Sensitivity and specificity of metabolomics screening (sputum, blood and urine) of diagnosing lung cancer (clinical-pathological diagnosis at 12 months) versus age matched controls area under the curve (AUC) analysis at baseline
2. Sensitivity and specificity of metabolomics screening (sputum, blood and urine) of diagnosing COPD (defined using clinical GOLD criteria) versus age matched controls i.e. area under the curve (AUC) analysis at baseline

Key secondary outcome(s)
No secondary outcome measures

Completion date
21/02/2028

Eligibility

Key inclusion criteria
Subjects: patients with a diagnosis of respiratory disease and eventually healthy control volunteers. These will conform to the following categories.

COPD:
1. Patients suffering from COPD according to current standard criteria
2. Age over 40 years
3. Ex or current smokers of at least 10 pack-years
4. Post bronchodilator FEV1/FVC<0.70 and FEV1<80% predicted

Lung Cancer:
1. Patients referred by their GPs or other specialists with possible diagnosis of lung cancer
2. Have a smoking history, asbestos exposure or other suspicious symptoms including breathlessness, chest pain, cough, weight loss or exhibits an abnormal chest X-ray

Healthy Controls:
1. Spouses and family members of COPD patients
2. Smokers attending our secondary care smoking cessation service
3. No symptoms or known diagnoses of lung disease.

Patients with lung disease other than COPD or Lung Cancer: depending on resources the study will be expanded to include other controls with asthma, bronchiectasis, fibrosis or lung other diseases.

Participant type(s)
Mixed

Healthy volunteers allowed
No

Age group
All

Sex
All

Total final enrolment
0

Key exclusion criteria
No exclusion criteria have been defined, except for the good condition of collected samples and reliability of the information provided to the reseachers by the particiapants.

Date of first enrolment
12/05/2016

Date of final enrolment
21/02/2028

Locations

Countries of recruitment
United Kingdom

Wales

Study participating centre
Prince Philip Hospital
Bryngwyn Mawr
Llanelli
Wales
SA14 8QF

Study participating centre
Glangwili Hospital
Dolgwili Road
Carmarthen
Wales
SA31 2AF

Study participating centre
Bronglais General Hospital
Caradog Road
Aberystwyth
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SY23 1ER

Study participating centre
Aberystwyth University
Institute of Biological Environmental and Rural Sciences (IBERS)
Penglais Campus
Aberystwyth
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SY23 3FL

Sponsor information

Organisation
Hywel Dda University Health Board

ROR
https://ror.org/012gye839

Funder(s)

Funder type
Charity

Funder Name
TENOVUS Wales

Funder Name
Knowledge Economy Skills Scholarships (KESS) ERDF via Aberystwyth University

Funder Name
Knowledge Without Borders Exchange Scholarships (Brazil)

Results and Publications

Individual participant data (IPD) sharing plan

Participant level data will be stored in a repository in password protected computer databases and source data will be kept in lever arch paper files within the secure Clinical Research Centre at Prince Philip Hospital for 5 years then stored for up to 25 years according to Health Board Standard Operating Procedures and UK Human Tissue Authority License approvals.
1. Persistent weblink: http://public-odp.nihr.ac.uk/QvAJAXZfc/opendoc.htm?document=CRNCC_Users%2FFind%20A%20Clinical%20Research%20Study.qvw&host=QVS%40win-qs1ilmcfh2h&anonymous=true&sheet=SH75&bookmark=Document\BM02&select=LB572,=StudyID=30816
2. Process for requesting access: written requests to Chief Investigator
3. Data is pseudo-anonymised
4. Any ethical or legal restrictions have all been approved through hospital R&D approvals and loco-regional Ethics approvals.

IPD sharing plan summary

Stored in repository

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
HRA research summary			28/06/2023	No	No
Participant information sheet	version V2	07/02/2016	07/03/2017	No	Yes