The University of Liverpool Biobanking Facility: 'Expanding upon a history of excellence.'

Preservation

CUSTOMER TESTIMONIAL - THE UNIVERSITY OF LIVERPOOL BIOBANKING FACILITY

The city of Liverpool lies at the centre of one of the UK's largest urban areas. Originally a port, it developed into the UK's most important city after London during the Industrial Revolution. Liverpool has a rich cultural history, but socioeconomic discrepancies led to it becoming a deprived area, with associated health burdens. However, expert research and innovation in health has clustered around this. The city has a world-class university which supports specialist health resources like The University of Liverpool Biobanking Facility. This important biobank, which now incorporates one of the oldest tissue banks in the UK, provides an invaluable resource for researchers who investigate the molecular mechanisms of medical conditions with a view to developing new treatments. The biobank staff work closely with researchers to not only expand scientific knowledge on health conditions, such as cancer, but advance medicine worldwide.

A long history of quality research

The University of Liverpool Biobanking Facility collects and stores biological samples (tissue and blood) from patients undergoing surgery, or biopsy procedures, for the treatment and diagnosis of a wide variety of medical conditions. It is a relatively new venture created to provide professional research groups with access to high quality biosamples and data. In addition, the biobank also offers a range of histology-based services. Based in the University of Liverpool, it was formally known as the Liverpool Tissue Bank (LTB), then Bio-Innovation Hub (LBIH) Biobank, which was eventually amalgamated with the Liverpool University Biobank (LUB). The LTB was established in 1993. It has been working with PHCbi ever since its inception.

Susan Holden is the Manager of the biobank. Responsible for the day-to-day running of the biobank, she also screens research requests before they are submitted to the Biobank Review Panel, manages finances and acts as an ambassador for the facility locally, nationally and internationally.

"The University of Liverpool Biobanking Facility has evolved significantly since it was established in 2015. It was originally focused on bioresources for cancer research, and while this is still an important area for us, there is now much more to our capabilities", she explained. "We work together with the University of Liverpool, but also collaborate with Principal Investigators (PIs) from research in many other institutions, such as hospitals. Specialties including head and neck, cardiovascular and alcohol-related conditions are areas that we collaborate on frequently. As well as collections of biosamples from patients, we also have collections of healthy donor tissues."

The biobank currently collects biosamples, as well as clinical information, from patients who have undergone surgery at hospitals and health trusts including:

- Liverpool University Hospitals NHS Foundation Trust
- Liverpool Women's Hospital NHS Foundation Trust
- Liverpool Heart and Chest Hospital NHS Foundation Trust.

Supporting scientific breakthroughs

Quite often, the biobank partners with research projects that underpin major advances in scientific knowledge and medical treatment. One recent example is a project that has investigated the possibility of using volatile organic compounds in urine as biomarkers in surveillance of Urothelial Bladder Cancer as an alternative to more invasive cystoscopy (camera investigation via the urethra), which is currently the only option for monitoring occurrence and recurrence of this common cancer.

The study[1] is ground-breaking. A research team lead by Professor Chris Probert of the University of Liverpool and Professor Norman Radcliffe at the University of the West of England (UWE) developed a gas chromatography sensor system called Odoreader to analyse biomarkers for prostate cancer in 2016. Subsequent use of this device to detect bladder cancer is a new development. The results of the study show statistically significant potential for further investigation that will compare the diagnosis made by the Odoreader with findings of surveillance cystoscopy. Commercialisation of Odoreader for bladder cancer could follow.

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"The biobank has worked in close partnership with Professor Probert in this investigation, which will ultimately change the way we test for bladder cancer with the aim of making it far less invasive for patients and health care professionals, and create a reliable tool that even General Practitioners (GPs) can use to detect the disease," remarked Mrs Holden.

Contributing directly to public health

The UK's health services are mostly provided by the NHS (National Health Service), which is publicly funded. In England and Wales, the NHS is organised into NHS Trusts that mostly serve a geographical area or specialism. Several NHS Trusts are involved in providing healthcare to the local population in the Liverpool area, and by working with them, the University of Liverpool Biobanking Facility has

potential accessibility to greater numbers of biosamples and can also then make a more significant contribution to larger scale health research projects.

"We already work together with some of the NHS Trusts in Liverpool and it is our aim to get the biobank approved to work with more of them," explained Mrs Holden. "This is both one of our biggest challenges and opportunities. Liverpool has a health landscape that is expanding and changing considerably. There are many new clinical research centres under development within the multiple NHS Trusts that serve the city. In 2020, a new specialist facility, the Clatterbridge Cancer Centre, opened its doors, and a large new hospital, the Royal Liverpool Hospital, is being completed. Building a working partnership with an NHS Trust involves an intricate process of approval, but when successful, enables us to make a direct contribution to public health."

Highest standards of regulatory compliance

The use of human tissues for research in the UK is highly regulated by national and local policies. The University of Liverpool Biobanking Facility strictly adheres to all relevant regulatory procedures. There is some variation between NHS Trusts and other organisations in policies and procedures, but all of these are integrated into the biobank's work. With the COVID-19 pandemic, even more procedures have been introduced, such as risk assessments for infection, additional disinfection procedures for samples, and limitations on the number of people in the laboratory.

Expanding resources

Currently, the biobank gathers consent and collects biological samples (tissue and blood) from around 800 patients per year. These samples are banked. They amount to more than 40,000 samples of paraffin wax embedded and frozen material. The largest collections are of breast, colorectal, and pancreatic tissues. Uniquely, the University of Liverpool Biobanking Facility also adopts biological sample collections with the appropriate consent. The facility is already an invaluable resource for research, but plans additional expansion and is in the process of restructuring to accommodate this.

As part of the process of issuing biosamples and clinical information, researchers using the University of Liverpool Biobanking facility are requested to supply raw data obtained through the use of its samples back to the biobank following publication or completion of their research project. This enables the facility to assist in the direction of future research projects and promote collaboration between groups, consolidating its contribution to wider research even further.

All the biobanking facility's sample collections are listed in the UK Clinical Research Collaboration Tissue Directory and the facility is a member of the UK's Confederation of Cancer Biobanks (CCB).

Well-equipped for the future

"Our capabilities as a biobank now and in the future are possible because the University of Liverpool Biobanking Facility is extremely well equipped," said Mrs Holden. "We have a large freezer capacity provided by PHCbi, who have been our suppliers for almost two decades. This is essential. A large part of the appeal of using the biobank is that researchers do not have to buy their own freezers and other equipment to handle biosamples. We currently have 25 MDF-U700VX-PE and MDF-DU702VX-PE -80°C PHCbi freezers, thirteen MDF-C2156VAN-PE -150°C PHCbi freezers and one fridge-freezer. Of course, a service agreement for maintenance and care of the equipment is provided by PHCbi too."

"What we particularly like about PHCbi is the intense attention to detail that they provide us with in products and service. They really do look at everything. Nothing is left to chance – For example, when installing new equipment, they will always check the installation parameters, such as if equipment will fit through certain doors etc. We also like features of the PHCbi freezers, such as interchangeable racking."

Far from a frozen environment

Despite its functionality for storage of biological samples, the biobanking facility is a highly dynamic research facility. Its contribution to advancing science and medicine is increasingly coming to the fore.

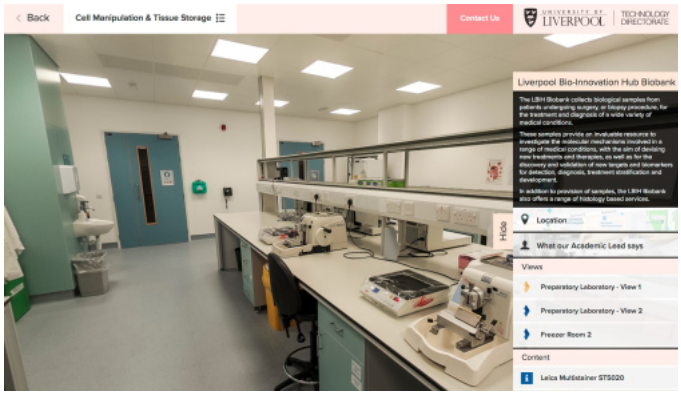
"Moving forward clinical research is not possible without partnership and collaboration," concluded Mrs Holden. "Creating a better future for patients, their families and healthcare professionals requires synergy, intricate and continual communication and sharing of high-quality resources and data. We are delighted to provide a central role in advancing research through effective partnership."

Take a virtual tour of the University of Liverpool Biobanking Facility here

https://www.liverpool.ac.uk/technology-directorate/360/?/cell-manipulation/liverpool-bio-innovation-hub-biobank/preparatory-laboratory-view-1

Services offered by the University of Liverpool Biobanking Facility

- Histology services, including processing and paraffin wax embedding of formalin fixed tissue.
- Sectioning of FFPE and frozen tissue.
- Staining services, including Hematoxylin and Eosin and immunohistochemistry.
- Digital slide scanning using an Aperio slide scanner.
- Nucleic acid extraction from fixed or frozen material using a QIAsymphony machine.
- Laser capture microdissection.
- Next generation sequencing using a MiSeq.



Equipped to offer a wide range of services

- 25 -80°C PHCbi freezers
- Thirteen -150°C PHCbi freezers
- One fridge freezer
- H&E autostainer
- 2 x biosafety cabinets
- Cryostat
- DNA robot
- Microtone
- Tissue processor
- TMA construct
- Slide scanner
- Inverted microscope
- Fluorescent microscope

Solid regulatory framework

Applicable UK regulation for the biobanking facility includes:

- The Human Tissue Act 2004 and subsidiary regulations.
- The Human Tissue Act Code of Practice issued by the Human Tissue Authority.
- The Health and Social Care Act 2003.
- The Data Protection Act 1998.
- The General Data Protection Regulation Act 2018.

Scientific papers published from material provided by the The University of Liverpool Biobanking Facility

2019

Hannah A. Davies, Eva Caamaño-Gutiérrez, Ya Hua Chim, Mark Field, Omar Nawaytou, Lorenzo Ressel, Riaz Akhtar & Jillian Madine. ***Idiopathic degenerative thoracic aneurysms are associated with increased aortic medial amyloid.*** Amyloid, DOI:10.1080/13506129.2019.1625323

2018

Areege Kamal, Anthony Valentijn, Roger Barraclough, Philip Rudland, Nihad Rahmatalla, Pierre Martin-Hirsch, Helen Stringfellow, Shandya B. Decruze and Dharani K. Hapangama. ***High AGR2 protein is a feature of low grade endometrial cancer cells.*** Oncotarget, 2018, Vol. 9, (No. 59), pp: 31459-31472

2017

Raymond Q. Migrino, Hannah A. Davies, Seth Truran, Nina Karamanova, Daniel A. Franco, Thomas G. Beach, Geidy E. Serrano, Danh Truong, Mehdi Nikkhah, and Jillian Madine ***Amyloidogenic medin induces endothelial dysfunction and vascular inflammation through the receptor for advanced glycation endproducts.*** Cardiovascular Research, Volume 113, Issue 11, 1 September 2017, Pages 1389–1402.

Ahmed A, Pritchard DM, Burkitt MD. ***PTH-060 Expression of MAdCAM-1 in the upper gastrointestinal tract: Is there a role for disrupting interactions between MAdCAM -1 and alpha-4/beta-7 integrin in upper GI Crohn's disease?*** Gut 2017. 66 (S2) A236. doi: 10.1136/gutjnl-2017-314472.459 Presented as a poster at the British Society of Gastroenterology's Annual Meeting 2017.

Thamir M. Ismail, Daimark Bennett, Angela M. Platt-Higgins, Morteta Al-Medhity, Roger Barraclough, and Philip S. Rudland. ***S100A4 Elevation Empowers Expression of Metastasis Effector Molecules in Human Breast Cancer***. Cancer Res; 77(3) February 1, 2017

2016

Rasheed Zakaria, Angela Platt-Higgins, Nitika Rathi, Daniel Crooks, Andrew Brodbelt, Emmanuel Chavredakis, David Lawson, Michael D Jenkinson and Philip S Rudland. ***Metastasis-inducing proteins are widely expressed in human brain metastases and associated with intracranial progression and radiation response.*** British Journal of Cancer (2016) 114, 1101–1108 | doi: 10.1038/bjc.2016.103

Hiu-Fung Yuen1, Ka-Kui Chan1, Angela Platt-Higgins2, El-Habib Dakir1,4, Kyle B. Matchett1, Yusuf Ahmed Haggag1,7, Puthen V. Jithesh6, Tanwir Habib6, Ahmed Faheem5, Fennell A. Dean3, Richard Morgan4, Philip S. Rudland2, Mohamed El-Tanani4. Ran ***GTPase promotes cancer progression via Met receptor mediated downstream signalling***. Oncotarget, Vol. 7, No. 46

INFORMATION

PHC Europe
www.phchd.com/eu/biomedical