Imperial College Academic Health Science Centre

Transforming patient care

Imperial College London

NHS Imperial College Healthcare NHS Trust

Royal Brompton & Harefield NHS Foundation Trust

The ROYAL MARSDEN NHS Foundation Trust

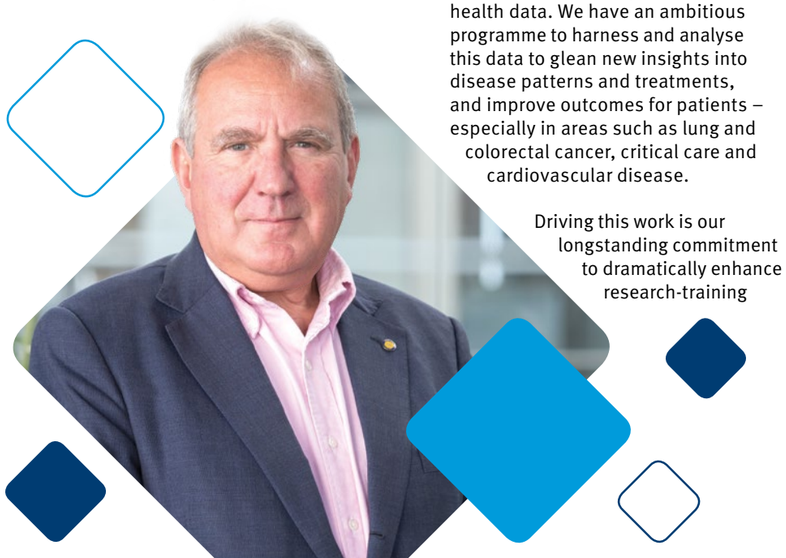
ICR The Institute of Cancer Research

A member of staff with a patient in the NIHR Health Protection Research Unit at Hammersmith Hospital.

Welcome from the Director

The Imperial College Academic Health Science Centre (AHSC) aims to drive innovation and improve care for our patients in North West London and beyond. Our exceptional ability to turn science and engineering advances into new ways of preventing and treating disease is helping to improve the lives of patients.

Between 2019 and 2024, the AHSC will continue to focus on its commitment to advance clinical care through research, education and training. We plan to do this by building on existing collaborative projects between our NHS partners. These include West London Genomic Medicine Centre, which played a key role in the successful delivery of the 100,000 Genomes Project; the Royal Marsden Partners Cancer Vanguard, which is developing new models of cancer care; and joint lung cancer research projects. We will also continue to build substantial critical mass around cardiology and respiratory medicine.



We will harness the insights of The Institute of Cancer Research, London, NHS clinicians and scientists at Imperial College London and its School of Public Health to prevent the onset of diseases, reduce the return of cancers and hospital admissions. In cases where we can't prevent disease, we will draw on the fullest range of academic strengths of our partners to develop and evaluate new technologies to detect and diagnose conditions at an earlier stage, so that we can intervene with more effective treatments for patients.

There is extraordinary innovation in health data. We have an ambitious programme to harness and analyse this data to glean new insights into disease patterns and treatments, and improve outcomes for patients – especially in areas such as lung and colorectal cancer, critical care and cardiovascular disease.

Driving this work is our longstanding commitment to dramatically enhance research-training opportunities for all staff across the AHSC. We will deliver an ambitious programme to train nurses and allied health professionals to PhD level and beyond. In collaboration with Imperial College Business School, we have a first of its kind leadership and development programme that aims to equip senior healthcare staff with the skills needed to operate effectively at board level and to address key management challenges facing the healthcare system over the next five to ten years.

The AHSC is in the unique position of being able to harness the strengths of an internationally leading science and technology focused university and three NHS hospital trusts renowned for their quality of care and contributions to improve healthcare. Now, with the addition of The Institute of Cancer Research (ICR), the AHSC will bring these five world leading West London-based institutions together around their medical research, clinical care and education missions. This is an exciting challenge and opportunity.

Together we represent a formidable partnership acting to tackle major health issues in the UK.

As Director, I look forward to building on the substantial work of the AHSC so that we can further advance translational medicine and improve our patients' quality of life.

Professor Jonathan Weber
Director of the Imperial College Academic Health Science Centre

Our vision

The purpose of the Imperial College AHSC is to improve human health by bringing together our partners' expertise in research, education and patient care. By drawing on the academic strengths of Imperial College London and the critical mass and clinical capabilities of our NHS partners, the AHSC aligns research and education activities to accelerate the translation of basic science discoveries into patients and whole populations.

Imperial is a science-based university with an international reputation for excellence in teaching and research. The College's Faculty of Medicine is one of the largest in Europe and was ranked fourth in the world by the Times Higher Education World University Rankings in 2018. Its Faculties of Natural Sciences, Engineering and the Imperial College Business School are each ranked in the top ten worldwide.

The Royal Marsden NHS Foundation Trust and Royal Brompton & Harefield NHS Foundation Trust are internationally renowned centres of excellence for cancer, cardiovascular and respiratory medicine drawing patients from across the UK and internationally. Imperial College Healthcare NHS Trust provides a comprehensive range of high quality acute and specialist services. It serves a local population of over 2.3 million people in North West London, making it one of the largest NHS Trusts in the country.

Our strategy

The AHSC strategy focuses on conditions that represent some of the highest burdens of disease. Our initial priority areas are:

- cancer
- cardiovascular disease
- infectious disease and antimicrobial resistance
- metabolic medicine
- neurological and neurodegenerative disease
- respiratory disease.

In these areas, we align our efforts to:

- develop programmes in disease prevention to reduce disease incidence, recurrence and hospital admissions wherever possible;
- identify and develop new ways to detect disease earlier where it cannot be prevented and;
- develop better, more targeted disease treatments.

These objectives are underpinned by an AHSC clinical academic workforce development programme, alongside an informatics capability that will support data driven solutions for improved patient care and population health.

Our priority programmes bring together clinicians with experts in bioengineering, chemistry, data science, computing, and mathematics through a convergence science approach. We collaborate with industry partners and other life sciences organisations to deliver research-led health improvements at scale and pace.

Clinical staff from the Imperial College Healthcare NHS Trust.

Preventing and treating diabetes more effectively

Diabetes is a lifelong condition that causes a person's blood sugar to become too high. If the condition is not managed it can lead to the development of other serious conditions such as cardiovascular disease and cancer. Treating and caring for patients with diabetes places a significant strain on the NHS and it is estimated that 10 per cent of the NHS' budget is spent on diabetes, equating to £3.5 billion per year.

The AHSC facilitates pioneering research in diabetes medicine by bringing together laboratory scientists, population scientists and clinicians with a view to reducing the impact of these conditions. Our current focus is on disease prevention and developing more effective disease management strategies. The following pages highlight several recent examples of our work in this area.

App technology to effectively monitor glucose levels in diabetes

The UK has one of the highest rates of type 1 diabetes in the world with over 400,000 people living with the condition. Type 1 diabetes occurs when the body cannot produce enough insulin, leading to high levels of blood glucose. People with type 1 diabetes need to take insulin and monitor blood sugar levels several times a day to avoid high or low levels of blood glucose, which can cause complications such as heart disease and stroke.

One of the ways that people monitor their glucose levels is by using a continuous glucose sensor. This is a small device worn just under the skin. It measures glucose levels continuously throughout the day and night, letting people see trends in their levels and alerts them to high and low glucose levels. However, this method doesn't take into account factors that can change blood sugar levels such as exercise, alcohol, hormone cycles, illness and stress.

A team of researchers led by Professor Nick Oliver, Professor of Human Metabolism at Imperial College London and Consultant in Diabetes and Endocrinology at Imperial College Healthcare NHS Trust, have developed an artificial intelligence system to help people monitor blood sugar levels in real-time.

The Advanced Bolus Calculator for Diabetes (ABC4D) is an app-based system that helps people make informed decisions about insulin dosage. The system consists of a glucose sensor and a smart insulin pen which gives a reading of blood sugar levels. To use the system, people enter their blood glucose levels and carbohydrate intake – a factor that affects blood sugar levels. They can also enter their alcohol consumption and the amount of exercise they carried out. The system analyses this information and gives a reading of blood sugar levels in real-time. The system can also continuously monitor glucose, insulin and lifestyle activities over a number of weeks and uses this information to make recommendations on the amount of insulin people should take to maintain blood sugar levels within a healthy range.

The team found initially that people who used the system achieved higher levels of blood glucose within the target range compared to current methods. They also found that this system helped to reduce the risk of hypoglycaemia, a condition caused by a very low level of blood sugar, and other long-term complications.

Further clinical trials led by Dr Monika Reddy, Senior Clinical Lecturer at Imperial and Consultant in Diabetes and Endocrinology at Imperial College Healthcare NHS Trust, in partnership with a commercial collaborator, are currently underway and show encouraging results for people living with type 1 diabetes.

Narvada Jugnee, Dr Monika Reddy, Professor Nick Oliver, Dr Pau Herrero-Viñas and Dr Pantelis Georgiou from the ABC4D research team. Above, a smart insulin pen

Diagnosing rare types of diabetes more effectively

Maturity onset diabetes of the young (MODY) is a rare form of diabetes, which runs in families and is caused by a mutation in a single gene. It is uncommon compared with type 1 and type 2 diabetes, and only around 20,000–40,000 people in the UK have it. People with MODY require different treatments to the standard care provided to those with type 1 and type 2 diabetes, so identification is important.

Dr Shivani Misra, Consultant in Metabolic Medicine at Imperial College Healthcare NHS Trust and an Honorary Research Fellow in Imperial's Department of Medicine, leads the MY DIABETES study, which looks at how type 1 and type 2 diabetes vary in different ethnic groups and whether MODY is found in all ethnic groups.

In the preliminary analysis of the first 1,300 participants, Dr Misra showed that healthcare professionals miss cases of MODY in South Asian and African Caribbean individuals compared with white Europeans. As a result, these individuals may not receive the right treatment.

Dr Misra also found that using broader criteria, such as whether a person is making their own insulin, identified undiagnosed cases of MODY in non-white ethnic groups.

Dr Misra aims to use the findings of her study to stratify patients with young-onset diabetes to improve diagnosis and to deliver precision diabetes care.

▸ Dr Shivani Misra

Intelligent implant to tackle obesity and prevent diabetes

Type 2 diabetes affects over 400 million people worldwide and being overweight or obese increases the risk of developing the condition. Currently, some of the best methods of treating obesity involve invasive surgery, such as a gastric bypass or fitting a gastric band.

Professor Sir Steve Bloom, Chair of the Division of Endocrinology and Metabolism at Imperial and Clinical Director of Pathology at Imperial College Healthcare NHS Trust, is working with Professor Chris Toumazou, Regius Professor of Engineering at Imperial, to create an implant that will reduce appetite in obese patients.

The 'Intelligent implantable modulator of Vagus nerve function for treatment of obesity' (i2MOVE) implant aims to detect signals in the nerves and instruct the brain and the gut that it is full. By reducing obesity the hope is that obesity-related diseases such as type 2 diabetes will also become less prevalent.

Tackling lung disease

Respiratory disease is one of the biggest health problems in the UK. Approximately 10,000 people are newly diagnosed with lung conditions each week and these diseases are responsible for one million deaths and over six million in-patient hospital days per year. The AHSC is the largest centre nationally for lung research, bringing together the National Heart and Lung Institute at Imperial College London, Imperial College Healthcare NHS Trust and Royal Brompton & Harefield NHS Foundation Trust.

Our clinical and academic programmes cover the spectrum of respiratory disorders, including acute respiratory infection, asthma, chronic pulmonary obstructive disease, interstitial lung disease and tuberculosis, as well as rarer, genetic conditions such as cystic fibrosis.

Our thriving research portfolio is focused on preventing acute and chronic lung disease, developing new approaches for detection and diagnosis, novel treatments for lung disease as well as targeted management strategies. The following examples of our pioneering research work in cystic fibrosis to develop new and effective treatments for patients living with the condition.

Professor Eric Alton

Gene therapy for cystic fibrosis shows encouraging trial results

Cystic fibrosis is a life-threatening inherited disease that causes breathing difficulties, lung infections and digestion problems. Around 80,000–100,000 children and adults worldwide have the condition. It is caused by mutations in a gene called CFTR that regulates the flow of chloride and the water level on the surface of cells that line the lungs, pancreas and other organs. Mutations in the CFTR gene result in a thick build-up of mucus in these organs usually resulting in permanent damage.

Researchers from the UK Cystic Fibrosis Gene Therapy Consortium (GTC), which includes Imperial and Royal Brompton & Harefield NHS Foundation Trust, have developed a gene therapy formulation that adds new normal CFTR proteins in patients' lungs.

One hundred and thirty-six patients aged 12 and over received monthly doses of either the therapy or the placebo for one year. The patients were treated by inhaling molecules of CFTR DNA wrapped in fat globules (liposomes) that deliver the gene into the cells in the lung lining.

The clinical trial reached its primary endpoint with patients who received therapy having a significant, if modest benefit in lung function compared with those receiving a placebo.

The trial is the first to show that repeated doses of gene therapy could have a meaningful effect on the disease and change the lung function of patients.

The Consortium, coordinated by Professor Eric Alton, Chair in Gene Therapy and Respiratory Medicine at Imperial and Honorary Consultant Physician at Royal Brompton Hospital, has now joined forces with pharmaceutical companies Boehringer Ingelheim and Oxford BioMedica to take the next generation of this gene therapy, delivering the CFTR gene using a disabled virus, towards clinical trials.

The hope is that this type of long-term treatment could help cystic fibrosis patients to reach a normal life expectancy and significantly improve their quality of life.

Drug combination offers hope for children with cystic fibrosis

A breakthrough drug for cystic fibrosis has been found to improve lung function of children suffering with the disease.

The international study, which was led by researchers at Imperial and a trial at Royal Brompton NHS Foundation Trust, showed that Orkambi – a combination of the drugs lumacaftor and ivacaftor – can improve the lung damage caused by the genetic disease, with benefits seen in under two weeks.

The average age at death for cystic fibrosis is 31 years and experts stress that early treatment in children is critical for a child's long-term outlook.

Orkambi is the first therapy to target the commonest form of the underlying faulty protein responsible for cystic fibrosis rather than the symptoms.

More than 200 patients aged between six to eleven took part in the trial. Half of the patients received Orkambi for six months, while the other half received a placebo.

At the end of the treatment period, researchers found that the airways of children on Orkambi were significantly healthier, as measured by a sensitive test of gas mixing in the lungs. Secondly, there was a 20 per cent reduction in the amount of chloride in their sweat – a common symptom of the disease.

Following the results, a new trial at Royal Brompton Hospital is now assessing the effectiveness of using three drugs to target the most common genetic mutation responsible for cystic fibrosis. Should these results be confirmed, this approach may be suitable for up to 90 per cent of cystic fibrosis patients.

Professor Jane Davies was part of the international team of scientists who found that Orkambi can improve lung function of children with cystic fibrosis.

Detecting and diagnosing cancer earlier

Cancer is one of the most significant health issues facing the UK with 50 per cent of the population expected to succumb to the disease during their lifetime. Survival rates are greatly enhanced if tumours are detected early and post-cancer quality of life can be improved with targeted treatments that have fewer long-term side effects.

Drawing on the fullest range of academic and clinical strengths of its partners, the AHSC is developing and evaluating new technologies and treatments across a broad range of tumour types. The examples below highlight some of our most exciting, recent work that has significant potential to advance patient care.

Breath test for early diagnosis of oesophageal and gastric cancer

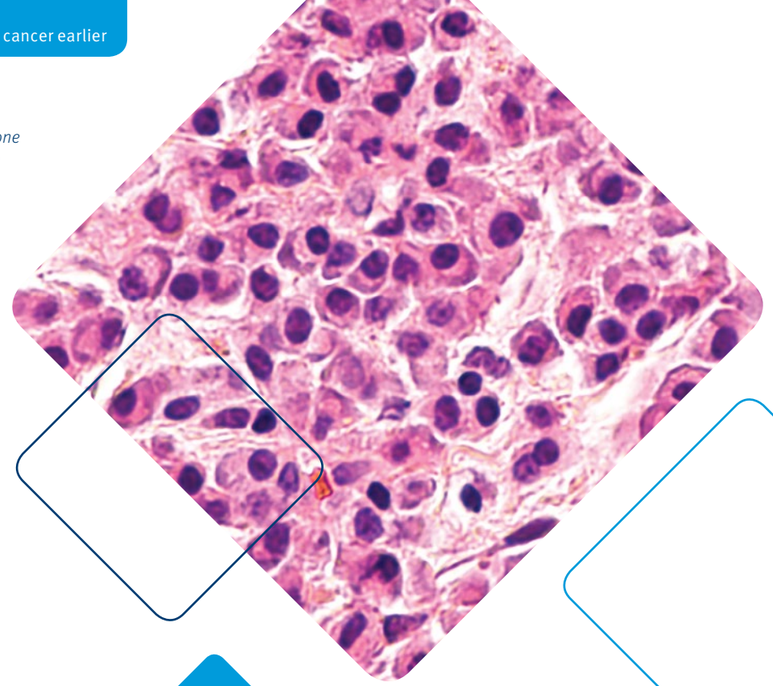
There are more than 15,000 new cases of gastric and oesophageal cancers in the UK each year. Detection of oesophageal and gastric cancers at an early stage can improve survival rates. But both are usually diagnosed in the advanced stages as symptoms only become noticeable once the disease develops. As a result, the long-term survival rate for patients in the UK is about 15 per cent.

Researchers have developed a breath test that can successfully detect oesophageal and gastric cancer and could be used as a first-line test for patients. A clinical trial at The Royal Marsden conducted between 2015 and 2016 demonstrated that the breath test can distinguish cancer between benign diseases with 85 per cent accuracy. Unlike other methods, the test is non-invasive and gives results within hours. In separate studies, the test has also been shown to diagnose pancreatic cancer at an earlier stage for the first time.

To take the test, patients breathe into a device that looks for chemical compounds unique to patients with oesophageal and gastric cancer. These cancers produce a distinctive smell of volatile organic compounds (VOC) – chemicals that contain carbon and are found in all living things – which can help doctors detect early signs of the disease.

The study was led by Professor George Hanna, Head of Surgery and Cancer at Imperial College London. He believes that the test can help clinicians decide whether patients need further investigations and hopes that in future, clinicians could order a breath test in the same way as they would order routine blood tests. The team are undertaking further investigations to improve the test and will conduct a larger clinical trial to validate the results in GP surgeries, where the test is intended to be used.

The breath test device looks for chemical compounds unique to people with oesophageal and gastric cancer



A microscopic image of a bone biopsy of multiple myeloma

Breakthrough drug shows early promise for multiple myeloma

Multiple myeloma is a relatively rare type of cancer that develops in the bone marrow – the spongy tissue inside the bone where new blood cells are produced – and often spreads to multiple sites within the body. Along with aching and exhaustion, patients can suffer from brittle bones, which break easily and can even cause fractures in their spine.

The insidious nature of multiple myeloma makes it difficult to tackle with standard treatments, and a poor prognosis for patients with aggressive forms of the disease means that more effective treatments are needed.

Researchers have shown that a new drug has promise for targeting tumours in patients with multiple myeloma and has the potential to improve outcomes. A team of researchers led by Professor Guido Franzoso, Head of the Centre for Cell Signalling and Inflammation at Imperial, and Dr Martin Kaiser, Myeloma Molecular Therapy Team Leader at the ICR and Consultant Haematologist at The Royal Marsden, developed a compound called DPT3 that can block signals sent by some proteins and enzymes, which encourage cells to become cancerous and spread.

A small, early-stage clinical trial involving three patients with progressive forms of advanced multiple myeloma found that the drug can selectively kill myeloma cells in the marrow while leaving the healthy tissue of the patients untouched.

The team now hope to carry out a larger trial to see if the initial results can be replicated in a bigger cohort of patients.

Professor Andrea Rockall

Artificial intelligence to enhance human detection of bone cancer

Researchers are developing artificial intelligence (AI) software to help interpret whole body MRI scans of patients with myeloma.

One of the ways that doctors diagnose myeloma is by using a special scan called 'whole-body MRI' (WB-MRI) to show which parts of the skeleton are affected by the disease. However, it can take a radiologist a considerable amount of time to read the scans, which include over a thousand images. Additionally, myeloma can be difficult to spot when there are only a few tiny sites of disease. As a result, only some NHS hospitals offer the state-of-the-art WB-MRI scan.

AHSC researchers led by Professor Andrea Rockall, Clinical Chair of Radiology at Imperial and Honorary Consultant Radiologist at Imperial College Healthcare NHS Trust and The Royal Marsden, are developing a tool to detect myeloma in patients' WB-MRI scans more quickly as part of the Machine Learning in Myeloma Response (MALIMAR) study. The team, which also includes Dr Christina Messiou, Consultant Radiologist at The Royal Marsden and a Reader at the ICR, and Dr Ben Glocker, from Imperial's Department of Computing, hopes that AI might detect the disease accurately as well as reduce the time needed for the radiologist to review the entire scan.

Lung cancer screening project

Lung cancer kills more people than any other type of cancer in the UK. More than 44,000 people are diagnosed with the disease each year. There are usually few or no symptoms in the early stages of lung cancer. As a result, the disease is often diagnosed at a later stage, when treatment has a limited impact on survival. Late diagnosis of lung cancer is the main cause of poor cancer survival outcomes in the UK.

Dr Anand Devaraj, Honorary Senior Lecturer at the National Heart and Lung Institute at Imperial and Consultant Thoracic Radiologist at Royal Brompton Hospital, has worked in collaboration with Royal Marsden Partners to pilot a mobile CT scanner to diagnose lung cancer patients at an earlier stage.

The project involves identifying high-risk patients in two London boroughs in West and North West London who are current or ex-smokers and inviting them to a lung health check.

The check-up consists of various tests including lung function, checking respiratory symptoms and Body Mass Index (BMI). In addition, staff use a risk assessment tool – in the form of a questionnaire – to determine whether the patient is at high risk of lung cancer. If the patient is found to be at high risk, they are offered an appointment for a low dose CT scan, ideally on the same day. The scans are reviewed and reported back to the patients and their GP within two weeks.

The mobile CT scanner will help to diagnose lung cancer at an earlier stage.

Fighting infection

Infectious diseases are a major cause of ill health in the UK and around the world. Although some infections such as smallpox have been eradicated through a global vaccination programme, many others continue to have a major impact, affecting the health of individuals, causing disruption to health services and having a negative impact on economies. These include common infections, like flu, that spread rapidly; new infectious diseases including Severe Acute Respiratory Syndrome (SARS), a serious form of pneumonia; and other infections that were once controlled, such as tuberculosis, and are now re-emerging.

Adding to this, antimicrobial resistance (AMR) is growing. Microorganisms such as bacteria are adapting and changing to prevent antibiotics and other antimicrobials from working. This has resulted in standard treatments becoming ineffective, and drug-resistant infections becoming more severe and spreading. Microorganisms that have become resistant to most antimicrobials are sometimes referred to as 'superbugs'. Superbugs could result in currently treatable infections becoming fatal and it is estimated that AMR could result in up to ten million additional deaths worldwide by 2050.

At the AHSC, we are responding to this growing global problem by harnessing the insights of NHS clinicians, scientists from Imperial College London and its School of Public Health to develop and evaluate new interventions that can be applied before there is any evidence of disease. We are also developing new strategies to detect diseases at an earlier stage, to stop or slow down their progression and new non-pharmacological approaches to disease treatment.

On the next page are a few examples of recent projects with encouraging results to improve patient care in the UK and worldwide.

Tackling sepsis with artificial intelligence

Sepsis, also known as blood poisoning, is a life-threatening condition caused by the body's response to an infection. It can be treated effectively with antibiotics if diagnosed early, but delays in treatment can result in multiple organ failure and death.

A new programme developed by researchers at Imperial working in collaboration with clinicians at Imperial College Healthcare NHS Trust has the potential to revolutionise sepsis care. Dr Aldo Faisal, Reader in Neurotechnology at Imperial and Professor Anthony Gordon, Consultant in Intensive Care Medicine at Imperial College Healthcare NHS Trust, have developed a computer programme that uses artificial intelligence (AI) to help clinicians treat patients with sepsis more effectively.

The programme, known as AI Clinician, 'learnt' the best treatment strategy for a patient by analysing the records of about 100,000 hospital patients in US intensive care units, along with the decision of every single doctor that treated them.

Their findings showed that AI Clinician made more reliable treatment decisions than human doctors. The programme uses a process called reinforcement learning – a type of machine learning that enables software to learn in an interactive environment using feedback from its own actions and experiences. It looks at 48 variables including age, vital signs and pre-existing conditions to make its decisions.

Following the results of the study, the team hopes to roll out the technology to intensive care units at Imperial College Healthcare NHS Trust and to others in the UK. AI Clinician could also help to treat other diseases such as diabetes and neurological conditions.

Dr Aldo Faisal, Professor Anthony Gordon and Dr Matthieu Komorowski.

HIV test performed on USB stick

The current treatment for HIV, called anti-retroviral treatment, reduces virus levels to near zero. However, regular monitoring of viral levels by healthcare teams is needed to check a patient is taking their medication. Stopping medication fuels HIV drug-resistance, which is an emerging global problem. To counter this, scientists at Imperial and the company DNA Electronics have developed a type of HIV test on a USB stick.

The test uses a drop of blood to detect HIV and creates an electrical signal that can be read by a computer or handheld device.

The team, led by Professor Graham Cooke, NIHR Professor of Infectious Diseases at Imperial, hope that the disposable test could be used by HIV patients to monitor their own treatment and that this could enable patients with HIV to be managed more effectively by clinicians in remote locations.

The device is very accurate, and it can produce a result in less than 30 minutes. This reduces the testing time significantly, as current tests take at least three days and involve sending a blood sample to a laboratory.

The team are also investigating whether the device can be used to test for other viruses such as hepatitis.

Dr Ben Mullish

Faecal microbiota transplant to tackle C. difficile

The bacterium *Clostridium difficile* (*C. difficile*) is considered one of the most severe hospital infections. It infects the bowel and may cause diarrhoea and severe inflammation. For the most vulnerable groups, such as the elderly, severe and repeated infections can kill – the infection led to more than 1,600 deaths in England and Wales in 2012.

C. difficile is usually treated with a course of antibiotics, but this can kill off normal 'healthy' gut bacteria, leaving vulnerable patients more at risk of infection from harmful bugs and the risk of the *C. difficile* returning. Furthermore, doctors are increasingly finding that the normal antibiotics used to treat *C. difficile* no longer work so well, and that new strains of the infection cause more severe disease than was seen in the past.

Dr Ben Mullish, Clinical Research Fellow at Imperial and Honorary Specialty Registrar in Gastroenterology and Hepatology at Imperial College Healthcare NHS Trust, has been using a procedure called faecal microbiota transplant (FMT) to rebalance patients' healthy gut bacteria.

FMT involves taking a sample of a donor's faeces – their poo – and processing it until all that remains is a watery fluid packed with microbes. This bacterial suspension can be given to sick patients via a tube through the mouth and into the stomach, via a colonoscopy, or by swallowing multiple capsules, and often results in rapid improvements to health. Randomised trials have shown that is can be a much more effective treatment than conventional antibiotic therapy for many patients. Donors are regularly screened for bacteria like *C. difficile*, viruses such as HIV and hepatitis, and any other microbes that may be harmful.

Dr Mullish is part of the FMT programme at St Mary's Hospital, one of only a handful of NHS centres in the UK that regularly carries out the procedure. The St Mary's FMT service has now delivered over 50 transplants, making it one of the busiest in the country.

Dr Mullish also works as part of a research team at Imperial who are investigating how and why FMT is so effective at treating *C. difficile* infection.

They are collecting samples from patients before and after FMT and analysing them to see how FMT affects the balance of microbes and chemicals. Researchers hope they can use the results to develop new, targeted personalised therapies to tackle *C. difficile* infection.

Developing our workforce

Attracting and developing staff across all partners of the AHSC is one of our key strategic objectives. We aim to encourage and train scientists, doctors and healthcare professionals working across a wide variety of disciplines in careers and roles that support innovation in patient care.

The following examples show how we are developing and delivering a wide range of professional development programmes and opportunities to support our mission.

The AHSC Leadership and Development programme

The AHSC Leadership and Development programme is a first-of-its-kind course in the UK that equips senior clinicians and NHS managers with the leadership skills they need to operate effectively at board level, and to address key management challenges facing the healthcare system over the next five to ten years.

Developed by the AHSC in collaboration with Imperial College Business School's Executive Education programme, the AHSC Leadership and Development programme supports the government's wider plan to recruit more clinicians into management roles, enabling them to use their expertise and clinical insights to deliver better patient care.

Staff from the AHSC's NHS partners are selected to take part in the one-year programme, which consists of six modules delivered by academics at the Imperial College Business School. As part of the programme, participants learn about how to be influential, lead teams effectively and foster a high performing and innovative culture.

Participants also work collaboratively on a strategic project and receive one-to-one coaching to ensure that their learning is translated to their hospital roles. They also have opportunities to attend board meetings and shadow senior board members.

Staff from the AHSC's NHS partners graduate from the AHSC Leadership and Development programme

Starting Out in Research

Imperial College London has the highest proportion of medical students who go into clinical academic training in the country and a large cohort of medical PhD students. However, the academic development routes for healthcare professionals who are not doctors are not as established, despite the fact that they represent a large proportion of the NHS workforce and have in-depth knowledge of what matters to patients.

The Starting Out in Research programme is aimed at NHS staff such as allied health professionals, nurses, midwives, pharmacists and healthcare scientists. This course develops the skills and confidence that participants need for a research career, so that they can apply for clinical academic career opportunities at pre-doctoral level.

The programme is delivered by academics from Imperial and healthcare staff from our NHS partners. Participants learn about how to identify a research question, involve patients in studies, analyse data and prepare grant proposals. They also hear from peers about the experience of undertaking research, developing their clinical academic careers and work in groups with a research coach to discuss how to apply the knowledge and skills they have learned in their work environment.

Participants from the AHSC's NHS partners on the Starting Out in Research programme.

The AHSC Clinical Research Training Framework

The AHSC Clinical Research Training Framework has been developed by the Imperial Clinical Academic Training Office, to support staff develop a detailed understanding of research, and associated skills and allow them to become more directly involved in the work of the AHSC.

The framework supports the AHSC's mission to increase the number of staff engaged in clinical research, improve research knowledge, fosters an environment for collaborative research and improve NHS practice.

A participant in the AHSC Pregnancy Feeding Study at Hammersmith Hospital

Imperial College Academic Health Science Centre

A partnership between Imperial College London, Imperial College Healthcare NHS Trust, Royal Brompton & Harefield NHS Foundation Trust, The Royal Marsden NHS Foundation Trust, and The Institute of Cancer Research, London.

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