

2021

Presentations from New Fellows

5-6 July 2021

Programme for Monday 5 July 2021

13:00 **Welcome from the Registrar**
Professor Philippa Saunders FRSE FMedSci

Presentations from new Fellows

**Pregnancy research matters: from bench to bedside,
campus to clinic**

Professor Lucy Chappell FMedSci, NIHR Professor in
Obstetrics, King's College London

A brief history of public engagement

Dr Roger Highfield FMedSci, Science Director, Science
Museum Group

**Viral diseases in Uganda - new challenges requiring
new approaches**

Professor Pontiano Kaleebu FMedSci, Director, Uganda Virus
Research Institute and Director, MRC/UVRI and London
School of Hygiene and Tropical Medicine Uganda Research
Unit

**Controlling drug transport with pharmaceutical
nanotechnology**

Professor Ijeoma Uchegbu FMedSci, Chair in Pharmaceutical
Nanoscience, University College London

14:30 Break

15:00 Networking – an opportunity for new and existing Fellows to
meet

16:00 Close

Programme for Tuesday 6 July 2021

13:00 **Welcome from the Registrar**
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Presentations from new Fellows

Pharmaceutical medicine

Dr Felicity Gabbay FMedSci, Managing Partner, tranScrip

Rewiring the brain

Professor Heidi Johansen-Berg FMedSci, Wellcome Trust
Principal Research Fellow and Director, Wellcome Centre for
Integrative Neuroimaging, University of Oxford

By helping the dead, the dead will help the living

Professor Guy Ruttly MBE FMedSci, Professor of Forensic
Pathology, University of Leicester

Respiratory virus research at the interface between science and public health policy

Professor Jonathan Van-Tam MBE FMedSci, Clinical Professor
and Head, Health Protection and Influenza, University of
Nottingham

14:30 Break

15:00 Networking – an opportunity for new and existing Fellows to
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16:00 Close

Pregnancy research matters: from bench to bedside, campus to clinic

Professor Lucy Chappell FMedSci (2020)

Research is an essential cornerstone for improving care and outcomes for pregnant women, in the UK and globally. Whilst some of antenatal care has changed little in the last 100 years, research has directly informed development and implementation of a new diagnostic test based on Placental Growth Factor for women with suspected pre-eclampsia. The pipeline of research can be best considered as a translational circle, with equity of access woven into the framework to tackle inequalities by pregnancy status and ethnicity.

Lucy Chappell is Professor in Obstetrics at King's College London, Honorary Consultant Obstetrician at Guy's and St Thomas' NHS Foundation Trust and an NIHR Senior Investigator. She runs a research programme investigating prediction and prevention of adverse pregnancy outcomes, particularly in women with pre-existing co-morbidities such as chronic hypertension and chronic kidney disease, using randomised controlled trials and observational studies. She has subspecialty training in maternal-fetal medicine and a Masters in higher education, supervising higher degree students from obstetric, nephrology, general practice and midwifery backgrounds. She is Chair of the NIHR HTA Clinical Evaluation and Trials committee and Chair of the NIHR Artificial Intelligence for Multiple Long-Term Conditions committee. She is national pregnancy lead for the RECOVERY trial in COVID-19 and has been vaccine lead for the Royal College of Obstetricians and Gynaecologists up to May 2021. She will take up the role of Chief Scientific Adviser to the Department of Health and Social Care in August 2021.

Pharmaceutical medicine

Dr Felicity Gabbay FMedSci (2020)

Pharmaceutical medicine is one of the fastest-growing medical specialities in the UK. In the 1970s, there were only 260 pharmaceutical physicians. By the mid-90s, that figure was 700. Nowadays, more than 2,500 doctors are working in the speciality – and around 140 are undergoing their training to become pharmaceutical physicians at any one time. Globally, there are more than 7,000 new medicines in the development pipeline. Doctors who specialise in pharmaceutical medicine use their clinical skills and knowledge of human biology to take products to the market and ensure prescribing information for individual information is maintained. They work in many different environments including the pharmaceutical industry, research organisations and drug regulatory authorities. tranScrip is a specialist pharmaceutical research organisation which conducts pharmaceutical projects and facilitates taking projects to the market (usually at least one successful license of an innovative or repurposed treatment per year) and works on ensuring information is updated for continued safe and effective prescribing.

Flic Gabbay is the Managing Partner of tranScrip. She has worked in the industry for four decades and has held a number of senior and CEO positions in big pharma, biotech and CROs in both Europe and North America. She has extensive experience of working on the development, submission and launches of products in infection, respiratory disease,

arthritis, immunology, chronic kidney disease and oncology. Much of her recent experience has been in overseeing successful tranScript teams for licensing new products. Flic started her career in big pharma in Rhone Poulenc (now Sanofi) and Parke Davis (now Pfizer) - in the latter she held senior positions including global therapeutic head and Board level in UK and Ireland. She was founding Chairman of the steering group that set-up the UK Faculty of Pharmaceutical Medicine (FPM) and is currently its Vice President and President Elect. She started Gabbay Group, a CRO acquired by PPD; was Founding Chairman of Phico Therapeutics and has also been CEO of two small biotech companies. She was also Director of Education at the Drug Safety Research Unit (DSRU) Portsmouth University and helped set up many courses for training pharmaceutical physicians and others globally.

A brief history of public engagement

Dr Roger Highfield FMedSci (2020)

Over his career, Roger Highfield has worked on ways to engage diverse audiences using a range of media and methods. He wrote for more than two million readers when he joined The Daily Telegraph in 1986, which grew to tens of millions more online after the Electronic Telegraph was launched in 1994. In addition to a range of initiatives, from a long running science writing competition to an annual encounter between scientists and media that continues today with the support of the Royal Society, he collaborated with the BBC on Megalab and LiveLab mass experiments and, as Editor of New Scientist, worked with the MRC's Cognition and Brain Sciences Unit on one of the largest mass cognitive tests. Today, as Science Director of the Science Museum Group, which attracts more than 5.5 million visitors to its five museums in a normal year, new opportunities for mass engagement arise through events, citizen science, exhibitions and galleries. Over the decades, he has reached other audiences by writing or co-authoring eight popular science books, including two bestsellers.

Roger Highfield is the Science Director at the Science Museum Group. He studied Chemistry at the University of Oxford and was the first person to bounce a neutron off a soap bubble. Roger was the Science Editor of The Daily Telegraph for two decades, and the Editor of New Scientist between 2008 and 2011. He is a member of the Medical Research Council and a visiting Professor at University College London and Oxford University.

Rewiring the brain

Professor Heidi Johansen-Berg FMedSci (2021)

This talk will focus on brain plasticity – how the brain changes with experience. It is well established that synaptic plasticity supports learning and memory in the brain. This talk considers whether the myelinated axon offers an alternative site for brain plasticity. Evidence from both humans and rodents suggests a role for myelin plasticity in skill learning and long-term memory consolidation. This suggests that plasticity is not limited to the synapse and that alternative sites for plasticity offer complementary routes by which experience can shape brain structure.

Heidi Johansen-Berg is a Wellcome Principal Research Fellow and Director of the Wellcome Centre for Integrative Neuroimaging (WIN), based at the University of Oxford. WIN is a multi-disciplinary research facility that aims to exploit the ability of non-invasive neuroimaging to bridge the gap between laboratory neuroscience and human health, by performing multi-scale studies spanning from animal models through to human populations. Heidi's own research group investigates plasticity and recovery in the sensorimotor system, with particular focus on white matter plasticity and activity-dependent myelination. Her research focuses on how the brain changes with learning, experience, and damage. As well as shedding light on how the healthy brain responds to change, her work also has implications for understanding and treating disease. For example, her group are testing new methods for rehabilitation after stroke and assessing whether taking up physical exercise could slow the effects of age on the brain or promote healthy brain development during adolescence. The group's research uses a variety of neuroimaging and stimulation tools in healthy human volunteers across the lifespan, individuals with brain damage, and rodents.

Viral diseases in Uganda - new challenges requiring new approaches

Professor Pontiano Kaleebu FMedSci (2020)

For more than 30 years Uganda has seen the devastating effects of HIV-1, an epidemic that is slowly being controlled but with new challenges. At the same time, with an ecosystem at the equatorial Africa, Uganda is also seeing challenges of emerging and re-emerging infections that require new approaches. In this presentation, I will discuss the challenges of the continuing HIV-1 diversity and emerging resistance to anti-retroviral drugs, and new approaches to identify sources of HIV-1 infection in communities. I will also discuss new virological and immunological approaches to confront emerging and re-emerging diseases like Ebola, Rift Valley Fever and COVID-19.

Pontiano Kaleebu is Director of the Uganda Virus Research Institute (UVRI) and Director of MRC/UVRI and LSHTM Uganda Research Unit. The UVRI is the largest Government Research Institution in Uganda dealing specifically in viral research. The MRC Unit he leads is one of the two MRC-UK Units outside of the United Kingdom and is a multidisciplinary programme studying the HIV epidemic in rural and urban settings, emerging and re-emerging infections and non-communicable diseases.

Professor Kaleebu holds a medical degree from Makerere University and a PhD from Imperial College. He is a Professor of Immunovirology at the London School of Hygiene and Tropical Medicine, a Fellow of Royal College of Physicians-Edinburgh and a Fellow of Imperial College London Faculty of Medicine. In November 2020, he received an Award of Excellence for his work on viruses and COVID-19 from the Uganda Ministry of Science, Technology and Innovation. He is a member of the Ministry of Health COVID-19 Scientific Advisory Committee, the COVID-19 Vaccine Access Committee and chairs the SARS-CoV-2/COVID-19 Laboratory Testing and Quality Assurance Committee. He also chairs the Technical working group on HIV drug resistance. His main research interests are viral vaccine research including understanding protective immune responses, HIV diversity and resistance to antiretroviral drugs. He has been very active in both human and infrastructure capacity development, including leading the East African Consortium for Clinical Research funded by the European & Developing Countries Clinical Trials

Partnership (EDCTP). He has more than 310 publications in scientific journals and book chapters.

By helping the dead, the dead will help the living

Professor Guy Rutty MBE FMedSci (2021)

The invasive autopsy dissection as a means of investigating the dead has changed little since the mid-16th century. It may cause significant negative effects to the surviving relatives potentially adding to the emotional burden of grief. It is disliked or forbidden within a number of religious faiths, may prove a risk to the dissector depending on the circumstances of the death and in cases outside forensic practice, is not subject to routine independent observation, audit or peer review. In the 21st century there has to be an alternative to either replace the necessity to undertake the examination in the first place, or when necessary, to enhance the examination without compromising the investigation. In this presentation, I will summarise how I have lead research at Leicester to translate the use of clinical computed tomography to investigate the dead. I will summarize the steps that I have taken from scanning the first cadaver in 2002, to implementing postmortem imaging systems to investigate natural, unnatural and mass fatality deaths.

Having established these methods, we are now reverse translating our systems to allow the dead to assist the living. I will briefly illustrate the example of how we are using postmortem imaging to try and improve our understanding of closed chest compression resuscitation. I have assisted the dead (and the relatives) with a more respectful means of investigating their death and the dead in return are assisting me in trying to save more lives.

Guy Rutty is the Foundation Chair in Forensic Pathology at the University of Leicester and also Chief Forensic Pathologist to the East Midlands Forensic Pathology Unit. He holds the basic medical qualifications of Bachelor of Medicine and Bachelor of Surgery and has a Medical Doctorate. He is a Fellow of the Royal College of Pathologists and holds its Diploma in Forensic Pathology. He is a Founding Fellow of the Chartered Society of Forensic Sciences, a Founding Fellow of the Faculty of Forensic and Legal Medicine at the Royal College of Physicians and an Associate Fellow of the Higher Education Academy. He is also an Honorary Consultant in Histopathology to the University Hospitals of Leicester NHS Trust and a Home Office Registered Forensic Pathologist – having joined the Home Office Accredited Register in 1996.

He is a member of the Pathology Delivery Board for Forensic Pathology for the Home Office and Forensic Science Regulator's Forensic Pathology Advisory Group by virtue of his role as Responsible Officer to the PDB. His principal clinical work relates to the provision of forensic pathology services to HM Coroners and police forces of the East Midlands. He also provides forensic pathology services to other UK police forces as well as opinion work for both prosecution and defence for solicitors and police forces alike. He provides forensic pathology and mass disaster services to police forces and countries internationally and has specialist training and experience in dealing with so-called CBRN (Chemical, Biological, Radiological and Nuclear) fatalities having been the UK forensic pathology lead for this area of work for over ten years.

Guy Rutty has acted as Chair of the Scientific Advisory Committee of the International Commission on Missing Persons (ICMP) and as Deputy Chair of the Pathology and Anthropology Working Group of the Steering Committee for Disaster Victim Identification of Interpol. He was awarded an MBE in 2010 for services to the police and counter terrorism. He was also responsible for the pathological examination of the remains of King Richard III and is the principal pathological author of the paper that describes the injuries he sustained and proposes the most probable cause of death.

Controlling drug transport with pharmaceutical nanotechnology

Professor Ijeoma Uchegbu FMedSci (2021)

Insights into *in vivo* drug transport mechanisms and their control, using pharmaceutical nanotechnology, allows for the development of efficacious and safer medicines. Over the past two decades we have designed self-assembling polymers and peptides from a variety of chemistries and used these new molecules to produce nano-enabled candidate medicines aimed at particular unmet clinical needs.

Lately we have focused on the design of a pain medicine, in which the endogenous and metabolically labile peptide, enkephalin, is packaged in pharmaceutical nanoparticles and delivered to the brain, resulting in the candidate medicine - Envelta™. Envelta™ has a number of differentiating features and has been outlicensed for clinical development, in an effort to address the US opioid crisis, as prescription opioid use in the US is responsible for 15,000 deaths per annum.

We have also developed nano-enabled ocular technologies, as drug delivery to ocular tissues is inefficient due to the very short ocular residence time (1-2 minutes) and eye-drops cannot be used to target the back of the eye. Our nano-enabled eye drops deliver drug to the retina and significantly enhance drug deposition into ocular tissues, with no plasma exposure. The use of eye drops to deliver drugs to the retina is unprecedented and could lead to more effective treatments for retinal diseases. One of these new candidate medicines will enter clinical development in 2021.

Other outputs from our laboratory include: a biocompatible nasal spray that significantly inhibits respiratory viruses and a new diagnostic platform, which enables high resolution imaging of the liver vasculature.

Ijeoma Uchegbu is Professor of Pharmaceutical Nanoscience at University College London and Chief Scientific Officer of Nanomerics Ltd, a UCL spin out company. She has studied the mechanisms of drug transport across biological barriers and created transformational drug transport nanoparticles. She was the first to show that peptides could be delivered across the blood brain barrier to elicit a pharmacological response, when presented as peptide drug nanofibers and the first to demonstrate, via definitive pharmacology and pharmacokinetics evidence, peptide transport into the brain, using peptide nanoparticles delivered via the nose to brain route. These findings led to the enkephalin pain medicine candidate Envelta™, which was designed to address the opioid crisis. In preclinical studies, Envelta™ showed no analgesic tolerance, reward seeking behaviour or potential to cause significant constipation. Envelta has been out licensed to Virpax Pharmaceuticals (NASDAQ: VRPX) and is currently being developed by the US National Center for Advancing Translational Studies. If successful, this will be the first

neuropeptide medicine approval and it will have been made possible by the innovation originating in Uchegbu's group. The technology underpinning Envelta™ won first prize in the Royal Society of Chemistry's Emerging Technologies competition in 2017 and the Academy of Pharmaceutical Sciences Science Innovation Award in 2016. Three other medicine candidates based on this nanotechnology have been outlicensed to pharmaceutical companies in the US. Uchegbu's work has been funded continuously for 21 years by the EPSRC and she serves on the BBSRC Council. As UCL's Pro Vice Provost for Africa and the Middle East, Uchegbu leads on the international research and teaching engagement strategy in this region. She has served as Chair of the Academy of Pharmaceutical Sciences and chaired EPSRC and Science Foundation Ireland grant prioritisation panels. She is UCL Provost's Envoy for Race Equality and leads on race equality work at UCL. Her initiatives (e.g. Dean's Pledges on Race Equality) were instrumental in achieving UCL's Bronze Race Charter in 2020.

Respiratory virus research at the interface between science and public health policy

Professor Jonathan Van-Tam FMedSci (2021)

Respiratory viruses are the most common cause of winter illness and consultations with a doctor in primary care. Until very recently they have been significantly neglected in terms of specific diagnosis, with knock-on problems related to the development and evaluation of vaccines and therapeutics. Creating rational public health policy for respiratory virus interventions has been at the forefront of my research for many years and a prominent part of my current role in the COVID-19 pandemic response.

Jonathan Van-Tam graduated in Medicine from the University of Nottingham in 1987. After 5 years of hospital-based clinical medicine, he pursued an academic training in public health and epidemiology with a special interest in influenza and respiratory viruses. He became a Senior Lecturer (Associate Professor) at the University of Nottingham (and Consultant Regional Epidemiologist, Public Health Laboratory Service) in 1997, before joining the pharmaceutical industry as an Associate Director (Anti-Infectives, New Product Development) at SmithKline Beecham in 2000. After a move to Roche as Head of Medical Affairs (UK) where he launched oseltamivir (Tamiflu®), he joined Aventis Pasteur MSD as UK Medical Director, with clinical responsibility for its large vaccines portfolio. He returned to the public sector in 2004 at the Health Protection Agency Centre for Infections (Colindale), where he was Head of the Pandemic Influenza Office until October 2007. He returned to Nottingham as Professor of Health Protection, maintaining his 30-year special interest in influenza and other respiratory viruses: epidemiology; transmission; vaccinology; antiviral drugs; and pandemic preparedness.

He was a member of the UK Scientific Advisory Group for Emergencies (SAGE) during the 2009-10 A/H1N1 influenza pandemic and has acted as a short-term consultant and temporary adviser to the World Health Organization (WHO), ECDC, and the European Commission (EC) on multiple occasions since 2005. He is Senior Editor of the highly rated textbook: *Introduction to Pandemic Influenza* and from 2014-2017 was Editor-in-Chief of *Influenza and Other Respiratory Viruses*. In late 2014 he became Chair of the UK's New and Emerging Respiratory Virus Threat Advisory Group (NERVTAG), and ran a WHO official Collaborating Centre for pandemic influenza at Nottingham University from 2010-2017.

From late 2017 he has been seconded to the Department of Health and Social Care, England as Deputy Chief Medical Officer where his portfolio is vaccines, pharmaceuticals, health protection, and biosecurity. In that role he has been extensively involved in domestic vaccines policy, seasonal influenza, infectious disease incidents (Ebola, Monkey Pox), the Novichok attacks, and the Covid-19 pandemic, including every aspect of the successful UK vaccine procurement and deployment programme. He is a member of the UK Scientific Advisory Group for Emergencies (SAGE) and co-Chair of the Global Health Security Advisory Group (GHSAG) pandemic influenza working group (PIWG).
