

2nd INTERNATIONAL SYMPOSIUM ON RESPIRATORY RESEARCH

19 & 20 March 2018

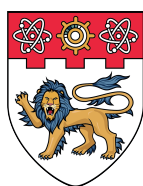
Lee Kong Chian School of Medicine

Novena Campus

Toh Kian Chui Annex, Lecture Theatre

11 Mandalay Road, Singapore 308232

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Co-Convenors' Message

Dear Friends and Colleagues,

It is with great pleasure as co-convenors to welcome you to the 2nd International Symposium on Respiratory Research at the Lee Kong Chian School of Medicine, Nanyang Technological University, Singapore. This meeting follows on from the very successful inaugural meeting held at the National University of Singapore in April 2016 where many collaborations and friendships were established. The success of the first workshop has been the catalyst for our official Memorandum of Understanding signing between all our partners to open the meeting this year. We hope this ceremony and symposium will bring us even closer; provide a basis for further collaborative projects and graduate student exchanges going forward.

The 2018 meeting has been jointly organised by the Lee Kong Chian School of Medicine, Nanyang Technological University, Singapore and the University of Newcastle, Australia in partnership with the Yong Loo Lin School of Medicine, National University of Singapore, University of British Columbia, Karolinska Institutet and Imperial College London. This year we are also delighted to welcome the University of Groningen as a new partner and hope that this is just the start of further expanding our network of respiratory collaboration.

Academic respiratory medicine is entering a new and exciting era; one where diagnostic challenges are emerging in the form of overlap syndromes, newer multi-omic technologies are being increasingly applied and complex bioinformatic challenges involving artificial intelligence have arrived. The themes of this year's meeting are aimed at addressing these challenges and include (1) Respiratory Infection, the Microbiome and Chronic Respiratory Disease; (2) Bioengineering, Nanomedicine and other Respiratory Innovations and (3) Respiratory Physiology, Therapeutics and Service Impact. These areas, while seemingly diverse will harness the strengths of participants across a range of basic science, translational and clinical research that underpins respiratory health and disease.

Singapore, our garden city is an exceptional location for the symposium. Our speakers' dinner on the top floor of the Clinical Sciences Building at our Novena Campus will provide you a bird's eye view of our beautiful island, which despite its small size, has a diversity of languages, religions, and cultures. I do hope that you will spend some time seeing both our historical and tourist attractions. No trip to Singapore is complete without tasting some of our local delicacies including chilli crab, chicken rice and *nasi lemak*.

We hope that you enjoy the two days of science, networking, building friendships and talking collaboration whilst refreshing your knowledge base and exploring the emerging innovations in respiratory medicine.

With best wishes,



S.H. Chotirmall



Sanjay Haresh Chotirmall and Darryl Knight

Monday, 19 March 2018

Time	Programme
8.00am – 9.00am	<i>Arrival and Registration</i>
9.00am – 11.00am	Launch of The Academic Respiratory Initiative for Pulmonary Health (TARIPH)
11:00am – 11:15am	<i>Coffee Break @ Lecture Theatre foyer</i>
2nd International Symposium on Respiratory Research	
Session 1: Respiratory Infection, the Microbiome and Chronic Respiratory Disease	
Chairpersons	
Asst Prof Sanjay CHOTIRMALL <i>Assistant Professor of Molecular Medicine, Principal Investigator, Translational Respiratory Research, Lee Kong Chian School of Medicine, Nanyang Technological University, Singapore</i>	
Prof Darryl KNIGHT <i>Professor & Head of School, Biomedical Sciences and Pharmacy, Faculty of Health and Medicine, University of Newcastle, Australia</i> <i>Visiting Professor, Lee Kong Chian School of Medicine, Nanyang Technological University, Singapore</i>	
11.15am – 11.30am	Gut Microbiomes in Respiratory Disease Prof Philip HANSBRO <i>NHMRC Principal Research Fellow</i> <i>Chair of Microbiology, Professor of Immunology and Microbiology, School of Biomedical Sciences & Pharmacy, University of Newcastle, Australia</i> <i>Group Leader, Microbiology Asthma and Airways, Hunter Medical Research Institute, Australia</i>
11.30am – 11.45am	The Air Microbiome: A Missing Ecosystem? Prof Stephan SCHUSTER <i>Director, Singapore Centre for Environmental Life Sciences Engineering, Nanyang Technological University, Singapore</i>
11.45am – 12.00pm	Asthma Endotypes: Microbiome and Environmental Pollution Prof CHUNG Kian Fan <i>Professor of Respiratory Medicine, National Heart & Lung Institute, Imperial College London, United Kingdom</i> <i>Visiting Professor, Lee Kong Chian School of Medicine, Nanyang Technological University, Singapore</i>
12.00pm – 12.15pm	Insights into the HIV Airway Epithelial Microbiome Asst Prof Janice LEUNG <i>Assistant Professor, Division of Respiratory Medicine, Department of Medicine, University of British Columbia, Canada</i>

12.15pm – 12.30pm	<p>United Airway Endotyping to Guide Personalised Medicine in Severe Airway Disease</p> <p>Asst Prof LIM Hui Fang Consultant, <i>Department of Respiratory and Critical Care Medicine, National University Hospital, Singapore</i> Assistant Professor, <i>Yong Loo Lin School of Medicine, National University Hospital, Singapore</i></p>
12.30pm – 12.45pm	<p>Importance of Macrophage Responses in the Pathogenesis of Pulmonary Aspergillosis</p> <p>Dr Darius ARMSTRONG-JAMES Clinical Senior Lecturer in <i>Respiratory Fungal Diseases, Faculty of Medicine, National Heart & Lung Institute, Imperial College London, United Kingdom</i></p>
12.45pm – 1.00pm	<p>Single-cell Transcriptional Delineation of Human ILCs Reveals Potential Targets for Treatment of Inflammatory Conditions</p> <p>Asst Prof Jenny MJÖSBERG Assistant Professor, <i>Centre for Infectious Medicine, Department of Medicine, Karolinska Institutet, Sweden</i></p>
1.00pm – 1.30pm	Lunch @ Lecture Theatre foyer
1.30pm – 3.45pm	<p>Collaborative Meetings and/or</p> <p>Optional Tour of Facilities @ CSB – Facilitated by Mr TAN Hee Kiang, Director of Operations and Resources, Lee Kong Chian School of Medicine, Nanyang Technological University, Singapore</p>
3.45pm – 4.00pm	Group reconvenes for Coffee Break @ Lecture Theatre foyer
<p>Session 2: Bioengineering, Nanomedicine and Other Respiratory Innovations</p> <p>Chairpersons</p> <p>Prof Christopher CARLSTEN Professor of Medicine, <i>Astra-Zeneca Endowed Chair, Canada Research Chair in Occupational and Environmental Lung Disease, University of British Columbia, Canada</i> Director and Staff Respiriologist, <i>Occupational Lung Disease Clinic, Vancouver General Hospital, Canada</i></p> <p>Assoc Prof Fred WONG Wai-Shiu Head & Associate Professor, <i>Respiratory Pharmacology Laboratory, Department of Pharmacology, Yong Loo Lin School of Medicine, National University Health System, Singapore</i></p>	
4.00pm – 4.15pm	<p>Development of Lung Organoids</p> <p>Prof Ian ADCOCK Professor of <i>Respiratory Cell and Molecular Biology, National Heart & Lung Institute, Imperial College London, United Kingdom</i> Honorary Senior Lecturer, <i>Royal Brompton & Harefield NHS Trust (HEFCE)</i></p>

4.15pm – 4.30pm	<p>Glycosylated Cationic Block Poly(β-peptides) for Potentiating Antibiotics Against Gram-negative Bacteria</p> <p>Prof Mary CHAN Bee Eng <i>Director, Centre for Antimicrobial Bioengineering, Nanyang Technological University, Singapore</i> <i>Co-Director, Nanyang Technological University Food Technology Centre, Singapore</i> <i>Professor, School of Chemical and Biomedical Engineering, College of Engineering, Nanyang Technological University, Singapore</i></p>
4.30pm – 4.45pm	<p>Molecular Sub-phenotyping of Obstructive Lung Disease</p> <p>Assoc Prof Craig WHEELLOCK <i>Head of Integrative Molecular Phenotyping Laboratory, Department of Medical Biochemistry and Biophysics, Associate Professor, Centre for Allergy Research, Karolinska Institutet, Sweden</i></p>
4.45pm – 5.00pm	<p>Understanding the Role of the Three Dimensional Extracellular Matrix in Driving Chronic Lung Disease Progression</p> <p>Assoc Prof Janette BURGESS <i>Rosalind Franklin Fellow, Associate Professor of Extracellular Matrix in Disease Pathogenesis, Groningen Research Institute of Asthma and COPD (GRIAC), Faculty of Medical Sciences, Department of Pathology and Medical Biology, University Medical Center Groningen, University of Groningen, Netherlands</i></p>
5.00pm – 5.15pm	<p>Impairment of the Cilia Architecture and Ciliogenesis in Common Inflammatory Nasal Diseases</p> <p>Prof WANG De Yun <i>Professor, Director of Research, Department of Otolaryngology, National University of Singapore, Singapore</i></p>
5.15pm – 5.30pm	<p>Using Airway Epithelial Targeting Nanoparticles to Translate Mechanism into Therapy</p> <p>Assoc Prof Nathan BARTLETT <i>Head and Associate Professor, Viral Immunology and Respiratory Disease Group, School of Biomedical Sciences and Pharmacy, Faculty of Health and Medicine, Hunter Medical Research Institute, University of Newcastle, Australia</i></p>
5.30pm – 5.45pm	<p>Traffic-related Air Pollution Alters the Lung Proteome</p> <p>Prof Christopher CARLSTEN <i>Professor of Medicine, Astra-Zeneca Endowed Chair, Canada Research Chair in Occupational and Environmental Lung Disease, University of British Columbia, Canada</i> <i>Director and Staff Respiriologist, Occupational Lung Disease Clinic, Vancouver General Hospital, Canada</i></p>
5.45pm	<p><i>End of Day 1</i></p>

Tuesday, 20 March 2018

Time	Programme
8.00am – 9.00am	<i>Arrival and Registration</i>
<p>Session 3: Respiratory Physiology, Therapeutics and Service Impact</p> <p>Chairpersons</p> <p>Prof Kian Fan CHUNG <i>Professor of Respiratory Medicine, National Heart & Lung Institute, Imperial College London, United Kingdom</i> <i>Visiting Professor, Lee Kong Chian School of Medicine, Nanyang Technological University, Singapore</i></p> <p>Prof Sven-Erik DAHLEN <i>Professor of Experimental Asthma and Allergy Research, Director of CfA – The Centre for Allergy Research, Karolinska Institutet, Sweden</i></p>	
9.00am – 9.15am	<p>Pharmacological Re-sensitisation of Steroid Resistance in Respiratory Diseases</p> <p>Assoc Prof Fred WONG Wai-Shiu <i>Head and Associate Professor, Respiratory Pharmacology Laboratory, Department of Pharmacology, Yong Loo Lin School of Medicine, National University Health System, Singapore</i></p>
9.15am – 9.30am	<p>Understanding the Molecular Processes Regulating Exacerbation of Asthma</p> <p>Laureate Prof Paul S. FOSTER <i>Director, Priority Research Centre for Healthy Lungs; Virus, Infection/Immunity, Vaccines and Asthma Program, Hunter Medical Research Institute, Australia</i> <i>Laureate Professor, Chair of Immunology, School of School of Biomedical Sciences and Pharmacy, Faculty of Health, University of Newcastle, Australia</i></p>
9.30am – 9.45am	<p>Wnt Activity Marks Lung Progenitors Capable of Forming Spheres <i>in vitro</i></p> <p>Assoc Prof Reinoud GOSENS <i>Associate Professor of Translational Pharmacology, Faculty of Mathematics and Natural Sciences, Department of Molecular Pharmacology, University of Groningen, Netherlands</i></p>
9.45am – 10.00am	<p>Harnessing the Potential of Family Medicine to Achieve Better Respiratory Health</p> <p>Prof Helen SMITH <i>Professor of Family Medicine and Primary Care, Lee Kong Chian School of Medicine, Nanyang Technological University, Singapore</i></p>

10.00am – 10.15am	<p>Respiratory Medicine at the University of British Columbia</p> <p>Prof Dermot KELLEHER <i>Dean, Faculty of Medicine, University of British Columbia, Canada</i> <i>Visiting Professor, Lee Kong Chian School of Medicine, Nanyang Technological University, Singapore</i></p>
10.15am – 10.30am	<p>Old and New Biomarkers for Identification of Mechanisms in Asthma and Other Respiratory Diseases</p> <p>Prof Sven-Erik DAHLEN <i>Director, CfA-The Centre for Allergy Research, Karolinska Institutet, Sweden</i> <i>Professor of Asthma and Allergy Research, Experimental Asthma and Allergy Research, Institute of Environmental Medicine, Karolinska Institutet, Sweden</i></p>
10.30am – 10.45am	<p>Ultrafast and Low Cost PCR Amplification For DNA Diagnostics at the Point of Need</p> <p>Assoc Prof Eric YAP <i>Associate Professor of Human and Microbial Genetics, Principal Investigator, Medical Genomics Laboratory, Lee Kong Chian School of Medicine, Nanyang Technological University, Singapore</i></p>
10.45am – 11.00am	<p>Tetraspanins as Therapeutic Targets in Respiratory Diseases</p> <p>Asst Prof Thai TRAN <i>Assistant Professor, Head, Diseases Research Laboratory, Department of Physiology, National University of Singapore, Singapore</i></p>
11.00am – 11.15am	<p>Groningen Research Institute for Asthma and COPD (GRIAC)</p> <p>Prof Han MOSHAGE <i>Professor of Experimental Hepatology and Gastroenterology; Academic Director (International Relations), Graduate School of Medical Sciences, University Medical Centre Groningen, Netherlands</i></p>
11.15am – 11.30am	<p><i>Closing Address by LKCMedicine Dean Prof James Best</i></p>
11.30am – 11.45am	<p><i>Coffee Break @ Lecture Theatre foyer</i></p>
11.45am	<p><i>End of Symposium</i></p>

Gut Microbiomes in Respiratory Disease

Professor Philip HANSBRO

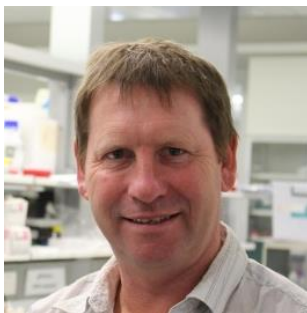
NHMRC Principal Research Fellow

Chair of Microbiology, Professor of Immunology and Microbiology, School of Biomedical Sciences & Pharmacy, University of Newcastle, Australia

Group Leader, Microbiology Asthma and Airways, Hunter Medical Research Institute, Australia

Respiratory diseases are major clinical issues. About 12% of Australians have asthma and chronic obstructive pulmonary disease (COPD) is the third commonest cause of death worldwide. There are no effective treatments for severe asthma or COPD. Asthma results from aberrant T cell responses to innocuous antigens and smoking is the commonest cause of COPD in the West. In both diseases, chronic inflammation results in tissue damage that causes airway remodelling, mucus hypersecretion and fibrosis that impair lung function. Alveolar destruction and emphysema also occur in COPD. Current therapies are ineffective in alleviating some symptoms and cannot reverse or cure the disease. The microbiome encompasses all microorganisms inhabiting the body. Recent studies show that a healthy microbiome is essential for maintaining homeostasis and health. Changes in the airway and lung microbiome may contribute to the pathogenesis of asthma and COPD. Deleterious bacteria may promote whereas beneficial bacteria may suppress inflammation and disease. These may be altered by immune responses to allergens and cigarette smoke. Alterations in the gut are associated with colitis, which may also be mediated by changes in the microbiome. Substantial immune and inflammatory cross-talk occurs between the lung and gut, and so changing gut microbiomes may be beneficial for lung disease. Microbiome profiling can assess the changes associated with disease and its transfer can modify microbiomes. This can identify deleterious and beneficial bacteria for therapeutic benefit.

About the Speaker



Professor Hansbro is a group leader and holds a personal chair in immunology and microbiology at the Hunter Medical Research Institute and University of Newcastle, Australia, and is Associate Director of the Priority Research Centre for Asthma and Respiratory Diseases there. He is also an NHMRC Principal Research Fellow. He has established internationally recognised research programs in infections, COPD, asthma and recently lung cancer. His group has developed several novel mouse models of the important diseases (COPD, severe, steroid-insensitive asthma, early life infection & lung cancer). He has interrogated them (immune, histological, pathological, lung function & molecular analysis) to substantially further our understanding of pathogenesis and to develop novel therapies. He performs complimentary collaborative clinical and multi-disciplinary studies and collaborates widely. He publishes extensively in influential journals and he is regularly invited to present internationally including as plenary and to chair sessions. He has a substantial funding record of obtaining nationally competitive grants that support his group. He undertakes substantial mentoring and supervision activities of junior researchers, regularly sits on grant review panels and is on the editorial board of four journals. He is an active advocate for respiratory research in lobby groups and is regularly in the press promoting research and funding.

The Air Microbiome: A Missing Ecosystem?

Professor Stephan SCHUSTER

Director, Singapore Centre for Environmental Life Sciences Engineering, Nanyang Technological University, Singapore

Microbial communities inhabiting terrestrial and aquatic ecosystems have long been studied. With the onset of metagenomics, the degree of diversity and abundance of these communities have become apparent, even on a global scale. In contrast, the atmosphere, despite its enormous planetary volume, has largely been neglected as a habitat for microbial communities, despite providing means of transport with an intercontinental range. We have studied the occurrence of airborne microbial organisms in the tropical climate of Singapore and found robust and persistent assemblages, both on an intra-day and a month-to-month time scales. Plant-associated bacteria and fungi were found to be the major constituent of the air microbiome, in addition to DNA derived from plants and insects. Besides conducting in-depth metagenomics studies that identified the diversity and abundance of airborne organisms, we have sequenced and assembled “100 genomes from air” using single molecule real-time sequencing (SMRT). These genome data, together with organismal and habitat information, are stored in a “DNAir database”, which largely extends the organismal range of public databases and also includes previously uncultivable organisms.

Funding acknowledgement: Singapore Ministry of Education Academic Research Fund Tier 3. Grant Number: MOE2013-T3-1-013

About the Speaker



After receiving an initial degree in organic chemistry, Professor Stephan C. Schuster moved into Biochemistry and Microbiology during his graduate studies, at the Max-Planck-Institute for Biochemistry in Martinsried, Germany. In his postdoctoral studies at the California Institute of Technology, Pasadena, USA, he continued his work on Bacterial Motility and Signal Transduction. In 2005, he was appointed Associate Professor for Molecular Microbial Ecology at Pennsylvania State University (PSU), USA. He is currently Professor at the School of Biological Sciences in NTU and

Research Director of SCELSE (Singapore Centre for Environmental Life Sciences Engineering).

Asthma Endotypes: Microbiome and Environmental Pollution

Professor CHUNG Kian Fan

Professor of Respiratory Medicine, National Heart & Lung Institute, Imperial College London, United Kingdom

Visiting Professor, Lee Kong Chian School of Medicine, Nanyang Technological University, Singapore

Definition of asthma endotypes will lead to causation discovery. In U-BIOPRED molecular phenotyping of sputum transcriptomics, non-T2 pathways have been linked with specific transcriptomic-associated clusters (TAC). TAC2 is dominated by inflammasome and neutrophil activation with interferon and TNF pathways associated with T2 activation which may be linked to microbial dysbiosis (Kuo et al Eur Respir J 2017; 49(2). pii: 1602135). TAC3 is dominated by mitochondrial oxidative stress linked to a gene signature associated with exposure to diesel exhaust particles. In 60% of asthma patients, TAC1 shifted to either TAC2 or TAC3, and TAC3 to TAC2 at one year, which may represent effects of causative factors. Interactions between T2 and non-T2 pathways at the level of surface epithelium and lung macrophages, may determine the endotype and ultimately the inflammatory and clinical phenotypes. Sampling of the environment of asthmatic individuals in relation to transcriptomic, metabolomic, proteomics and metagenomics is the way forward.

About the Speaker



Kian Fan Chung is Professor of Respiratory Medicine and Head of Experimental Studies Medicine, National Heart & Lung Institute (NHLI) at Imperial College London and Respiratory Consultant Physician at the Royal Brompton & Harefield NHS Foundation Trust, London.

He is a Senior Investigator for the National Institute for Health Research, NHS, and Principal Investigator for the Medical Research Council & Asthma UK Asthma Centre on Allergic Mechanisms of Asthma and the Medical Research Council & Public Health England Health & Environment Centre at Imperial & Kings Colleges. He is Visiting Professor at Lee Kong Chian School of Medicine and Guangzhou Respiratory Institute and Medical University, China. He co-leads the Shenzhen government-funded Hong Kong University-Shenzhen Hospital ‘San Min Gong Cheng’ Respiratory Project.

His areas of expertise include asthma (particularly severe asthma) and chronic obstructive pulmonary disease (COPD) where he has a major interest in developing precision medicine and personalised treatments. He is currently studying epithelial-macrophage interactions at the airway interface, the effects of mitochondrial oxidant stress, the mechanisms underlying corticosteroid resistance, and the pulmonary impact of environmental pollution and nanoparticles.

Prof Chung co-led the European U-BIOPRED (Unbiased BIOmarkers in PREDiction of respiratory disease outcomes) Consortium and the European Union-funded MyAirCoach project, a novel mobile-health management system based on a wireless body sensor network to managing and supporting patients with asthma.

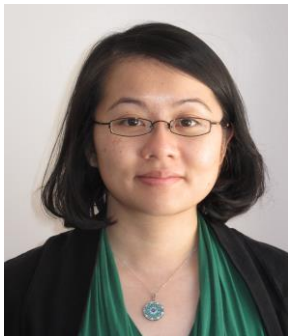
Insights into the HIV Airway Epithelial Microbiome

Assistant Professor Janice LEUNG

Assistant Professor, Division of Respiratory Medicine, Department of Medicine, University of British Columbia, Canada

In the era of combination antiretroviral therapy, people living with HIV are living longer yet are prone to developing chronic lung diseases such as COPD in accelerated and severe fashion. Respiratory symptoms in the HIV population are disproportionate to their spirometry results and to their smoking histories. With their chronic immunosuppression and history of repeated respiratory infections, we hypothesised that dysbiosis in the airway epithelium may be a key factor in the susceptibility to COPD. We collected airway epithelial cells via bronchoscopy in 28 HIV+ and 48 HIV- subjects and performed 16S rRNA sequencing on extracted DNA. HIV+ individuals demonstrated significantly decreased Shannon diversity, driven predominantly by a decrease in bacterial richness. Phyla distribution was also significantly altered in HIV with an increase in relative abundance of Proteobacteria, and a decrease in Bacteroidetes and Firmicutes. Within the HIV+ population, Pasteurellaceae, Brachybacterium, and Yersinia were able to distinguish between those with and without COPD. An altered airway epithelial microbiome in HIV may be one critical factor predisposing HIV+ patients to early COPD.

About the Speaker



Janice Leung is a Clinical Assistant Professor in the Division of Respiratory Medicine, Department of Medicine, University of British Columbia. She completed her medical degree at The Johns Hopkins University School of Medicine and her internal medicine residency at The Johns Hopkins Hospital, followed by respirology and critical care medicine fellowships at the University of Washington and the National Institutes of Health. Her clinical and translational research program focuses on chronic airways diseases in the HIV-infected population. She is a Canadian Institutes for Health Research Early Career Investigator and a Michael Smith Foundation for Health Research Health Professional Investigator.

United Airway Endotyping to Guide Personalised Medicine in Severe Airway Disease

Assistant Professor LIM Hui Fang

Consultant, Department of Respiratory and Critical Care Medicine, National University Hospital, Singapore

Assistant Professor, Yong Loo Lin School of Medicine, National University Hospital, Singapore

Severe airway disease is a heterogeneous group and thus cannot be managed using a generic approach. The speaker will describe her experience in personalised medicine in a severe airway clinic. Treatment decisions are guided by careful clinical characterization and biomarkers that pinpoint the underlying disease mechanisms e.g. inflammatory profile, mucociliary dysfunction and immunogenetic status. Close collaboration between scientists and doctors can benefit patient care directly and bridge the gap between translational research and clinical practice

About the Speaker



Assistant Professor Lim Hui Fang's research interests include severe asthma endotyping and biomarker guided treatment. She was awarded the Academic Medical Development Award to undergo a 1-year research fellowship in severe asthma, in MacMaster University (Canada) under the tutelage of Professor Parameswaran Nair. Since then she has set up a sputum inflammatory laboratory and a multi-disciplinary severe airway clinic. Her current scientific collaborations include united airway endotyping in severe asthma with chronic rhinosinusitis, the role of B cells in severe eosinophilic asthma, the association between insulin resistance and steroid insensitivity and exhaled breath analytics in asthma and respiratory infections.

She is also involved in health services research and is currently helping the integrated asthma program with GP partners, as part of the Singapore National Asthma Program.

Importance of Macrophage Responses in the Pathogenesis of Pulmonary Aspergillosis

Dr Darius ARMSTRONG-JAMES

Clinical Senior Lecturer in Respiratory Fungal Diseases, Faculty of Medicine, National Heart & Lung Institute, Imperial College London, United Kingdom

The Armstrong-James Lab is interested in the role of macrophage cell biology in the pathogenesis of pulmonary aspergillosis during immunocompromised. In this talk, Dr Armstrong-James will discuss research findings with regard to lung transplantation, cystic fibrosis and novel clinical tyrosine kinase inhibitors such as Ibrutinib. In particular, Armstrong-James and colleagues found that defects in intracellular macrophage signalling during phagocytosis in the airway appear to strongly influence outcome from infection.

About the Speaker



Dr Darius Armstrong-James is a clinical senior lecturer in respiratory fungal diseases at the National Heart and Lung Institute, Imperial College London and honorary consultant physician in infectious diseases and medical mycology to the Royal Brompton and Harefield NHS Trust. His research is primarily on innate immunity to *Aspergillus fumigatus* with a particular focus on macrophage cell biology and signal transduction. In addition, Dr James involved in clinical translation relevant to medical mycology.

Dr Armstrong-James initially studied trypanosomal peroxidases with John Kelly and David Horn at the London School of Hygiene and Tropical Medicine during his MSc in pathogen Molecular Biology. He then went on to undertake his PhD with Ken Haynes and Tom Rogers at Imperial College London on fungal host adaptation. Dr Armstrong-James was subsequently awarded a MRC Clinician Scientist Fellowship to retrain in immunology and established the fungal immunobiology laboratory at Imperial. He has recently moved to the NHLI to further support the development of academic medical mycology and clinical infectious diseases at the NHLI and Royal Brompton and Harefield.

Single-cell Transcriptional Delineation of Human ILCs Reveals Potential Targets for Treatment of Inflammatory Conditions

Assistant Professor Jenny MJÖSBERG

Assistant Professor, Centre for Infectious Medicine, Department of Medicine, Karolinska Institutet, Sweden

Innate lymphoid cells (ILCs) are increasingly appreciated as important players in homeostasis and inflammation. Mjösberg and colleagues have recently delineated heterogeneity among human tonsil CD127+ ILCs through single-cell RNA sequencing. These efforts provided interesting targets for treatment of inflammatory conditions. One such target was PGE₂, where the study found that PGE₂ limits proliferation and cytokine production from human ILC2 through the combined action of the EP2 and EP4 receptors. Thus, selective EP2 and EP4 receptor agonism might serve as promising therapeutic approach by suppressing ILC2 function. Furthermore, the study showed that ILC2 constitutively express hematopoietic prostaglandin D2 synthase (HPGDS), and upregulate COX-2 upon IL-2, IL-25, IL-33 plus TSLP-stimulation. Consequently, PGD₂ and its metabolites can be detected in ILC2 supernatants. The study reveals that endogenously produced PGD₂ is essential in cytokine-induced ILC2 activation, as blocking of the COX-1/2 enzyme or the CRTH2 receptor abolishes ILC2 responses. Hence, the study provides the detailed mechanism behind how CRTH2 antagonists represent promising therapeutic tools for allergic diseases by controlling ILC2 function.

About the Speaker



After having earned a Master degree in Biomedical Chemistry, Assistant Professor Jenny Mjösberg conducted her PhD thesis work in Clinical Immunology at Linköping University in Sweden. Her research concerned the role of regulatory T cells in human pregnancy. She graduated in 2010, and immediately joined Professor Hergen Spits at the Academic Medical Center in Amsterdam, the Netherlands. As a postdoctoral fellow in Prof Spits' lab, she has made important discoveries in the field of innate lymphoid cells (ILCs) focusing especially on human type 2 ILCs and their role in allergic inflammation. Asst Prof Mjösberg is now continuing her research on ILCs at the Center for Infectious Medicine at Karolinska Institutet, Sweden. There, she has established her independent line of research focusing on transcriptional and epigenetic features of ILCs and their role in inflammatory bowel diseases, colorectal cancer as well as in allergies and asthma.

Development of Lung Organoids

Professor Ian ADCOCK

Professor of Respiratory Cell & Molecular Biology, National Heart and Lung Institute, Imperial College London, United Kingdom

Honorary Senior Lecturer, Royal Brompton & Harefield NHS Trust (HEFCE)

The airway epithelium is a complex pseudostratified ciliated cellular layer surrounded by extracellular matrix proteins and contains goblet cells. Current airway models do not accurately reflect the three-dimensional luminal surface of the airway epithelium. We have developed a novel 3-D organoid culture of the airway epithelium using primary basal cells termed bronchospheres. Normal, Asthmatic or COPD human bronchial epithelial progenitor cells (NHBE, AHBE and CHBE respectively) formed fully functional bronchospheres with a vacuole containing beating cilia and mucous producing goblet cells in the inner lumen by day 16, 18 and 21 respectively. Size and histological differences were observed between NHBE, AHBE and CHBE. Quantitative assessment of ciliary beat frequency demonstrated a clear difference between organoid cultures from airway disease (AHBE and CHBE) compared to organoid cultures from NHBE (12.3 Hz+/-2).

Our bronchosphere model recapitulates the epithelial cell layers and physiologically relevant functions observed in the human airway epithelium.

About the Speaker



Professor Ian M Adcock graduated in 1987 from the University of London with a PhD in molecular Pharmacology having investigated the role of steroid hormones in sexual dimorphisms in the brain. After spells in Edinburgh and at St Georges' Hospital in London he moved in 1990 to the National Heart and Lung Institute to work with Professor Peter J Barnes on the molecular mechanisms of glucocorticoid action in the lung. In 2004 he became Professor of Respiratory Cell & Molecular Biology at Imperial College London.

Prof Adcock serves on the Editorial Board of several Journals, is Head of Assembly 5 (Airway Diseases) within the ERS and on the ATS Programme Committee. Prof Adcock is a PI and WP Leader in the EU/EFPIA IMI UBIOPRED initiative to determine biomarkers of severe asthma using integrated 'omics and clinical features; PI in the MRC-ABPI COPD MAP initiative; PI in the MRC-Asthma UK Centre for Asthma and Allergy and a PI in the NIHR-funded BRU at the Royal Brompton and Harefield Hospitals.

Prof Adcock's main research focus is on the regulation of the inflammatory mechanisms underlying severe asthma and COPD and understanding the causes of heightened inflammation and relative glucocorticoid insensitivity in patients with these diseases. Recent work has examined how epigenetic processes can modify inflammatory gene expression and glucocorticoid function in response to oxidative stress. Prof Adcock has published >400 papers (H-index = 82).

Glycosylated Cationic Block Poly(β -peptides) for Potentiating Antibiotics Against Gram-negative Bacteria

Professor Mary CHAN Bee Eng

Director, Centre for Antimicrobial Bioengineering, Nanyang Technological University, Singapore

Co-Director, Nanyang Technological University Food Technology Centre, Singapore

Professor, School of Chemical and Biomedical Engineering, College of Engineering, Nanyang Technological University, Singapore

The rise of multi-drug resistant (MDR) bacteria together with the decrease of useful antibiotics has been a mounting problem. Especially for Gram-negative bacteria, no new family of drug was found in the last past 50 years. Herein, we developed a novel glyco- β -peptides through one-step polymerisation, following by one-pot global deprotection to get water soluble polymers. Our glyco- β -peptides had relatively good antimicrobial activity against both Gram-negative *P. aeruginosa* and Gram-positive *S.aureaus*, with MIC of 64 $\mu\text{g}/\text{mL}$. In vivo biocompatibility test using a murine intravenous toxicity model at dosage of 10 mg/kg indicated that glycopeptide had excellent biocompatibility, with 100% animal survival after seven days and no significant difference in all the clinical important biomarker compared to the control groups. Our polymer could work synergistically with antibiotics at low concentration (16 $\mu\text{g}/\text{mL}$), to potentiate conventional traditional antibiotic against wide type *P.aeruginosa* and their clinical relevant strain PAN-sensitive (PAES), clinical isolate *P. aeruginosa* D25, *P. aeruginosa* D1 and clinical multi-drug resistant strain PAER (almost no antibiotic showed effect except colistin) greater than 16 times.

About the Speaker



Professor Mary Chan is presently a professor at the School of Chemical and Biomedical Engineering at the Nanyang Technological University Singapore (NTU Singapore). She is presently the Director of the Centre for Antimicrobial Bioengineering. Her expertise is in polymers for biotechnology and nanotechnology. She has developed various types of polymeric agents for dispersing and sorting carbon nanotubes. She has also developed a class of cationic antimicrobial polymers and coatings that are selective toxic to bacteria and have good biocompatibility.

Her current interests are in antimicrobial coatings for cardiac catheters and wound dressings. Her hydrogel materials for various biomedical applications (contact lens and wound dressing) have been licensed to the companies.

She has recently been elected to being a Fellow of the America Institute of Medical and Biological Engineering. She is also an associate editor of the ACS Applied Materials & Interfaces. She is presently in the NTU President Advisory Committee and was the Acting Chair of the School of Chemical and Biomedical Engineering at NTU from 2011-2013. She obtained her BEng (Chem) and PhD (polymers) from the National University of Singapore and MIT respectively.

Molecular Sub-phenotyping of Obstructive Lung Disease

Associate Professor Craig WHEELLOCK

Head of Integrative Molecular Phenotyping Laboratory, Department of Medical Biochemistry and Biophysics, Associate Professor, Centre for Allergy Research, Karolinska Institutet, Sweden

Obstructive lung disease is an increasing global health problem of pandemic proportions. The definition of obstructive lung disease is currently based upon clinical parameters. However, this definition represents an umbrella diagnosis that can be derived from a multitude of etiologies including environmental exposures, genetic predispositions and developmental factors. It is necessary to perform molecular sub-phenotyping of individuals with obstructive lung disease to develop relevant diagnostic and treatment options for this heterogeneous patient group. The aim of our investigations is to develop an understanding of the molecular sub-phenotypes of disease towards the goal of identifying prognostic markers for discovering early signs and/or increased risk of developing disease prior to debilitating destruction of lung capacity. The identification of a panel of non-invasive biomarkers (e.g., blood and urine markers) that correlate with specific molecular lung profiles will enable clinicians to apply personalised interventions at earlier stages, and greatly improve patient quality of life.

About the Speaker



Associate Professor Craig Wheelock leads the Integrative Molecular Phenotyping laboratory at the Karolinska Institutet's Centre for Allergy Research (CfA) and a Distinguished Visiting Professor of Metabolomics at the Gunma Institute for Advanced Research (GIAR) at Gunma University. His research focuses on mass spectrometry-based molecular phenotyping of obstructive lung disease. These efforts are combined with multivariate modelling to perform omics-based data integration to identify sub-phenotypes of disease. Assoc Prof Wheelock employs mass spectrometry-based metabolomics methods to investigate disease aetiology, with a major area of his research investigating the role of lipid mediators in pulmonary inflammation. Recent efforts in his laboratory involve performing exposome-based studies to understand the effect of environmental exposure upon disease aetiology and identify sensitive sub-populations of individuals with respiratory disease. The long-term goal of his research is to perform population-based molecular sub-phenotyping of obstructive lung disease. The developed metabolomics methods are being expanded to include broad profiles of metabolites from the microbiome, diet, pharmaceuticals, nutritional status and environmental exposures. These molecular profiles will be combined with personal monitoring (e.g. fitbits), self-questionnaires, and home monitoring to identify associations between disease state, metabolic status, and environmental exposure. The data will enable the development of personalised molecular profiles that can be associated with an individual's current disease status and lifestyle. Assoc Prof Wheelock is a member of the ERS Scientific Events Working Group, Board Member of the International Metabolomics Society, and consultant at the Mount Sinai School of Medicine on metabolomics and exposome-based analyses.

Understanding the Role of the Three Dimensional Extracellular Matrix in Driving Chronic Lung Disease Progression

Associate Professor Janette BURGESS

Rosalind Franklin Fellow, Associate Professor of Extracellular Matrix in Disease Pathogenesis, Groningen Research Institute of Asthma and COPD (GRIAC), Faculty of Medical Sciences, Department of Pathology and Medical Biology, University Medical Center Groningen, University of Groningen, Netherlands

Millions of people worldwide suffer from chronic lung diseases, which only have symptomatic treatment available. As the population ages, the occurrence of lung diseases is increasing rapidly. Importantly, many of these diseases affect the three dimensional (3D) flexible skeleton in which lung cells reside: the extracellular matrix (ECM). Evidence is emerging suggesting that an altered ECM is an active contributor to disease, not just a consequence of the pathology. The ECM provides signals that direct cell responses; these become disrupted upon alteration of the 3D ECM structure during disease. Our recent studies have illustrated that disruption of the ECM 3D structure and composition causes aberrant cellular behaviour in the lungs thereby interrupting proper tissue repair. The use of innovative imaging and 3D scaffold creating technologies is enhancing our approaches for understanding the contribution of the 3D ECM structure of the lungs to the mechanisms underlying ongoing disease progression.

About the Speaker



Associate Professor Janette Burgess studied biochemistry at the University of Adelaide, Australia, completing her Bachelor of Science (with honours) in 1991. After receiving her PhD at the University of New South Wales in 1998, she was a Post-doctoral fellow at the University of Sydney. She was awarded a National Health and Medical Research Council (NHMRC) (Australia) Peter Doherty training award (2000-2006), a NHMRC R.D Wright Career Development Award (2006-2011) and a NHMRC Career Development Fellowship level 2 (2012-2015). Since 2015, she has been at the Department of Pathology and Medical Biology, UMCG as a Rosalind Franklin Fellow.

Her research focusses on the role of the extracellular matrix (ECM) in lung pathology. She is intrigued by the changes in the tissue and airway structures of the lungs that occur during disease development and progression and her research focuses on whether these changes are a cause or a consequence of the pathology. Working with primary human cells, human lung tissue samples and patient clinical information, the research seeks to characterise the changes in the ECM that occur during disease and to understand the mechanisms that underlie these changes.

Assoc Prof Burgess also served as a member of the American Thoracic Society Respiratory Structure and Function Assembly Long Range Planning Committee (2008-present), member of the Program Committee (2009-2014), member of the European Respiratory Society Cell Biology Long Range Planning Committee (2017-present) and is member of the National Board of the Netherlands Matrix Biology Society (2017-present).

Impairment of Cilia Architecture and Ciliogenesis in Common Inflammatory Nasal Diseases

Professor WANG De Yun

Professor, Director of Research, Department of Otolaryngology, National University of Singapore, Singapore

Recently, our research team is able to investigate ciliary dysfunction and ultrastructural abnormalities of the nasal epithelium, which are shown to be closely associated with the pathogenesis of common nasal diseases. A number of molecular markers for study of ciliogenesis (i.e., FoxJ1 and CP110) and ultrastructure (i.e., DNAH5) of cilia have been developed in various studies. These findings indicated that chronic inflammatory diseases (i.e., chronic rhinosinusitis with and without nasal polyps) are highly associated with dysfunctional ciliated cells lining the nasal epithelium, which may provide novel candidate targets for more accurate clinical assessment and future treatment guidelines for management of the chronic inflammatory airway diseases.

About the Speaker



Professor Wang has published over 230 papers in prestigious medical journals and over 30 book chapters, and has been invited to give more than 400 lectures at scientific meetings worldwide. He is the Associate Editor (Allergy, International Archives of Allergy and Immunology, Therapeutics and Clinical Risk Management, Current Treatment Options in Allergy, Military Medical Research, and Medical Journal of Chinese People's Liberation Army) and a member of the editorial boards of more than twenty journals in ENT, allergy and medical sciences. He is a member of expert committees for several international and European guidelines and consensus report in allergic rhinitis and rhinosinusitis, e.g., European White Paper in Allergy, WHO Initiative – Allergic Rhinitis and its Impact on Asthma (ARIA 2001 and ARIA 2008), European Position Paper on Rhinosinusitis and Nasal Polyps (EPOS, 2007, 2012), International Consensus Statement on Allergy and Rhinology: Rhinosinusitis (2016), and International Consensus Statement on Allergy and Rhinology: Allergic Rhinitis (2018).

Using Airway Epithelial Targeting Nanoparticles to Translate Mechanism into Therapy

Associate Professor Nathan BARTLETT

Head and Associate Professor, Viral Immunology and Respiratory Disease Group, School of Biomedical Sciences and Pharmacy, Faculty of Health and Medicine, Hunter Medical Research Institute, University of Newcastle, Australia

We hypothesise that a dysregulated epithelial response to rhinovirus infection causes the airway inflammation that triggers an asthma exacerbation – particularly in susceptible populations with severe, poorly controlled, persistent disease. Targeting the airway epithelium with nanoparticles that prevent this aberrant inflammatory immune response by suppressing infection represents an innovative treatment strategy. Our aim is to determine if nanoparticles (NP) delivering anti-viral molecules to asthmatic bronchial epithelium can suppress rhinovirus (RV)-induced production of the inflammatory mediators that trigger an asthma exacerbation. We will describe development of nanoparticles that provide controlled and sustained delivery of the water soluble TLR7 agonist (CL264) to asthmatic bronchial epithelium. In our study, anti-EpCAM monoclonal antibody (mAb) was introduced onto the surface of PEG-PLGA NPs with varied densities. The resulting EpCAM-targeted NPs were fluorescently labelled and investigated for cellular uptake and induction of anti-viral interferon.

About the Speaker



Associate Professor Nathan Bartlett is the head of the Viral Immunology and Respiratory Disease group at the Hunter Medical Research Institute (HMRI), University of Newcastle. He retains an honorary academic appointment at the National Heart and Lung Institute (NHLI), Imperial College London, UK. He is also an Associate Editor for the American Journal of Physiology - Lung, Cellular and Molecular Physiology (AJP-LUNG).

Following the completion of his PhD, Assoc Prof Bartlett undertook Postdoctoral research positions at the Sir William Dunn School of Pathology, University of Oxford, and the Department of Virology, Imperial College London. He undertook a second Postdoctoral position and was appointed a Lecturer in the Department of Respiratory Medicine, NHLI, Imperial College London. He returned to Australia to accept an academic appointment at the University of Newcastle and set up a lab at the HMRI.

Assoc Prof Bartlett uses primary human airway cell- and mouse models of respiratory virus infection to uncover pathogenic mechanisms that drive asthma and COPD disease exacerbations and severe viral illness. He has identified airway epithelial anti-viral and type-2 immune pathways that regulate the host response to viral infection and determine the outcome of disease. He is a world expert on pre-clinical *in vitro* and *in vivo* rhinovirus infection models and consults for several companies that develop novel anti-viral/anti-inflammatory therapies and epithelial-targeting nanoparticles to deliver therapeutic molecules to the respiratory mucosa.

Traffic-related Air Pollution Alters the Lung Proteome

Professor Christopher CARLSTEN

*Professor of Medicine, Astra-Zeneca Endowed Chair, Canada Research Chair in Occupational and Environmental Lung Disease, University of British Columbia, Canada
Director and Staff Respiriologist, Occupational Lung Disease Clinic, Vancouver General Hospital, Canada*

Inhaled air pollution is a well-known human health hazard. Traffic-related air pollution is associated with an increased risk of respiratory diseases like asthma and COPD, enhanced allergic responses and an increased risk of lung infections. This study examined the effects of exposure to diesel exhaust on human lungs and whether or not these effects are enhanced when exposed to allergens at the same time. For the first time, this study has shown that simultaneous exposure to diesel exhaust and allergens can cause a reduction in molecules known as antimicrobial peptides in the lungs. These are proteins involved in immune responses and protect against infections. Interestingly, this effect is not observed with diesel exhaust alone, only when diesel exhaust is together with allergens. This indicates that inhaled diesel exhaust or traffic related air pollution can reduce antimicrobial peptides in the lungs when allergen is present, which suggests that air pollution may enhance the risk of lung infections in people already sensitised to allergens.

About the Speaker



Chris Carlsten, MD MPH is an Associate Professor of Medicine and holds the Astra-Zeneca Chair in Occupational and Environmental Lung Disease, as well as the Canada Research Chair in Occupational and Environmental Lung Disease, at the University of British Columbia. He is the Director of the Air Pollution Exposure Laboratory and also holds adjunct positions at the Peter Wall Institute for Advanced Studies, the UBC School of Population and Public Health and the Centre for Heart Lung Innovation (formerly James Hogg Research Centre).

He attended undergraduate and medical school at Stanford University before training in internal, occupational, pulmonary and critical care medicine at the University of Washington. His clinical and research interests center on occupational airways disease, and his efforts resulted in his being granted both the CIHR New Investigator Award and the Career Investigator Award from the Michael Smith Foundation for Health Research.

The Carlsten laboratory is highly collaborative and interdisciplinary and focuses on the respiratory and immunological health effects of inhaled environmental and occupational exposures, using diesel exhaust, western red cedar, and phthalates as model inhalants. In particular, the lab uses controlled human exposures and genomics as translational tools to address the synergism due to co-exposure to inhaled particles and allergens in mediating health effects related to induction and exacerbation of airways disease. An epidemiological complement to the experimental model uses a meta-birth cohort of over 20,000 children to study incident asthma related to air pollution.

As director of the Occupational Lung Disease Clinic at The Lung Centre (Vancouver General Hospital), Assoc Prof Carlsten welcomes patients with concerns regarding occupational or environmental exposures contributing to respiratory disease including asthma, COPD, interstitial lung disease, cancer, and pleural disease.

Pharmacological Re-sensitisation of Steroid Resistance in Respiratory Diseases

Associate Professor Fred WONG Wai-Shiu

Head and Associate Professor, Respiratory Pharmacology Laboratory, Department of Pharmacology, Yong Loo Lin School of Medicine, National University Health System, Singapore

Inhaled corticosteroid is the first-line controller for asthma and COPD. However, about 10% of the asthmatics (severe/refractory asthma) and most of the COPD patients are resistant to the beneficial effects of corticosteroids. There is a pressing unmet medical need to develop novel therapeutic agents to restore corticosteroid efficacy in affected patients. There have been reports showing the promise of theophylline and rapamycin in reversing steroid resistance in COPD. Our laboratory has demonstrated that andrographolide, a bioactive diterpenoid lactone isolated from the plant *Andrographis paniculata*, is an effective anti-inflammatory and anti-oxidative compound in both asthma and COPD experimental models. In a severe asthma mouse model using combined IFN- γ /LPS exposure, production of IL-27 and methacholine-induced airway hyperresponsiveness (AHR) were found to be corticosteroid-resistant. Andrographolide was found to restore the anti-inflammatory effect of dexamethasone in LPS/IFN- γ -induced IL-27 levels in bronchoalveolar lavage (BAL) fluid and AHR in mice. LPS/IFN- γ markedly reduced the nuclear level of histone deacetylase-2 (HDAC2), an essential epigenetic enzyme that mediates corticosteroid anti-inflammatory actions. Andrographolide significantly restored nuclear HDAC2 levels and diminished total HAT/HDAC activity ratio in mouse lungs exposed to LPS/IFN- γ , probably via suppression of PI3K/Akt/HDAC2 phosphorylation and up-regulation of the antioxidant transcription factor Nrf2 level. In a cigarette smoke (CS)-induced COPD model, andrographolide markedly restored dexamethasone actions in inhibiting CS-induced lung neutrophilia. In addition, andrographolide facilitated dexamethasone actions to suppress BAL fluid IL-6, IL-1 β , KC and IL-17 levels. In lung lysates, andrographolide markedly restored total nuclear HDAC activity. The complete steroid re-sensitisation mechanism of andrographolide remains to be unraveled. Nevertheless, our existing data strongly implicate a potentially novel steroid re-sensitising activity of andrographolide in both severe asthma and COPD models.

About the Speaker



Associate Professor W.S. Fred Wong's research programme is to discover and develop pharmacological strategies for the treatment of asthma, COPD and lung fibrosis. Bioactive compounds isolated from herbal medicinal plants are a rich source of novel therapeutics or for drug repositioning. Assoc Prof Wong's laboratory was the first to report the protective effects of genistein, an isoflavone isolated from soy beans; and andrographolide, a labdane diterpenoid lactone isolated from the herb *Andrographis paniculata*, in experimental models of asthma and COPD. His laboratory has repurposed artesunate, an anti-malarial drug, as an anti-inflammatory agent for asthma and COPD. There has been a long debate on which vitamin E isoform, α -tocopherol or γ -tocotrienol, is the effective and potent antioxidant. His laboratory has answered this question by showing γ -tocotrienol's superior antioxidant and anti-inflammatory effects in both asthma and COPD models. Assoc Prof Wong has recently reported the direct DNA damaging effects of aeroallergens (e.g. house dust mite) on airway epithelium, proposing an additional pathological pathway for allergen-induced asthma. Besides, his laboratory is screening molecules that can reverse steroid resistance in both severe asthma and COPD. In addition, his team is investigating bioactive molecules that can modulate ER stress and autophagy in COPD and lung fibrosis.

Understanding the Molecular Processes Regulating Exacerbation of Asthma

Laureate Professor Paul S. FOSTER, FAHMS

Director, Priority Research Centre for Healthy Lungs; Virus, Infection/Immunity, Vaccines and Asthma Program, Hunter Medical Research Institute, Australia

Laureate Professor, Chair of Immunology, School of School of Biomedical Sciences and Pharmacy, Faculty of Health, University of Newcastle, Australia

Severe asthma and exacerbations are poorly controlled by current therapy and new ways to treat this disorder are urgently required. Laureate Professor Foster will discuss recent work from his laboratory highlighting the role of the innate immune system in regulating pathogenesis.

About the Speaker



Laureate Professor Paul Foster FAHMS, is the Director of the Priority Research Centre for Healthy Lungs; and the Virus, Infection/Immunity, Vaccines and Asthma Programme at the Hunter Medical Research Institute. Prof Foster has been appointed as the Visiting Professor at the National University of Singapore (NUS) for 2018, and currently holds the Chair of Immunology, School of Biomedical Sciences and Pharmacy. Prof Foster was a visiting Professor at Brigham and Women's Hospital, Harvard Medical School, Boston, MA, USA from 2010-2013. He served on the Editorial Boards of a number of leading international immunology/allergy journals. Prof Foster's research focuses on understanding the molecular and cellular basis of asthma, allergy, respiratory infection, and chronic inflammation. His research programme focuses on translational approaches directed towards the development of novel anti-inflammatory therapies.

Wnt Activity Marks Lung Progenitors Capable of Forming Spheres *in vitro*

Associate Professor Reinoud GOSENS

Associate Professor of Translational Pharmacology, Faculty of Mathematics and Natural Sciences, Department of Molecular Pharmacology, University of Groningen, Netherlands

Wnt signalling regulates stem/progenitor cell fate decisions, including balancing self-renewal and differentiation, during lung development and in various adult tissues. The role of Wnt/ β -catenin signalling in adult distal lung progenitor cell function is poorly understood. Here, we demonstrate that a Wnt/ β -catenin signaling reporter line (TCF/Lef:H2B-GFP) labels adult distal lung epithelial progenitor cells capable of forming airway and alveolar spheroids *in vitro*. The spheroid-forming population is responsive to Wnt/ β -catenin activation, is enriched for airway epithelial and progenitor cell markers, and contains surfactant protein C negative (non-alveolar) cells that can form alveolar structures. Spheroid-forming distal lung progenitor cells undergo Wnt/ β -catenin-dependent initial division, generating progeny that proliferate via Wnt-independent mechanisms. The initial division is sometimes asymmetric, and may be associated with differential Notch signalling in progeny via unequal segregation of the cell fate determinant and Notch antagonist Numb. This study reveals a novel, fundamental mechanism of lung epithelial progenitor cell activation.

About the Speaker



Reinoud Gosens is Associate Professor of Translational Pharmacology at the Faculty of Mathematics and Natural Sciences at the University of Groningen, the Netherlands. He has an MSc in Pharmaceutical Sciences from the University of Groningen and a PhD from the Department of Molecular Pharmacology at the University of Groningen. Assoc Prof Gosens has undertaken research fellowships at the University of Manitoba, Canada, and the University of Groningen.

Assoc Prof Gosens' current research interests are focused on mechanisms that regulate structural remodelling and repair of the airways and parenchyma in asthma and COPD. In particular, he is interested in the mechanisms and therapeutic perspectives of muscarinic receptor signalling and Wnt signalling. He is a member of the ATS, the American Physiological Society, the Dutch Pharmacological Society and the Netherlands Respiratory Society.

Harnessing the Potential of Family Medicine to Achieve Better Respiratory Health

Professor Helen SMITH

Professor of Family Medicine & Primary Care, Lee Kong Chian School of Medicine, Nanyang Technological University, Singapore

In Professor Smith's talk, she will address those challenges faced by Family Medicine in Singapore when striving to improve the respiratory health of their patients. Many of the challenges are clinical, organisational or financial, but they are further exacerbated by the weak tradition for research in a primary care setting. The presentation will describe the initiatives recently introduced to develop the research capacity of general practitioners, to enable them to address those pertinent questions that arise from their own clinical practice. Prof Smith will also introduce the respiratory focused work within a NMRC funded program of work on multi-morbidity and multi-ethnicity, which the National Healthcare Group Polyclinics, the Institute of Mental Health and Lee Kong Chian School of Medicine are collaborating on.

About the Speaker



Professor Helen Smith is an academic clinician-scientist who graduated in Medicine from Nottingham University, UK in 1981 and later trained in epidemiology and health services research at the London School of Hygiene and Tropical Medicine and the University of British Columbia. She has dual accreditation in family medicine and in public health medicine and has experience working in academic, hospital and community settings, both in the UK and Canada. She held professorial appointments in the UK before being appointed Professor of Family Medicine and Primary Care at LKCMedicine in August 2016. She has a strong track record in research funding and publication (190+ peer-reviewed articles, H score 44, with >7600 citations and an i10index of 114). Her research focuses mainly on the evaluation of new interventions (pharmaceutical, technological, psychological or organizational) in the primary health care setting. Her research involves a mix of quantitative and qualitative methods, but her particular expertise is in pragmatic trial design. She has a long-standing research interest in the inappropriate usage of expensive health care resources, and asthma and atopy.

Prior to moving to Singapore, she was the UK's Royal College of General Practitioners' Clinical Champion for Allergy. Already in her new role, she has established a Centre of Primary Health Care Research and Innovation with the National Healthcare Group of polyclinics, a Primary Care Research Network for family physicians and has collaborated in a NMRC funded program of research that addresses the challenges of multi-morbidity and multi-ethnicity when delivering care in a polyclinic setting.

Respiratory Medicine at the University of British Columbia

Professor Dermot KELLEHER

Dean, Faculty of Medicine, University of British Columbia, Canada

Visiting Professor, Lee Kong Chian School of Medicine, Nanyang Technological University, Singapore

A key research priority for the University of British Columbia's Faculty of Medicine is heart and lung health which is a core area of critical importance to human health. The Faculty has emerging and established strengths in respiratory medicine including: the environment and airway diseases, asthma, life course in airway diseases, and chronic obstructive pulmonary disease. Our research has a number of cross-cutting themes including: genomics, metagenomics, biomaterials, computational biology, and biomedical engineering. Working with a Faculty which has province-wide research, enables us to take an approach to life course research in airway diseases and to engage in precision approaches to complex lung diseases. Through a collaborative and focused approach the Faculty of Medicine is working to create new knowledge, discoveries, and translation to improve prevention and treatment of airway diseases and advance delivery of care.

About the Speaker



Professor Kelleher graduated in medicine from Trinity College Dublin in 1978, going on to specialise in gastroenterology. As an author of over 300 publications and 14 patents, Prof Kelleher's research examines the immune response to many of the leading causes of gastrointestinal infectious disease worldwide. Over the years he has received many prestigious awards including a Fogarty Scholarship at the University of California San Diego, Welcome Senior Fellow in Clinical Science, and most recently the Conway Medal from the Royal Academy of Medicine in Ireland.

Prof Kelleher joined UBC in the summer of 2015 as Dean of the Faculty of Medicine. Prior to his appointment at UBC, he served as Vice-President Health and Dean of the Faculty of Medicine at Imperial College London, where he also held a concurrent appointment as Dean of LKCMedicine until 2014. He also served as Head of the School of Medicine and Vice Provost for Medical Affairs at Trinity College, Dublin.

Prof Kelleher brings significant experience and is recognised internationally for innovation in academic health leadership and administration, clinical care, research and education. Prof Kelleher has also worked to found several companies supporting both translational developments in biomedical science and fostering collaboration in biomedical research in both Dublin and London. He also served as President of the Federation of European Academies of Medicine until moving to British Columbia.

Old and New Biomarkers for Identification of Mechanisms in Asthma and Other Respiratory Diseases

Professor Sven-Erik DAHLEN

Director, CfA-The Centre for Allergy Research, Karolinska Institutet, Sweden

Professor of Asthma and Allergy Research, Experimental Asthma and Allergy Research, Institute of Environmental Medicine, Karolinska Institutet, Sweden

The presentation will report on different platforms used for sub-phenotyping of asthma and other airway diseases by different clustering strategies. One aspect will include very recent findings concerning the mode of action of cysteinyl-leukotrienes in human airways. Another will be the emerging role of chitinases as novel steroid-resistant markers of airway remodelling in severe asthma and COPD.

About the Speaker



Professor Sven-Erik Dahlen MD, PhD is a physiologist and pharmacologist and member of the team that discovered leukotrienes and responsible for the early exploration of biological activities in airways and on the microcirculation. He continued with clinical investigations and contributed to the implementation of leukotriene pathway inhibitors as the first targeted new treatment of asthma. As director of the Centre for Allergy Research (CfA) at Karolinska Institutet, he led the networking to increase interactions among basic and clinical scientist in the area of allergy and respiratory medicine. Now, he is PI of several initiatives that conduct biomarker-guided phenotyping of asthma and other respiratory diseases. Over the years, he had had many commissions of trust within Karolinska, most recently chairman of the selection committee for new Vice-Chancellor, but also internationally, for example research director of the European Respiratory Society.

Ultrafast and Low Cost PCR Amplification For DNA Diagnostics at the Point of Need

Associate Professor Eric YAP

Associate Professor of Human and Microbial Genetics, Principal Investigator, Medical Genomics Laboratory, Lee Kong Chian School of Medicine, Nanyang Technological University, Singapore

PCR is widely used for molecular diagnosis of microbial pathogens, but DNA purification and thermocycling typically takes hours to complete and requires lab infrastructure. We have integrated innovations in assay design, enzyme biochemistry and thermofluidics to achieve ultra-rapid sample lysis and thermocycling of standard volume reactions. Complete analysis from blood sample to end-point results through 35 amplification cycles can be performed under 5 minutes. Prototypes for rapid thermocycling that are suitable for various point-of-care settings have been made, covering a range of cost (\$5-\$500), power source, skill (manual to fully-automated) and usability (wireless smartphone interface) requirements. Rapid PCR protocols have been demonstrated with several fluorescent dye chemistries and for a variety of targets, including bacterial and viral respiratory pathogens. It is envisioned that making DNA analysis as rapid, economical, simple and robust as lateral flow immunoassays will accelerate the exploitation of genomic technologies for ubiquitous application at point-of-care.

About the Speaker



Associate Professor Eric Yap graduated with MBBS (Hons) from the National University of Singapore and was a Rhodes Scholar (DPhil) from the University of Oxford. For the past two decades, Assoc Prof Yap has been pursuing and promoting cross-disciplinary work across several interfaces – clinician:researcher, science:engineering, commercial:non-profit, government:academia, military:civilian and sciences:arts. He has set up a government research lab, spun off a tech startup, and founded charities. He has received various national and international awards for his pioneering work in myopia, molecular medicine, biodefence, bioMEMS and disaster relief. His current research interests are in molecular diagnostic technologies and applications in microbiology and human genetics.

Tetraspanins as Therapeutic Targets in Respiratory Diseases

Assistant Professor Thai TRAN

Assistant Professor, Head, Diseases Research Laboratory, Department of Physiology, National University of Singapore, Singapore

Tetraspanins belong to the superfamily of 4-transmembrane glycoproteins whose biological functions remain elusive. Our laboratory is interested in the tetraspanin, CD151, that associates selectively with laminin-binding integrins and is highly expressed in the human lung. We show that CD151 expression is a determinant of airways hyperreactivity in asthma (JACI, 2017) and that treatment with anti-inflammatory agent, glucocorticoid, paradoxically upregulate its expression. This helps explain its lack of efficacy in reducing bronchoconstriction in patients whose asthma is not controlled with glucocorticoids (AJRCCM, 2018). We also provide the first evidence of CD151 as a critical host factor of nuclear export signalling in influenza virus infection, making this regulation unique and holds promise for the development of novel alternative/complementary strategies to reduce influenza virus severity (JACI, 2018). Further studies examining the regulatory mechanisms behind the elevated CD151 expression in the lung may provide novel approaches for treatment of asthma and influenza virus infection.

About the Speaker



Thai Tran is an Assistant Professor in the Department of Physiology at the National University of Singapore where she heads the Lung Diseases Research Laboratory. Her research interest is aimed at understanding the role of extracellular matrix proteins on muscle and epithelial function in various lung disease models, specifically asthma, respiratory infections and lung cancer, with the goal of identifying novel therapeutic targets for these diseases. Prior to this, she obtained her PhD from the University of Melbourne, Australia, where her studies provided novel explanations for reductions in glucocorticoid sensitivity in certain inflammatory environments. Having received an elite Canadian Institutes of Health Research/Canadian Lung Association/GlaxoSmith Kline Postdoctoral Fellowship, she moved to the University of Manitoba, Canada. There, she made novel discoveries about how fibrosis in the airways of asthmatics modulates the function of smooth muscle cells via specialized receptors for the extracellular matrix protein, laminin-2. She has since continued in her own laboratory to focus on the laminin-binding protein, CD151, and its significant contributions to the pathophysiology of asthma, influenza infections and lung cancer.

Groningen Research Institute for Asthma and COPD (GRIAC)

Professor Han MOSHAGE

Professor of Experimental Hepatology and Gastroenterology; Academic Director (International Relations), Graduate School of Medical Science, University Medical Centre Groningen, Netherlands

The main theme of the Groningen Research Institute for Asthma and COPD (GRIAC) is unravelling the underlying mechanisms of the development, progression and remission of airway obstruction, allergy and airway hyperresponsiveness, their mutual interactions, and their relevance to treatment. These phenomena are important risk factors for the development of asthma and COPD and crucial characteristics in their clinical pictures. Research within GRIAC takes place at the interface of fundamental and applied patient-related research.

In his presentation, Professor Moshage will speak on 1) identifying risk factors for the development, progression and remission of disease; 2) identifying disease-related genes, gene pathways, gene functionality and gene regulation; 3) unravelling the pathophysiology of allergen-, environmental- and smoke- induced disease; 4) unravelling the effects of disease-related inflammation on lung function; 5) hyperresponsiveness and remodelling of large and small airways; 6) defining new targets for drug intervention and evaluation of intervention strategies; and 7) development of non/less invasive tools to assess severity of disease and effects of treatment.

About the Speaker



Professor Han Moshage studied chemistry at the Radboud University of Nijmegen and graduated in 1983 with specialisation Biochemistry. After receiving his PhD degree at the Radboud University of Nijmegen in 1987, he was a postdoctoral fellow at the Alcohol Research and Treatment Center of the VA Medical Center/Mount Sinai Medical Center in New York, USA. From 1990-1993 he was staff-scientist at the Department of Hepatology, University Hospital Leuven in Belgium. Since 1993, he has been at the Dept. of Gastroenterology and Hepatology of the University of Groningen. In 2005, he became Professor of Experimental Hepatology and Gastroenterology. Prof Moshage's research focuses on mechanisms and manipulation of cell death, inflammation and fibrogenesis in (chronic) inflammatory liver diseases, with a special emphasis on non-alcoholic fatty liver diseases (NAFLD) and lipotoxicity. His research focuses on signal transduction mechanisms in the pathogenesis of inflammatory liver diseases and interventions in these disorders using natural products obtained from (medicinal) plants.

Prof Moshage also served as secretary of the Dutch Society of Hepatology (1997-2003); member of the Scientific Council of the Dutch Digestive Diseases Foundation (1998-2005); director of the master programme Medical and Pharmaceutical Drug Innovation (2005-2013); director of the Research Institute GUIDE (2005-2012); and director of the Graduate School of Medical Sciences (2009-2012) and is currently responsible for International Relations within the Graduate School of Medical Sciences.

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