MOM-TARIPH JOINT SYMPOSIUM

Lung Health in the Occupational Setting: Prevention, Protection and Promotion

Friday, 10 May 2019
11am to 4.15pm
Toh Kian Chui Annex, Lecture Theatre, Level 1
Headquarters, Novena Campus
Lee Kong Chian School of Medicine
11 Mandalay Road, Singapore 308232

Keynote Speaker:
Mr Ismadi MOHD
Deputy Commissioner for Workplace Safety and Health
Occupational Safety and Health Division
Ministry of Manpower

Co-organised by:

LEE KONG CHIAN SCHOOL OF MEDICINE

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

Imperial College London

MINISTRY OF MANPOWER

In partnership with:

COLLEGE OF PUBLIC HEALTH & OCCUPATIONAL PHYSICIANS SINGAPORE

WSH Institute

Time	Programme
11.00am – 11.45am	*Arrival, Registration and Lunch*
11.45am – 11.55am	**Welcome Address** **Professor James BEST** *Dean, President's Chair in Medicine, Lee Kong Chian School of Medicine* *Nanyang Technological University, Singapore*
11.55am – 12.10pm	**Introduction to TARIPH** **Associate Professor Fabian LIM** *TARIPH Co-academic Lead; Assistant Dean, Research* *Associate Professor of Exercise Physiology* *Programme Director for Graduate Diploma in Sports Medicine* *Lee Kong Chian School of Medicine, Nanyang Technological University, Singapore*
12.10pm – 12.30pm	**Keynote Address** **Mr Ismadi MOHD** *Deputy Commissioner for Workplace Safety and Health* *Director, Occupational Safety and Health (OSH) Specialist Department* *OSH Division, Ministry of Manpower (MOM)*
Session 1: Occupational Exposure **Chairperson** **Associate Professor LOO Chian Min** *Senior Consultant, Department of Respiratory and Critical Care Medicine, Singapore General Hospital*	
12.30pm –12.45pm	**Review on the Use of Tear Gas for Mask Confidence Training and Its Associated Occupational Health Hazards** **Dr LOKE Weng Keong** *Programme Director, DSO National Laboratories*
12.45pm – 1.00pm	**The Invisible Threat of Indoor Air Pollutants** **Associate Professor NG Lee Ching** *Director, Environmental Public Health Division* *Environmental Health Institute, National Environmental Agency* *Adjunct Associate Professor, Nanyang Technological University, Singapore*
1.00pm – 1.15pm	**Understanding the Air You Breathe: Scale and Dynamics of the Air Microbiome** **Professor Stephan SCHUSTER** *Research Director (Meta-'omics and Microbiomes), Singapore Centre for Environmental Life Sciences Engineering* *Professor, School of Biological Sciences, Nanyang Technological University, Singapore*

1.15pm – 1.30pm	**Respiratory and Cardiovascular Health Risk from Exposure to Engineered Nanomaterials Released from Printing Equipment** **Associate Professor NG Kee Woei** *Deputy Director, Environmental Chemistry and Materials Centre* *School of Materials Science & Engineering* *Programme Director, Initiative for Sustainable Nanotechnology* *NTU-Harvard School of Public Health* *Nanyang Technological University, Singapore*
1.30pm – 1.45pm	**Prevention and Control of Occupational Health Hazards** **Ms Evelyn KOH** *Senior Assistant Director, Occupational Safety and Health (OSH)* *Specialist Department* *OSH Division, MOM*
1.45pm – 2.00pm	*Q&A Session*
2.00pm – 2.30pm	*Coffee Break & Networking*
Session 2: Occupational Diseases **Chairperson** **Dr LEE Lay Tin** *Senior Consultant, Occupational Health Physician, Tan Tock Seng Hospital*	
2.30pm – 2.45pm	**Why What You Know About COPD Might Be a Lie** **Associate Professor Augustine TEE** *Deputy Chairman, Medical Board (Medical Disciplines)* *Chief of Medicine and Senior Consultant Respiratory and Intensivist* *Respiratory and Critical Care Medicine* *Changi General Hospital*
2.45pm – 3.00pm	**Recognising Occupational Lung Diseases** **Associate Professor LEE Hock Siang** *Senior Consultant, OSH Specialist Department, OSH Division, MOM* *Visiting Consultant, Occupational Lung Disease Clinic, Department of Respiratory and Critical Care Medicine, Singapore General Hospital* *Adjunct Associate Professor, Saw Swee Hock School of Public Health* *National University of Singapore*

3.00pm – 3.15pm	**A Practical Approach to Assessing Fitness to Work with Lung Conditions** **Assistant Professor Gregory CHAN** *Senior Specialist Physician, The Occupational and Diving Medicine Centre, Work Health & Safety Inc. (Pte Ltd)* *Adjunct Assistant Professor, Saw Swee Hock School of Public Health* *National University of Singapore*
3.15pm – 3.30pm	**Malignant Mesothelioma** **Assistant Professor Anantham DEVANAND** *Head and Senior Consultant, SingHealth Duke-NUS Lung Centre* *Senior Consultant, Respiratory and Critical Care Medicine* *Singapore General Hospital*
3.30pm – 3.45pm	**Occupational Asthma** **Associate Professor TAN Keng Leong** *Senior Consultant, Respiratory and Critical Care Medicine* *Singapore General Hospital* *Adjunct Associate Professor, Yong Loo Lin School of Medicine* *National University of Singapore*
3.45pm – 4.00pm	*Q&A Session*
4.00pm – 4.15pm	*Closing Remarks / Open Discussion*
4.15pm	*End of Symposium*

Keynote Address

Workplace Health in Singapore – The Time is Now
Mr Ismadi MOHD
Deputy Commissioner for Workplace Safety and Health
Director, Occupational Safety and Health (OSH) Specialist Department, OSH Division, Ministry of Manpower (MOM)

Singapore has made significant progress in its workplace safety and health (WSH) outcomes. The workplace fatal injury rate has declined by more than 75% over the past 14 years from 4.9 per 100,000 workers in 2004 to 1.2 per 100,000 workers in 2018 – the lowest in history. The WSH2028 vision acknowledges both Workplace Safety and Workplace Health to be of equal importance and reaffirms its aspiration to be a global leader in WSH. Hence, there is no better time to reframe, renew and refocus efforts in Workplace Health, with progress to be made in the prevention of Occupational Diseases (OD) and promotion of Workplace Health. Only through effective injury prevention, OD prevention and Workforce Health promotion, can we attain Vision Zero – where all injury and ill health at work can, and should, be prevented.

About the Speaker

Mr Ismadi Mohd is the Deputy Commissioner for Workplace Safety and Health (WSH) and Director, Occupational Safety and Health (OSH) Specialist Department, OSH Division, Ministry of Manpower. His career with the Ministry spans over a period of more than 20 years in WSH, in the fields of Policy and Legislation, Planning & Development, Engineering Safety, Investigations, Field Operations, Information & Technology, as well as Corporate Services.

During the reform of the WSH framework in 2005, Mr Ismadi Mohd was part of the team that contributed to the rollout of Singapore's WSH framework and the WSH2018 national strategy. He also contributed to the completion of key WSH legislative reviews and the development of flagship programmes and initiatives to support the new WSH framework.

Ten years on, Mr Ismadi Mohd was also part of the team that played a pivotal role in shaping the next milestone of the WSH Strategy – the new WSH2028 blueprint. One of the Strategy's cornerstone is the need to enhance focus on Workplace Health. This includes the need to strengthen occupational diseases (OD) prevention efforts and build capabilities to promote Workforce Health. The WSH2028 Strategy was successfully launched on 5 April 2019.

A mechanical engineer by profession, Mr Ismadi Mohd is a registered Professional Engineer with the Professional Engineers Board, Singapore. In recognition of his outstanding service to public service, Mr Ismadi Mohd was conferred the prestigious National Day Commendation Award.

Review on the Use of Tear Gas for Mask Confidence Training and Its Associated Occupational Health Hazards

Dr LOKE Weng Keong
Program Director, DSO National Laboratories

Mask confidence training (MCT), to demonstrate the effectiveness of personal protective equipment (PPE) against chemical, biological, radiological, and nuclear (CBRN) hazards, is typically carried out in a relatively airtight structure where a o-chlorobenzylidene malononitrile (CS)-rich environment is created and maintained by thermally dispersing CS on an improvised aerosol generator. Incapacitating effects (intense irritation of the eyes, mouth, throat and lungs) are immediately felt when a mask is defective, has an improper fit or when participants remove their mask during the training.

While CS is a potent acute irritant to the eyes and respiratory system, recovery from CS exposure is generally rapid upon exposure to fresh air, usually within 30 minutes after exposure. However, CS is also noted to be a powerful skin sensitiser, which can cause allergic contact dermatitis with rashes or hypersensitivity upon repeated exposure to the agent. A significant skin sensitising potential to CS has been reported in industry where contact dermatitis was reported in 25/28 workers in a US chemical plant manufacturing CS. Unexpected respiratory risks linked to tear gas exposures have been reported from epidemiological studies by the US Army where relatively young and healthy population was found to have a high risk of presenting acute respiratory illness after CS exposure. The details of these occupational findings from CS exposure will be elaborated during the presentation.

About the Speaker

Dr Loke Weng Keong received his graduate training in both Chemistry and Pharmacology at the National University of Singapore. He spent his last 25 years in defence research with DSO National Laboratories and is the co-editor for a book, co-author for three book chapters and three patents, 33 journal papers and 54 conference papers. For his technical contributions to chemical defence, he is recognised as a Distinguished Member of Technical Staff in DSO.

He is currently serving as the Director to a team of researchers working on technological solutions to counter Chemical, Toxins, Radiological and Nuclear threats. At the national level, Dr Loke Weng Keong is actively involved in a number of committees that include the Technical Working Committee for Select Agents in support of National Biosafety Committee, Advisory Committee to the National Environment Agency on Radiation Protection and Nuclear Science, Operational Civil Emergency Joint Planning Staffing of the Singapore Civil Defence Force and the Toxicology Advisory Team advising the Ministry of Health.

The Invisible Threat of Indoor Air Pollutants

Associate Professor NG Lee Ching
Director, Environmental Public Health Division, Environmental Health Institute
National Environmental Agency, Singapore
Adjunct Associate Professor, Nanyang Technological University, Singapore

Indoor air quality is particularly important in tropical cities like Singapore, where most residents spend a substantial amount of time in an indoor environment. Associate Professor Ng Lee Ching will report on the findings of a baseline study of air-conditioned premises, conducted by the Environmental Health Institute, National Environment Agency. The results highlight the importance of three basic concepts in maintaining indoor air quality and limiting the exposure of occupants to contaminants such as formaldehyde : 1) reducing contaminants at the source; 2) improving ventilation; and 3) treatment of air supplied from the outdoor, especially during haze episodes.

About the Speaker

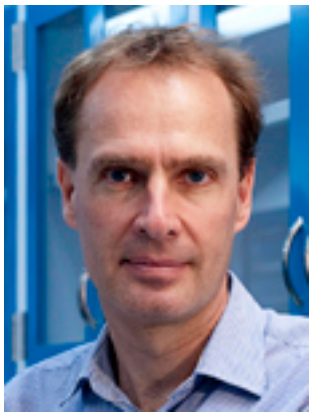
Associate Professor Ng Lee Ching is the Director of Environmental Health Institute (EHI), a national public health laboratory in Singapore. She has spent more than 20 years building scientific capabilities for Singapore's public health, conducting research to understand disease risk and transmission, and developing tools and strategies for mitigation of risks. She has co-authored more than 140 scientific papers and book chapters, and serves as an Adjunct Associate Professor at the Nanyang Technological University, Singapore. She is a regular temporary advisor to the World Health Organisation (WHO), and serves as the Director at the WHO Collaborating Centre for Reference and Research of Arbovirus and their Associated Vectors, in Singapore. The centre has contributed to regional capacity building through collaborative projects, hosting attachments of public health practitioners at EHI and training workshops.

Understanding the Air You Breathe: Scale and Dynamics of the Air Microbiome

Professor Stephan SCHUSTER
Research Director (Meta-'omics & Microbiomes)
Singapore Centre for Environmental Life Sciences Engineering
Professor, School of Biological Sciences, 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 has become apparent, even on a global scale. In contrast, the atmosphere, with its sizable planetary volume, has largely been neglected as a habitat for microbial communities, despite providing means of transport with an intercontinental range. The study showed occurrence of airborne microbial organisms in the tropical climate of Singapore and found robust and persistent assemblages, both on intra-day and a month-to-month time scale. Bacteria and fungi were the major constituents 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 sequencing (SMRT). These genome data from various indoor and outdoor settings, together with organismal and habitat information, are now enabling investigations of the impact of air environments on respiratory cohorts.

About the Speaker



Professor Stephan Schuster's expertise lies in developing and implementing sequencing platforms with significant discoveries in microbial and human evolution, eukaryotic cell biology and biodiversity. At the Singapore Centre for Environmental Life Sciences Engineering (SCELSE), Professor Stephan Schuster investigates bacterial communities using cutting-edge technologies to address structure, function, dynamics and interactions in complex biofilm communities.

Respiratory and Cardiovascular Health Risk from Exposure to Engineered Nanomaterials Released from Printing Equipment

Associate Professor NG Kee Woei
Deputy Director, Environmental Chemistry and Materials Centre
School of Materials Science & Engineering
Programme Director, Initiative for Sustainable Nanotechnology
NTU-Harvard School of Public Health, Nanyang Technological University, Singapore

Toner-based printing equipment (TPE) utilises engineered nanomaterials (ENMs) to improve performance. These ENMs are emitted during printing as complex incidental nanoparticles with varied physico-chemical and morphological compositions. Exposure to them can cause cellular injury *in vitro*, while innate immune activation has been reported in humans at occupational relevant exposure levels. Methodical risk assessment based on “real world” exposures to establish protective regulatory guidelines is lacking. Similarly, industry-wide molecular epidemiology and mechanistic studies are also scarce.

This study has measured exposure levels in six printing companies in Singapore to: (i) study the health risks from ENMs released from nano-enabled products; (ii) develop integrated methodologies that can be used along the exposure-disease continuum; (iii) develop novel early health effect biomarkers relevant to the respiratory and circulatory systems. Biological samples (blood, urine and nasal lavage) from more than 20 volunteers were collected. Preliminary data suggests acute activation of immune cells in specific individuals. Associate Professor Ng Kee Woei will describe further findings from ongoing analyses of these first samples.

Acknowledgement: Funding support from NTU-Harvard School of Public Health Initiative for Sustainable Nanotechnology (NTU-Harvard SusNano), ref: NTU-HSPH 17001.

About the Speaker

Associate Professor Ng Kee Woei was one of the first to be awarded the National Science Scholarships – Local Graduate Scholarship (PhD) by the Agency for Science Technology and Research (A*STAR). In 2010, he began his tenure-track Assistant Professor position at Nanyang Technological University (NTU), and was promoted to Associate Professor with tenure in 2015. In biomaterials development, he is recognised for developing novel human hair keratin-based platforms for various applications. In sustainable nanotechnology, he is interested in understanding nanotoxicological implications of exposure to EMNs in various scenarios.

A/Prof Ng is currently the Program Director of the NTU-Harvard School of Public Health Initiative for Sustainable Nanotechnology (NTU-Harvard SusNano), and the Deputy Director of the Environmental Chemistry & Materials Centre at the Nanyang Environment and Water Research Institute (ECMC-NEWRI). In 2016, he was elected Treasurer of the Tissue Engineering and Regenerative Medicine International Society – Asia Pacific Chapter (TERMIS-AP). In addition, he currently serves as the Deputy Chairman, Health & Safety Engineering Technical Committee, Institute of Engineers Singapore (IES), and is also a member of the Technical Committee on Nanotechnology within the Chemical Standards Committee commissioned by Enterprise Singapore. He further serves as a Subject Expert (Nanotechnology) on the SingHealth Institutional Biosafety Committee.

Prevention and Control of Occupational Health Hazards

Ms Evelyn KOH
Senior Assistant Director, Occupational Safety and Health (OSH) Specialist Department, OSH Division, Ministry of Manpower

The prevention and control of occupational health hazards involve anticipation and identification of hazards present in the work environment, assessment of the work environment and recommendation of control measures to eliminate or reduce the hazards. Ms Evelyn Koh will elaborate on the prevention and control of health hazards with a focus on asbestos and silica dust, regulatory requirements and intervention programmes to effectively manage and control health risks at the workplace.

About the Speaker

Ms Evelyn Koh is a Senior Assistant Director (Occupational Hygiene) in the Specialist Department of the Occupational Safety & Health (OSH) Division, Ministry of Manpower (MOM). She provides specialist support in OSH standards, best practices, and research and development. Her work involves assessment and control of health hazards at workplaces to safeguard workers and advises on engineering control measures for health hazards at workplaces. She leads a team that coordinates and conducts occupational hygiene programmes, investigations and enforcement activities. She operationalises strategies into effective implementation and execution of occupational hygiene programmes to prevent and control occupational health risks.

Why What You Know About COPD Might Be A Lie

Associate Professor Augustine TEE
Deputy Chairman Medical Board (Medical Disciplines)
Chief of Medicine and Senior Consultant Respiratory and Intensivist
Respiratory and Critical Care Medicine, Changi General Hospital

Chronic Obstructive Pulmonary Disease (COPD) was thought to be only a smoker's disease. Healthcare professionals have previously taken a nihilistic approach to management, while sufferers are underdiagnosed and public awareness is low. Some recent findings have shed light on misconceptions and renewed hope in the battle against this disease, which is set to become the third leading cause of death worldwide by 2030.

About the Speaker

Associate Professor Augustine Tee is currently the Deputy Chairman of the Medical Board (Medical Disciplines) and Chief of Medicine at Changi General Hospital (CGH) where he practises as a Senior Consultant Respiratory Physician and Intensivist. He is also the current Co-Chair of the MOH-appointed COPD Service Improvement Team. A/Prof Tee was previously a two-term Chair of the Chapter of Respiratory Physicians. He is a Residency Advisory Committee member with Respiratory Medicine and Internal Medicine. His main research interest is in Chronic Obstructive Pulmonary Disease (COPD).

Recognising Occupational Lung Diseases

Associate Professor LEE Hock Siang
Senior Consultant, Occupational Safety and Health (OSH) Specialist Department, OSH Division, Ministry of Manpower
Visiting Consultant, Occupational Lung Disease Clinic, Department of Respiratory and Critical Care Medicine, Singapore General Hospital
Adjunct Associate Professor, Saw Swee Hock School of Public Health National University of Singapore

There is a need to recognise and diagnose occupational lung diseases to better manage patients and protect workers who may be at risk. The patient could benefit from work injury compensation benefits, where applicable. A high index of suspicion and knowledge of common occupational lung diseases and their causative agents, as well as the occupations and industries, in the local context are good starting points. Knowledge of the typical clinical presentation including any specific features (if present) eg. pleural plaques (suggestive of asbestos exposure) or calcified hilar lymph nodes (some silicosis cases) is helpful. However, in most cases, there are no specific clinical features that can differentiate occupational diseases from non-occupational ones (e.g. interstitial lung diseases and lung cancer). A properly taken, complete and accurate occupational history is key in establishing the likelihood of occupational lung disease. The history should begin with the first job (given the long latency of such diseases) and be sufficiently detailed to establish the likelihood of exposure to known causative agents and estimate the level of exposure (high, medium or low).

About the Speaker

Associate Professor Lee Hock Siang is a Senior Consultant with the Occupational Safety and Health Division, Ministry of Manpower. He has more than 35 years of experience in occupational medicine with a special interest in occupational respiratory diseases. He has published numerous papers on occupational respiratory diseases and contributes his expertise as a Visiting Consultant to the Occupational Lung Disease Clinic, Department of Respiratory and Critical Care Medicine, Singapore General Hospital.

A Practical Approach to Assessing Fitness to Work with Lung Conditions

Assistant Professor Gregory CHAN
Senior Specialist Physician, The Occupational and Diving Medicine Centre
Work Health & Safety Inc. (Pte Ltd)
Adjunct Assistant Professor, Saw Swee Hock School of Public Health
National University of Singapore

There is a diversity of occupational hazards that is toxic to the respiratory system. Conversely, the individual may also be afflicted with a range of chronic respiratory conditions. However, respiratory medical standards for fitness to work assessments are not readily available except for specialised vocations like commercial divers, compressed air workers and pilots. Assistant Professor Gregory Chan will discuss a practical approach for assessing medical fitness to work in a worker with pre-existing lung conditions in the outpatient setting.

About the Speaker

Assistant Professor Gregory Chan is senior specialist physician at The Occupational and Diving Medicine Centre. He is an Occupational Health advisor to various institutions and companies including the Singapore Armed Forces, National University of Singapore and SingHealth centres.

Malignant Mesothelioma

Assistant Professor Anantham DEVANAND
Head and Senior Consultant, SingHealth Duke-NUS Lung Centre
Senior Consultant, Respiratory and Critical Care Medicine, Singapore General Hospital

Malignant mesothelioma is a rare cancer affecting the pleura and more than 85% of males with the disease is attributable to occupational asbestos exposure. At high risk are workers involved in the production of brake linings, construction and demolition workers, shipyard workers, electricians, plumbers and launderers. The latency period between exposure and malignancy is about 40 years and the overall median survival is estimated at 9.5 months. Chest pain and dyspnoea are the most common presentation and there is a right hemothorax predominance.

Histological diagnosis is challenging because of the wide range of morphological subtypes from epithelioid to sarcomatoid to biphasic; and it can mimic other pleural malignancies. The non-epithelioid subtype has a significantly shorter overall survival. Immunohistochemistry plays a crucial role in the histological diagnosis. The International Association for the Study of Lung Cancer (IASLC) uses the TNM descriptors in staging. Contrast enhanced CT is the most commonly utilised imaging modality and findings include pleural thickening of more than 1cm, pleural nodules, mediastinal pleural involvement and interlobar fissure nodularity. The presence of pleura plaques and absence of parenchymal lung involvement favour mesothelioma over other metastatic pleural aetiology. MRI is useful in differentiating T stage and PET-CT is used to exclude distal metastases. Several prognostication scores such as LENT and Brimms decision tree analysis are available.

Talc pleurodesis and indwelling pleural catheters are used in the management of pleural effusions. None of the available surgical options (pleurectomy, decortication or extrapleural pneumonectomy) have shown proven benefit especially in the non-epithelioid subtypes. The British Thoracic Society 2018 guidelines recommend cisplatin, pemetrexed and bevacizumab as a reasonable first line chemotherapeutic option. Radiotherapy should only be considered in the context of palliation of localised pain. The early involvement of palliative care and psychosocial support is also prudent. The patient may be eligible for compensation and the diagnosis of mesothelioma is reportable to the Ministry of Manpower under the Workplace Safety and Health Act.

About the Speaker

Assistant Professor Anantham Devanand was trained in interventional bronchoscopy and clinical ethics at Beth Israel Deaconess Medical Centre, Harvard Medical School and Thoraxklinik, University of Heidelberg. He has clinical interests in rigid bronchoscopy, advanced diagnostic bronchoscopy, sarcoidosis and medical thoracoscopy. His research interests include lung nodule evaluation and navigational bronchoscopy.

Occupational Asthma

Associate Professor TAN Keng Leong
Senior Consultant, Respiratory and Critical Care Medicine, Singapore General Hospital
Adjunct Associate Professor, Yong Loo Lin School of Medicine
National University of Singapore

Occupational asthma is defined as asthma due to conditions attributable to work exposures and not to causes outside the workplace. Occupational asthma is a legally notifiable and compensable occupational disease in many countries, including Singapore where 9-15% of adult asthmatics may have occupational asthma. Delays in diagnosis remain common and lead to worse outcomes.

Associate Professor Tan Keng Leong will discuss the two types of occupational asthma: sensitiser-induced asthma and irritant-induced asthma. He will also elaborate on the diagnosis of occupational asthma, the management of sensitiser-induced occupational asthma and the primary prevention method of reducing the burden of occupational asthma.

Appropriate management and prevention of occupational asthma is important because of the medical, socio-economic and legal consequences. Continued exposure to the causative agent may lead to irreversible chronic airflow limitation, resulting in persistent asthma even after removal from exposure. Identification of the specific causative agent and early removal from exposure may prevent the risk of a severe or fatal asthmatic attack in the workplace.

About the Speaker

Associate Professor Tan Keng Leong is a senior consultant at the Department of Respiratory and Critical Care Medicine, Singapore General Hospital and an Adjunct Associate Professor at the Yong Loo Lin School of Medicine, National University of Singapore. A/Prof Tan holds specialist registrations in Respiratory Medicine, Intensive Care Medicine and Internal Medicine with the Singapore Medical Council. His clinical interests include asthma, allergic airway, occupational lung and sleep breathing disorders. He was the physician-in-charge at the Occupational Lung Clinic at the Singapore General Hospital since 1999. He received several awards such as the National University of Singapore-Yong Loo Lin School of Medicine Dean's Award for Teaching Excellence (2008-2009) and the National Day 2016 Long Service Award.

*This programme booklet is designed and done by Sufian Bin Suderman and Eugene Woon from RASS Research Seminars and Support team