

On the frontier of chronic obstructive pulmonary disease—an interview with Prof. Peter J Barnes

Wei Ma^{a,*}

^a Department of Geriatric Respiratory Medicine, Guangzhou First People's Hospital, South China University of Technology, Guangzhou, Guangdong, China.

Abstract

The article is an interview with Prof. Peter J Barnes of the National Heart and Lung Institute, previously Head of Respiratory Medicine at Imperial College, conducted by Wei Ma of the Department of Geriatric Respiratory Medicine, Guangzhou First People's Hospital, on behalf of *Aging Pathobiology and Therapeutics*.



Peter J Barnes, DM, DSc, FRCP, FCCP, FMedSci, FRS

Peter Barnes is Professor of Thoracic Medicine at the National Heart and Lung Institute, and was Head of Respiratory Medicine at Imperial College and Honorary Consultant Physician at Royal Brompton Hospital, London from 1987-2017.

He qualified at Cambridge and Oxford Universities (first class honours) He has published over 1500 peer-review papers on asthma, Chronic Obstructive Pulmonary Disease (COPD), and related topics (H-index 240) and has written or edited over 50 books. He is in the top 10 most highly cited researchers in the world, and has been the most highly cited respiratory researcher in the world over the

last 30 years.

He was elected a Fellow of the Royal Society in 2007, the first respiratory researcher for over 150 years. He is a member of the Scientific Committee of global guidelines on COPD (GOLD). He also serves on the Editorial Board of over 30 journals and is currently Editor-in-Chief of *Up-to-Date Pulmonary Medicine*. He has given several prestigious lectures, including the Amberson Lecture at the American Thoracic Society, the Sadoul Lecture at the European Respiratory Society, and the Croonian Lecture at the Royal College of Physicians, London. He has received honorary degrees from the Universities of Ferrara (Italy), Athens (Greece), Tampere (Finland), Leuven (Belgium), and Maastricht (Netherlands). He is an NIHR Senior Investigator and was elected a Master Fellow of the American College of Chest Physicians and a member of Academia Europaea in 2012. He was President of the European Respiratory Society 2013/2014. He was awarded the Trudeau Medal of the American Thoracic Society in 2020. He co-founded an Imperial spin-out company RespiVert, which was acquired by Johnson & Johnson, and has developed novel inhaled treatments for COPD and severe asthma.

Wei Ma: Professor Barnes, could you please tell us why you are interested in the research of COPD and where were your early passions?

Peter Barnes: I was initially focused on research into asthma, and we worked on the underlying inflammatory mechanisms and the effects of therapies such as corticosteroids on this inflammation. I then moved on to apply the same approaches to COPD, as the underlying mechanisms were much less well understood and there was a greater unmet need for more effective therapies - even though COPD is the third-ranked cause of death in the world and a common cause of hospital admission.

* Corresponding author: Wei Ma, MD

Mailing address: Department of Geriatric Respiratory Medicine, Guangzhou First People's Hospital, South China University of Technology, Guangzhou, Guangdong, P.R.510180, China.

Email: eymawei@scut.edu.cn

Accepted: 20 October 2022 / Published: 29 December 2022

Wei Ma: You have made extraordinary achievements in your career and you've published highly impactful work in the field of COPD. Can you share your experience in achieving that?

Peter Barnes: We learned a lot about asthma mechanisms and treatments using a multidisciplinary approach from molecular and cell biology through to clinical studies; we adopted the same approach to investigating COPD. We were lucky to attract a large team of highly talented clinical and non-clinical scientists to work on the mechanisms of COPD, so were able to produce many publications at a time when few people were exploring the underlying mechanisms of the disease.

Wei Ma: Your research is focused on cellular and molecular mechanisms of COPD, what is your latest finding in therapies and biomarkers for COPD?

Peter Barnes: We have been investigating two important mechanisms in COPD that may be linked. The first is the role of cellular senescence in driving the pathology, chronic inflammation, disease progression, and comorbidities in COPD. The second is to understand the cellular mechanisms of defective phagocytosis of bacteria in COPD patients that may underlie the bacterial colonization of the lower airways and may also be linked to cellular senescence.

Wei Ma: You are also involved in multidisciplinary translational research which integrates basic science with clinical studies. Can you provide some novel insights into COPD?

Peter Barnes: I believe that it is very important to link basic research in cellular and molecular mechanisms to clinical aspects of COPD, so all of our research is conducted in human cells obtained from carefully phenotyped COPD patients and appropriate controls. This is important as animal models of COPD do not closely represent the human disease.

Wei Ma: What do you think is most valuable to study in the field of COPD and can you share with us your future focus?

Peter Barnes: As already mentioned, we are working on cellular senescence and accelerated ageing of the lung in COPD, as this may provide a better understanding of chronic inflammation due to inflammatory mediator release from senescent lung cells, particularly small airway epithelial cells. We are currently working on how senescence spreads in the lungs through the lungs and beyond by extracellular vesicles that contain microRNAs that induce senescence. We think this may account for disease progression and for comorbidities of COPD which are usually also diseases of accelerated ageing. Understanding

these mechanisms has identified new therapeutic targets and biomarkers.

Wei Ma: You are a Senior Research Investigator at the National Heart and Lung Institute and an Honorary Consultant Physician at Royal Brompton Hospital, and you have received honorary MD degrees from the Universities of Ferrara (Italy), Athens (Greece), Tampere (Finland) and Leuven (Belgium). Can you give some advice for junior colleagues on how to balance your life and jobs?

Peter Barnes: Research is hard work but very enjoyable working with an excellent group of colleagues and collaborators. Traveling to scientific meetings around the world and meeting with others addressing the same research questions is exciting. However, it is also important to balance work with quality leisure time. I particularly enjoy traveling with my family and exploring different areas of the world and often combine this with scientific conferences and meetings.

Wei Ma: How did you decide to get involved with editorial roles? Any advice to help junior faculty/early career researchers on the editorial work?

Peter Barnes: Reviewing manuscripts for journals is a very valuable way of keeping up to date with the literature, so I encourage junior colleagues to undertake journal reviews. I have served on many editorial boards, including acting as Associate Editor for several journals, which provides an opportunity to involve more junior researchers in reviewing. I also founded two respiratory journals (*Journal of Pulmonary Pharmacology and Experimental Therapeutics and Respiratory Research*) as there was a need for more basic research in respiratory medicine.

Wei Ma: Your future focus on lung aging and extracellular vesicles arouses my interest. Extracellular vesicles are successful in intercellular and interorgan communication in the aging microenvironment and age-related diseases. They have detrimental effects on downstream targets at the levels of immunity, inflammation, gene expression, and metabolism. What will you choose as downstream targets of lung aging?

Peter Barnes: We have recently shown that small airway epithelial cells from COPD patients produce increased numbers of extracellular vesicles compared to age-matched controls and that these vesicles are taken up and induce senescence in normal and COPD epithelial cells via the transfer of a specific microRNA. We think this is likely to be an important mechanism for the progression of COPD and also for many comorbidities through the spread of these senescence-inducing vesicles via circulation.