Prof. Kian Fan Chung: neuropathic mechanisms of chronic cough and views on air pollution

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Kian Fan Chung (Figure 1), MD, DSc, is Professor of Respiratory Medicine and Head of Experimental Studies at Imperial College London, and Physician at the Royal Brompton & Harefield NHS Trust, London, UK. He heads the Asthma Consortium of the NIHR-funded Biomedical Research Unit of the Royal Brompton NHS Trust. He co-leads the IMI-funded EU/EFPIA UBIOPRED project on severe asthma and is also an investigator in the MRC/Asthma UK Centre in Allergic Mechanisms of Asthma, in the MRC-EPA Environment & Health Centre at Imperial/Kings Colleges and in the MRC-ABPI-funded COPD-MAP Consortium. He is also a senior investigator of the UK National Institute for Health Research.

His current research interests are focused on the role of airway smooth muscle and effects of oxidant stress, on the mechanisms underlying corticosteroid insensitivity, and on the impact of environmental pollution and nanoparticles on the lungs. The translational aspects relate to systems medicine approach to understanding the chronic airflow obstruction and inflammation of asthma and COPD. He also has a deep interest in the cough hypersensitivity syndrome.

He is currently on the Editorial Boards of Lancet Respiratory Medicine, Respirology, Translational Respiratory Medicine, Journal of Thoracic Disease, European Journal of Clinical Pharmacology & European Journal of Pharmacology, and is a founding editor of COUGH. He has published over 650 original articles and reviews.

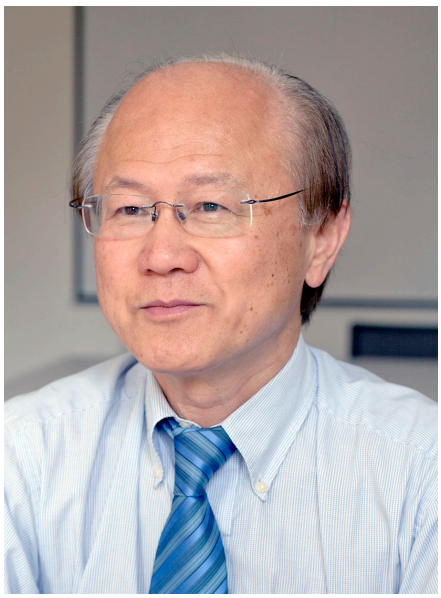

Figure 1 Prof. Kian Fan Chung.

JTD: You have proposed that chronic cough is a neuropathic disorder that arises from neural damage caused by a range of inflammatory, infective, and allergic factors. Could you please briefly introduce the neuropathic mechanisms of chronic cough?

Prof. Kian Fan Chung: This is a new concept of cough resulting from the damage to the sensory nerves. So the hypothesis is that there are a range of factors that can damage the sensory nerves, which include inflammatory factors, viruses, including the common cold virus which we know can induce cough, and various allergic factors that are related to allergic asthma. This damage leads to an increased sensitivity of the peripheral sensory nerves, but also of the central afferent pathways. And once this is established, this hypersensitivity does not reverse easily, which explains the chronicity of the cough.

This concept in fact arose from our experience of the patients with chronic cough in whom we cannot find any cause for the cough. Our reasoning is that whatever induced the cough from the start, though disappeared, it has caused permanent damage to the sensory nerves. So this will

explain why there is this cough hypersensitivity syndrome, a term that should replace chronic cough. This is similar to the concept behind neuropathic pain, which is likely to have the same mechanism as neuropathic cough. The reason why it's important to have this concept is that we can then start thinking of developing better antitussive treatments for patients with chronic cough.

JTD: Yes, we do look forward to further achievements on antitussives. Last year, a haze clinic existed for a while in a hospital in Chengdu. It caught the eyes from all over China. The doctors even suggested a patient to visit Sanya, a city has little pollution, to treat the disease but without prescribing any medicine. How do you consider about this special prescription? Currently, are there any effective medicines to protect people from the diseases in haze?

Prof. Kian Fan Chung: This is a very important issue that how to protect yourself from the effects of pollution, an issue that affects everyone who live in polluted areas. The best way is of course to reduce the pollution, but it will take time to do this, and China is taking steps in this direction. In the meantime, there is some good advice can be given: the advice about moving to a less polluted place is sensible but practically difficult. Just going out and spending a short time away to a less polluted area is not the answer because you have to go back to the polluted area again!

There is increasing evidence that pollutants cause damage by their oxidative capacity secondary to the generation of oxidative stress. There are certain genes that control the levels of anti-oxidants in the body that combat the effect of the pollutants. Clearly, some people are more susceptible to the effects of pollutants depending on the level of antioxidants their body can produce.

Therefore, in general, it would be a good idea to increase our anti-oxidant levels. I think there is a role here for good dietary advices, for example. People should be advised about food that contains high levels of anti-oxidants, or about food that can stimulate the anti-oxidant production in the body.

JTD: Could you please give some detailed suggestions on the food you've mentioned?

Prof. Kian Fan Chung: One recent development is the discovery in green vegetables such as broccoli that contains sulforaphane that can activate a substance called NrF2, which is a transcription factor that induces the production of many anti-oxidant enzymes. This is one example and there are many other examples of other substances contained in food that can be used to combat the effects of pollution. So thinking about ways like this in which we can take to protect ourselves against the effects of oxidative stress caused by the exposure to the pollutants could be useful.

JTD: Changing the dietary habit is a much better way than medication, and people would like to have a try when they learn this. Besides this, it's noted that the masks are selling good when the haze comes.

Prof. Kian Fan Chung: Yes, there are other protective ways that people can take, using air filters in the home to reduce the indoor levels of pollutants. Using masks outside in the polluted areas is also a reasonable protection to take, but we need to design more comfortable and effective masks.

JTD: We are very grateful for your assuming the guest editor with Drs. Junfeng Zhang and Nanshan Zhong for the haze, health and disease issue. Could you please explain the significance of this issue to the environment as well as people's health in China, as well as to other countries?

Prof. Kian Fan Chung: This issue is going to focus on the potential deleterious effects of haze on lung health. This is of course not a problem only seen in China, but it is now becoming the most important issue for the health of the people in China. In the Europe and North America, there has already been experience of the high pollution due to traffic and also due to industry and factories. We are seeing a similar situation now arising in China but the levels of pollution observed are much higher than previously recorded. So this issue will highlight this serious problem in China. We will gather the experience in North America and Europe and share this with China.

The pollution in China is has been characterized recently by frequent episodes of "haze" that has lasted for months over large areas of China. The interaction of very high levels of pollution with climatic factors particularly in the winter months in the north have led to this haze. There will be papers in the issue describing what is known about the composition of this particular haze, and what the particular effects of this haze on lung health and those with respiratory conditions could be. We hope that this issue will contribute to the efforts being done by the government to drastically reduce environmental pollution.

JTD: Thank you for your accepting the interview and we do look forward to the release of the "haze, health and disease" issue.

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