

## PRESS RELEASE

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### **HOUSE DUST MITE ALLERGENS DAMAGE DNA, KILL LUNG CELLS AND WORSENS ASTHMA**

*Singapore, 12 May 2016* – Asthma afflicts 300 million people around the world and is one of the most common chronic illnesses in children. In Singapore, about 20 per cent of children have asthma, while 5 per cent of adults suffer from the problem.

The causes have been traced to allergens ranging from pollen and pet dander to mold, cockroaches and tiny dust mites that are not visible to the naked eye. Now, researchers from NUS-SMART (Singapore-Massachusetts Institute of Technology Alliance for Research and Technology) have evidence that the damage caused by these microscopic creatures goes far beyond the irritation that is produced by the powerful allergens in their fecal matter-and secretions.

House dust mites can cause DNA damage in bronchial epithelium cells, the cells lining the central airways in our lungs. When DNA is damaged, DNA repair mechanisms are activated. Cells that are not properly and adequately repaired are more likely die, which is predicted to worsen the asthmatic condition, said Ms Chan Tze Khee. She is the first author of a research paper that was published by the team on the topic, and is a SMART PhD student at the Department of Pharmacology, NUS Yong Loo Lin School of Medicine.

Working with an experimental house dust mite asthma model, human lung tissues and human lung cell culture in the laboratory, the extensive damage to DNA directly caused by house dust mites was measured by the research team. The findings have just been published in *The Journal of Allergy and Clinical Immunology (JACI)*. The JACI is the highest ranked journal in the Allergy category and is a highly-cited allergy/immunology journal globally.

Asthma is an exaggerated immune response to innocuous allergens, characterised by a significant influx of immune cells into the airways. These cells, including eosinophils, neutrophils and macrophages, are capable of secreting high levels of reactive oxygen and nitrogen species (RONS), which are free radicals that can damage DNA.

The research by the team reveals that house dust mites can directly trigger RONS production and induce DNA damage in lung epithelial cells grown in the laboratory. This is of great interest because DNA damage has the potential to be toxic. Importantly, when the team used a drug to inhibit DNA repair, enhanced DNA damage and cell death were observed both in cultured cells and in experimental asthma models, pointing to the possibility that a person's DNA repair capacity can be a novel susceptibility factor for asthma.

"These findings essentially identify a potential additional alternative pathway in which asthma develops, caused by the direct damaging effects of house dust mites on lung cells," said the project's lead investigator, Associate Professor Wai Shiu Fred Wong, Head of the Department of Pharmacology at NUS Medicine and the research project's corresponding author.

DNA damage could be a component in asthma development, potentially responsible for the worsening of asthma, added Professor Bevin Engelward, Affiliate Principal Investigator of SMART Infectious Disease Interdisciplinary Research Group (IRG), Deputy Director of the MIT Center for Environmental Health Sciences and Professor of Biological Engineering of MIT, and the last author of the paper. "In addition to activation of immune responses, the patient's DNA repair capacity may determine the disease progression. Screening for DNA repair capacity might someday be used to predict the development of severe asthma."

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The School offers one of the finest undergraduate medical programs in the Asia-Pacific region and commands international recognition and respect. The Times World University Subject Rankings 2015-2016 list NUS Medicine as Asia's leading medical school, while the Quacquarelli Symonds (QS) World University Rankings by Subject 2016 placed NUS Medicine 22 globally.

The School admits 300 students to its medical undergraduate degree programme annually. Its principal missions are to educate and train the next generation of healthcare professionals, and foster research that will help to transform the practice of medicine.

Its 18 departments in the basic sciences and clinical specialties work closely with the Centre for Biomedical Ethics and the Centre for Medical Education to ensure that teaching and research are aligned and relevant to Singapore's healthcare needs.

The School is also a member of the National University Health System (NUHS), an integrated academic health system which comprises National University Hospital (NUH), National University Cancer Institute, Singapore (NCIS), National University Heart Centre, Singapore (NUHCS), National University Centre for Oral Health, NUS Faculty of Dentistry and NUS Saw Swee Hock School of Public Health.

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