

## **MEDIA RELEASE FOR IMMEDIATE RELEASE**

**1 August 2016**

### **SKIN MICROBES MODULATE ECZEMA FLARES**

*Finding provides deeper understanding of the skin disease and could lead to possible interventions for improved skin health*

**SINGAPORE** – Research investigators in Singapore have found distinct bacterial and eukaryotic compositional differences in inter-flare Atopic dermatitis (AD) skin microbiome and provided evidence for its impact on *Staphylococcus aureus* (*S. aureus*) colonisation and skin immune response. The differences were also functionally predicted to shape the skin microenvironment by contributing to skin dryness and reduced acidity, which favour pathogen colonisation and inflammation during AD flares. Taken together, the study demonstrates an intricate relationship between skin microbiome alterations and skin health.

AD, or eczema, is a highly prevalent skin disorder that affects one in five Singaporeans. AD patients suffer from dry, itchy skin with cyclic periods of asymptomatic non-flare and red, inflammatory, and often infected flares. While studies have been conducted previously to demonstrate near-complete colonisation of AD skin lesions during flares with the pathogen *S. aureus*, the between-flare skin microbiome composition and its contribution to AD pathology has remained elusive.

In AD, helpful skin microbes are missing even when the skin appears healthy. That in turn allows opportunistic and pathogenic microbes to flourish. This situation is similar to the “calm before the storm” when we see a signature in the non-flare skin. Published in scientific journal *Nature Microbiology*, this study was led by researchers from A\*STAR’s Genome Institute of Singapore (GIS) and Institute of Medical Biology (IMB).

This work could provide the beginnings of a method to look for microbial signatures that would indicate a person is at risk of disease, with between-flare

time points a good opportunity to target the skin microbiome as a possible prophylactic treatment for recurrent infections often seen in AD. In the long run, this could develop into an alternative and complementary approach for a continuum of skin health treatments that would be included with emollients and moisturisers to help promote a happy skin microbiome and stable non-flare disease state.

A multi-institutional effort that brought together expertise in skin biology, genomics, immunology and dermatology, this study also involved A\*STAR's Institute of Molecular and Cell Biology (IMCB) and Singapore Immunology Network (SIgN), alongside collaborators based at the National University of Singapore and National Skin Centre.

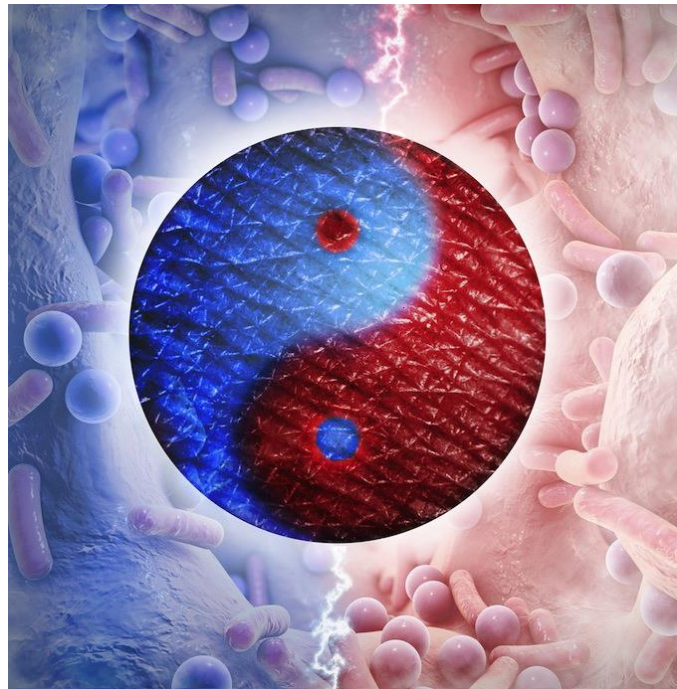
“The skin microenvironment, microbiome and immune system cross-modulate one another, culminating into AD flare cycles. Hence, therapeutic intervention for skin microbiome in AD patients seems like a feasible and attractive alternative. This gives us the momentum to continue to investigate this part of the disease cycle for possible interventions that could ultimately improve skin health,” said Dr Niranjan Nagarajan, the study's joint corresponding author and Principal Investigator of Computational & Systems Biology at the GIS.

“This study suggests that interventional treatments targeting the skin microbiome with probiotic or microbe transplants could be useful for prevention of skin diseases. We are now focusing on longitudinal clinical studies across AD flares, microbiome development in infants at high risk of developing AD and studying the various strains of microbes that we identified here,” said Dr John Common, co-lead author of the study and Project Leader at the IMB.

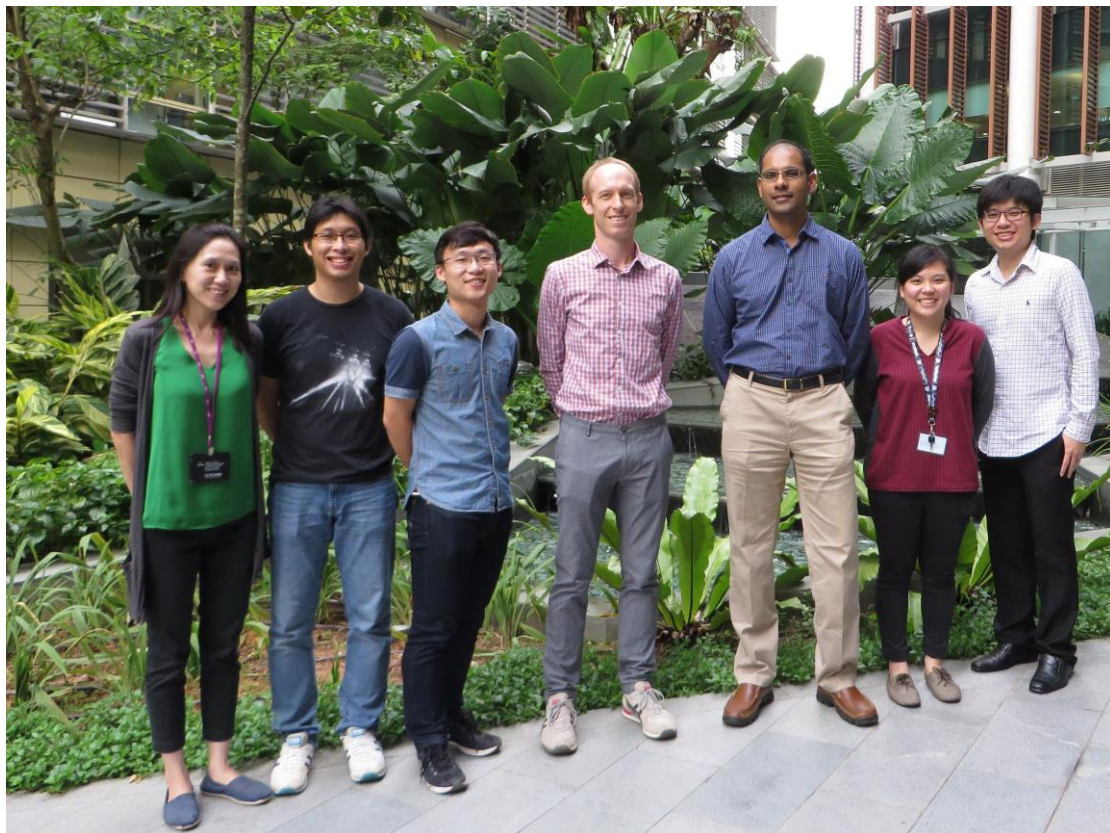
GIS Executive Director Prof Ng Huck Hui said, “Once again, this highlights the importance of cross-institutional efforts. By harnessing the expertise and resources within the industry and our clinical community, we can achieve more high-impact results in the shortest time possible, which would ideally lead to more timely interventions for patients in need.”

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**IMAGE**



*(Image source: A\*STAR's Institute of Medical Biology)*  
The microbial yin and yang of the AD flare cycle.



(L-R) Dr Angeline Tay, Colin Wong, Chenhao Li, Dr John Common, Dr Niranjan Nagarajan, Amanda Ng, Dr Kern Rei Chng.

## Notes to Editor:

The research findings described in this media release can be found in the scientific journal *Nature Microbiology*, under the title, “Whole metagenome profiling reveals skin microbiome-dependent susceptibility to atopic dermatitis flare” by Kern Rei Chng<sup>1</sup>, Angeline Su Ling Tay<sup>2</sup>, Chenhao Li<sup>1</sup>, Amanda Hui Qi Ng<sup>1</sup>, Jingjing Wang<sup>3,4</sup>, Bani Kaur Suri<sup>5</sup>, Sri Anusha Matta<sup>5</sup>, Naomi McGovern<sup>6</sup>, Baptiste Janela<sup>6</sup>, Xuan Fei Colin C Wong<sup>2</sup>, Yang Yie Sio<sup>5</sup>, Au Bijin Veonice<sup>3</sup>, Andreas Wilm<sup>1</sup>, Paola Florez De Sessions<sup>1</sup>, Thiam Chye Lim<sup>7</sup>, Mark Boon Yang Tang<sup>8</sup>, Florent Ginhoux<sup>6</sup>, John E Connolly<sup>3</sup>, E Birgitte Lane<sup>2</sup>, Fook Tim Chew<sup>5</sup>, John E A Common<sup>2\*</sup>, Niranjana Nagarajan<sup>1\*</sup>

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The *Nature Microbiology* paper can be accessed online from:  
<http://www.nature.com/articles/nmicrobiol2016106>

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### **About A\*STAR's Genome Institute of Singapore (GIS)**

The Genome Institute of Singapore (GIS) is an institute of the Agency for Science, Technology and Research (A\*STAR). It has a global vision that seeks to use genomic sciences to achieve extraordinary improvements in human health and public prosperity. Established in 2000 as a centre for genomic discovery, the GIS will pursue the integration of technology, genetics and biology towards academic, economic and societal impact.

The key research areas at the GIS include Human Genetics, Infectious Diseases, Cancer Therapeutics and Stratified Oncology, Stem Cell and Regenerative Biology, Cancer Stem Cell Biology, Computational and Systems Biology, and Translational Research.

The genomics infrastructure at the GIS is utilised to train new scientific talent, to function as a bridge for academic and industrial research, and to explore scientific questions of high impact.

For more information about GIS, please visit [www.gis.a-star.edu.sg](http://www.gis.a-star.edu.sg)

### **About A\*STAR's Institute of Medical Biology (IMB)**

IMB is one of the Biomedical Sciences Institutes of the Agency for Science, Technology and Research (A\*STAR). It was formed in 2007, with a mission to study mechanisms of human disease in order to discover new and effective therapeutic strategies for improved quality of life.

IMB has 20 research teams working in three primary focus areas - stem cells, genetic disease, and skin biology. The teams work closely with clinical collaborators as well as industry partners, to target the challenging interface between basic science and clinical medicine. IMB's strategic research topics are targeted at translational research to understand the mechanisms of human disease so as to identify new strategies for disease amelioration, cure and eradication and to improve health and wellbeing. Since 2011, IMB has also hosted the inter-research institute Skin Biology Cluster platform, and leads major strategic funding programs in rare genetic diseases and in skin biology. In 2013 IMB became a founding institute of the Skin Research Institute of Singapore.

For more information about IMB, please visit [www.imb.a-star.edu.sg](http://www.imb.a-star.edu.sg).

### **About the Agency for Science, Technology and Research (A\*STAR)**

The Agency for Science, Technology and Research (A\*STAR) is Singapore's lead public sector agency that spearheads economic oriented research to advance scientific discovery and develop innovative technology. Through open

innovation, we collaborate with our partners in both the public and private sectors to benefit society.

As a Science and Technology Organisation, A\*STAR bridges the gap between academia and industry. Our research creates economic growth and jobs for Singapore, and enhances lives by contributing to societal benefits such as improving outcomes in healthcare, urban living, and sustainability.

We play a key role in nurturing and developing a diversity of talent and leaders in our Agency and Research Institutes, the wider research community and industry. A\*STAR oversees 18 biomedical sciences and physical sciences and engineering research entities primarily located in Biopolis and Fusionopolis.

For more information on A\*STAR, please visit [www.a-star.edu.sg](http://www.a-star.edu.sg)