

**MEDIA RELEASE**  
**FOR IMMEDIATE RELEASE**

**7 JULY 2020**

**WHY SOME PATIENTS RECOVER FASTER FROM THE SIDE-EFFECTS OF  
ANTIBIOTIC TREATMENT**

*Discovery of gut bacteria critical to restoring gut health offers new insights into  
microbiome recovery after antibiotic treatment*



*Antibiotics are some of the most widely used drugs, yet their side effects on gut bacteria are not fully  
understood*

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**SINGAPORE** – A team of scientists from the Agency for Science, Technology and Research's (A\*STAR) Genome Institute of Singapore (GIS) and the National University of Singapore (NUS) Yong Loo Lin School of Medicine has identified the microbial factors underlying the response of the gut microbiome to antibiotic treatment. The study discovered a small set of gut bacteria strongly linked to gut microbiome recovery after antibiotic treatment. This discovery is critical in mitigating the side-effects of antibiotic treatment and its associated long-term health consequences. Findings from this study were published in the June issue of [\*Nature Ecology and Evolution\*](#).

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Antibiotics are one of the most commonly used drugs in healthcare, with billions of doses consumed around the world every year. Several studies have shown that repeated consumption of antibiotics in different stages of life disrupts the normal microbiome in our bodies, and increases the risk for various diseases (eg. diabetes, obesity, atopic dermatitis)<sup>1</sup>. Yet despite the high consumption rate of antibiotics, the side effects of its usage and associated long-term health consequences have been understudied.

In this study, the team analysed hundreds of gut microbiome profiles of patients from three different countries. They investigated why healthy bacterial communities in the gut recover better in some individuals after antibiotic treatment, but remain disrupted for others.

Dr Niranjan Nagarajan, Associate Director and Group Leader at GIS, commented, “Our guts harbour billions of bacteria, forming an ecosystem that serve as an additional ‘organ’ for our body. This ecosystem is supported by what we eat, but can also be destroyed by the antibiotics that we consume. The impact of antibiotics on the gut microbiome is similar to how a forest fire wreaks havoc on its flora and fauna. The recovery of a forest’s ecosystem is dependent on its food-web relationships and the presence of certain key species. The same is also true for the gut microbial ecosystem.”

“Our study reports the first attempt to reconstruct a gut bacterial ‘food-web’ from microbiome data, and has identified a small set of bacteria critical to its recovery post antibiotic treatment. This discovery challenges a dogma in the field that recovery of the gut microbiome is primarily due to antibiotic resistance and repopulation. It presents a different perspective to existing studies, and provides a new paradigm for studying microbiome recovery,” added Dr Nagarajan.

Bacteria that promote recovery of the gut microbiome are enriched with enzymes which degrade a wide range of host and diet-derived carbohydrates. They serve as the primary producers (akin to plants in macro-ecology) of the gut ecosystem to harvest energy for other bacteria. Their presence rapidly re-establishes the gut microbial food-web after antibiotic treatment, and boosts the recovery of a diverse, healthy microbial community.

Prof Patrick Tan, Executive Director of GIS, said, “The synergy between different types of gut bacteria that promote recovery is an exciting direction of research. It needs to be further explored to protect our bodies from the side-effects of antibiotic usage. The team is working on follow-up projects that aim to further characterise the mechanisms and synergies involved in gut microbiome recovery. In time, we hope to promote this recovery through consumption of appropriate pre- and probiotics.”

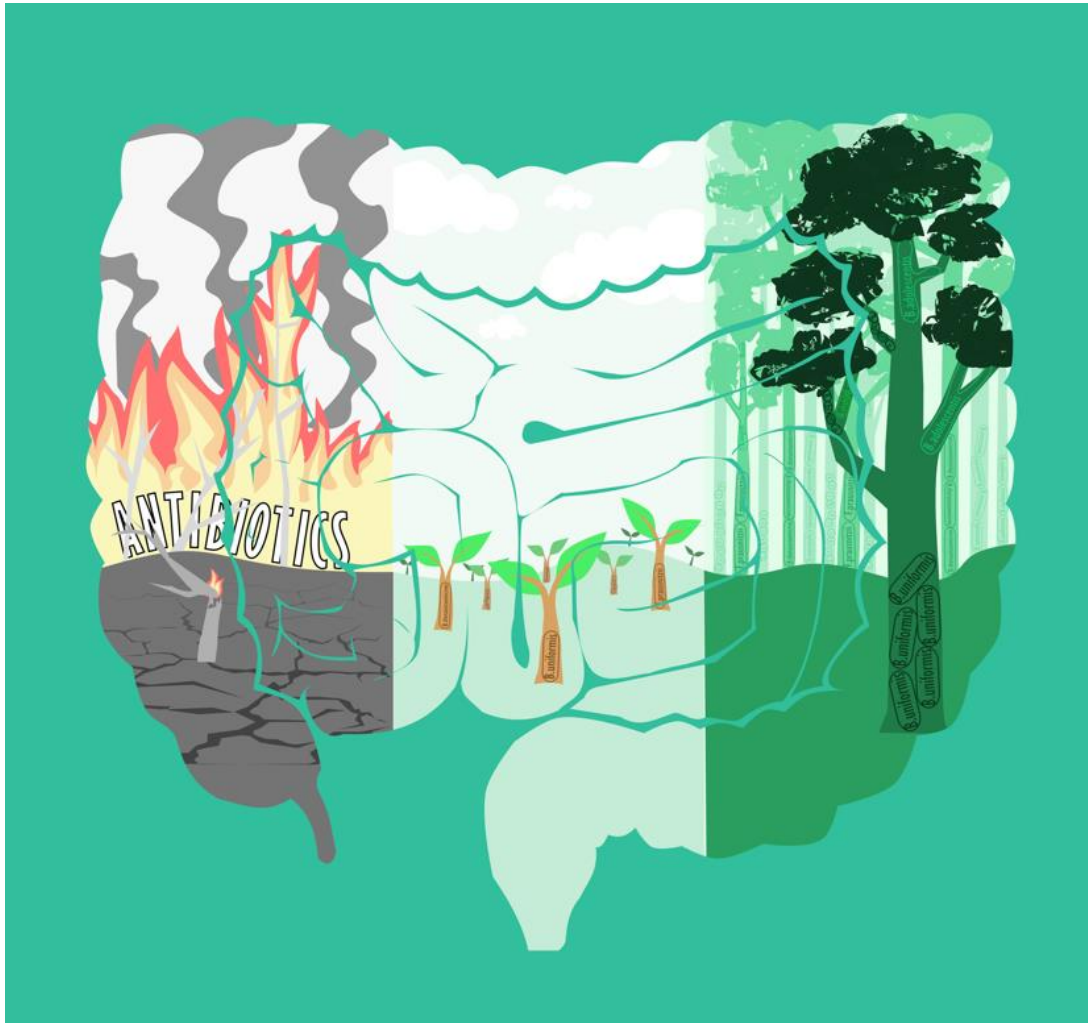
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<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4709861>

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*Recovery of gut microbial ecology is analogous to recovery after a forest fire  
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– END –

**Enclosed:**

**ANNEX A** - Notes to Editor

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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.a-star.edu.sg/gis](http://www.a-star.edu.sg/gis).

## 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 R&D agency, spearheading 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 entities, the wider research community and industry. A\*STAR's R&D activities span biomedical sciences and physical sciences and engineering, with research entities primarily located in Biopolis and Fusionopolis. For ongoing news, visit [www.a-star.edu.sg](http://www.a-star.edu.sg).

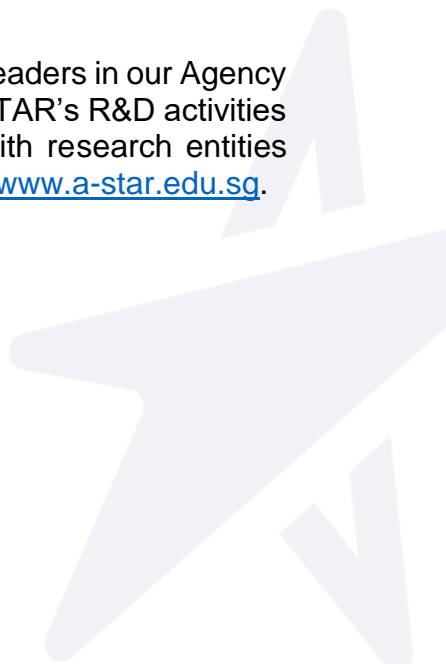
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## ANNEX A - NOTES TO EDITOR:

The research findings described in this media release can be found in the scientific journal Nature Ecology and Evolution, under the title, "[Metagenome-wide association analysis identifies microbial determinants of post-antibiotic ecological recovery in the gut](#)" by Kern Rei Chng<sup>1\*</sup>, Tarini Shankar Ghosh<sup>1,2\*</sup>, Yi Han Tan<sup>3\*</sup>, Tannistha Nandi<sup>1\*</sup>, Ivor Russel Lee<sup>3</sup>, Amanda Hui Qi Ng<sup>1</sup>, Chenhao Li<sup>1</sup>, Aarthi Ravikrishnan<sup>1</sup>, Kar Mun Lim<sup>1</sup>, David Lye<sup>3,4,5,6</sup>, Timothy Barkham<sup>6</sup>, Karthik Raman<sup>7</sup>, Swaine L Chen<sup>1</sup>, Louis Chai<sup>3,8</sup>, Barnaby Young<sup>4,5,6#</sup>, Yunn-Hwen Gan<sup>3#</sup>, Niranjan Nagarajan<sup>1,3#</sup>

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