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ASIA EDITION

Researchers from Japan discover new enzyme with promising antibacterial activity

July 15, 2024 | News

Phage-derived enzyme targets E. faecalis biofilms to mitigate acute graft-versus-host disease



Acute graft-versus-host disease (aGVHD) is a medical condition that occurs when donor immune cells attack the recipient's tissues after an allogeneic hematopoietic stem cell transplantation (allo-HCT). The pathogenesis of aGVHD is influenced by gut dysbiosis and Enterococcus domination.

A multidisciplinary team led by Associate Professor Kosuke Fujimoto from Osaka Metropolitan University and The University of Tokyo, alongside Professor Seiya Imoto from The University of Tokyo, and Satoshi Uematsu from Osaka Metropolitan University and The University of Tokyo, Japan recently identified a bacteriophage-derived enzyme called endolysin capable of targeting biofilms formed by Enterococcus faecalis. Their findings offer hope for tailored interventions in allo-HCT.

The team initiated their investigation by examining the intestinal microbiome of allo-HCT patients, where they noted a predominance of Enterococcus species, particularly E. faecalis. This was notably associated with acute leukemia.

Despite being sensitive to several antibiotics, E. faecalis strains possessed cytolysin-associated genes, indicating high virulence. Further exploration through metagenomic analysis revealed the presence of genetic signatures associated with biofilm formation.

They then proceeded with whole-genome sequencing of E. faecalis. This unveiled the presence of an intriguing bacteriophage-derived enzyme known as endolysin, exhibiting potent antibacterial activity specifically targeting E. faecalis.

“Bacteriophage research is gaining momentum, with advancements in phage therapy paving the way for new treatments. Our discovery of the endolysin enzyme holds promise for future applications in preventing or treating acute GVHD,” says Fujimoto, expressing his optimism regarding the potential impact and real-life applications of the research work.

Thanks to the research team for the identification of endolysin from bacteriophage, a new class of therapeutic compounds targeting highly resistant, biofilm-forming bacteria is now possible.