



OPEN ACCESS

EDITED AND REVIEWED BY

Benoit Chassaing,
Institut National de la Santé et de la
Recherche Médicale (INSERM), France

*CORRESPONDENCE

Learn-Han Lee

✉ leelearnhan@yahoo.com

Xuefeng Gao

✉ xfgao@smu.edu.cn

Gang Sun

✉ dr.sungang@outlook.com

RECEIVED 16 November 2023

ACCEPTED 20 November 2023

PUBLISHED 29 November 2023

CITATION

Lee L-H, Gao X and Sun G (2023) Editorial:
Roles of microbes in esophageal disease.
Front. Cell. Infect. Microbiol. 13:1339579.
doi: 10.3389/fcimb.2023.1339579

COPYRIGHT

© 2023 Lee, Gao and Sun. This is an open-
access article distributed under the terms of
the [Creative Commons Attribution License
\(CC BY\)](https://creativecommons.org/licenses/by/4.0/). The use, distribution or
reproduction in other forums is permitted,
provided the original author(s) and the
copyright owner(s) are credited and that
the original publication in this journal is
cited, in accordance with accepted
academic practice. No use, distribution or
reproduction is permitted which does not
comply with these terms.

Editorial: Roles of microbes in esophageal disease

Learn-Han Lee^{1,2*}, Xuefeng Gao^{3,4*} and Gang Sun^{5*}

¹Sunway Microbiome Centre, School of Medical and Life Sciences, Sunway University, Sunway City, Malaysia, ²Research Center for Life Science and Healthcare, China Beacons of Excellence Research and Innovation Institute (CBI), University of Nottingham Ningbo China, Zhejiang, China, ³Department of Hematology and Oncology, International Cancer Center, Shenzhen Key Laboratory of Precision Medicine for Hematological Malignancies, Shenzhen University General Hospital, Shenzhen University Clinical Medical Academy, Shenzhen University Health Science Center, Shenzhen, China, ⁴Central Laboratory, Shenzhen University General Hospital, Shenzhen, China, ⁵Microbiota Division, Department of Gastroenterology and Hepatology, The First Medical Center, Chinese People's Liberation Army (PLA) General Hospital, Beijing, China

KEYWORDS

microbes, esophageal disease, microbiome, gastroesophageal reflux disease (GERD), eosinophilic esophagitis (EoE), esophageal squamous cell carcinoma (ESCC)

Editorial on the Research Topic

Roles of microbes in esophageal disease

The human body is home to a vast ecosystem of microorganisms, collectively known as the microbiome, which plays a pivotal role in maintaining our health (Lim et al., 2022b). In recent years, research has shed light on the significance of the microbiome in various aspects of health (Kong et al., 2022), including its involvement in esophageal disease (ED) (Chen et al., 2022; Muszyński et al., 2022). This Research Topic aims to investigate the esophageal microbiota's role in various EDs, such as gastroesophageal reflux disease (GERD), eosinophilic esophagitis (EoE) and esophageal squamous cell carcinoma (ESCC), shedding light on potential diagnostic and therapeutic avenues.

Two studies investigated the relationship between microbiota and GERD. The first study, focusing on proton pump inhibitors (PPIs), Shi et al. revealed mycobiota dysbiosis in GERD patients, irrespective of PPI use. PPI treatment exacerbated fungal dysbiosis, particularly with increased *Candida* colonisation, warranting further investigation for a deeper understanding of PPIs effects on fungal dynamics in GERD. The second study, Ye et al. examined gut microbiota in pediatric GERD, identifying imbalances in bacterial phyla and specific metabolic pathways related to arachidonic acid, tyrosine, glutathione, and caffeine. The study suggests potential therapeutic interventions targeting specific bacteria associated with these pathways. Together, these studies provide scientific insights into microbiota dysregulation in GERD, influencing our understanding and potentially reshaping therapeutic approaches for GERD. Meanwhile, in the third study, Zhang et al. scrutinised the intratumoral microbiome in ESCC. The study underscores their potential as prognostic indicators and therapeutic targets by linking higher microbiome diversity and *Lactobacillus* abundance to forming an immunosuppressive microenvironment. The findings highlight the symbiotic relationship between the intratumoral microbiome and the immune microenvironment, paving the way for innovative ESCC prognosis and treatment approaches.

Zou et al. comprehensively reviewed studies on esophageal microflora in GERD, EoE, ESCC and Barrett's esophagus, suggesting a bidirectional causal relationship between ED

and shifts in esophageal microflora. This implies that pathogenic microflora can reshape the mucosal microenvironment, and alterations in the mucosal microenvironment, in turn, can facilitate changes in the microflora. Meanwhile, Zhang et al. focused on reviewing EoE-related esophageal microbiome research, highlighting key findings such as alterations in microbial composition, the potential role of the microbiota in EoE pathogenesis through interactions with the epithelial barrier and immune system, modulation of the microbiota by EoE treatments, and the emerging therapeutic potential of targeting the esophageal microbiota. Nevertheless, despite the methodological challenges and existing limitations in esophageal microflora research, both Zou et al. and Zhang et al. indicate that the development of genomics and multi-omics approaches holds promise for enhancing our understanding of the esophageal microbiome, identifying molecular biomarkers for more accurate diagnosis, and ultimately contributing to the prevention and treatment of ED.

In conclusion, these studies underscore the oesophageal microbiota's pivotal role in ED. From unraveling the complexities of EoE to questioning the implications of PPI use and exploring the intricate relationships in ESCC and pediatric GERD, the esophageal microbiota emerges as a dynamic player in the spectrum of ED. As we navigate this fascinating landscape, the call for larger, standardised studies becomes increasingly imperative to investigate the impact of interventions, such as targeted microbiota modulation (Lim et al., 2022a; Lim et al., 2022b; Sim et al., 2023), which holds promise for developing more effective therapeutic strategies in ED.

References

- Chen, X., Xian, B., Wei, J., Chen, Y., Yang, D., Lai, X., et al. (2022). Predictive value of the presence of *Prevotella* and the ratio of *Porphyromonas gingivalis* to *Prevotella* in saliva for esophageal squamous cell carcinoma. *Front. Cell. Infect. Microbiol.* 12. doi: 10.3389/fcimb.2022.997333
- Kong, G. Y.-E., Letchumanan, V., Tan, L. T.-H., and Law, J. W.-F. (2022). Gut microbiome in obsessive compulsive disorder: potential of probiotics as an adjuvant therapy. *Prog. Microbes Mol. Biol.* 5, 1–10. doi: 10.36877/pmmb.a0000272
- Lim, J.-M., Letchumanan, V., Tan, L. T.-H., Hong, K.-W., Wong, S.-H., Ab Mutalib, N.-S., et al. (2022a). Ketogenic diet: A dietary intervention via gut microbiome modulation for the treatment of neurological and nutritional disorders (a narrative review). *Nutrients* 14, 3566. doi: 10.3390/nu14173566

Author contributions

L-HL: Conceptualization, Writing – original draft, Writing – review & editing. XG: Conceptualization, Writing – review & editing. GS: Conceptualization, Writing – review & editing.

Funding

The author(s) declare that no financial support was received for the research, authorship, and/or publication of this article.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

- Lim, W. Q., Cheam, J. Y., Law, J. W.-F., Letchumanan, V., Lee, L.-H., and Tan, L. T.-H. (2022b). Role of garlic in chronic diseases: focusing on gut microbiota modulation. *Prog. Microbes Mol. Biol.* 5, 1–12. doi: 10.36877/pmmb.a0000271

- Muszyński, D., Kudra, A., Sobocki, B. K., Folwarski, M., Vitale, E., Filetti, V., et al. (2022). Esophageal cancer and bacterial part of gut microbiota – A multidisciplinary point of view. *Front. Cell. Infect. Microbiol.* 12. doi: 10.3389/fcimb.2022.1057668

- Sim, A., Cheam, J. Y., Law, J. W.-F., Letchumanan, V., Kumari, Y., Ogawa, S., et al. (2023). The ameliorative role of probiotics in 5-fluorouracil induced intestinal mucositis. *Prog. Microbes Mol. Biol.* 6, 1–34. doi: 10.36877/pmmb.a0000339