FINE MOLECULAR STRUCTURE OF GLYCOGEN PARTICLES IN *ESCHERICHIA COLI*

Liang Wang[a,b,c,d], Qing-Hua Liu[e], Zi-Yi Wang[f]

[a] Department of Laboratory Medicine, Guangdong Provincial People's Hospital, China
wangliang@gdph.org.cn
[b] School of Biomedical Sciences, University of Western Australia, Australia
[c] School of Medical and Health Sciences, Edith Cowan University, Australia
[d] School of Agriculture and Food Sustainability, University of Queensland, Australia
[e] Macau University of Science and Technology, Macao SAR, China
[f] School of Chemistry and Molecular Biosciences, The University of Queensland, Australia

Glycogen in *Escherichia coli* exhibits dynamic structural alterations, switching between fragile and stable states, yet the molecular mechanisms underlying these changes remain unclear. Recent studies suggest that glycogen degradation enzymes may play a crucial role in the structural regulation of glycogen particles. However, the specific contributions of glycogen phosphorylase (GlgP) and glycogen debranching enzyme (GlgX) have not been thoroughly investigated. This study aims to explore the roles of GlgP and GlgX in glycogen structural stability and fragility. In particular, the fine molecular structure of glycogen particles in *E. coli* wild-type and three mutant strains, *ΔglgP*, *ΔglgX*, and *ΔglgP/ΔglgX*, were explored. Using a combination of biochemical assays and advanced imaging techniques, glycogen particle fragility and stability across these strains were compared. Our findings reveal that glycogen in *E. coli ΔglgP* and *ΔglgP/ΔglgX* mutants was consistently in a fragile state, whereas glycogen in the *ΔglgX* mutant exhibited a stable conformation. These observations suggest that GlgP plays a dominant role in maintaining glycogen structural stability. The absence of *glgP* leads to a significant disruption in the structural stability of glycogen particles, while *glgX* deletion alone does not appear to affect glycogen stability. In sum, this study highlights the essential role of glycogen phosphorylase in regulating glycogen structural stability in *E. coli*. Our findings provide important molecular insights into the mechanisms governing glycogen structural stability, offering a deeper understanding of glycogen metabolism and its regulation in prokaryotic systems.

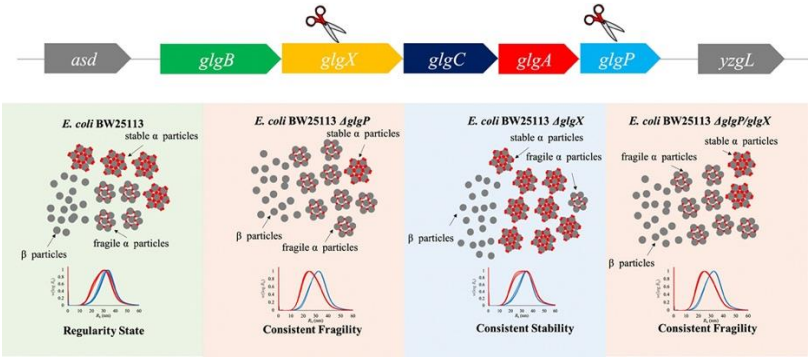

Figure 1. Schematic illustration of the influences of key genes on glycogen structural stability and fragility in *Escherichia coli* [1].

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References:
1. F. Li, M. M. Wang, Q. H. Liu, Z. W. Ma, J. J. Wang, Z. Y. Wang, J. W. Tang, J. W. Lyu, Z. B. Zhu, L. Wang. *Carbohydr. Polym.* **2023**, *299*, 1-10.