Poster | 33.Poster

Wed. Jul 1, 2026 12:10 PM - 1:00 PM JST | Wed. Jul 1, 2026 3:10 AM - 4:00 AM UTC | Poster 1(4FFoyer+401+402)
[P005] Poster

12:10 PM - 1:00 PM JST | 3:10 AM - 4:00 AM UTC

[P03-311] Adaptive laboratory evolution enables autotrophic growth of *Eubacterium limosum* under defined medium conditions

○Seulgi Kang[1], Jiyun Bae[1], Donghwi Lee[1], Chanho Park[1], Hyunwoo Jung[2], Jejin Kim[2], Byung-Kwan Cho[1,2,3] (1. Department of Biological Sciences, Korea Advanced Institute of Science and Technology, Daejeon 34141 (Korea), 2. Graduate School of Engineering Biology, Korea Advanced Institute of Science and Technology, Daejeon, 34141 (Korea), 3. KI for the BioCentury, Korea Advanced Institute of Science and Technology, Daejeon 34141 (Korea))

Keywords：Acetogens、ABC transporter、Autotrophic growth、Defined media、Adaptive laboratory evolution

Acetogens convert C1 substrates into acetyl-CoA via the Wood-Ljungdahl pathway. However, most acetogens require complex media containing undefined components, such as yeast extract, to support their autotrophic growth. The presence of these undefined components has obscured a precise understanding of their autotrophic metabolism. In this study, to reduce dependence on yeast extract for autotrophic growth, we performed adaptive laboratory evolution of *Eubacterium limosum* ECO2 under syngas conditions by reducing the yeast extract concentration. The resulting evolved strain, designated ECO_X, demonstrated the capability to grow in a yeast extract-free chemically defined medium, achieving complete CO consumption with a growth rate of $0.101 \pm 0.001\ h^{-1}$. In addition, we found that ECO_X produced less biofilm than ECO2, resulting in a 2-fold increase in transformation efficiency. To elucidate the genetic basis of these phenotypic changes, we identified a causal mutation in the ABC transporter gene via whole-genome resequencing and validated that it enables autotrophic growth in the defined medium. Furthermore, transcriptomic analysis revealed a significant upregulation of the tryptophan biosynthetic pathway in ECO_X, indicating that tryptophan biosynthesis is essential for autotrophic growth in defined conditions. Collectively, these findings provide a foundation for developing chemically defined media and enhance our understanding of acetogen physiology. This work was supported by Korea Environmental Industry & Technology Institute (KEITI) through Technology Development Program for CO_2 Mitigation and Conversion to Value-Added Products Using Indigenous Organism, funded by Korea Ministry of Climate, Energy and Environment (MCEE) (RS-2026-25505528).