

Mycelium based Living Hydrogel Bioreactor Platform for Enhanced Production of Postbiotics using Gut Microbes

U.L.Sachini Upeka Perera^{a*}, Srinivas Mettu^b

^a Chemical & Petroleum Engineering Department, Khalifa University of Science & Technology, Abu Dhabi, UAE

^b Food Security and Technology Center (FSTC), Khalifa University of Science & Technology, Abu Dhabi, UAE

Abstract

Mycelium grown under static liquid culture exhibits a highly microporous structure and exceptional water-holding capacity (>95%), creating a hydrated microenvironment that supports efficient nutrient diffusion and microbial colonization. This structure makes it a promising scaffold for microbial co-culture systems. In this study, two anaerobic bacterial species compared on co-cultivation with mycelial pellicle, and their short-chain fatty acid (SCFA) production and other postbiotics was monitored. One species showed promising results on accelerated SCFA synthesis under co-culture conditions compared to monoculture, suggesting potential metabolic synergy. SCFAs possess recognized antimicrobial activity and anti-inflammatory properties, including modulation of pro-inflammatory signalling pathways and maintenance of epithelial barrier integrity. Ongoing analyses aim to quantify metabolite production and clarify functional interactions within this bioengineered microbial system.

* Corresponding author *E-mail address*: srinivas.mettu@ku.ac.ae