

Dual Coating Improves the Survival of Probiotic *Bifidobacterium* Strains during Exposure to Simulated Gastro-Intestinal Conditions

Joo Yeon Kang¹, Do Kyung Lee², Jae Eun Park¹, Min Ji Kim², Joong-Su Lee³, Jae-Gu Seo³,
Myung Jun Chung³, Hea Soon Shin¹, and Nam Joo Ha^{2*}

¹College of Pharmacy, Duksung Women's University, Seoul 132-714, Republic of Korea

²College of Pharmacy, Sahmyook University, Seoul 139-742, Republic of Korea

³R&D Center, Cell Biotech Co., Ltd., Gimpo 415-871, Republic of Korea

위장관내 조건에서 이중코팅 처리 된 프로바이오틱 비피도박테리움의 생존력 향상

강주연¹ · 이도경² · 박재은¹ · 김민지² · 이종수³ · 서재구³ · 정명준³ · 신혜순¹ · 하남주^{2*}

¹덕성여자대학교 약학대학, ²삼육대학교 약학대학, ³㈜셀바이오텍 연구소

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Probiotics have been reported to benefit human health by modulating immunity, lowering cholesterol, improving lactose tolerance, and preventing some cancer. Once ingested, probiotic microorganisms have to survive harsh conditions such as low pH, protease-rich condition, and bile salts during their passage through the gastro-intestinal (GI) tract colonize and proliferate to exert their probiotic effects. The dual coating technology, by which the bacteria are doubly coated with peptides and polysaccharides in consecutive order, was developed to protect the ingested bacteria from the harsh conditions. The aim of the study was to evaluate the viable stability of a doubly coated blend of four species of *Bifidobacterium* by comparing its bile/acid resistance and heat viability *in vitro* with that of the non-coated blend. After challenges with acid, bile salts, heat, and viable cell counts (VVCs) of the dual coated and non-coated blend were determined by cultivation on agar plates or flow cytometric measurement after being stain with the BacLight kitTM. The results showed that the dual coated blend was much higher resistant to the acidic or bile salt condition than the non-coated blend and heat viability was also higher, indicating that the dual coating can improve the survival of probiotic bacteria during their transit through the GI tract after consumption.

Keywords: *Bifidobacterium*, dual coating technology, duolac, probiotics

In today's society, there has been increasingly interested in their personal health and functional food. Probiotic products are an important functional food as they represent about 65% of the world functional food market, and the market for probiotic products continues to expand (Agrawal, 2005; Jankovic *et al.*, 2010). Probiotics are defined as 'live microorganisms which, when administered in adequate amounts, confer a health benefit on the host' (FAO/WHO, 2002). Researchers have reported to play a therapeutic role by modulating immunity, lowering cholesterol, improving lactose tolerance and preventing some cancer (Kailasapathy and Chin, 2000; Sanders *et al.*, 2007).

Probiotics are orally administrated and are available in various forms such as food products, capsules, sachets, or tablets. Ingested probiotics have to survive adverse conditions such as low pH, protease-rich condition, and bile salts during their passage through the gastro-intestinal (GI) tract to be able to influence the human gut microflora (Weichselbaum, 2009; Burgain *et al.*, 2011). However some probiotic bacteria are sensitive to oxygen, and many require media ingredients or modified gas environments to enable their growth (Dave and Shah, 1996; Talwalkar and Kailasapathy, 2004). Especially, *Bifidobacterium* strain that are the most widely used probiotic bacteria and are included in many products and functional foods vary greatly in their sensitivity to the harsh acidic environment of the stomach and many foods (Clark and Martin, 1994; Lankaputhra and

*For correspondence. E-mail: hanj@syu.ac.kr; Tel.: +82-2-3399-1607; Fax: +82-2-3399-1617