P03-030

Antioxidant Effect and Short-Chain Fatty Acid Production by Bioconversion using Purple *Helianthus tuberosus L.* Extract and *Lactobacillus paracasei.*

Soo Ah Jeong[1),3)], Yu Chang Jo[1)], Seung Hyeun Oh[1)], Yeong Hwan Jeong[1)], Son Myeong Gwan[2)], Kim Min Ji [2)], and Beong Ou Lim[1),3)*]

1)Medicinal Biosciences, Department of Applied Biological Sciences, Konkuk University, Chungju, Chungbukdo, 27478. Korea

2)College of Biomedical & Health Science, Konkuk University, Chungju 27478, Korea

3)Human Bioscience Corporate R&D Center, Human Bioscience Corp. 268 Chungwondaero, Chunju, Chungbukdo, 27478. Korea

ABSTRACT

Background : Purple *Helianthus tuberosus L*. (HT) is a major crop in North Chungcheong Province with various physiological activities. In particular, its main functional ingredients are anthocyanins and inulin, which are purple. Dietary fiber such as inulin and short-chain fatty acids produced as metabolites of intestinal microorganisms have recently been reported to be involved in important signal transmission in the gut-brain axis, improving not only intestinal health but also brain function decline. Therefore, our research team aims to develop new materials with high biological activity through bioconversion using purple HT and strains.

Methods and Results : In order to find an appropriate extraction method that can increase the physiological activity of purple HT, hot water extraction was performed using DW and 70% EtOH as solvents. Accordingly, a new material was developed by applying a bioconversion method using the lactic acid bacteria strain *Lactobacillus paracasei.* To confirm the expression of SCFA produced by bioconversion of the two samples, HPLC analysis was performed and compared. In addition, to investigate the biological antioxidant effect of the two samples, 70% EtOH hot water extract was selected after evaluating the total phenol and flavonoid content, and DPPH and ABTS activities and cell viability were measured. The production of SCFA was confirmed through bioconversion of purple HT and L. *paracasei*, and a higher phenol content was confirmed in 70% EtOH hot water extraction than DW during solvent hot water extraction with DW and 70% EtOH. Additional experiments were conducted on new bioconversion materials using purple HT 70% EtOH hot water extract and L. *paracasei*, and the results showed excellent DPPH and ABTS activities and no cytotoxicity from low to high concentrations.

Conclusion : These results suggest that bioconversion using purple HT and L. *paracasei* produces SCFA, and that it has the potential to be a functional material that can improve gut health and cognitive decline based on the gut-brain axis through its high antioxidant effect.

MATERIAL & METHOD

Chemical and Reagents: DPPH, potassium persulfate, anhydrous sodium phosphate (dibasic), ammonium thiocyanate, EDTA, anhydrous sodium phosphate (monobasic), pyrogallol, and ferrous sulphate (FeSO4) were purchased from Sigma, Sigma Chemical (St. Louis, MO, USA). Ferric chloride and sodium hydroxide were obtained from Wako Pure Chemical Industries Ltd. (Osaka, Japan). Water, Acetonitrile(ACN) (J.T Baker, USA)
All other chemicals and reagents were of analytical grade and used without further purification.

Methods

- **Phenolic Content(FC Method)**
- **Flavonoid Content**
- **DPPH radical Scavenging Activity**
- **MTT assay**
- **HPLC analysis**

Statistical Analysis: All data are presented as the mean ± SD (standard deviation) at least three independent experiments and statistical analyses were calculated by using Microsoft Excel 2016 edition.

Extraction Process

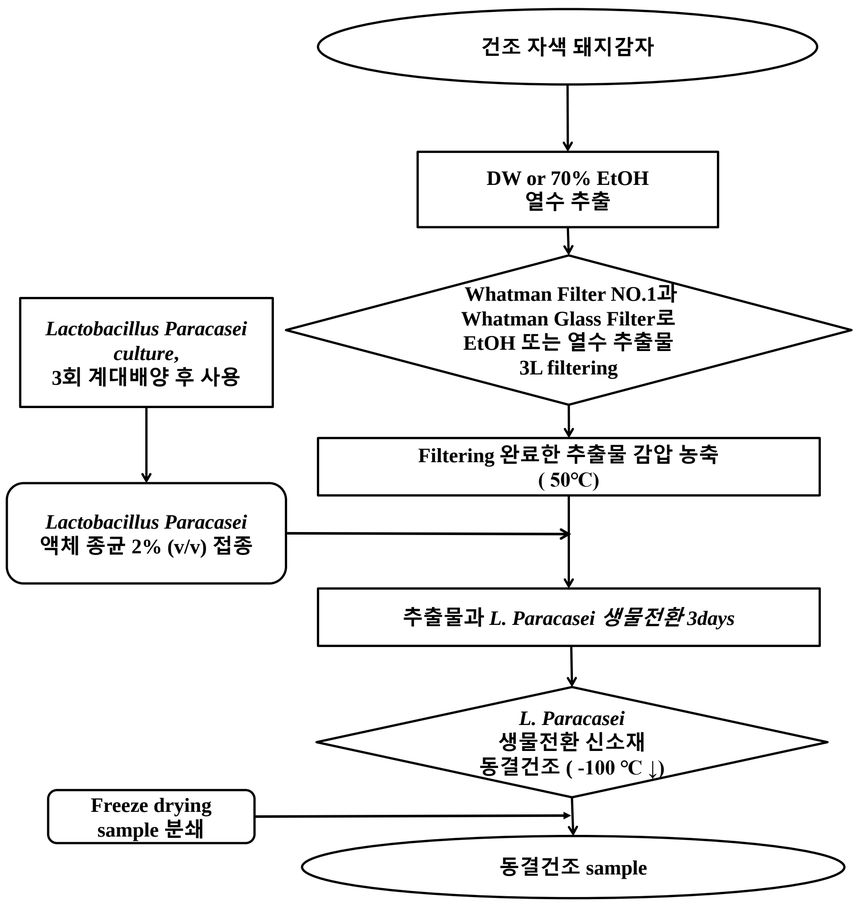


Fig. 1. Process of PHT Extraction and Bioconversion with L. *Paracasei*

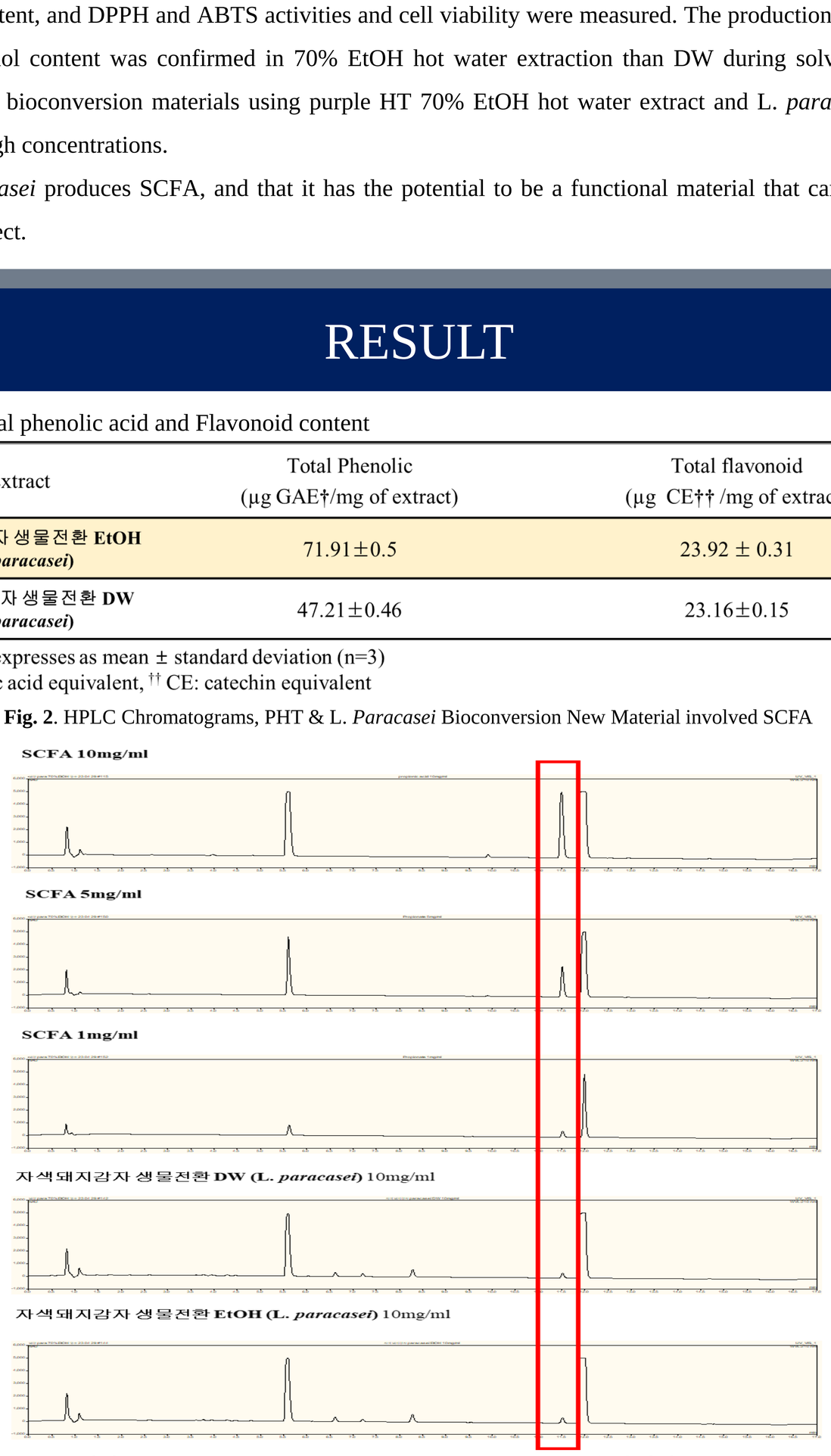
RESULT

Table 1. Total phenolic acid and Flavonoid content

Extract	Total Phenolic (μg GAE†/mg of extract)	Total flavonoid (μg CE†† /mg of extract)
자색돼지감자 생물전환 **EtOH** (**L. *paracasei***)	71.91±0.5	23.92 ± 0.31
자색돼지감자 생물전환 **DW** (**L. *paracasei***)	47.21±0.46	23.16±0.15

All data are expresses as mean ± standard deviation (n=3)
† GAE: gallic acid equivalent, †† CE: catechin equivalent

Fig. 2. HPLC Chromatograms, PHT & L. *Paracasei* Bioconversion New Material involved SCFA



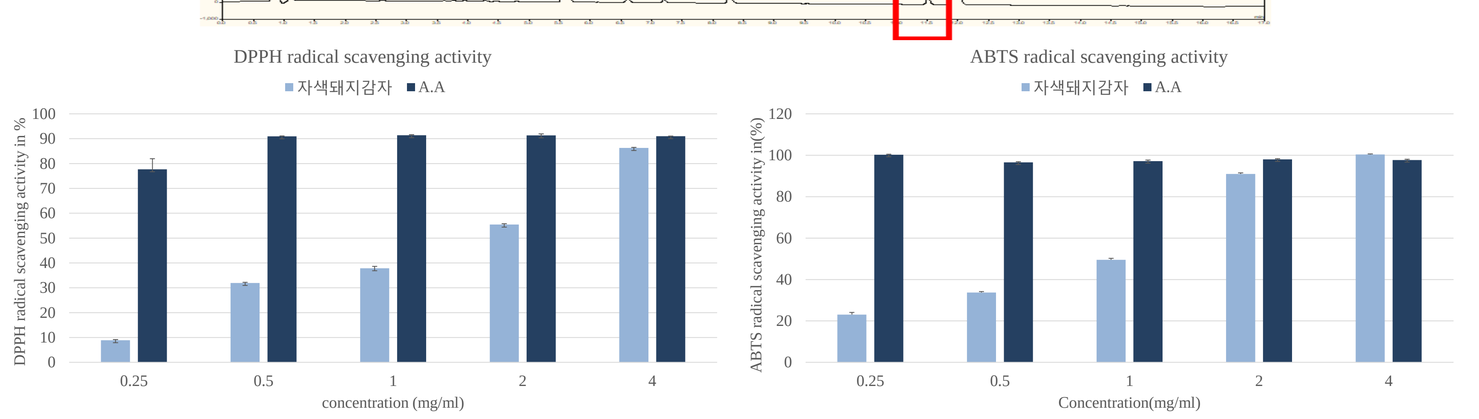


Fig. 3 DPPH, ABTS radical scavenging activities of PHT & L. *Paracasei* Bioconversion New Material Values are mean±SD (n=3).

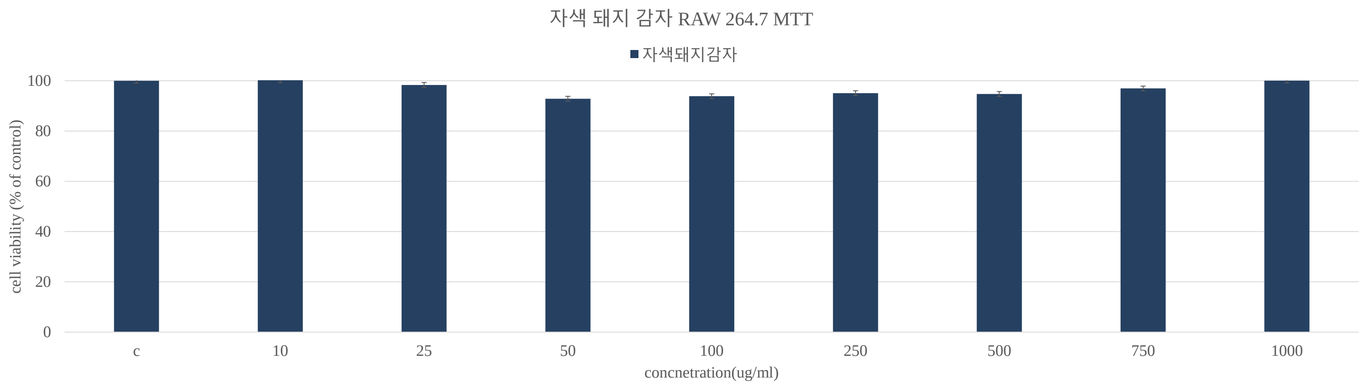


Fig. 4. . Cell viability of PHT & L. *Paracasei* Bioconversion New Material