

## Radical Scavenging Activity and Inhibition of Macrophage NO Production by Fukinolic Acid, a Main Phenolic Constituent in Japanese Butterbur (*Petasites japonicus*)

Satoru WATANABE\*, Ken HASHIMOTO\*\*, Hiroyuki TAZAKI\*\*\*, Yuzuri IWAMOTO\*\*\*\*, Naoko SHINOHARA\*, Kazue SATOH\*\*\*\*\* and Hiroshi SAKAGAMI\*\*

\* Department of Health and Nutritional Sciences, Tokyo Seiei College, Nishishinkoiwa 1-4-6, Katsushika-ku, Tokyo 124-0025, Japan

\*\* Division of Pharmacology, Department of Diagnostic and Therapeutic Sciences, Meikai University School of Dentistry, Keyakidai 1-1, Sakado-city, Saitama 350-0283, Japan

\*\*\* Department of Veterinary and Animal Science, Nippon Veterinary and Life Science University, Sakaiminami-cho 1-7-1, Musashino-city, Tokyo 180-8602, Japan

\*\*\*\* Agricultural, Food and Environmental Sciences Research Center of Osaka Prefecture, Shakudo 442, Habikino-city, Osaka 583-0826, Japan

\*\*\*\*\* Department of Anatomy, School of Medicine, Showa University, Hatanodai 1-5-8, Shinagawa-ku, Tokyo 142-8555, Japan

### Abstract

Four phenolic compounds were isolated from Japanese butterbur (*Petasites japonicus*) by preparative RP-HPLC technique, and were identified as chlorogenic acid (CGA), fukinolic acid (FA), 3,5-dicaffeoyl quinic acid, and 3,4,5-tricaffeoyl quinic acid. Since the antioxidant activity of FA among these four compounds has not been reported in detail, we investigated the scavenging activity of FA against several active oxygens and radicals, compared with CGA, gallic acid (GA) and epigallocatechin gallate (EGCG), using ESR spectroscopy. The order of potency of scavenging superoxide anion, nitric oxide (NO) and DPPH was EGCG > FA > CGA. The order of potency of scavenging hydroxy radical was EGCG > FA > GA. FA inhibited the lipopolysaccharide-stimulated NO production and inducible NO synthase protein and mRNA expression by mouse macrophage-like cells Raw 264.7, more potently than CGA. The present study suggests that FA should be considered as a candidate of applicable antioxidant.