

## RESEARCH ARTICLE

# Improvement in Human Immune Function with Changes in Intestinal Microbiota by *Salacia reticulata* Extract Ingestion: A Randomized Placebo-Controlled Trial

Yuriko Oda<sup>1\*</sup>, Fumitaka Ueda<sup>1</sup>, Masanori Utsuyama<sup>2,3</sup>, Asuka Kamei<sup>4</sup>, Chihaya Kakinuma<sup>1</sup>, Keiko Abe<sup>4,5</sup>, Katsuiku Hirokawa<sup>2,3</sup>

**1** Pharmaceutical and Healthcare Research Laboratories, Research and Development Management Headquarters, FUJIFILM Corporation, Kanagawa, Japan, **2** Institute for Health and Life Science, Tokyo, Japan, **3** Department of Comprehensive Pathology, Tokyo Medical & Dental University, Tokyo, Japan, **4** Kanagawa Academy of Science and Technology, Kanagawa, Japan, **5** Department of Applied Biological Chemistry, Graduate School of Agricultural and Life Science, The University of Tokyo, Tokyo, Japan



## Abstract

Plants belonging to the genus *Salacia* in the *Hippocrateaceae* family are known to inhibit sugar absorption. In a previous study, administration of *Salacia reticulata* extract in rats altered the intestinal microbiota and increased expression of immune-relevant genes in small intestinal epithelial cells. This study aimed to investigate the effect of *S. reticulata* extract in human subjects by examining the gene expression profiles of blood cells, immunological indices, and intestinal microbiota. The results revealed an improvement in T-cell proliferation activity and some other immunological indices. In addition, the intestinal microbiota changed, with an increase in *Bifidobacterium* and a decrease in *Clostridium* bacteria. The expression levels of many immune-relevant genes were altered in blood cells. We concluded that *S. reticulata* extract ingestion in humans improved immune functions and changed the intestinal microbiota.

**Trial Registration:** UMIN Clinical Trials Registry [UMIN000011732](https://clinicaltrials.gov/ct2/show/study/UMIN000011732)