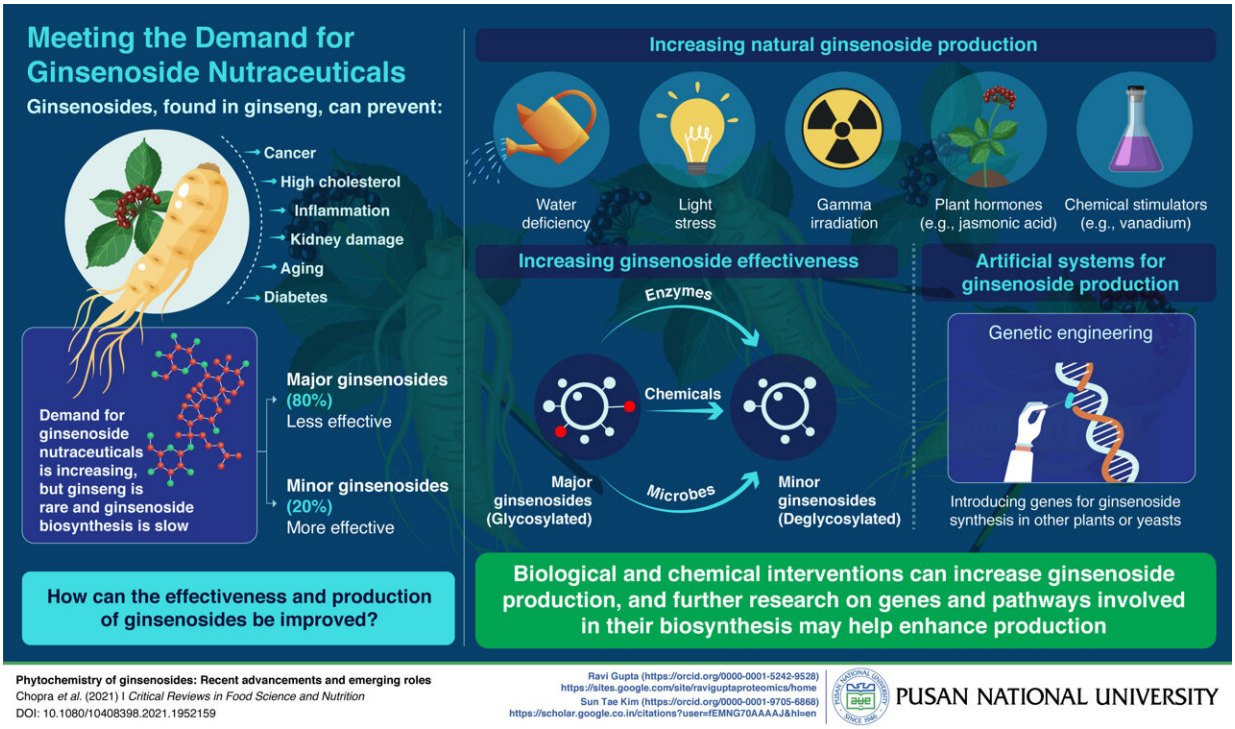
Exploring the health benefits of ginseng

September 16 2021



Phytochemistry of ginsenosides: Recent advancements and emerging roles. Credit: Pusan National University

Ginseng, a widely popular superfood, has long been used in traditional medicine. The health benefits of ginseng are largely attributed to compounds called ginsenosides, which are present in the roots, stems, and leaves of the plant. Ginsenosides are known to prevent inflammation, diabetes, and cancer, and can also help control blood cholesterol levels and reduce aging.

Although there are 13 known species of ginseng, Korean ginseng—which contains the highest number of ginsenosides—is not commonly found in nature. Moreover, of the two types of ginsenosides, the more effective variety—the minor ginsenosides—accounts for only 20% of the total ginsenoside content in ginseng. As a result, the supply of ginsenosides is insufficient to meet the high demand in the nutraceutical and pharmaceutical industries. In order to improve ginsenoside production, a one-stop resource with consolidated information from previous ginsenoside studies is required, but such a resource is currently unavailable.

A team of researchers led by Dr. Ravi Gupta from Kookmin University and Dr. Sun Tae Kim from Pusan National University, Korea, embarked on a journey to address this gap. In their recent review published in *Critical Reviews in Food Science and Nutrition*, they compiled a vast amount of data from a large number of ginsenoside studies across multiple fields, including botany, biochemistry, genetics, and drug research.

In addition to providing an overview of the different types and sources of ginsenosides, this review highlights several opportunities for improving ginsenoside production, both in the natural sources, as well as in synthetic biosystems. First, it discusses how major ginsenosides can be converted to the more effective minor type using chemical and enzymatic treatments as well as microbial action. Subsequently, it focuses on how treatments such as water restriction, light stress, gamma radiation, and the administration of plant hormones like jasmonic acid can enhance the ginsenoside content of ginseng.

Finally, the review provides a detailed summary of the biochemistry underlying ginsenoside synthesis in plants as well as its regulation at the gene level. "Understanding and identifying the genes and pathways involved in ginsenoside production can help us develop plants containing

high levels of ginsenosides. The identified genes can also be inserted into other organisms that do not make ginsenosides to create artificial systems like ginsenoside-producing yeasts," explains Dr. Gupta, adding that such strategies would be essential for large-scale ginsenoside production.

This review is the first of its kind to focus on ginsenosides on a wide scale. "This was a mammoth challenge, but we strongly believe that our efforts will bear fruit. Our work cements together all the research that has been conducted in the past, and we hope that in the future, scientists will capitalize on it and develop new ways to meet the global demand for ginsenosides," according to Dr. Kim.

This work by Dr. Gupta, Dr. Kim, and their team is an important step in further improving the industrial potential of a natural food.

More information: Priyanka Chopra et al, Phytochemistry of ginsenosides: Recent advancements and emerging roles, *Critical Reviews in Food Science and Nutrition* (2021). DOI: 10.1080/10408398.2021.1952159

Provided by Pusan National University