Compounds in female ginseng could lead to new osteoporosis treatments

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With ever-increasing life expectancy comes the challenge of treating age-related disorders such as osteoporosis. Although there are effective drugs for treating this metabolic bone disease, they can be expensive and have

side effects, limiting their availability to some people.

In the search for alternative drug candidates, researchers reporting in *ACS Central Science* have discovered and fully replicated a compound from a botanical source, female ginseng, that had potent anti-osteoporotic activity in cellular tests.

Osteoporosis and low bone mass impact 54 million American adults over the age of 50, according to the International Osteoporosis Foundation. The disease can progress to significant disability, such as hip and spine fractures, and financial burdens, such as lost wages and hospitalization.

Several drugs have proven effective in either preventing bone loss or promoting bone formation, but each comes with potential side effects, including injury to jaw and leg bones. Searching for alternative treatments, Hao Gao, Xin-Luan Wang and colleagues turned to female ginseng (Angelica sinensis), which has long been used in traditional Chinese medicine to treat osteoporosis.

The researchers performed chemical extraction on the medicinal plant and identified two new compounds, calling them falcarinphthalide A and B, that were structurally unlike anything previously discovered in female ginseng. They also determined potential biosynthetic precursors and metabolic pathways that the plants use to form these compounds.

Then, with these mechanisms as starting points, the team devised lab synthesis methods and produced the compounds at quantities sufficient for biological testing.

Inspired by the traditional efficacy of female ginseng, the team tested the compounds for their impact on the formation of cells called osteoclasts, which facilitate bone loss.

They observed that only falcarinphthalide A and its precursors showed osteoclast inhibitory activity and an anti-osteoporotic effect. Further analysis showed that falcarinphthalide A blocked key molecular pathways involved in osteoclast generation.

The researchers say that this study opens up the possibilities for new osteoporosis treatments based on the female ginseng compound, whether in its current form or as a structural template for further drug development.

More information: Discovery of a Potent Antiosteoporotic Drug Molecular Scaffold Derived from Angelica sinensis and Its Bioinspired Total Synthesis, *ACS Central Science* (2024). DOI: 10.1021/acscentsci.3c01414

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