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FILE: ▪Ginger (*Zingiber officinale*)
▪Anti-Inflammatory

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RE: Ancient and Modern Medicinal Uses of Ginger

Grzanna R, Lindmark L, Frondoza CG. Ginger—an herbal medicinal product with broad anti-inflammatory actions. *J Med Food.* 2005;8(2):125–132.

The medicinal use of ginger (*Zingiber officinale*) rhizome dates back 2,500 years in China and India, where it was prescribed to treat headaches, nausea, rheumatism, and colds.[1] Ancient Greek, Roman, Chinese and Sanskrit texts also document its use.[2] Historically ginger has been recommended for the treatment of stomach aches, diarrhea, nausea, asthma, respiratory disorders, toothache, gingivitis, and arthritis. Today ginger is used as a flavoring agent and in many clinical situations, including in the prevention of motion sickness, for nausea and vomiting; to improve digestive function; for peptic ulcers; and for its antiplatelet, anti-inflammatory, antipyretic, thermogenic, antimicrobial, and antioxidant properties. This article reviews the evidence for ginger's ancient and modern uses, with emphasis on ginger's anti-inflammatory effects.

More than 400 chemicals have been identified in ginger rhizome; however, "only a few of them have been evaluated for their pharmacological properties." Of those, only three structurally similar types of compounds—gingerols, shogaols, and paradols—are believed responsible for ginger's anti-inflammatory activity. Geography, age of rhizome at harvest, and extraction methods determine the relative proportions of chemicals. Drying and storage can increase the amount of shogaols and zingerone, which exist in small concentrations in fresh ginger rhizome.

Ginger reduces inflammation by inhibiting nuclear factor-κB (NF-κB) and the cyclooxygenase (COX) and lipoxygenase (LOX) enzymes. NF-κB regulates genetic expression of pro-inflammatory intermediates. Elevated NF-κB activity has been found in joints with osteoarthritis and rheumatoid arthritis, and other chronic inflammatory conditions. Three placebo-controlled clinical trials with a total of 333 volunteers evaluated ginger rhizome for the treatment of osteoarthritis. All three showed significant efficacy of ginger compared to placebo. Knee pain significantly decreased in the two studies in which knee pain was an end point. Additionally, in vitro studies showed decreased tumor necrosis

factor-α (TNF-α, a pro-inflammatory factor) in chondrocytes (connect tissue cells lining joints).

Gingerols are non-selective COX inhibitors; however, ginger extracts appear devoid of the toxic effects caused by NSAIDs. Instead, ginger has anti-ulcer effects and appears to protect the intestinal mucosa from damage. The authors conclude, "The lack of ginger's gastrointestinal side effects suggested the presence of a yet unidentified pharmacological activity responsible for the protective effects against the toxicity associated with COX-1 inhibition."

Not included in the article are the findings of a study that concluded that 6-gingesulfonic acid isolated from dried ginger rhizome has anti-ulcer activity.[3] Additionally, experimentally-induced gastric ulceration was reduced 97.5% by administration of 1000 mg/kg of acetone ginger extract, 53.6% by 100 mg/kg zingiberene and 54.5% by 100 mg/kg of 6-gingerol in a rat study.[4] While other animal studies have confirmed ginger's anti-ulcer effects, no randomized, controlled trials in humans have been conducted.

Ginger may also help in decreasing pain. Gingerols increase the activity of vanilloid receptors, which leads to potent analgesia. Pain is caused by joint inflammation and the production of inflammatory mediators, such as PG, TNF-α, interleukin-1β (IL-1β), IL-6, and IL-8. These last three are generated by LOX activity. Inhibition of NF-κB, COX, LOX, and stimulation of the vanilloid receptors might explain ginger's beneficial effects in reducing pain and inflammation. While the information in this review is compelling, and the empirical evidence created by 2,500 years of ginger use as a medicine, additional clinical trials are needed to further define the patient populations that will benefit most from ginger and the optimum dosages needed to obtain clinical benefits.

—John Neustadt, ND

References

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