

# USANA Technical Bulletin

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## Bromelain

### Technical Background

- Bromelain is a standardized complex of enzymes (cysteine proteases) found in the stem of pineapples (*Ananas comosus*). Proteases are protein-digesting enzymes.
- When taken orally, bromelain is an effective anti-inflammatory and is used to treat a number of inflammatory conditions,<sup>1,2</sup> including bronchitis, sinusitis,<sup>3</sup> swollen and injured joints, insect bites and bee stings, and arthritis. People suffering from rheumatoid arthritis who received bromelain experienced a reduction in joint swelling and pain, as well as increased joint mobility.<sup>4</sup>
- Bromelain can improve the effectiveness of antibiotics by increasing their levels in blood and tissues.<sup>2,5</sup> In addition, it may have antibacterial properties of its own.<sup>6</sup> Because bromelain is also an anti-inflammatory, it is now being recommended by doctors as a post-operative supplement, as it has been found to reduce recovery time after surgery.<sup>7</sup> Patients typically take bromelain in the form of Phlogenzym<sup>®</sup>, a mixture of bromelain, trypsin, and rutin.
- Other studies have established bromelain's antitumor capabilities. It acts as an immunomodulator by inducing the immune system's production of cells that fight tumors.<sup>8</sup>
- Bromelain influences blood coagulation by enhancing serum fibrinolytic activity and inhibiting the synthesis of fibrin, a protein involved in blood clotting.<sup>1</sup> There is some evidence that bromelain may be able to dissolve coronary thromboses.<sup>9,10,11</sup> It has also been used in the treatment of varicose veins.<sup>12,13</sup> Bromelain is now also used topically to treat second- and third-degree burns.<sup>14</sup>

### Sources and Recommended Intake

- Bromelain is extracted from pineapple stems.
- No Recommended Dietary Allowance (RDA) has been established for bromelain. Supplemental doses vary from 10-500 mg.
- Bromelain is generally safe and has been found to produce few – if any – side effects.
- Because bromelain reduces blood clotting, large dosages should not be taken by anyone on blood thinners. It should also not be taken by anyone with allergies to pineapple or bee stings.

### Abstracts

**Maurer HR.** *Bromelain: biochemistry, pharmacology and medical use. Cell Mol Life Sci. 2001 Aug;58(9):1234-45.* Bromelain is a crude extract from the pineapple that contains, among other components, various closely related proteinases, demonstrating, in vitro and in vivo, antiedematous, antiinflammatory, antithrombotic and fibrinolytic activities. The active factors involved are biochemically characterized only in part. Due to its efficacy after oral

administration, its safety and lack of undesired side effects, bromelain has earned growing acceptance and compliance among patients as a phytotherapeutic drug. A wide range of therapeutic benefits has been claimed for bromelain, such as reversible inhibition of platelet aggregation, angina pectoris, bronchitis, sinusitis, surgical traumas, thrombophlebitis, pyelonephritis and enhanced absorption of drugs, particularly of antibiotics. Biochemical experiments indicate that these pharmacological properties depend on the proteolytic activity only partly, suggesting the presence of nonprotein factors in bromelain. Recent results from preclinical and pharmacological studies recommend bromelain as an orally given drug for complementary tumor therapy: bromelain acts as an immunomodulator by raising the impaired immunocytotoxicity of monocytes against tumor cells from patients and by inducing the production of distinct cytokines such as tumor necrosis factor- $\alpha$ , interleukin (IL)-1 $\beta$ , IL-6, and IL-8. In a recent clinical study with mammary tumor patients, these findings could be partially confirmed. Especially promising are reports on animal experiments claiming an antimetastatic efficacy and inhibition of metastasis-associated platelet aggregation as well as inhibition of growth and invasiveness of tumor cells. Apparently, the antiinvasive activity does not depend on the proteolytic activity. This is also true for bromelain effects on the modulation of immune functions, its potential to eliminate burn debris and to accelerate wound healing. Whether bromelain will gain wide acceptance as a drug that inhibits platelet aggregation, is antimetastatic and facilitates skin debridement, among other indications, will be determined by further clinical trials. The claim that bromelain cannot be effective after oral administration is definitely refuted at this time.

## References

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