

COSMECEUTICAL CRITIQUE

Bromelain (Pineapple Extract)

Bromelain is a designation referring to the family of sulfhydryl-containing proteolytic enzymes derived from the stem of the pineapple plant, *Ananas comosus* (Altern. Med. Rev. 2003;8:359-77).

Pineapple has been used as a folk medicine in tropical regions such as Hawaii, as well as in Japan and Taiwan, for centuries.

It continues to be used to clean wounds and burns in those regions. As an oral supplement, bromelain is typically administered to aid digestion. It also is considered a natural blood thinner, and has long been part of traditional tropical health regimens for its range of anti-inflammatory properties (Skin Therapy Lett. 2000;5:1-2, 5). Bromelain is considered by some to be as effective as some of the popular NSAIDs.

The most common use of bromelain is for the treatment of inflammation and soft tissue injuries.

Therapeutic Effects

The pharmacologic properties of pineapple's constituent bromelain have been gradually uncovered by Western medicine during the last 4 decades. Bromelain inhibits platelet aggregation, exhibits fibrinolytic activity, has anti-inflammatory action, promotes skin debridement, and interferes with the growth of malignant cells (J. Ethnopharmacol. 1988;22:191-203).

Studies performed 40 years ago showed that the oral administration of bromelain reduced edema, bruising, pain, and healing time after dental surgery. Although postsurgical administration was seen as effective, a combination of pre- and postsurgical administration was recommended (J. Dent. Med. 1965;20:51-4; J. Dent. Med. 1964;19:73-7).

Studies performed since the 1960s have confirmed bromelain's beneficial effects after surgery or trauma (Altern. Med. Rev. 2003;8:359-77; Obstet. Gynecol. 1967;29:275-8; Eye Ear Nose Throat Mon. 1968;47:634-9; J. Obstet. Gynaecol. Br. Commonw. 1972;79:951-3; Skin Therapy Lett. 2000;5:1-2, 5; Altern. Med. Rev. 1998;3:302-5).

In a study of patients undergoing rhinoplasty, 53 patients were randomized to one of two bromelain treatment groups or placebo. Edema and ecchymosis lasted for 7 days in the placebo group but only 2 days in both bromelain groups (Eye Ear Nose Throat Mon. 1962;41:813-7). A few years later, a randomized study of 154 facial plastic surgery patients showed no significant differences in edema between bromelain and a placebo (Acta Chir. Scand. 1966;131:193-6).

An uncontrolled trial performed a decade ago suggested that bromelain reduces edema, tenderness, and pain, at rest and in motion, in patients with blunt trauma to the musculoskeletal system

(Fortschr. Med. 1995;113:303-6). In a more recent study of a proteolytic enzyme formulation containing bromelain, patients with long bone fractures given the botanical exhibited significantly less postoperative edema than the placebo group (Acta Chir. Orthop. Traumatol. Cech. 2001;68:45-9).

These effects are largely ascribed to the anti-inflammatory capacity of the plant enzyme (Altern. Med. Rev. 2003;8:359-77). In vitro and in vivo studies have shown that the various proteinases contained in bromelain have antiedematous, anti-inflammatory, antithrombotic, and fibrinolytic activities (Cell. Mol. Life Sci. 2001;58:1234-45).

The topical application of a bromelain cream (35% bromelain in a lipid base) has been shown to confer specific benefits, including eliminating burn debris and accelerating wound healing. Escharase, a nonproteolytic constituent, is credited with imparting these effects (Altern. Med. Rev. 1998;3:302-5).

Bromelain has been demonstrated to enhance the potentiation of antibiotics (Altern. Med. Rev. 1998;3:302-5), and to confer benefits in the treatment of angina pectoris, bronchitis, sinusitis, thrombophlebitis, pyelonephritis, and wounds (Cell. Mol. Life Sci. 2001;58:1234-45).

In animal experiments, bromelain has been found to inhibit coagulation, primarily by the stimulation of serum fibrinolytic activity, disruption of fibrinogen synthesis, and the related degradation of fibrin and fibrinogen.

Bromelain has also been shown to inhibit experimentally induced tumors in animals, predominantly dose dependently, and exhibit antiedematous and anti-inflammatory activity (Planta Med. 1990;56:249-53).

Recent studies suggest the usefulness of oral bromelain as an immunomodulatory tumor therapy, as it shows a time- and dose-dependent capacity to enhance, in vivo, the immunocytotoxicity of monocytes against tumor cells and to induce production of cytokines, including tumor necrosis factor- α , interleukin-1 β , Il-6, and Il-8 (Cell. Mol. Life Sci. 2001;58:1234-45).

Renewed interest in bromelain, after a drop-off for several years, has resulted in a spate of recent studies and evidence of oral efficacy. Such results, coupled with bromelain's positive safety profile, have brought increasing acceptance of this botanical among consumers and some practitioners (Cell. Mol. Life Sci. 2001;58:1234-45).

The discovery of oral efficacy helped to surmount earlier uncertainty about the bioavailability of bromelain. A study of 19 healthy human males found that small levels of undegraded bromelain traveled intact through the gastrointestinal tract (Am. J. Physiol. 1997;273:G139-46).

While the primary component of bromelain is the sulfhydryl proteolytic fraction, it also contains a peroxidase, acid phosphatase, several protease inhibitors, and organically bound calcium. Bromelain's pharmacologic activities, although often ascribed to the proteolytic fraction, cannot be wholly attributed to that portion as there is evidence that several of its constituents have beneficial properties (Altern. Med. Rev. 1998;3:302-5). Bromelain's mechanism of action has been ascribed partly to its modulation of the arachidonic acid cascade (J. Ethnopharmacol. 1988;22:191-203).

The pineapple enzyme is believed to inhibit the production of proinflammatory prostaglandins, initiate the production of anti-inflammatory series 1 prostaglandins, and reduce capillary permeability (Med. Hypotheses 1980;6:99-104).

A study of a commercial polyenzyme preparation containing bromelain showed that it induced cytokine production in vitro in peripheral blood mononuclear cells. This capacity to induce cytokine production has been cited as a reason for the antitumor effects of such bromelain-containing enzyme formulations (Oncology 1993;50:403-7).

On the Market

Bromelain has been approved by the German Commission E for postsurgical and/or posttraumatic edema, particularly of the nasal and paranasal sinuses characteristic of some plastic surgery. A patented cutaneous tape containing bromelain is also available in Europe for debriding scar tissue.

Although it is no longer commercially available, Ananase, used for healing wounds and resolving certain hematomas, contained bromelain as the main active ingredient and was included in the Physicians' Desk Reference in the early 1960s. Taken orally 1 hour before or 2 hours after meals, bromelain supplements are absorbed by white blood cells and enhance their enzymatic activity (Dermatol. Ther. 2003;16:106-13).

Bromelain has been known to cause allergic reactions such as asthma, rhinitis, and gastrointestinal symptoms (Clin. Allergy 1979;9:443-50). Such occurrences are rare, however.

The botanical is contraindicated in children, people with allergies to pineapple or bee stings, individuals with a history of heart palpitations, and patients taking blood thinners.

In My Practice

We began using bromelain supplements in our patients about a year ago, with spectacular results. We have them take 500 mg twice a day for 3 days after botulinum toxin injections, dermal fillers, surgeries, or other procedures that may result in bruising. We do not have patients take the supplements prior to the procedure because it seems to increase bruising. (Arnica tablets can be used prior to the procedure.)

I have seen bruising resolve much more rapidly when patients take these supplements. One of my patients had a facelift and ate pineapple three times a day, and her lack of bruising was amazing.

I had a basal cell carcinoma removed from my lid margin, which required a 1-cm-by-7-mm excision. I took bromelain supplements (even though the surgeon told me not to), and he was amazed at my lack of bruising. I have not seen any allergic reactions or complications.

I have not had time to do a formal study of this botanical, but I wanted to share my experience with you. Please send me your recommendations for preventing and treating bruising. I plan to do a future column on bruising and its treatment and prevention. Thanks to you all for your continued letters, suggestions, and input. Keep it coming! ■

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BY LESLIE S. BAUMANN, M.D.



Bromelain, a family of sulfhydryl-containing proteolytic enzymes derived from the stems of pineapples, is used to treat inflammation and soft tissue injuries.