

ALTERNATIVE THERAPY FOR TISSUE HEALING

Dr Jyotika Sangale and Dr D J Kalita of Zenex Animal Health mention the significance of alternative medicines to manage inflammation and damage of tissues.



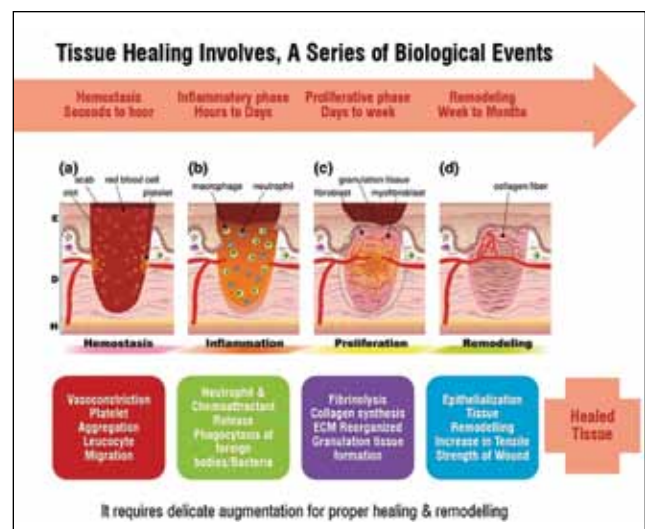
In dogs and cats, chronic enteropathies, impaired gut integrity, microbiome imbalances, as well as various tissue injuries are very common. These conditions may represent a continuous load of endotoxins, which may result in the development of diseases that are attributable to chronic inflammation. Management of such inflammatory conditions or damaged tissues can be a challenging endeavor. The contemporary scientific community has recognized the significance of alternative medicines derived from natural sources especially proteolytic enzymes and flavonoids in the management of inflammatory conditions and repair of damaged tissues.

The use of natural plant-derived compounds as supplements to conventional medicine in small animal medicine is becoming popular. Enzymes, especially proteolytic enzymes and flavonoids of plant or natural origin exert many beneficial properties and have been explored for numerous pharmacological effects. The combination of proteolytic enzymes and flavonoids supplements demonstrate a more complete spectrum of action as compared to NSAIDs against initial symptoms of inflammation.

Stages of Wound Healing

When a pet experiences an injury or wound, the body initiates its intrinsic healing mechanisms. This process encompasses

several stages: hemostasis, inflammation, proliferation, and remodeling. The hemostasis phase, which occurs immediately following injury, aims to halt bleeding. During the inflammatory phase, the body dispatches white blood cells to the affected area to combat potential infections and eliminate foreign materials.



During the inflammatory phase, proteolytic enzymes play a pivotal role. They assist in the removal of debris and damaged tissue from the wound site, facilitating the growth of new tissue. Additionally, these enzymes contribute to the reduction of inflammation at the wound site, which is a natural response to injury.

Various beneficial properties of few such natural enzymes flavonoids, plant extracts and probiotics which are well demonstrated in various in-vitro animal model studies as well as in human subjects are given below:

Bromelain: Bromelain is a proteolytic enzyme extracted from the pineapple plant (*Ananas comosus*), with sources including the stems and fruits of the pineapple, as well as by-products such as the core, crown, and peel. The potential therapeutic value of bromelain is due to its biochemical and pharmacological properties, and the main ingredient in crude bromelain is a proteolytic enzyme termed glycoprotein, which is in addition to minerals, protease inhibitors, organic acids and organic solvents. It has been shown that bromelain downregulates COX-2 and PGE-2 expression levels in vitro & in-vivo studies. Bromelain activates the inflammatory mediators, including interleukin (IL)-1 β , IL-6, interferon (INF)- γ and tumor necrosis factor (TNF)- α in mouse macrophage and human peripheral blood mononuclear cells. These results indicated that bromelain can potentially activate the healthy immune system.

Clinically, bromelain has been employed as an anti-inflammatory agent for soft tissue injuries, chronic pain and surgical wound care. Currently, bromelain is utilized to manage post-surgical wounds, alleviating pain and swelling. Additionally, bromelain acts as an effective fibrinolytic agent, preventing blood coagulation.

Trypsin: Trypsin or chymotrypsin is a widely used oral proteolytic enzyme combination to hasten repair of traumatic, surgical and orthopedic injuries. It shows high bioavailability without losing its biological activities as an anti-inflammatory, anti-edematous, fibrinolytic, antioxidant and anti-infective agent. These properties facilitate the repair process. Trypsin reduces inflammatory edema, oxidative stress and tissue destruction, which facilitates healing.

Papain: Papain, an endolytic cysteine protease enzyme from the papaya (*Carica papaya* L.) latex, catalyzes the breakdown of proteins by hydrolysis. Studies have shown that Papain possesses diverse beneficial properties in addition to digestion. It is nowadays offered as an anti-inflammatory, anti-coagulant and fibrinolytic agent. In addition, papain was reported as an anti-biofilm and anti-plaque agent. It has been shown to be as effective as aspirin in several studies. It is a natural treatment for wounds after surgical procedures, as well as burns, bedsores and skin ulcers. Papain aids in elimination of fibrin layer of wound or tumors or fibrous tissue or breaking up deadly blood clots and thereby allowing the body access to the softer, more vulnerable tissues.

Rutin: Flavonoids represent a significant class of phytochemicals. A notable attribute of these compounds is their antioxidant capacity. Rutin, also known as Rutoside or Vitamin P, is a bioflavonoid that exemplifies these characteristics. Chemically, Rutin is a glycoside, consisting of the flavonolic aglycone quercetin and the disaccharide rutinose. The pharmacological effects of Rutin demonstrate

the most substantial inotropic responses. Its therapeutic properties include antihistaminic and antiulcer effects, as well as antioxidant, cytoprotective, vasoprotective, anticarcinogenic, neuroprotective and cardioprotective activities. Additionally, Rutin has shown efficacy in combating cirrhosis, thereby exhibiting hepatoprotective properties.

Amla extract: Amla, scientifically referred to as *Phyllanthus emblica* (also known as *Emblica officinalis*), has been recognized for its therapeutic properties since ancient times. The seeds of Amla have demonstrated potential in alleviating conditions such as asthma and bronchitis, while the juice is employed for ocular health. The anti-inflammatory efficacy of Amla is attributed to its capacity to suppress various enzymes that trigger inflammation, including COX-1 and COX-2. By diminishing the activity of



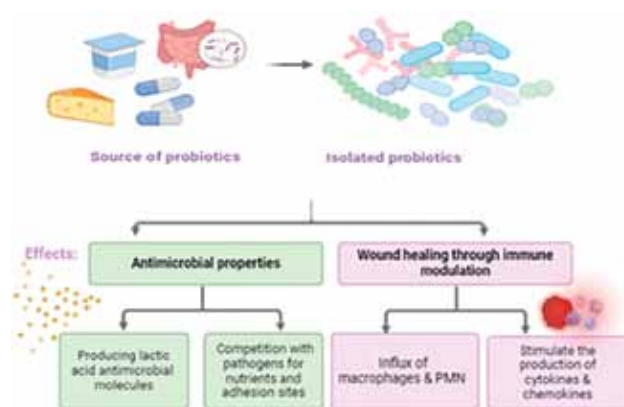
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WHEN A PET EXPERIENCES
INJURY, THE BODY INITIATES
ITS INTRINSIC HEALING
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these enzymes, Amla reduces the synthesis of molecules responsible for swelling and pain, positioning it as a promising natural alternative for managing inflammatory disorders.

Oral Probiotic: Oral probiotics initiate a series of systemic responses that can enhance wound healing indirectly. Researchers have identified various anti-pathogenic mechanisms employed by probiotics that aid healing process. These mechanisms include inhibition of pathogen adhesion, competition for binding sites, access to nutrients, production of anti-pathogenic substances, antagonistic actions, stimulation of epithelial barrier integrity and modulation of immune responses. Probiotic strains of *Bifidobacterium longum* and *B. coagulans* exert a variety of beneficial effects, including modulation of the microbial composition, alteration of immune responses and metabolism.



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PHYTOCHEMICALS HAVE BEEN FOUND TO EXERT ANTI-INFLAMMATORY AND ANTIOXIDANT EFFECTS.

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Conclusion:

Use of natural and alternative medicine is a promising approach in improvising medical challenges. Proteolytic enzymes and flavonoid preparations are receiving increased medical acceptance. Combination of such phytochemicals have been found to exert anti-inflammatory, anti-thrombotic and antioxidant effects through myriad mechanisms that include favourable modulation of inflammatory mediators, enhancement of plasmin levels, reduced leukocyte migration to injury site and suppression of the formation of reactive oxygen species. These actions have been demonstrated in multiple in vitro and animal models. Further, the beneficial effects of the combination on inflammatory markers have been reported from multiple clinical studies. Till date there are limited published reports of their use in pet and farm animals, such formulations can be a very useful candidate for faster healing of damaged tissue in various disease conditions including injury, wounds, skin and coat problem and to restore other bodily functions in pet animals.