Reducing Bruising, Swelling and Pain with Systemic Proteolytic Multi-Enzyme Therapy

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Anyone who has played ice hockey or even just watched a game knows how rough it can be. Flying across the ice at breakneck speeds, players routinely flatten each other against the boards. They may be pummeled by a swinging hockey stick or stung by a rock-hard puck sailing through the air at speeds in excess of 100 miles per hour, not to mention bloodied by their opponents ungloved fists.

If you come out of a hockey game without at least a few bruises, you probably spent it sitting on the bench. Bruises, contusions, torn muscles, and ruptured ligaments are pretty much the norm for serious hockey players. The swelling, pain, and immobility that follow such traumatic injuries not only leave the individual player feeling uncomfortable, they can diminish his performance or keep him out of action altogether.

So it was in an attempt to shorten the recovery time from common injuries that the German National Hockey Team began experimenting in the early 1990s with a substance known as *Wobenzym*. In addition to their usual treatments, the players took Wobenzym capsules either immediately after an injury or prophylactically before games. Each of 100 injuries the athletes suffered was well-documented, and the healing process carefully and systematically monitored with regard to several criteria.

The first use of Wobenzym in athletics was by the German Olympic team competing in Los Angeles. The coaches and athletes found that those who were hampered by painful bruises and swelling seemed to get back into action faster if they were taking Wobenzym.

> **The apparent ability of Wobenzym to reduce bruising, swelling, and pain while improving mobility and healing was also suggested by two studies on hockey players and skiers.**

Those who used the product preventatively were able to return to their sport significantly faster after an injury than those who used conventional and potentially dangerous nonsteroidal anti-inflammatory drugs (NSAIDs) like aspirin or ibuprofen.

Both the physicians and the players of the German National Hockey Team were pleased with their results. Bruises and hematomas shrank in size faster, swelling was less severe and resolved faster, spontaneous pain, pain on mobility, and pain on pressure were all lower than expected, and full mobility returned quicker. Moreover, they found that taking Wobenzym prophylactically worked better than taking it right after an injury.

Proteolytic Enzyme Combinations

What is this remarkable substance with the strange-sounding name? It is actually not a single substance but rather a unique, synergistic combination of various proteolytic (protein-destroying) enzymes, or proteases. It was developed during the 1950s by Professor Max Wolf, a Vienna-born scientist, and his American collaborator, Dr. Helen Benitez. (The name Wobenzym is simply a combination of their names and the word enzyme.) The precise formulation has evolved over the years, but its basic ingredients remain the same.

> **The ingredients include the enzymes, bromelain and papain, which are derived from plant sources; pancreatin, trypsin, and chymotrypsin, which are extracted from animal sources; and the flavonoid rutin, which also comes from a plant.**

Although systemic enzymatic combinations, such as those developed by Wolf and Benitez are of fairly recent origin, their healing roots reach far back into antiquity. The leaves and fruit of the papaya tree (the source of papain) and the fruit of the pineapple (the source of bromelain), for example, were used therapeutically by the ancient peoples of Central and

South America. The use of an enzyme (ficin, derived from the fig) to treat a form of cancer is described in the Bible (Second Book of Kings, Chapter 20, Verse 7). In Europe during the Middle Ages, early forms of enzyme therapy were used topically to heal such conditions as decubitus ulcers and warts. Beginning in the 1900s, proteolytic enzyme extracts of pancreas (pancreatin) were used systemically with some success for treating certain cancers.

The Modern Age of Enzymes

The modern age of proteolytic enzyme therapy began with the work of Max Wolf, who is also credited with writing the first textbook on the young science of endocrinology. The work of Wolf and Benitez with various enzyme combinations, from the 1930s until the 1970s, was largely empiric in nature and lacked the rigorous controls common to modern-day research. Nevertheless, they observed positive effects of enzyme therapy in people with vascular diseases, lymphedema, certain viral infections, and in the healing of injuries and inflammations. This convinced them that a deficiency of proteolytic enzymes was a primary factor in premature aging.

In his 1970 book Enzymtherapie, Dr. Wolf proposed that a disturbance of important physiologic regulatory and feedback mechanisms lay at the heart of most geriatric diseases-including the loss of immune function-and that the essential equilibrium within these systems depended on the actions of various proteolytic enzymes. When certain specific protease enzymes, derived from both vegetable and animal sources, are administered systemically by oral, rectal or by intravenous injection, in the proper proportions, Wolf, Benitez, and their colleagues found they could produce extraordinary healing related to:

- **Reduced swelling and inflammation**
- **Enhanced immune function**
- **Improved circulation**
- **Less pain**
- **More rapid recovery from traumatic injury**
- **Minimal scar formation**
- **Prevention of serious consequences of injury**
- **Management of rheumatic diseases, such as rheumatoid arthritis, soft tissue rheumatism and ankylosing spondylitis**

Proteolytic enzymes can also be helpful in cases of infection. For example, both papain and trypsin have been shown to inhibit the growth or multiplication of bacteria; bromelain, trypsin, and chymotrypsin can serve a vehicular function when combined with many antibiotic drugs, bringing more drug to the site of an infection. This combination has proved particularly useful for treating urinary tract infections.

Clinical investigations carried out in Europe show that systemic proteolytic enzymes combined with antibiotic drugs like ampicillin, tetracyclines, and trimethoprim leads to a substantially higher antibiotic concentration at the site of the infection and a more rapid cure. In addition, enzymes reduce the pain, support the development of better circulation and hinder the spread of the infection.

Enzymes, Inflammation and Immunity

While we hear a lot about the value of hormones, vitamins, and antioxidants for optimizing health and prolonging life, hardly anyone pays any attention to enzymes. In fact, enzymes are the unsung heroes of bodily function. Life without them would be impossible. It has been estimated that the human body contains at least 50,000 different enzymes. These vital chemicals help orchestrate the countless biochemical reactions that control the function of everything from large organs like the heart, lungs, liver and brain, to individual chemical bonds in molecules of proteins and lipids. Enzymes also play an essential role in inflammation and other functions of the immune system.

> **Inflammation is one of the body's most important mechanisms for protecting itself against dangers both animate and inanimate.**

If you've ever had an insect bite, a sprained ankle, a sore throat, or a bad sunburn, you know what an inflammation is. Inflammation is the bodys way of imposing a measured, temporary discomfort in the interests of long-term health.

The five cardinal symptoms of inflammation are:

- **Redness,**
- **Heat,**
- **Swelling,**
- **Pain, and Restriction of movement.**

These signs indicate that the body is bringing in more blood and immune resources, like white blood cells and macrophages, to remove microorganisms and other foreign matter. Redness is a sign that vasodilation is allowing more blood and other fluids to reach the affected area; local heat reflects the increased flow of warm blood from deep within the body; swelling (edema) is caused by the local accumulation of fluids; pain and restricted mobility arise from the added pressure due to the swelling.

Essential Regulators of Inflammatory Response

Proteolytic enzymes are essential regulators and modulators of the inflammatory response. Among their important actions is a 7- to 10-fold increase in the appetite of macrophages and in the potency of natural killer (NK) cells. Proteolytic enzymes also degrade pathogenic immune complexes which can inhibit normal immune function. These immune complexes,

which consist of an antigen bound to an antibody, are a normal part of the immune response. But when immune complexes occur in excess, they are a principal cause of certain kidney diseases (e.g., glomerulonephritis), nerve inflammations, and a number of rheumatologic diseases, including rheumatoid arthritis.

> **Evidence suggests that trypsin, papain, and other proteolytic enzymes can break up existing pathogenic immune complexes and even prevent their formation in the first place, enhancing lymphatic drainage.**

The bottom line of these actions is a regulatory or stimulatory effect on the immune system. Proteolytic enzymes modulate the inflammatory process by a variety of mechanisms, including reducing the swelling of mucous membranes, decreasing capillary permeability, and dissolving blood clot-forming fibrin deposits and microthrombi. By reducing the viscosity (thickness) of the blood, enzymes improve circulation this consequently increases the supply of oxygen and nutrients to and the transport of harmful waste products away from traumatized tissue. Proteolytic enzymes also help break down plasma proteins and cellular debris at the site of an injury into smaller fragments. This greatly facilitates their passage through the lymphatic system, resulting in more rapid resolution of swelling, with the consequent relief of pain and discomfort.

Enzymes vs. Anti-Inflammatory Drugs

In an Italian study the relative ability of the enzymes trypsin, chymotrypsin and bromelain to prevent edema was compared with that of four powerful steroidal and nonsteroidal anti-inflammatory drugs – phenylbutazone, hydrocortisone, indomethacin, and acetylsalicylic acid (aspirin). Utilizing a standard laboratory animal model of edema – rat paw edema – investigators injected rat paws with a small amount of a substance known to cause an inflammatory response. Prior to injecting the rat paws with the edematogenic agent, however, they gave the animals oral doses of either one of the enzymes or one of the drugs. The scientists then evaluated the extent of the resulting edema.

Following administration of one of these agents, experimental edema was induced in rat paws using either serotonin (A), brewers yeast (B), or carrageenan (C). (Source: Netti et al, 1972). The results showed that the proteolytic enzymes were generally equal or superior to the drugs in their ability to reduce swelling. Bromelain consistently reduced swelling by 40 to 45%, as did the trypsin/chymotrypsin combination (although bromelain was ineffective against swelling induced by brewers yeast).

> **Interestingly, in this study papain showed absolutely no ability to prevent edema, although other research has shown it to be quite effective when applied to a pre-existing inflammation.**

In a randomized, double-blind, placebo-controlled study of edema and pain following episiotomy, women received either bromelain, the anti-inflammatory drug oxyphenbutazone, or placebo. The results showed bromelain and oxyphenbutazone to be equally effective and significantly superior to placebo in reducing post-episiotomy edema and associated pain. The placebo group also used substantially more analgesic drugs than the two treated groups.

Although rutin is classified as a quercetin glycoside flavonoid and not a proteolytic enzyme, it also has important anti-inflammatory properties. Key among these are its ability to inhibit enzymes like hyaluronidase and the phospholipases, cyclooxygenases, and lipoxygenases.

Keeping the Blood Flowing

Many serious chronic diseases, in addition to the aging process itself, are marked by a slowdown in the flow of blood, especially in the smallest vessels. Various mechanisms contribute to this circulatory deterioration. For example, aging and chronic disease are commonly associated with increased levels of the protein fibrinogen. Fibrinogen's role in the body is to be transformed into fibrin, the central structural element in all blood clots. As fibrinogen levels rise, blood begins to thicken, slowing its flow throughout the body and increasing the risk of forming thrombi (blood clots that may block a blood vessel) and consequent heart attack or stroke.

Red blood cells (*erythrocytes*) also tend to stiffen with age and chronic disease, making it more difficult for them to fold and bend within the tight confines of the capillary bed, where they must go to perform the oxygen-delivery function. Those cells inflexible enough to get "stuck" may block the way for others, failing to deliver oxygen and possibly initiating the formation of a thrombus.

Studies confirm that proteolytic enzymes, including bromelain, papain, and especially trypsin and chymotrypsin improve the flow characteristics of blood by at least three different mechanisms:

- **Dissolving fibrin (*fibrinolysis*)**
- **Keeping red blood cells flexible**
- **Inhibiting the conglomeration of platelets and the aggregation of thrombocytes (a *thrombolytic* effect is similar to the anti-clotting effect of aspirin)**

Numerous animal studies have demonstrated the fibrinolytic activity of proteolytic enzymes. For example, papain given intravenously to rabbits or dogs inhibits the coagulation of the animals' blood for as long as 2 weeks. When given to monkeys following abdominal surgery, papain prevented the development of peritoneal adhesions; clots that formed were easily broken down. A similar result was reported as far back as 1936 following abdominal surgery in human patients.

Rutin also has important vascular protective actions. By inhibiting the enzyme phosphodiesterase, for example, it reduces thrombocyte aggregation. In addition, rutin is a potent free-radical scavenger, which helps prevent oxidative damage within the vascular system, which is thought to be an early stage in cardiovascular disease.

Pain Relief

Proteolytic enzymes produce a delayed analgesic effect that appears to arise from two separate mechanisms. First, the enzymes neutralize inflammatory mediators, such as the kinins and prostaglandins, which otherwise would directly stimulate nerve pain receptors. Second, by promoting the breakdown of plasma proteins and immune complexes and by stimulating phagocytosis, as described earlier, they reduce edema which subsequently leads to a relief of pain due to fluid pressure.

> **Numerous clinical studies in various types of pain have confirmed the analgesic abilities of proteolytic enzymes.**

In a randomized, double-blind, placebo-controlled crossover study in 25 people undergoing oral surgery. Each subject underwent two different comparable procedures (left and right) on two different occasions. Without knowing which condition they were in at a given time, the participants received papain for one procedure and placebo for the other. Regression of edema and reduction in pain occurred significantly faster following papain treatment compared with placebo. Papain treatment was also associated with a shorter recovery time.

In a randomized, double-blind, placebo-controlled study of episiotomy pain, 160 women received either bromelain or placebo following episiotomy. After 4 days of treatment, the researchers found striking reductions in pain, edema, and inflammation in the bromelain-treated women. In fact, 100% of the women in the placebo group were still reporting pain on movement by day 4, compared with less than 4% of the bromelain-treated women.

Systemic Multi-Enzyme Therapy: The Power of Synergy

Although individual proteolytic enzymes can be exceptionally useful, the extraordinary contribution of Wolf, Benitez, and their successors was the discovery that combining these enzymes in just the right proportions yields a therapeutic combination that can be greater than the sum of its parts. The reason for this synergy is really quite simple, although the details of the mechanisms involved could fill volumes. Inflammatory processes, cardiovascular diseases, and immune modulation are all extremely complex events. It makes intuitive sense that one or two individual substances, whether individual enzymes or pharmaceutical drugs, could not cover all the bases. Different enzymes have different actions as well as different sites of action. For example, chymotrypsin is known to cleave phenylalanine and tryptophan bonds, while trypsin cleaves the bonds in arginine and lysine.

In general, systemic multi-enzyme therapy is advantageous because the combination of enzymes has a broader spectrum of activity than the individual enzymes. For example, the degradation of protein-rich intermediary and residual products during an inflammatory reaction takes place through a number of physiological enzymatic processes that occur sequentially. These molecules are catalyzed by successive metabolic processes of the various proteolytic enzymes, which attack them from different points. Some proteolytic enzymes attack the molecule at its midpoint, while others attack it at the ends.

With regard to thrombocyte aggregation, an important step in blood clot formation, papain and bromelain reduce aggregability that depends on ADP (adenosine diphosphate), while trypsin activates plasminogen, which in turn degrades native fibrin.

> **Scores of clinical studies have evaluated the use of systemic multi-enzyme therapy (mostly various forms of Wobenzym) in a variety of conditions commonly associated with inflammation, such as rheumatoid arthritis, surgery, fractures, sports injuries, and other injuries of the knees and ankles.**

Included among these are 11 double-blind, placebo-controlled trials and three trials comparing enzyme therapy with conventional pharmaceutical anti-inflammatory drugs. Of these 14 controlled trials, 13 showed the enzymes to be superior to placebo or the comparative drug and the fourteenth was inconclusive due to methodological problems in the study design.

In one randomized, double-blind, placebo controlled, crossover trial of patients with soft tissue injuries sustained during karate the participants, aged 13 to 21 years, took either a multi-enzyme formulation (Wobenzym) or placebo prophylactically for 8 weeks, beginning 2 weeks prior to the start of karate training. The superiority of enzyme therapy in reducing symptoms of inflammation was obvious.

Arthritis Relief

One of the most important potential benefits of systemic multi-enzyme therapy is in the treatment of rheumatoid arthritis. Conventional treatment of this devastating disease involves powerful, dangerous drugs, like steroidal and nonsteroidal anti-inflammatory drugs, as well as more exotic treatments, such as methotrexate and D-penicillamine. About the best one can say about these drugs is that they may provide a degree of short-term symptomatic relief. At worst, they will kill you.

> **Numerous studies in animals and people with rheumatoid arthritis indicate that enzyme therapy can manage symptoms of pain and inflammation at least as well as the conventional drugs but with none of the adverse effects. In fact, side effects with enzymes are virtually nonexistent.**

Physicians who are experienced with systemic multi-enzyme therapy find that, in addition to treatment of arthritis and related diseases, prophylactic treatment offers a wide range of benefits following injury or surgery, including:

- Less postoperative, soft-tissue swelling and hematoma
- Earlier mobilization, reducing the degree of muscle atrophy, arthritis and pain on movement
- Less risk of thromboembolic complications
- Less pain and discomfort due to swelling
- Less risk of cartilage or capsular damage due to immobility
- Quicker recovery, with lower associated costs
- Quicker return to training for athletes

Summary

Although individual proteolytic enzymes are useful, the extraordinary combination of these enzymes yields a combination greater than the sum of its parts. Systemic multi-enzyme therapy has proved helpful in cases of arthritis and related diseases, offering a wide range of benefits relative to anti-inflammatory, vasculoprotective, and immunomodulatory effects.