

Helping the Body Heal

by

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OVERVIEW

The body can handle many types of stresses. Nature has provided for this or else none of us would age into maturity, let alone grow out of adolescence. A highly trained athlete can usually handle the physical stresses demanded by his sport to a greater extent than the so-called “weekend warrior.” ***The body can train to train, but can it train to greatly improve or excel? That takes in-depth knowledge of human physiology mixed with good coaching, accommodating genetics, and a little luck.*** But there is one circumstance which has nothing to do with athletic prowess or good coaching or even high-minded determination which could make or break a competitor...especially if circumstances present poor timing with regards to a major athletic event. And that circumstance deals with ***physical trauma***, whether sustained from an accident, overuse injury or the need to recuperate from reparative surgery.

The Body's Response to Physical Trauma

The body's response to sustaining wounds is to first isolate, and then adapt the affected tissue to try and lessen the extent of damage. Then, regeneration begins which takes time and energy, nutrients and hydration, rest and recovery. The most critical nutrients involved with wound healing include protein, enzyme co-factors, glucosamine, Omega-3, zinc, vitamin A, vitamin C, vitamin E, and iron. The fact that these substances can all be purchased over-the-counter (OTC), affords the athlete and/or coach the opportunity to help the healing process quickly.

When the body is injured, its normal operating functions can become compromised. Depending upon the severity and/or the extent of physical trauma, ***the body's need for high-quality protein is substantially increased. The immune system is extremely dependent upon quality protein*** to have manufactured all its important elements for keeping infection and inflammation from getting out of control. To emphasize, several studies have shown that ***about 25% of hospitalized patients and as many as half of general surgery patients exhibit protein malnutrition. This can significantly lengthen the time of healing by allowing inflammation to linger and infection to fester. Also, the building of new blood vessels (revascularization) and the actual remodeling of tissue can both be delayed and impaired. Anyone undergoing major surgery can attest to the body's need for help in recovery by experiencing a dramatic sustained increase in overall weakness.*** Much of this can be alleviated by the simple intake of quality protein starting about a week before elective surgery and the assurance of adequate fluid intake before and after surgery.

(A rather amazing story of recovery, exhibited by Jeff Farrell, America's premier freestyle sprinter in 1960, is made all the more remarkable in light of what was stated above. He only had seven days after abdominal surgery for appendicitis before Olympic Trials that year. His high level of physical fitness and his obviously strong determination to make the team have become the stuff of legend.)

Protein Supplementation

Prime sources of protein include fish, lean meats, eggs or a quality vegetable protein, such as soy. Soy is also available in powdered form that can be mixed in drinks or in yogurt. Supplements of several individual amino acids can provide an additional protein benefit. Increased intake of sulfur-containing amino acids such as cysteine and methionine (as found in eggs, for example) shorten the inflammatory stage and decrease the amount of protein destroyed during inflammation.

Two other very important amino acids that have an intimate relationship with the healing process are

arginine and L-glutamine. Arginine functions as an antioxidant to kill bacteria and increase T-cell-mediated activity, which, in turn, also enhances immune function. Supplementation with arginine has been shown to significantly increase the amount of collagen deposited into a wound site during the healing process.

Requirements for L-glutamine increase dramatically during critical illness or trauma. It is considered “conditionally essential” in that as physical stress increases, so does the body’s need for glutamine; depending upon how vigorous the stress or intense the trauma, the body’s ability to produce glutamine in skeletal muscle can fall short of need. Endogenous (from within) sources are soon depleted with generalized sepsis (infection), extensive burns, major injury, surgery, intense exercise, and over-training in athletes. Exogenous sources (outside the body...from diet or as a supplement) are needed to help in the healing process and /or recovery. Glutamine is the most abundant amino acid in skeletal muscle protein, and as such, its uptake during stress exceeds that of any other amino acid. Because it is an effective nitrogen donor (all amino acids must have the element nitrogen as part of the molecular structure) and a precursor for protein synthesis, glutamine is also extremely important in helping to rebuild wounded tissues.

Mineral Supplementation

The mineral zinc is another powerful ally in supporting immune system function and speeding healing. Zinc levels decline dramatically during stress from the same causes listed above. Zinc concentrates in wounds during the period of collagen synthesis and helps to strengthen new tissue. The simple application of zinc topically (in either spray or ointment form) can reduce the size of the wound and shorten healing time even in patients who are not zinc deficient. But those who are zinc deficient can suffer a compromised immune system which can delay closure of wounds and ulcers, and cause newly-produced collagen (connective tissue) to have a weaker tensile strength.

Iron is the other essential mineral nutrient for new cellular growth and wound healing. The enzyme ribonucleotide reductase, which requires iron as co-factor, is essential for DNA synthesis. Since cells cannot divide without prior DNA synthesis, iron deficiency can impair the proliferation of all cells involved in wound debridement (removing dead or dying cells and other contaminants) and healing. Iron-deficiency anemia is relatively common in menstruating women, and anemic patients of any age will exhibit delayed wound healing. Some salts of iron are absorbed better than others, and some are more irritating to the gut than others. As a rule, it is also best to have vitamin C taken along with the iron supplement to insure the proper oxidation state of the mineral for best absorption. Consultation with a pharmacist should bring about the best selections.

There are some minerals that are needed only in small concentrations to have a positive effect on many metabolic processes...micronutrients. Copper and manganese are examples and act as co-factors for enzymes involved in collagen synthesis. If, for some reason, a deficiency existed for either of these two minerals, the overall healing process would be compromised.

Vitamin Supplementation

Vitamins, especially A, C, and E, play a significant role in wound healing. Administering Vitamin A for seven days after surgery increases lymphocyte (infection-fighting) activity, collagen synthesis, and enhances the bursting strength of scar tissue. Large doses of A (100,000IU/kg/day) can reverse post-surgical suppression of the immune system and speed up healing but should only be taken at this level for no more than one week. During the recovery period from severe injury or infection, A in dosages ranging from 10,000 IU to 25,000 IU daily can be safely used for a few weeks’ duration. The reason for caution here is that Vitamin A is fat-soluble and is readily stored in the body. Toxic levels can be reached much sooner than with water-soluble vitamins which are excreted daily through the kidneys.

The water-soluble Vitamin C, meanwhile, increases the strength of new collagen formation and the rate of healing, and it enhances the immune system and helps fight infections. Severe trauma such as burns,

fractures or major surgery cause a substantial decrease in plasma Vitamin C levels. The stresses associated with injuries and wound healing dramatically increase the body's overall need for C. Amounts as high as 1000 mg/day can safely be ingested for a few weeks. The caution here, even though the vitamin is able to be excreted daily, concerns the kidneys. Since about 50% of Vitamin C degrades to a molecule called oxylate, there is always the potential for kidney stones in the form of Calcium Oxylate, the most insoluble substance known in physiology. Adequate hydration with non-calcium and non- oxylate-containing liquids (water is best) will usually dilute the urine enough to help prevent this type of stone formation. A few studies have shown that as much as a 42% reduction in blood Vitamin C levels can develop by the third day following major surgery if extra C is not ingested.

Vitamin E supplementation also enhances immune function and increases resistance to infection. But special benefit comes from its ability to help prevent excessive free-radical destruction that seems to surround wounded tissue, thus reducing secondary damage and improving the healing process. Topical Vitamin E has been touted as preventing or at least lessening scar formation if applied directly to a wound. But scar formation is probably more a function of genetics than vitamin effect since some patients produce more scar tissue than others. It has also been shown that Vitamin E can possibly inhibit collagen formation suggesting that there may be somewhat of a cosmetic effect with Vitamin E; but if the strength of a wound closure is important, topical E should probably be avoided.

Ancillary Substances Supplementation

Two substances have been hyped into the common pool of knowledge regarding their ability to help heal damaged tissue. Glucosamine, is a natural compound produced within the body that acts as a natural precursor of important large molecules needed to keep connective tissue functioning healthy and to help heal any damage that can occur. The substances that glucosamine produces are glycoproteins, glycolipids, and glycosaminoglycans or mucopolysaccharides...complex words that describe the content and substance of the various tissues that make up ligaments, cartilage, synovial fluid, mucous membranes, and blood vessels. In cases of serious and/or extensive trauma, whether from an accident or training overuse, the body's store of glucosamine may not be sufficient to meet the demands of tissue needing to synthesize these macromolecules for wound healing.

The essential fatty acid compound, Omega-3, is a powerful antioxidant. Found naturally in several species of "fatty" fish, it not only is beneficial to keeping a healthy blood lipid profile, but it is also an intimate component of cell-wall architecture; a deficiency of Omega-3 compromises the transport of important substances across cell membranes, which can contribute to poor wound healing.

Water, the simplest of all the substances mentioned here, is so vital that it is second only to oxygen in keeping the body functioning the way nature intended; it should NEVER be overlooked, taken for granted, or assumed to be adequate. Waiting for the thirst alert is wrong. People suffering trauma can help speed their own recovery without much effort by forcing fluids. As adequate hydration is crucial to wound healing, patients should be encouraged to drink two to three quarts of quality water daily during the healing process. Nutrient delivery, tissue repair, detoxification, and pain are all directly influenced by hydration, and injury and wound healing greatly increase the body's need for water. Adequate hydration positively influences circulation which enhances nutrient delivery and waste removal during the time of healing.

Whether it is vitamins, proteins, minerals, natural body substances or simple water, there are numerous options available (in addition to appropriate medication) to assist the trauma patient in healing. It has been stated by those in the medical field: **THE BODY NEVER FORGETS**. We realize the possible long-term effects of various trauma but hope for the best. Time may heal, but it can always use some help.