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Understanding Injury Healing of Muscle, Tendon, Ligament, Disc

Those tissues of the human body, which are not bone or organs, are called *soft tissues*. The soft tissues are the skin, nerves, blood vessels, spinal cord, muscles, tendons, ligaments, cartilage, discs and meniscus. A soft tissue injury can be as minor as a superficial bruise or as severe as a partial or complete tear of a muscle, tendon, ligament, or a tear, bulge, or rupture of a disc or meniscus. Regardless of the cause of your injury, the human body reacts to the different types of injuries with a similar response.

The healing process has been classified into 3 distinct phases. Specific nutrients have been proven to be essential for smooth, quick transition from the acute tissue injury phase to total, complete healing. Joint mal-positions, muscle tightness and nutritional deficiencies will slow and/or prevent this complex process resulting in poorly repaired, weaker tissue, which can lead to chronic long-term problems and future arthritic changes.

***PHASE 1. INFLAMMATORY* STAGE** The four cardinal signs of injury are redness, swelling, heat, and pain which characterize the acute inflammatory stage. Usually this stage lasts from 48 to 72 hours and is complete in about 2 weeks on average. During this time, events can be subclassified into either a vascular/humoral response, and a cellular response. Soon after a soft tissue injury occurs, a series of events takes place. Capillary walls leak plasma (transudate) and leukocytes (specialized white blood cells) marginate or rush to the area. Then in response to chemical factors released from the injured tissues, these white blood cells and plasma squeeze past the injured capillary walls to surround the injured area (this is the cause of swelling and inflammation). Another specialized type of white blood cell; the macrophage, then begins the process of phagocytosis. Phagocytosis is the process of breaking down and removing the damaged tissues in the area of the injury, cleaning up the area in preparation for the next phase of healing. Macrophages also release specialized chemical factors to stimulate capillary re-growth, and also growth factors to promote muscle and connective tissue cell division, growth and repair. This healing process is entirely dependent on this specialized white blood cell called the macrophage. Any interference with these cells will interfere with healing, an important fact, since non-steroidal anti-inflammatory drugs (NSAID's) inhibit the white blood cell activity and production. Even aspirin can have this effect. Steroids and NSAID's also suppress mitotic activity (cell division) of connective tissue. Therefore, while these medications can be useful for short-term pain control, their use can delay, interfere and hinder the complete healing during this critical stage.

For Acute Pain Control, apply an ice pack to the area 15 minutes & repeat twice per hour. NO DRY Heat/ DRY Heating Pad, Moist Heat after 72 hours can be used followed by ice. Supplemental proteolytic enzymes (*INFLAMAZYME* &/or *WHITE WILLOW FORTE*), Vitamin C, Laser Therapy and Chiropractic Manipulation are all effective in reducing inflammation and pain and can help to speed up the healing without the harmful side effects of drugs. Premature exercise, lack of proper treatment, use of heat, continued use of non-steroidal anti-inflammatory drugs (NSAID's such as Tylenol, Advil, Motrin etc.) can result in excessive inflammation and scar tissue formation, production of weaker repair tissue, and longer periods of pain and/or disability, and can possibly lead to a chronic condition due to the weaken tissue and re-injury.

PHASE 2. REPAIR STAGE The Second stage, or repair stage, is characterized by synthesis of the collagen molecule by special cells called fibroblasts. Several nutrients necessary for this process are vitamin C, iron, zinc, copper, manganese, magnesium, and the amino acid methionine. A specialized fibroblast called a myofibroblast contains actomyosin, a contractile element, and assists in wound contraction or closure. Collagen will contract between 3 and 14 weeks post-injury, but contraction may continue for up to 6 months. During this stage weak collagen molecular links are gradually replaced with stronger linked thicker collagen fibers. During all times (even in health) there exists a balance of between breakdown (lysis) and production (synthesis) of collagen. The body is constantly remodeling. During the process of wound healing, however, synthesis outstrips lysis by a factor of 40. Later, intermolecular cross-links form between collagen filaments, thereby, increasing the tissue's tensile strength. **But even at 3 weeks post injury this tissue may only be 15% of its normal strength.** These crosslinks allow early controlled motion. However, and this cannot be overstated, excessive tissue strain during this stage can result in renewed inflammation and further unwanted scar formation. Joint manipulation, Myofascial Release, Stretching & Laser Therapy are vital to the reduction of excessive strain on muscles, tendons, ligaments and discs by reducing joint subluxations and increasing individual joint motion.

PHASE 3. REMODELING STAGE A process of scar reorganization that is still poorly understood characterizes the third stage, or remodeling stage. This stage may last up to 12 months and will usually leave scar tissue that is weaker than the original tissue. Injured spinal ligaments may remain in a state of plastic deformation (permanently stretched) and so, leave a joint chronically hypermobile and subject to increased biochemical forces that result in early joint and disc degeneration and osteoarthritic changes. Chiropractic is one of the most effective treatments for the best chance of complete healing.

Many external forces affect the newly formed scar tissue and remember that this newly healed tissue will almost *always* be weaker than original tissue. These forces include posture, gravity, muscle tension, muscle weakness, joint mal-position (subluxations) improper joint movement. Manipulation & Myofascial Release will help to reduce these forces. Proper treatment & nutrition early & throughout the healing phase is essential in restoration of the pre-injury tissue strength and flexibility. ** Drugs do not accomplish this and should only be used for extreme pain/inflammation.*

Suggested Nutrients for Pain Control and Tissue Repair:

PHASE I: For Pain, Anti-inflammation, & Increased Healing use:
WHITE WILLOW FORTE and / or **INFLAMAZYME** 2-3 capsules 3-6 times daily away from food. To be used in conjunction with Laser Therapy and gentle stretching.
FORMULA 303 *2-3 tablets 3-6 times daily* for muscle spasms
ULTRAGENESIS Multi-Vitamin/Mineral 2 capsule 3 times daily
For additional Pain Control: Apply an ice pack to the area 15 min. per hour and repeat each hour. *NO DRY Heat/ DRY Heating Pad*
For Muscle Spasm/Tightness: Moist heat/shower/hot tub 15 min.

PHASE II & III: Glucosamine Sulfate, Chondroitin Sulfate, MSM, Vitamin C, Essential Fatty Acids, Minerals & Anti-Oxidants, use:
ARTHROGENX 2 capsules 3 times daily during pain, then reduce to 2 capsule 2 times daily as maintenance, with food
ULTRAGENESIS 2 capsule 3 times daily with food
ULTRA EPA /DHA 1 capsule 3 times daily with food