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## **Injury Mechanisms, Healing and Pain**

How They Occur

How They Heal

How to Prevent

### **Injury Mechanisms**

1. **Trauma** – Injury caused by a blow, fall or other external force acting on the body.
2. **Over-Use** – Injury caused by repetitive stress over a long period of time.
3. **Overload** – Injury caused when the stress on the body exceeds tissue strength and sudden failure of the body part occurs.

### **Injury Healing**

When an “injury” occurs to a body part, living tissue that makes up the structure of that part is disrupted. As a result of the tissue disruption, bleeding occurs. The bleeding causes the tissue to “swell”. The swelling that occurs acts to alert the person that something is hurt and that attention needs to be paid to the injured part. Swelling also helps to immobilize the part since it makes the muscle or joint harder to move. This is a protective mechanism to alert and immobilize the body part so that no further damage is done to the injured tissue. Applying ice to an injured area helps stop bleeding and thus helps minimize swelling.

After bleeding and swelling is stopped, the inflammation stage begins. Chemicals released by the damaged tissue signal the circulatory system to send white blood cells to the injured area. These white blood cells then remove the damaged tissue from the injury site.

After the inflammation stage is complete, the “repair” phase can begin. Repair begins when the cells in the healthy, uninjured tissue mobilize and move to the injury site. These “repair “ cells produce the structural protein called collagen which “glues” the injured tissue back together. This whole process takes six weeks, in most cases, and sometimes longer in more serious injuries. However, although the injury is technically repaired, the injury site does not possess the strength of normal, uninjured tissue.

The now repaired injury site must be loaded and stressed gradually over an additional six weeks before normal activities can be resumed. At this time, the injury is “healed”. The exercise routines outlined in the upcoming chapters will guide you on how exactly to accomplish a safe return to activity following an injury.

Inflammatory conditions such as tendinitis and bursitis can be caused to worsen or become chronic when you return to activity or begin using an injured body part before the repair process is completed or before the healing process is done. Tissue undergoing repair is re-injured or torn down by overstressing the tissue repair site. This causes the inflammatory stage to return, most times with increased bleeding and tissue swelling. This is undesirable because it prolongs healing time, creates more swelling and scar tissue and delays your return to your fitness and sports activities.

### **Pain**

The presence of pain in an exercising body part is the main indicator, besides swelling, that alerts you to pay attention to that body part. You must be able to distinguish between the mild discomfort of a fatiguing muscle and the sharp pain experienced when spraining your ankle or tearing a muscle.

In general, if you experience pain while exercising, you should stop what you are doing at that moment. If, after 2 to 3 minutes the pain is gone, then you can try to resume your exercise as long as there is no swelling and there is full range of motion of the joints and surrounding muscles. If pain persists after 2 to 3 minutes, then you must stop exercising for that session and the rest of that day. You should apply ice to the injured area for 10 to 15 minutes, 3 times a day until the swelling and pain is gone. If, on the next day, the pain is gone and there is no swelling, you may resume exercising carefully, taking heed of the previous day’s pain and its location. If the pain is not gone on the next day and/or if swelling persists, then you should stop exercising, continue 3 times a day ice applications and have your injury evaluated by a physician.

If there is tissue damage at the injury site, then the stages of tissue Injury-Inflammation-Repair-Healing have to take place before safe return to exercise can occur. After healing has occurred, that is when the swelling and pain has resolved and there is full range of motion of the joints and surrounding muscles, then you may begin to follow the rehabilitative progression outlined for that particular body part.

When the rehabilitative progression is completed and pain free, then you may resume your previous fitness program on a gradual basis. I strongly DO NOT recommend trying to “work-through” pain and injury. By not heeding the pain associated with injury or an over-used body part, you can cause more tissue damage and set up a persistent cycle of pain - inflammation - tissue damage - scar tissue formation at the injury site. Over time,

muscle, joint and ligament damage can occur causing the injury to become chronic, permanent and disabling in terms of fitness pursuits or even activities of daily living.

I use the term “injury ownership” to emphasize the concept that pain and injury needs to be carefully paid attention to in terms of rest, healing and rehabilitation so the injury does not become permanent and prevent you from pursuing your desired fitness activities. As the aging process proceeds through your lifetime, you will accumulate joint and muscle conditions due to injuries. In most cases, the injuries to joints and muscles will cause pain at the injured site that occurs when a threshold level of stress is imposed upon the injured part. The pain that is caused at this particular stress level must be heeded and you must adjust your exercise so that you lower the stress on the injured part to a level that is below that which causes pain or swelling. It is important to try to continue to exercise even though the joint or muscle is compromised due to previous injury or overuse. You must strive to find that “threshold level” of exercise that can be applied to that body part without causing pain, swelling or concern that damage is being caused.