Injury Mechanisms, Healing, and Pain

How Injuries Occur

Injuries typically result from three main mechanisms:
Trauma - Caused by an external force such as a fall, blow, or impact.
Overuse - Caused by repetitive stress applied to the same tissues over an extended period.
Overload - Occurs when a sudden stress exceeds the strength of a tissue, leading to immediate failure.

How the Body Heals

When an injury happens, the affected tissue is damaged and blood vessels may rupture, causing bleeding and swelling. Swelling serves two purposes:

- It signals the body (through pain and stiffness) that something is injured.
- It limits movement, helping protect the area from further harm.Ice application can reduce bleeding and swelling during this stage.

Stages of Healing:

Inflammation - Damaged tissues release signals that attract white blood cells to clear away dead or injured cells.
Repair - Healthy surrounding cells migrate to the injured area and start producing collagen (a structural protein) to rebuild tissue. This repair stage usually lasts about six weeks, though more severe injuries may take longer. The repaired tissue, however, is initially weaker than normal tissue.
Remodeling/Strengthening - Once basic repair is complete, the injured area must be gradually reloaded and strengthened over another six weeks before fully returning to normal activity.
If activity is resumed too quickly, conditions like tendinitis or bursitis may develop, as the tissue is re-injured before completely healing. This often leads to recurring inflammation, scar tissue buildup, and extended recovery times.

Pain as a Warning Signal

Pain-along with swelling-is the body's primary alert system. It's crucial to distinguish between:

- Normal muscle fatigue (a dull ache from exertion).
- Sharp or sudden pain (signaling possible injury, such as a sprain or tear).

Guidelines:
Stop exercise immediately if sharp pain occurs.
Wait 2-3 minutes. If the pain disappears, movement is normal, and there's no swelling, you may cautiously resume activity.
If pain persists, stop for the day and apply ice for 10-15 minutes, three times daily.
If pain or swelling continues into the next day, rest and consult a physician.
Attempting to "push through" an injury can result in a damaging cycle of pain, inflammation, tissue breakdown, scar tissue, ultimately leading to chronic or permanent damage.

Injury Ownership & Long-Term Considerations
"Injury ownership" means taking responsibility for recognizing, respecting, and properly managing pain and injury through rest, recovery, and rehabilitation. Ignoring pain increases the risk of long-term limitations.
As we age, the accumulation of past injuries often leaves certain joints or muscles sensitive to stress. Each injured body part has a threshold stress level-the point at which pain or swelling develops. To maintain long-term mobility and fitness:

- Identify and respect this threshold.
- Adjust activity intensity accordingly.

Continue exercising below the painful stress level to preserve strength, mobility, and overall health.

Summary:
Injuries happen through trauma, overuse, or overload. Healing occurs in predictable stages (inflammation, repair, remodeling), and proper recovery requires time, rest, and gradual reloading. Pain is a key warning sign and should never be ignored. Respecting injuries and adjusting exercise appropriately will help prevent chronic damage and support long-term physical health.

Adapted courtesy of Dr. Tom Gill.