



Just the Facts...

Cumulative Trauma Disorders

What are cumulative trauma disorders?

Repeated body movements that cause afflictions of the muscles, tendons, and nerves are known as cumulative trauma disorders (CTDs). Such afflictions are also called repetitive strain injuries, repetitive motion trauma, or occupational overuse syndrome. A CTD is not a specific diagnosis but a class of disorders with similar characteristics.

Microtraumas are small tissue damages or tears that occur from routine stresses and are initially unnoticeable. When daily rest and overnight sleep fail to completely heal the microtrauma, residual tissue damage carries over to the next day. When the tissue damage exceeds the body's ability to repair itself over time, the problem can escalate. A CTD involving permanent debilitating damage may result.

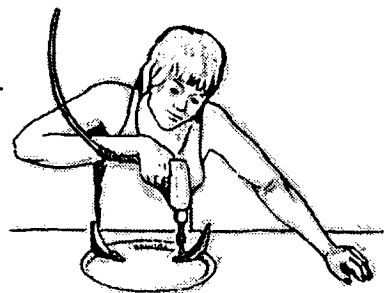
One of the best known CTDs is carpal tunnel syndrome (CTS). Other common CTDs are epicondylitis (tennis elbow), tendinitis, bursitis, DeQuervain's tenosynovitis (of the thumb), and trigger finger. Back injuries are often a result of cumulative trauma due to repeated strain.

Conditions that can cause CTDs include--

- Decreased blood flow to muscles, nerves and joints.
- Nerve compression.
- Tendon damage.
- Muscle strain.
- Joint damage.

What causes cumulative trauma disorders?

Awkward or deviated postures. All the joints in the body have an optimal range of motion in which the joints are strongest, fastest, and least likely to become damaged. Within that range is a position that has the best biomechanical advantage and blood circulation. This position is the "neutral" posture. Using work practices that maximize neutral postures is one of the goals of ergonomic work design. Deviation from the neutral posture puts increased stress on tissues. Excessive bending and twisting of the wrist or repeated elbow or shoulder elevation are typical awkward postures. Some common causes of awkward or deviated postures are inadequate work space, improper seating, inappropriate tool handle design, and awkward lifting.



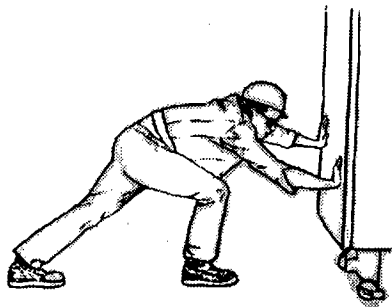
➔ Safety and Health Professionals

➔ Definition

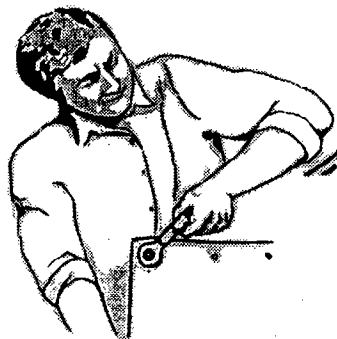
➔ Causes/Risks

Excessive force. Forceful exertions can place extreme stress on muscles and joints. High-force applications can be especially damaging if occurring in conjunction with deviated postures. Using a manual screwdriver for high-torque operations, lifting heavy objects, or merely using unnecessary force to do highly repetitive work, like typing, are examples. Sometimes, seemingly low-force tasks, such as filling out numerous multi-part forms using a pinch grip to hold the pen, can stress small

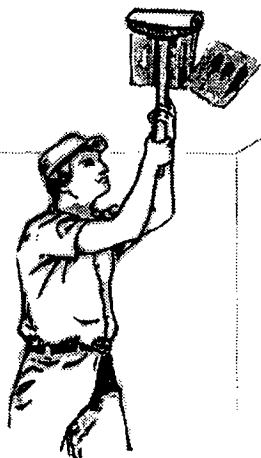
muscle groups beyond safe limits. Wearing gloves, especially oversized gloves, can cause the worker to use extra force to get the necessary sensory feedback to grip an object (i.e., feel the object).



Highly repetitive work. Body tissues need time to recover after exertion. In highly repetitive work, the recovery time may not be adequate. High-speed machine pacing and production-based incentives can contribute to the problem because the worker does not take the necessary time to allow the tissues to recover. Muscles, tendons, and nerves are at risk. Smaller, weaker muscle groups under heavy use are especially susceptible to damage from highly repetitive work (e.g., grasping and pulling materials, using tweezers or forceps, and inserting small parts with fingers). The tendons that control finger movements all pass through the wrist, and repetitive hand work can cause friction as the tendons move against each other and the surrounding bone. Highly repetitive work, especially in conjunction with awkward postures, can stress the tendons and cause them to rub against each other resulting in irritation and inflammation.



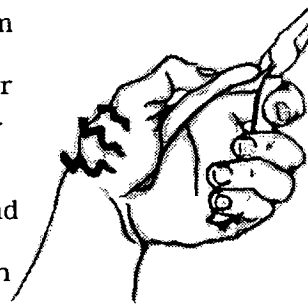
Extended duration of effort. A task involving static work requires muscular effort, but no movement takes place. Holding the arms overhead to paint a ceiling is an example. The static muscular contraction prevents blood from flowing through the muscle. Without sufficient blood circulation, the nutrient supply for the muscle is cut off, and waste products, such as lactic acid and carbon dioxide, build up. The tissues are not able to repair



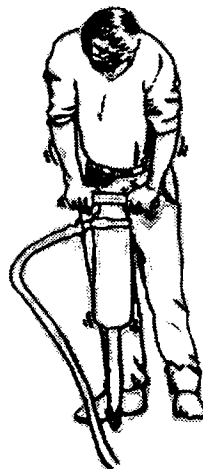
microtraumas, and a serious problem can result over time. One of the most common static postures is prolonged contraction of the back muscles from sitting in a chair with inadequate back support.

Mechanical trauma.

Mechanical trauma occurs from contact with sharp edges or other surfaces that compress or damage the underlying tissues. Tool handles that have sharp ridges or distribute excessive force to a small area of the hand (e.g., a screwdriver handle that digs into the palm) are common examples. Other causes of potentially damaging direct pressure are using the palm of the hand as a hammer and resting the wrists on a sharp table edge while typing.



Vibration. *Segmental vibration* occurs when a specific body segment is in contact with a vibrating source but the vibrations are not typically transmitted to other parts of the body. The use of vibrating hand tools is an example of segmental vibration. High-frequency vibration impairs circulation in the extremities. Prolonged exposure can cause permanent damage or death of the affected cells. Overexposure to this type of vibration can produce extensive damage to the fingers, a condition known as Raynaud's phenomenon (or Vibration White Finger). *Whole-body vibration* occurs when oscillatory motions are transmitted to the entire body through contact with a vibrating source. Whole-body vibration from vehicle operation can increase the risk of back injury.



Cold and hot temperature extremes.

Cold temperatures cause decreased circulation in the extremities, which exacerbates injury caused by other risk factors. The upper extremities are especially susceptible, and Vibration White Finger in particular occurs more frequently in cold environments. In hot environments, blood flow is diverted to the skin to dissipate heat. This results in increased cardiac demand, dehydration from sweating, and earlier onset of fatigue, which can impair normal tissue recovery.

