

	What You Should Know to Protect Your Wrists and Hands from Repetitive Motion Injury	Effective:	February 07, 2006
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1. Purpose:

To familiarize people with the effects and precautions to protect your wrists and hands from repetitive motion injury.

2. Scope:

These guidelines apply to all faculty, staff and students on campus.

3. Procedure

The Potential for Injury

Any combination of the following factors can lead to the over use of some part of your body. Repetitive tasks, awkward or fixed postures and excess stress without adequate recovery time can lead to repetitive motion injury. Prolonged keyboard use and prolonged manual pipetting are the most likely causes of repetitive motion injury at UC Davis.

Structures of the Wrist

- **Bony Structure:** Eight small bones called carpal bones make up the bony structure of the wrist (Figure 1). The bones are aligned in two rows and form the bottom and sides of the carpal tunnel (Figure 2).

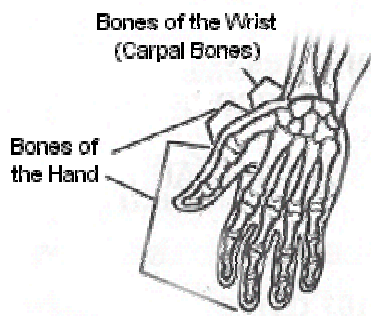


Figure: 1

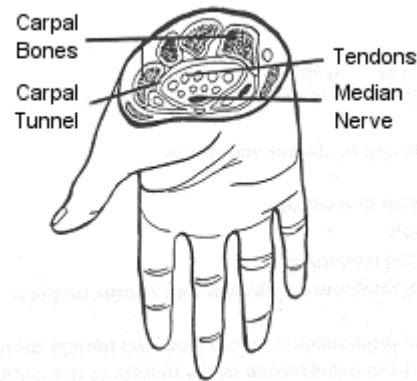


Figure: 2

- Ligament: A thin, but very strong band of connective tissue called a ligament covers the top of the carpal tunnel (Figure 2, 3). A complex network of smaller ligaments holds each carpal bone to the next.
- Carpal Tunnel: A narrow passage between the forearm and hand at the base of the palm through which nerves and tendons pass is called the carpal tunnel.
- Nerve and Blood Supply: Part of the nerve and blood supply to the hand also passes through the carpal tunnel (Figure 2).
- Muscles/Tendons: Nine tendons also run through the tunnel connecting the muscles of the forearm to the bones of the wrist and hand (Figure 3). These tendons bend your fingers and thumb.

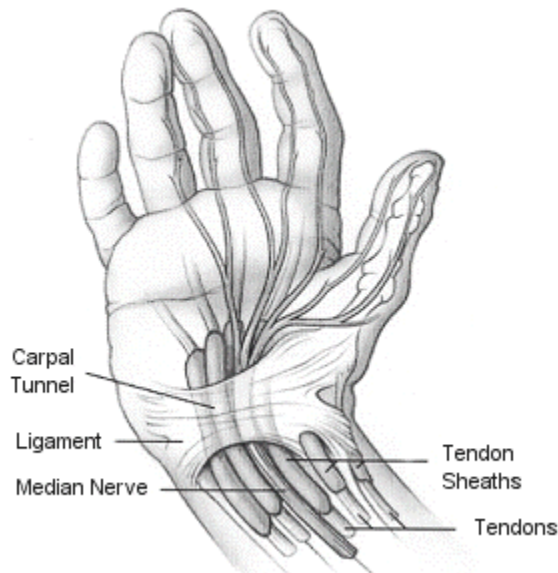
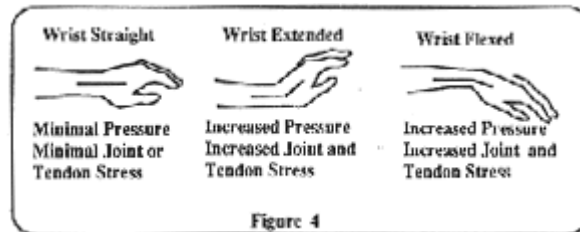


Figure: 3

- Lubricating membrane: The tendons are covered with a lubricating membrane called synovium which may enlarge and swell under some circumstances.

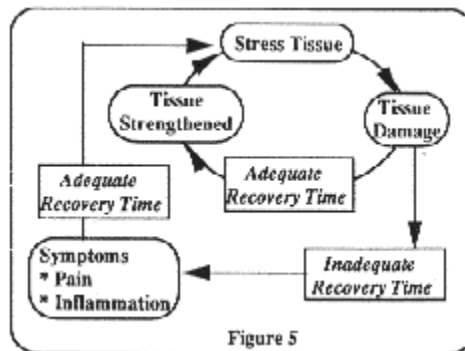
Wrist Position

Studies have shown that pressure within the carpal tunnel depends on wrist position (Figure 4). Pressure is relatively minimal when the wrist is straight or in neutral position. Pressure dramatically increases with positions of wrist flexion (bent forward) and extension (bent backwards). Positions of wrist flexion and extension also cause increased stress to the joints between the carpal bones and increased tension to the tendons crossing the wrist.



The Body's Reaction to Stress

Stress is needed to maintain tissue strength (Figure 5). When the body is stressed, tissue damage occurs as a natural process. If adequate recovery time is allowed before the tissues are again stressed, the body tissues rebuild themselves to a stronger level. However, if recovery time is inadequate, symptoms can result. Adequate recovery time will then be needed to again enter the cycle. Any increase in stress to the tissues above the level to which the tissues are accustomed, will begin the cycle. New activities or an increase in the intensity of an activity, to which the body is accustomed, would each result in an increase in stress to the tissues.



Types of Injury and Methods of Prevention

- **Wrist Joint Sprain:**
The wrist joints can be sprained if relatively large forces are applied to the wrist when the wrist is in an awkward position, typically when it is extended. Examples include: 1) lifting a heavy binder with one hand during which the wrist is forced into extension to balance the weight of the book; 2) placing full body weight on the hand with the wrist extended when stapling; 3) pushing against an object with the wrist extended.

Prevention:

Avoid large forces to the wrist, especially when the wrist is extended.

Whenever possible, try to keep the wrists straight during activity. Use two hands to lift relatively heavy objects such as full binders. Use of two hands helps distribute the load and results in increased control of wrist position.

- **Tendonitis/Tenosynovitis:**

Tendonitis is inflammation of a tendon. Tenosynovitis is inflammation of a tendon sheath. Both can occur if the tendon is used excessively, especially when the wrist is in an awkward position. Initially, irritation of a tendon occurs over a localized area. If the irritation continues, inflammation of the tendon can spread along the tendon sheaths, resulting in symptoms into the forearm and/or hand.

Prevention:

Avoid excessive wrist flexion or extension during activity. Avoid rapid changes in workload or activity. Remember that the body will adapt to a given workload if it is given adequate time to adapt. When beginning a new activity, limit the amount of new activity for a given session. Try to vary activities as much as possible to alter the type of stresses. Realize that the body can become de-conditioned during an extended leave of absence such as a long vacation, sick leave, or maternity leave. Upon return, increase activity gradually.

- **Carpal Tunnel Syndrome:**

Carpal Tunnel Syndrome is diagnosed when compression within the carpal tunnel is sufficient to cause damage to the median nerve. Typical symptoms of Carpal Tunnel Syndrome include pain in the front of the wrist and hand, tingling and numbness in the thumb and first two fingers, and/or loss of strength and coordination of the hand. It is possible to have symptoms that mimic Carpal Tunnel Syndrome if inflammation within the carpal tunnel is sufficient to compromise the space within the carpal tunnel. Typically, carpal tunnel-type symptoms resulting from injury to the wrist (e.g. wrist sprain or tendonitis) resolve with treatment of the injury and do not result in Carpal Tunnel Syndrome.

Prevention:

Take frequent, regular wrist breaks. Avoid resting your wrist on the work surface or wrist when mousing or keying. Reduce the repetition and force of gripping and pinching activities. Resolve wrist sprains, tendonitis or tenosynovitis quickly through proper care. Smoking has been identified as a risk factor for Carpal Tunnel Syndrome. Assess your wrist position and posture during activity. Avoid excessive wrist flexion or extension during activity and avoid wrist flexion at night.

Steps to Take if Symptoms Arise

If symptoms are severe, seek medical advice immediately. Often symptoms come on gradually but even minor symptoms should not be ignored. Early recognition of a problem and following steps 1-6 below can prevent symptoms from getting worse and will dramatically shorten treatment time.

1. Assess your activity level and make adjustments as needed. Have you increased your activity too quickly? Have you added a new activity? Back off on activities that aggravate the symptoms.
2. Assess your wrist position during activity and make adjustments as needed. Look at activities at work and at home since it is important to consider the overall stress to the body.
3. During the initial phase of symptoms, you can apply ice and take an anti-inflammatory such as Motrin or Ibuprofen to control inflammation.
4. If symptoms last more than 3-4 days, inform your supervisor and seek medical attention. Employee Health Services will provide evaluation for work related problems.