

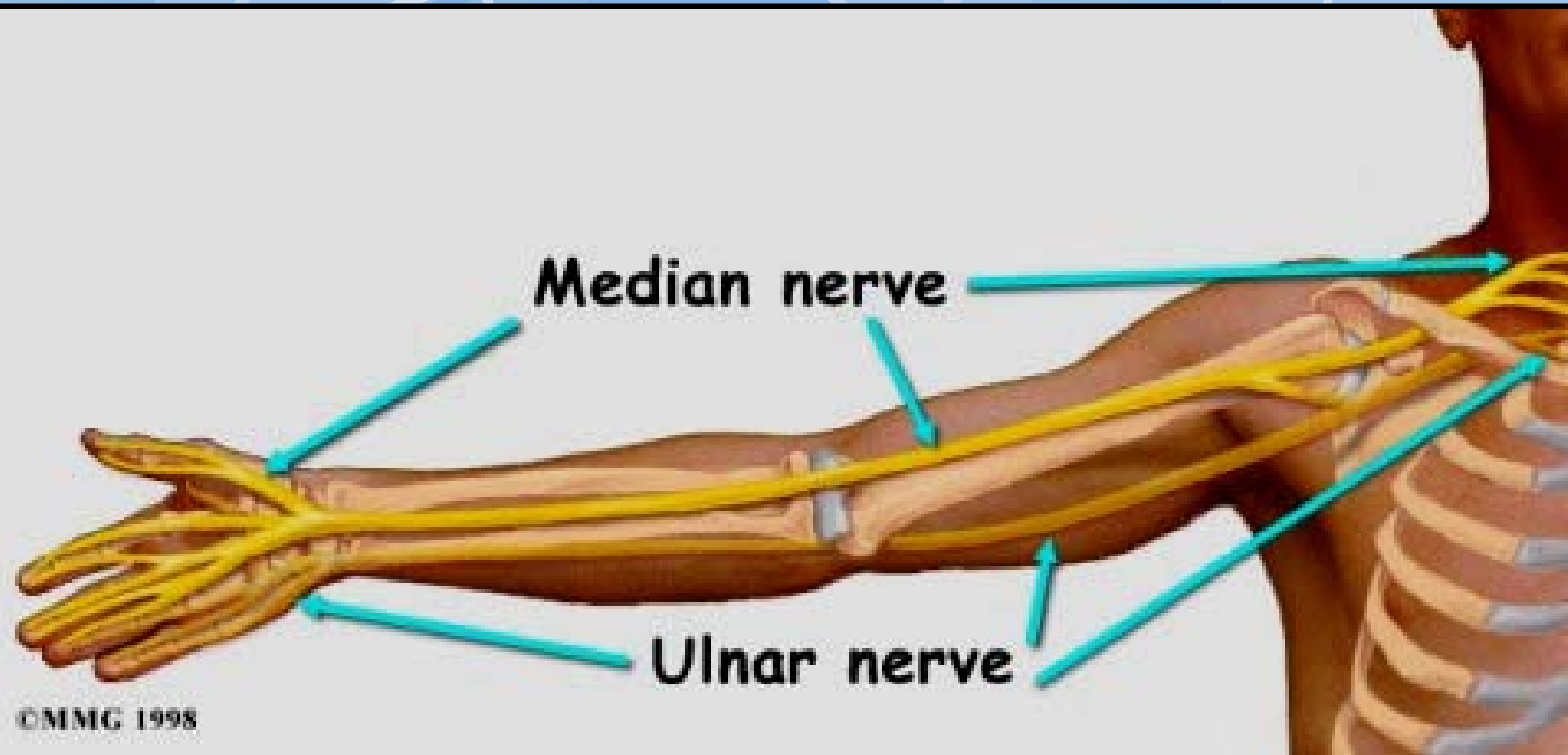
# Carpal Tunnel Syndrome

Description, Diagnosis, and Treatment

***[www.fisiokinesiterapia.biz](http://www.fisiokinesiterapia.biz)***

# Carpal Tunnel Syndrome (CTS)

- Repetitive stress injury
- Due to inflammation of the tissues around the median nerve
- Results in reduced nerve transmission; pain, numbness, and tingling in wrist, hand, and fingers (except little finger)
- Estimated 2.8 million identified cases in 1988



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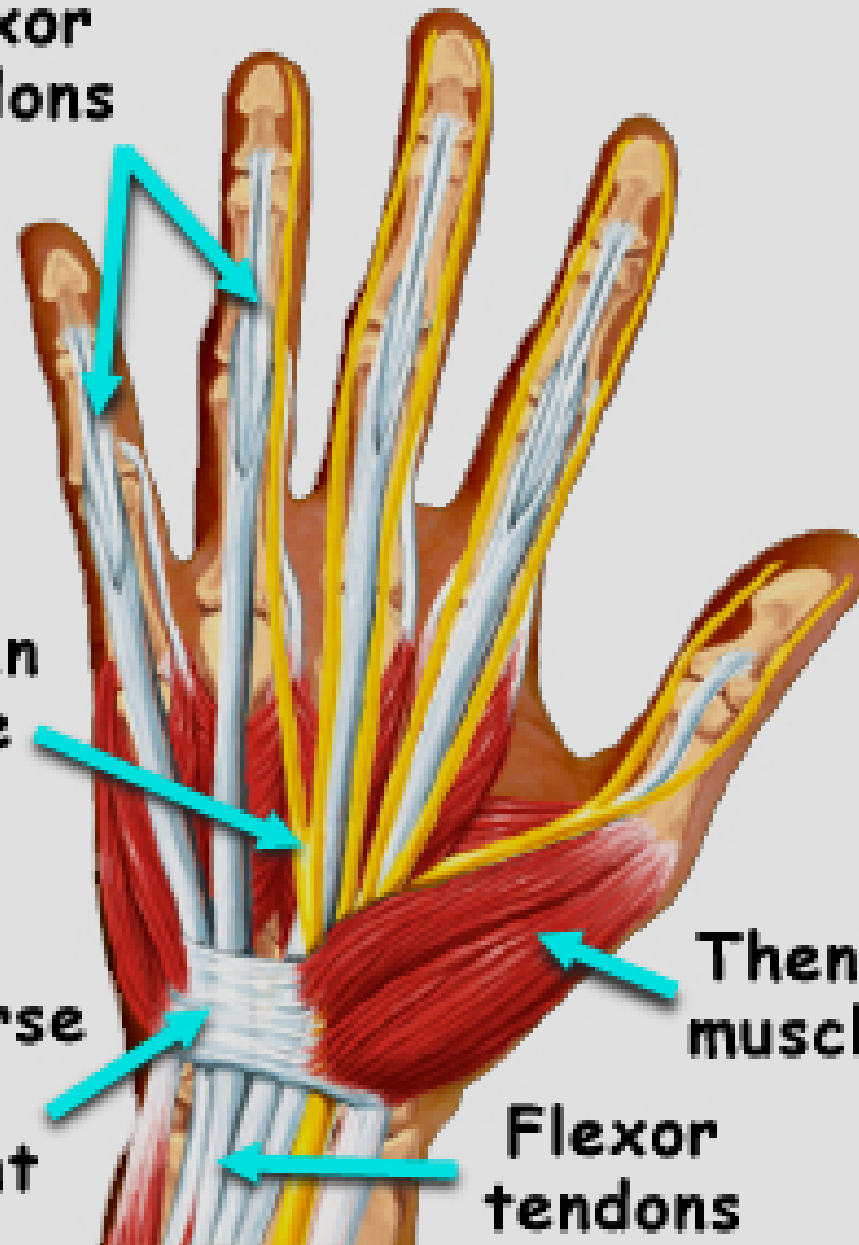
Flexor  
tendons

Median  
nerve

Transverse  
carpal  
ligament

Thenar  
muscles

Flexor  
tendons

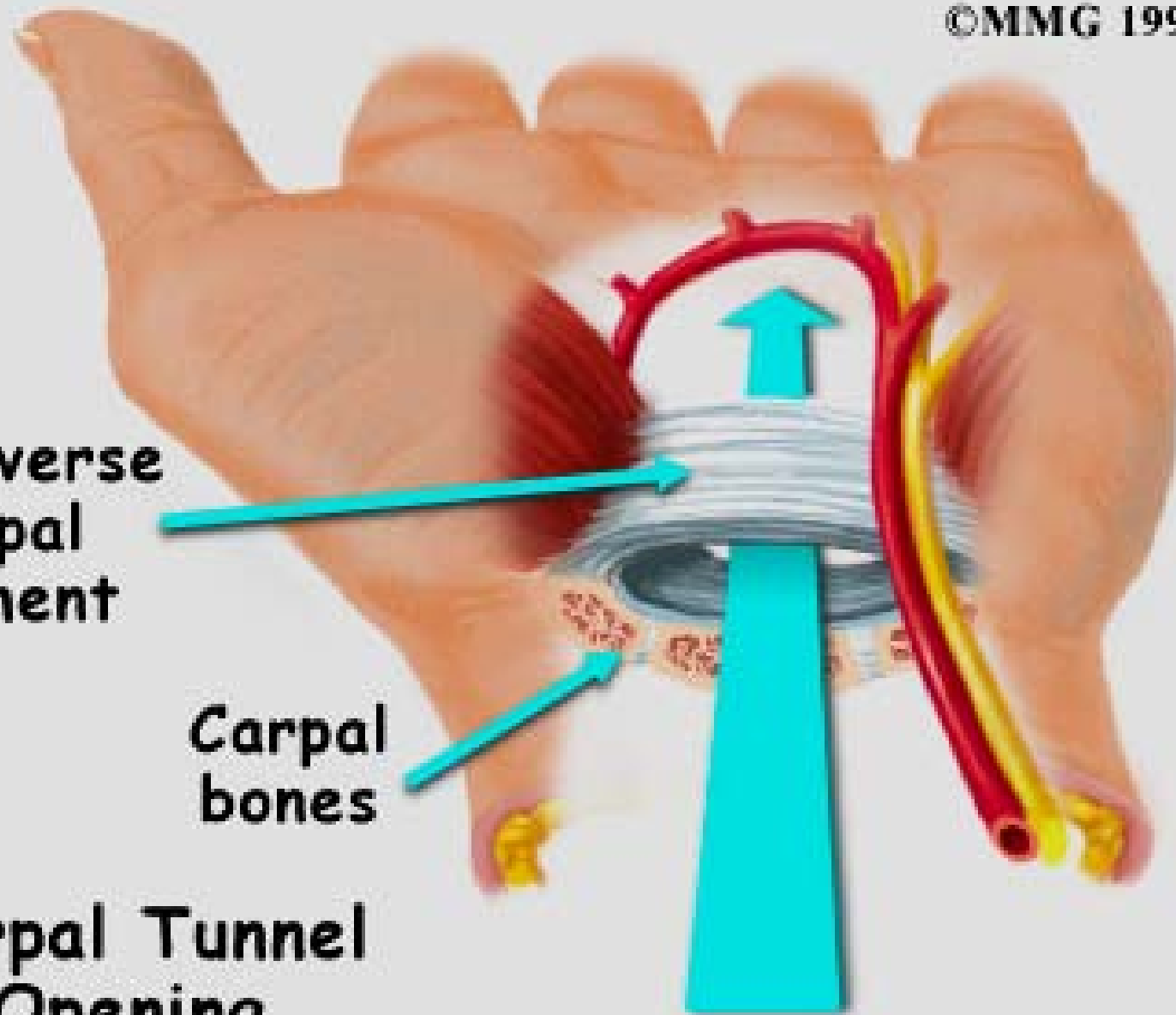


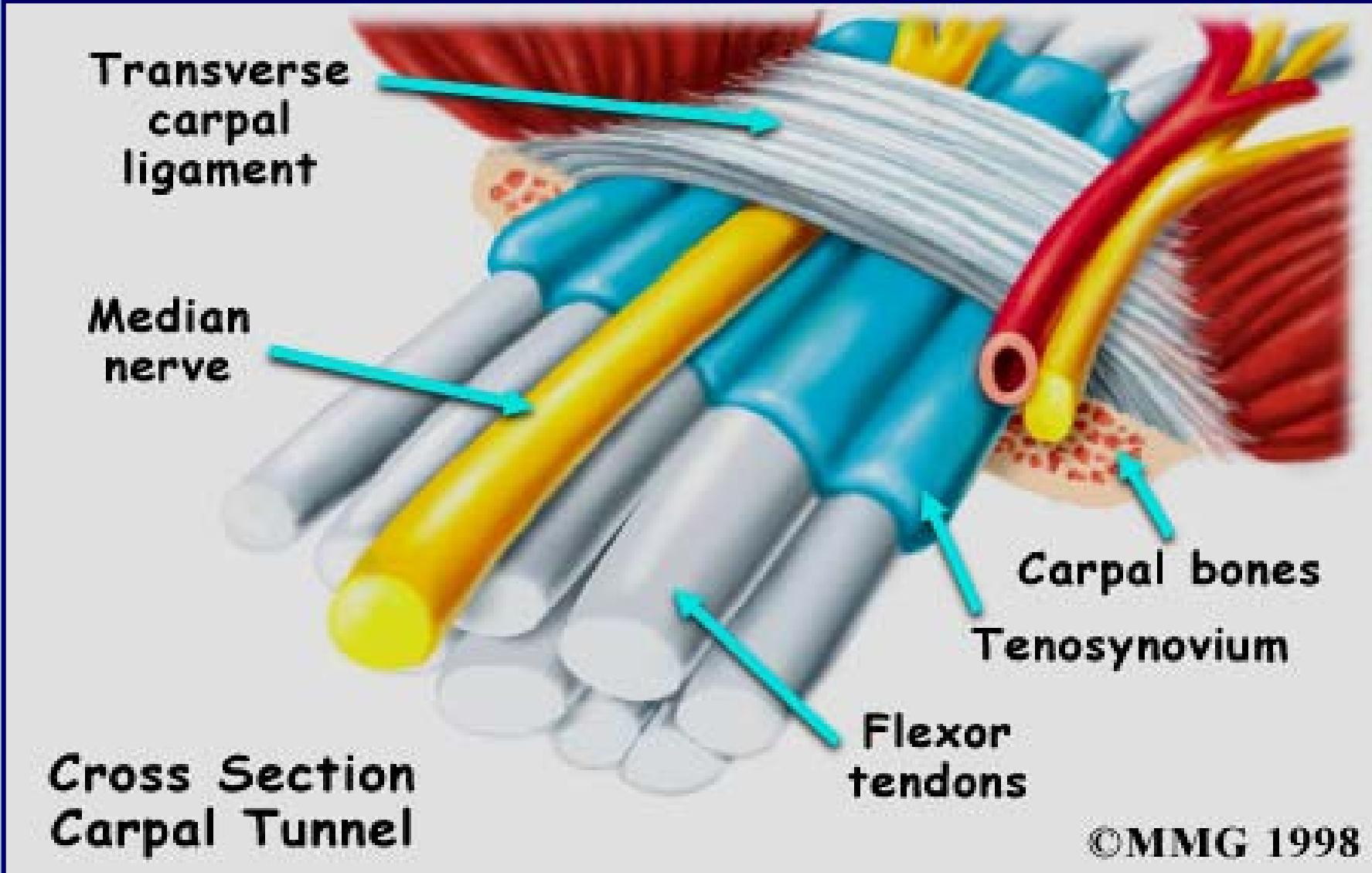
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Transverse  
carpal  
ligament

Carpal  
bones

Carpal Tunnel  
Opening







**Inflamed  
Tendons and  
Tenosynovium**

# Causes of CTS

## Work-related

- Repetition
- High force
- Awkward joint posture
- Direct pressure
- Vibration
- Prolonged constrained posture

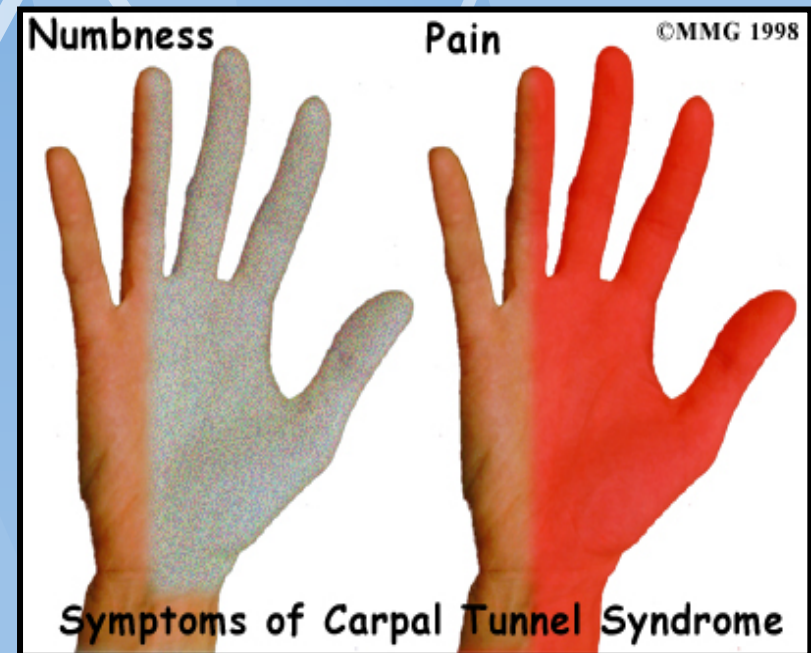
## Medically-related

- Fractures
- Arthritis
- Diabetes
- Obesity
- Acromegaly
- Long term hemodialysis
- Pregnancy



# Symptoms

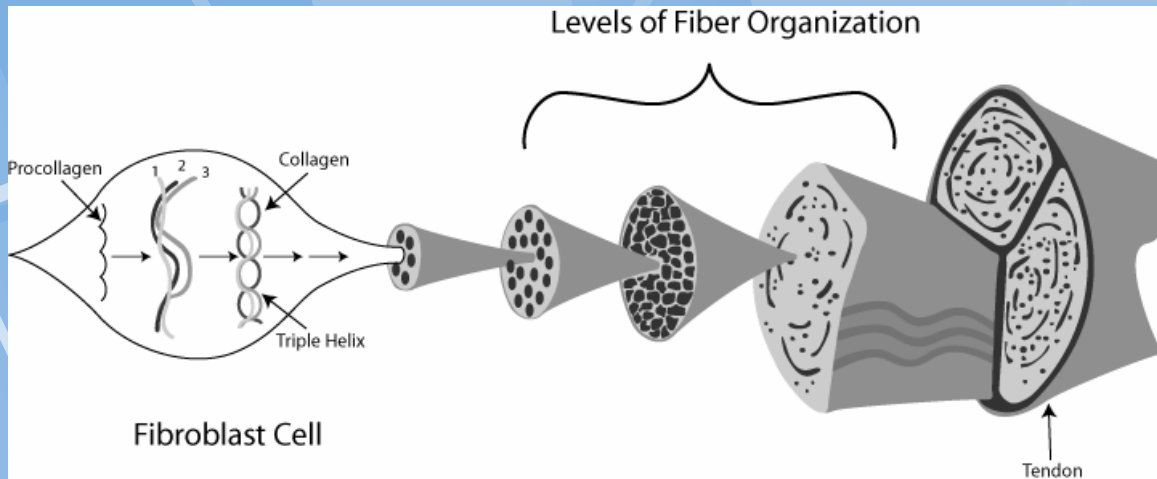
- Pain in wrist and hand
- Numbness and tingling in fingers
- Weakened grip
- Feeling of swelling in hand
- Worsened pain at night with rest



# Inflammation

- **Body's response to injury: Characterized by blood vessel dilation and increased temperature at site.**
- **Stage 1, Inflammatory: monocytes, fibroblasts & phagocytes migrate to injury.**
- **Stage 2, Proliferative: Fibroblasts increase in #; lymphocytes recruited to provide control signals**
- **Stage 3, Remodeling: Decrease in cellularity and fibronectin production; collagen production**

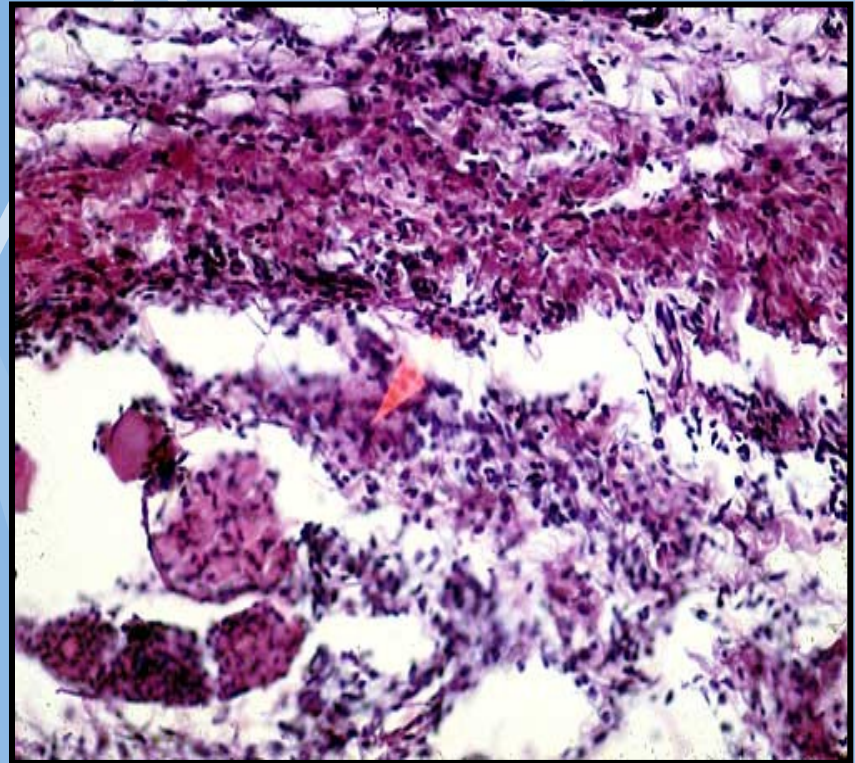
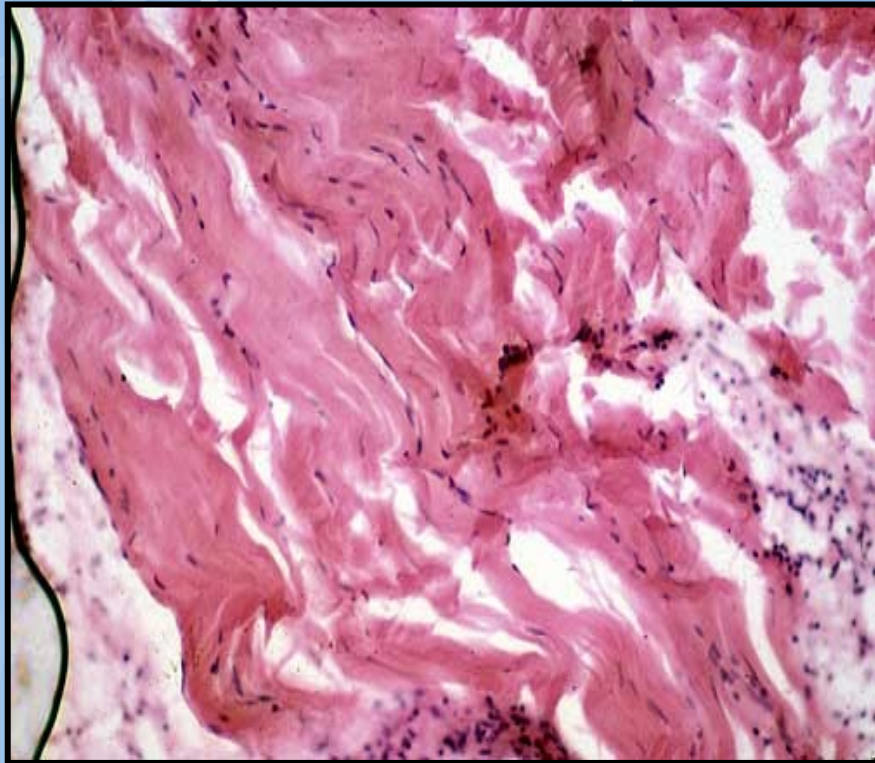
# Tendon Structure



- **Tendon has low cellularity normally**
- **Consists of highly organized fibrils of collagen**
- **Wavy appearance in healthy tendon**
- **Specialized fibroblasts called tenocytes are aligned between the collagen fibers.**
- **Each tendon is surrounded by a structure known as tenosynovium; a protective sheath - affected area in CTS – inflamed:  
CTS = compression of median nerve**



# Healthy vs. Injured Tendon



# Diagnosis

## Medical History

- Job
- Symptoms
- Medical conditions



## Physical Exam

- Tinel's sign (tapping median nerve)
- Phalen's test (compression of nerve)
- Muscle strength (thenar strength)

# Diagnosis

## Lab tests

- X-ray
- MRI

## Electrodiagnostic tests

- Electromyography
- Nerve conduction (electric shocks)

# X-ray and MRI

- X-ray: check for arthritis or fractured bones; not useful for detecting CTS
- MRI: around \$1,000/test: to estimate severity of CTS: not used routinely but is capable of detecting abnormalities indicative of CTS.

# Electromyography (EMG)

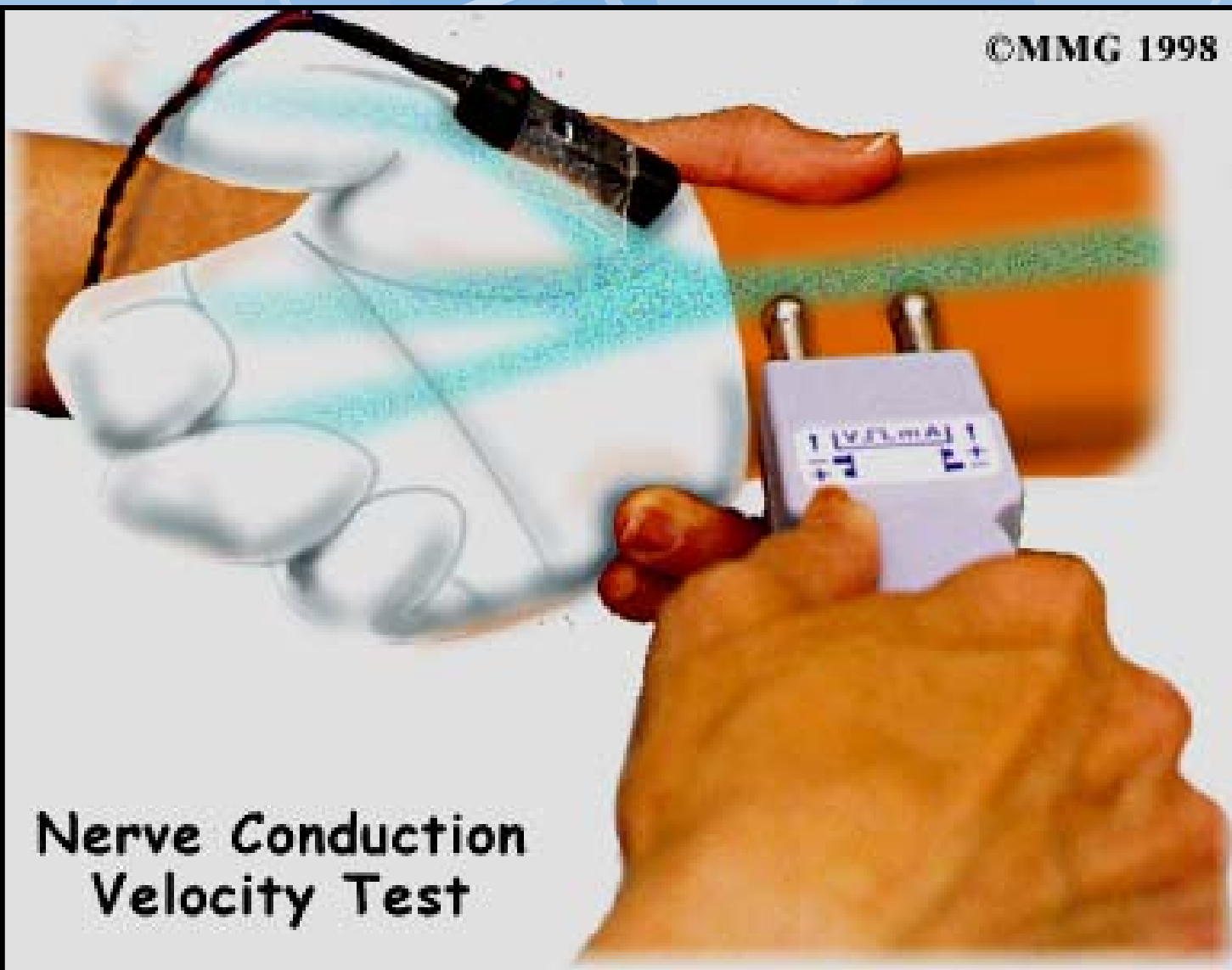
- To confirm diagnosis
- Indwelling or surface electrodes; electrical activity is displayed on a screen (benefits vs. disadvantages)
- Conditions such as obesity and anxiety can slow conduction speed and cause skewed results



# Nerve Conduction Studies

- Surface electrodes on hand and wrist
- Small elec. shocks applied to nerves in fingers, wrist, and forearm (measure speed of conduction)
- Can detect 84% of people with CTS
- Can eliminate 95% of cases that are not CTS

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**Nerve Conduction  
Velocity Test**

# Investigative Tests

- Researchers reported on a computer-assisted device
- Measures pinch and grip strength and finger pressure
- Accurate and consistent way to diagnose CTS (FROM: <http://www.medinfo.ufl.edu>)

**\*\*Example Ref:**

**Nindl G, Balcavage WX, Vesper DN, Swez JA, Wetzel BJ, Chamberlain JK, and Johnson, MT (2000) Experiments showing that electromagnetic fields can be used to treat inflammatory diseases. *Biomed. Sci. Instrum.* 36: 7-13.**

# Stats on CTS

- **Estimate:**  
**Company costs: \$37,000 in lost work time, treatment, rehabilitation per worker**
- **Workman's comp figures: \$6-10,000/case**
- **Imp. to find noninvasive, low-cost treatments**
- **Federal statisticians say repetitive motion injuries account for more than half of all workplace injuries.**

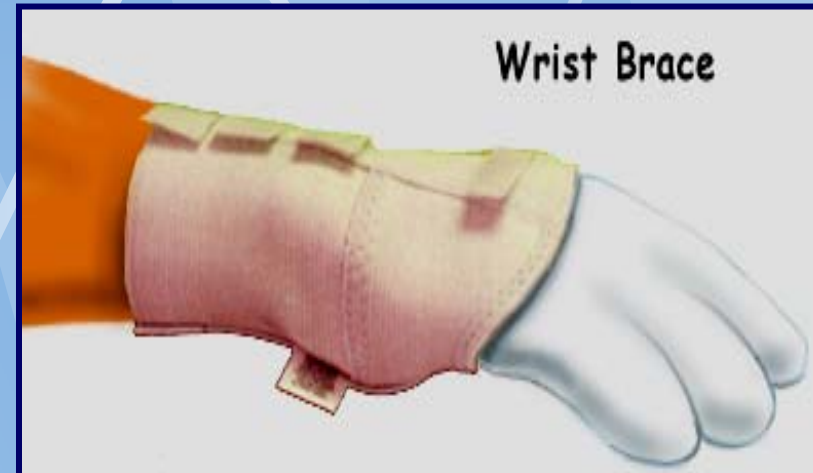
# Other culprits

- **Workplace not always culprit**
- **Associations with fluid retention:**  
**pregnancy**, diabetes, sudden weight gain, birth control pills

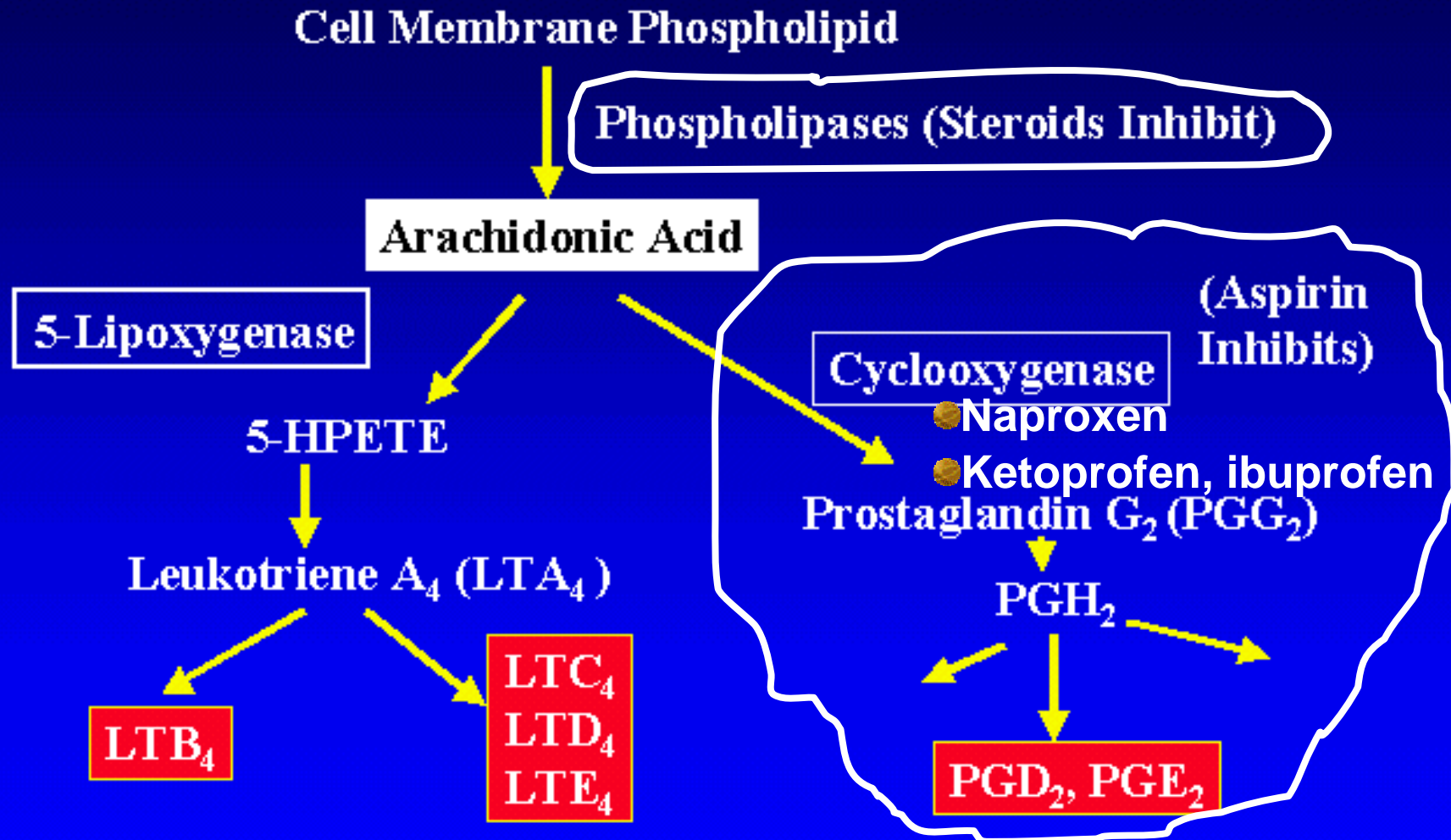
# Treatment

## Conservative

- Rest, Ice, Heat
- Brace
- Physical therapy
- Drugs
  - NSAIDS (ibuprofen, naproxin, aspirin): recommended **EARLY** in the inflammation cycle
  - Corticosteroids: decrease in tendon strength & mass over time



# Arachidonic Acid Metabolites



- Vioxx, Celebrex (COX-II inhibitors) may act without COX-I associated side effects (platelet aggregation); may increase risk of heart attack

# Treatment (con't)

## ● **Surgery**

- Endoscopy
- Mini Open Release
- Percutaneous Balloon Carpal Tunnel-Plasty

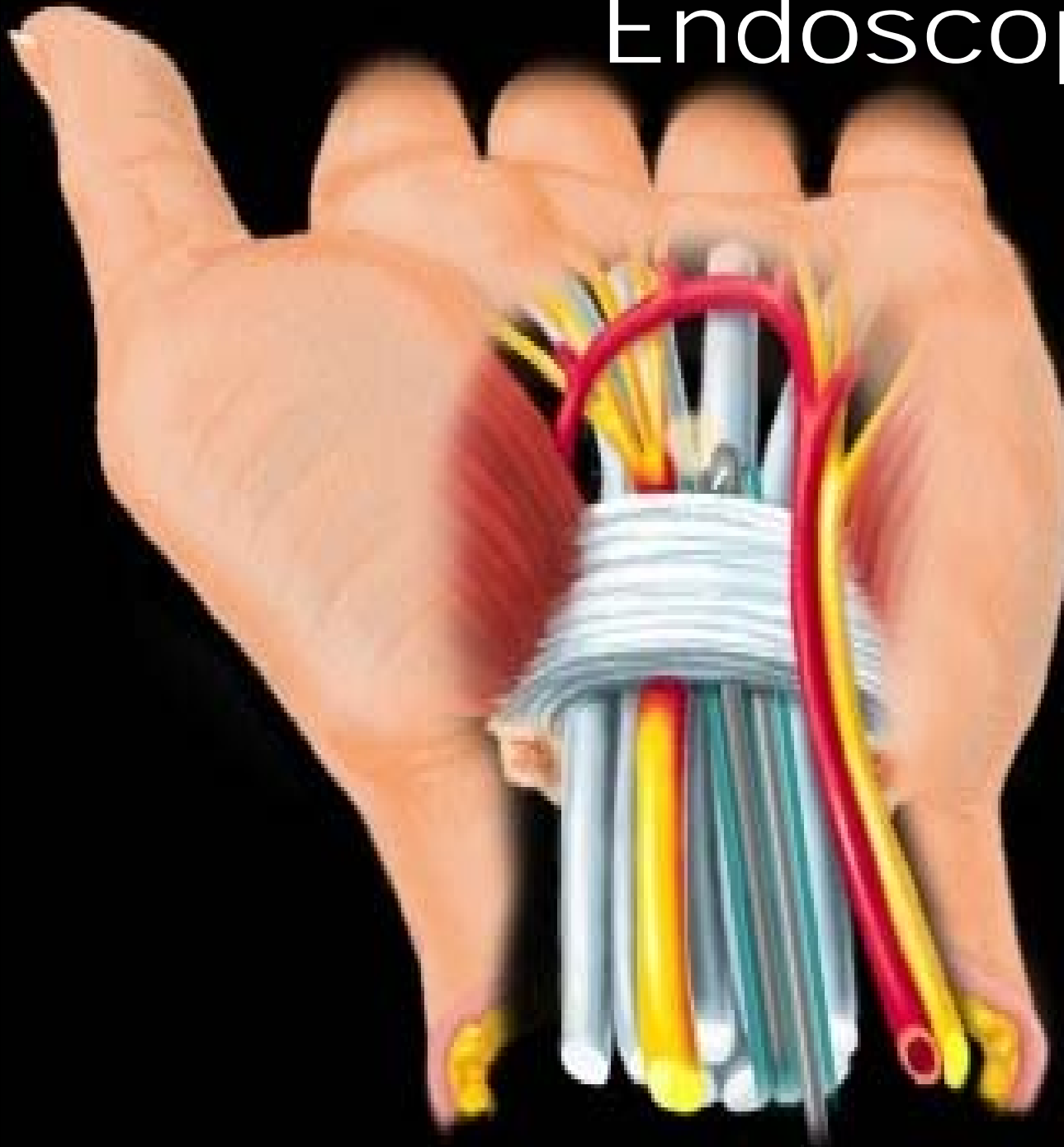


# Surgery

## Open release



# Endoscopy



# Treatment (con't)

## ● **Alternative Therapies**

- Vitamins (B6)
- Chiropractic methods
- Acupuncture
- Electromagnetic fields

# Ganglion Cysts



- **very common, masses (lumps) that grow in the hand and wrist, generally found on the top of the wrist, on the palm side of the wrist, the end joint of a finger (mucous cysts), and at the base of a finger.**
- **usually come from nearby joints or tendon sheaths, but, no specific cause.**
- **painful, especially when they first appear or with constant or strenuous use of the hand. Ganglions often change in size and may disappear completely. These cysts are not malignant (cancerous).**

# Diagnosis & Treatment of Ganglionic Cysts

- **Diagnosis.** usually based on location & appearance of the cyst
- **X-rays** may rule out problems in nearby joints.
- **Treatment.** watching for any changes. However, if painful, limits activity, or its appearance is unacceptable to the patient, other treatment may be recommended:
  - Needle aspiration of cyst fluid
  - Wearing of a splint to immobilize joint
  - Surgery to remove the cyst



# Some "Good" Web Sources

- <http://www.assh.org/>
- <http://www.sechrest.com/mmg/reflib/ctd/cts/cts.html>
- <http://www.carpaltunnel.com/>
- <http://www.chicagolegalnet.com/4step.htm>
- <http://www.scoi.com/handanat.htm>
- <http://www.cdc.gov/niosh/topics/ergonomics/>

# Some “?able” Web Sites

- <http://www.anyvitamins.com/treatment-carpal-tunnel-syndrome.htm>
- <http://www.geocities.com/cfsdays/ctstreet.htm>
- <http://hypnosismd.com/Treatment/c/carpal-tunnel.htm>

# SOAP Notes

- S- Subjective. Information the patient give you.
- O- Objective. Information from tests.
- A- Assessment. What you think about the information. Differential diagnoses.
- P- Plan. What you are going to do.