

# WORK-RELATED ARM PAIN AND CTS

BENIGN, MOSTLY HARMLESS,  
AND SELF-LIMITED.

BUT THEY COST A FORTUNE

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“It is incident to physicians, I am afraid, beyond all other men, to mistake subsequence for consequence.”

*Samuel Johnson (1734)*

NOWHERE IS THIS ILLUSTRATED  
MORE CLEARLY THAN WITH  
ARM PAIN AND THE CARPAL  
TUNNEL SYNDROME

# THE NATURE OF THE PROBLEM

## MUSCULOSKELETAL DISORDERS (MSDs)

- DEFINED BY BLS: INJURIES OR ILLNESSES AFFECTING MUSCLES, NERVES, TENDONS, DISCS, OTHER CONNECTIVE TISSUE NOT CAUSED BY DIRECT TRAUMA TO THE BODY, BUT FROM ACTIVITIES SUCH AS BENDING, TWISTING, REPETITION, ETC
- INCLUDES CARPAL TUNNEL SYNDROME, SPRAINS, STRAINS, TEARS, SORENESS AND PAIN

# MSD's: A VERY COSTLY PROBLEM

## SOFT TISSUE COMPLAINTS (BLS 2006)

- SPRAINS/STRAINS 40% OF ALL INJURIES/ILLNESSES
  - PAIN/SORENESS ALONE 9% OF ALL  
CTS/TENDONITIS
  - ONLY 1.5 % OF TOTAL
  - CTS CASES W/LOST WORK TIME HAD MEDIAN 27 DAYS OFF WORK, SAME AS FRACTURES, AND MORE THAN AMPUTATIONS
- OVER 300,000 SEPARATE MSD's RESULTING IN LOST TIME ARE REPORTED EVERY YEAR

# THE STORY OF SUSAN M

- SYMPTOM ONSET AGE 50
- OFFICE/CLERICAL WORK FOR 30 YEARS
- DEVELOPS PAIN AT BASE OF BOTH THUMBS WITH USE, WORSE WITH SOME WORK ACTIVITIES
- ASSUMED IT WAS DUE TO HER JOB BUT DID NOTHING ABOUT IT OTHER THAN TAKE OTC MEDS

IS MUSCULOSKELETAL PAIN  
NORMAL?

# OUR DAILY ACHES AND PAINS

IF YOU LIVE LONG ENOUGH, YOU WILL  
NOT SHED YOUR MORTAL COIL  
WITHOUT AT LEAST ONE BOUT OF  
SIGNIFICANT BACK, NECK AND LIMB  
PAIN,  
AND HAVE NO IDEA HOW OR WHY IT  
HAPPENED

# SYMPTOMS IN THE COMMUNITY

AFFLICTION	PREVALENCE
JOINT PAIN	37%
BACK PAIN	32%
ARM/LEG PAIN	24%

LIFETIME PREVALENCE IN 13,538 PEOPLE  
IN 4 COMMUNITIES

PAIN WAS “EXCESSIVE” AND CAUSED “A  
LOT OF PROBLEMS”

*Archives of Internal Medicine* 1993;153:2474-80

# SYMPTOMS IN THE COMMUNITY

## LOCATION

## ANNUAL INCIDENCE

■ SHOULDER	10%
■ ELBOW	15%
■ WRIST	25%

THIS IS PAIN OCCURRING WITHOUT ANY  
DEFINITE TRAUMA, MEMORABLE AND  
LASTING A WEEK OR MORE

ONLY A SMALL PORTION OF THESE PEOPLE  
WILL SEEK ANY MEDICAL HELP, AND EVEN  
FEWER WILL FILE A WORKERS' COMP CLAIM



# IS IT A REAL INJURY, OR DO YOU JUST HURT?

- AN *ILLNESS* IS AN UNHEALTHY CONDITION OF THE MIND OR BODY, AND MAY NOT BE DUE TO A *DISEASE*
- HAVING AN ILLNESS DOES NOT IMPLY THE PRESENCE OF *INJURY*, *HARM*, OR *DAMAGE*
- A REAL *INJURY* RESULTS FROM REAL *DISEASE*

# REAL DISEASE

THE BODY'S RESPONSE TO  
ENVIRONMENTAL OR GENETIC  
FACTORS

TRAUMA MALNUTRITION  
TOXINS METABOLIC ERRORS  
INFECTION

DISEASE IMPLIES *TISSUE PATHOLOGY*  
CAUSING MALFUNCTION, WITH A  
POTENTIAL FOR DAMAGE

# REAL TRAUMA

- TRAUMA CAUSES *INJURY*: A WOUND
- TRUE INJURIES RESULT IN *DAMAGE*, WHICH IMPLIES *LOSS* - TEMPORARY OR NOT
- TRAUMA IMPLIES THE APPLICATION OF *EXTERNAL FORCE OR VIOLENCE*

# SUSAN'S HANDS GET NUMB

- 3 YEARS LATER, AT AGE 53
- HER THUMBS ARE STILL HURTING WITH USE (THIS IS NOT NORMAL!)
- DEVELOPS *NOCTURNAL* HAND NUMBNESS AND TINGLING
- NUMBNESS IS NOT PRESENT WITH WORK AT FIRST, AND SYMPTOMS ARE RELIEVED WITH ACTIVITY

WHAT ABOUT NUMB HANDS?

DOES SHE HAVE CARPAL TUNNEL SYNDROME (CTS)?

# NUMB HANDS ARE COMMON

SURVEYS OF LARGE NUMBERS OF  
PEOPLE HAVE SHOWN THE  
PREVALENCE OF “TYPICAL”  
SYMPTOMS SUGGESTIVE OF CTS TO  
BE 14% - 20%

SO JUST WHAT IS CARPAL TUNNEL  
SYNDROME?

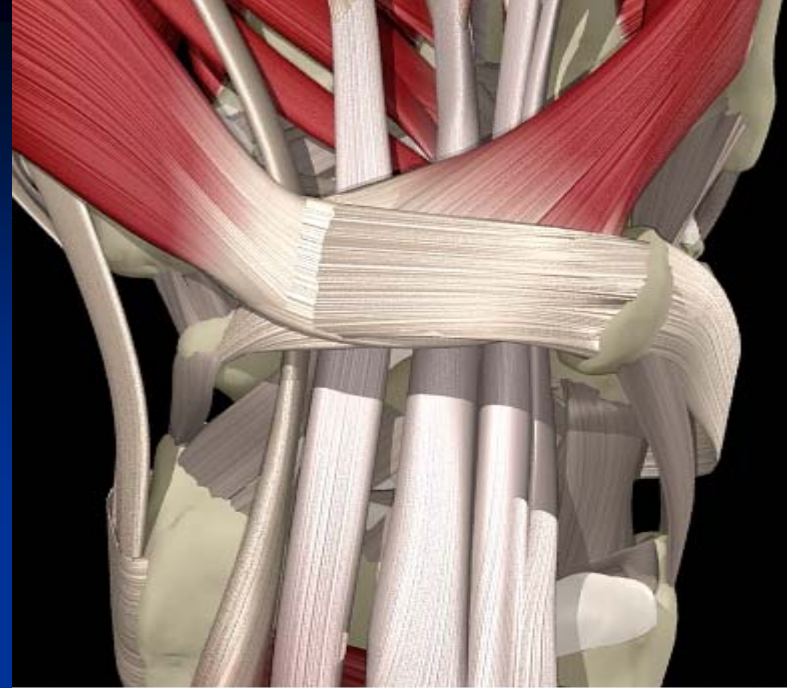
CTS IS A COMPRESSION OR  
ENTRAPMENT NEUROPATHY

ANY CONDITION THAT INCREASES  
PRESSURE ON THE MEDIAN NERVE AS IT  
PASSES THROUGH THE NARROW  
CARPAL TUNNEL CAN CAUSE THE  
TYPICAL NUMBNESS, TINGLING, OR  
PINS-AND-NEEDLES SENSATIONS IN THE  
FINGERS SERVED BY THE MEDIAN  
NERVE

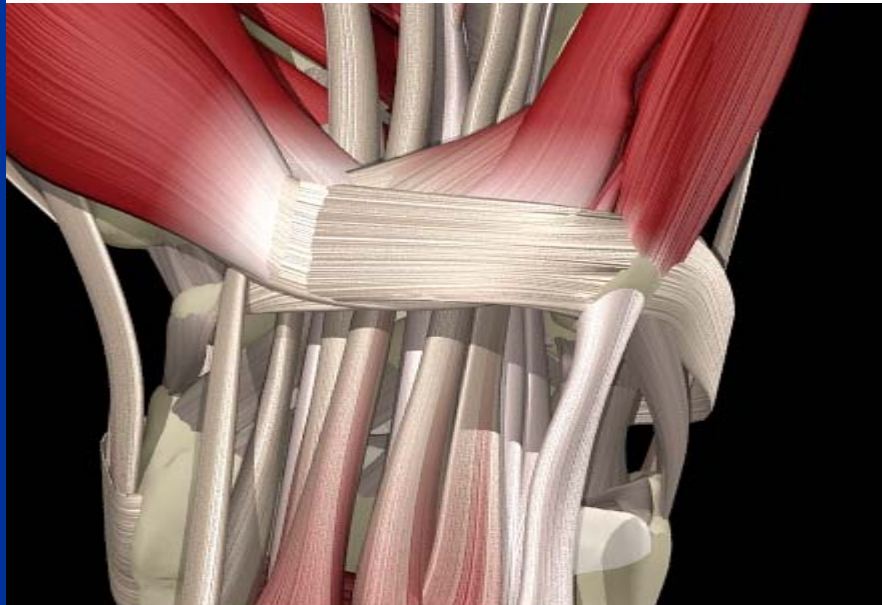
EDEMA, THICKENED SOFT TISSUES, BONE  
SPURS, HEMORRHAGE, TUMORS OF ANY  
TYPE



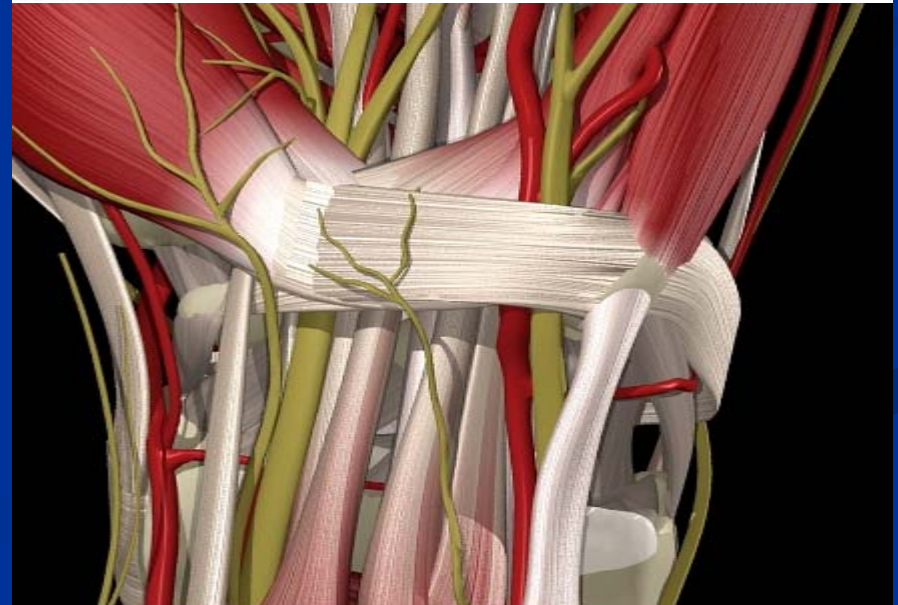
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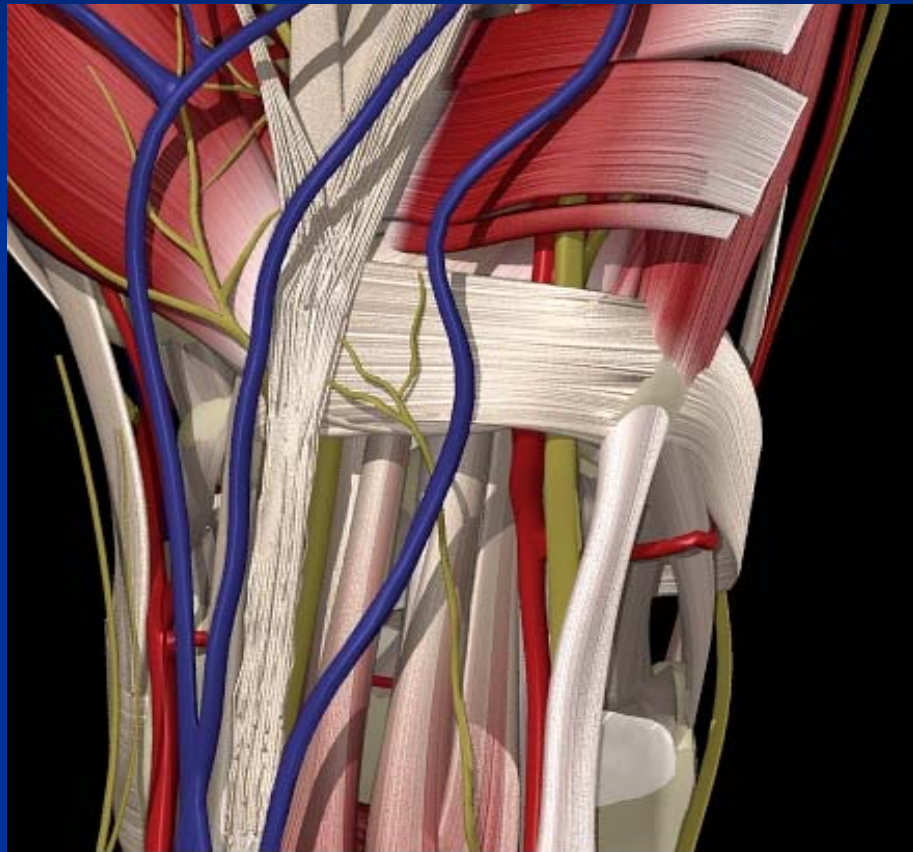


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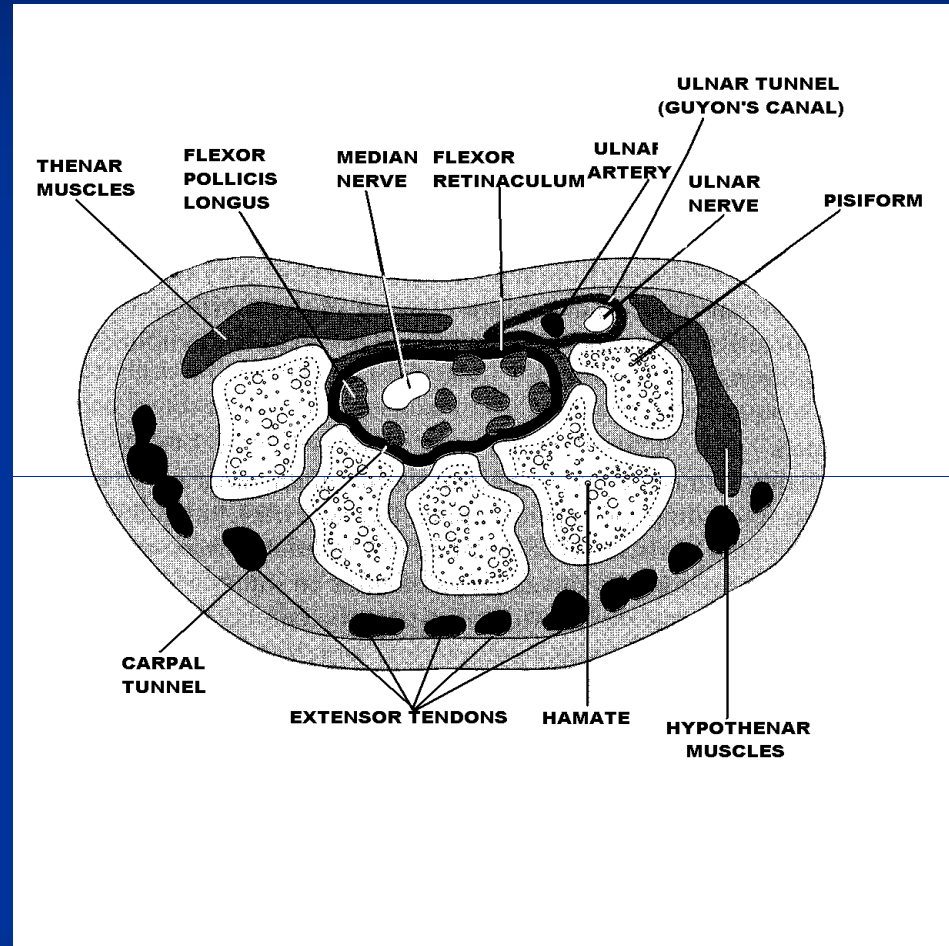


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# A CROWDED PLACE

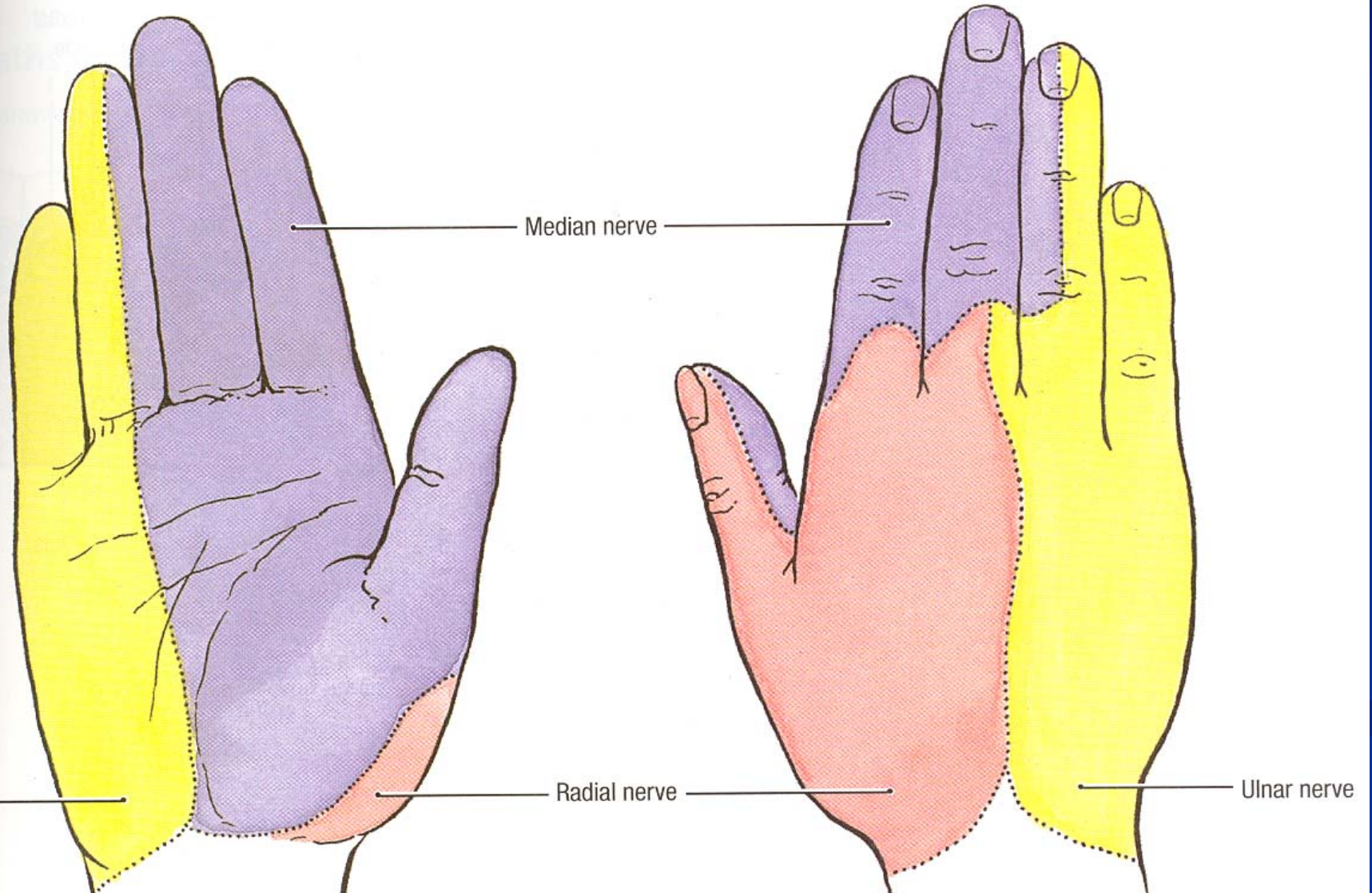


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# NERVE SUPPLY TO THE HAND



# DIAGNOSING CTS

## AT A MINIMUM:

- ABNORMAL SENSATION LOCALIZED TO THE MEDIAN NERVE DISTRIBUTION OF THE HAND, *PLUS*
- ABNORMAL MEDIAN NERVE CONDUCTION, WITH SLOWING AT THE WRIST

## IDEALLY:

- SYMPTOMS HAVE PERSISTED OVER TIME, *AND*
- NERVE STUDIES CORRECTED FOR CONFOUNDERS

# SUSAN FINALLY SEES A DOCTOR

- REFERRED TO ORTHOPEDIST, WHO DID X-RAYS BUT NO LAB WORK
- DIAGNOSED THUMB OSTEOARTHRITIS AND CTS
- SAID HER CONDITIONS WERE WORK-RELATED
- SAID SHE MIGHT NEED SURGERY AND ORDERED ELECTRODIAGNOSTICS (EMG's)

WHAT ABOUT EMG's FOR THE DIAGNOSIS OF CTS?

# MEDIAN NERVE CONDUCTION STUDIES

“ABNORMAL” NERVE CONDUCTION IS  
ASSOCIATED WITH MANY FACTORS:

- AGE
- GENDER
- BODY MASS INDEX (OBESITY)
- ARM TEMPERATURE

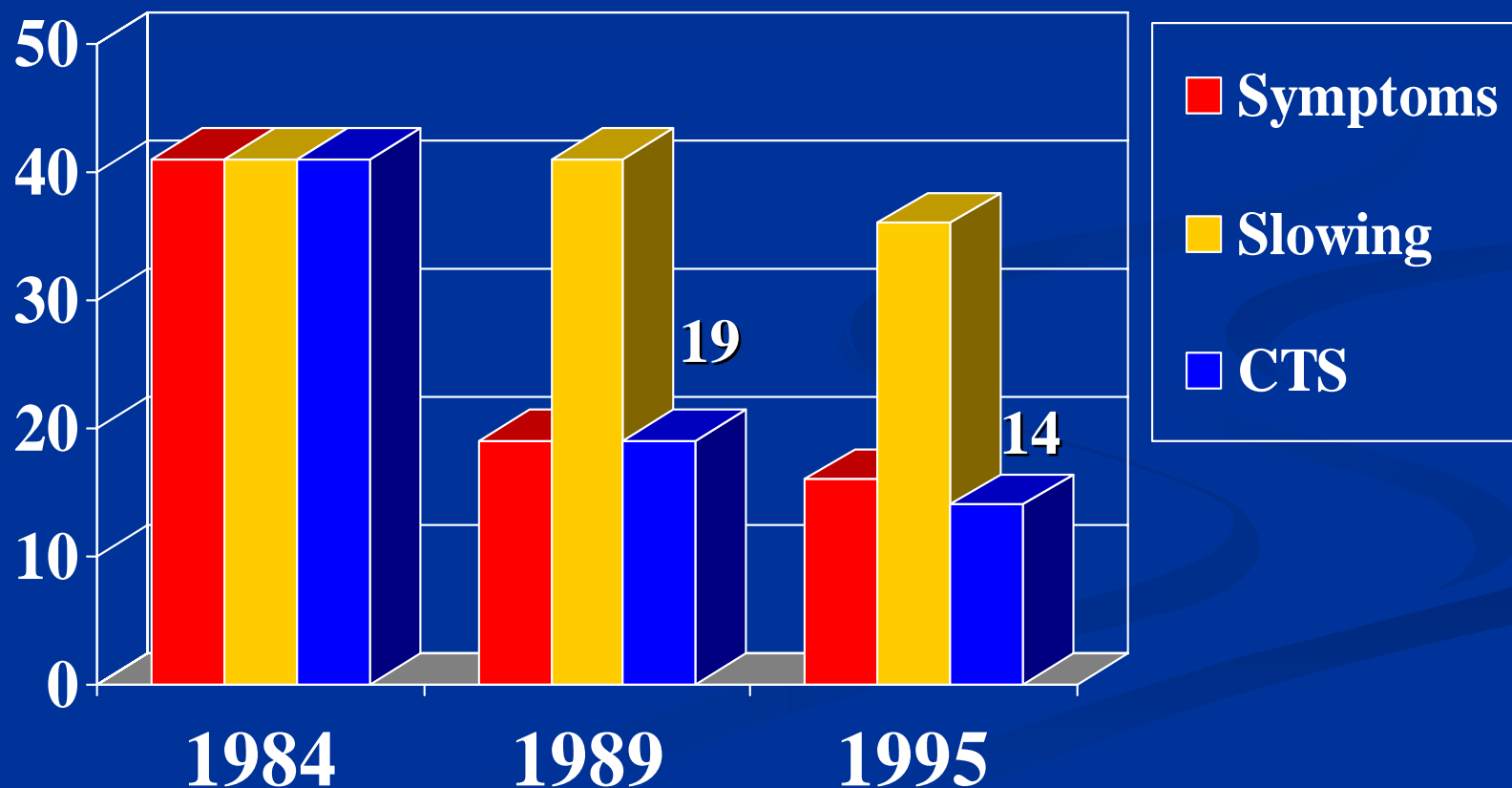
FAILURE TO CORRECT FOR THESE  
FACTORS MAY RESULT IN A  
FALSE- POSITIVE TEST RESULT

# FALSE-POSITIVE NERVE STUDIES ARE COMMON

- A STUDY OF 50 **ASYMPTOMATIC** PEOPLE SHOWED THAT 46% HAD AT LEAST 1 FALSE-POSITIVE RESULT
- A POPULATION-BASED STUDY IN SWEDEN FOUND THAT 18.4% OF **ASYMPTOMATIC** PEOPLE HAD ABNORMAL MEDIAN NERVE CONDUCTION STUDIES

# NUMB HANDS AND ABNORMAL NERVE TESTS ARE NOT PERMANENT

## 41 HANDS WITH CTS IN 1984



# SUSAN HAS SURGERY

- THE EMG'S SHOW MEDIAN NERVE SLOWING AT BOTH WRISTS, CONSISTENT WITH CTS
- THE X-RAYS SHOW SEVERE OSTEOARTHRITIS OF THE BASILAR THUMB (1<sup>st</sup> CMC) JOINTS
- SHE HAS BILATERAL 1<sup>st</sup> CMC (BASILAR THUMB) ARTHROPLASTIES AND BILATERAL CARPAL TUNNEL RELEASES

THE SURGERY WORKS GREAT!

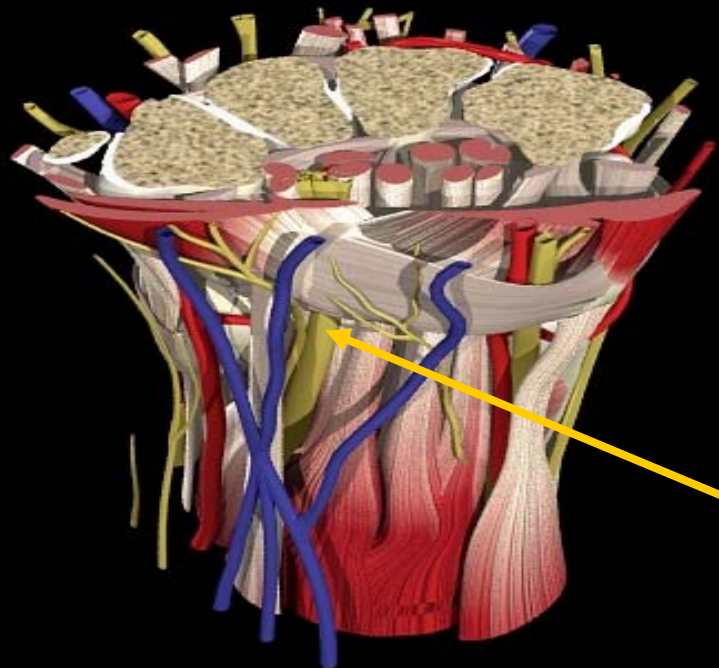
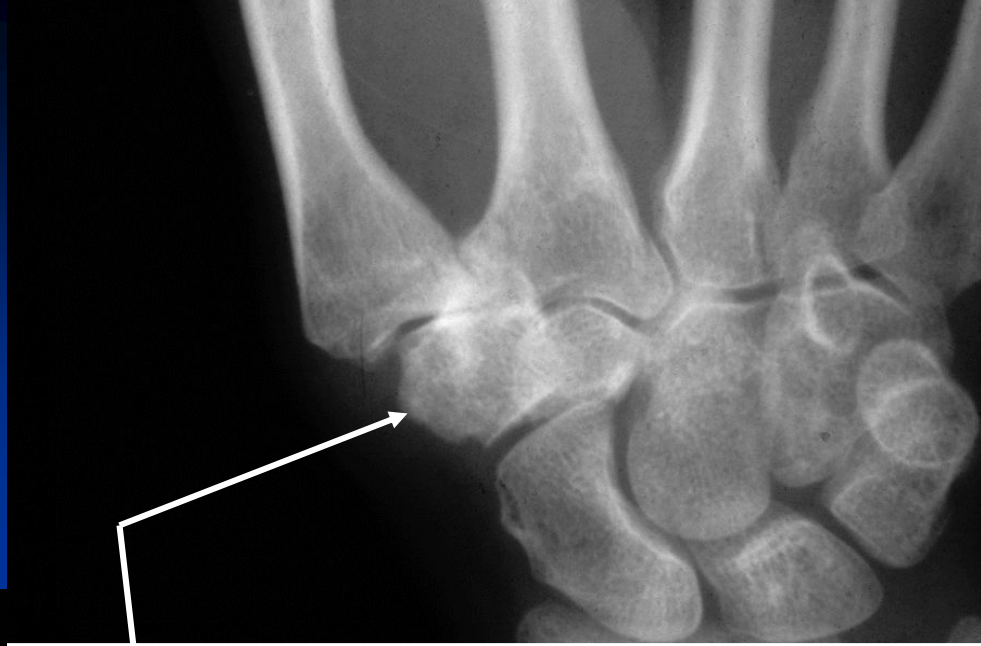
THUMB PAIN AND HAND NUMBNESS ALL GO AWAY.

# WHY DID THINGS WORK OUT SO WELL?

- SUSAN HAD A REAL DISEASE (OSTEOARTHRITIS) CAUSING HER CARPAL TUNNEL SYNDROME
- WHEN THE ANATOMIC DERANGEMENT FROM THE OSTEO WAS CORRECTED, THE PRESSURE ON THE MEDIAN NERVES WAS RELIEVED AND HER CTS DISAPPEARED ALONG WITH THE THUMB PAIN
- THE ORTHOPEDIST DID EVERYTHING RIGHT  
OVER 40% OF PEOPLE WITH BASILAR THUMB OSTEOARTHRITIS HAVE ASSOCIATED CTS



# REAL DISEASE



**MEDIAN NERVE**

# CTS IS A *SYNDROME*, NOT A *DISEASE*

- A **SYNDROME** IS A SPECIFIC COLLECTION OF SYMPTOMS AND SIGNS THAT AIDS THE PHYSICIAN IN DIAGNOSING THE *DISEASE* THAT IS CAUSING THE *ILLNESS*
- **SYNDROMES** ARE INDICATORS OF POSSIBLE DISEASE BUT **ARE NOT DIAGNOSTIC OF ANY SINGLE DISEASE**
- WHEN YOU DIAGNOSE A SYNDROME, YOU MUST DEVELOP A **DIFFERENTIAL DIAGNOSIS**

# DIFFERENTIAL DIAGNOSIS OF CARPAL TUNNEL SYNDROME

## ■ METABOLIC

PREGNANCY

THYROID

DIABETES MELLITUS

ACROMEGALY

AMYLOID

## ■ INFLAMMATORY

WRIST ARTHRITIS,

TENOSYNOVITIS,

RAYNAUD'S, RA,

LUPUS, GOUT,

SPONDYLOARTHRO

-PATHY, INFECTION

## ■ MECHANICAL / DEGENERATIVE/OTHER

OSTEOARTHRITIS, OBESITY, TRAUMA, CYST,

LIPOMA, CONGENITAL

# PEOPLE DON'T GET BETTER, THEY JUST GET OLDER

- 5 YEARS AFTER SURGERY, AT AGE 58, SUSAN ONCE AGAIN DEVELOPS NOCTURNAL HAND NUMBNESS AND TINGLING
- THIS TIME THE NUMBNESS OCCUPIES THE ENTIRE HAND, AND SHE HAS BEEN UNUSUALLY TIRED
- HAD HER CLAIM REOPENED AND SAW A COMP DOCTOR. ORDERED EMG's. NO LAB
- EMG's AGAIN CONSISTENT WITH BILATERAL CTS
- HE SAID SHE HAD TO STOP WORKING OR FACE "PERMANENT NERVE DAMAGE"

DOES ANY OF THIS MAKE SENSE?

# NERVE DAMAGE AND CTS

- IF SYMPTOMS ARE INTERMITTENT, THEN BY DEFINITION NO NERVE DAMAGE CAN HAVE OCCURRED. TRUE NERVE DAMAGE IS RARE IN CTS.
- NOTE THAT THE NUMBNESS ONLY OCCURS WHEN HER HANDS ARE AT REST, AND GOES AWAY WHEN SHE IS MOVING HER HANDS, AND AT WORK
- DOES IT MAKE ANY SENSE TO IMPOSE ANY WORK RESTRICTIONS, SINCE WORK IS WHAT MAKES HER FEEL BETTER?
- THERE IS NOT A SHRED OF EVIDENCE THAT ANY PARTICULAR WORK RESTRICTION HELPS ANYONE WITH CTS

THERE IS NO EVIDENCE THAT ANY KIND  
OF WORK MAKES CTS  
FUNDAMENTALLY WORSE

# SUSAN'S RED FLAGS FOR CTS

## RECURRENT CTS AFTER SURGERY

- SURGERY IS SUCCESSFUL 95% OF THE TIME IN CTS
- FAILURE TO IMPROVE, OR RECURRANT SYMPTOMS SHOULD PROMPT A FRESH EVALUATION

## PARESTHESIAS NOT CLASSIC FOR CTS

- HAD SYMPTOMS INVOLVING BOTH THE MEDIAN AND ULNAR NERVE AREAS

## SYMPTOMS OF POSSIBLE SYSTEMIC DISEASE

- UNUSUAL FATIGUE, HAIR LOSS, FEVERS, NIGHT SWEATS, WEIGHT CHANGE, SKIN RASHES
- THESE ALL POINT TO A SYSTEMIC PROBLEM, NOT A LOCALIZED ONE

## SUSAN ASKS FOR A SECOND OPINION

# SUCCESS AGAIN

SUSAN FINALLY GETS LAB WORK DONE  
FOR CTS

- SERUM TSH IS 24 (NORMAL UP TO 4.8)
- SERUM T4 LOW
- THYROID REPLACEMENT STARTED
- TOLD TO CONTINUE HER REGULAR JOB  
WITH NO RISK OF NERVE DAMAGE

AFTER 5 MONTHS ALL HAND NUMBNESS  
GONE, AND ENERGY BACK TO NORMAL

# IS CARPAL TUNNEL SYNDROME CAUSED BY REPETITIVE USE?

AN EXAMINATION OF THE  
CURRENT EVIDENCE



# HYPOTHESIS

THAT MANY PEOPLE ALREADY  
CERTIFIED WITH WORK-RELATED  
CARPAL TUNNEL SYNDROME HAVE  
A CONCURRENT MEDICAL DISEASE  
KNOWN TO BE ABLE TO CAUSE THE  
SYNDROME

# Concurrent Medical Disease in Work-Related Carpal Tunnel Syndrome

Steven G. Atcheson, MD; John R. Ward, MD; Wing Lowe, PhD

*Archives of Internal Medicine, July, 1998*

## The Many Faces of Carpal Tunnel Syndrome

**C**ARPAL TUNNEL syndrome (CTS) is the most common of the nerve entrapment disorders.<sup>1</sup> The symptoms associated with this syndrome result from compression of the median nerve typically as it passes

face visits, yet diagnostic laboratory studies were ordered only 25 times. Careful review of these patients by the authors found that up to two thirds of them either had a medical illness or were obese. However, many textbooks have made CTS synonymous with repetitive motion disorder.

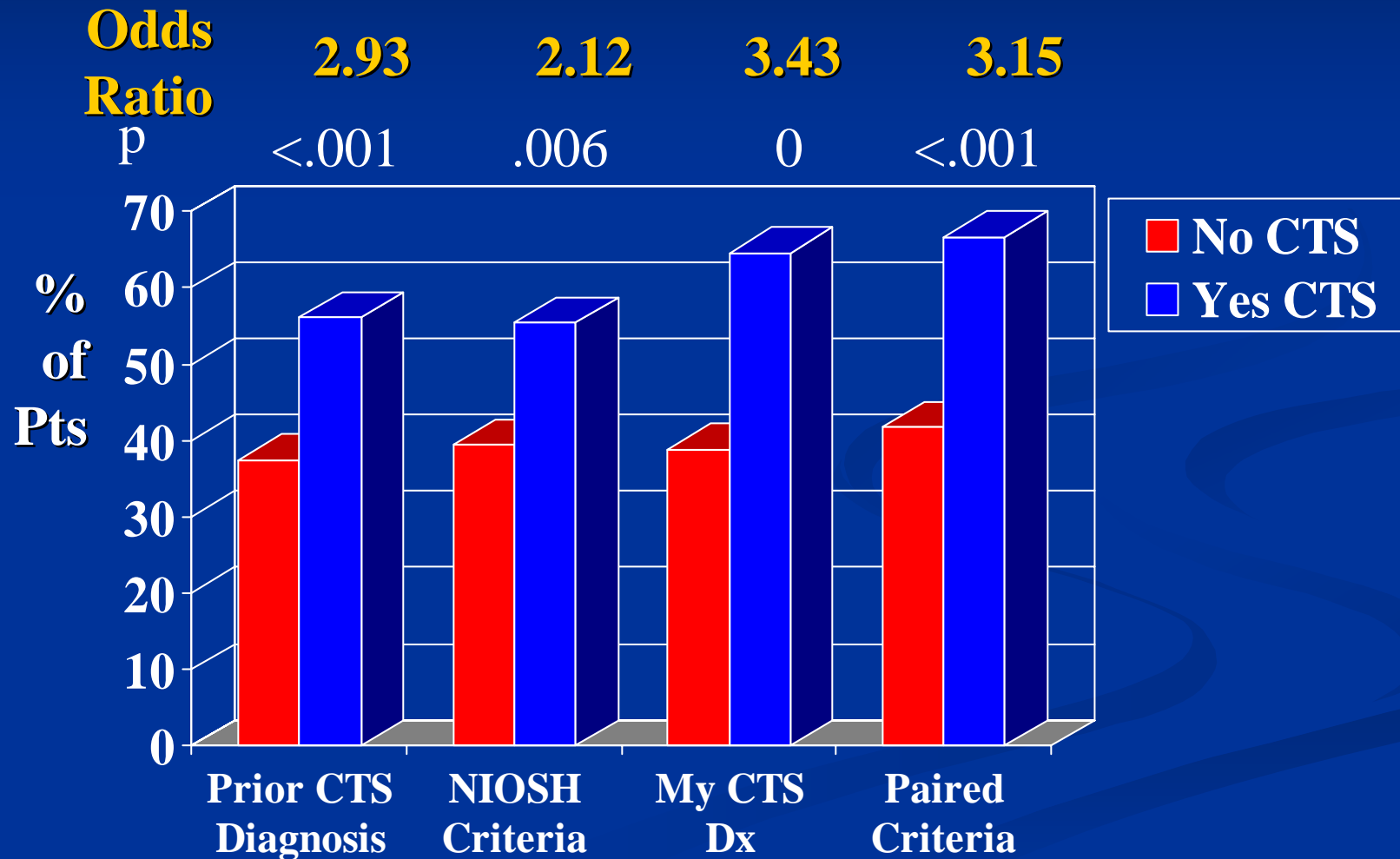
# CONCURRENT DISEASE IN WORK-RELATED CTS

- 297 PATIENTS CERTIFIED WITH OCCUPATIONAL HAND/ARM PAIN
- DISEASES DIAGNOSED ACCORDING TO STANDARD CRITERIA
- JOBS CATEGORIZED ACCORDING TO TASK DESCRIPTION OR INDUSTRY
- 4 SEPARATE CASE DEFINITIONS OF CTS

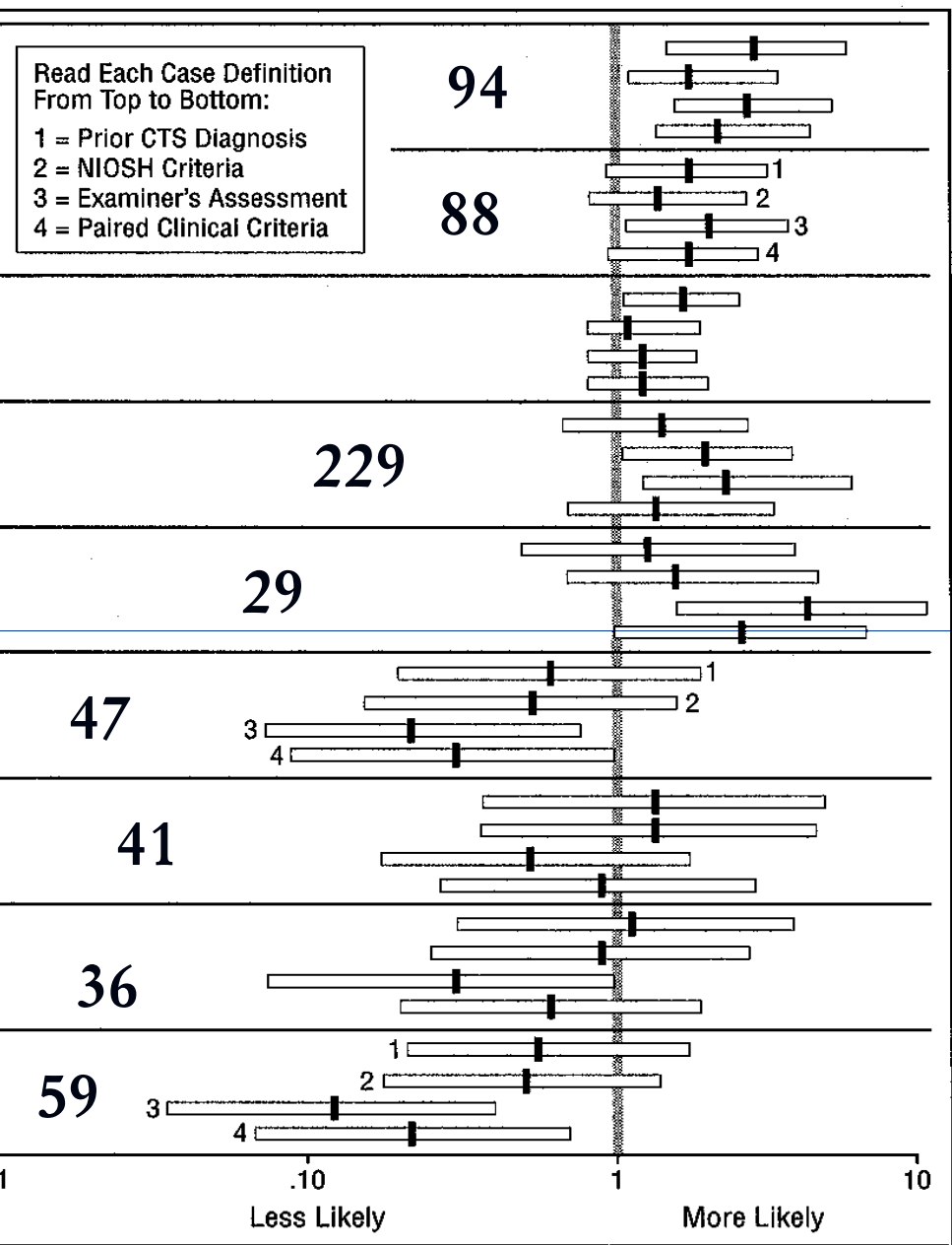
# MEDICAL DISEASES DIAGNOSED

- **METABOLIC** 41 (13.8%)
    - HYPOTHYROID 18 (6.1%)
    - DIABETES MELLITUS 17 (5.7%)
    - GOUT / OTHERS 6 (2.0%)
  - **INFLAMMATORY** 33 (11.1%)
    - RA, SPONDYLOARTHROPATHY, RAYNAUD'S,  
SLE, UNCLASSIFIED CTD
  - **OSTEOARTHRITIS** 35 (11.7%)
- TOTAL: 109 CONDITIONS IN 98 PTS**  
**PATIENTS WERE UNAWARE OF 2/3 OF THEM**

# DISEASE OR OBESITY IN WORK-RELATED CTS



# OCCUPATION AND CTS



MEDICAL DISEASE

OBESITY (BMI  $\geq$  30)

INCREASING AGE

FEMALE SEX

INDUSTRIAL WORK

OFFICE/CLERICAL

DATA ENTRY

GAMES DEALER

SUPERMARKET

# CTS IS SELDOM PURE

- OF 195 PATIENTS DIAGNOSED WITH CTS, 81% HAD SIGNIFICANT MUSCULOSKELTAL SYMPTOMS
- 37% SAID THEY WOULDN'T HAVE SEEN A DOCTOR IF ALL THEY HAD WERE PARESTHESIAS

CTS CAUSES PARESTHESIAS IN THE FINGERS +/- PALM ONLY.

CTS DOES NOT CAUSE WRIST PAIN OR ARM PAIN

# NERVE CONDUCTION AND OCCUPATION

## CROSS-SECTIONAL STUDIES

1. NO SIGNIFICANT DIFFERENCES IN GROUP OF POULTRY WORKERS VS. THOSE APPLYING FOR WORK

Schottland, et al

2. NO DIFFERENCE IN SYMPTOMATIC EMPLOYEES USING VDT's VS. THOSE WITHOUT SYMPTOMS

Bernard, et al



# LONGITUDINAL STUDIES

316 WORKERS; 660 HANDS STUDIED

- TESTED AT BASELINE AND 5 YEARS LATER
- JOBS CLASSIFIED ACCORDING TO RESISTANCE AND REPETITION
- CORRECTED FOR AGE, HAND DOMINANCE, AND OBESITY
- NO MEDIAN NERVE CONDUCTION DIFFERENCES DETECTED BETWEEN JOBS OR WITHIN JOBS

Nathan, et al

# COMPUTER USE AND CTS

## MAYO CLINIC (2001)

- NO DIFFERENCE IN CTS FREQUENCY BETWEEN COMPUTER USERS AND NON-USERS
- PREVALENCE OF CTS IN COMPUTER USERS SAME AS GENERAL POPULATION

## SWEDEN (2007)

- 2,465 PEOPLE SURVEYED, RESPONDANTS EXAMINED
- PREVALENCE OF CTS DECREASED AS COMPUTER KEYBOARD USE INCREASED
- CONCLUSION: INTENSIVE KEYBOARD USE REDUCES THE RISK OF CTS!

# REMOVING THE PRESUMPTIVE CAUSE

## ERGONOMIC INTERVENTIONS

AFTER A REVIEW OF THE WORLD'S  
LITERATURE ON WORKPLACE  
INTERVENTIONS FOR THE PREVENTION  
OF CTS, THE AUTHORS CONCLUDED:

“..IT IS TROUBLING THAT THE  
SCIENTIFIC EVIDENCE IN SUPPORT OF  
PRIMARY PREVENTION INTERVENTIONS  
IS SO SCANT.”

# ENOUGH EVIDENCE IS IN

## CARPAL TUNNEL SYNDROME

- IS NOT CAUSED BY ORDINARY REPETITIVE USE
- IS DIAGNOSED FAR MORE OFTEN THAN IT REALLY OCCURS
- IS OFTEN ASSOCIATED WITH UNRECOGNIZED UNDERLYING MEDICAL DISEASES

# CARPAL TUNNEL SYNDROME: THE EVIDENCE MANDATES

- THAT ALL PATIENTS WITH SUSPECTED CTS HAVE A THOROUGH EVALUATION FOR CONFOUNDING MEDICAL DISEASE OR OBESITY
- THAT ELECTRODIAGNOSTIC STUDIES HAVE SUCH A HIGH FALSE-POSITIVE RATE THAT THEY BE RESERVED FOR CONFUSING SITUATIONS OR PRE-OPERATIVE CONFIRMATION

EMPLOYEE'S CLAIM - PROVIDE ALL INFORMATION REQUESTED

First Name		M.I.	Last Name		Birthdate	Sex <input type="checkbox"/> M <input type="checkbox"/> F	Claim Number (Insurer's Use Only)
Home Address				Age	Height	Weight	Social Security Number
City		State		Zip		Telephone	
Physical Address			City		State	Zip	Primary Language Spoken
INSURER		THIRD-PARTY ADMINISTRATOR			Employee's Occupation (Job Title) When Injury or Occupational Disease Occurred		
Employer's Name/Company Name						Telephone	
Office Mail Address (Number and Street)							
Date of Injury (if applicable)	Hours Injury (if applicable)		Date Employer Notified	Last Day of Work After Injury or Occupational Disease		Supervisor to Whom Injury Reported	
Address or Location of Accident (if applicable)							
What were you doing at the time of the accident? (if applicable)							
How did this injury or occupational disease occur? (Be specific and answer in detail. Use of "I" is preferred if necessary)							
If you believe that you have an occupational disease, when did you first have knowledge of the disability and its relationship to your employment?						Witnesses to the Accident (if applicable)	
Nature of Injury or Occupational Disease				Part(s) of Body Injured or Affected			
<p>I CERTIFY THAT THE ABOVE IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND THAT I HAVE PROVIDED THIS INFORMATION IN ORDER TO OBTAIN THE BENEFITS OF NEVADA'S INDUSTRIAL INSURANCE AND OCCUPATIONAL DISEASES ACTS (NRS 616A TO 616D, INCLUSIVE OR CHAPTER 617 OF NRS). I HEREBY AUTHORIZE A PHYSICIAN, CHIROPRACTOR, SURGEON, PRACTITIONER, OR OTHER PERSON, ANY HOSPITAL, INCLUDING VETERANS ADMINISTRATION OR GOVERNMENTAL HOSPITAL, ANY MEDICAL SERVICE ORGANIZATION, ANY INSURANCE COMPANY, OR OTHER INSTITUTION OR ORGANIZATION TO RELEASE TO EACH OTHER, ANY MEDICAL OR OTHER INFORMATION INCLUDING BENEFITS PAID OR PAYABLE PERTINENT TO THIS INJURY OR DISEASE, EXCEPT INFORMATION RELATIVE TO DIAGNOSIS, TREATMENT AND/OR COUNSELING FOR ANY PSYCHOLOGICAL CONDITIONS, ALCOHOL OR CONTROLLED SUBSTANCES, FOR WHICH I MUST GIVE SPECIFIC AUTHORIZATION. A PHOTOSTAT OF THIS AUTHORIZATION SHALL BE AS VALID AS THE ORIGINAL.</p>							
Date	Place	Employee's Signature					
THIS REPORT MUST BE COMPLETED AND MAILED WITHIN 10 WORKING DAYS OF TREATMENT							
Place		Name of Employee					
Date	Diagnosis and Description of Injury or Occupational Disease				Is there evidence that the injured employee was under the influence of alcohol and/or another controlled substance at the time of the accident? <input type="checkbox"/> No <input type="checkbox"/> Yes (if yes, please explain)		
Hour							
Treatment:				Have you advised the patient to remain off work five days or more? <input type="checkbox"/> Yes Indicate dates: from _____ to _____ <input type="checkbox"/> No If no, is the injured employee capable of: <input type="checkbox"/> full duty <input type="checkbox"/> modified duty If modified duty, specify any limitations/restrictions: _____			
X-Ray Findings:							
From information given by the employee, together with medical evidence, can you directly connect this injury or occupational disease as job incurred? <input type="checkbox"/> Yes <input type="checkbox"/> No							
Is additional medical care by a physician indicated? <input type="checkbox"/> Yes <input type="checkbox"/> No							
Do you know of any previous injury or disease contributing to this condition or occupational disease? <input type="checkbox"/> Yes <input type="checkbox"/> No (Explain if yes)							
Date	Print Doctor's Name			I certify that the employer's copy of this form was mailed to the employer on:			
Address				INSURER'S USE ONLY			
City	State	Zip	Provider's Tax I.D. Number	Telephone			
Doctor's Signature				Degree			

# GIANT RED FLAGS

“REPETITIVE MOTION”  
NAMED AS CAUSE OF  
PROBLEM

CTS DIAGNOSED

THE HARDEST  
CLAIMS TO  
CLOSE ARE  
THOSE THAT  
NEVER SHOULD  
HAVE BEEN  
ACCEPTED

# Specialty Health

