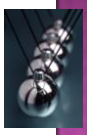
# ERGONOMICS

## ERGONOMICS-WHAT IS IT?

ved from two Greek words:

- "Nomoi" meaning natural laws
- "Ergon" meaning work
- Hence, ergonomists study human capabilities in relationship to work demands



## HISTORY

- As early as 18th century doctors noted that workers who required to maintain body positions for long periods of time developed musculoskeletal problems.
- Within last 20 years research has clearly established connections between certain job tasks and RSI or MSD.

## What two elements are at work?

1) *Static work*: musculoskeletal effort required to hold a certain position, even a comfortable one.

Example: sit & work at computers; keeping head and torso upright requires small or great amounts of static work depending on the efficiency of the body positions we chose.

## ELEMENTS AT WORK (CONT)

- *Force*: amount of tension our muscles generate

  Example: tilting your head forward or backward from a neutral, vertical position *quadruples* the amount of force acting on your lower neck vertebrae

- Increased force is d/t increase in muscular tension needed to support head in a tilted position

## 3 MAIN ERGONOMIC PRINCIPLES:

1. Work activities should permit worker to adopt several different healthy and safe postures.
2. Muscle forces should be done by the *largest appropriate* muscle groups available
3. Work activities s/b performed with joints at about mid-point of their ROM (esp. head,trunk,UE)

## FACTS

- **The average person working at a keyboard can perform 50,000 to 200,000 keystrokes a day**
- **Overexertion, falls & RMI are the most common cause of workplace injury**
- **An average of 125,000 back injuries due to improper lifting each year.**
- **Muscles overuse results in tiny tears in the muscles and scarring; these contribute to inflammation and muscle stiffness**

## A BIT OF ANATOMY !!

- Overuse and small repetitive movem ie: CTD, RSI, MSD disturb balance of muscles, tendons, ligaments and nerves
- Brachial plexus: nerve group that supply muscles and skin of UE, course down side of front of neck and become median, ulnar and radial nerves.
- Nerves send signals to muscles to contract
- When nerve compressed feel sensation somewhere b/w point of compression and fingertips

## WHAT CAUSES NERVE COMPRESSION OR ENTRAPMENT?

1) Repeated motions
2) Tight muscles
3) Inflammation of surrounding tissues
4) Misalignment of the nerve

## WHAT ARE 4 COMMON NERVE INJURIES?

I. Thoracic Outlet Syndrome: brachial plexus compression d/t muscle tightness side of neck from poor head position or slumped posture.

S/Sx: numbness/tingling in hand, made worse w/overhead activities or cradling phone b/w ear and shoulder

## NERVE INJURIES (CONT)

II. Radial tunnel syndrome: compressed radial nerve @ outside of elbow d/t repetitive wrist & finger extension or turning of forearm

S/Sx: Sensations from elbow to base of thumb w/ wrist weakness a common sx

## NERVE INJURIES (CONT)

III. Cubital tunnel syndrome: ulnar nerve compression inside of the elbow d/t repetitive bending of elbow or *resting your elbow* on a hard surface

S/Sx: numbness or tingling and inside of arm w/ tingling to ring & little fingers

## NERVE INJURIES (CONT)

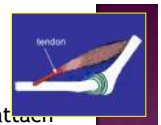
IV. Carpal tunnel syndrome: compres of median nerve at level of carpal tunnel

Where is carpal tunnel? Formed @ wrist by ligament over the carpal bones in hand

S/Sx: numbness or tingling in thumb, index, or middle finger & ½ of ring finger; often awakened @ night by hand "falling asleep"

Sx increased by driving or attempting to hold objects; dropping objects is a common complaint

## TENDONS AND TENDONITIS

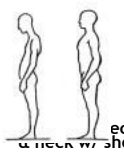



- Tendons are connective tissue that attach muscle to bone; have little stretch or rebound
- Tendon overuse, static or prolonged position=inflammation or tendonitis
- Tendons of wrist & hand very small; @ high risk for injury w/ overuse
- "Tennis elbow" or lateral epicondylitis affects *finger extensor* tendons outside of elbow
- "Golfer's elbow" or medical epicondylitis affects finger flexor tendons inside of elbow

## WHAT TO DO ??

### PREVENT, PREVENT, PREVENT !!!

a) Warm up & stretch before activities that are repetitive, static or prolonged
b) Take *frequent breaks* from ANY sustained posture every 20-30 minutes
c) Respect pain- positions or stop painful activity
d) Recognize early signs of inflammatory process, & tx early



Maintain Neutral Posture

a) ect position of back & neck w/ shoulders relaxed
b) Position equipment & work directly in front of and close to your major tasks
c) Keep upper arms close to the body, elbows 90-100 degrees
d) Keep feet flat on floor, upper body weight resting on "sits bones"
e) Wrists as neutral as possible; safe zone for wrist movement is 15 degrees in all directions

You talking to me?

f) Avoid bending neck forward for prolonged periods of time (*remember *quadruple* the force); use a copy holder
g) Avoid static positions for prolonged time; muscles fatigue---MOVE to circulation!

## MODIFY TASKS:

a) Alternate activities frequently; rotate heavy &/or repetitive tasks w/ lighter less repetitive ones.
b) If sx become worse *REASSESS* task setup & look for alternative methods
c) Avoid repetitive or prolonged grip activities
d) Avoid pinching w/ wrist in flexion or wrist deviation (bending to side)
e) Take *frequent breaks* to stretch & rest hands


## Body Mechanics

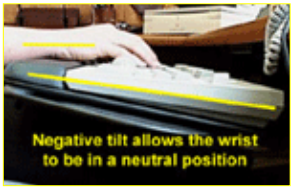
- Use the largest joints & muscles to do the job
- Use 2 hands to lift rather than one, even with light objects and tasks.
- Avoid lifting w/ the forearm in full pronation (palm down) or supination (palm up)
- Slide or push & pull objects instead of lifting
- Keep reaching to a minimum
- Carry objects close to body at waist level

## CORRECT & INCORRECT TECHNIQUES

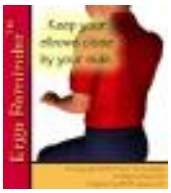

Correct lifting technique


Incorrect lifting technique

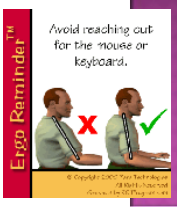

## GOOD AND BAD OF " TILT"




## ERGO REMINDERS from Stretchbreak.com








Practice Wellness at Work and Home !

**Exercise**

Body

**Nutrition**

Mind

**Relaxation**

Spirit

**MOVE**


**STRETCH**


**BREATHE**

# AN OUNCE OF PREVENTION IS WORTH A POUND OF CURE !