Office Ergonomics:

All About the Basics

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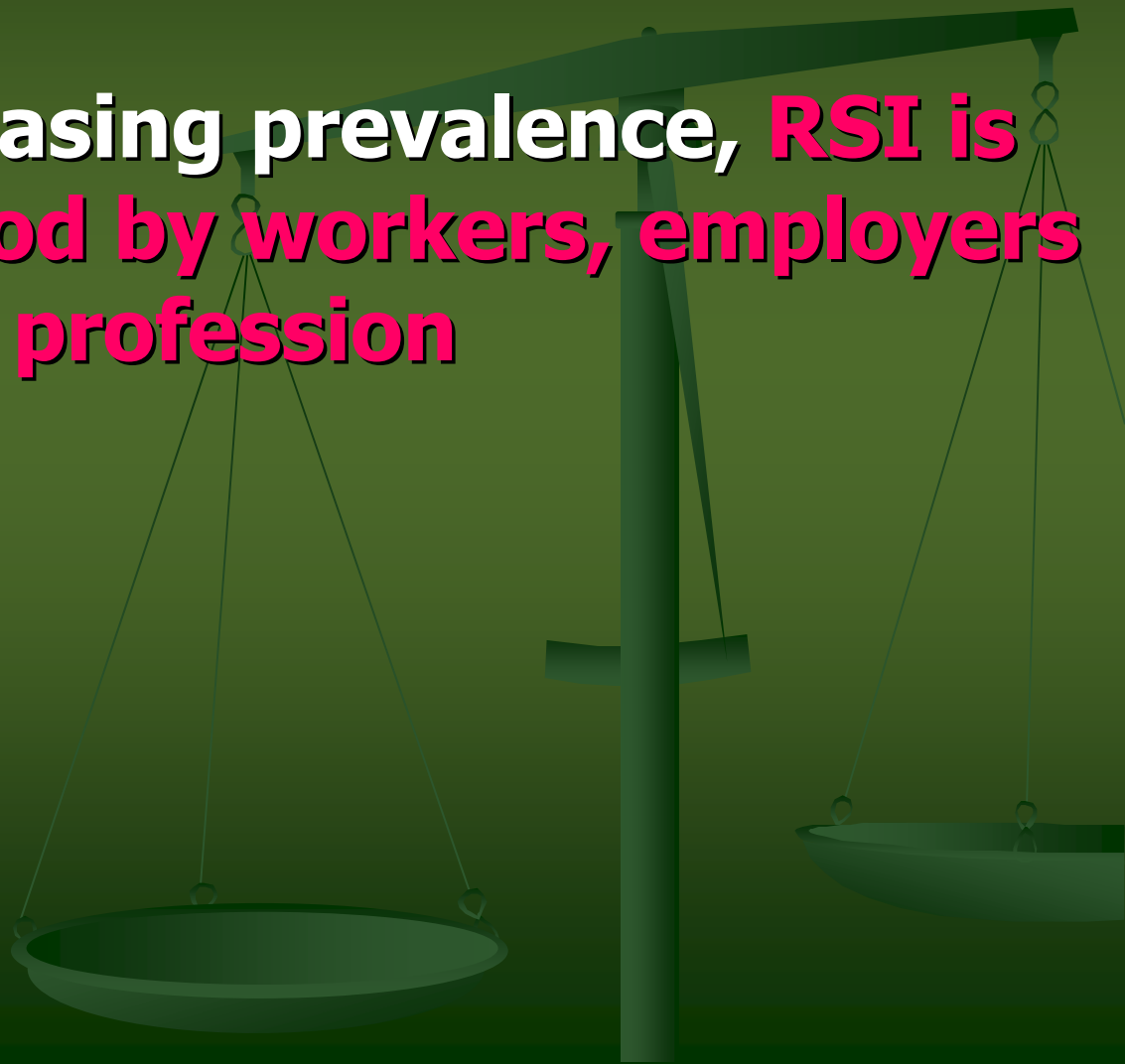
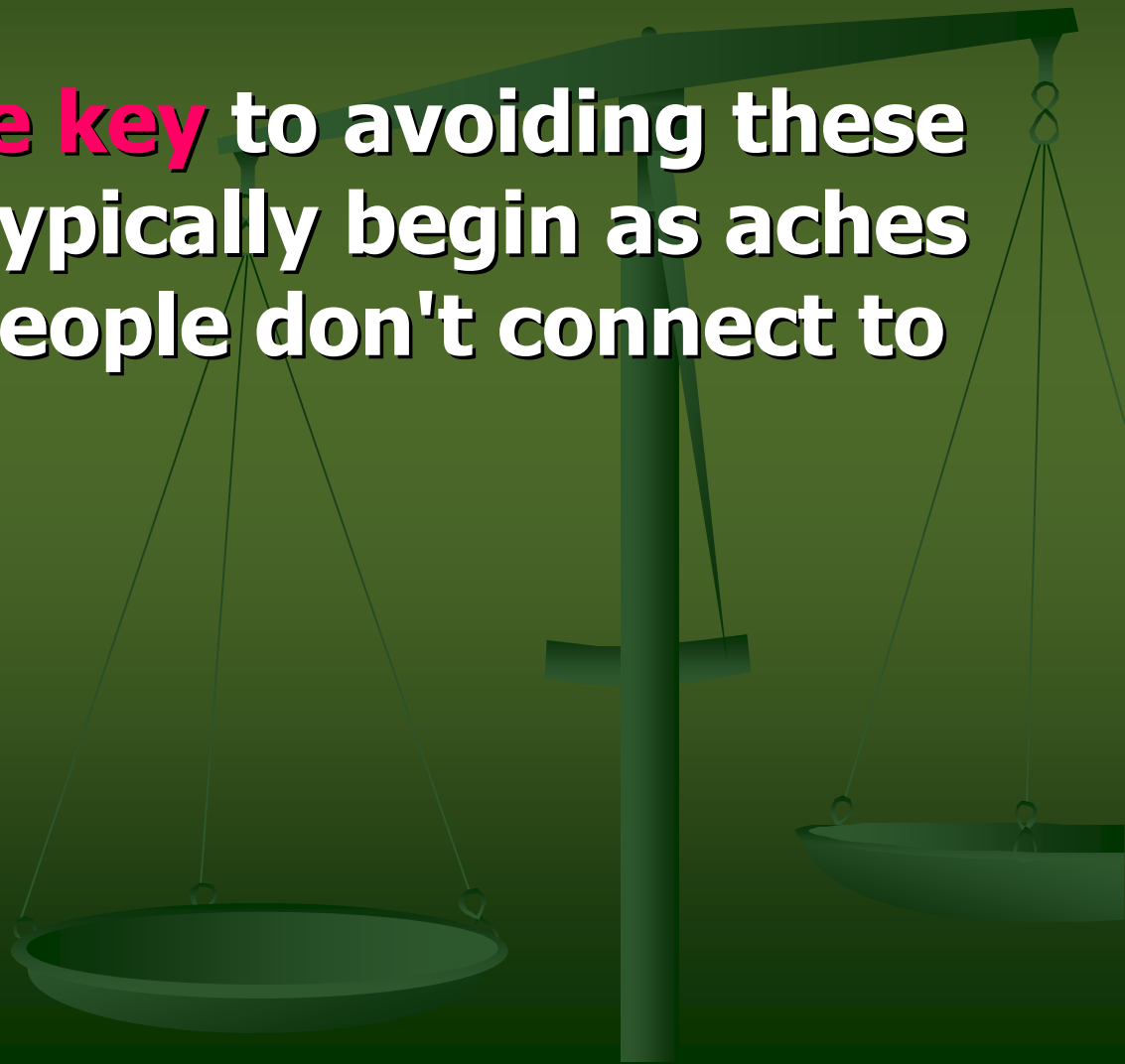
- **Repetitive Strain Injury** (RSI) is an umbrella term for a number of overuse injuries affecting tissues (muscles, tendons, nerves and bones) of the neck, upper and lower back, chest, shoulders, arms and hands, **"caused" by a variety of factors including repetition, force, and awkward or static postures**

- **RSI is a significant occupational health concern in Canada. Statistics Canada estimates that nearly 2 million Canadians suffer from these disabling injuries and the numbers continue to rise**

- **Despite its increasing prevalence, RSI is poorly understood by workers, employers and the medical profession**



- **Prevention is the key** to avoiding these injuries, which typically begin as aches and pains that people don't connect to their jobs

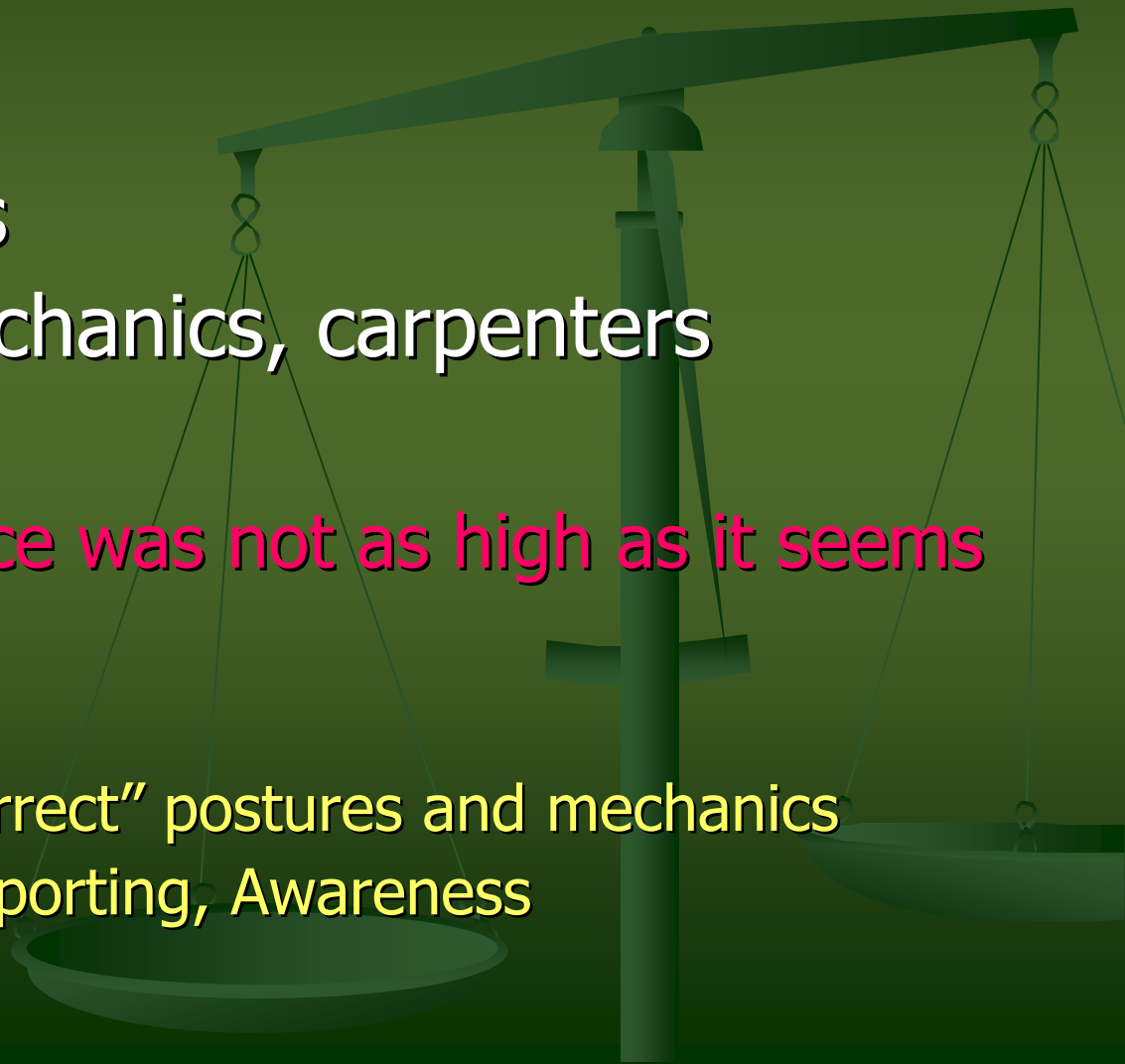


- **Early intervention is critical** in keeping these injuries from progressing to permanent disorders, which prevent their sufferers from working or leading normal lives.

- There is a strong need to raise public awareness about RSI to prevent further injuries and to promote understanding and acceptance for those with RSI.

Are repetitive strain injuries something new?

- Musicians
- Clerical Workers
- Labourers – mechanics, carpenters

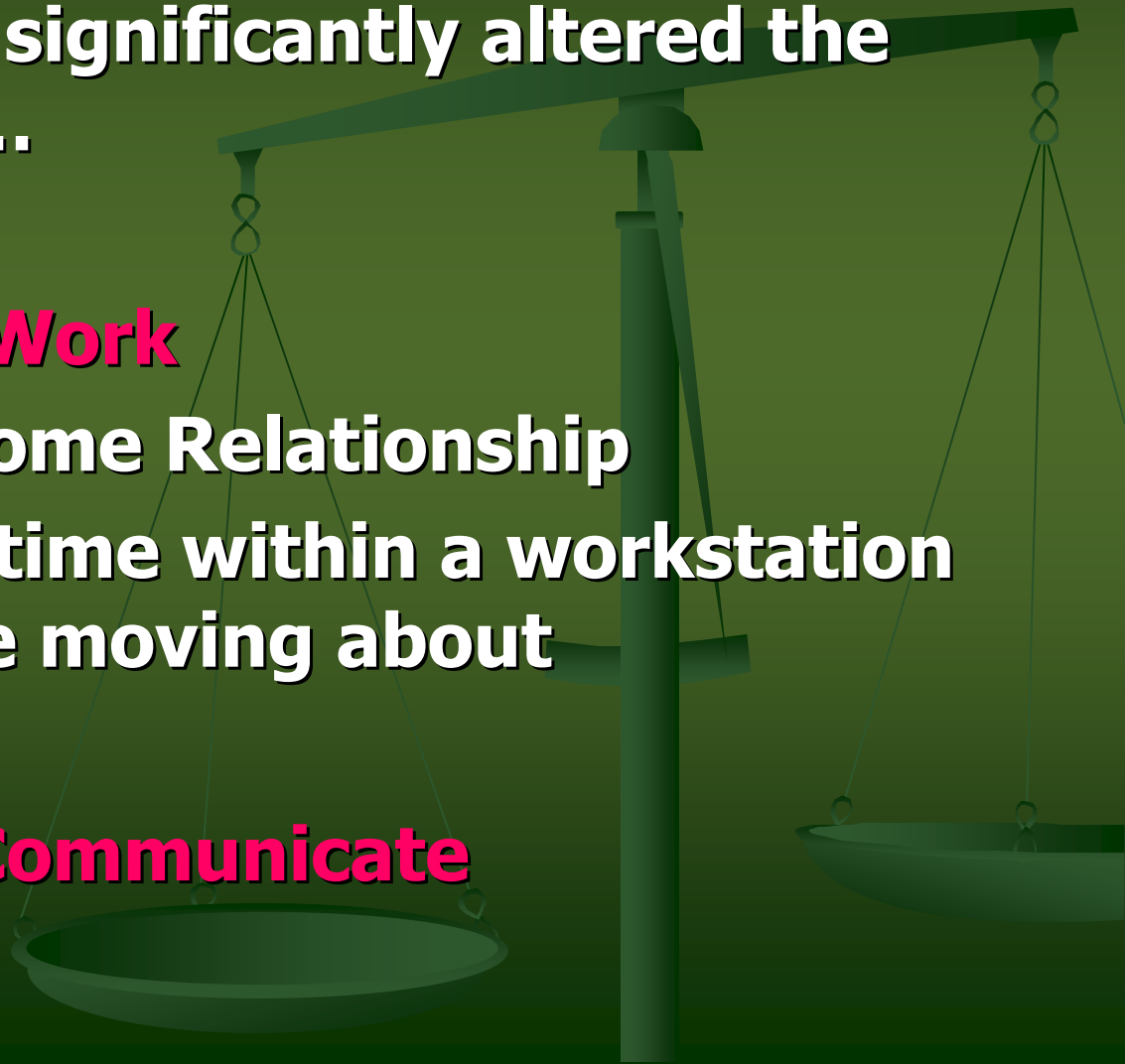


  - But the incidence was not as high as it seems to be today!

    - Taught the "correct" postures and mechanics
    - Diagnosing, Reporting, Awareness

The Information Age

- **The accelerated development of various technologies has significantly altered the fabric of Society…**
  - **How Humans Work**
    - **Office and Home Relationship**
    - **Spend more time within a workstation and less time moving about**
  - **How Humans Communicate**



- We are spending too much time
  - keeping up with the technological advances
  - and the workload demands…
- And FORGETTING ABOUT THE BASICS!

Education is the Key!

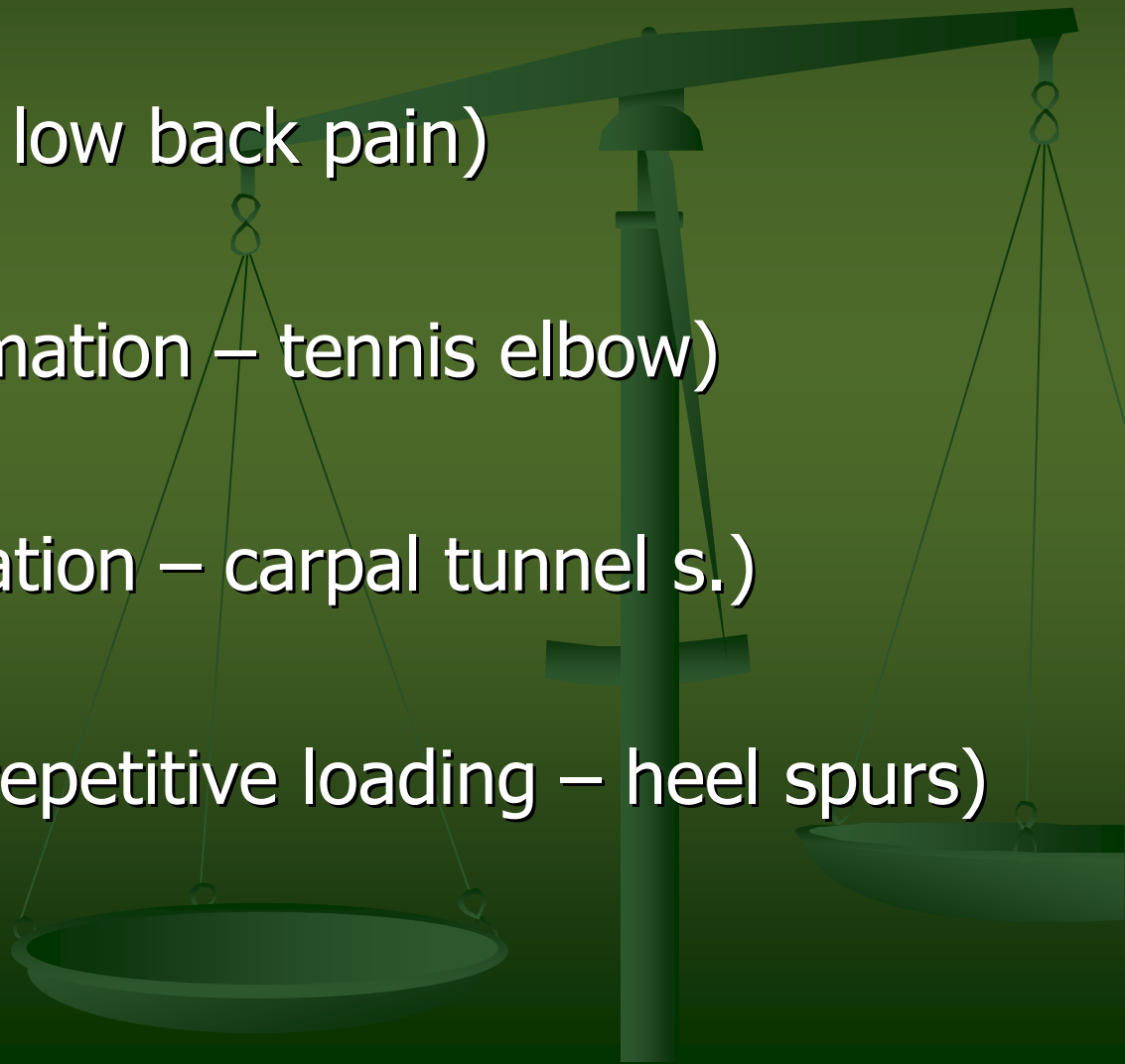
What we should know…

- Anatomy
- Posture
- Workstation
- Repetition
- Individual

ANATOMY

(EYES)
NECK
BACK
SHOULDERS
ELBOWS
WRIST

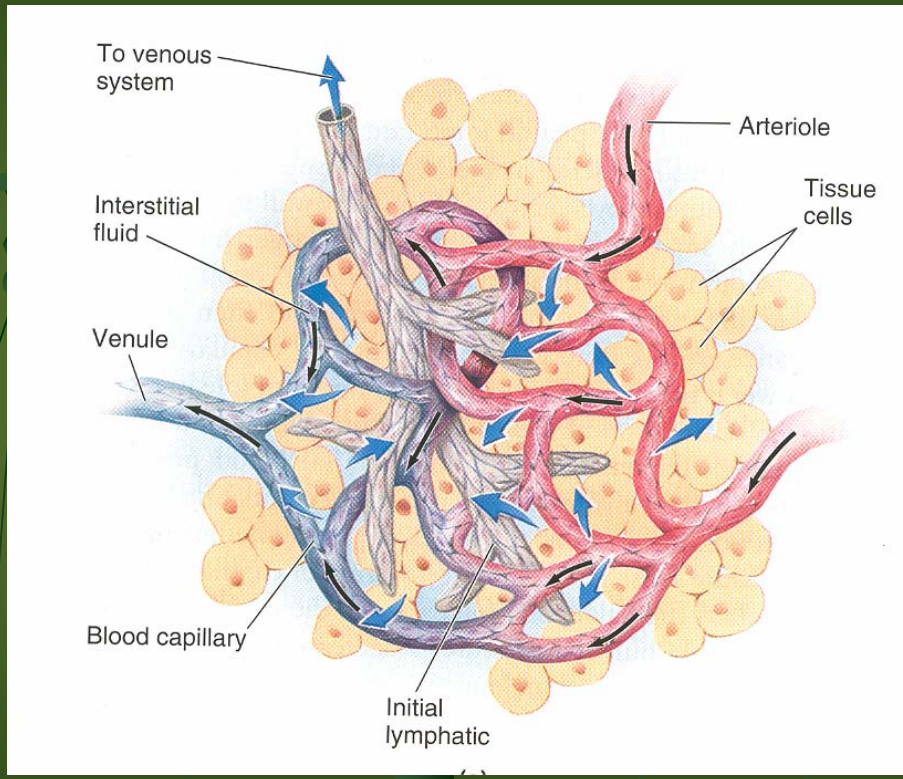
What is actually hurting me?



- Muscles (strain – low back pain)
- Tendons (inflammation – tennis elbow)
- Nerves (inflammation – carpal tunnel s.)
- Skeletal Tissue (repetitive loading – heel spurs)

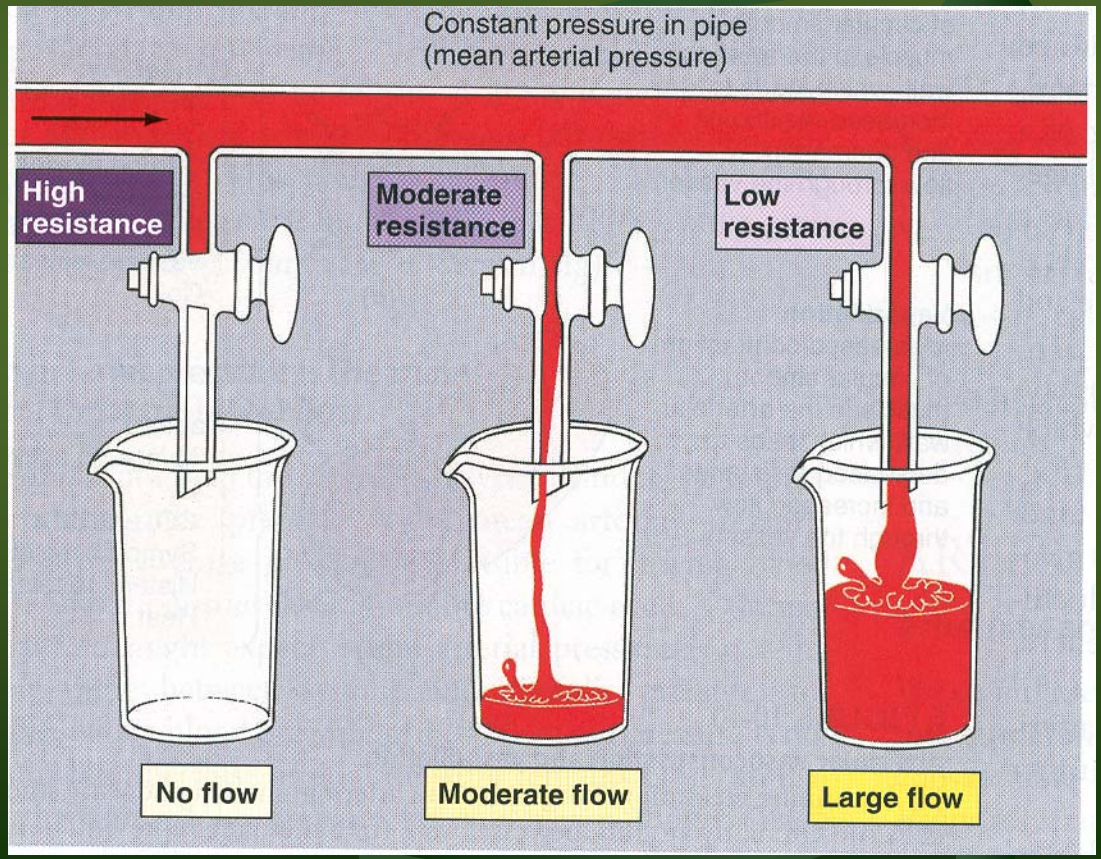
Muscle Function

- Muscles require chemical energy from sugars (and in some cases oxygen) in order to contract
- Produce by-products such as lactic acid
- Blood circulation assists in these processes



Muscle Function

- A muscle contraction that lasts a long time reduces the blood flow *(like a blood pressure cuff)*

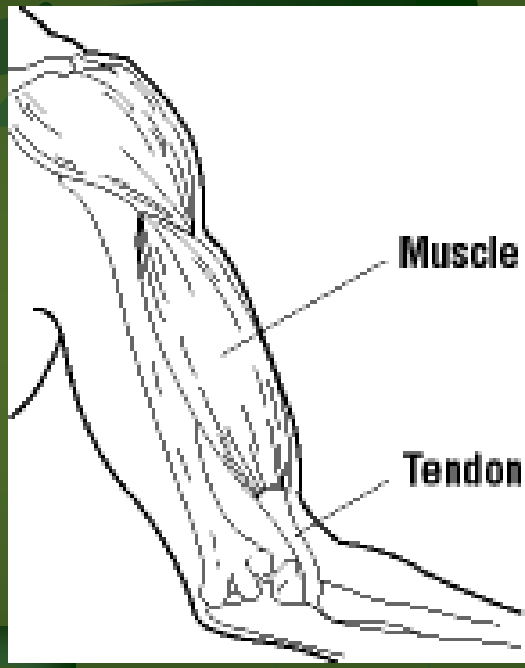


Muscle Function

- Consequently, the substances produced by the muscles are not removed fast enough, and they accumulate.
- The accumulation of these substances irritates muscles and causes pain.
- The severity of the pain depends on:
  - the duration of the muscle contractions
  - the amount of time between activities for the muscles to get rid of those irritating substances.

Tendons

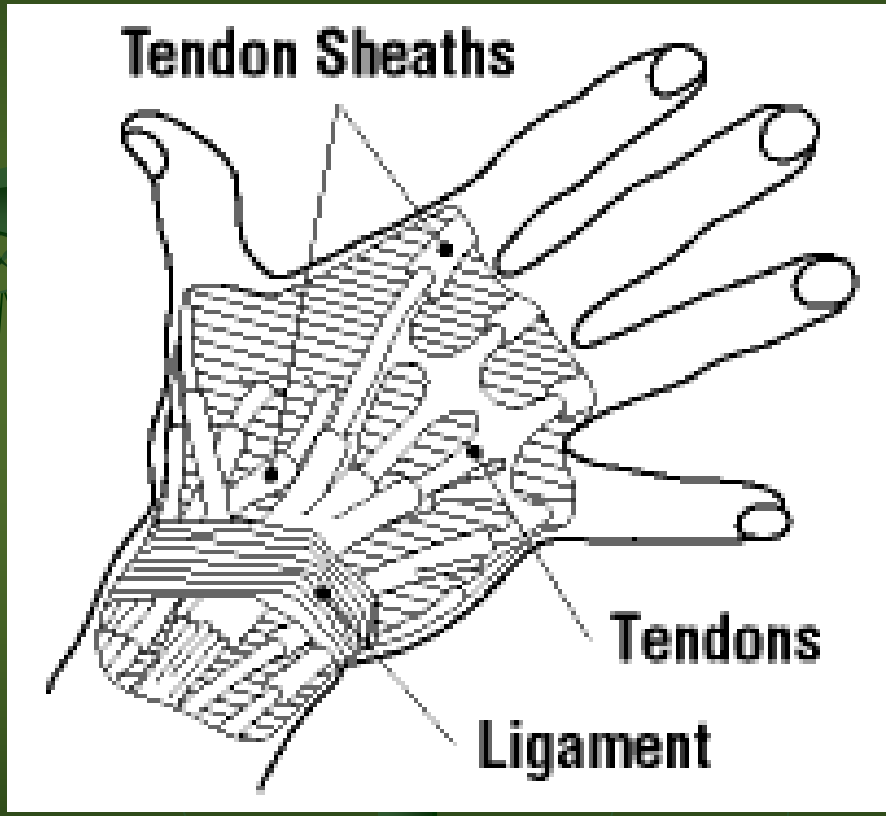
- **Tendons consist of numerous bundles of fibres that attach muscles to bones.**
- **Tendon disorders occur in two major categories:**
  - **Tendons with sheaths (found mainly in the hand and wrist).**
  - **Tendons without sheaths (generally found around the shoulder, elbow, and forearm)**



Tendon Sheath Injuries

- The inner walls of the sheaths contain cells that produce a slippery fluid to lubricate the tendon.

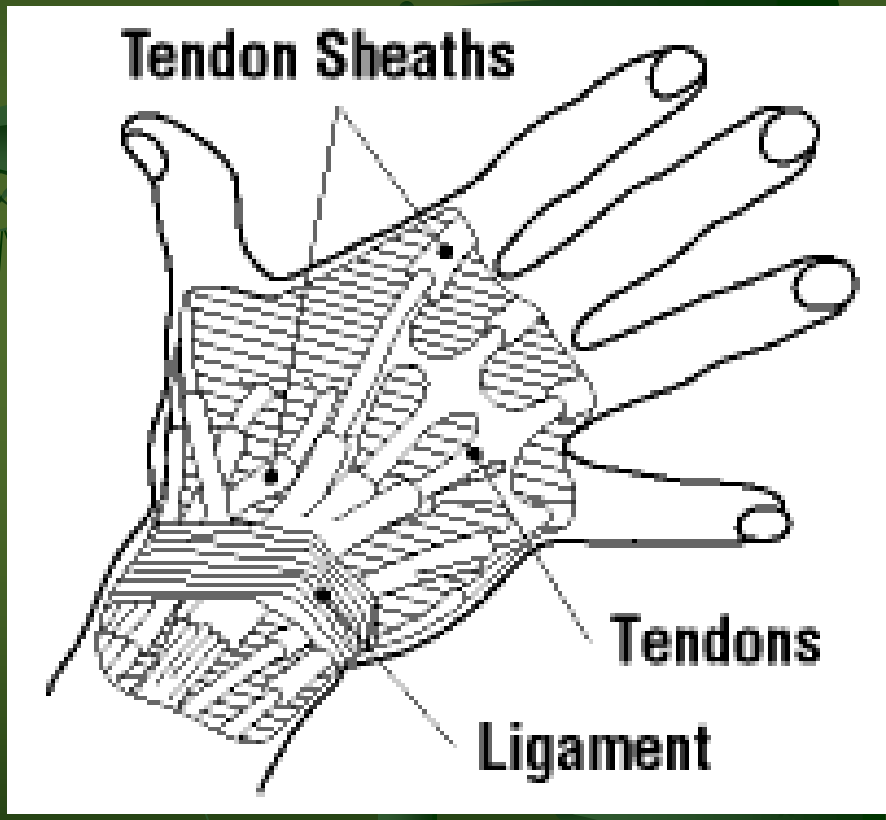
- With repetitive or excessive movement of the hand, the lubrication system may malfunction
  - not produce enough fluid
  - may produce a fluid with poor lubricating qualities.



Tendon Sheath Injuries

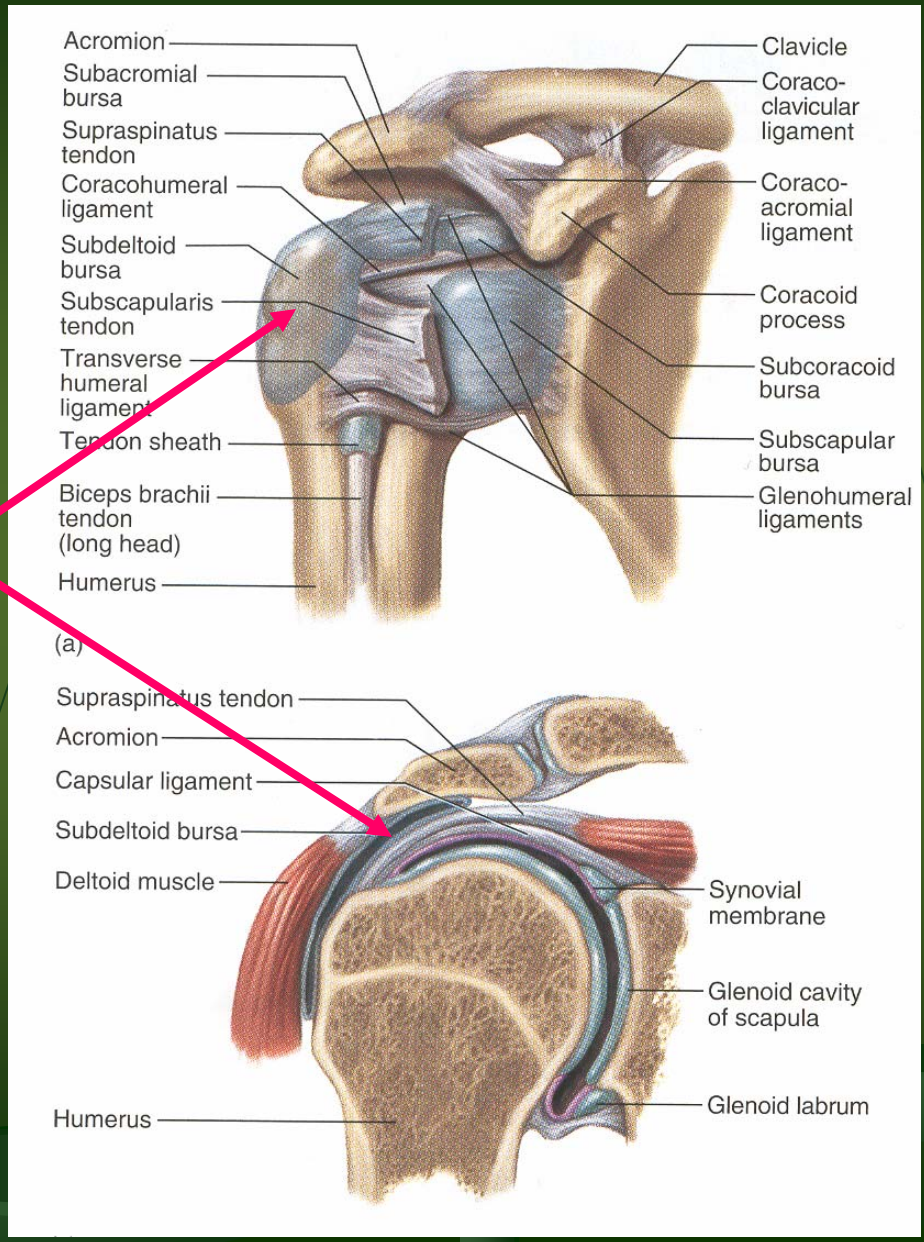
Failure of the lubricating system creates friction between the tendon and its sheath, causing inflammation and swelling of the tendon area.

- Repeated episodes of inflammation cause fibrous tissue to form.
- The fibrous tissue thickens the tendon sheath, and hinders tendon movement.
- Inflammation of the tendon sheath is known as tenosynovitis.
- When inflamed, a tendon sheath may swell up with lubricating fluid and cause a bump under the skin. This is referred to as a ganglion cyst.



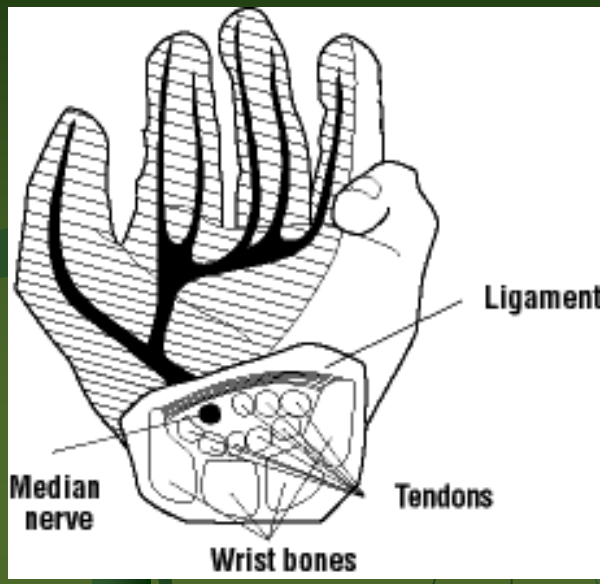
Tendons Without Sheath Injuries

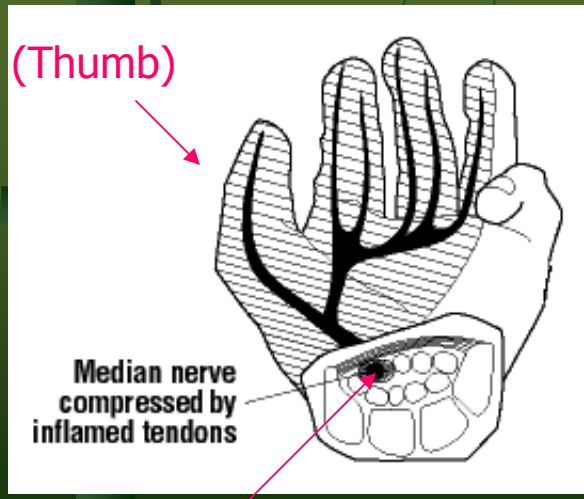
- When a tendon is repeatedly tensed, some of its fibres can tear apart. The tendon becomes thickened and bumpy, causing inflammation.
- Tendons pass through a narrow space between bones.
- A sac called the bursa filled with lubricating fluid is inserted between the tendons and the bones as an anti-friction device.
- As the tendons become increasingly thickened and bumpy, the bursa is subject to a lot of friction and becomes inflamed.
- Inflammation of the bursa is known as **bursitis**.



Nerves

- Nerves carry signals from the brain to control activities of muscles.
- They also carry information about temperature, pain and touch from the body to the brain, and control bodily functions such as sweating and salivation.
- Nerves are surrounded by muscles, tendons, and ligaments.
- With repetitive motions and awkward postures, the tissues surrounding nerves become swollen, and squeeze or compress nerves.
- Compression of a nerve causes muscle weakness, sensations of "pins and needles" and numbness. Dryness of skin, and poor circulation to the extremities, may also occur.

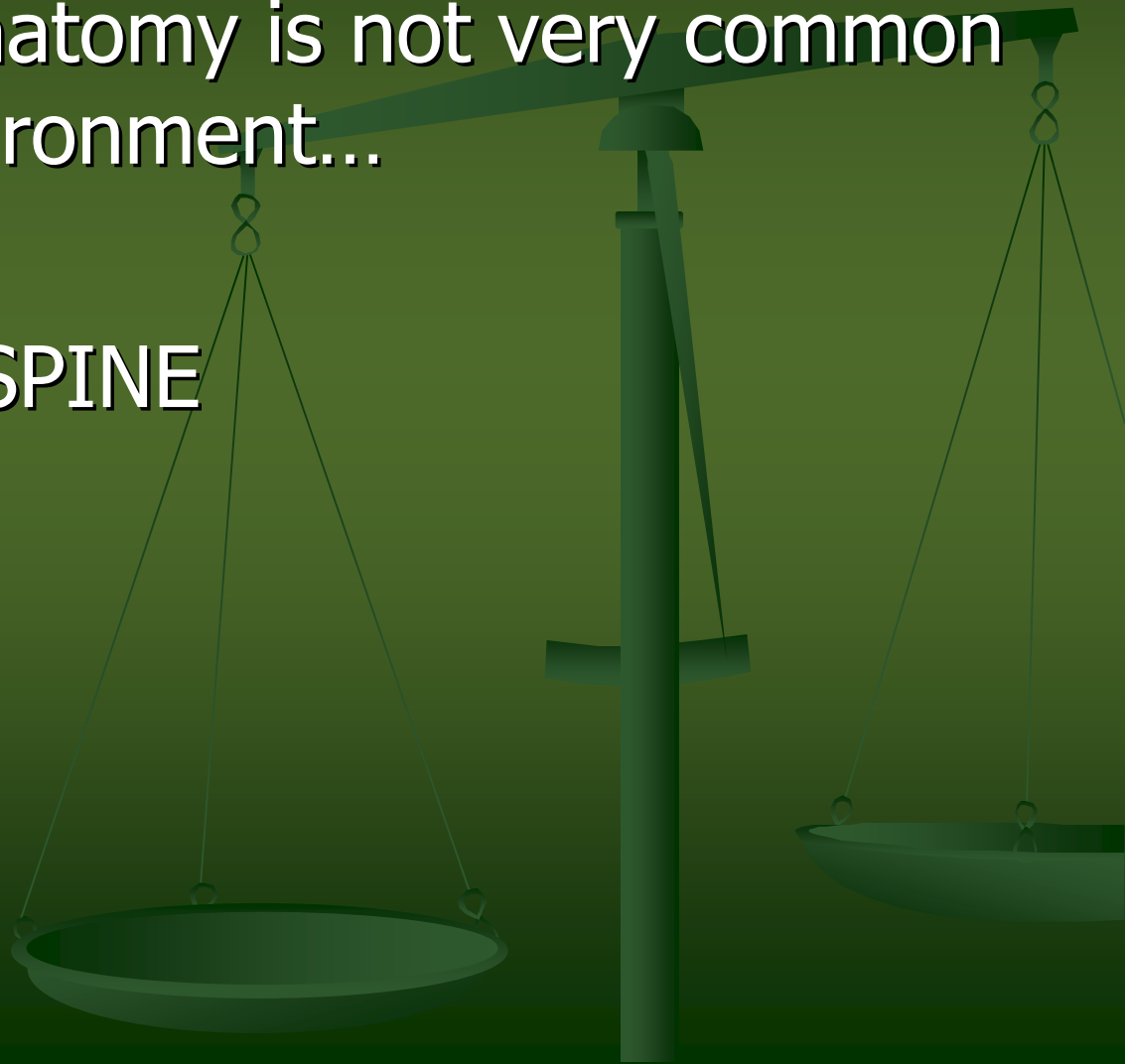




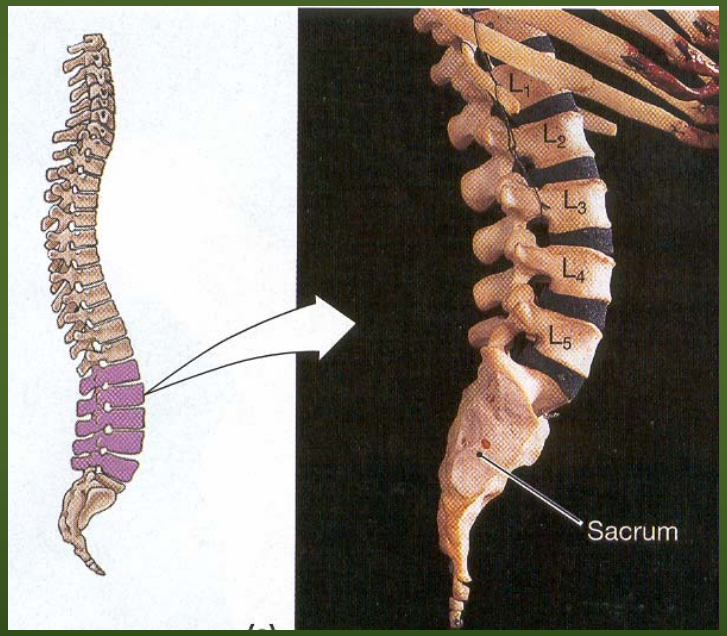
Carpal Tunnel

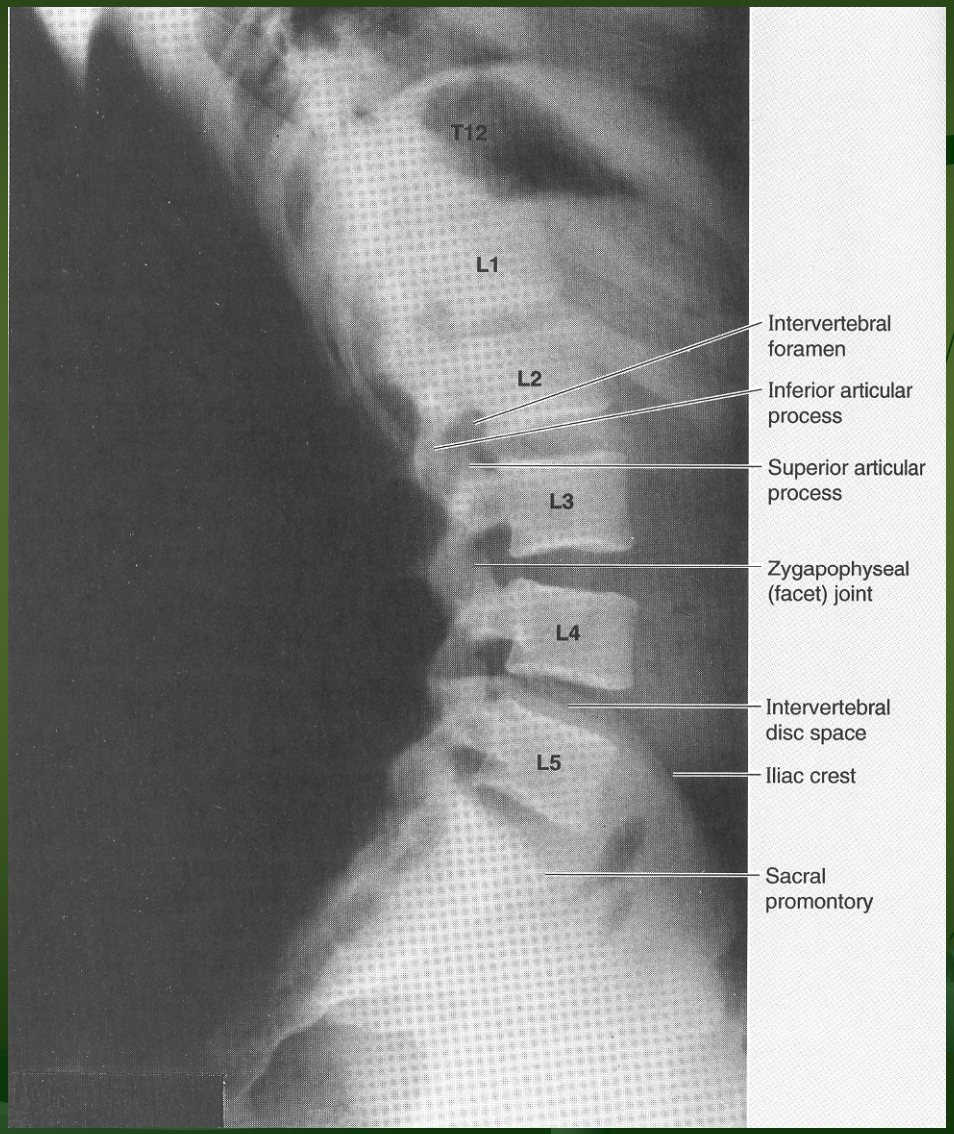
Bones

- Injury to this anatomy is not very common in an office environment…
- EXCEPT to the SPINE

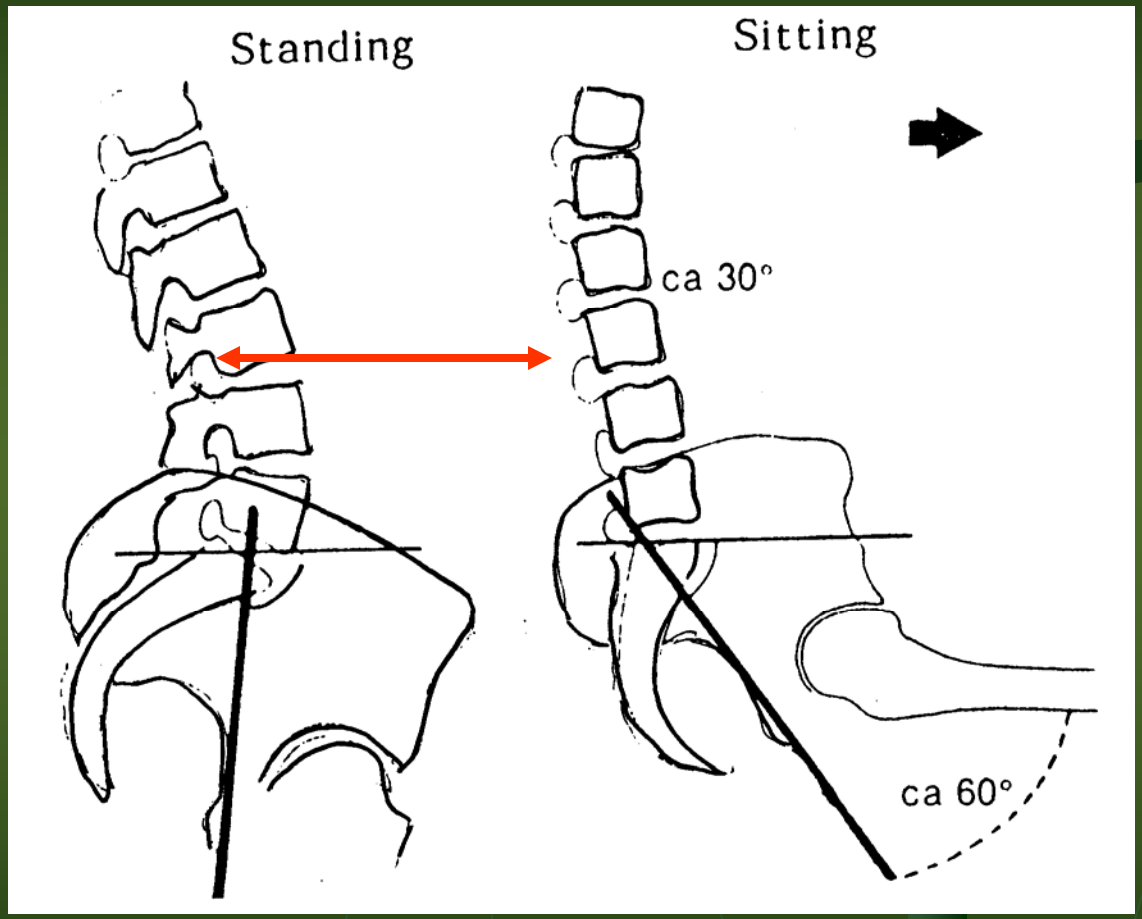


The Spine
(lots of bones, muscles, tendons, bursae, nerves!)





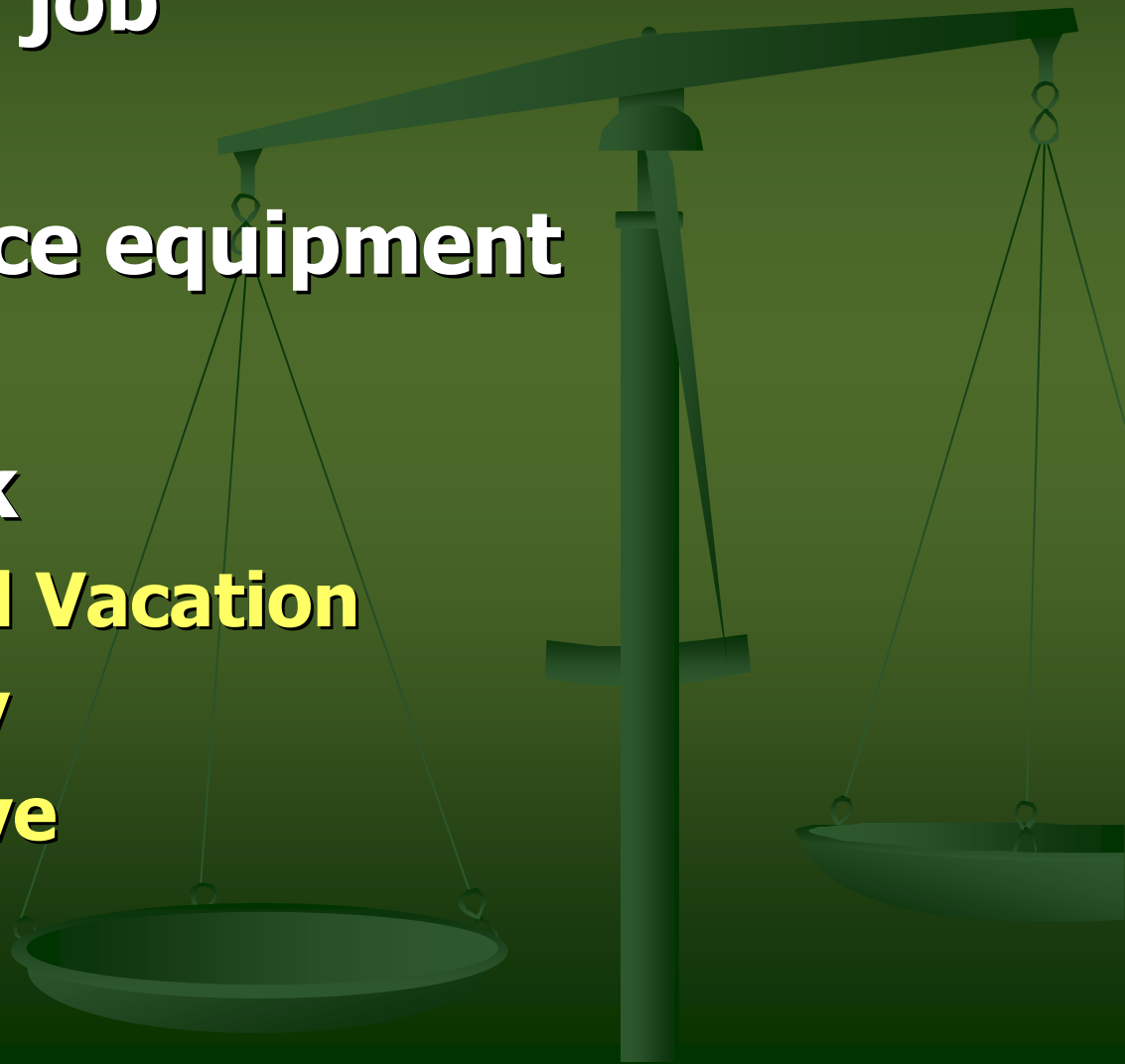
What does sitting do to the spine?



Changes the curvature of the lumbar spine (flattening of about 30 degrees)

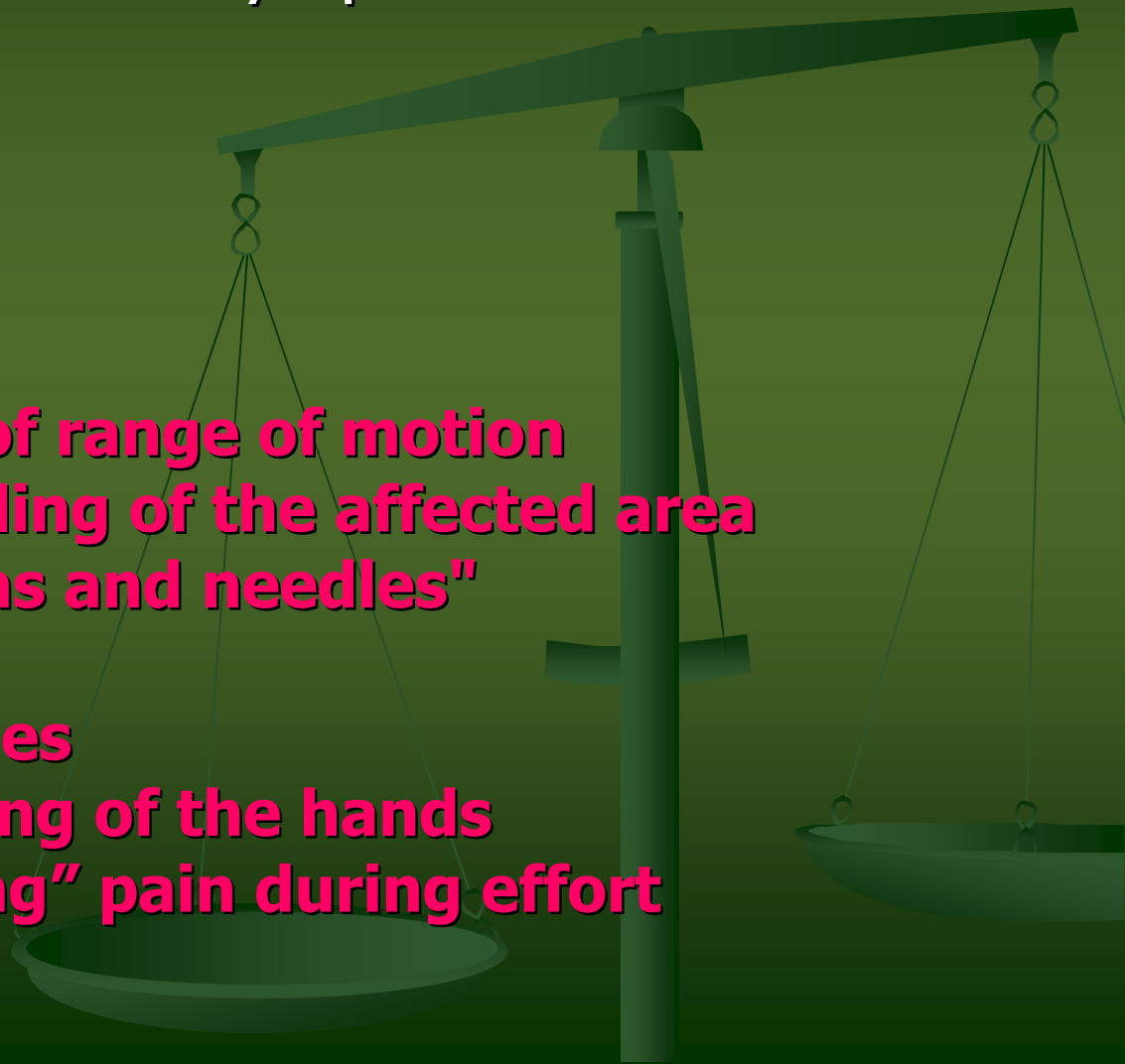
When do RSI's Appear?

- Starting a new job
- Using new office equipment
- Return to work
  - After Extended Vacation
  - After an Injury
  - Maternity Leave



What are the Signs and Symptoms of RSI Injuries?

- Pain is the most common symptom associated with these disorders
  - **joint stiffness**
  - **muscle tightness**
  - **muscle "burning"**
  - **pain at the ends of range of motion**
  - **redness and swelling of the affected area**
  - **sensations of "pins and needles"**
  - **numbness**
  - **skin colour changes**
  - **decreased sweating of the hands**
  - **localized "shooting" pain during effort**



3 Stages of Pain

- **Stage 1**
  - Gradual onset
  - Aching and tiredness of the affected limb occur during the work shift
  - Disappears with rest (overnight, weekend)
  - No reduction of work performance
  - ***WE DON"T WANT TO GET PAST THIS STAGE!***
- **Stage 2**
  - Aching and tiredness occur early in the work shift and persist at night
  - Reduced capacity for repetitive work
  - Rest does not make pain subside
- **Stage 3**
  - Aching, fatigue, and weakness persist at rest
  - Inability to sleep and to perform light duties
  - Medical treatment required

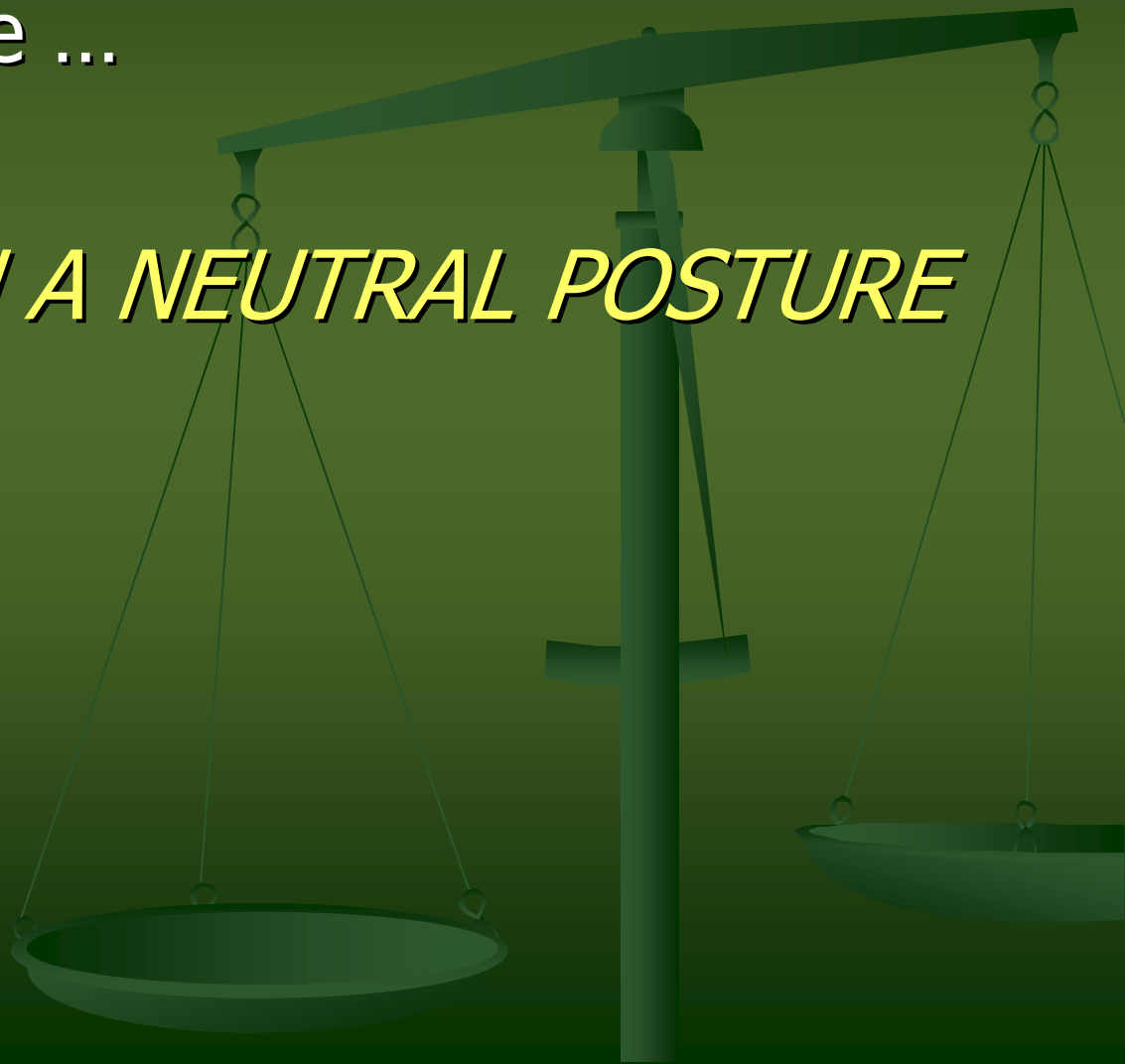
How are RSI's Diagnosed?

- **Evaluation includes identifying workplace risks.**
  - **Evaluation begins with a discussion of the person's employment and requires a detailed description of all the processes involved in a typical workday.**
  - **Consideration is given to the frequency, intensity, duration, and regularity of each task performed at work.**
- **Diagnosis is confirmed by performing laboratory and electronic tests that determine extent of damage.**

POSTURE

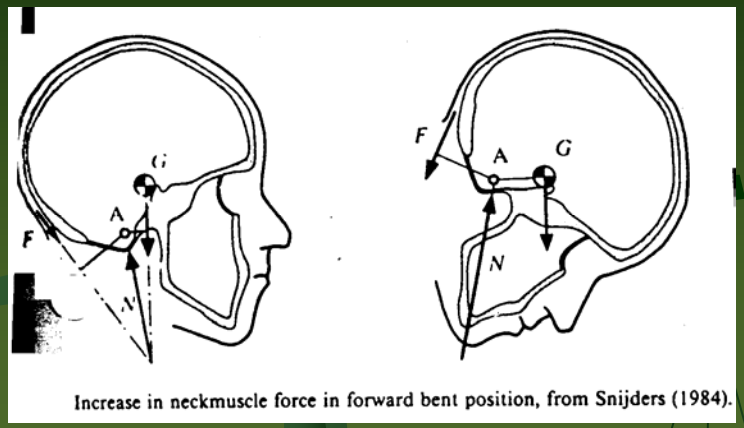
- The Golden Rule …

PUT LIMBS IN A NEUTRAL POSTURE

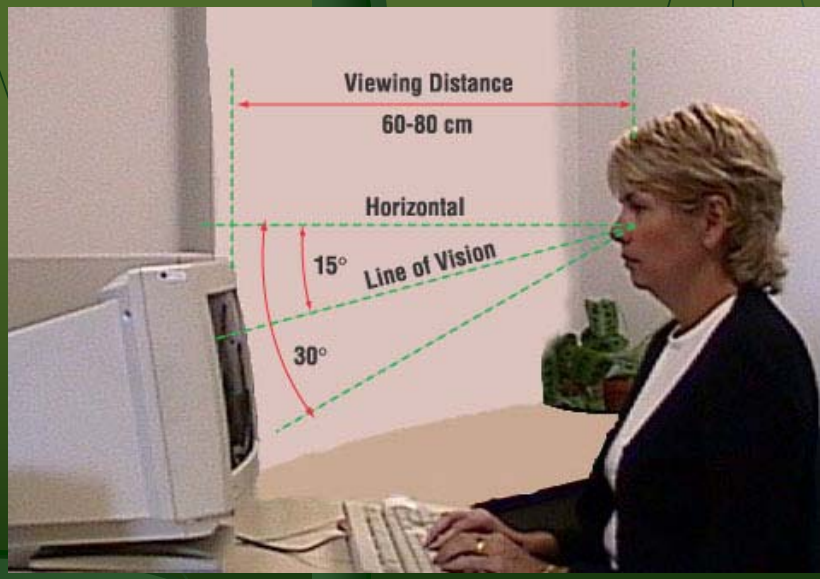


Neck

- Researchers agree that at rest, the eyes naturally assume a straightforward and downward cast.
- Numerous field studies among people doing intense visual work indicate that looking upwards (above the horizontal) is tiring ~ there is an increase in the exposed surface area of the eye causing "dry eye", requiring an increase in the "blink" rate.
- Experimental findings range from about 10 degrees to almost 40 degrees (but research is not conclusive).



Increase in neckmuscle force in forward bent position, from Snijders (1984).

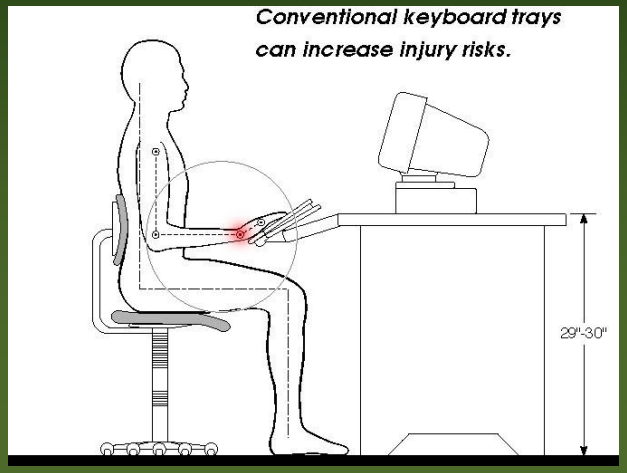


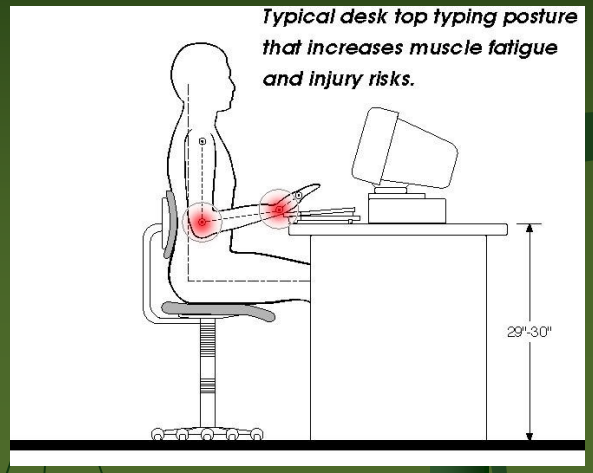
Some Monitor “Warning” Hints

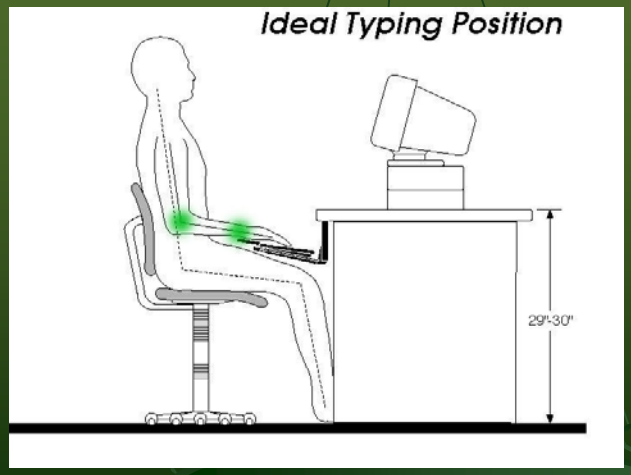
- **Warning one: A high monitor location is a source of discomfort and, in the long run, can cause musculoskeletal problems in the neck and shoulder area.**

- **Warning two: When using a larger monitor (17", 19" or larger) or one that is oriented to the "portrait" position, make sure that the top of the screen is not at a level higher than the operator's eye.**

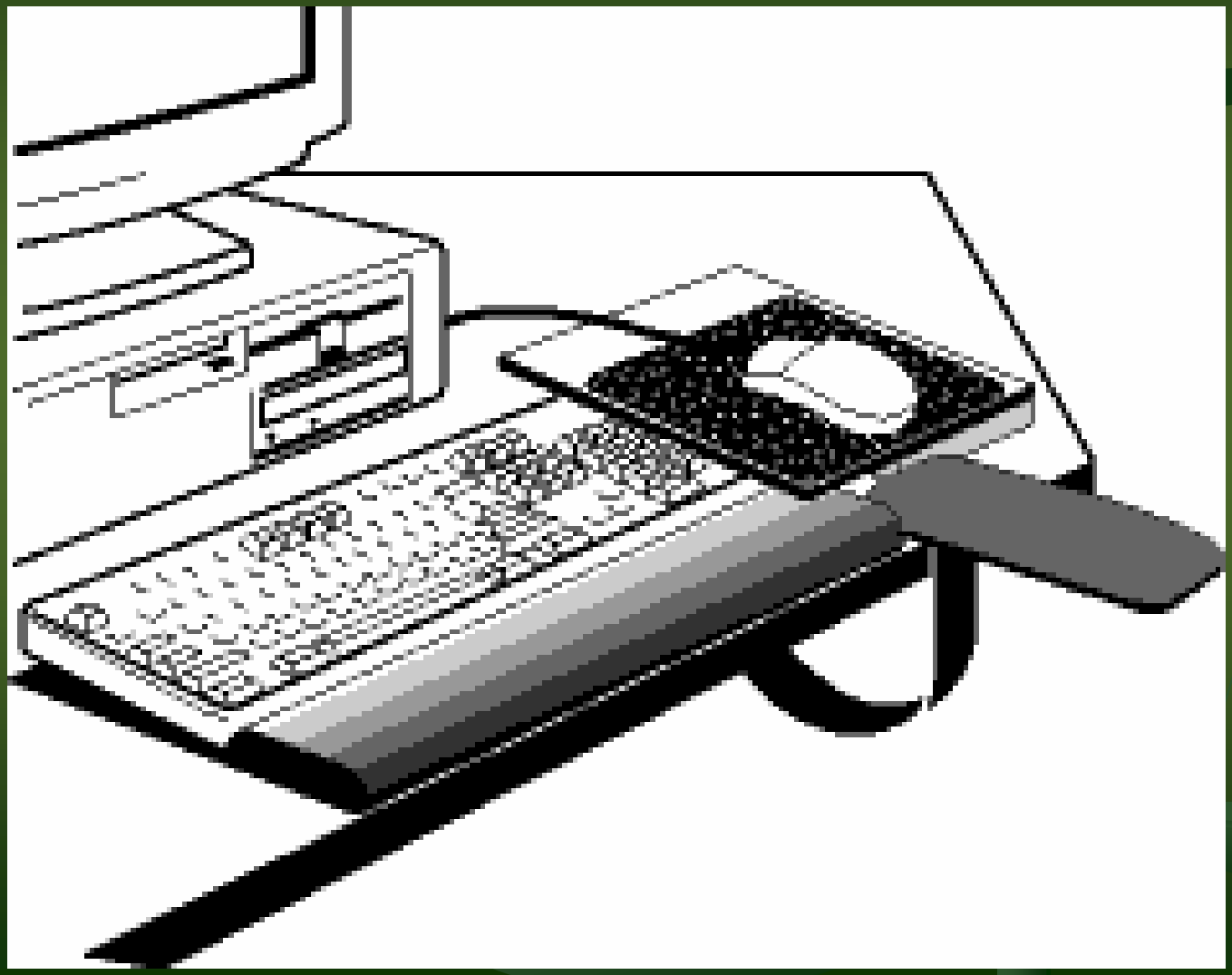
Wrist


Conventional keyboard trays
can increase injury risks.
29"-30"

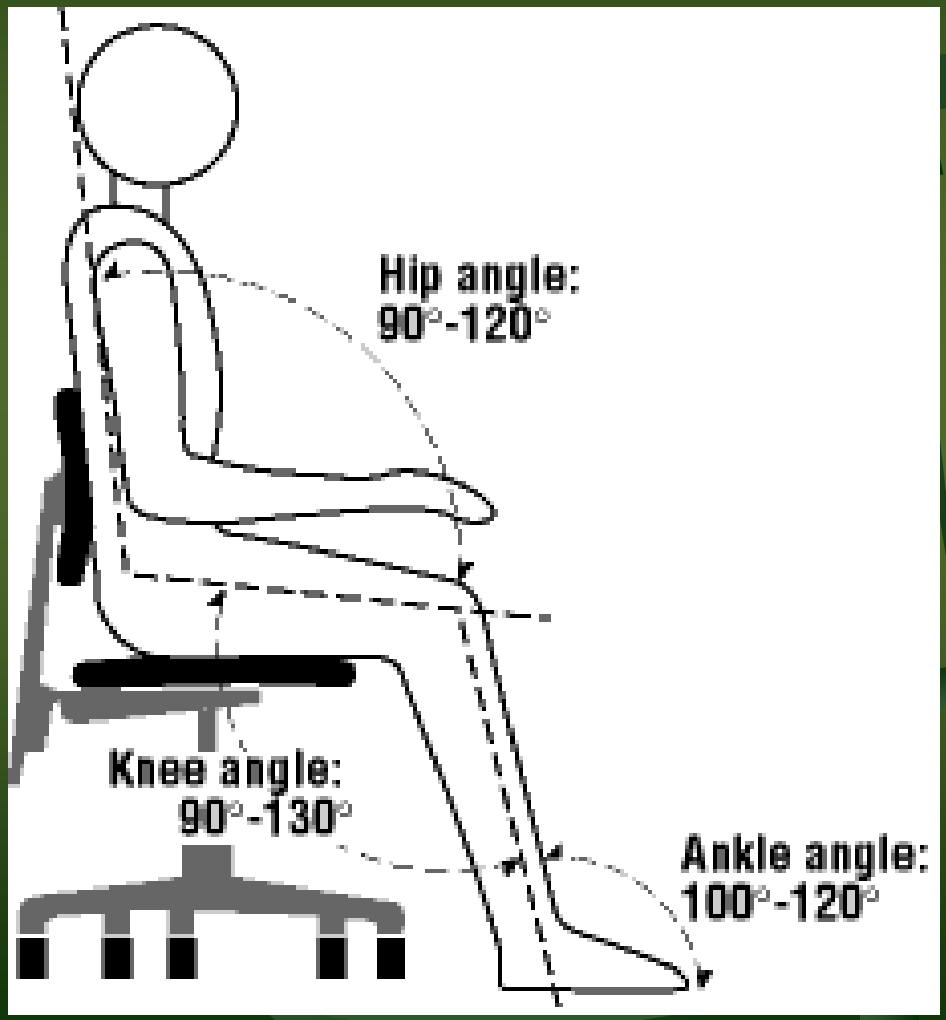

Typical desk top typing posture
that increases muscle fatigue
and injury risks.
29"-30"


Ideal Typing Position
29"-30"

The Mouse~Keyboard Relationship



The Large Body Segments



Workstation Design and Layout

Looking for Complete Adjustability in Office Furniture

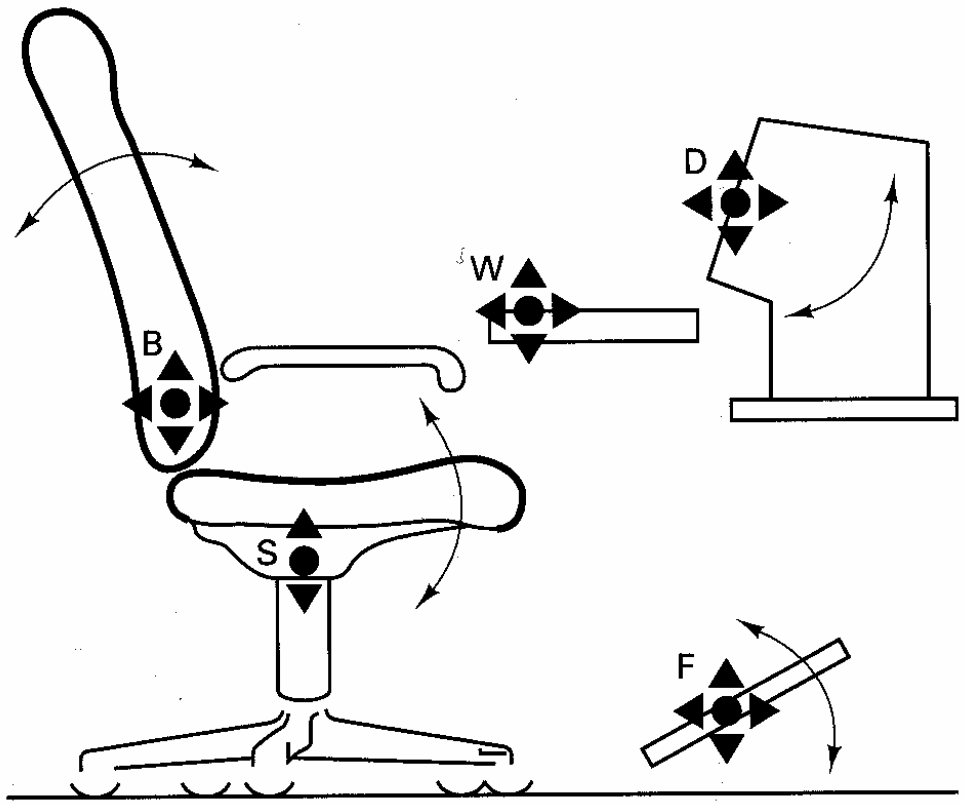
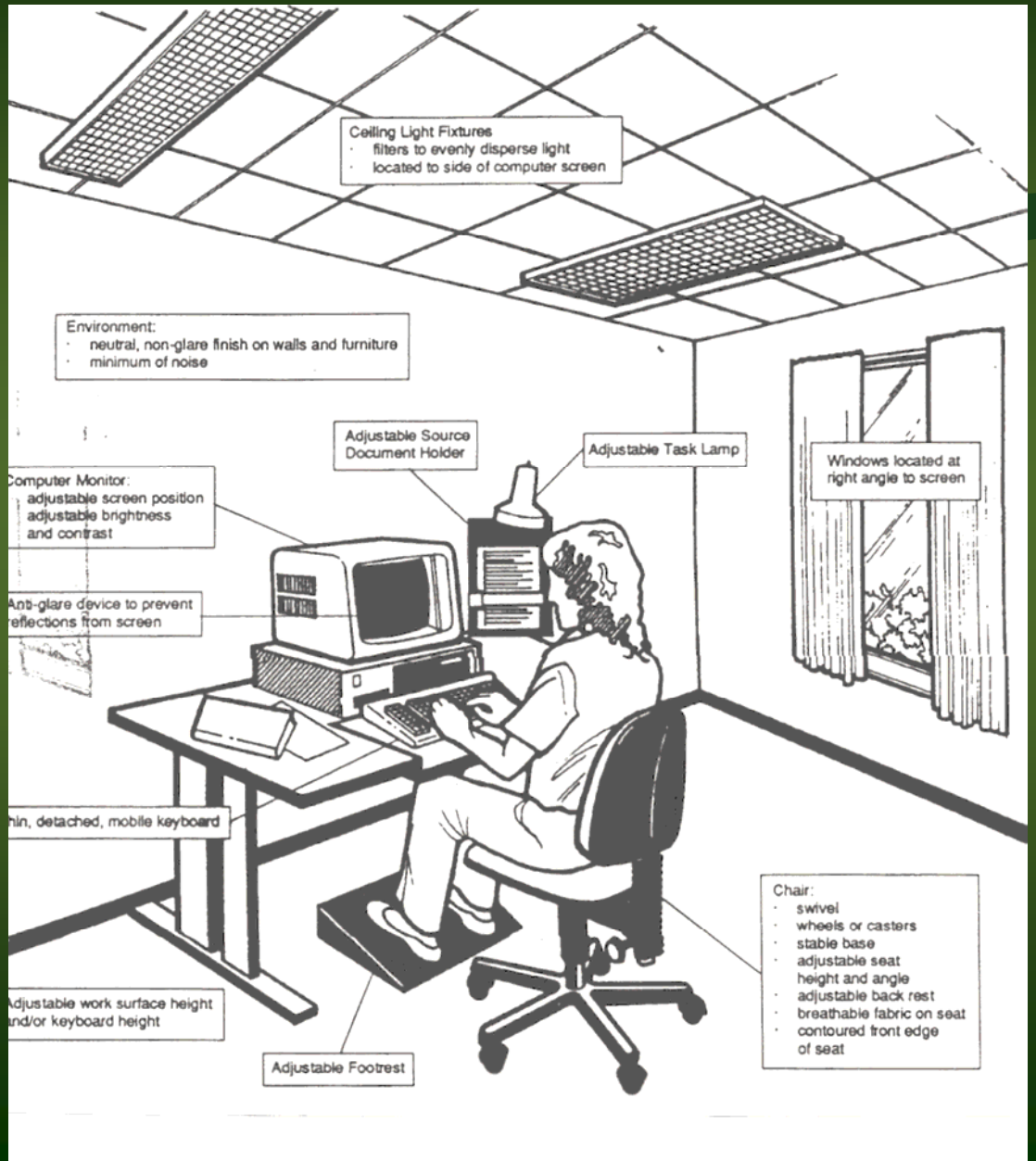
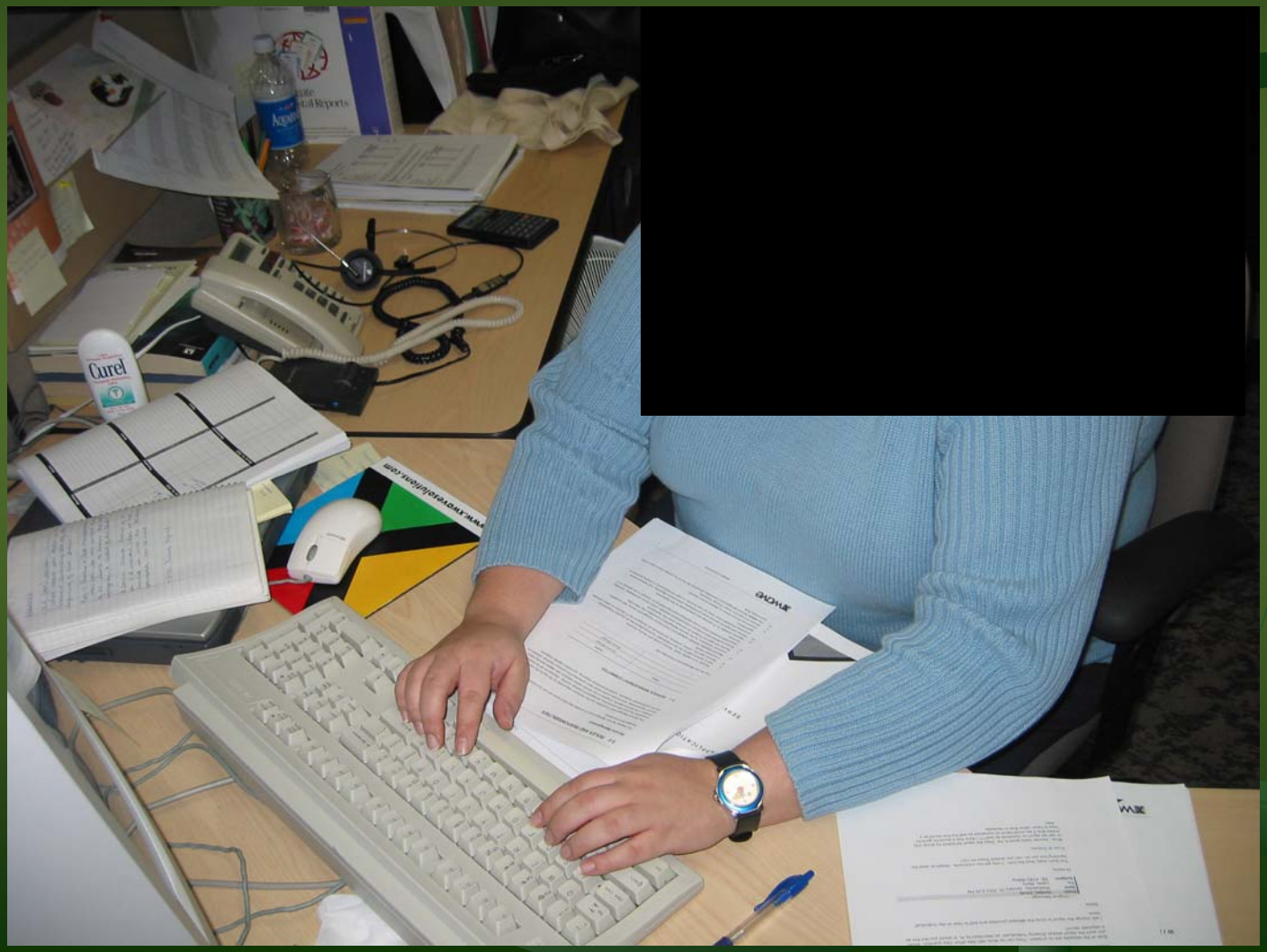


Figure 9–18. Adjustments of the components of a computer workstation.

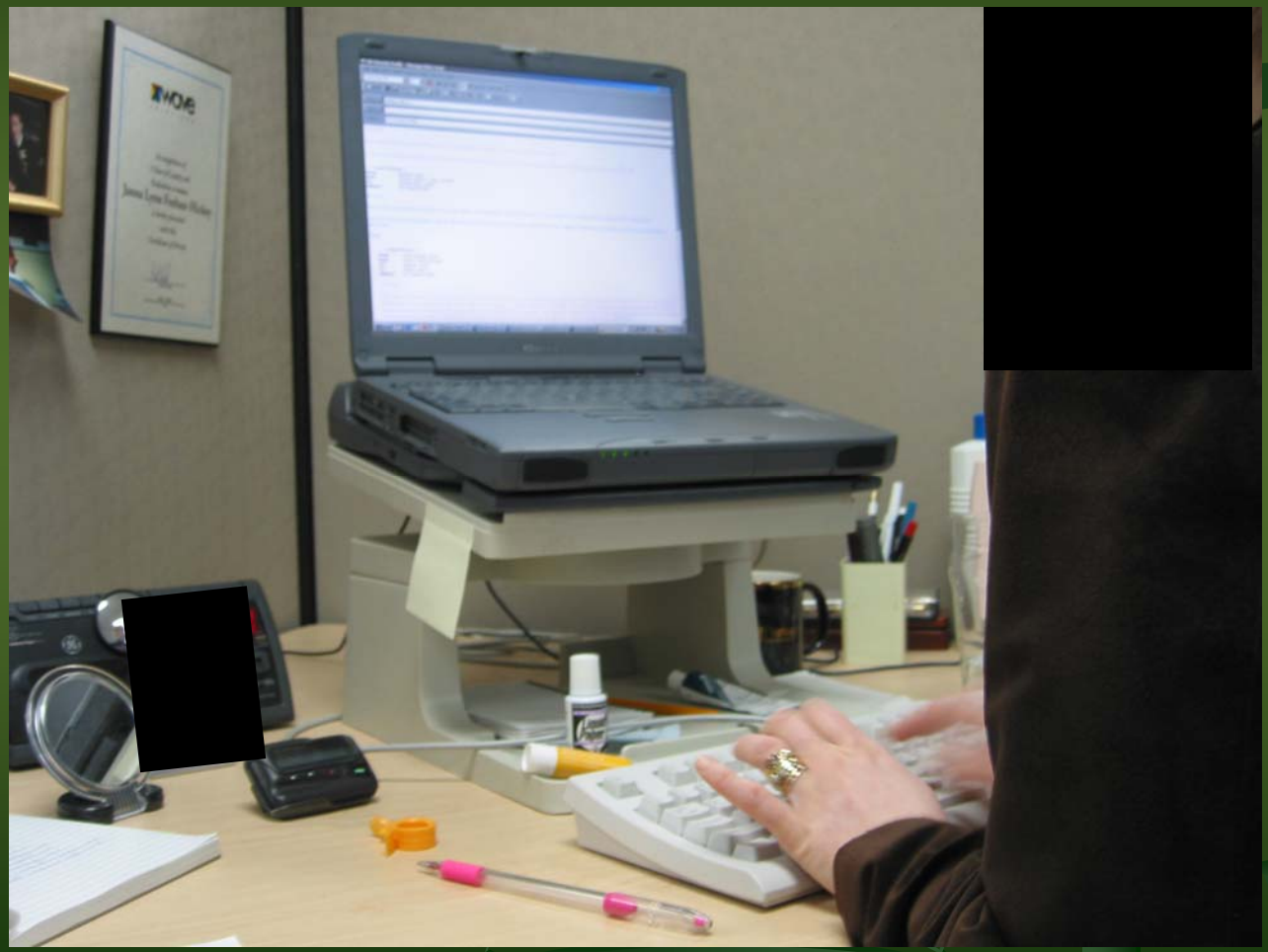
Have to Consider the Whole Working Space



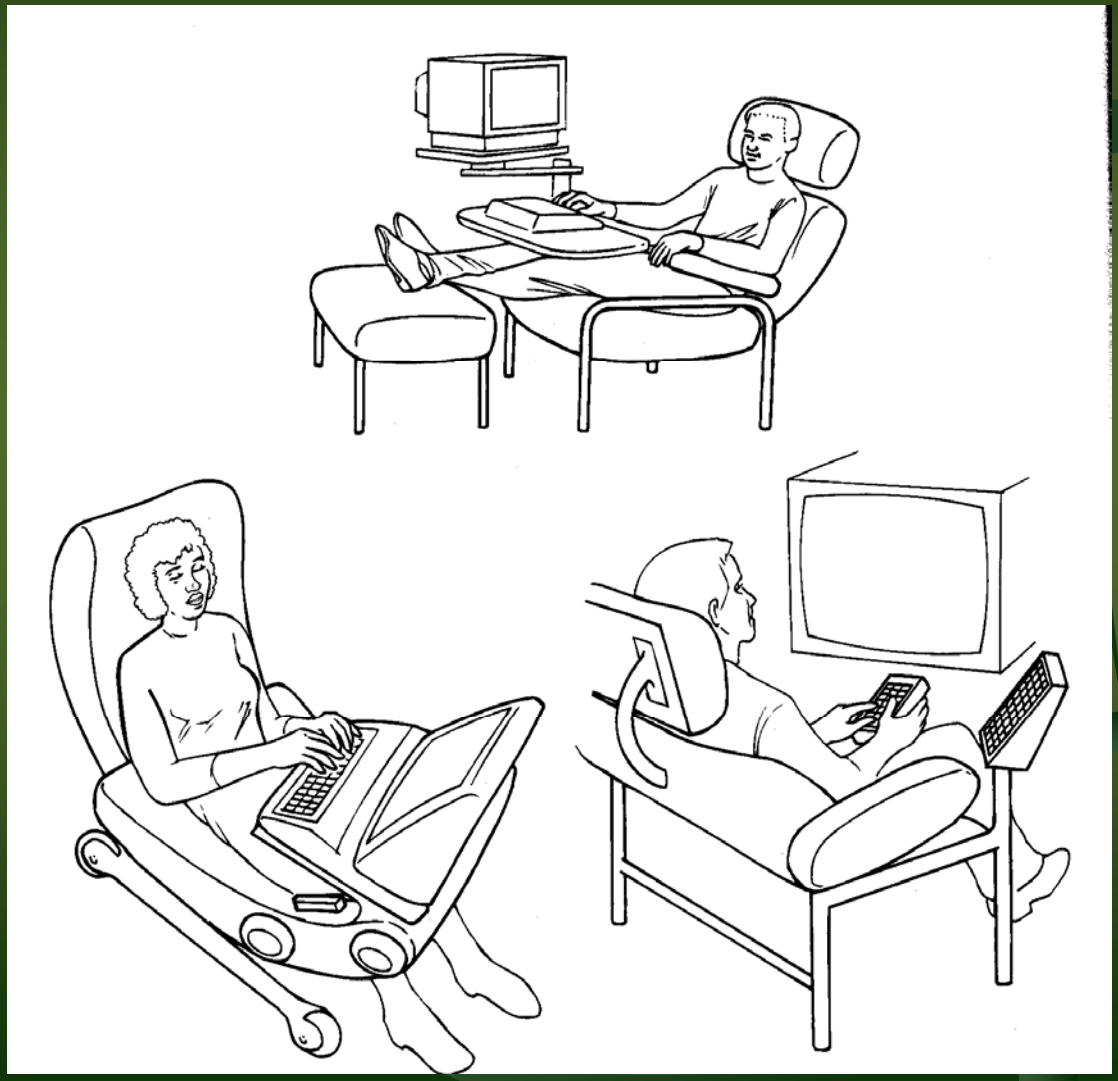
And try juggling at the same time!



The Evolution of Workspace Design



Wouldn’t this be NICE!

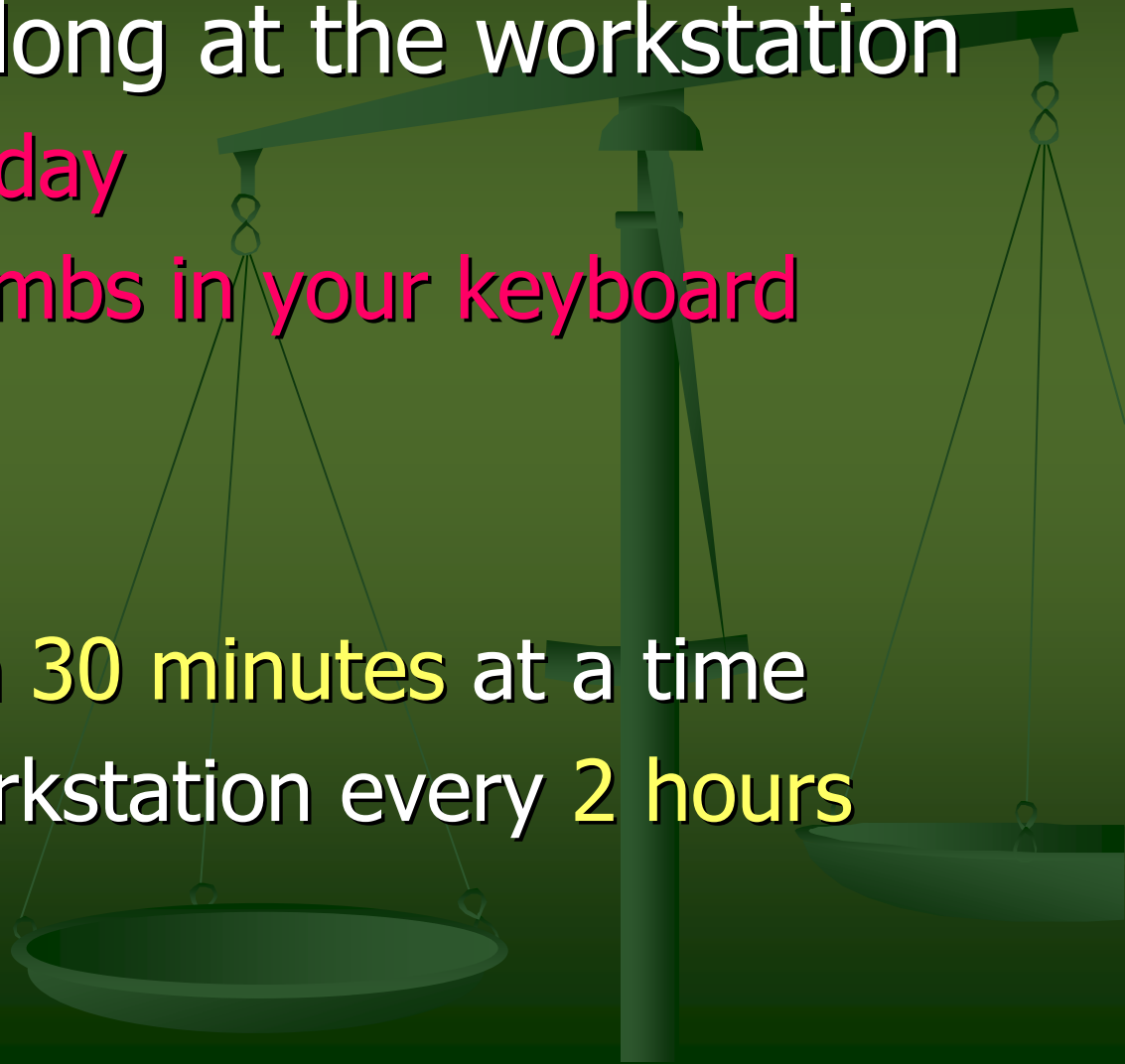


Workstation Guidelines

- Guidelines exist… but not legislated!
- Applying these guidelines properly is the most important issue!

Repetition

- Spending too long at the workstation
  - 9-12 hours a day
  - Sandwich crumbs in your keyboard
- Take a Break!
  - No more than 30 minutes at a time
  - Leave the workstation every 2 hours



Stretching
(it often comes naturally)

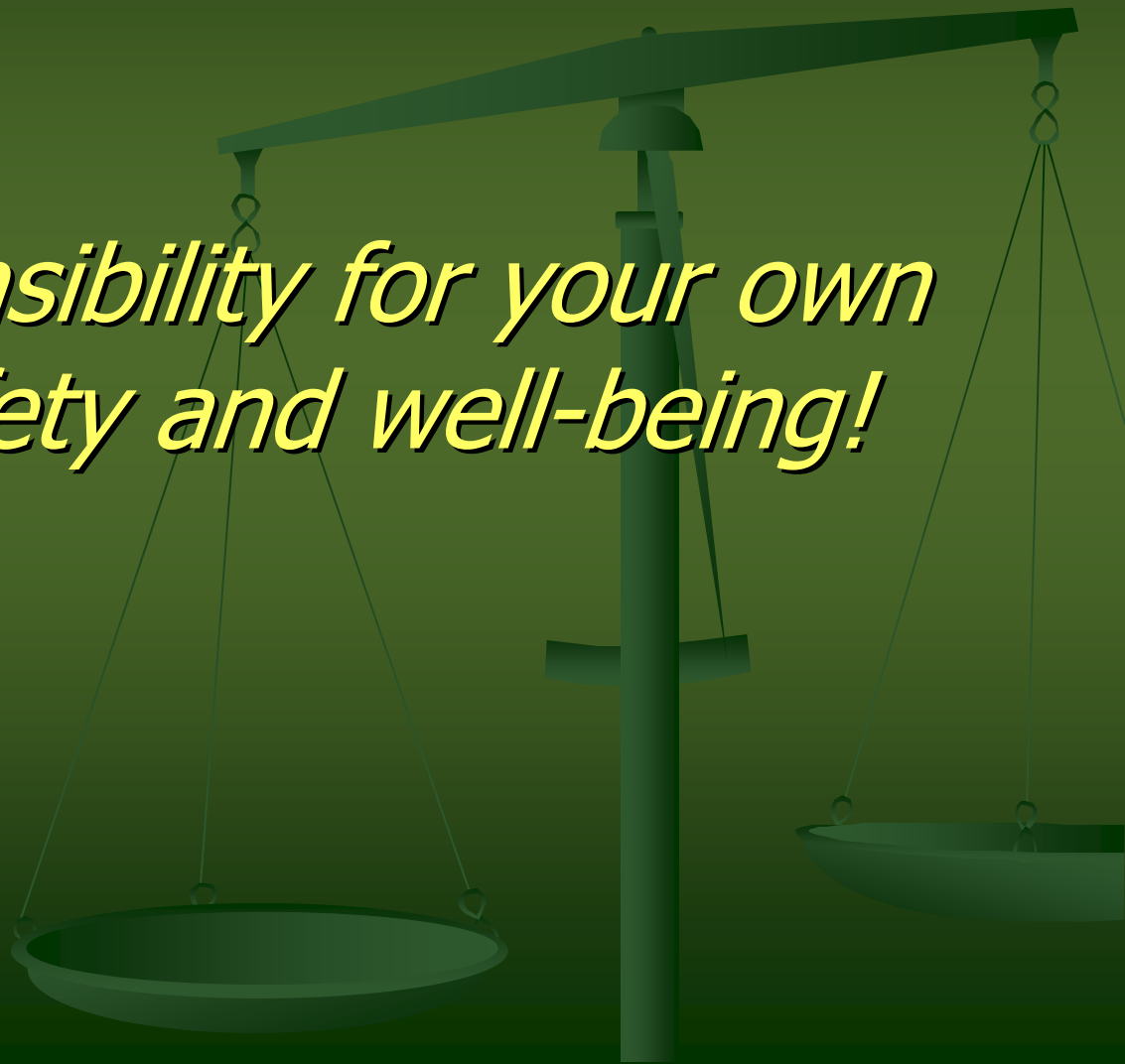
Individual Factors

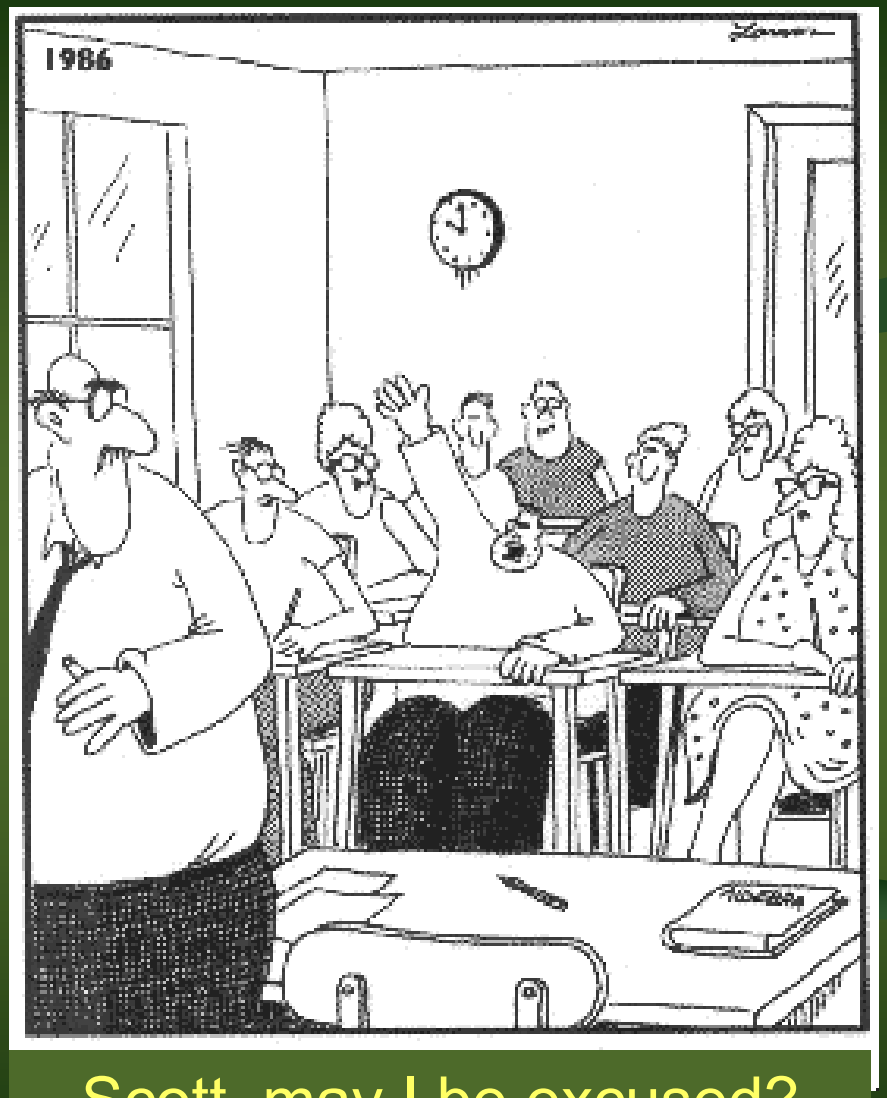
- Age
- Sex
- Previous Trauma
- Job Experience
- Morphological
  - Strength
  - Aerobic Fitness
  - Obesity
- Nutrition
  - Vitamin and Mineral Deficiency
- Disease Processes
  - Rheumatoid Arthritis
  - Diabetes Mellitus
  - Renal Dialysis
  - Thyroid Abnormalities
- Hormonal Factors
  - Diurinal Variations
  - Menstruation
  - Oral Contraceptives
  - Pregnancy

Employee…

- Must be educated to identify the signs
- Must know the basics of remedial interventions
  - Basic Workstation Alterations
  - Knowing your body's limitations
- Report it to an "accepting OH&S Committee or supervisor/manager"

Take responsibility for your own health, safety and well-being!





Scott, may I be excused?
My brain is full!

Canadian Centre for Occupational Health and Safety

www.ccohs.ca/oshanswers/ergonomics/office

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