



BOLTON
& COMPANY

Office Ergonomics and The Aging Workforce

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Today's Agenda

- Housekeeping
- What is Ergonomics?
- History
 - Ergonomics- A Brief History
 - The Evolution Of Computing
 - We've Come a Long Way...
 - History of the Mouse
 - New Technology- Barriers to Adoption
- The Importance of Movement
- The Aging Workforce
- Ergonomic Injuries and Causes
- Ergonomic Risk Factors
- Neutral and Non-Neutral Postures
- Cost of Doing Nothing...
- Prevention Strategies
 - Workstation Evaluations
 - Inventions for the Aging Workforce
- Q&A



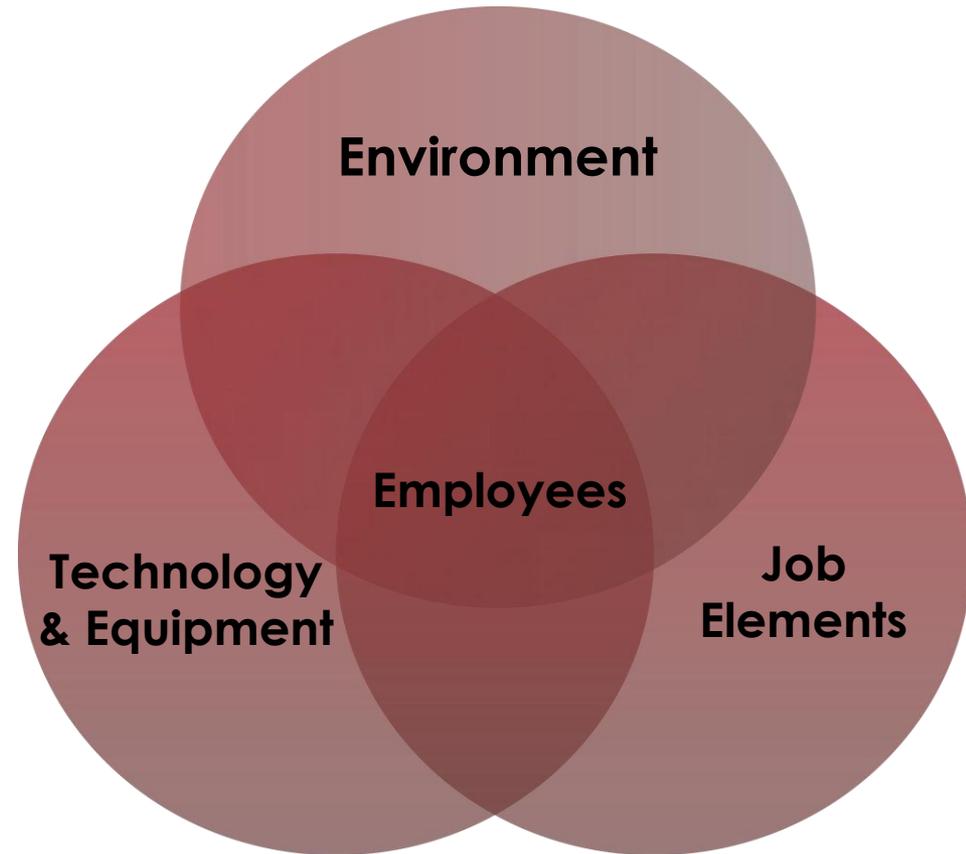
What is Ergonomics?

→ **Erg** - a unit of work

→ **Nomos** - the laws or study of

The science of work and a person's relationship to that work.

Ergonomics is sometimes defined as the science of fitting the work to the user instead of forcing the user to fit the work. However this is more a primary ergonomic principle rather than a definition.





Ergonomics A Brief History

→ Ancient History

- **Bernardino Rammazzini -De Morbis Artificum (*About Diseases of Workers*), 1700 AD , Documented that:** “Certain violent and irregular motions and unnatural postures of the body, by reason of which the natural structure of the living machine is so impaired that serious diseases gradually develop therefrom . . .”

→ Ergonomics- Word

- Wojciech Jastrzebowski created the word ergonomics in 1857 in a philosophical narrative, "based upon the truths drawn from the Science of Nature" (Jastrzebowski, 1857).

→ Wartime Innovations

- Complicated machinery during WWII required serious thought into the way humans would interact with machinery and tools.
- Post War- The concept of ergonomics began to include worker safety and health by addressing muscle force required to perform tasks, forces on the back during lifting, cardiovascular activity while performing heavy labor, and maximum weights that can be safely carried, pushed, or pulled.

→ Human Computer Interaction

- With the coming of the Information Age, a field of study called human-computer interaction (HCI) has appeared and just like the concepts before it, attempts to find a perfect 'fit' between man and machine.

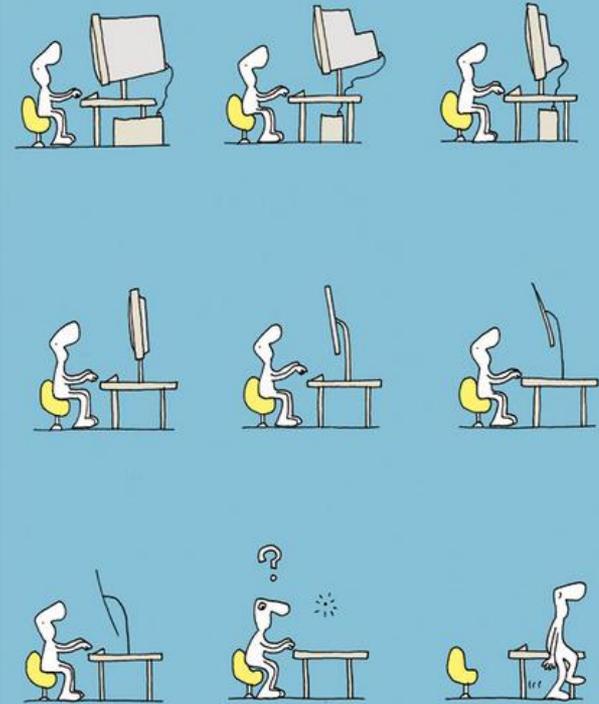


The Evolution Of Computing and Technology



HAROLD'S PLANET by Swerling and Lazar

The Evolution of the Computer





In 1964, the first prototype computer mouse was designed by Douglas Engelbart and Bill English. Engelbart received a patent for the wooden shell with two metal wheels in 1970, describing it in the patent application as an "X-Y position indicator for a display system." "It was nicknamed the mouse because the tail came out the end".

We Have Come A Long Way...
History of the Mouse...





We've come a long way...



Key functions

• Rollerbar (for cursor movement)	• Cursor speed
• Copy	• Scroll wheel
• Left-click	• Right-click
• "One-touch" double-click	• Paste



A sleek, silver and black rollerball mouse with a horizontal rollerbar and several buttons. Below the mouse, the letters 'A B C D E F G H' are displayed in a row.



We've Come A Long Way...
New Technology- Barriers to Adoption



The Importance Of Movement

Inactivity Physiology Explained Simply



→ Some of the most potent mechanisms at the **root cause** of chronic disease are caused by inactivity (generally sitting) because the body needs frequent muscular activity...

ESSR, 2004 & Diabetes, 2007, Marc Hamilton, Ph.D.



The Importance of Movement

The Upper Back Stretch:

The upper back can also become tense and tight from hunched shoulders, especially if you hold the phone against your shoulder or use your mouse a lot. The shoulder rolls above may help loosen you up for this upper back stretch.

Do it right:

Seated or standing, stretch the arms straight out and rotate the hands so that the palms face away from each other. Cross the arms so that the palms are pressed together, contract the abs and round the back, reaching away as you relax the head. Don't collapse but instead imagine you're curving up and over an imaginary ball. Hold the stretch for 10-30 seconds. If twisting the arms doesn't feel good, simply lace the fingers together.



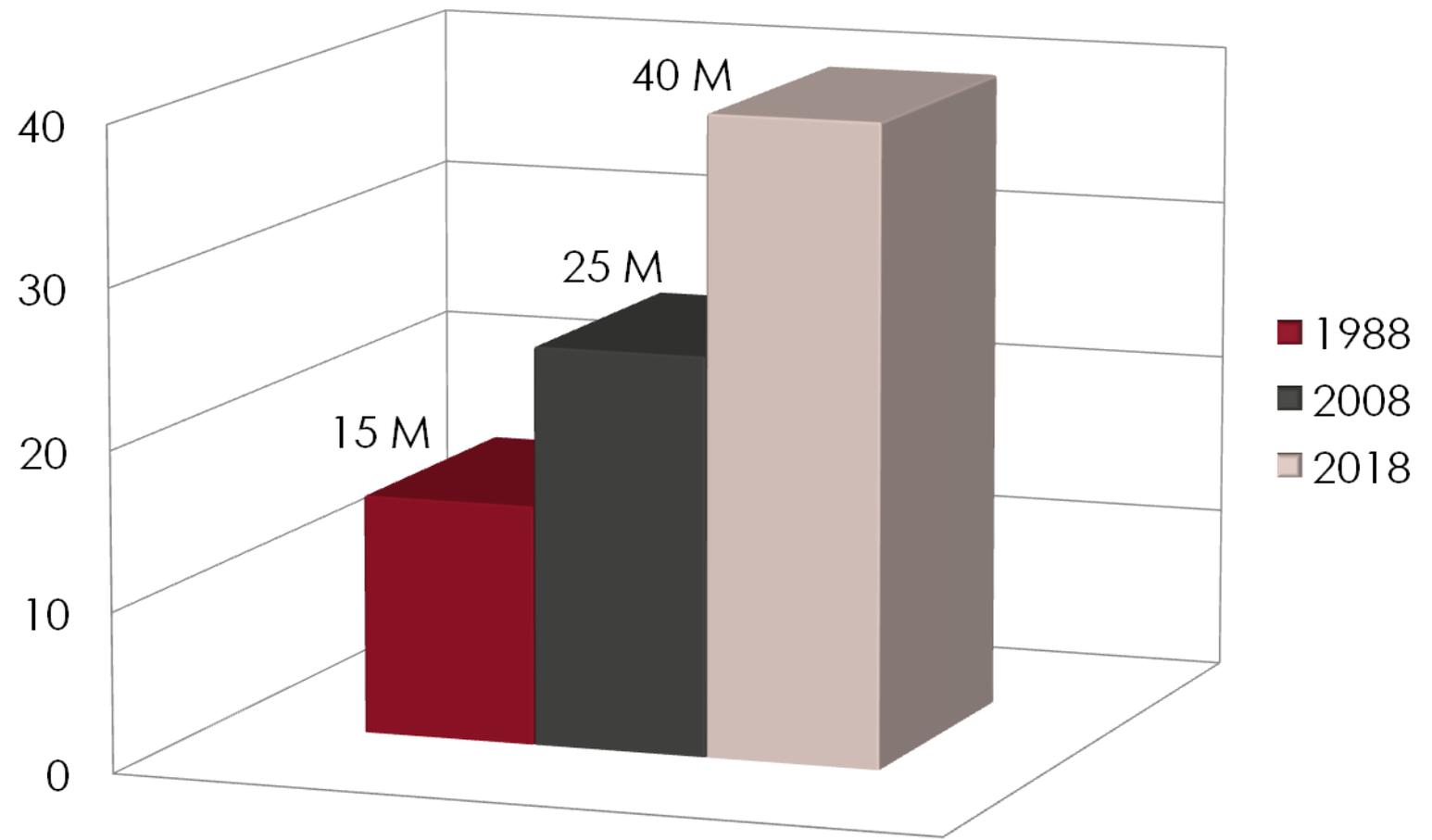
- The **76 million “baby boomers”** are growing older and our workforce is graying with them.
- According to the Bureau of Labor Statistics, the proportion of — “older” workers (over age 55) will increase steadily from 12% in 2000 to **20% by 2025**.
- In 1988, U.S. workers 55 and older numbered about 15 million according to U.S. Bureau of Labor Statistics. That number increased to nearly **28 million in 2008** and is expected to grow to nearly **40 million by 2018**.
- The physical changes associated with aging can affect older workers and their safety on the job.
- Employers and employees should prepare for the aging workforce now to ensure that job tasks and worksites remain safe.



The Aging Workforce



The Aging Workforce



Spinal Twist:

The upper back can also become tense and tight from hunched shoulders, especially if you hold the phone against your shoulder or use your mouse a lot. The shoulder rolls above may help loosen you up for this upper back stretch.



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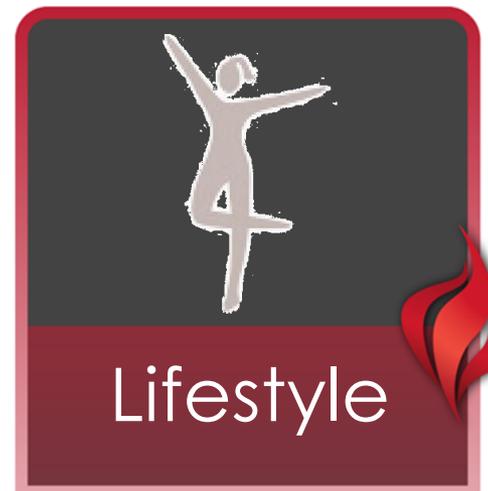
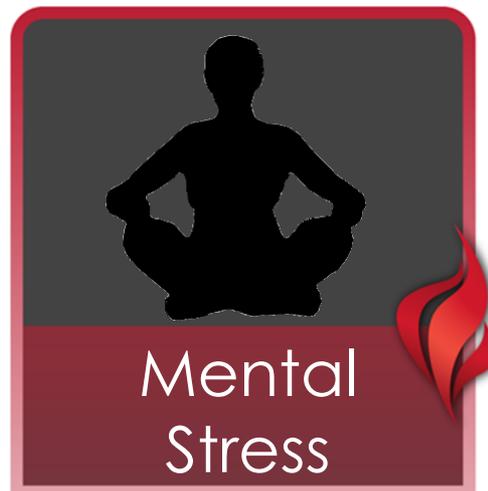
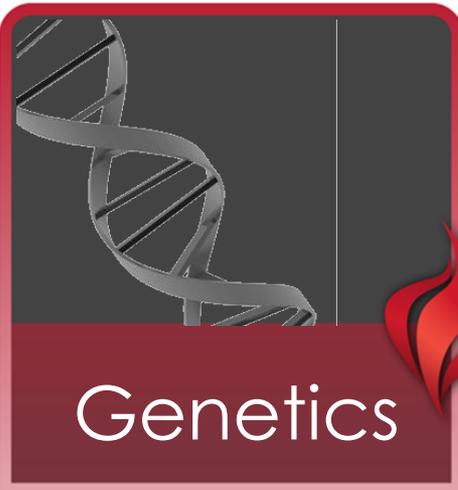
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The Importance of Movement



Variables Affecting How Well People Age





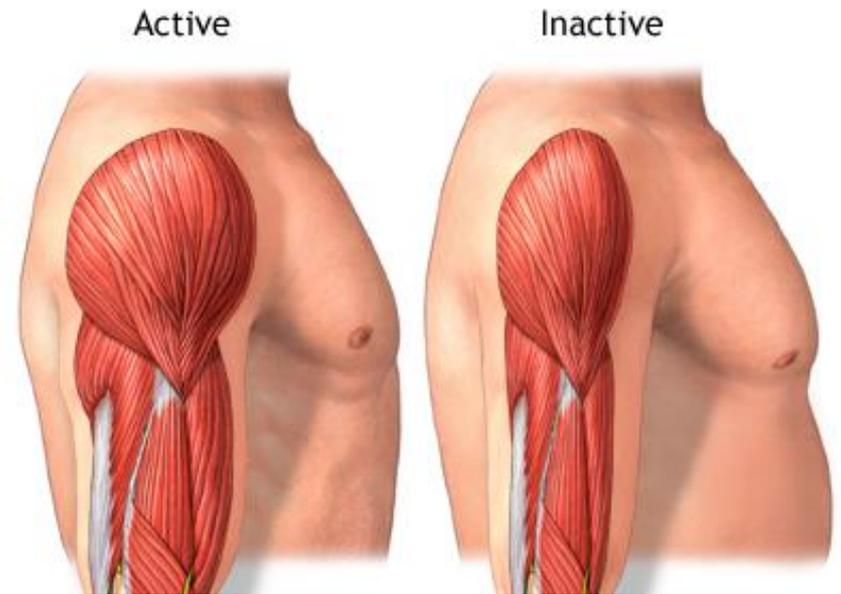
As People Age, Endurance Decreases

→ Fatigue and “Presenteeism” Impacts Productivity



→ Physical changes vary by individual, but as we age, we tend to lose muscle mass and flexibility; a 15-20% decrease in strength by age 60 is typical.

→ Employers should prepare for this by examining work tasks and determining the physical requirements for each job.



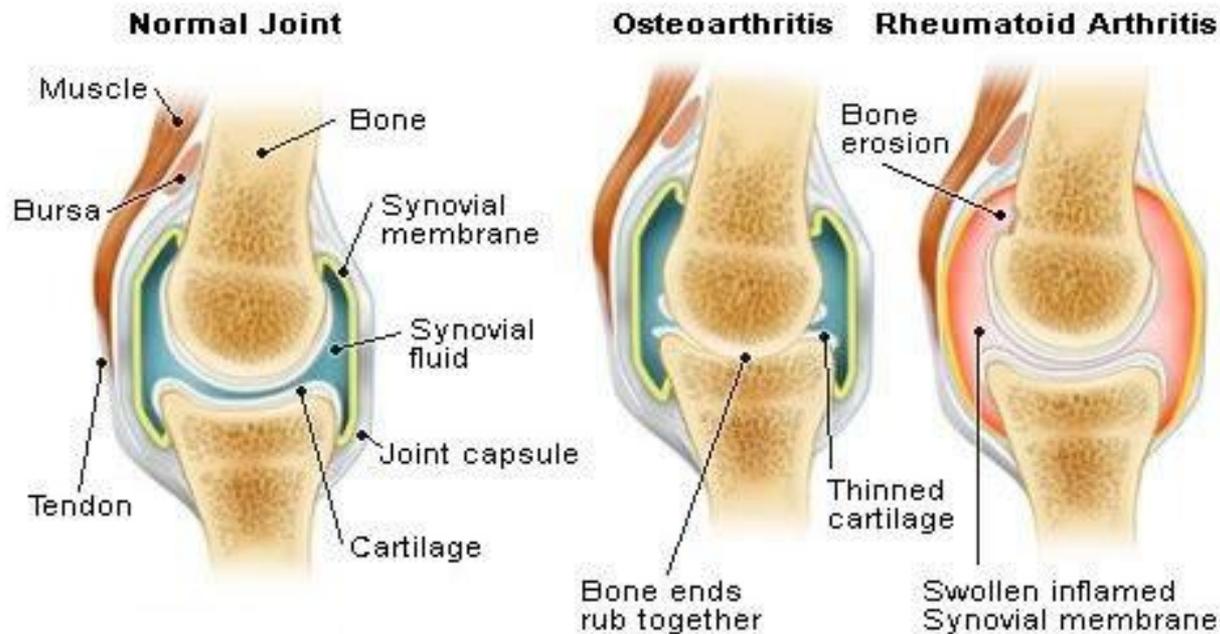
Physical Changes of Aging

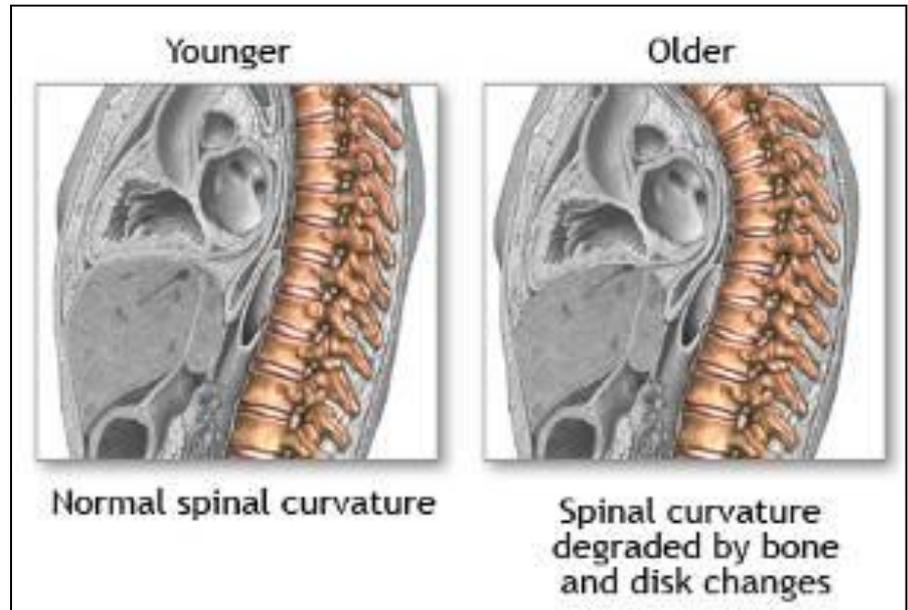
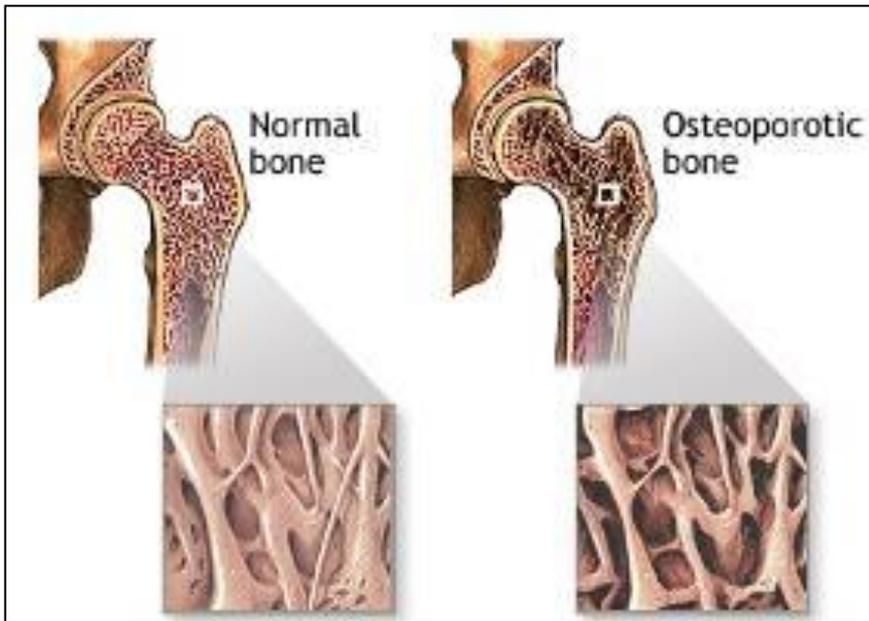




Physical Changes of Aging

→ Joint Degeneration results in loss of flexibility and less tolerance to prolonged postures





Aging: Bone Loss and Disk Changes





The Importance of Movement

Torso Stretch:

Even if you pay attention to your posture, you may find yourself sinking back into a hunched position, which can make your back ache. This simple move will stretch all the muscles in your back, sides and arms.

Do it right:

Seated or standing, lace the fingers together and stretch them up towards the ceiling. Take a deep breath as you stretch up as high as you can, then exhale and open the arms, sweeping them back down. Repeat for 8-10 reps.

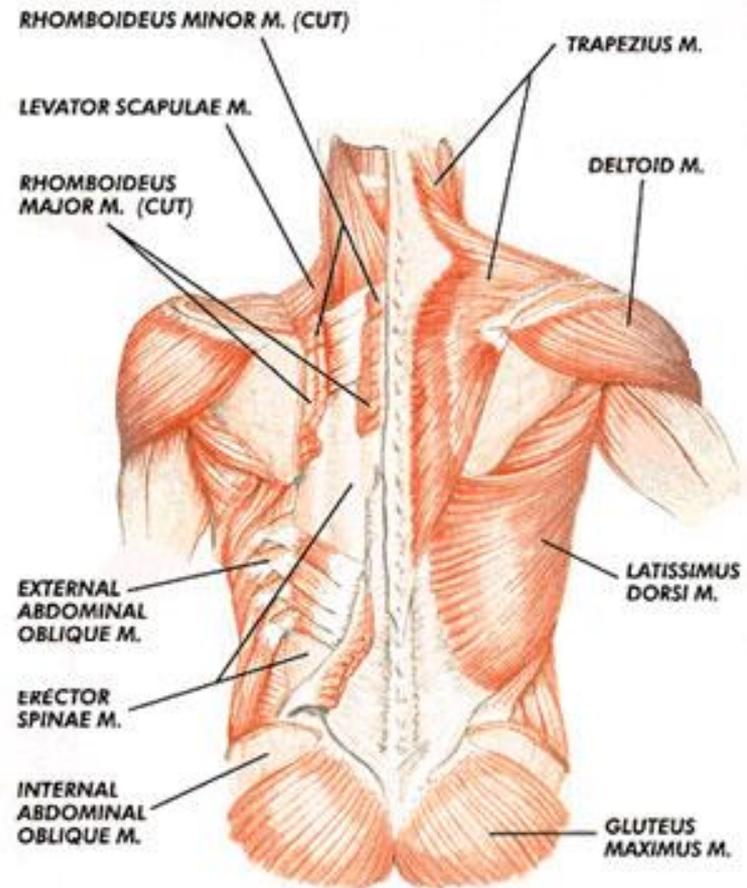


→ Disorders of the:

- Muscles
- Nerves
- Tendons
- Ligaments
- Joints
- Cartilage
- Spinal discs

→ Cumulative

→ Chronic



Ergonomic Injuries





Causes of Ergonomic Injury

→ At Work:

- Work habits
- Workstation design
- Work organization

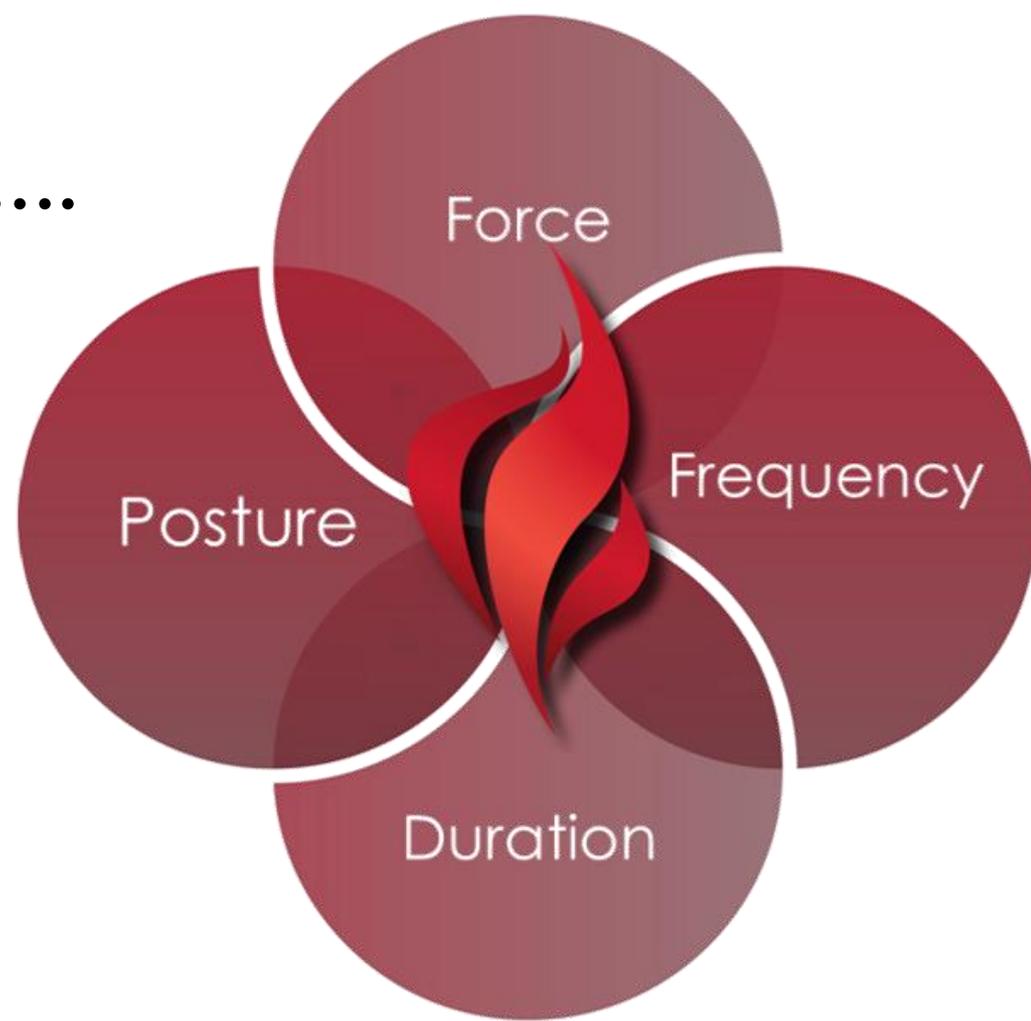


→ Outside of Work:

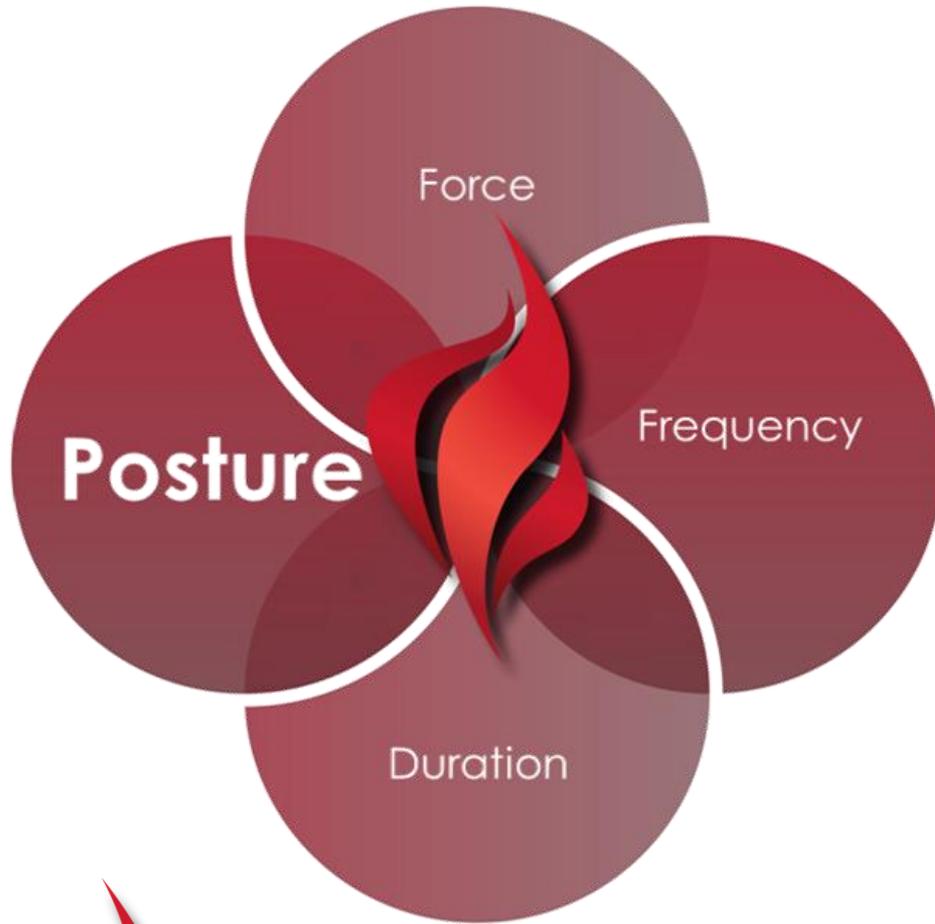
- Sports
- Hobbies
- Medical conditions



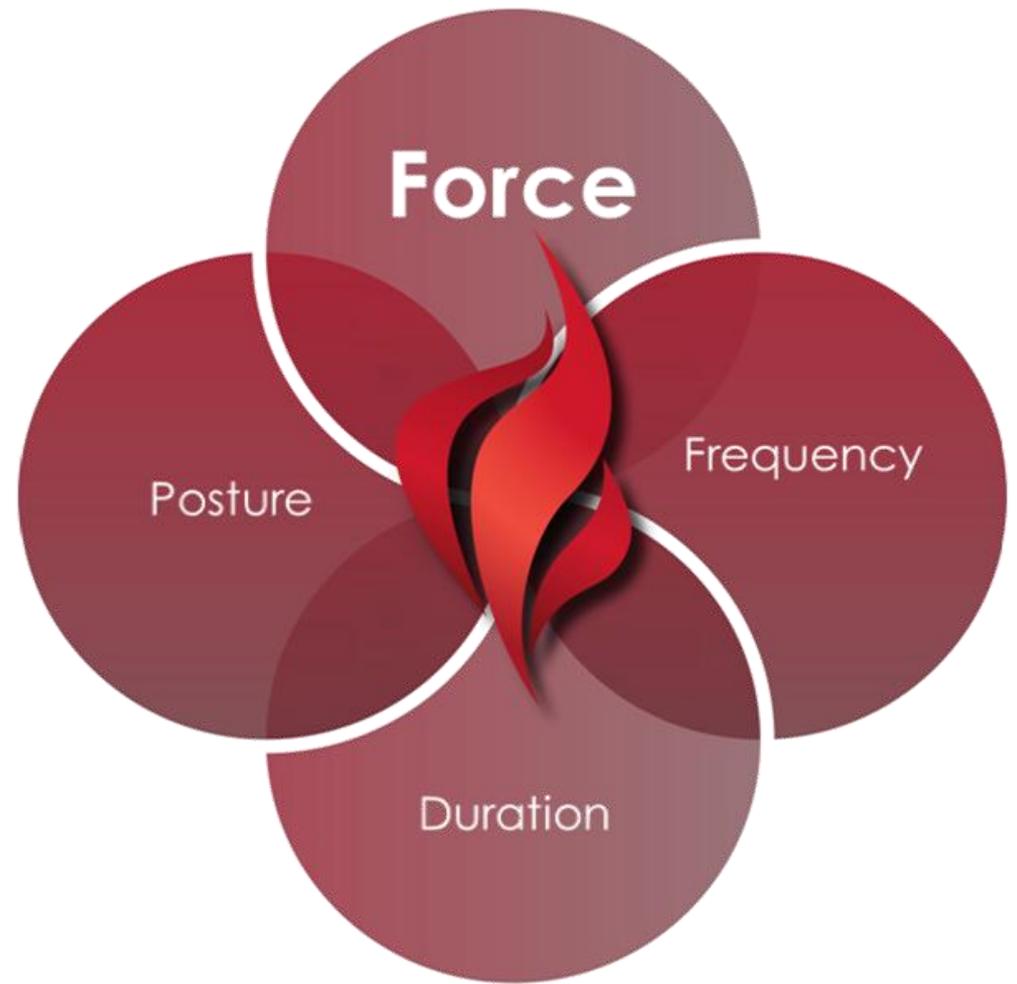
Consider the following....



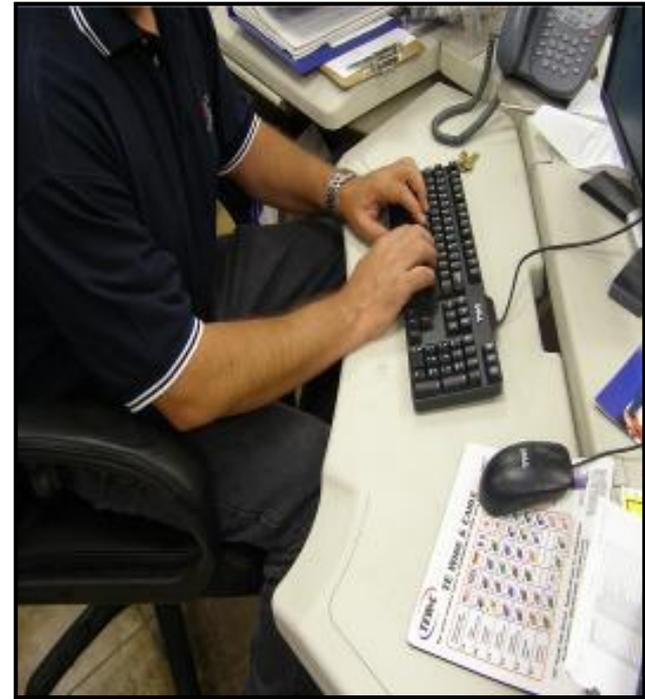
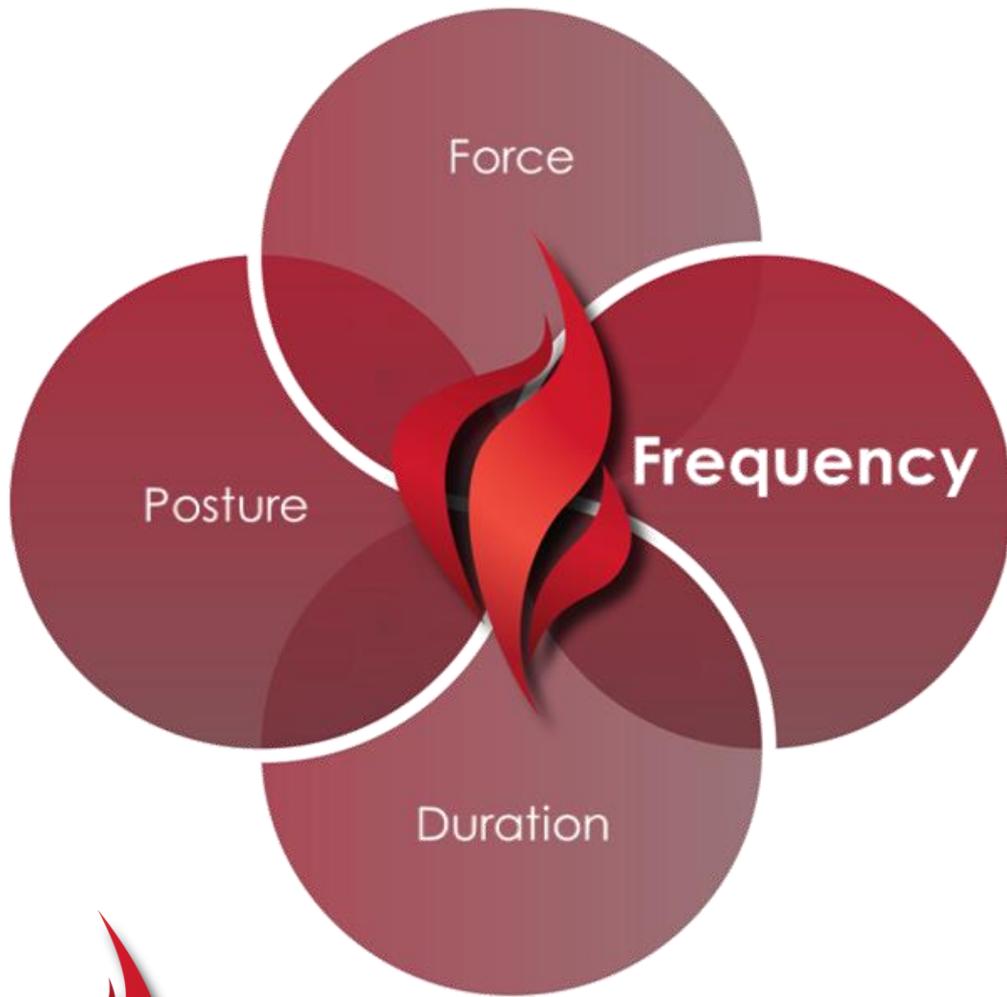
Ergonomic Risk Factors



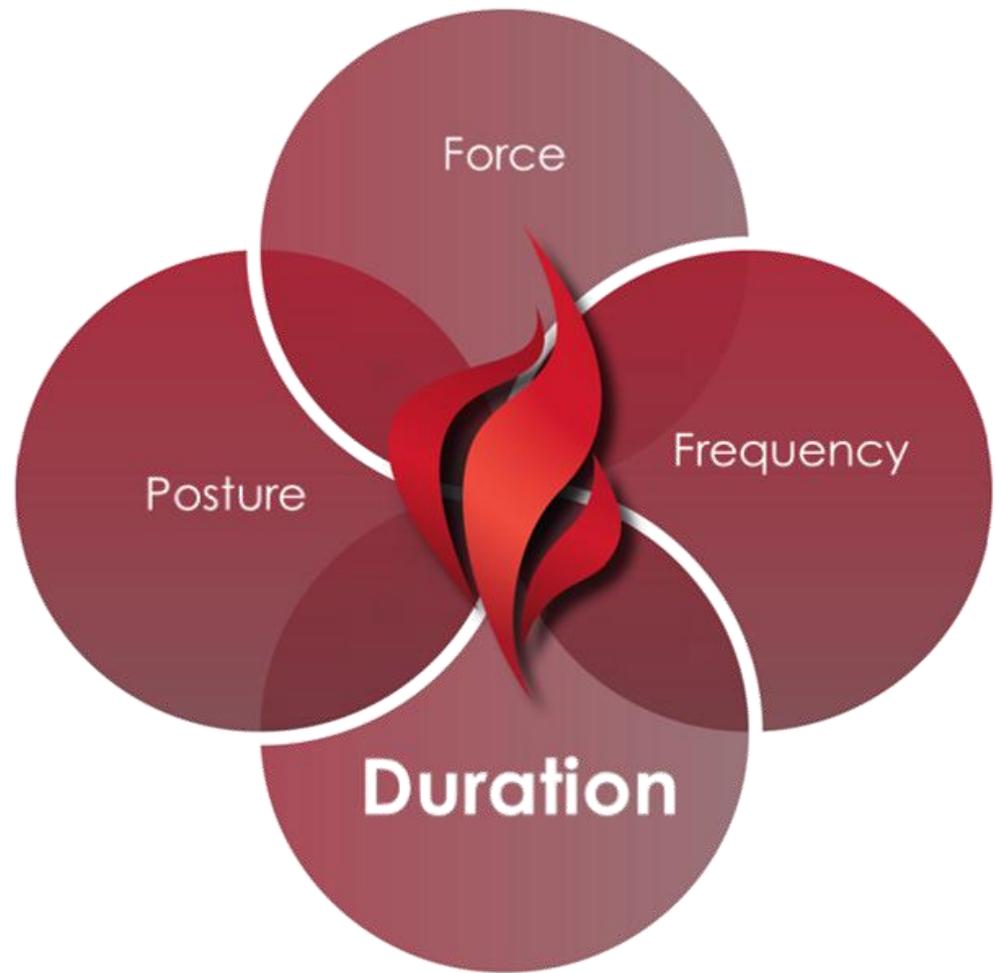
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Ergonomic Risk Factors



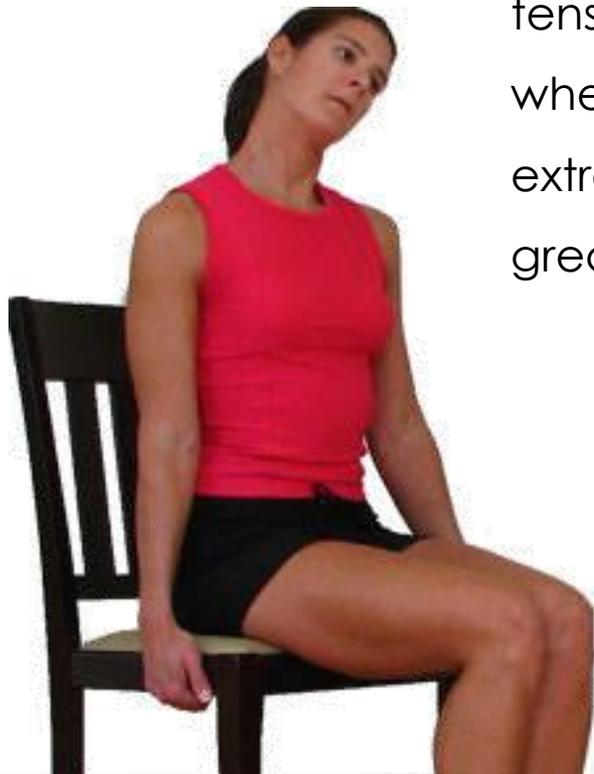
Ergonomic Risk Factors



Ergonomic Risk Factors

Neck Stretch:

Holding tension in the neck can lead to headaches and upper back tension as well. Many of us drop the head forward when working on the computer, which can put extra stress on the neck muscles. This stretch feels great on the neck and shoulders.



Do it right:

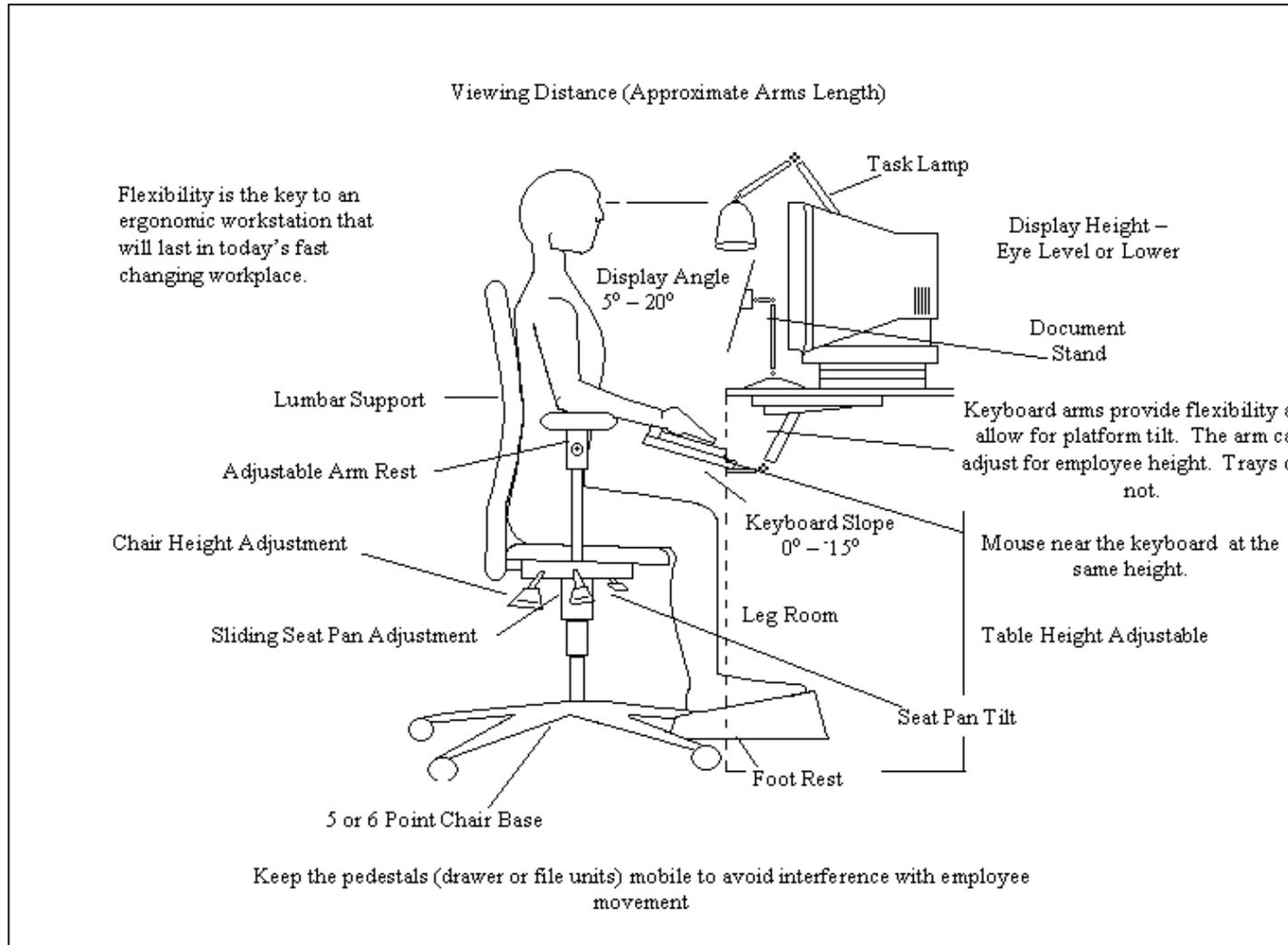
Sitting in your chair, reach down and grab the side of the chair with the right hand and gently pull while tilting your head to the left, feeling a stretch down the right side of the neck and shoulder. Hold for 10-30 seconds and repeat on the other side.

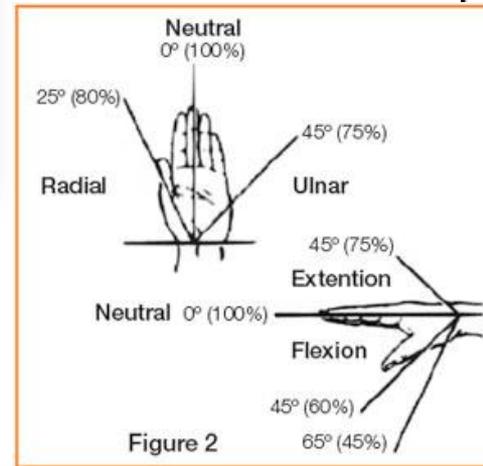
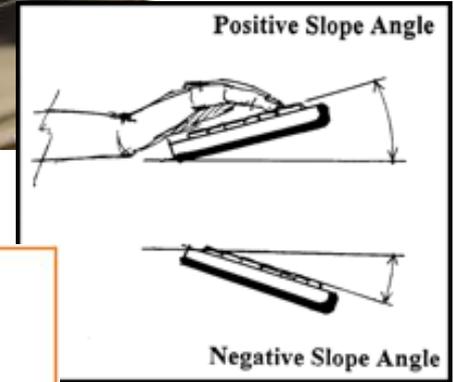
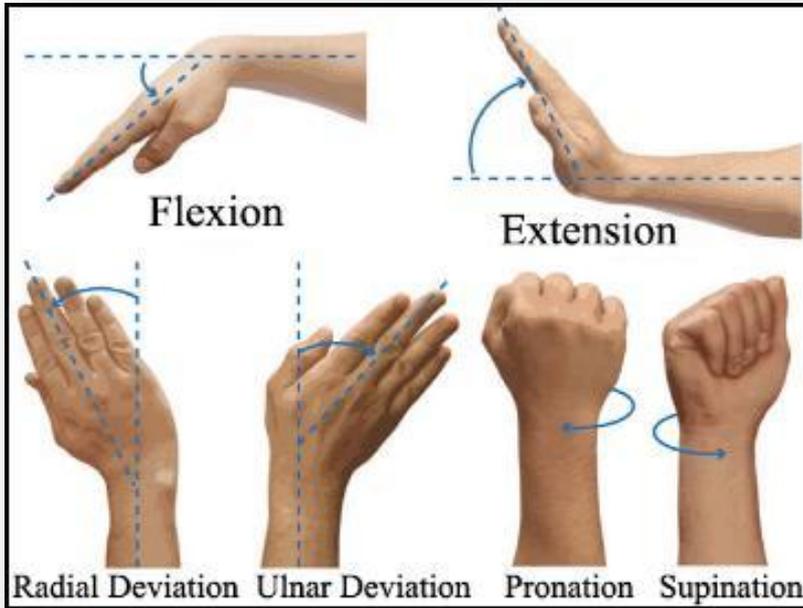


The Importance of Movement



Neutral . . .





The Neutral and Non Neutral Wrist





Examples of Non-Neutral or Awkward Postures . . .



Back
Flexion



Neck
Cradling the
phone receiver,
includes mobile
phones



Shoulders
Shrugging



Hip, Lower Back,
Circulation



Cost of Doing Nothing . . .

- ➔ U.S. Bureau of Labor Statistics reports 650,000 work-related musculoskeletal disorders (WRMSD), resulting in costs to employers of over 20 billion dollars.
 - Costs include Worker's Compensation and medical expenses, the latter of which are increasing 2.5 times faster than benefit costs.
- ➔ Mean costs per case of upper extremity MSD are \$8,070 versus a mean cost of \$4,075 per case for all types of work-related injury.
- ➔ Workers' Compensation claims per injury equal \$29,000 - \$32,000 per year.
 - The average cost of 1 repetitive motion injury in California is \$40,000
 - Medical bills for the average shoulder injury (excluding surgery) are \$20,000 per year.
- ➔ Mean costs are 3 to 5 times higher, reaching approximately \$150 billion per year.
 - These include absenteeism, staff replacement and retraining, productivity, and/or quality.
 - Cost of hiring replacement staff is between \$130,000-166,000 per year.



Prevention Strategies . . .

The Importance of the Right Equipment. . .



So What Can You Do?



Workstation Evaluations

Office Employees

Five Step Process

1. Chair – height, backrest
2. Keyboard/mouse – height, location
3. Monitor- location, height
4. Lighting- external or internal, glare
5. Other tools and equipment



The Importance of Movement

Seated Hip Stretch:

This move helps open up the hips and stretch the complex series of muscles in the hips and glute.

Do it right:

While seated, cross the right ankle over the left knee and sit up nice and tall. Gently lean forward, keeping the back straight and reaching out with the torso until you feel a stretch in the right glute and hip. You can also press down on the right knee to deepen the stretch. Hold for 10-30 seconds and repeat on the other side.



→ Adjust the chair height.

- Keep feet supported.
- Start with thighs approximately parallel to the floor.
- Seat too low: pressure on buttocks
- Seat too high: pressure behind knees

→ Sit all the way back in the chair.

- Adjust the backrest height to support the entire back thru a full range of tasks.
- May need to add additional lumbar support —rolled up towel, pillow—about waist or belt height.
- You should reach the backrest without feeling pressure behind the knees.



→ The seat pan should support the thighs.





Keyboard & Mouse

→ Adjust the keyboard height and angle.

- Wrist in neutral or straight
 - Padded wrist rest even with home row
- Follow angle of the forearms
- Drop the keyboard legs in back
- Consider a negative or back tilt
 - Consider keyboard with legs in front
 - Slightly raise front edge



→ Position the mouse to avoid reaching.

- Place next to and at the same height as the keyboard
- Height should allow the wrist to remain straight
- Consider a mouse rest
- Consider a 10-key mouse bridge



→ Consider an alternative input device.

- ➔ Place the monitor at the appropriate reading distance, typically arm's reach or 18 – 28 inches (average 24 inches)
- ➔ Normally, a 10° to 20° downward angle or 4 to 8 inches lower than the horizontal sight line
- ➔ Center line of monitor just below center of focus
- ➔ Adjust monitor to face the user
 - Avoid twisting the neck
- ➔ Adjust the monitor height
 - Entire viewing area somewhere below eye level
 - Measure for the center of the screen
 - Considerations for
 - Bifocals
 - Kyphosis



The Monitor



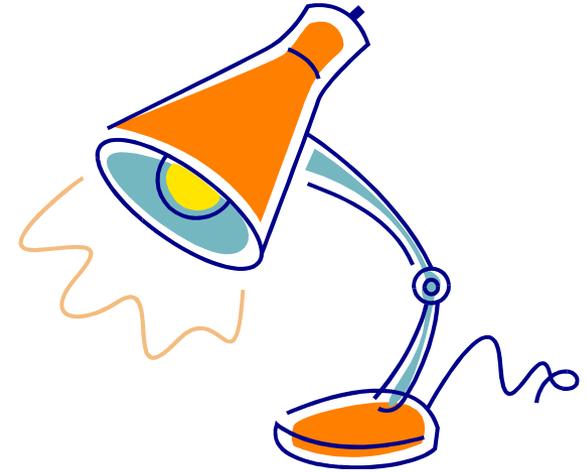


Lighting

→ Check for glare.

→ Correct by changing or shielding the light source

- Consider shields or hoods
- Workstation should be 90° to a light source
- Adjust blinds
- Turn off the monitor to determine the source of glare problems



→ Check for reflections

→ Check for light sources that shine directly into users eyes

→ Check for brightness around monitor

→ Check brightness and contrast of the monitor

→ Best color combinations—black on white

→ Adjust the document and monitor position to minimize eye and head movement between the two

- The most-often looked-at item (document or monitor) should be in the center position
- Look at both equally, place on either side of the center line

→ Think about . . .

- Reach zones
 - Frequently used item within 14 to 16 inches
 - Less frequently used items, 22 to 26 inches
- Clutter under the desk
 - Inhibits movement and getting close to work
- Frequent phone usage with or without writing or simultaneous computer use
 - Consider a headset
- Need for task lighting



Other Equipment



The “Micro-Break” and Self-Responsibility

→ Self-Responsibility

- Organize your work area.
- Vary tasks.
- Clean the monitor and daily.
- Practice a light typing touch and floating hand.
- Remember to blink and rest the eyes.



→ Take frequent mini-breaks for movement and recovery.

→ Stretches at the workstation.

Inner Thigh Stretch:

This not-very-ladylike stretch feels great on the inner thighs, hips and groin and is another hip-opening move that may help get rid of tension and stress in the lower body.



Do it right:

While seated, take the legs wide, toes out and lean forward with the elbows on the thighs. Keep the back straight and the abs contracted. Gently press forward while using the elbows to push the thighs out until you feel a stretch in the inner thighs. Hold for 10-30 seconds.

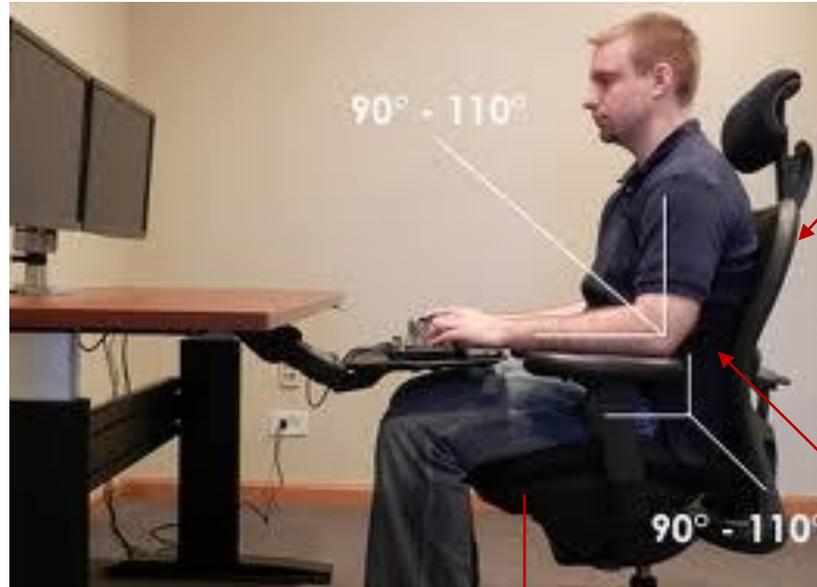
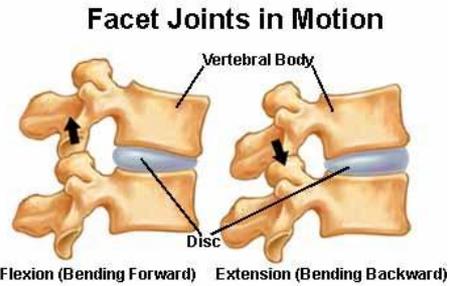


The Importance of Movement



Interventions of the Aging Workforce

- Job tasks should not require that employees work at their maximum power repeatedly or over extended periods of time; this can lead to injury to a worker of any age. Micro-breaks become increasingly important.
- Altering job tasks and processes and providing assistive devices such as hand trucks, dollies, and hoists can reduce worker effort on the job.
- Slumped sitting changes the alignment of the neck, back and shoulders.
- Good ergonomic chairs are essential.



Reclining the seat back slightly reduces lumbar disk pressure by opening the hip

Lumbar support should fit the concavity of the lower back, just above the buttocks

Angling the seat pan down lowers disc pressure although can increase pressure on the facet joints.

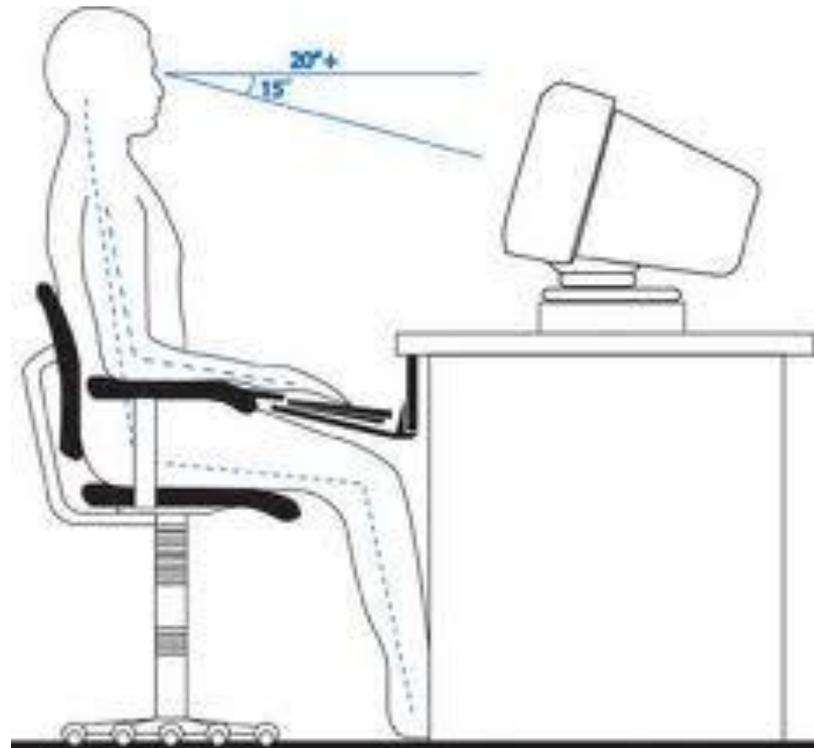
Interventions for the Aging Workforce





Interventions of the Aging Workforce

- Monitor height for “mature” eyes or those wearing bifocals, trifocals or progressives should be lower and dependent upon the user.
- Increase the “screen character height”.
- There is no “right” display position or height. It is dependent upon the regions of discomfort, age and corrective lens use.





Interventions of the Aging Workforce

Older workers have less tolerance to prolonged poor postures due to changes in the body with age, such as degeneration of the neck and spine.

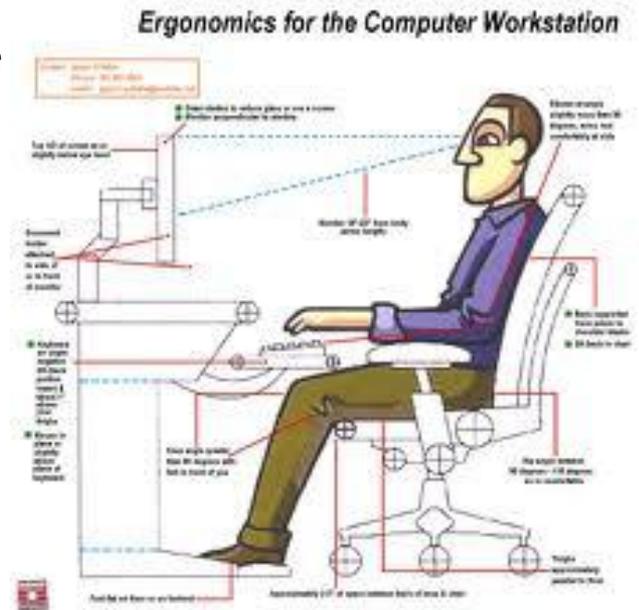
- ➔ Equipment, such as a good chair with proper back support, is important.
- ➔ Training is also an important element. Consider one-on-one training to address specific issues your mature workers may be experiencing.
- ➔ Frequent “micro-breaks” are also important. Encouraging micro-breaks will help to make your mature worker more productive.

→ **Rotation of the neck or head forward posture can compress blood flow to the vertebral artery up to 100%.**

→ Avoid “head forward” or “turtle neck” posture

→ Keep the monitor or work inline with the user

- Inline document holders
- Keyboard trays
- Monitor placement inline with the user



Interventions for
the Aging Workforce





→ Design a wellness program that benefits your entire workforce and includes:

- A Three Year Operating Plan
- Top Management buy in...
- Risk factor identification through Health Risk Assessments, Culture surveys and Biometric Screenings
- Activities that are meaningful to your Aging Workforce



Wellness



Equipment for the Entire Workforce



Seated Rest:

- Helps to quiet the mind and completely relax the body. You can use this technique for stress management at work.
- Seated in your chair with your chest lifted.
- Shoulders relaxed and down.
- Palms are rested gently on your thighs.
- Relax the face. Jaw is relaxed. Close your eyes.
- Focus on your breath.
- Deep belly breathing. Inhale allowing the abdomen to rise and fill the lungs.
- As you exhale, allow the abdomen to pull slightly in the empty the lungs of air.
- Repeat three times. Each time focus on relaxing the body and mind. Quiet the mind and focus on the breath slow and even.
- Allow 4 minutes for this relaxation.



Relaxation & Stress Management



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Questions?

