



# OFFICE ERGONOMICS

**OKLAHOMA STATE UNIVERSITY**



**Current as of April  
2022**

# OBJECTIVES

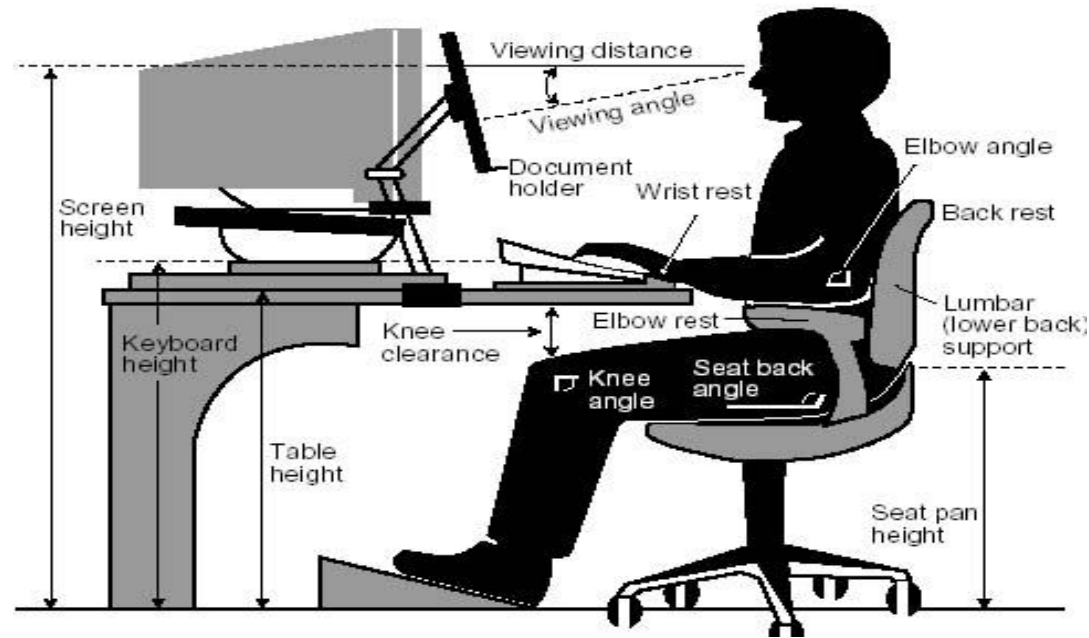
- What is Contact Stress, Force, Repetition
  - Musculoskeletal Disorders (MSD) Signs and Symptoms
  - Working Postures
  - Computer and Office Equipment Set-up
  - Hand and Ergonomics issues
  - Lap Top Ergonomic Guidelines
-

# OFFICE ERGONOMICS AND OSHA

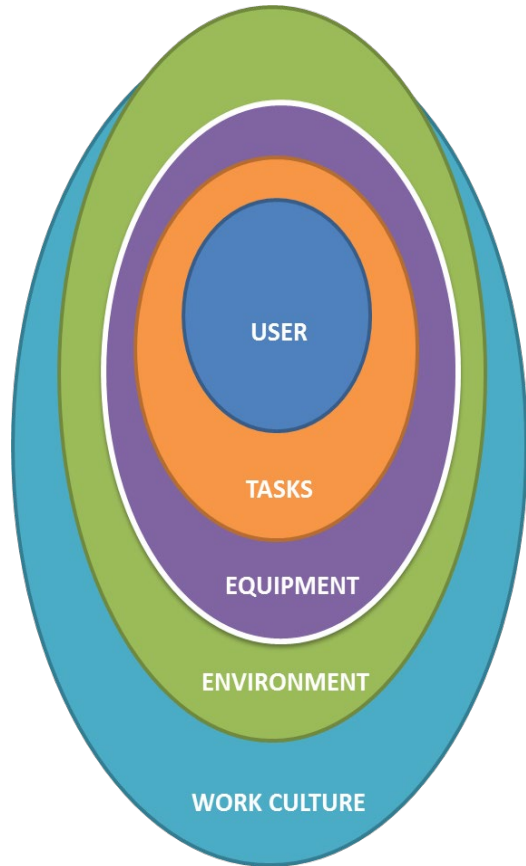


# OFFICE ERGONOMICS

- There is not a single “correct” posture or arrangement of components that will fit everyone
- However, there are basic design goals, some of which are shown in the accompanying figure, to consider when setting up a computer workstation or performing computer-related tasks



# OFFICE ERGONOMICS



- The science of “designing the job to fit the worker, not forcing the worker to fit the job”
- Ergonomics covers all aspects of jobs:
  - Physical stress placed on joints, muscles, nerves, tendons, bones, etc.
  - Environmental factors affecting hearing, vision, and general comfort and health
  - Enhanced comfort
  - Increased productivity
  - Improved job satisfaction and morale
  - Reduced musculoskeletal discomfort, work injuries/illnesses

## CONTACT STRESS

- You can experience contact stress to your forearms when you rest them on the leading edges of work tables. Nerves in the forearm are affected, your fingers and hands may tingle and feel numb, similar to the feeling when you hit your “funny bone.”
  - You may experience pain and numbness in your legs if blood circulation is cut off by contact with the leading edge of a chair.
  - Your forearms and wrists can be affected if wrist rests have sharp, hard leading edges.
  - Tendons can be damaged when repetitive finger motion tasks are performed with a bent wrist.
-

## FORCE

- Your finger and forearm muscles may become sore if you use a pointing device at a setting that is so sensitive that it is hard to control. Hand and arm muscles must work continually to keep the device steady.
  - Your shoulder and neck muscles are continually being used to lift the arm away from your body if the mouse is placed too far away.
  - The muscles of the back can become strained if you must tilt your head back to view a monitor that is too high.
-

## REPETITION

- Computers require little task variation. Old typing activities, such as adding paper or mechanically advancing pages, have been reduced or eliminated. Users can stay in their chairs and type or perform mouse work for an almost unlimited amount of time. Under these conditions, a proficient typist can easily perform more than 18,000 keystrokes per hour. These repetitive motions can lead to tendon and tendon sheath injuries, especially if the wrist is bent during the activity.
  - Similar repetitions occur when using a pointing device such as a mouse. Here, the hazard may be greater because the motions are often concentrated in only a few fingers of one hand.
-



## REPETITION

- A computer operator may remain in essentially the same posture for an entire shift. This forces a few isolated muscles to repeatedly activate to accomplish a task such as holding the head up or focusing on a computer screen.
  - A poorly designed workstation may cause you to repeatedly reach to use a mouse or answer the phone. This can fatigue the muscles of the shoulder and irritate the tendons.
-

# REDUCING REPETITION

- **Task Rotation or Job Enlargement**

- If you perform a variety of tasks, when possible, intersperse them throughout the work day. Minimize long blocks of uninterrupted computer time by doing other non-computer tasks such as photocopying, phone work, cleanup, etc.

- **Micro Breaks or Rest Pauses**

- Build short micro pauses into computer use sessions. Frequent short breaks are desirable. Every hour, take a five-minute break from computer tasks. Look away, stretch, get up, or walk. These brief pauses provide time for muscles and tendons to recover.
-

# AWKWARD POSTURES

- Muscles can be stretched or compressed causing them to be inefficient and resulting in possible fatigue and overexertion.
  - Non-neutral postures can pull and stretch tendons, blood vessels, and nerves over ligaments or bone where they can become pinched and restricted.
  - Tendons and their sheaths can rub on bone and ligaments, which can lead to irritation and fraying. This can lead to swelling within confined areas such as the carpal tunnel, which then restricts nerves and blood vessels.
  - Tingling and numbness of the fingers and hands as well as pain from tendinitis and tenosynovitis (inflammation of a tendon sheath) can result.
-

## **GOOD WORKING POSITIONS**

- Understand the concept of neutral body positioning.
  - A comfortable working posture in which your joints are naturally aligned.
  - Body in a neutral position reduces stress and strain on the muscles, tendons, and skeletal system and reduces your risk of developing a musculoskeletal disorder (MSD).
-

# NEUTRAL BODY POSTURES

- **Hands, wrists and forearms**

- Straight, in-line and roughly parallel to the floor

- **Head**

- Is level, or bent slightly forward, forward facing and balanced. Generally, it is in line with the torso.

- **Shoulders**

- Are relaxed and upper arms hang normally at the side of the body

- **Elbows**

- Stay in close to the body and bent between 90 and 120 degrees
-

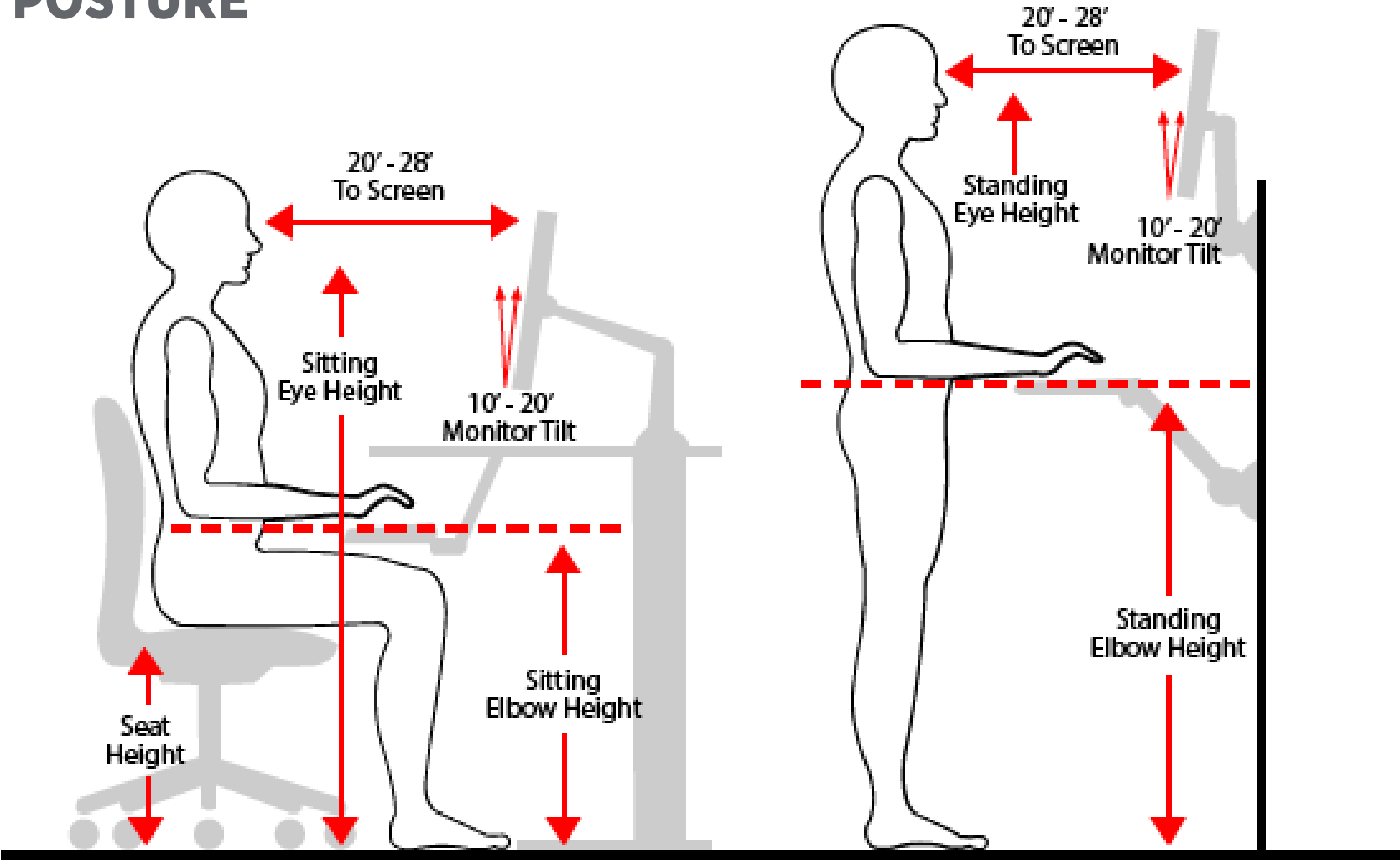
# NEUTRAL BODY POSTURES

- **Feet**
    - Are fully supported by the floor, or a footrest may be used if the desk height is not adjustable
  - **Back**
    - Is fully supported with appropriate lumbar support when sitting vertical or leaning back slightly
  - **Thighs**
    - And hips are supported by a well-padded seat and generally parallel to the floor
  - **Knees**
    - Are about the same height as the hips with feet slightly forward
-

# WORKING POSTURE

- Regardless of how good your working posture is, working in the same posture or sitting still for prolonged periods is not healthy. **You should change your working position frequently throughout the day in the following ways:**
    - Make small adjustments to your chair or backrest.
    - Stretch your fingers, hands, arms, and torso.
    - Stand up and walk around for a few minutes periodically.
-

# WORKING POSTURE





# WORKING POSTURE

## Upright sitting position

- The user's neck and torso are approximately vertical and in line. The thighs are approximately horizontal and the lower legs are vertical



## Standing

- The user's legs, torso, neck, and head are approximately in-line and vertical. The user may also elevate one foot on a rest while in this posture.



# WORKING POSTURE

## Declined sitting

- The user's thighs are inclined with the buttocks higher than the knee and the angle between the thighs and the torso is greater than 90 degrees. The torso is vertical or slightly reclined and the legs are vertical



## Reclined sitting posture

- The user's torso and neck are straight and recline between 105 and 120 degrees from the thighs.



# MONITOR



- Put monitor directly in front of you and at least 20 inches away.
- Place monitor so top line of screen is at or below eye level.
- Place monitor perpendicular to window.

# KEYBOARD



- Put the keyboard directly in front of you.
  - Your shoulders should be relaxed and your elbows close to your body.
  - Your wrists should be straight and in-line with your forearms.
-

# POINTING DEVICES

- Keep the pointer/mouse close to the keyboard.
- Alternate hands with which you operate the pointer/mouse.
- Use keyboard short cuts to reduce extended use.



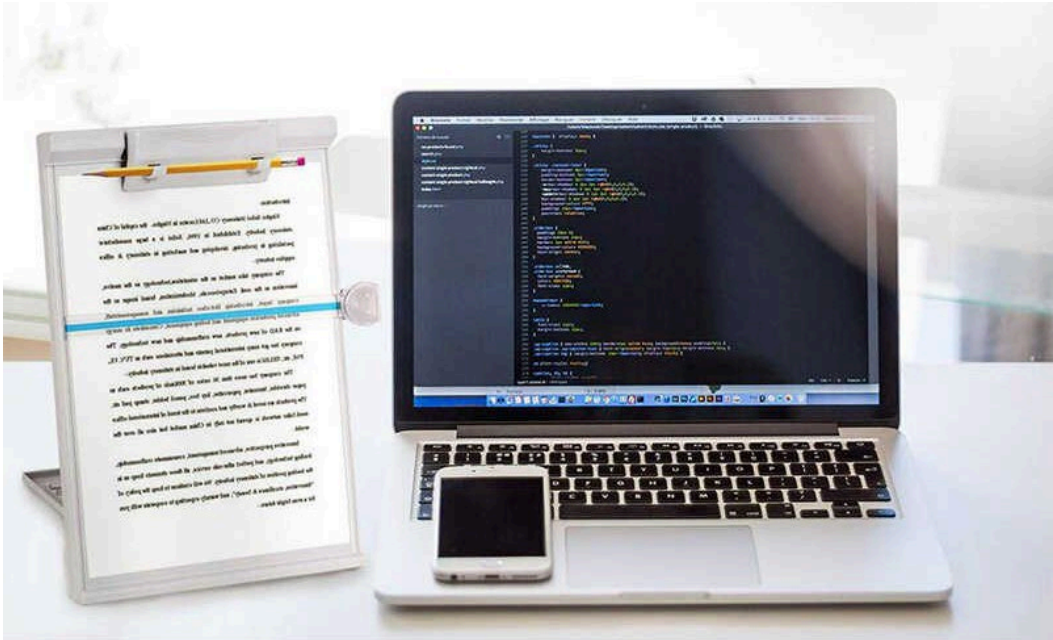
## WRIST AND PALM SUPPORT

- Use a wrist rest to maintain straight wrist postures and to minimize contact stress during typing and mousing tasks.



# DOCUMENT HOLDERS

- Documents should be at the same height and distance as the monitor.



# DESK



- Desk surface should allow you to place the monitor directly in front of you, at least 20 inches away.
- Avoid storing items on top of workspaces or under desks.
- Desks should be able to accommodate a variety of working postures.



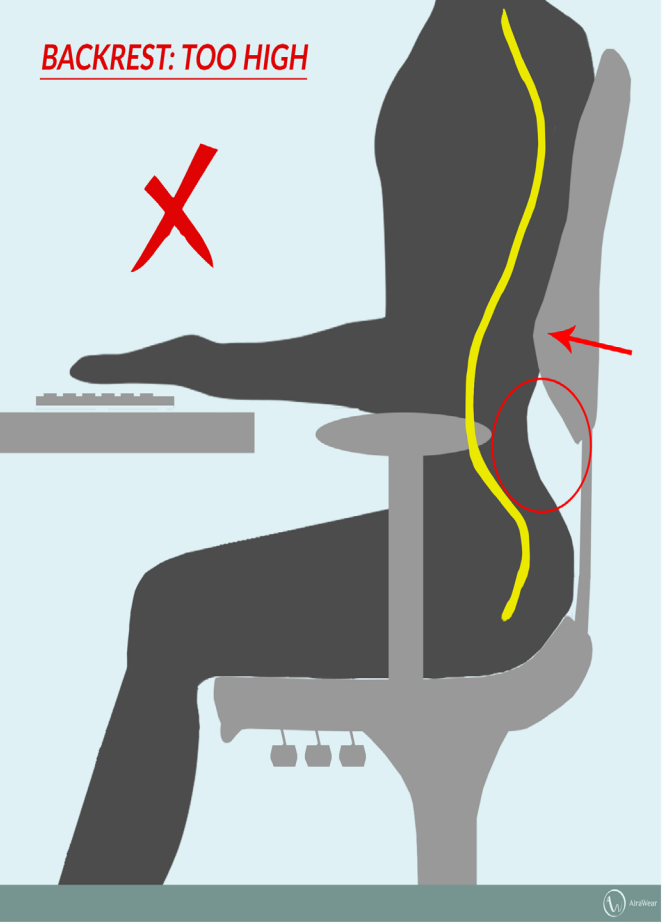
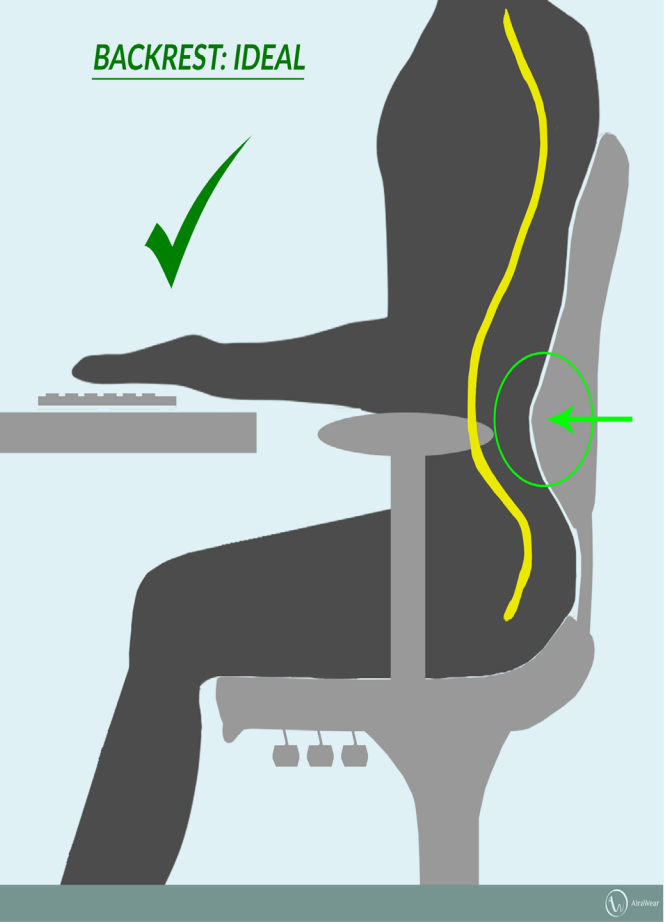
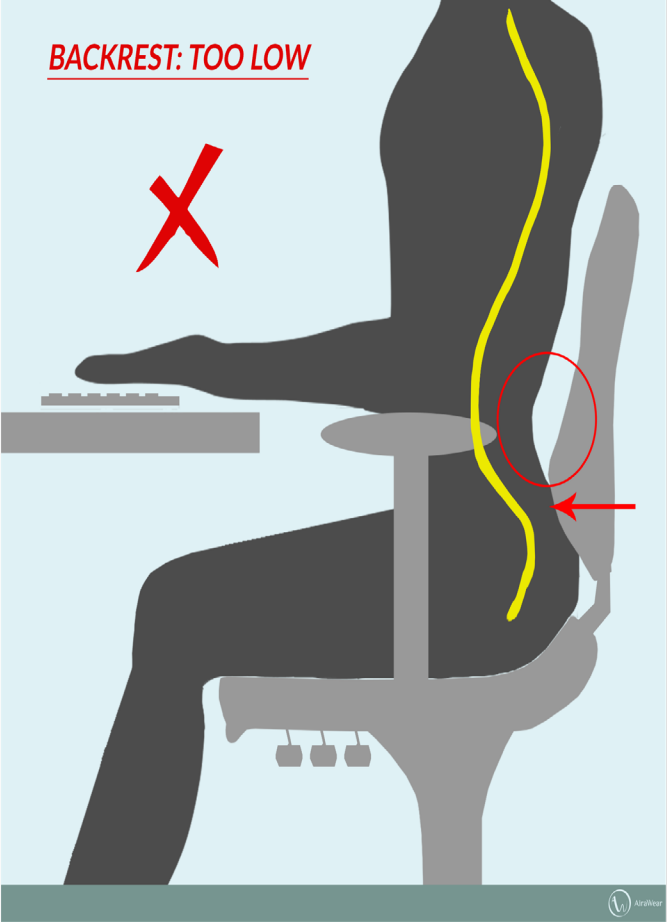


# CHAIR

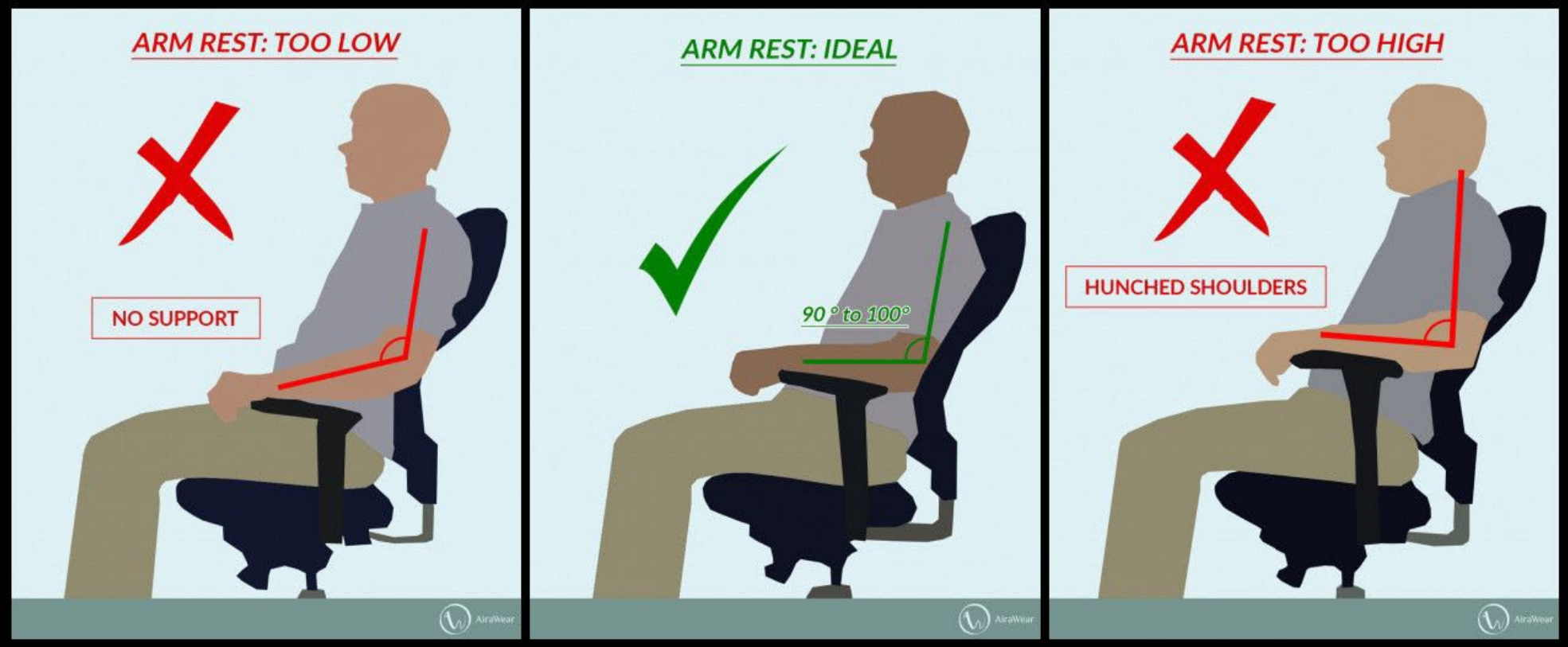
- The backrest should conform to the natural curvature of your spine and provide adequate lumbar support.
- The seat should be comfortable and allow your feet to rest flat on the floor or footrest.
- Armrests, if provided, should be soft, allow your shoulders to relax and your elbows to stay close to your body.
- The chair should have a five-leg base with casters that allow easy movement along the floor.



# CHAIR

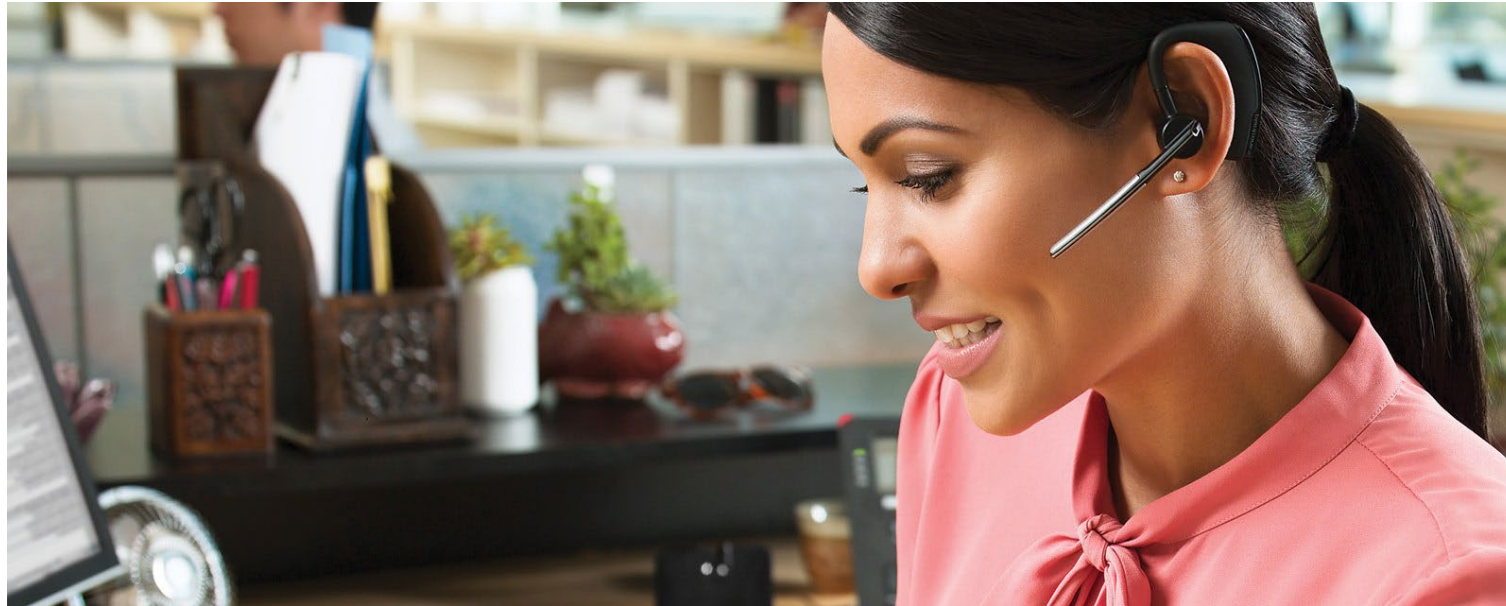


# ARM REST



# TELEPHONE

- Use a speaker phone or head set for long conversations.
- Keep it close enough to avoid repeated reaching.



## WORKSTATION ENVIRONMENT

- Arrange your office to minimize glare from overhead lights, desk lamps, and windows.
  - Maintain appropriate air circulation.
  - Avoid sitting directly under air conditioning vents that "dump" air right on top of you.
-

# EXERCISES

- High repetition tasks or jobs that require long periods of static posture may require several, short rest breaks (micro breaks). During these breaks users should be encouraged to stand, stretch, and move around. This provides rest and allows the muscles enough time to recover.
- Alternate tasks whenever possible, mixing non-computer-related tasks into the workday. This encourages body movement and the use of different muscle groups.



# DESK EXERCISES

- Blink!!! and exercise eye muscles frequently to avoid eye strain
- Head rolls side to side and front to back
- Shoulder shrugs
- Arms over the head stretching side to side and backwards
- Stretching legs outward off the floor
- Ankle rolls
- Seated knee raises



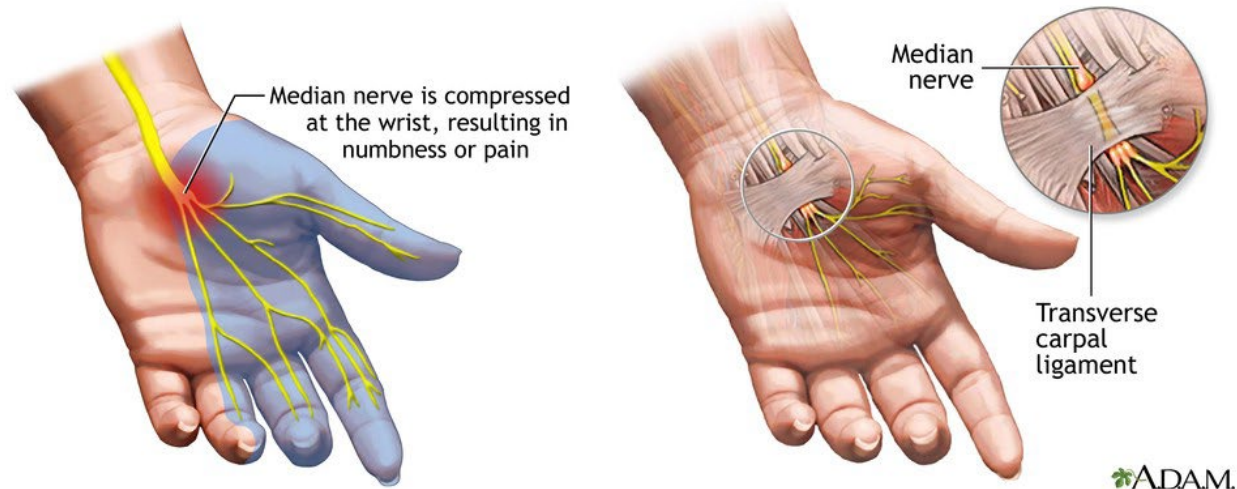
## MSD'S SIGN SYMPTOM

- Numbness or a burning sensation in the hand
  - Reduced grip strength in the hand
  - Swelling or stiffness in the joints
  - Pain in wrists, forearms, elbows, neck, or back
  - Reduced range of motion in the shoulder, neck, or back
  - Dry, itchy, or sore eyes
  - Blurred or double vision
  - Aching or tingling
  - Cramping
  - Weakness
-



# CARPAL TUNNEL, INSIDE OF WRIST

- Inside view of wrist
- Yellow nerve crosses under flexor retinaculum
- Nerve has to share the space with nine tendons and tendon sheaths.



# MEDIAN NERVE (CARPAL TUNNEL)

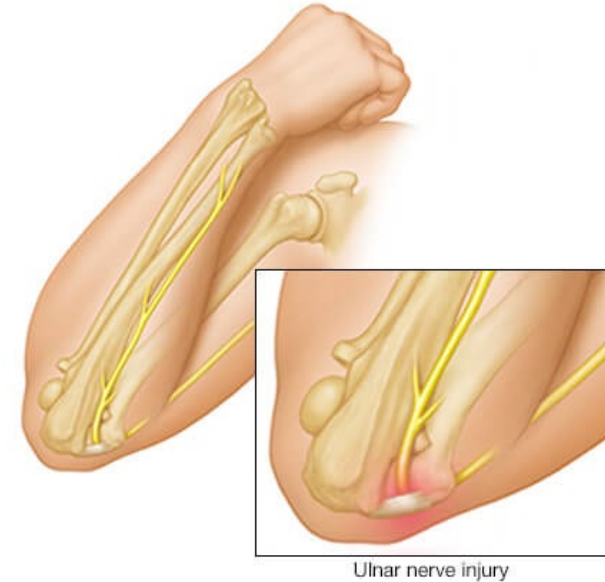


## Signs and Symptoms

- Pain in the front of the wrist.
  - Numbness or tingling into the thumb, index, middle and 1/2 of the ring finger.
  - Weakness in the hand with a tendency to drop objects.
  - Increased pain and tingling at night while sleeping.
-

# CUBITAL TUNNEL OR “FUNNY BONE”

- The ulnar nerve passes by the inside of the elbow through a fibrous tunnel.
- Swelling can put pressure on the ulnar nerve.
- Symptoms are felt at the elbow and into the little finger.
- This is called Cubital Tunnel Syndrome.



## WATCH THE HAND MOVEMENTS



- **DON'T** rest your wrists on the desktop



- **DO** let your wrists float
-

# WATCH THE HAND MOVEMENTS

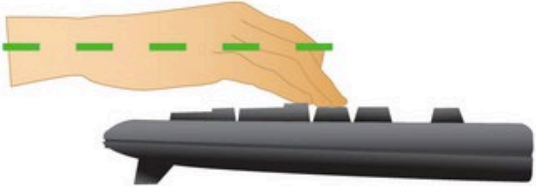
**RIGHT!**



**WRONG!**



**RIGHT!**



**WRONG!**



# SIT, STAND, OR WALK



# LAPTOP ERGONOMIC GUIDELINES

## CENTERS FOR DISEASE CONTROL AND PREVENTION

The CDC recommends that laptop computers not be used as a primary computer at home or at work.

### **OCCASIONAL USERS SHOULD:**

- Find a comfortable chair
- Use a neutral wrist position
- Position screen to minimize neck bending



# LAPTOP GUIDELINES

- Take mini-breaks every 20-30 minutes.
  - Keep viewing distance at 18-30 inches.
  - Position keyboard at elbow height.
  - If seated in a side-chair or couch, use a pillow to support your arms while keying.
  - Clean the screen regularly.
  - Consider using an external keyboard or docking station
-



## TRANSPORTING THE COMPUTER

- If computer and accessories > 10 lbs, consider a bag with wheels.
- Eliminate all unnecessary items from your briefcase.
- Carry a laptop in a case with padded shoulder pad and handle.
- Shift hands and shoulders to balance the load.



# PROGRAMS AND SERVICES

## ENVIRONMENTAL HEALTH AND SAFETY

- Fire Protection Engineering
- Life Safety and Emergency Preparedness
- Environmental Compliance
- Laboratory Safety
- Occupational Safety
- Occupational Health and Medical Surveillance
- Materials Management
- Industrial Hygiene
- Chemical Hygiene
- Safety Training



# Greg Hogan

## Environmental Health and Safety

**O** | 405.744.7241

**E** | [ehs@okstate.edu](mailto:ehs@okstate.edu)

UHS Suite 002

[ehs.okstate.edu](http://ehs.okstate.edu)



QUESTIONS?

