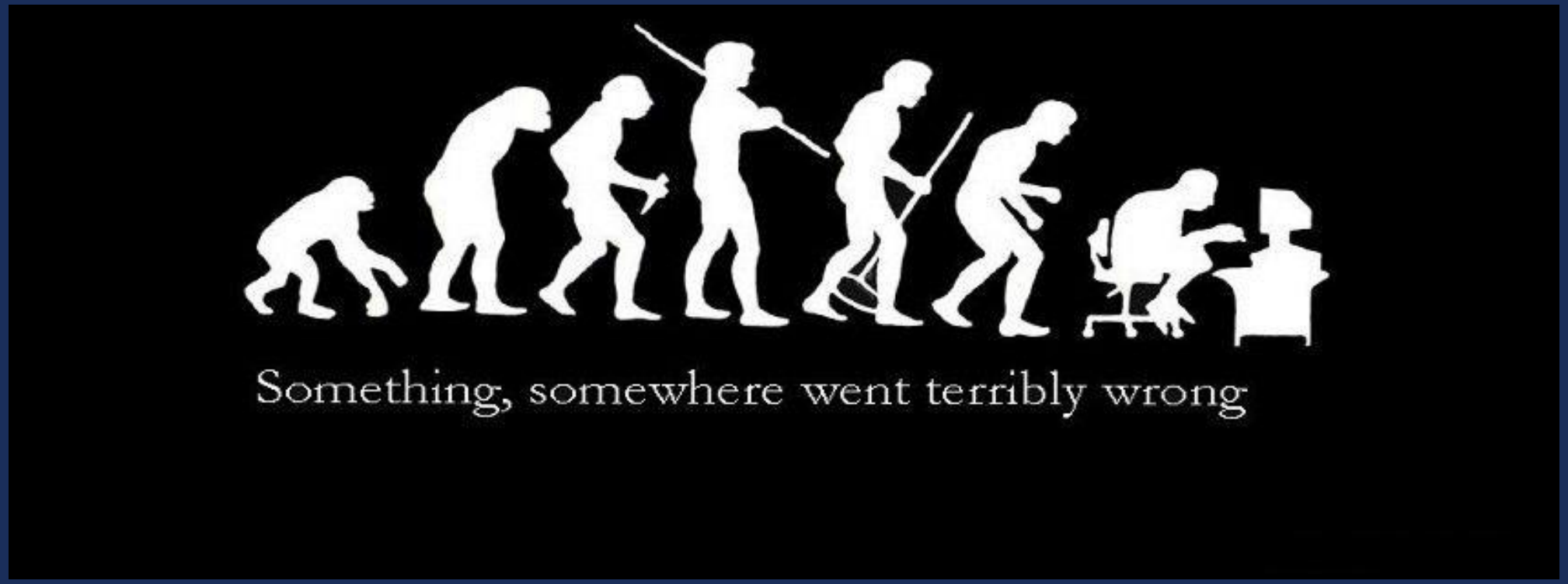
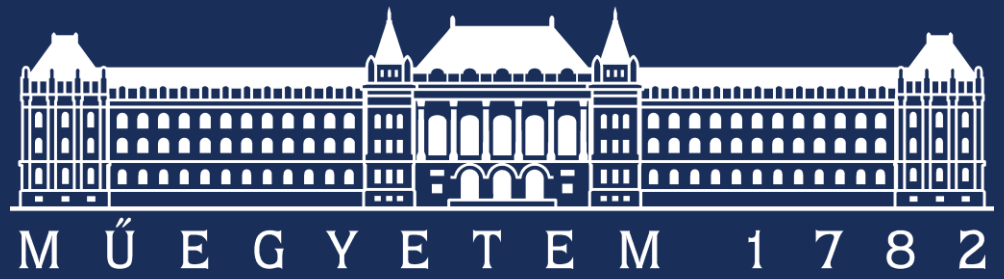
Office Ergonomics



„The Evolution of man”



Office Ergonomics

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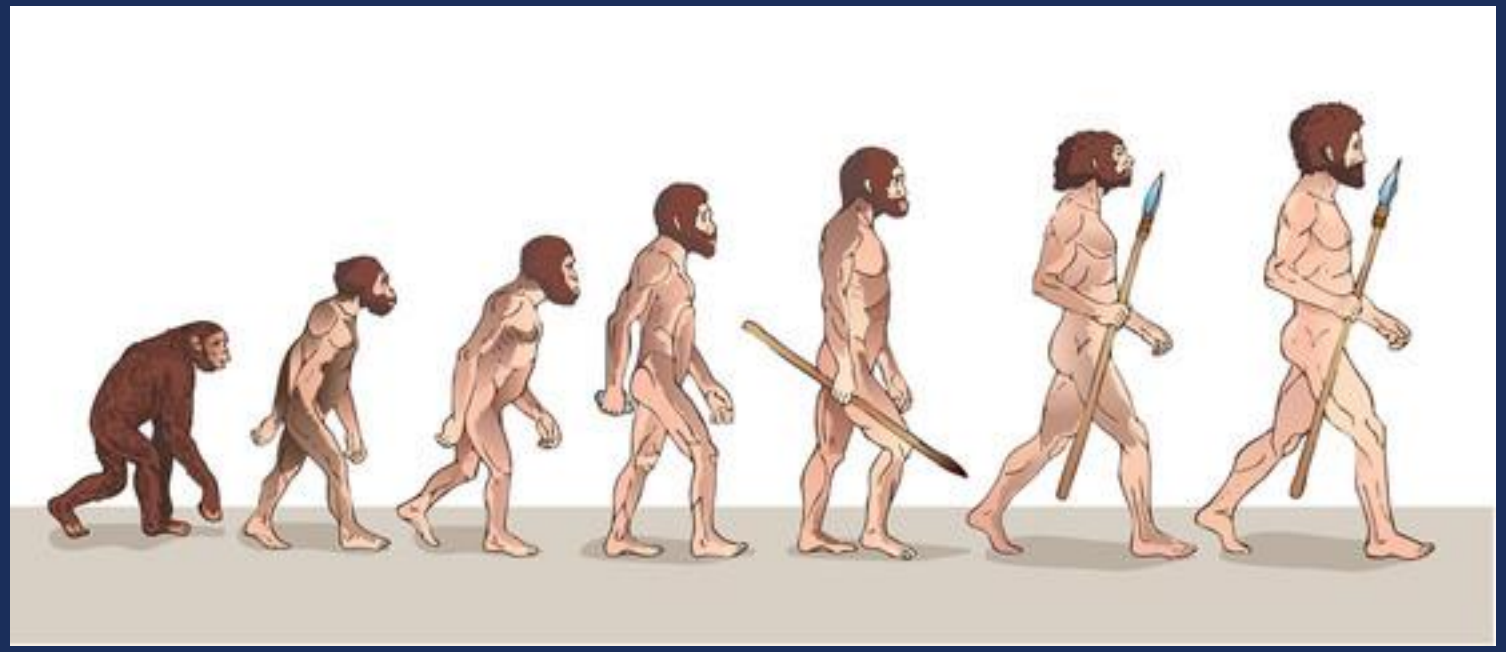
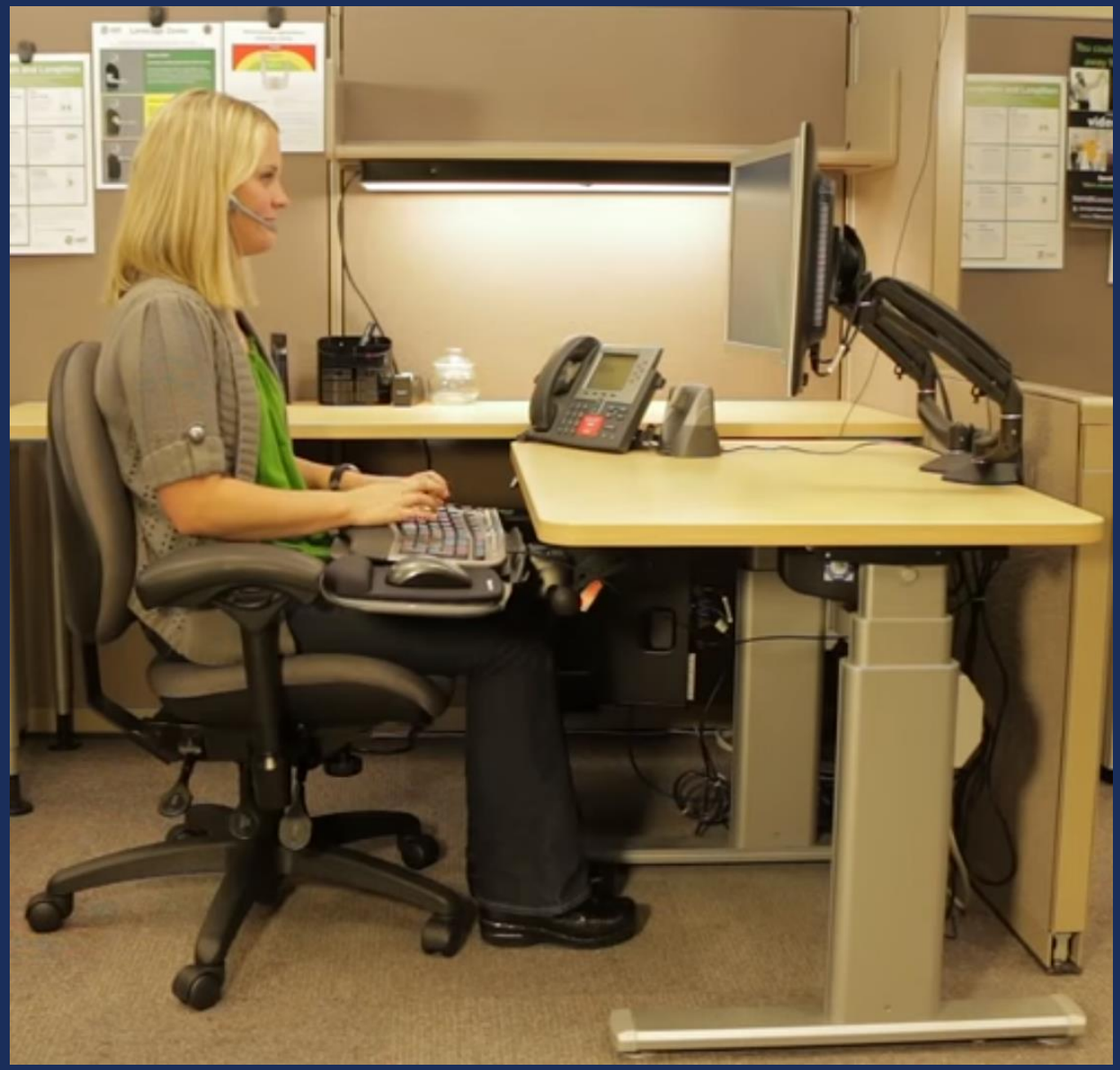
Human evolution shaped our bodies to be good long distant runners

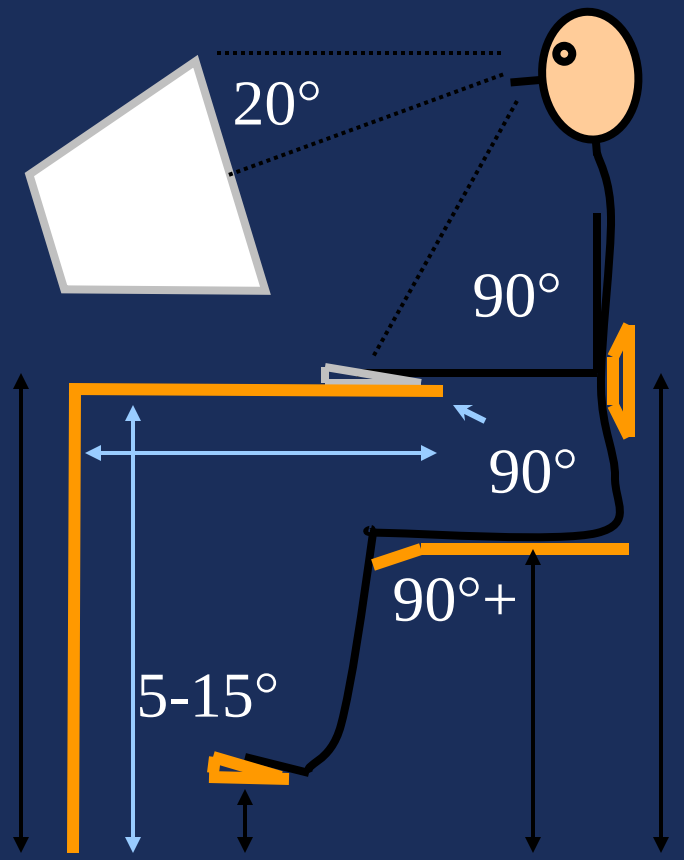


... and this is what most of us do today

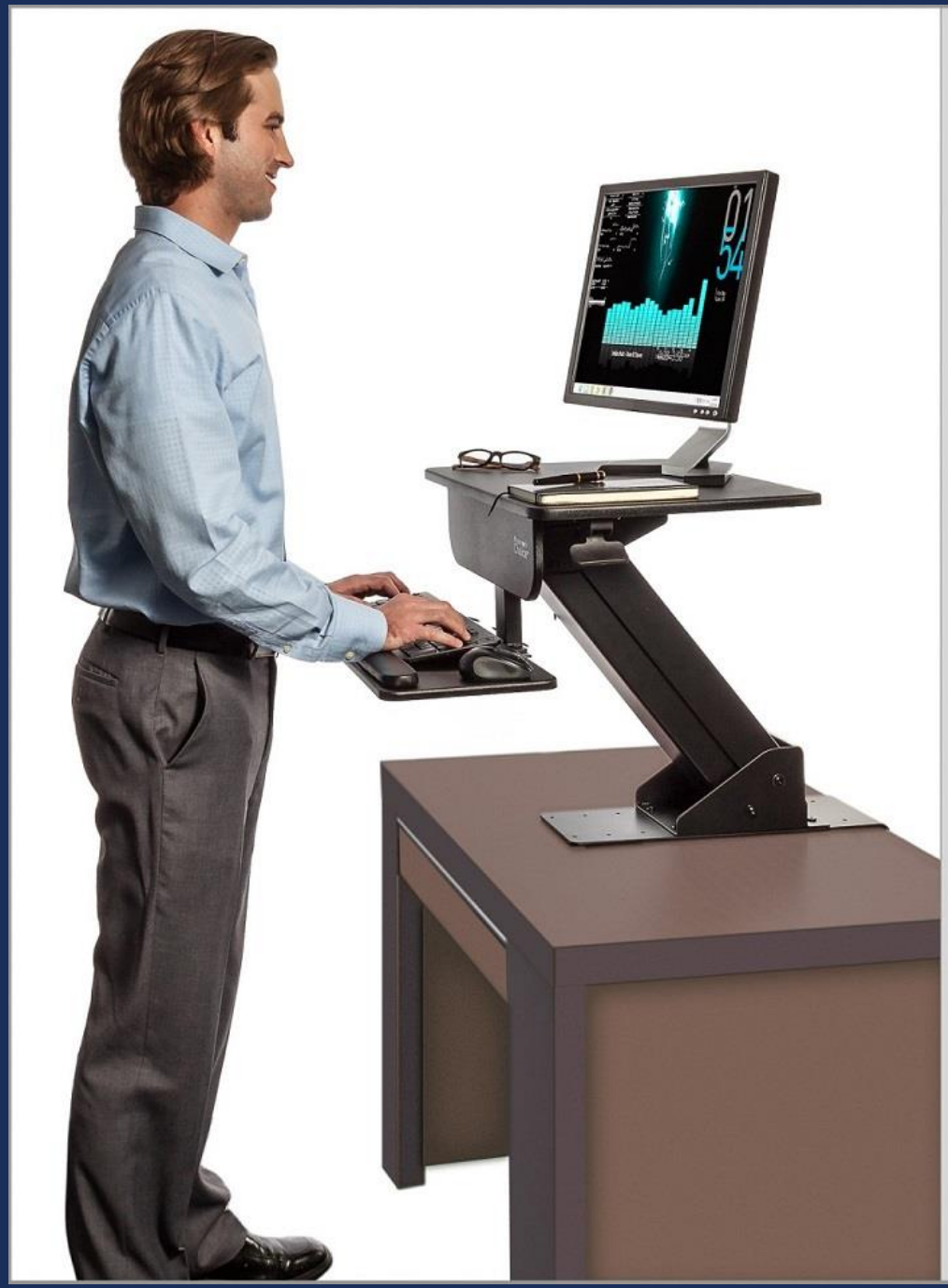
The right way to sit

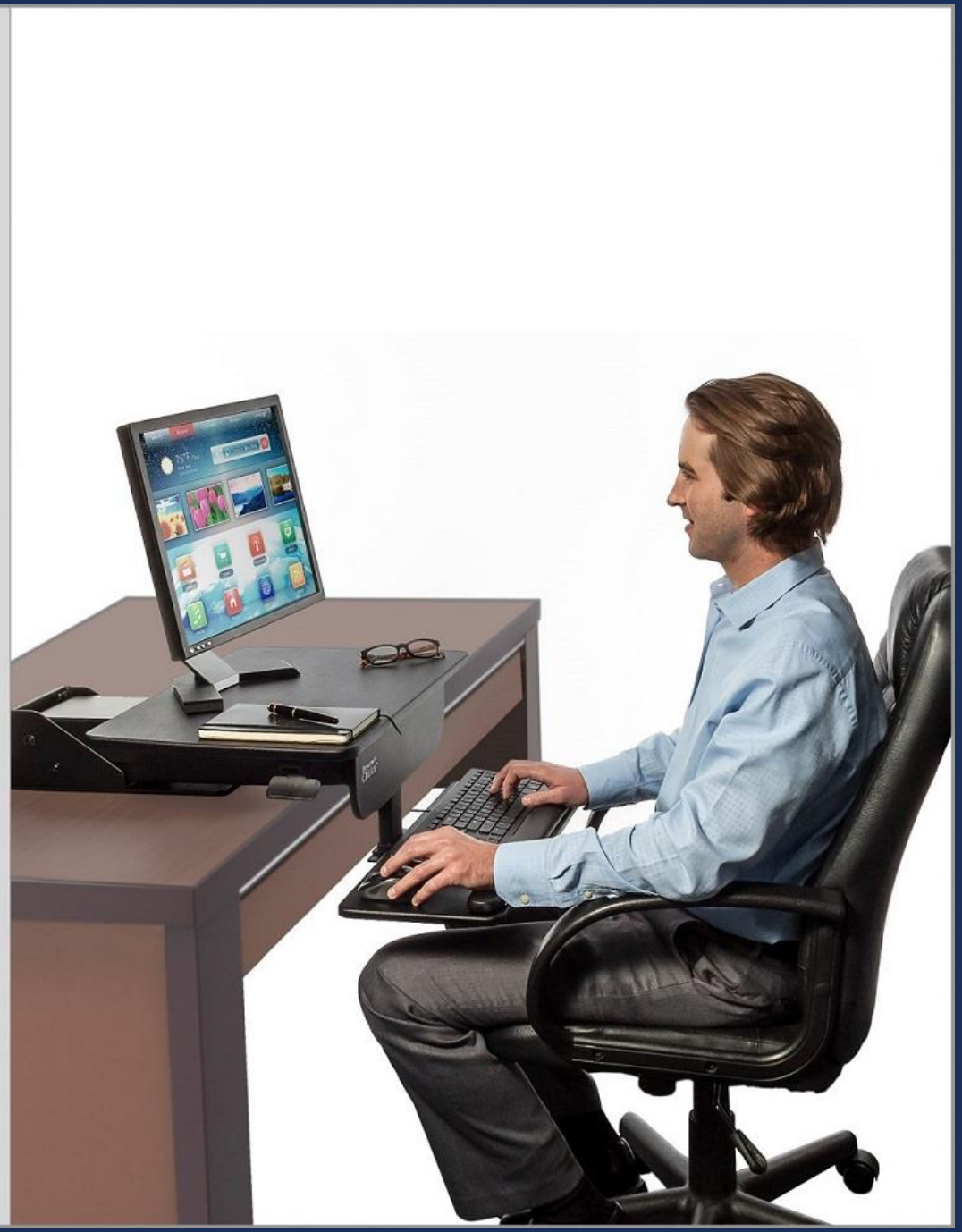


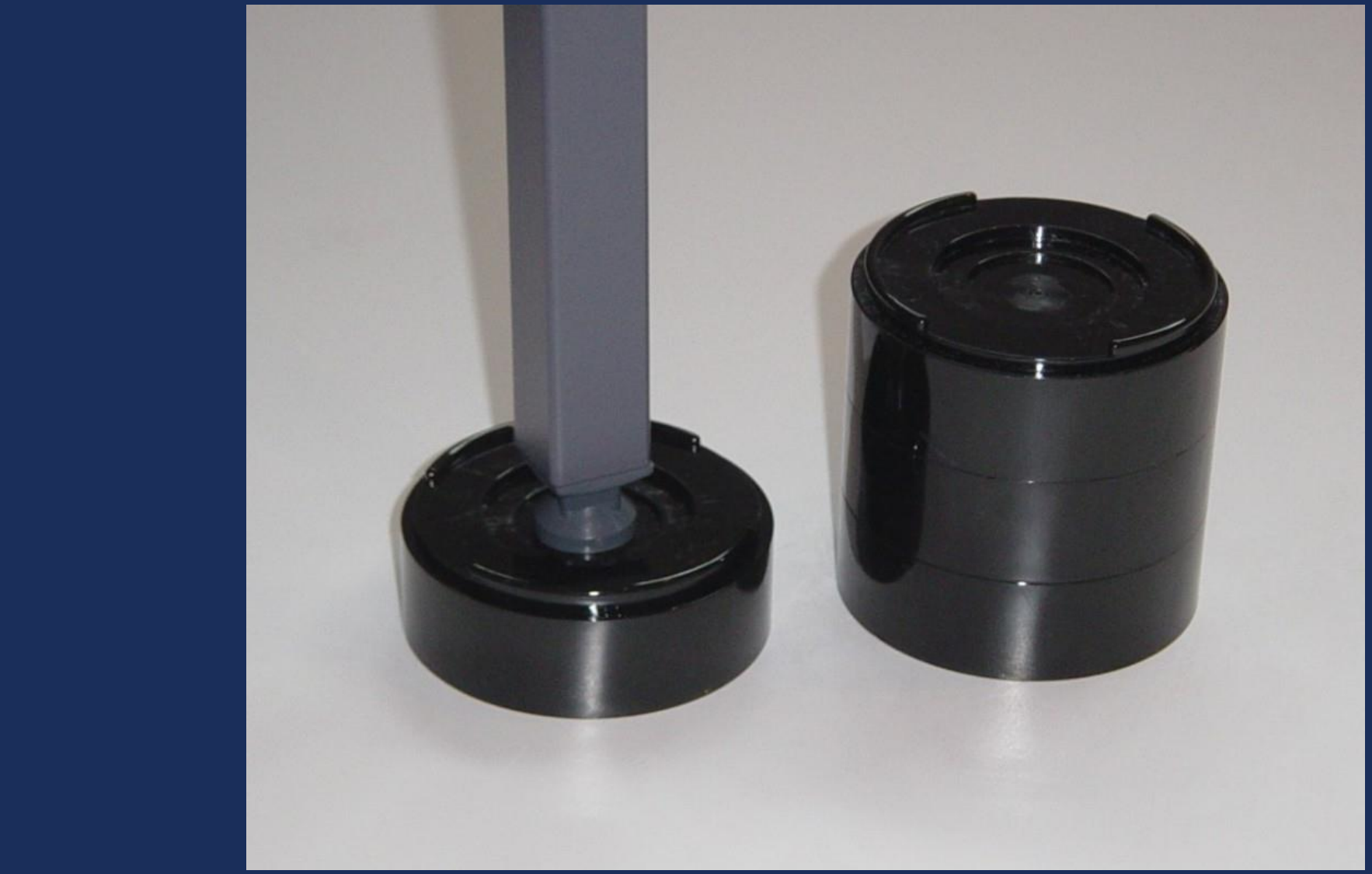
Suggested Setup



- Adjustable height of the seat/table/footrest
- Adjustable height of the *lumbar* support (not a *back*-rest! supporting the *waist*, not the back!)
- Circa vertical back with natural spinal curvature, perpendicular and horizontal arms horizontal thigh, vertical legs
- -20° view angle (neck + eyes)
- Equal viewing distances: display +keyboard? +papers?
- Place to support the wrist, optional arm/rest; keyboard and mouse in the same height
- Enough place for the legs







Problems of the Standing Posture

- Problems of the 5th vertebra
- Varicose vein, phlebitis
- Dental caries
- etc.

Problems of the Sitting Posture

1. The inflexed posture
   - Pressing the abdominal organs
     - Disorders of digestion
   - Pressing the arteries
2. Pressing symptoms
     - Deflection of arteries
       - Torpidity
     - Decubitus (bed-sore)
   - Boundary of the seat -> thigh
   - Arm-rest -> arm

Problems of the Sitting Posture

3. Few motions,
   the muscles slacken

- The pump effect of contractures of muscles don’t help the heart
  - Higher load of the heart
  - The organs (in general) get insufficient amount of blood (oxygen and nutritive)
  - The muscles get insufficient amount of blood -> torpidity, etc..
  - The brain get insufficient amount of blood -> fatigue

Problems of the Sitting Posture

4. A few muscles tense always (without relaxing, without sufficient amount of blood)

- Muscles get tired
- Muscular strain, fatigue-fever (i.e. shoulders)
- The balance of the muscles upset
  - Nodulation of muscles (i.e. shoulders) -> inflammation
- Constrained posture
- Deformations
- Narrowed capacity of motion (i.e. shoulders)
- Pain

Problems of the Sitting Posture

4/B. Indirect results of the uninterrupted muscle tensions:

- Referred pain (i.e. the problems of the back and the shoulders can cause headache)
- The nodular muscles press the artery of the neck -> headache, dizzy, turning

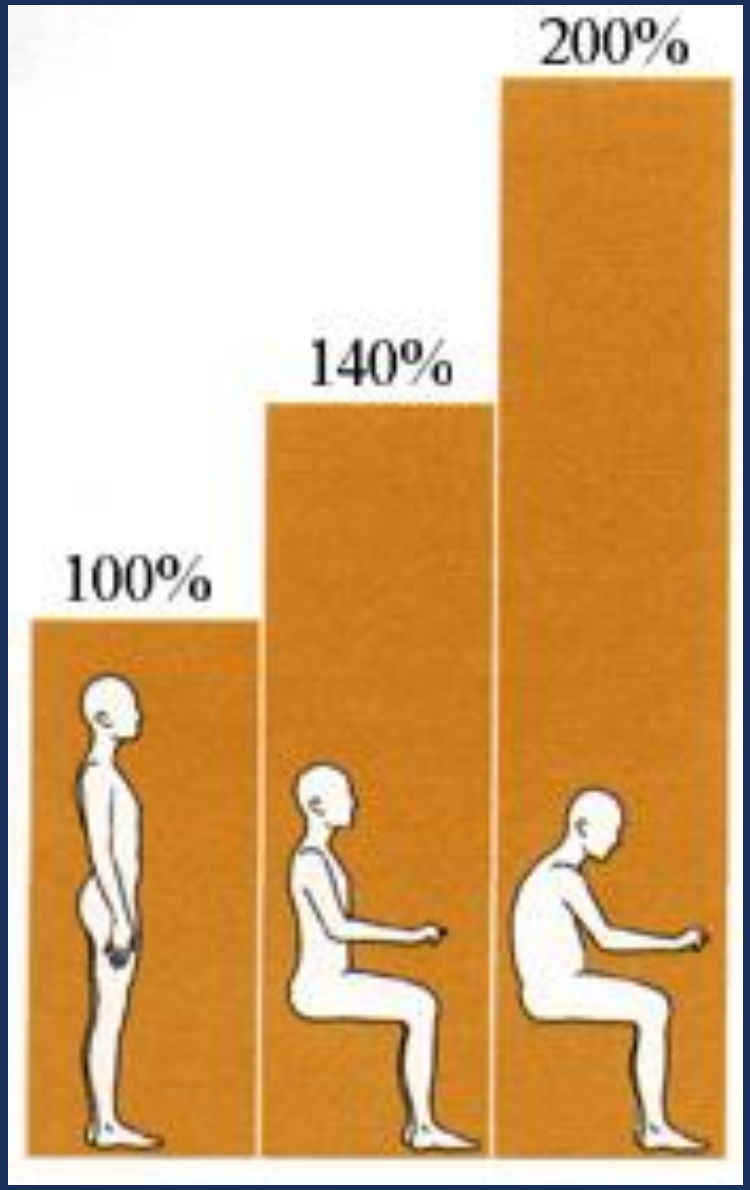
5. The wrong pose of the backbone

Problems of the Sitting Posture

5. The bad posture of the backbone

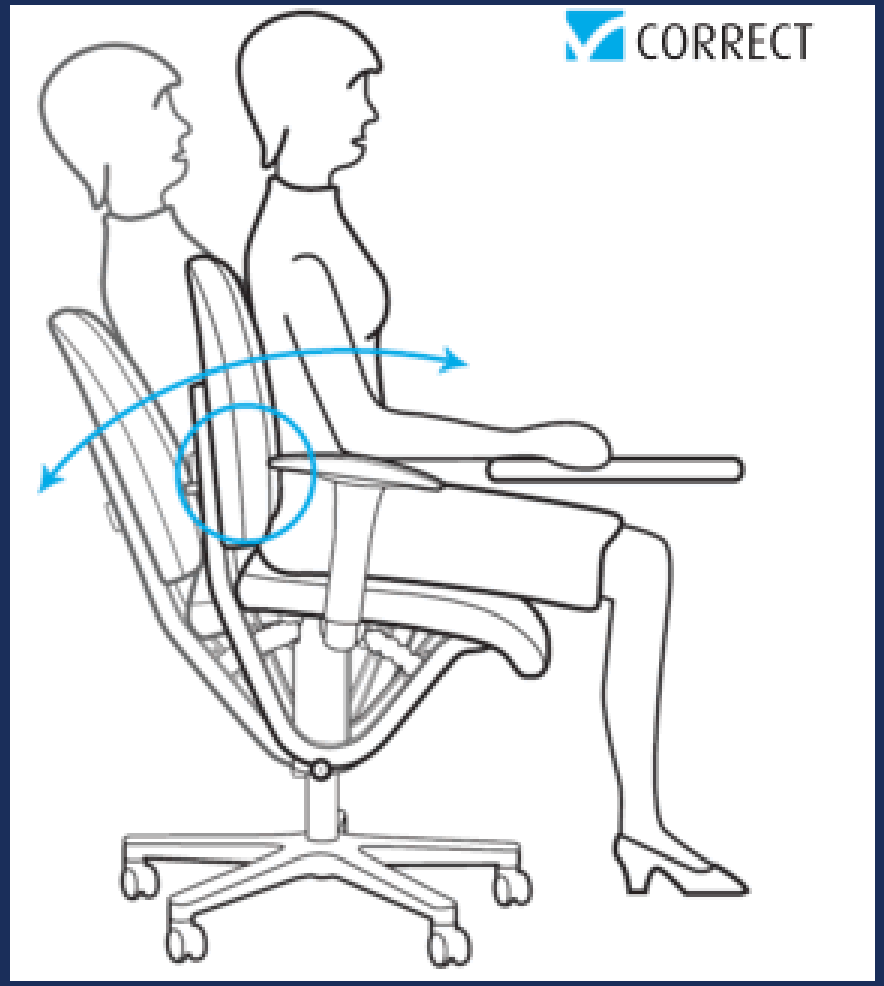
- The vertebral disks loaded asymmetrically
- Muscles get tired
  -> the backbone will be overloaded
  - Slipped vertebral disk, Lumbago

Load of the Back



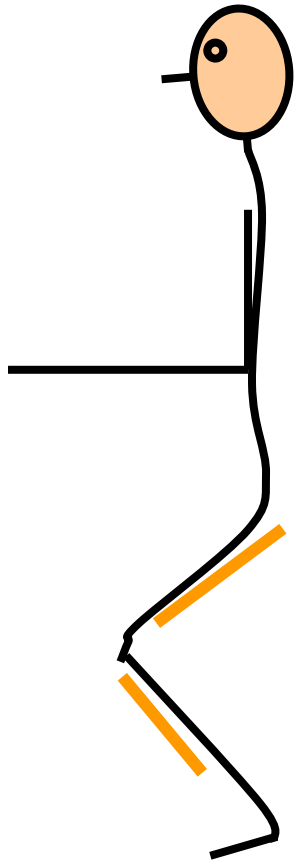
Solution

- Minimize the duration of sitting!
- Sit dynamic! (Change your posture/position in the seat frequently!)
- 5-minute physical exercises in every hour either sitting or standing (stretching, etc.)
- Adequate pose
- Sufficient furniture to supply the above mentioned issues
- Massage, remedial gymnastics



Alternative Choice

Kneeling chair



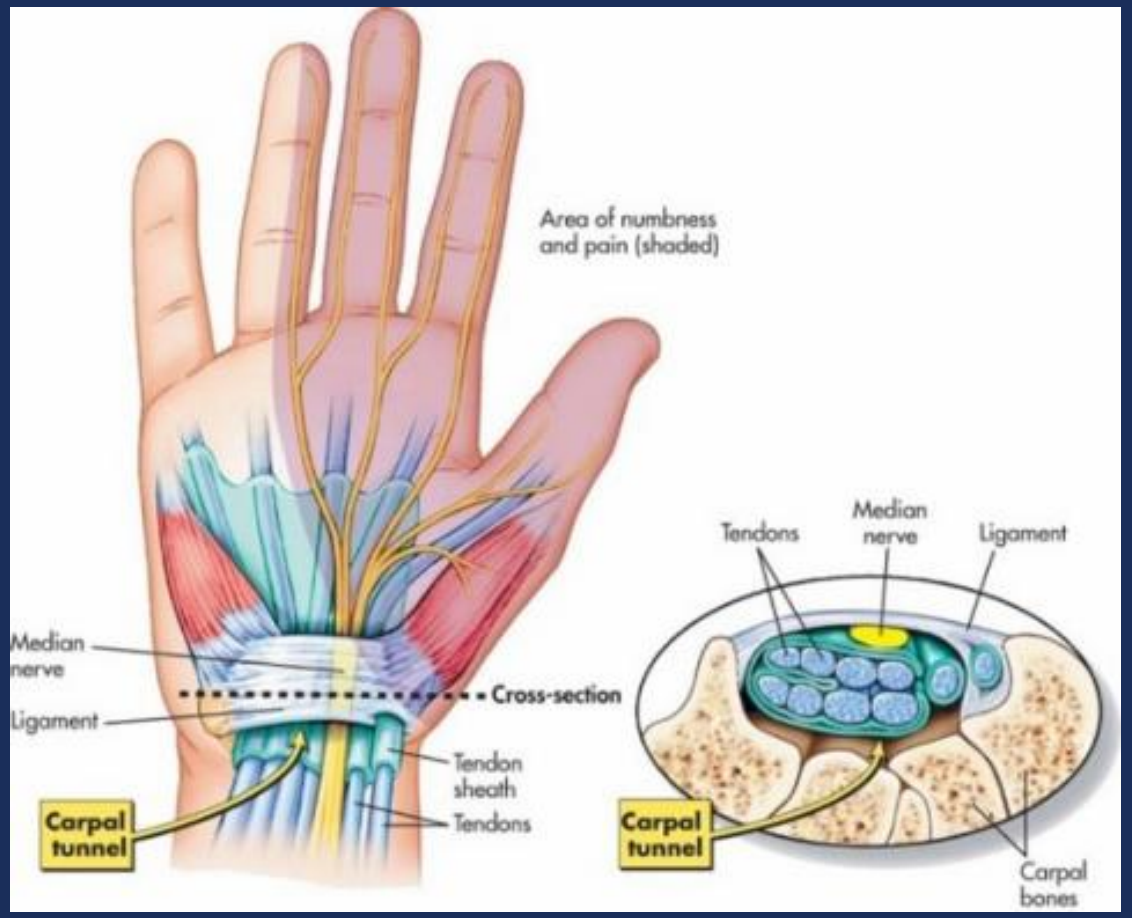

Stacking Tray/Phone Stand
Accessory Slots
Manuscript Stand
Adjustable Height Work Surface
Clear View Liftable Center Console
Cup/Accessory Hold
Universal Attachment: Fits Most Treadmills
Mobile Office by Day, Treadmill at Night

RSI - CTD =

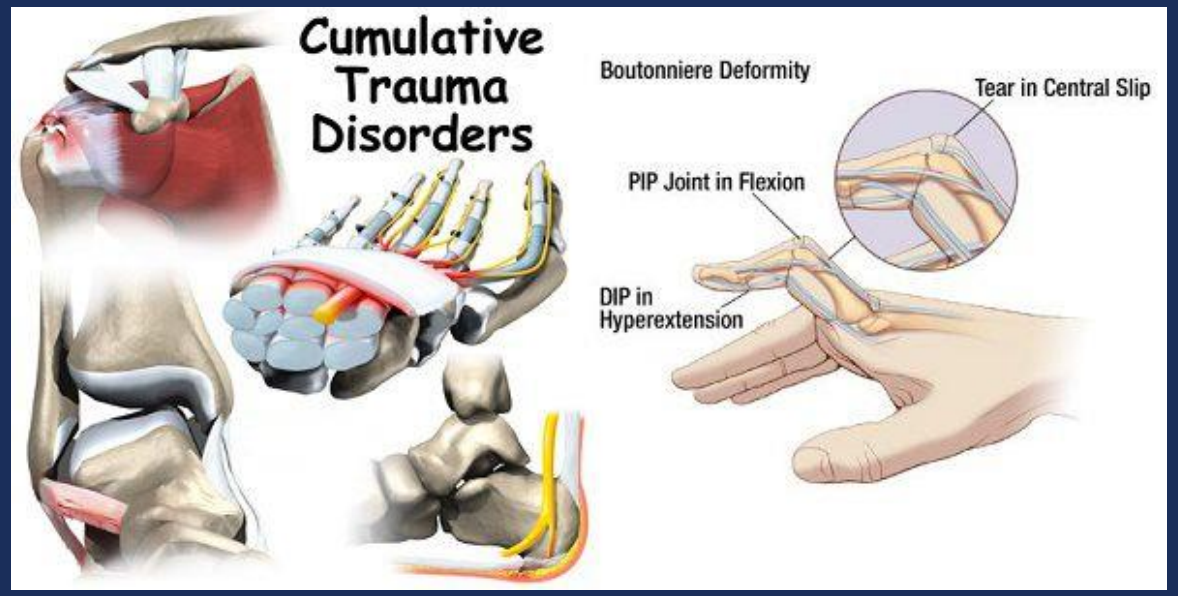
Repetitive Strain Injury -

Cumulative Trauma Disorder

- Symptoms
  - Torpidity - Inactivity
  - Whitening of the fingers
  - Circulatory disturbances
  - Pain
  - Tennis-elbow
  - Arthritis: inflammation of the tendon sheath (tissue surrounding tendon) of the finger-related tendons (leaders) of the fingers inside the hand



RSI - CTD



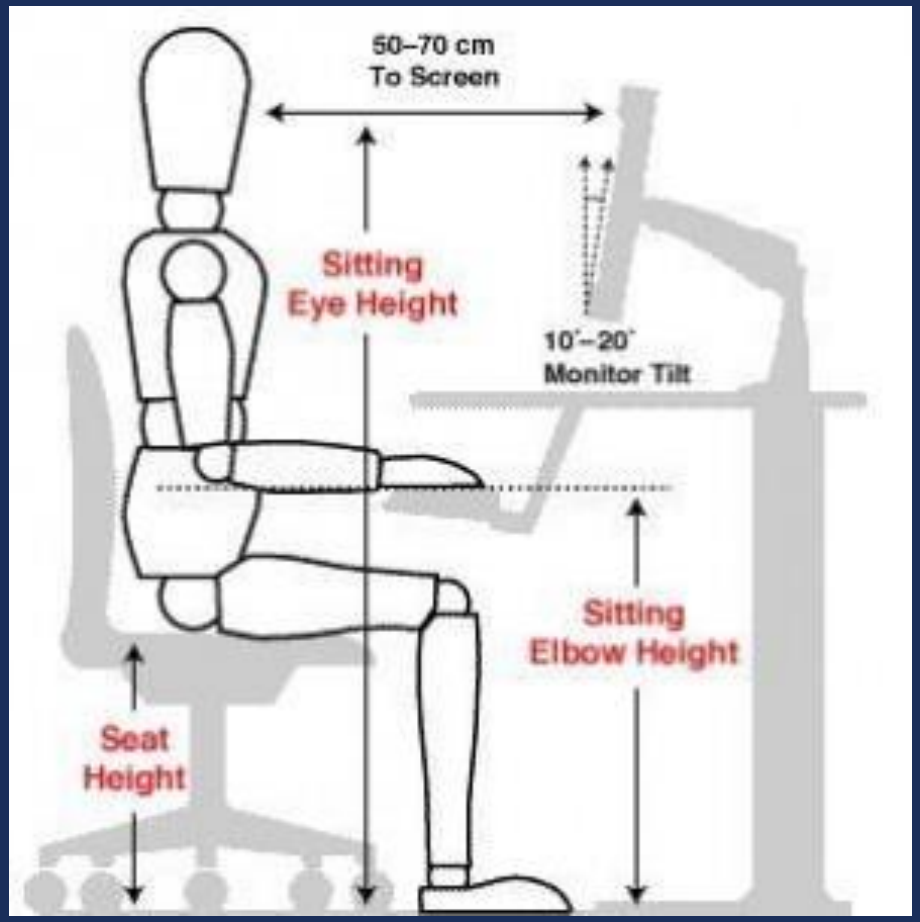
- Causes
  - Unnecessary repetition
  - Wrong pose (i.e. wrong carriage of wrist)
  - Wrong tool (i.e. cool metal)

RSI - CTD

- Solutions
  - Simplified operations (software ergonomics)
  - Natural pose
  - Sufficient support (enough place on the table in front of the keyboard and the mouse)
  - Break (at least hourly) to relax and regenerate
  - Changing the activity – decreasing the monotony (work organization)

Issues of the Eyes

1. If the display is placed too high
   -> the eyelids stretch up
   -> insufficient number of blinks
   -> too dry eyeballs
   -> rubefaction of eyes (red eyes)
   -> higher sensitivity of infections




tower
MONITOR STAND

Issues of the Eyes

2. Equal distances to focus
   - i.e. the distances between
     - the eyes and the display
     - the eyes and the papers
     - the eyes and the keyboard

3. Not too much differences between the brightness of the display, the brightness of the closer environment, and the brightness of the room

Issues of the Eyes

4. Glaring, reflections
   - Lighting must be perpendicular to the direction of viewing
   - At least 2 m from the windows
   - Screen filter against the reflections

5. Sufficient contrast

Physical Environment

1. Lighting
2. Noise
3. Vibration
4. Climate
5. Quality of the air
6. Meteorological factors

Main types of lightings

Natural Light

Artificial Lights

Static lighting – dynamic lighting

Approaching the natural effect

Saving energy – sensors control the inner lighting

Lighting Systems

General lighting

Aim: to diffuse light, avoiding shade and glaring

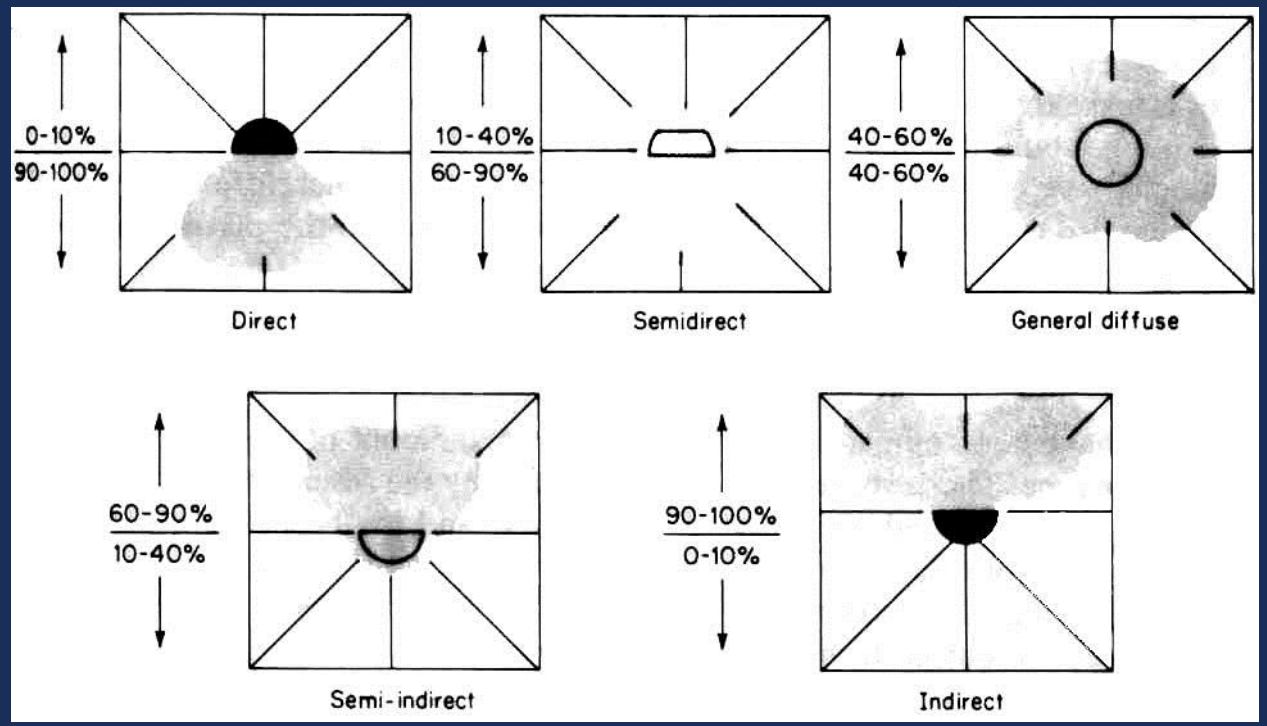
Localized lighting

Essential for precise work

Local lighting

Focused only to personal area

- 3 main types of the artificial lights:
  - Direct lighting
  - Diffuse lighting
  - Indirect lighting



General lighting of rooms that need same lighting:

Proportion of the less and the general lighting 1:3

If lighting consists of localized and general lighting:

The general lighting should give at least the 40%

Localized lighting on the workspace – without general lighting:

Proportion of the less and the general lighting 1:6

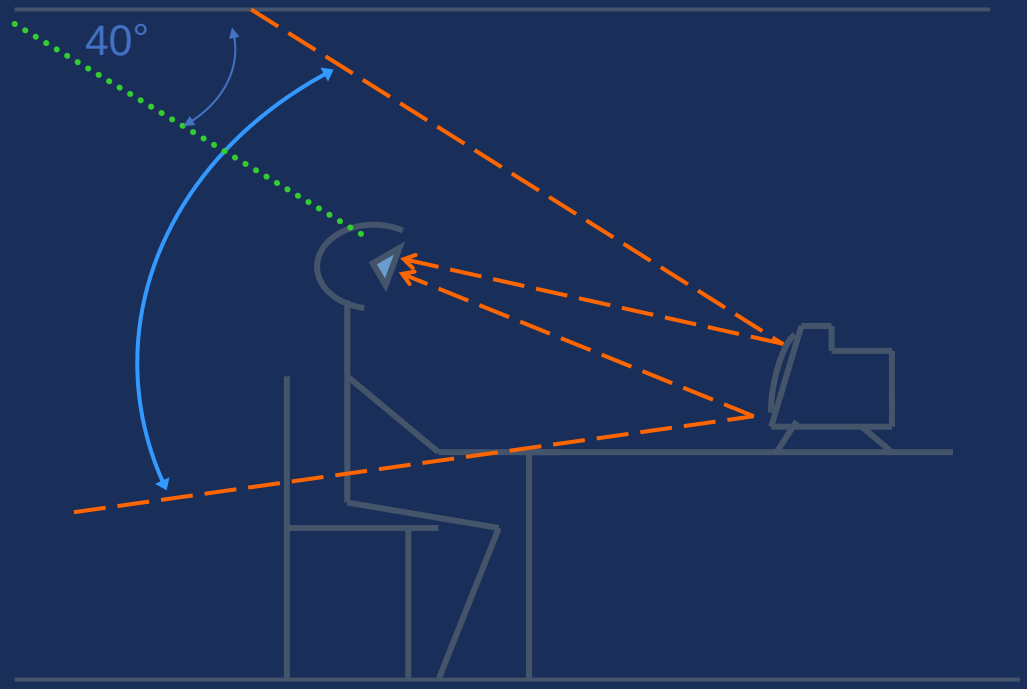
Glare

If a relatively strong light or its reflected picture appears in the field of vision

- direct
- reflected

Critical range

The inner space that reflects to eyes on the screen



Glare

- Effects:
  - Visibility decreases, it causes visual discomfort, it makes one indignant, accelerates the fatigue of the eyes

Due to these it decreases the productivity,
increases the accident risk

- Decreasing of the direct and reflected glare:
  - Removing the lights that are in 60°around the centre of the field of vision; using eyeshade
  - Using indirect, diffuse lights; using smooth, matt surfaces
  - Decreasing the reflection with screen filter

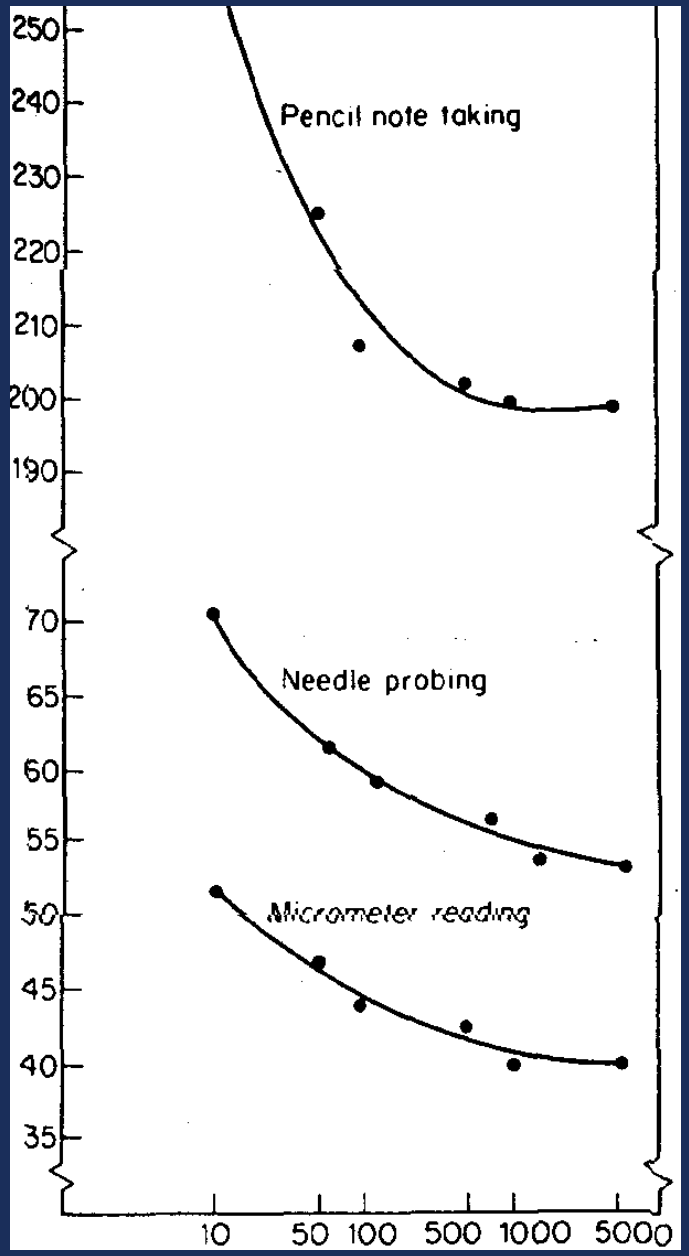
Illumination

Different work activities need light with different intensity - MSZ 6240

- Lavatory, restroom, staircase: **at least 100 lx**
- Living room, kitchen, dining room: **at least 200 lx**
- Classroom, washing-up, cafeteria, office with natural lighting: **at least 300 lx**
- Office without natural lighting, cooking, presentation, cashier: **at least 500 lx**

Illumination Efficiency

- How does the intensity of the lighting (*illumination*, lx) influence the efficiency and the time (sec.) needed for the work in case of tasks that need lot of light?



Colours

- Happy / sad colors
- Calming / stimulating colors
- Sensation of the temperature
- Sensation of the room (optical effect)
- Sensation of the brightness
- Gives the feeling of safety, natural
  (up: light, down: dark)
- Learnt meaning (e.g.: traffic – red, green, yellow, blue)
- Warning (red, yellow-black)
- Separating the important things from the unimportant ones
  (avoiding unwanted contrast)
- Different color – different function

The Effects of Insufficient Lighting

- Eye-muscles get tired quickly
- Headache, nervousness
- General mental and physical fatigue
- Decrease of the efficiency, faulty products, accident risk
- injury of the eye

The Effects of Noise

- Vegetative reactions over 65 dB
- Effect on the organs of hearing
  - adaptation: stimulus with the same strength effects them permanently, and, because of this, after a while, this sensation decreases or disappears
  - Exhaustion: giving decreased reactions to other stimuli after being stimulated permanently
  - Enduring injury: working in loud voice can have serious damages after a while

The Effects of Noise

- Psychological effects
  - They got used to it, they do not feel it is a burden, but it still effects in a damaging way
- Effects on the efficiency
  - Contradictory opinions

The Effects of Noise

- To avoid enduring loss of hearing:
  - Equivalent acoustical pressure level should be lower than 85 dB
  - The highest acoustical pressure should never go higher than 125 dB

- **To a greater extent demanding office work** 50 dB
- **Demanding office work** 55 dB
- **Medium demanding office work** 60 dB
- **Less demanding office work** 65 dB
- **Physical workplace that need higher attention** 70 dB
- **Computer room and kitchen** 75 dB

Standards according to office work:
MSZ 18152/2-83.

Defence against Noise Injury

- Decrease of the noise
  - Less loud machines
  - Constructional changes on the machines we have (flexible block)
- Change of the acoustics (of the room)
- Adequate organization of the work
- Individual safety equipment
  - Ear-plug, noise barrier helmet
- Ability tests, medical supervision

Personal Bubble

- The „bubble” around ourselves that can not be entered by others
- Its size changes due to our partner who we have interaction with
- We always have intensive response if it gets hurt
- Zones:
  - private (circle with 45 cm radius)
  - personal
  - social (120-360 cm)
  - public