Computer Vision Syndrome

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What is computer vision syndrome (CVS) ?

Combination of ocular problems associated with prolonged, uninterrupted use of computers or other disp

Rosenfield M. Computer vision syndrome: A review of ocular causes and potential treatments.
Ophthalmic Physiol Opt 2011;31:502-15.

Pathophysiology / etiology

- Due to accommodative spasms
- Due to vergence responses to electronic screens
- Due to ocular surface dryness
- Due to impact of glare and lightening

- There are other non ocular effects that are due to posturing

Pathophysiology / etiology(Dry eyes)

- The normal blink rate in human eyes is between 16-20 blinks/min.
- For persons working on the computer this decreases to 6- 8 blinks/minute.
- This leads to dry eyes which then leads to a feeling of tiredness in the eyes
- The increased corneal exposure resulting from the eyes being in the primary position as it fixates on the monitor frequently adds to the dry eye
- Air conditioning and fans in offices worsens the dry eyes

Pathophysiology / etiology(asthenopia)

- Reading a computer monitor screen is harder on the eyes because of the way the characters are formed on the monitor.

- The video display is made up of pixels, or tiny dots, rather than solid lines as on a printed page.

- Because our eyes cannot "lock" focus on and of these dots, the eyes must continually focus and refocus to keep the image sharp.

- This focusing and refocusing results in stress to the ciliary muscles
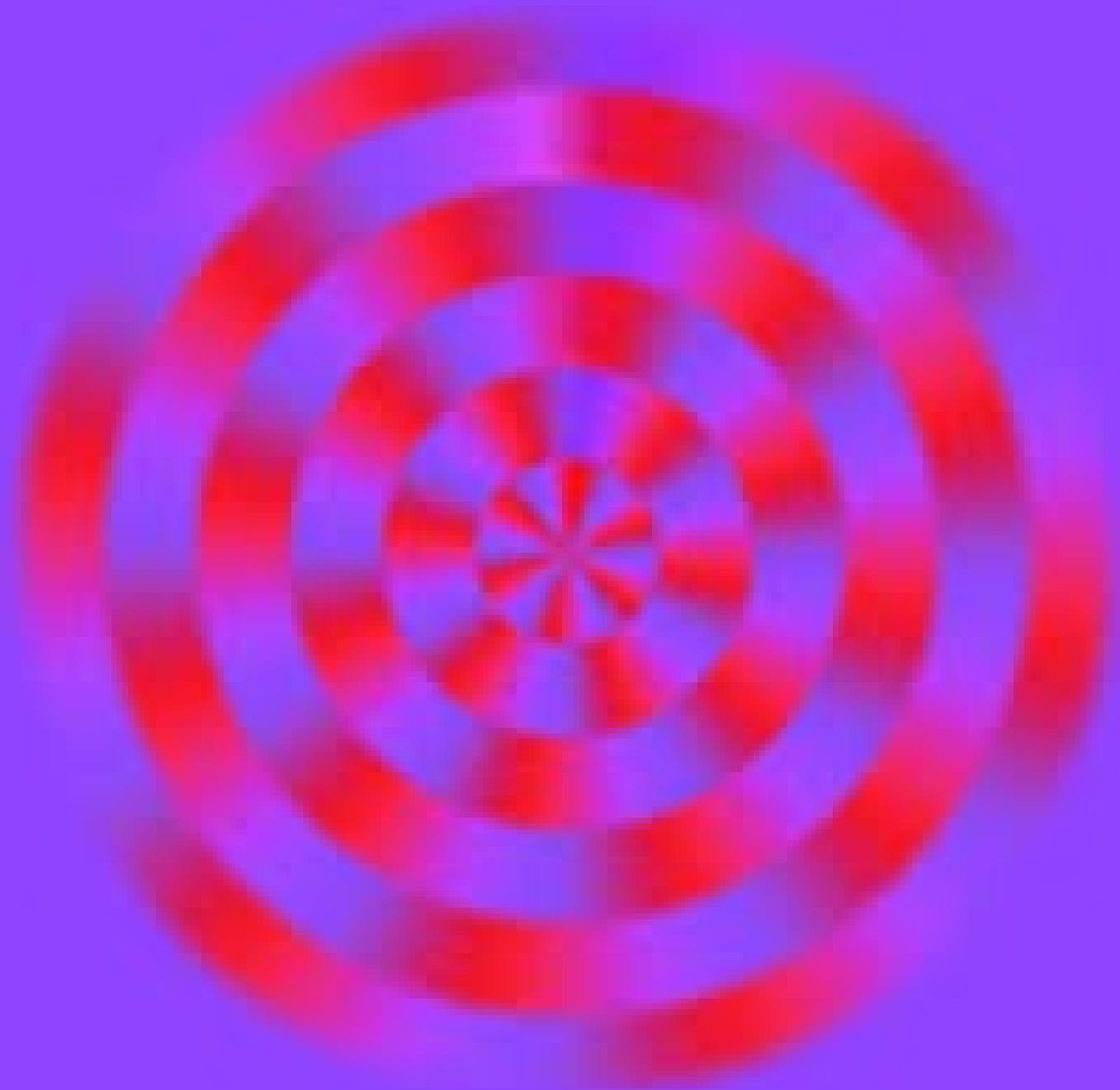
Pathophysiology / etiology(glare and lightning)

Monitors on computer screens may have poor level of contrast of the letters to the background

The presence of glare and reflections on the screen causes scattering of light ray and poor retinal focusing. Defocused imaged induces more accommodation .

Glare and reflection are made worse if windows are behind the patient or by bright overhead lightening .

5 major actors associated with CVS
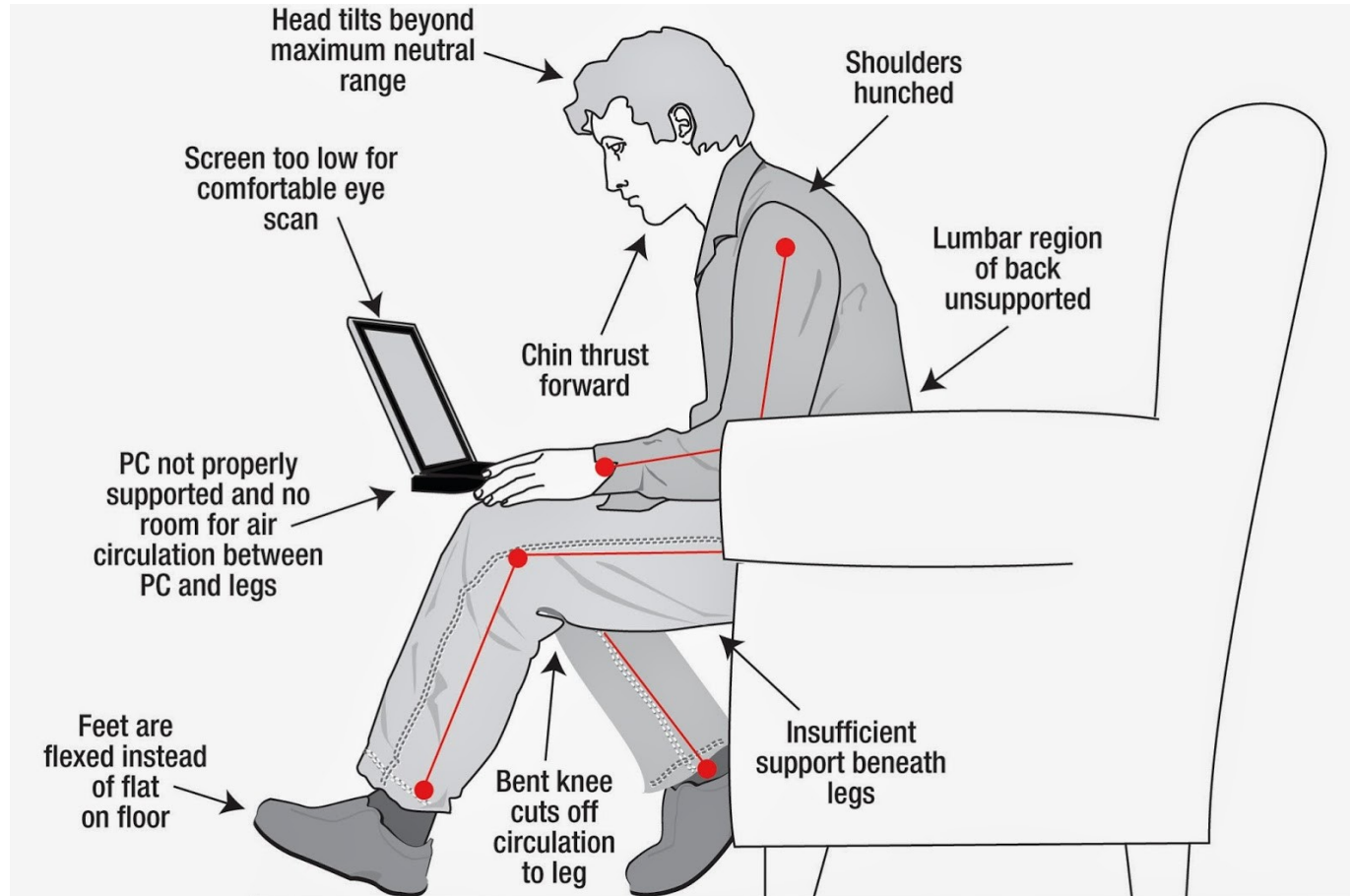
Computer Room

Human Eye

Computer User

Computer Screen

Computer Task

Poor posturing

Clinical features

- tired eyes
- irritation
- redness
- blurred vision
- double vision
- headache
- Vertigo and dizziness
- neck and shoulder pain
- polyopia,
- difficulty refocusing the eyes.

Prevalence of CVS

- between 64% and 90% of computer users experience visual symptoms

Prevalence of CVS

Ninety percent of university students in Malaysia experienced symptoms related to CVS, which was seen more often in those who used computer for more than 2 hours continuously per day

. Reddy SC, Low CK, Lim YP, Low LL, Mardina F, Nursaleha MP

Nepal J Ophthalmol. 2013 Jul-Dec;5(2):161-8. doi: 10.3126/nepjoph.v5i2.8707. **Computer vision syndrome: a study of knowledge and practices in university students**

Prevalence of CVS

- In China ,more than three-fourth of the students complained of any one of the symptoms of CVS while working on the computer.

- Logaraj M[1], Madhupriya V[1], Hegde S[1]. Ann Med Health Sci Res. 2014 Mar;4(2):179-85. doi: 10.4103/2141-9248.129028. **Computer vision syndrome and associated factors among medical and engineering students in chennai.**

Prevalence of CVS

- In the United States, according to the <u>National Institute of Occupational Safety and Health</u>, computer vision syndrome affects about 90% of the people who spend three hours or more a day at a computer.[2].

- Computer usage, even for 3 hrs/day, leads to a risk of developing computer vision syndrome (CVS), low back pain, tension headaches and psychosocial stress

- Sen A, Richardson S. A study of computer-related upper limb discomfort and computer vision syndrome. J Hum Ergol (Tokyo) 2007;36:45-50.

MANAGEMENT

- Treatment requires a multidirectional approach by combining
  - Ocular therapy
  - Adjustment of the workstation and room

OCULER THERAPY

- Ask patient to regulery consciously blink the eyes every now and then (this helps replenish the tear film)
- To look out the window to a distant object or to the sky —doing so provides rest to the ciliary muscles.
- The 20 20 20 rule
  - every 20 minutes ,the patient focus the eyes on an object 20 feet (6 meters) away for 20 seconds.

OCULER THERAPY

- A low additional plus add may alleviate the need for accommodation (+1.00 to +1.50) . This is added to the patient existing add .
- The patients refraction may not be adequate for computer work
- Lenses prescribed to meet the unique visual demands of computer viewing may be needed.

OCULER THERAPY

- Special lens may be required to minimise glare and reflection

- Lens tints
- Special antireflective coatings on lenses

OCULER THERAPY

- Lubricating eye drops help relieve ocular surface related symptoms

WORK STATION ADJUSTMENT

- Proper lighting
- Anti-glare filters
- Ergonomic positioning of computer monitor
- Chair comfortably positioned with good posturing
- Proper location of reference materials
- Regular work breaks.

- .

WORK STATION ADJUSTMENT

- **Location of computer screen** -

- Most people find it more comfortable to view a computer when the eyes are looking downward.

- Optimally, the computer screen should be 15 to 20 degrees below eye level (about 4 or 5 inches) as measured from the centre of the screen and 20 to 28 inches from the eyes.
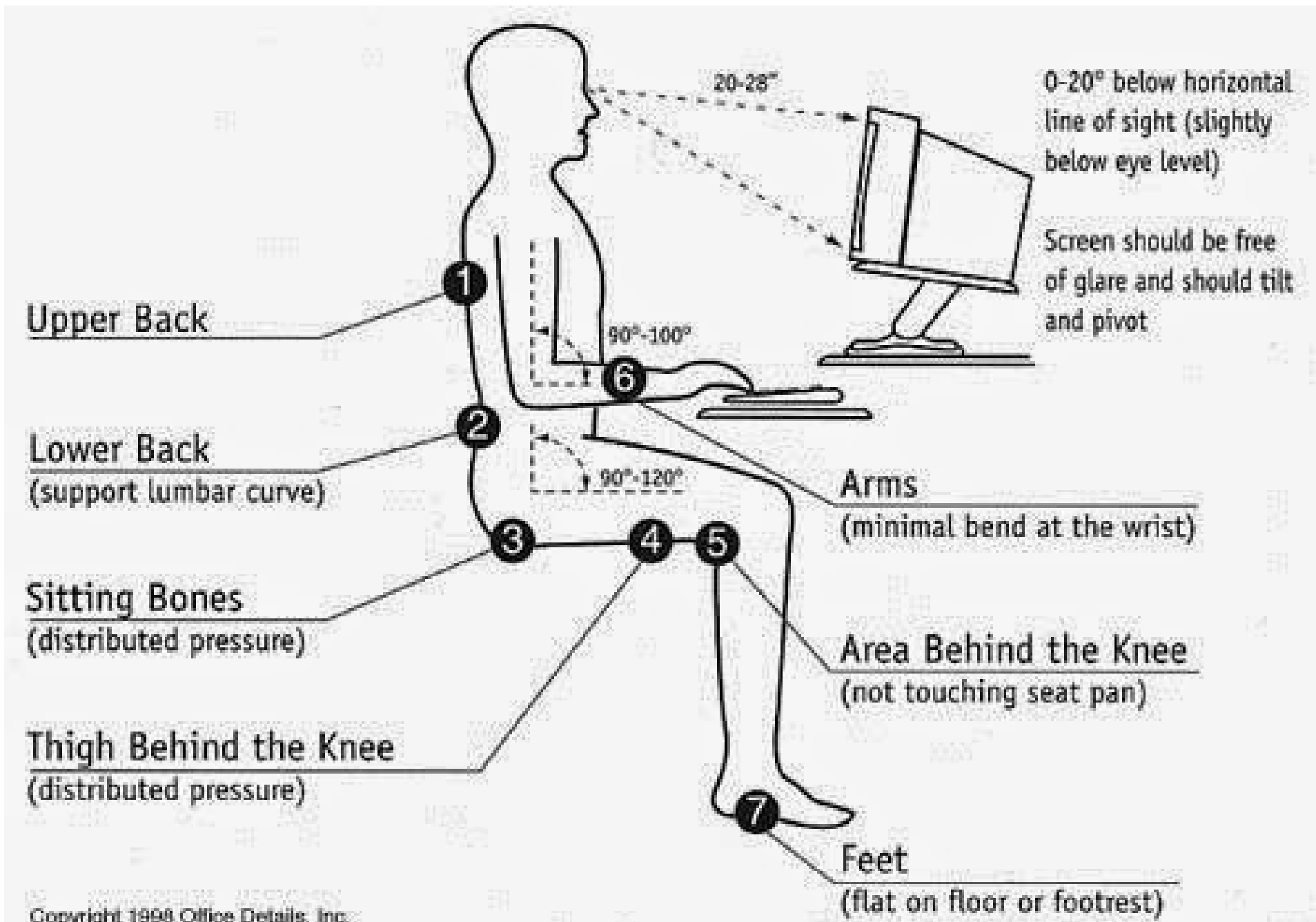
WORK STATION ADJUSTMENT

- **Reference materials** -
- These materials should be located above the keyboard and below the monitor.
- If this is not possible, a document holder can be used beside the monitor.
- The goal is to position the documents so you do not need to move your head to look from the document to the screen.

WORK STATION ADJUSTMENT

- **Lighting** -

- Position the computer screen to avoid glare, particularly from overhead lighting or windows.

- Use blinds or drapes on windows and replace the light bulbs in desk lamps with bulbs of lower wattage.

WORK STATION ADJUSTMENT

- **Anti-glare screens** -
- If there is no way to minimize glare from light sources, consider using a screen glare filter.
- These filters decrease the amount of light reflected from the screen.

Upper Back

Lower Back
(support lumbar curve)

Sitting Bones
(distributed pressure)

Thigh Behind the Knee
(distributed pressure)

Arms
(minimal bend at the wrist)

Area Behind the Knee
(not touching seat pan)

Feet
(flat on floor or footrest)

20-28"

0-20° below horizontal line of sight (slightly below eye level)

Screen should be free of glare and should tilt and pivot

90°-100°

90°-120°

WORK STATION ADJUSTMENT

- **Seating position** -
- Chairs should be comfortably padded and conform to the body. Chair height should be adjusted so your feet rest flat on the floor.
- If the chair has arms, they should be adjusted to provide arm support while you are typing.
- wrists shouldn't rest on the keyboard when typing.