

Computer Vision Syndrome

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Computer vision syndrome (CVS) is a term that describes vision-related problems and other symptoms caused by prolonged computer use. As our dependence on computers continues to grow, an increasing number of people are seeking medical attention for eye strain and irritation, along with back, neck, and shoulder soreness. Working for long hours in front of the computer is no longer confined to the office. Computers are now extensively used in schools and at home as well. With an increased popularity of notebooks, tablets, smartphones, and e-book readers, the use of digital devices is no longer only limited to desktops. People use digital display devices for work, web surfing, social networking, and playing video games. In this technologic age, children as young as 2 years are given touchscreen devices like iPads to play. Professional video game players in South Korea are known to spend as long as 18 h per day in front of their screens at a stretch. However, based on the current evidence, it is unlikely that the use of computers causes permanent changes or damage to the eyes or visual system.^[1-4]

SYMPTOMS

Up to 90% of computer users may experience visual symptoms such as blurred vision, eyestrain, headaches, dry eye, and diplopia.^[5] In addition, there may be neck and shoulder pain. Dry eye is intimately related to CVS as either cause or effect.^[6,7] Contributing factors may be reduced rate of blinking, environmental factors (air conditioners, heating, and low humidity), corneal exposure due to higher gaze angle in desktop monitor viewing, increasing age.^[8] The other causes may be uncorrected refractive errors and other visual problems, glare on the screen, incorrect sitting posture, or a combination of all these factors. Vision problems experienced

by computer operators are generally only temporary and will decline after stopping computer work at the end of the day.^[9,10] However, some workers may experience continued impaired or reduced visual abilities, such as blurred distance vision, even after work.^[11,12]

VISUAL DEMANDS OF COMPUTER WORK

Viewing a computer screen is different than viewing a typewritten or printed page. Often the letters on a computer screen are not as precise or sharply defined, the level of contrast of the letters to the background is reduced and the presence of glare and reflections on the screen may make viewing more difficult.^[13,14] Eyeglasses or contact lenses prescribed for general use may not be adequate for computer work. Specific occupational lenses prescribed to meet the unique demands of computer work may be needed.^[15] Special lens designs, lens powers, or lens tints or coatings may help to maximize visual abilities and comfort.^[16] Computer workers who receive eye examinations and occupational eyewear have reported improved comfort and resolution of their symptoms. The quality and efficiency of their work have also been improved.

RADIATION EMITTED BY COMPUTERS

Like most electrical appliances, computers emit both ionizing and non-ionizing radiation. These include visible light, ultraviolet, infrared, X-ray, and radio frequency emissions. However, computer emissions are often as low as to be unmeasurable or are found to be significantly

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below recommended safety levels. Numerous studies have been conducted to determine what effect, if any, radiation levels emitted from computers may have on workers' health. Repeated studies to date have failed to find any direct link between computer use and radiation-related general or eye health problems.^[17] There is no evidence that radiation from computers contributes to the development of cataracts.

WORKPLACE LIGHTING

One of the most significant environmental factors affecting computer work is lighting. Surveys indicate that many computer users report problems with general workplace lighting, glare, and images reflected on the computer screen.^[15,18] Many problems related to lighting may be caused by the introduction of computers into offices where the lighting was originally designed for traditional desktop work. The lighting is designed on the assumption that workers will perform tasks requiring their lines of sight to be depressed 200–400 from the horizontal.^[1] A viewing distance of 20–28 inches is generally recommended. Musculoskeletal problems related to head and eye postures when working at a computer are common and can often be alleviated through proper workstation adjustment. Workstation furniture should be adjustable and designed so that operators can easily change postures.

Diagnosis

The diagnosis of CVS requires a comprehensive workup with a proper history and a thorough eye examination including visual acuity measurement, refraction, assessment of convergence, and accommodation and evaluation for dry eye. The use of computers is associated with a decreased frequency of blinking and an increased rate of tear evaporation, each of which contributes to dry eyes.^[19-21]

Prevention

Proper lighting at the workplace like reflected glare from windows and lighting should be avoided. Anti-glare screens may help. The position of monitor should not be too high. Ideally, the center of the screen should be about 6 inches below the straight-ahead gaze. High-resolution LCD monitors with matte finish reduce eye strain. Older CRT monitors should be set to their highest refresh rates to minimize flicker.

Management

The management for CVS may include a variety of strategies as follows: Correction of any refractive errors and use of occupational glasses as required. Advice to blink frequently to re-wet the cornea that helps to prevent dryness and irritation. Rest breaks: 20/20/20 rule - after every 20 min of computer viewing, one should look into the distance 20 feet away for 20 seconds to allow the eyes

to refocus. The American Optometric Association suggests a break of 15 min after 2 hours of continuous computer use. Given the overwhelming symptoms experienced by computer users, adequate education about CVS and its prevention among people at risk is highly recommended. In addition, special attention should be given to the young population including children and students in schools, colleges, and universities.

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