

# Dry eye syndrome: a new look at etiopathogenesis and treatment

## Abstract

“Computer syndrome” or dry eye syndrome (DES) is asthenopia and dryness of the cornea and conjunctiva. The supposed cause of “computer syndrome” is an excessive constriction of the pupil and accommodation weakness. The article offers to use mydriatics in mild cases and laser mydriasis in severe cases in a complex of treatment. It is also suggested leaving slight myopia and physiological astigmatism while refractive surgery, contact and spectacle correction of myopia, so that the pupil does not narrow sharply and does not overstrain accommodation system, that is, there would be no conditions for the DES occurrence. The apparatus treatment, vision hygiene and healthy lifestyle are also required for a complete restoration of the working capacity of the accommodative muscles in case of DES.

**Keywords:** dry eye syndrome, mydriatics, laser mydriasis

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## Introduction

Pandemic coronavirus, an increase in the frequency of teleworking leads to a significant spread of “monitor”, “office” diseases associated with dry eye syndrome (DES). DES leads to discomfort and a decline in visual function.<sup>1,2</sup>

In the modern practice of an ophthalmologist, SSG occupies one of the leading places.<sup>3-10</sup> Reason: the growth of “computer syndrome”, laser refractive surgery, contact correction.<sup>8,9</sup>

Since the etiology of DES is not fully understood, the treatment of this disease is a complex and not completely solved problem.<sup>2</sup>

It is known that DES develops in ocular pathology, as well as in systemic diseases of the whole organism (hypertension, diabetes mellitus, collagenosis, etc.).<sup>8</sup>

What could be the trigger of DES in such a variety of pathologies?

In our opinion - excessive constriction of the pupil and the resulting weakness of accommodation.<sup>5,6</sup> Let us explain our idea.

“Computer syndrome”: with a strong visual load, the pupil narrows excessively, and the ring of the ciliary body also narrows (synergistic innervation). Zinn’s ligaments sag somewhat, the effect of the ciliary muscle on the lens capsule decreases. Thus, there is a weakness of accommodation.

This has been clinically confirmed: computer users experience DES: asthenopia and dryness of the cornea and conjunctiva. All patients with accommodative asthenopia have reduced accommodation reserves (in comparison with the age norm) by 4.0 - 6.0 D; the reserve of relative accommodation is 1.5 D.<sup>1</sup>

The reason for this situation is the prolonged excessive constriction of the pupil, which causes weakness of accommodation. Since accommodation (the ability to scan danger at different distances) played an extremely important role in the survival of humans as a species, in the process of evolution, various compensatory reactions arose, aimed at facilitating the work of weakened accommodation. In the case of DES, autoimmune processes are triggered in the eye,<sup>9</sup> which cause dryness of the cornea and conjunctiva, which makes it

impossible a significant amount of visual work, and, thus, makes it possible to “rest” the weakened accommodation.

As for DES in systemic diseases of the body, the etiology of keratoconjunctivitis is the same - excessive constriction of the pupil and weakness of accommodation.

We have proposed a theory,<sup>7</sup> according to which all diseases of the body (including eye diseases) are encoded in the width of the pupil.

Thanks to the work of the opto-vegetative system, the eyes are responsible not only for vision, but also harmonize the work of the whole organism.

80% of all diseases are caused by chronic stress, which leads to excessive constriction of the pupil. This triggers disease. Where there is a “weak link” in the body, pathology is realized there.

Therefore, we proposed to use mydriatics in the complex of treatment of diseases, and in severe cases - laser mydriasis.<sup>7</sup> Based on the existence of “direct - feedback” in the optic-vegetative system, this should improve the condition of the eyes and the body as a whole.

The fact that the parasympathomimetic pilocarpine (which constricts the pupil) does not improve tear production in DES<sup>2</sup> speaks in favor of our theory. It also becomes clear why the improvement of office equipment and special coatings for spectacle lenses do not solve the problem of SSG. The fact that keratoconjunctivitis dry is associated with the width of the pupil is also indicated by the fact that DES is determined in 12% of patients under 50, and in 67% (2/3) of patients over the age of 50 (the pupil narrows over the years!).<sup>10</sup>

We have experience in the treatment of filamentous keratitis (Sjogren’s syndrome) with trophic drugs and tropicamide. The symptoms of the disease were significantly reduced in 2 weeks. We suggest treating with non-preservative drugs in conjunction with mydriatics (M-anticholinergics, since sympathomimetics, narrowing blood vessels, can impair tear production) for mild DES. In severe cases of DES, it is advisable, in our opinion, to carry out laser mydriasis.

How can you explain the occurrence of DES after refractive surgery?

In myopia, the sympathetic system was activated before the operation, which caused the pupil to dilate. After the operation, when the optical focus is on the retina, there is no longer any need to activate the sympathetic system - the pupil narrows. If there is also a weakness of accommodation, this triggers the DES.

What happens when you wear contact lenses?

If refractive errors are corrected too carefully, there is no physiological astigmatism, the focal area narrows, which increases the load on the accommodative apparatus. The pupil constricts (there is no stimulus for the sympathetic system), and together with weakened accommodation, this causes DES.

Which exit?

During refractive surgery, contact correction of myopia and, by the way, spectacle also - to leave a slight myopia and physiological astigmatism, so that the pupil does not sharply narrow and the accommodation system does not overload, that is, does not provoke the occurrence of DES.

## Conclusion

1. "Computer syndrome" is asthenopia and dryness of the cornea and conjunctiva.
2. The cause of "computer syndrome" - excessive constriction of the pupil and weakness accommodation.
3. It has been proposed to use mydriatics in mild cases for DES, and laser mydriasis in severe cases.
4. It is proposed to leave slight myopia and physiological astigmatism during refractive operations, contact and spectacle correction of myopia, so that there are no conditions for the occurrence of DES.
5. To fully restore the working capacity of the accommodative muscle in DES, apparatus treatment, vision hygiene, and a healthy lifestyle are also required.

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## Conflicts of interest

The authors declare no conflicts of interest.

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