

## THE OCULAR SURFACE IN PATIENTS VIDEO DISPLAY TERMINAL (VDT)

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*[La superficie oculare nei soggetti video terminalisti (VDT)]*

### ABSTRACT

**Purpose:** The Authors want to evaluate the effect of a new generation tear substitute (hipromellose 0.5% and amino acids) on the ocular ecosystem applied to video terminal subject with dry eye syndrome.

**Methods:** 36 patients (14 F- 26 M mean age 57+/- 5 yr) with signs of discomfort and/or ocular dryness (burning, feeling of extraneous body, dryness and itch) were admitted to our study. Patients were treated with hipromellose, for 28 days. Subjective symptoms and objective signs were considered at the first visit, 28 days after therapy and 5 days after wash out following the 28 days of therapy. Studied parameters were: Schirmer I (mm/5 min); Schirmer II (mm/3 min); time of breakup of the film of shed tears (BUT, sec) and conjunctival buffer for the search of aerobic and anaerobic bacteria.

**Results** data shows a change in the tear test, considered in our study, with the following results: Schirmer I 7.8. - 11.5; Schirmer II 7.1 - 10.6; BUT 6.7.- 10.5 before and after the treatment respectively. The culture examinations shows an initial bacterial increase of 31 strains (43.%) compared to 15 (20.8%) after the treatment.

**Conclusion:** The results shows that hipromellose 0.5% has good regulating activity and its clinical effectiveness was confirmed by a direct activity in normalizing clinical parameters of shed tears film and by an indirect activity in selecting normal bacterial flora.

**Key words:** Video Display Terminal (VDT), dry eye, hipromellose.

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### Introduction

Dry eye is a pathology characterized by an alteration of the tear film caused by insufficient production of tears or / and by an alteration of the evaporation time. This condition manifests with symptoms of ocular discomfort that may cause damage to the ocular surface and represents one of the most common eye diseases, with a prevalence ranging from 7% to 34% depending of epidemiological studies<sup>(1-7)</sup>. The tear film which is part of the ocular surface, is a stable system, but it can lose their balance due to different environmental factors. Individuals disease with chronic dry eye are characterized by an instability of the tear film with symptoms of burning, foreign body sensation, fatigue of the eyelids, impaired vision, aggravated by environmental factors such as air conditioning and expo-

sure to the monitor<sup>(8-16)</sup>. In recent years some health issues as "office eye syndrome" characterized by the use of VDT (Video Display Terminal) have become of particular scientific importance and health<sup>(17-18)</sup>.

In subjects video terminal operators (VDT), one can observe an alteration of the tear film with a consequent possible damage to the ocular surface that is characterized by symptoms of ocular discomfort<sup>(19-20)</sup>. Recent studies have shown that the increase of certain components of the tear film, in these subjects will cause a reduction of its stability. In fact, the electronic circuitry used to create the image produce static electric and magnetic fields and electromagnetic fields and low high frequency. In electric and magnetic fields and optical radiation, produced by VDT is represented virtually the entire electromagnetic spectrum. The optical radiation

emitted includes ultraviolet (UV) wavelength, the visible and infrared radiation (IR). According to some authors it would seem that the static electric fields present in particular conditions of low humidity environment, generated by the accumulation of electric charge caused by the electrons striking the screen, can cause changes to the ocular surface.

On the basis of this knowledge we set out to verify how in subjects video terminal operators (VDT) these alterations were modified after treatment with a tear substitute the latest generation based hypromellose 0.5% and amino acids.

## Materials and methods

### Patients

Were admitted to the study, 36 subjects video terminal operators (VDT) (14 F and 26 F, mean age of 67.5 (table no. 1) with signs and symptoms of discomfort and/or dry eyes (burning, foreign body sensation, dryness and itching), Schirmer I with less than 10 mm; with BUT less than<sup>(8)</sup> seconds according to the criteria of Van Bijsterveld<sup>(1)</sup>.

patients n°	N°. Eyes	Sex		age (media)	range
		M.	F.		
36	72	26	14	57.5	51 – 61

**Table 1:** Demographic characteristics of patients who completed the study.

In all patients was considered the subjective symptoms and the objective signs, at the time of enrollment visit, and after treatment (28 days), ie, the 5th day from the last administration of eye drops (wash out).

### Treatment

All subjects were treated with a tear substitute new generation hypromellose 0.5% and amino acids (Nextal)

- ° 1 drop 3 times/in both eyes/day for 28 days.
- ° BIOOS Italy

### Criteria for inclusion

- Subjects in video terminal operators (VDT) for at least 2 years, with signs and symptoms of ocular discomfort (burning, foreign body sensation, dryness or itching),
- Subjects with at least three of the four criteria listed above,

- No corneal staining with fluorescein,
- Absence of infection of the ocular surface and appendages,
- Absence of allergic diseases of the ocular surface.

### Criteria for exclusion

- Previous eye surgery,
- Alteration lacrimal apparatus,
- Medical therapy with systemic or topical medications that alter tearing and / or topical steroids during the 4 weeks prior to the start of the study.

### Parameters considered

- Symptoms: foreign body sensation, dryness, itching and burning,
- Signs objectives: discomfort and/or dry eyes,
- Examination of the anterior segment performed by slit-lamp,
- Test of Schirmer I test (mm/5'),
- Test of Schirmer II (mm/3'),
- Time to rupture of the tear film (BUT, sec),
- Buffer conjunctival search for aerobic and anaerobic bacteria.

### Test of Schirmer I

Applies to the outer third of the lower eyelid of a strisca absorbent paper of graduated length of 35 mm. The patient is asked to look up, after 5 min, the strips are removed and assesses the amount of paper that is wet with tears (normal values between 10 and 15 mm).

### Test Shirmer II

After instillation of one drop every 3 minutes, for three times, of anesthetic (novesina), one proceeds as the previous Schirmer test I. After 3 minutes, the strips are removed, and assesses the portion of paper soaked (normal values greater than or equal to 10 mm).

### B.U.T. Test

After instillation of fluorescein to 2% is calculated by the time lag (normal values ranging between 10-15 seconds). Between the last blink and the beginning of the formation of areas corneal dried (dry spots).

### Bacteriological Test

It is performed with the removal of conjunctival secretions through a pad of Hess, for the search of aerobic and anaerobic bacteria. The samples

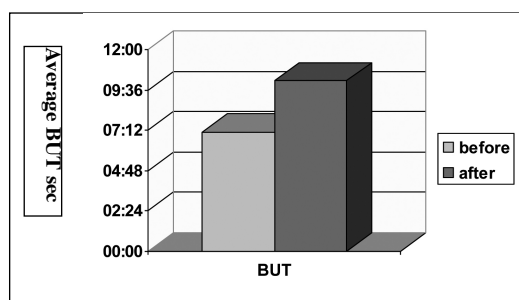
taken from patients, were seeded in the appropriate culture media and incubated in aerobic and anaerobic atmosphere for the Isolation and identification of bacteria present, with separate counts for aerobic and anaerobic bacteria. In particular, each anaerobic bacterial strain, was identified biochemically according to the format recommended by the “Anaerobe Laboratory Manual”, 4<sup>th</sup> ed., Virginia Polytechnic Institute<sup>(6-7)</sup>.

**Analysis statistical**

Data from the clinical parameters obtained in our study, between before and after treatment, was applied the test statistical “Student’s t test”. It was considered appropriate to apply the “Student’s t test” since it deals with classes of samples (paired data) sufficiently homogeneous

**Results**

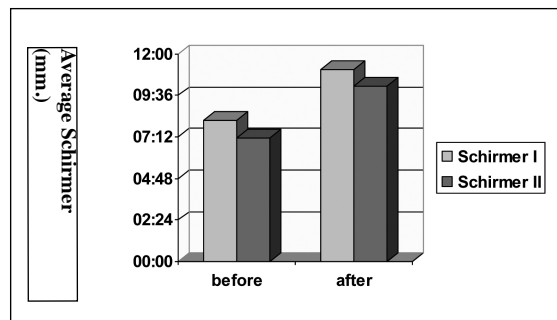
In all subjects, video terminal operators (VDT), included in our study, after treatment with hypromellose 0.5% and amino acids, was observed the disappearance of symptoms present for inclusion in the study (Figures 1 and 2) highlights the average of the test values of tear secretion obtained at the beginning and at the 5th day after discontinuation of treatment (after 28 days). The data shows a change with improved tear test, with the following results before and after: Schirmer The 7.8 mm - 11.5 mm; Schirmer II 7.1mm - 10.6 mm; BUT 6.7 sec - 10.5 sec. The culture tests have revealed a total of initial bacterial growth of 31 (43%).



**Figure 1:** Break-up time before and after treatment with 0.5% hypromellose (the fifth day after treatment discontinuation).  
\*  $P < 0.001$

Examinations in comparison to 15 (20.8%) observed after treatment (Table 2). The number of isolations of total aerobes and anaerobes found before and after treatment are shown in Table 3, where there is the reduction of aerobic from 24

16 strains and for anaerobes from 13 to 7 bacterial isolates. In some patients it was observed the simultaneous presence of aerobic and anaerobic bacteria.



**Figure 2:** Schirmer test I and II before and after treatment with hypromellose 0.5% (the fifth day of treatment discontinuation).  
\*  $P < 0.001$

patients n° 26	Eyes N°. (72)	Before	After
bacteriological tests cultivation	72	31. 43.0	15 20.8

**Table 2:** Positivity total of cultures obtained for an eye between before and after treatment.

Organisms	Before	After
Aerobic	24	16
Anaerobic	13	7
Total strains	37	23

**Table 3:** Total number of aerobic and anaerobic isolates from culture tests before and after treatment with 0.5% hypromellose.

Organisms	Before		After	
	N	%	N	%
S. epidermidis	15	40.5	13	56.6
S. aureus	6	16.3	1	4.3.
S.pneumoniae	1	2.7	1	4.3.
S.pyogens	1	2.7	1	4.3.
H. influenzae	1	2.7	-	
Sub totale aerobic	24		16	
Peptococcus spp.	10	27.0	6	26.2

**Table 4:** Number and percentage of aerobic and anaerobic bacterial strains isolated from subjects video terminal operators (VDT), before and after treatment with 0.5% hypromellose.

In Table 4 are shown the species of aerobic and anaerobic seen in patients video terminal operators (VDT). Before and after treatment the fifth day after discontinuation of therapy: *S. epidermidis* from 15 strains (40.5%) 13 (56%); for the *S. aureus* from 6 (16.3%) 1 (4.3%), while for the rest of the insulation is shows a reduction almost completely homogeneous of Gram - negative aerobic between, before and after treatment. In the same table are listed the species of anaerobic isolates before and after treatment: for the *Peptococcus* spp. from 10 strains (27%) 6 (26.2%); the *Peptostreptococcus* ssp. from 3 (8.1%) 1 (4.3%).

The data of clinical parameters (figure n. 1 and 2) Schirmer I, Schirmer and BUT II, obtained before and after discontinuation of treatment with hypromellose 0.5% in the two study groups are expressed as the mean of the samples. Since data rather homogeneous, the standard deviation is not far deviated from the average. It was considered appropriate to apply the T student in the case of classes of samples (paired data) sufficiently homogeneous. The statistical significance of differences between the "A" before and the "B" group after treatment was calculated by applying the statistical test "Student"  $P > 0.001$ . As regards the amount of bacteria obtained, it was not possible to apply any statistical test

## Conclusions

The significant change of tear test (Schirmer I, Schirmer and BUT II) obtained after treatment with hypromellose 0.5% and the fifth day after his suspension, with the disappearance of symptoms, showed a clinical efficacy and a good recovery tasks with physiological production of tear film in subject video terminal operator (VDT). The indirect effect of this molecule in restoring the normal ocular microbiota, characterized by the increase in the percentage of normal bacteria inhabitants of the ocular surface, restores a good physiological ecology of the ocular surface in these subjects. In fact, the modifications habitat of the ocular surface with the increase of saprophytic bacteria should allow these bacteria integration with the glycocalyx of cells resulting in an ocular epithelial barrier of stability and prevention by the possible superficial infections. These data show a good activity of hypromellose 0.5% increase in the defense system of the ocular surface of the subject video terminal operator (VDT), also thanks to its compatible

solutes acting under a great depth restore osmotic balance and consequent prolonged comfort. As has been confirmed in previous searches 1.2 a stable tear film is the result of the balance of a series of complex functions implemented by the system of the ocular surface. A suitable environment for pH, electrolyte concentration, relative humidity and the presence of the essential nutrient elements is essential because the ocular surface performs its main functions, together with an integration of the normal bacterial flora, a direct and indirect defense of the same surface. In fact, the barrier function of physical and immunological part of the epithelium of the ocular surface is ensured by the narrow junction of epithelial cells that determines precisely the barrier effect versus pathogenic bacteria. It was shown by several studies 16-18 that if the is molarity lacrimal increases chronically can determine the damage to the epithelial cells of the ocular surface. In the light of these results it locates in our hypromellose 0.5% amino acids in eye drops and an activity directed in the normalization of clinical parameters of the tear film and indirect activity in restoring of the microbiota ocular surface in the subject video terminal operator (VDT).

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