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*DIPARTIMENTO SPECIALITA' CHIRURGICHE*  
*SEZIONE DI OFTALMOLOGIA*  
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# ***LA CHERATOCONGIUNTIVITE SECCA***

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# **CHERATOCONGIUNTIVITE SECCA**

SINONIMI DI CHERATOCONGIUNTIVITE SECCA SONO:

Occhio secco, Sindrome dell`Occhio Secco, Dry Eye, DES

**SINDROME DA DISFUNZIONE LACRIMALE**

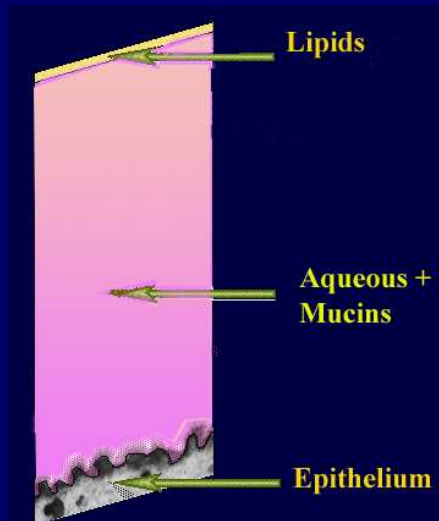
# DEWS Definition and Classification

## The Definition and Classification of Dry Eye Disease: *Report of the Definition and Classification Subcommittee of the International Dry Eye WorkShop (2007)*

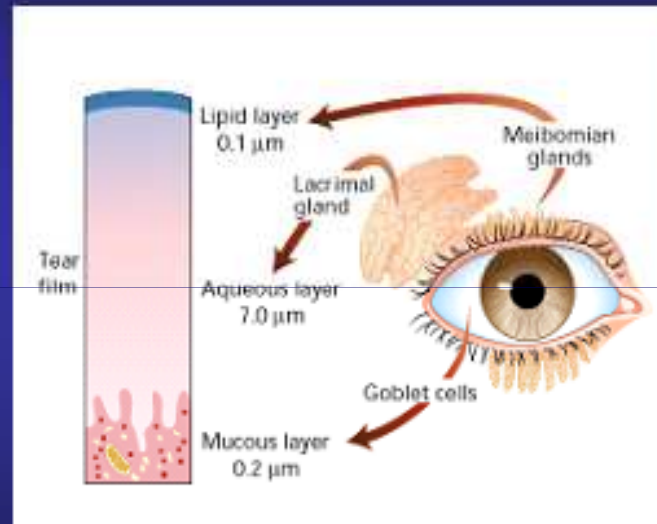
*Dry eye is a multifactorial disease of the tears and ocular surface that results in symptoms of discomfort,<sup>2-4</sup> visual disturbance,<sup>5-7</sup> and tear film instability<sup>8-10</sup> with potential damage to the ocular surface. It is accompanied by increased osmolarity of the tear film<sup>11-14</sup> and inflammation of the ocular surface.<sup>15,16</sup>*

# Ocular Surface Structures

- Lids
- Meibomian Glands
- Cornea
- Conjunctiva
- Lacrimal Glands
- Lacrimal Drainage System
- Lymphatic System

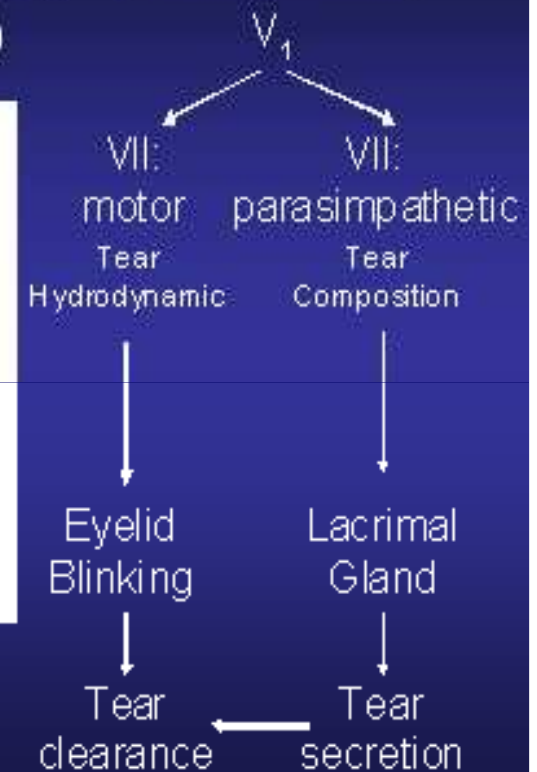


## THE OCULAR SURFACE FUNCTIONAL UNIT (OSU)



Endocrine Control:  
sex hormones, etc.

## Nervous Control



## TEAR FILM

# DRY EYE

## Effect of the Environment

### *Milieu Interieur*

Low blink rate  
behavior, VTU,  
microscopy  
Wide lid aperture  
gaze position  
Aging  
Low androgen pool  
Systemic Drugs:  
antihistamines,  
beta-blockers,  
antispasmodics,  
diuretics, and  
some psychotropic  
drugs

### *Milieu Exterieur*

Low relative humidity  
High wind velocity  
Occupational  
environment

## Aqueous-deficient

### Sjogren Syndrome Dry Eye

Primary

Secondary

### Non-Sjogren Dry Eye

Lacrimal Deficiency

Lacrimal Gland Duct Obstruction

Reflex Block

Systemic Drugs

## Evaporative

### Intrinsic

Meibomian Oil Deficiency

Disorders of Lid Aperture

Low Blink Rate

Drug Action  
Accutane

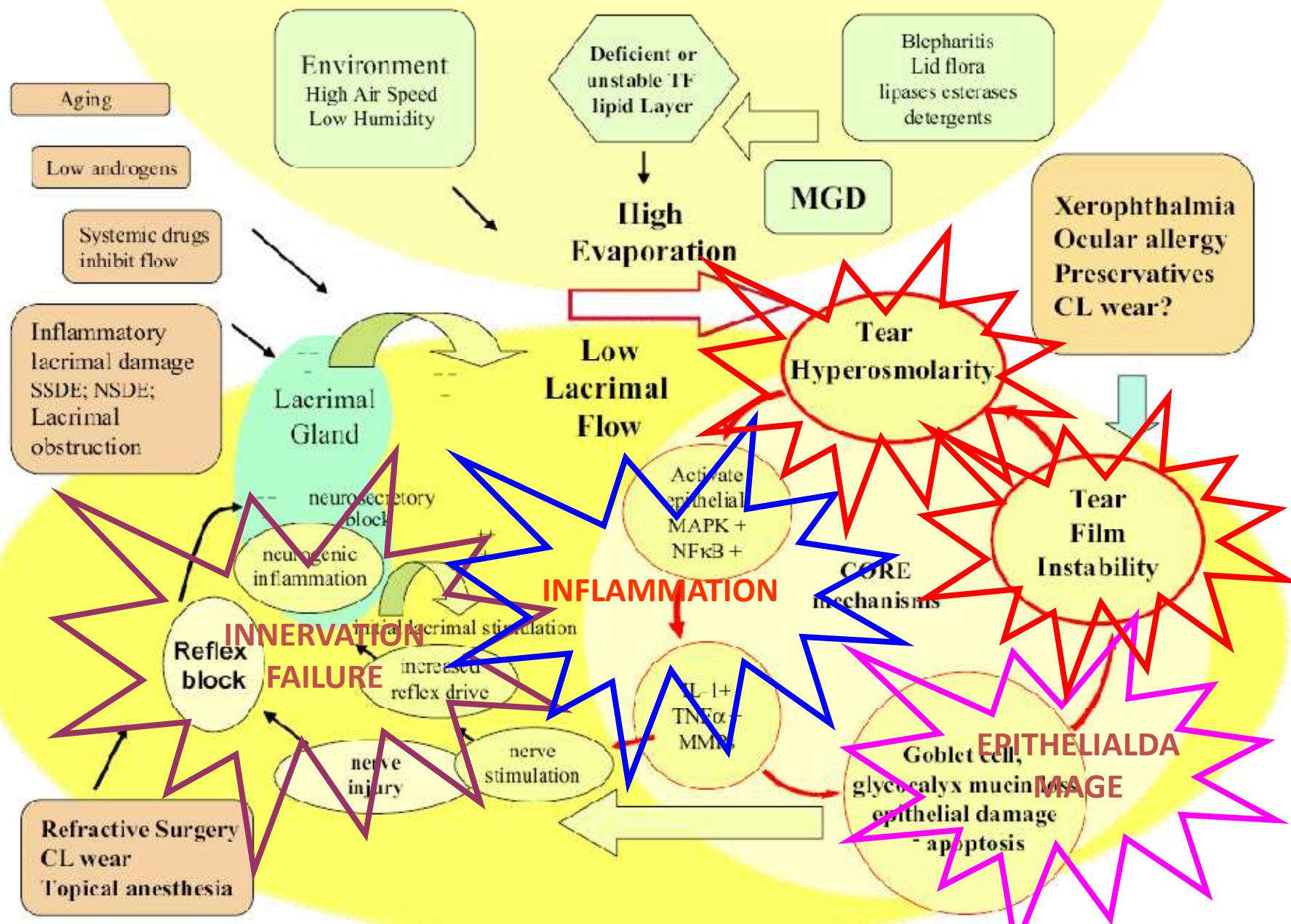
### Extrinsic

Vitamin A-Deficiency

Topical Drugs  
Preservatives

Contact Lens  
Wear

Ocular Surface  
Disease  
eg, Allergy

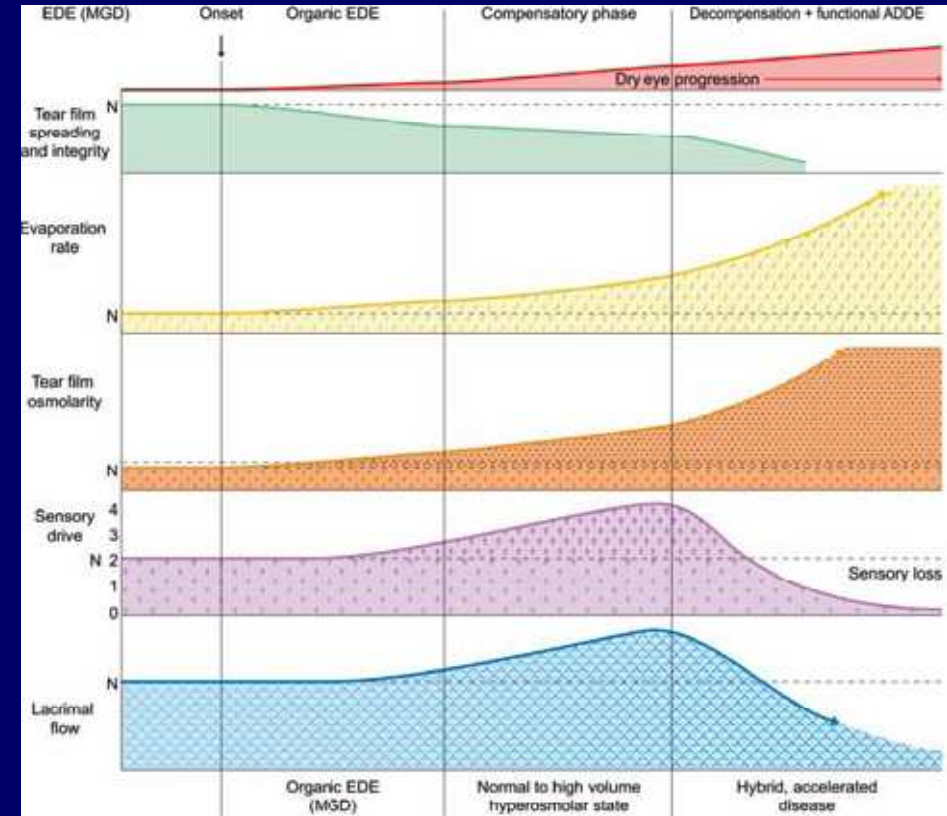
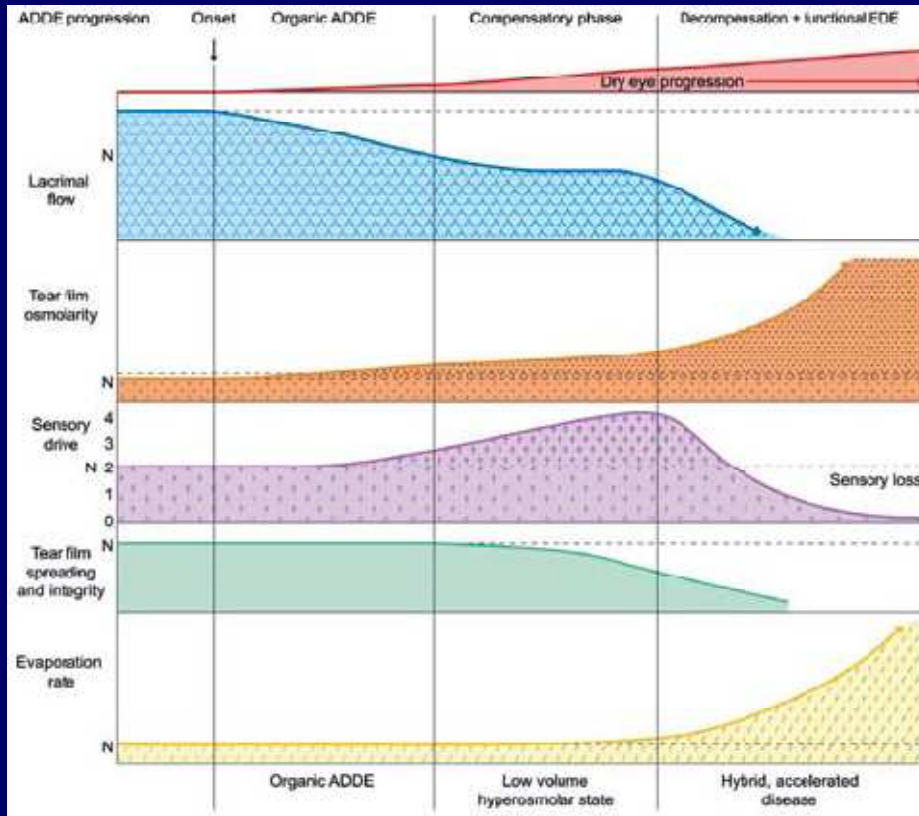




# Predicted Natural History of ADDE and EDE

## ADDE

## EDE



# Dry Eye Epidemiology

- It has been estimated that about 3.23 million women and 1.68 million men, for a total of 4.91 million Americans 50 years and older have dry eye.
- Tens of millions more have less severe symptoms and probably a more episodic manifestation of the disease that is notable only during contact with some adverse contributing factor(s), such as low humidity or contact lens wear.



# Dry Eye Epidemiology

- Age-specific data on the prevalence of dry eye from large epidemiological studies reveals a range of about 5% to over 35% at various ages.
- WHS data about race or ethnicity effect on dry eye prevalence, suggest that more severe symptoms and/or clinical diagnosis of dry eye may have a greater prevalence in Hispanic and Asian, as compared to Caucasian, women.
- The number of women affected with dry eye appears to exceed that of men.

# Dry Eye Epidemiology

**Table 1.** Summary of population-based epidemiologic studies of dry eye

Study	N	Age range	Dry eye assessment	Prevalence
<b>US Studies</b>				
Salisbury Eye Study <sup>3,5</sup>	2420	≥ 65 y	At least 1 of 6 symptoms (dryness, gritty/sandiness, burning, redness, crusting on lashes, eyes stuck shut in morning), occurring at least often.	14.6%
Beaver Dam <sup>6</sup>	3722	> 48 y	"For the past 3 months or longer have you had dry eyes?" (If needed, described as foreign body sensation with itching, burning, sandy feeling, not related to allergy.)	14.4%
Women's Health Study <sup>7</sup>	36995	> 49 y	Severe symptoms of dryness and irritation, either constantly or often, and/or the physician's diagnosis of dry eye as volunteered by the patient.	7.8%
Physician's Health Studies I and II <sup>8,9,14</sup>	25655	≥ 50, 55 y	Severe symptoms of both dryness and irritation either constantly or often and/or the physician's diagnosis of dry eye as volunteered by the patient.	
<b>Australian Studies</b>				
Blue Mountains <sup>10</sup>	1075	> 50 y	At least 1 of 4 symptoms regardless of severity, or at least 1 symptom with a moderate to severe ranking (dryness, grittiness, itchiness, discomfort).	16.6% (at least 1 symptom) 15.3% (3 or more symptoms)
Melbourne Visual Impairment Project <sup>11</sup>	926	≥ 40 y	At least 1 of 6 "severe" symptoms, not attributed by the subject to hay fever (discomfort, foreign body, itching, tearing, dryness, photophobia).	5.5%
<b>Asian Studies</b>				
Shihpai <sup>12</sup>	2038	≥ 65 y	At least 1 of 6 symptoms, often or all of the time (dryness, gritty/sandiness, burning, sticky, tearing, redness, discharge, eyes stuck shut in morning).	33.7%
Sumatra <sup>13</sup>	1058	≥ 21 y	At least 1 of 6 symptoms, often or all of the time (dryness, gritty/sandiness, burning, redness, crusting on lashes, eyes stuck shut in morning).	27.5%

# Risk Factors for Dry Eye

- Environmental
- Occupational
- Iatrogenic

# Risk Factors for Dry Eye

## Environmental: Low Humidity Environments

- Closed air-conditioned office environments are associated with Dry Eye syndrome
- Ocular dryness due to increased tear evaporation may be caused by:

- Low humidity
- High room temperature
- High air velocity
- Decreased blink rate
- Indoor air pollution
- Poor air quality
- Air travel



# Risk Factors for Dry Eye

## Occupational: Video Display Terminal (VDT)

- Incidence: Any one who spends more than 2 hours each day in front of a computer screen is likely to experience some discomfort symptoms. Eye-related complaints are the most frequent health problems among computer users
- In a recently published Japanese study on office workers using computers, clinically diagnosed Dry Eye was present in:
  - 10.1% of male subjects
  - 21.5% of female subjects
- The study also concluded that the condition is more prevalent among:
  - Females
  - Contact lens wearers and
  - Prolonged VDT users



# Risk Factors for Dry Eye

## Iatrogenic: Systemic Therapies/Diseases

- Contact lens wear
- Long term treatment with Preserved Eye Drops
- Glaucoma
- Systemic medications
- Hormonal therapy
- LASIK and other surgeries
- Bone marrow transplantation and cancer



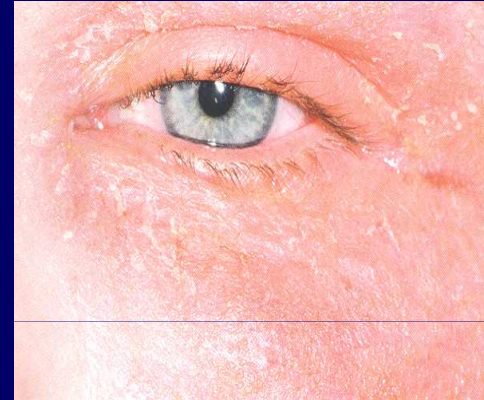
# DIAGNOSIS

## Skin of the Face

Seborrhea



Eczema



Psoriasis

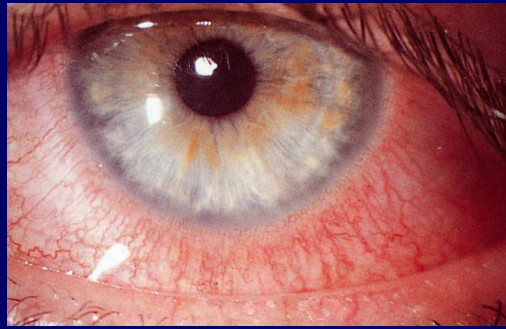


Rosacea

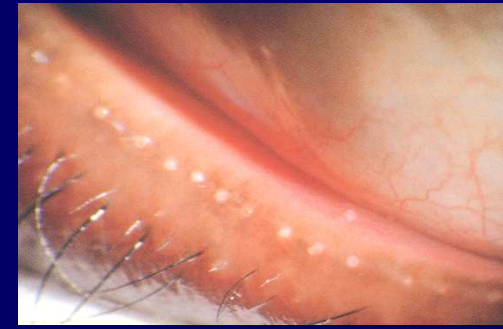




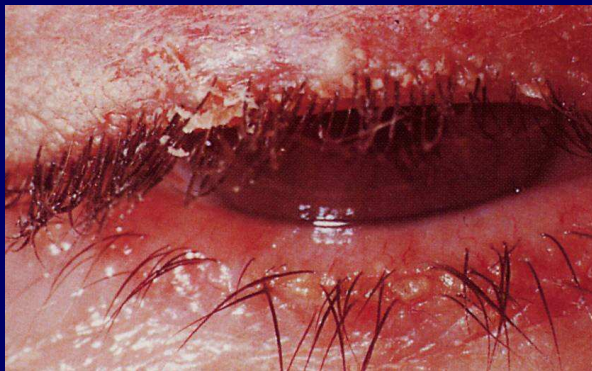
Staphylococcal  
Anterior Blepharitis



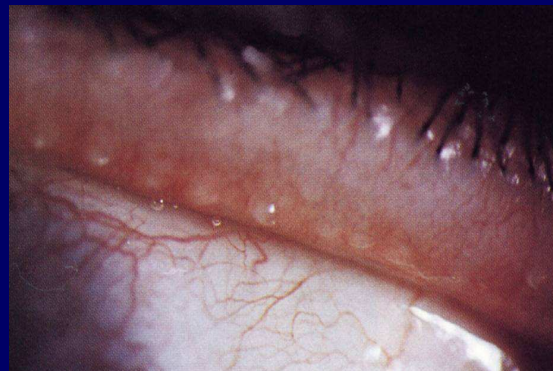
Mixed Staph/Seborrheic  
Blepharitis



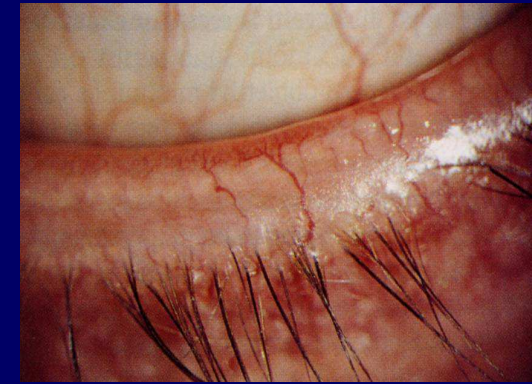
Primary Meibomitis



Staphylococcal Sty



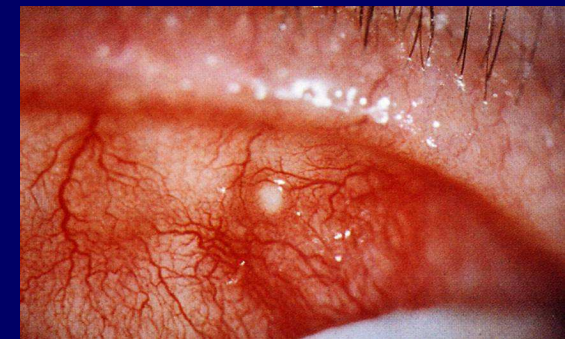
Meibomian Seborrhea



Primary Meibomitis



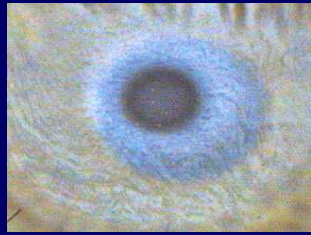
Seborrheic Blepharitis



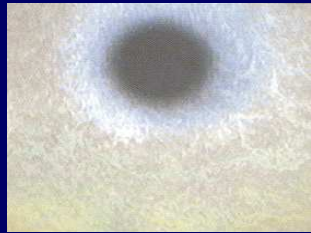
Primary Meibomitis



# QUADRI MORFOLOGICI E RELATIVI SPESSORI DEL FILM LIPIDICO ALL'ESAME COL TEARSCOPE®



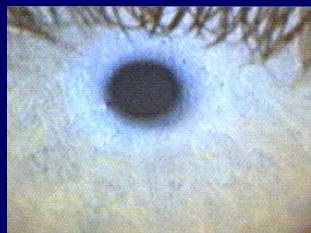
Open meshwork ~ 20 nm



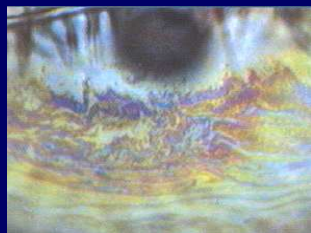
Closed meshwork ~ 40 nm



Wave ~ 65 nm



Amorphous ~ 85 nm



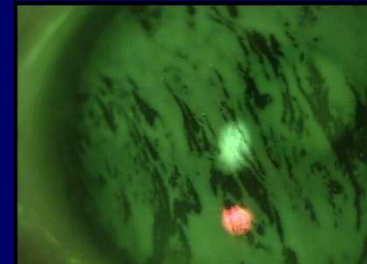
Coloured Fringes ~ 115 nm



# Aspetti diagnostici

Patient Number	Patient Initials	Physician's Name	Date of Visit			
<b>OCULAR SURFACE DISEASE INDEX (OSDI)</b>						
Please answer the following questions by checking the box that best represents your answer						
<b>Have you experienced any of the following during the last week:</b>						
	ALL of the time	MOST of the time	HALF of the time	SOME of the time	NONE of the time	
1. Eyes that are sensitive to light?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2. Eyes that feel gritty?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3. Painful or sore eyes?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4. Blurred vision?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5. Poor vision?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Have problems with your eyes limited you in performing any of the following during the last week:</b>						
	ALL of the time	MOST of the time	HALF of the time	SOME of the time	NONE of the time	NOT applicable
6. Reading?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Driving at night?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Working with a computer or bank machine (ATM)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Watching TV?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Have your eyes felt uncomfortable in any of the following situations during the last week:</b>						
	ALL of the time	MOST of the time	HALF of the time	SOME of the time	NONE of the time	NOT applicable
10. Windy conditions?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Places or areas with low humidity (very dry)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Areas that are air conditioned?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<small>Calculation of OSDI: OSDI = sum of severity for all questions answered / total number of questions answered.            ALL of the time = 4 MOST of the time = 3 HALF of the time = 2 SOME of the time = 1 NONE of the time = 0 NOT applicable = 0            NOTE: questions answered 75% for the calculation = 0.75 * answered question</small>						

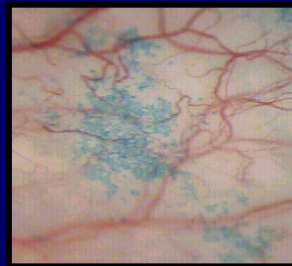
- Valutano presenza e gravità della sintomatologia



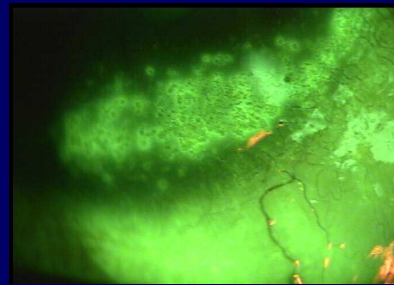
- Intervallo di tempo che intercorre tra un ammiccamento e la rottura del film lacrimale

Questionari

Tear Break-Up Time



Lissamina



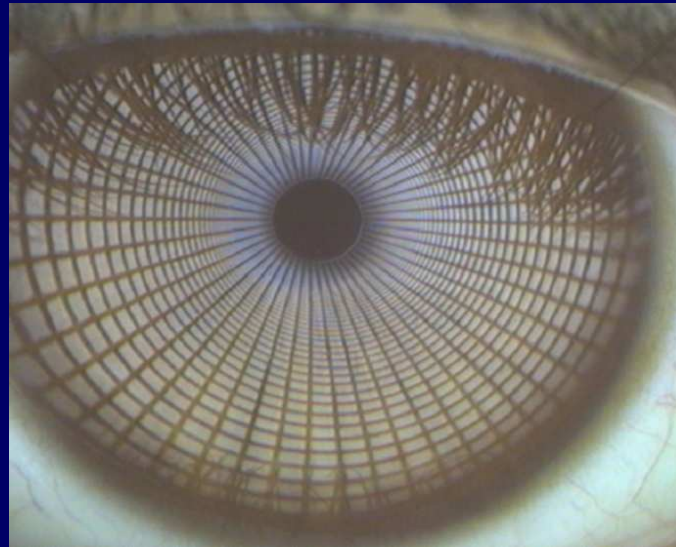
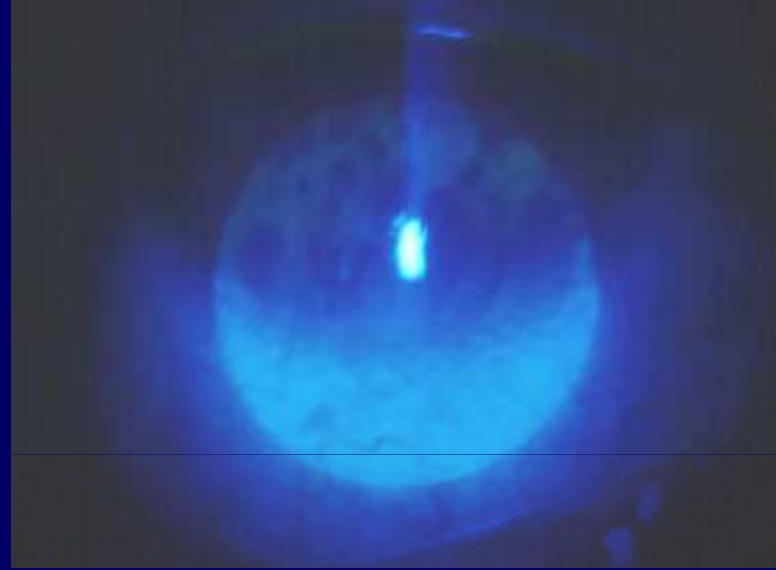
Fluoresceina



Misurazione osmolarità

- Valutano le alterazioni morfologiche della congiuntiva e della cornea

# BREAK UP TIME







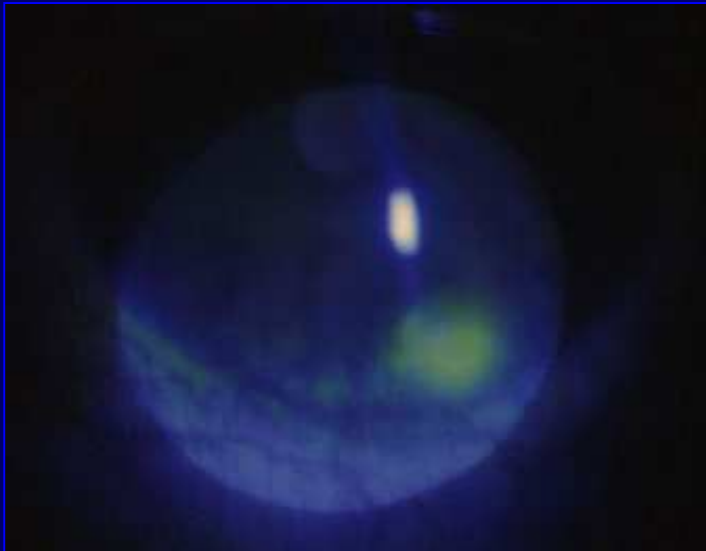
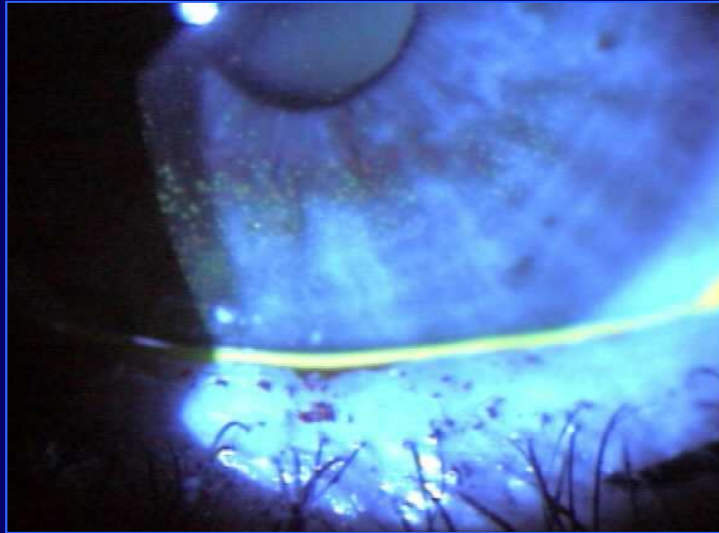




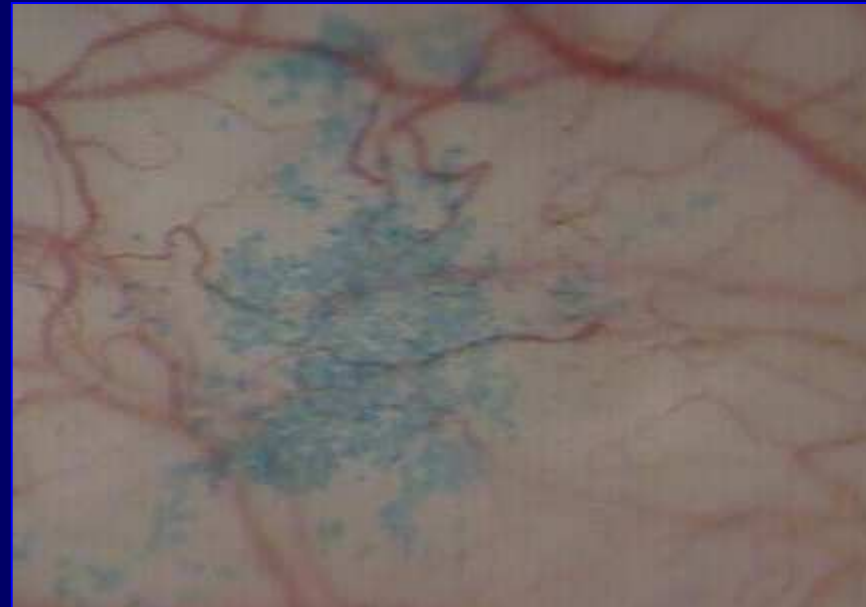
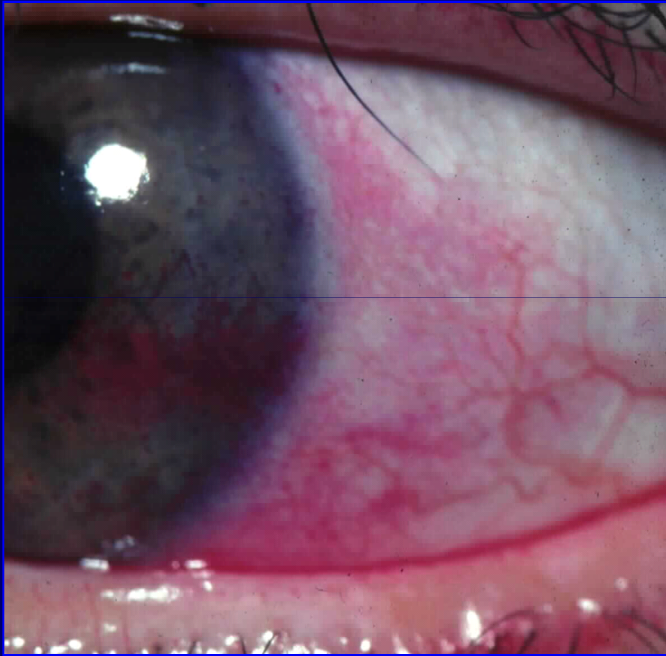


Tear Lab

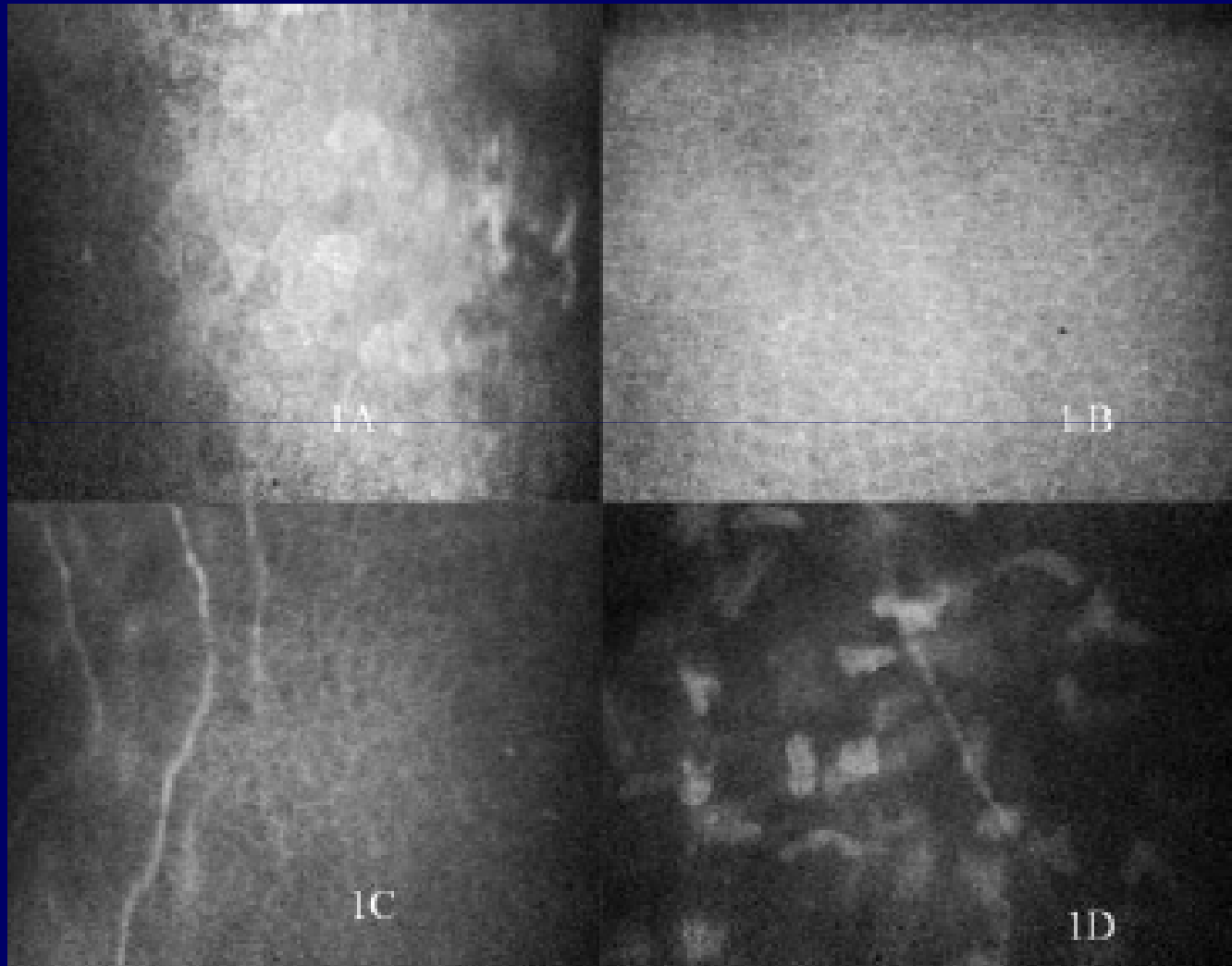
## Colorazione corneale: Fluoresceina



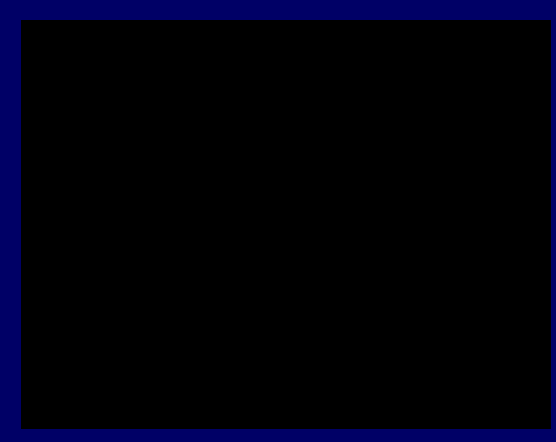
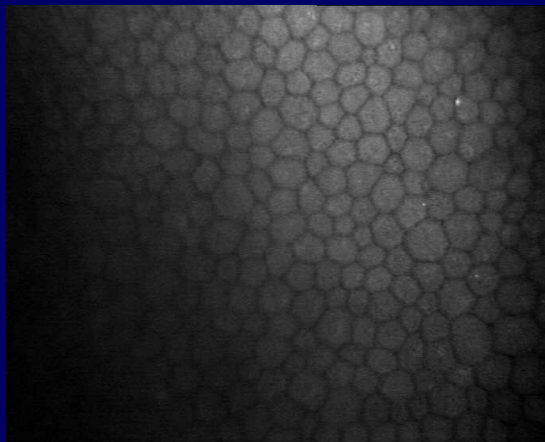
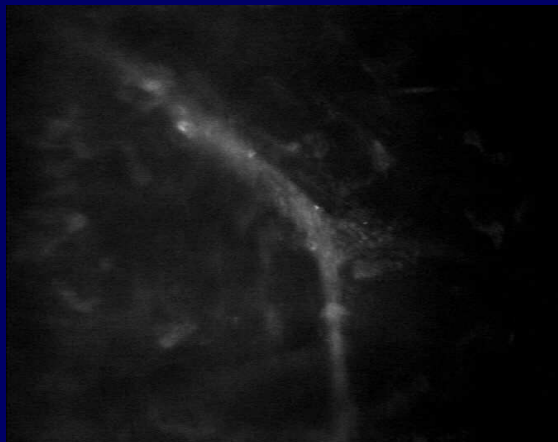
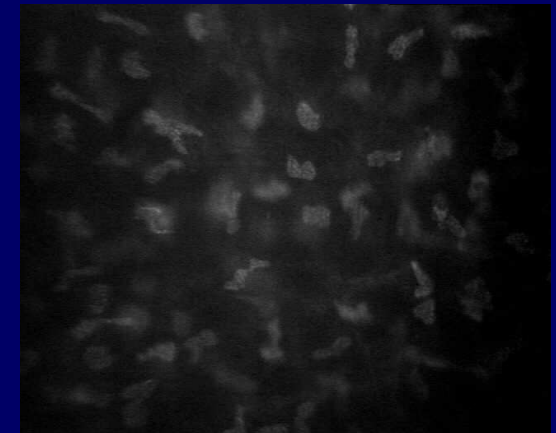
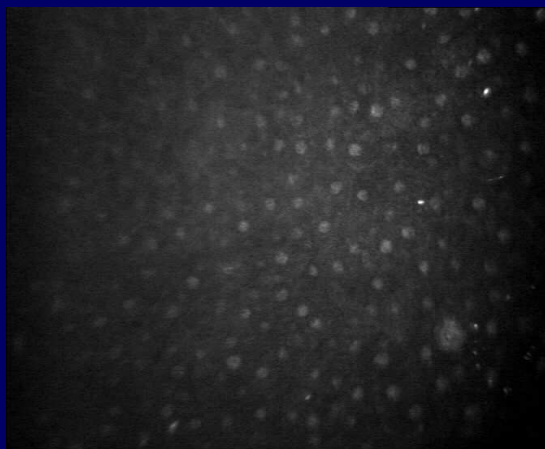
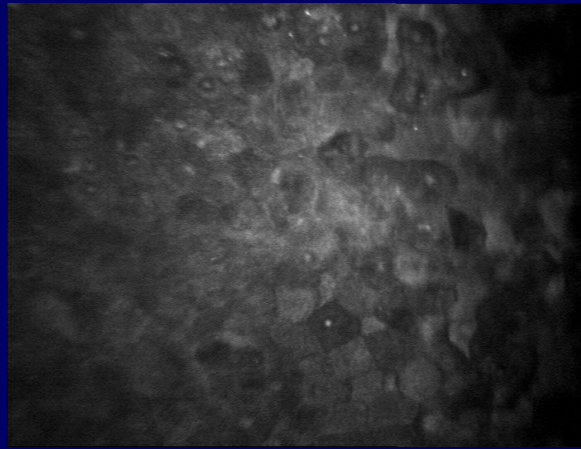
## Colorazione congiuntivale: Rosa Bengala / Verde di Lissamina



# Microscopia Confocale

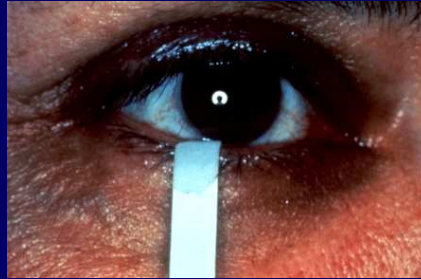








# Aspetti Diagnostici



- Valuta la produzione lacrimale (e pone diagnosi di DE iposecretivo)  
Cut-off < 5 mm/5min

Test di Schirmer

Schirmer-I  
senza anestesia

Test di Schirmer I positivo:  
indica già una condizione di  
Dry Eye iposecretivo  
moderato/grave

Schirmer  
con anestesia

Test più sensibile di quello senza  
anestesia: individua i casi di  
Dry Eye iposecretivo lieve

## DEWS DEFINITION AND CLASSIFICATION

**Table 5. Dry eye severity grading scheme**

Dry Eye Severity Level	1	2	3	4*
Discomfort, severity & frequency	Mild and/or episodic; occurs under environmental stress	Moderate episodic or chronic, stress or no stress	Severe frequent or constant without stress	Severe and/or disabling and constant
Visual symptoms	None or episodic mild fatigue	Annoying and/or activity-limiting episodic	Annoying, chronic and/or constant, limiting activity	Constant and/or possibly disabling
Conjunctival injection	None to mild	None to mild	+/-	+ / ++
Conjunctival staining	None to mild	Variable	Moderate to marked	Marked
Corneal staining (severity/location)	None to mild	Variable	Marked central	
Corneal/tear signs	None to mild	Mild debris ↓ meniscus	Filamentary keratitis, mucus clumping ↑ tear debris	Filamentary keratitis, mucus clumping ↑ tear debris
Lid/meibomian glands	MGD variably present	MGD variably present	Frequent	Trichiasis, keratinization, symblepharon
TFBUT (sec)	Variable	≤ 10	≤ 5	Immediate
Schirmer score (mm/5 min)	Variable	≤ 10	≤ 5	≤ 2

\*Must have signs AND symptoms. TBUT: fluorescein tear break-up time. MGD: meibomian gland disease

Reprinted with permission from Behrens A, Doyle JJ, Stern L, et al. Dysfunctional tear syndrome. A Delphi approach to treatment recommendations. *Cornea* 2006;25:90-7

**Table 4.** Treatment recommendations by severity level

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**Level 1:**

Education and environmental/dietary modifications  
Elimination of offending systemic medications  
Artificial tear substitutes, gels/ointments  
Eye lid therapy

**Level 2:**

*If Level 1 treatments are inadequate, add:*

Anti-inflammatories  
Tetracyclines (for meibomianitis, rosacea)  
Punctal plugs  
Secretagogues  
Moisture chamber spectacles

**Level 3:**

*If Level 2 treatments are inadequate, add:*

Serum  
Contact lenses  
Permanent punctal occlusion

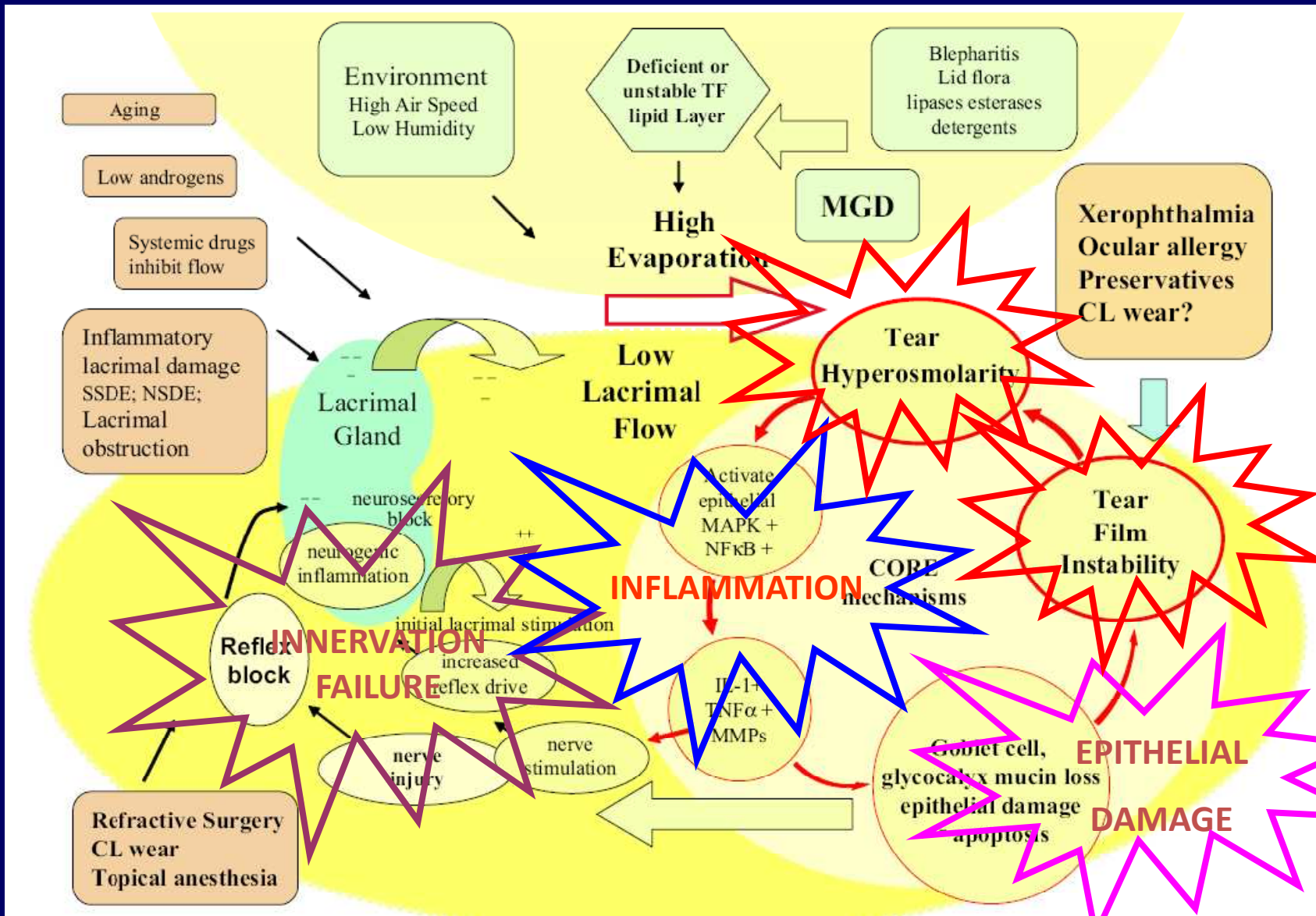
**Level 4:**

*If Level 3 treatments are inadequate, add:*

Systemic anti-inflammatory agents  
Surgery (lid surgery, tarsorrhaphy; mucus  
membrane, salivary gland, amniotic  
membrane transplantation)

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# TARGET THERAPEUTICS



# TARGET TERAPEUTICI

FILM LACRIMALE

INFIAMMAZIONE

EPITELIO

INNERVAZIONE

# DRY EYE DIAGNOSTIC-THERAPEUTIC FLOW CHART

