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# Dry eye in the spotlight

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In partnership with the French Society of Ophthalmology (SFO), Quantel Medical organised a symposium chaired by Dr Sihem Lazreg (Algeria), involving Prof. Béatrice Cochener, Dr Florence Malet and Dr Marie-Caroline Trone. Here we summarise the presentations given by each speaker.

## Managing dry eye: the key to successful cataract and refractive surgery

Based on the presentation by
Prof. Béatrice Cochener
(Brest University Hospital Centre)

**Determining vision quality is all about monitoring**, the aim being to obtain 10/10 vision in all situations. The tear film plays a key role in visual performance: its stability determines the condition of the corneal surface. It measures between 6 and 20 µm. While a uniform reduction in tear film thickness causes a modest refractive effect, irregular variations in its surface will lead to significant changes in power, with an impact on vision. Tear film thickness is directly linked to dry eye, and in particular to meibomian gland dysfunction (MGD), in which damage to the lipid layer of the tear film causes the film to become unstable. Blinking frequency—which physiologically lies at 15 blinks/minute—reduces during screen use, amplifying this instability [1].

Vision quality is a new dimension of visual performance, based on observed refraction. It is associated with the idea of visual comfort, defined by the absence of functional signs of dry eye and high-order aberrations (halos, glare, fluctuations, night vision discomfort), and with stable visual performance.

**Vision quality measurement** requires multimodal objective assessment of the ocular surface:

**>>>** Repeat qualitative topographic assessment, to identify any instability of the ocular surface. A Placido disc can be used to reveal any changes in corneal curvature or increases in the irregular astigmatism index. Elevation topography measures lability between blinks. It is important to note that topography systems are designed for monitoring purposes and cannot provide information on eye function.

**>>>** Vision quality is measured using aberrometers, which measure high-order optical aberrations that can be correlated to tear meniscus volume. Interpretation of the results must take neuroadaptation phenomena into account. The optical quality analysing system (OQAS) measures the combined effect of high-order optical aberrations and reduced media transparency on the optical quality of the eye. It can also estimate the objective scatter index (OSI), which must be confirmed by clinical examination. If the media are normal, the observed fluctuations can be attributed to the tear film.

**>>>** Meniscus height and tear film thickness can be measured by SD-OCT, UHR-OCT and epithelial mapping.

**>>>** It is also important to assess functional visual acuity and check for reduced corneal sensitivity (esthesiometry) and low contrast sensitivity.

**>>>** Finally, eyelid movement impact—particularly on the lipid layer—needs to be measured via meibography and non-invasive break-up time assessment (NIBUT) (***Figs 1 and 2***). LacryDiag® is a quick-use device (4 min) that offers a variety of different types of analysis, detailed in the next presentation. It can be handled by a trained assistant.

**>>>** In the future, it should be possible to use inflammation and infection biomarkers as part of this monitoring process.

**The key to success: detecting and pre-treating ahead of surgery, informing and monitoring after the operation.** The treatment strategy is based on the pre- and post-operative use of preservative-

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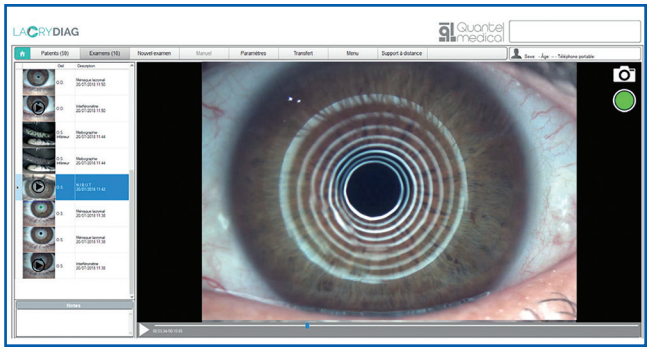


**Fig. 1:** NIBUT (*non-invasive break-up time*).


**Fig. 2:** Meibography.

free lubricants (balancing the need for sustained lubrication with the potential for blurred vision), combined with short-term corticosteroids or, for very severe forms, cyclosporin and autologous serum. It is essential to treat associated conditions such as blepharitis and ocular rosacea.

Punctal occlusion can also improve the quantity and quality of the aqueous phase. Finally, conditions affecting other areas must also be taken into account, including collagenosis, autoimmune diseases, rheumatoid arthritis and herpes. With rheumatoid arthritis, excess cortisone must be avoided in the preoperative period, as must postoperative NSAIDs. Herpes recurrence must be prevented by antiviral protection during the procedure.

## Ocular surface analysis and TFOS DEWS II Report criteria

Based on the presentation by
Dr Sihem Lazreg (Blida, Algeria)

Ophthalmological examination remains the gold standard here, with targeted questioning, slit lamp examination with fluorescein, BUT assessment and Schirmer's test. Tear film instability is a key aspect of the physiopathology of dry eye syndrome. However, BUT assessment has its limits: it has low reproducibility and extensive inter-observer and intra-patient variability. It is also affected by the amount of fluorescein instilled, which is why the TFOS DEWS II Report advocates the use of more objective measures, such as NIBUT (***Fig. 1***).

The TFOS DEWS II Report introduces a new diagnostic approach [2] involving the incorporation of triaging questions to more precisely identify patients with clinical symptoms compatible with a diagnosis of dry eye. If symptoms are present, associated risk factors must then be looked for, such as contact lens use, refractive surgery and smoking. Essential diagnostic tests include a screening questionnaire (DEQ-5 or OSDI) and homoeostasis marker analysis. A DEQ-5 ≥ 6 or an OSDI ≥ 13 is considered positive, and must be associated with:
– A NIBUT < 10 s
– Osmolarity ≥ 308 mOsm/L in each eye, or a difference of > 8 mOsm/L between the eyes
– Ocular surface staining > 5 corneal spots or > 9 conjunctival spots or clear edges.

Once the diagnosis has been made, the dry eye must be categorised on a spectrum between evaporative dry eye and aqueous deficient dry eye. Evaporative dry eye requires exploration of the meibomian glands and the tear film lipid layer.

Hyposecretion is evaluated by analysing the lacrimal gland and tear meniscus. LacryDiag® can measure NIBUT automatically and reproducibly to a definite value, without the use of fluorescein. The tear meniscus can also be assessed (normal value > 0.2 mm). Non-automated infrared meibography can identify shortening, tortuosity and total atrophy of the meibomian glands (***Fig. 2***). Finally, interferometry can be used to assess the lipid layer through semi-quantitative comparison, providing information on the functioning of the meibomian glands. LacryDiag® provides a summary of this ocular surface analysis in the form of a one-page report.

## Ocular surface quality and comfort in contact lens wearers

Based on the presentation by
Dr Florence Male (Point Vision, Bordeaux)

The literature reports contact lens discomfort at a frequency of between 31% and 79%. It is the main reason patients stop wearing lenses. In numerous epidemiological studies, contact lens use is considered to be a risk factor for dry eye. The contact lens changes the tear film by cutting it in two, which encourages it to evaporate. Blinking frequency, too, is affected by contact lenses, and there are also biophysical and biochemical effects that impact on tear film dynamics, stability and composition. The contact lens material has an impact on lens wettability, which can change after several days of use due to deposits, with hydrophobic zones appearing. This further alters the surface quality and the con-

sistency of the tear film over the lens. In clinical practice, discomfort linked to dryness during contact lens use is assessed firstly by carefully interviewing the patient to clearly determine the type of lenses used, the duration of wear, the point at which the feeling of dryness occurs, the OSDI score, the lens cleaning routine and the frequency with which the lenses are changed. A slit lamp is then used to examine the patient for any objective signs of dryness, identified as fluorescein uptake in the lid-parallel conjunctival folds (LIPCOF) or wide, irregular staining along the Marx line (***Figs 3 and 4***) [3].

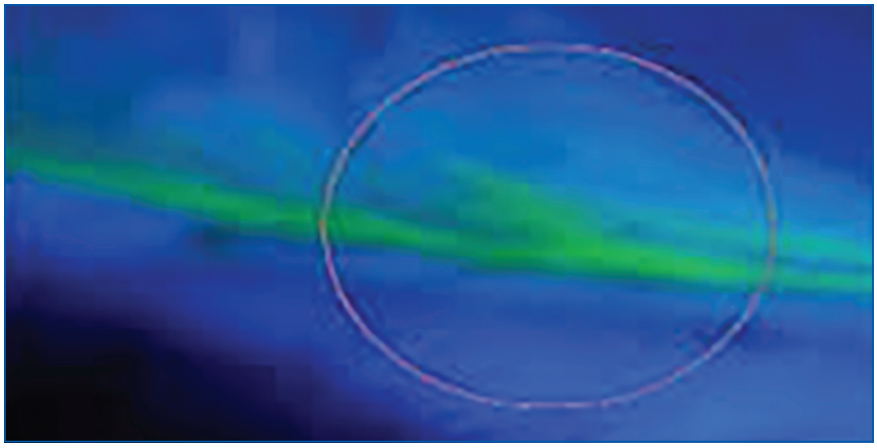

**Fig. 3:** LIPCOF: lid-parallel conjunctival folds.

Additional assessment of the ocular surface using LacryDiag® provides information on contact lens wettability via NIBUT and surface quality during wear, and can also measure the tear ducts and the lipid layer over the contact lens.

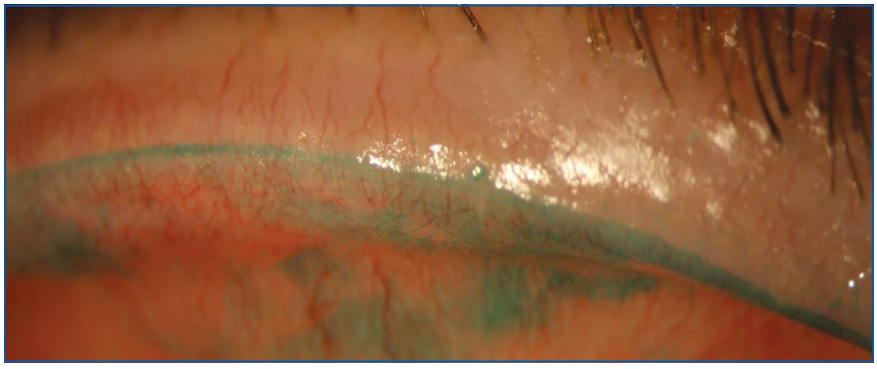

**Fig. 4:** Extensive fluorescein uptake along the Marx line.

## A bright new treatment for dry eye

Based on the presentation by
Dr Marie-Caroline Trone
and Prof. Philippe Gain
(Saint-Étienne University Hospital Centre)

In the TFOS DEWS II Report, intense pulsed light (IPL) is included under step two of the treatment options for dry eye associated with MGD. The mechanisms of action of IPL have yet to be fully described, but it has been hypothesised that the treatment may stimulate parasympathetic innervation, speed up meibomian gland metabolism, improve meibum expression (due to the heat) or produce an anti-inflammatory effect on the skin. Studies have confirmed that IPL improves clinical signs and symptoms, enhances tear film quality, reduces inflammatory markers (cytokines) in the tears and has an antimicrobial effect (against bacteria and Demodex). Tolerance is satisfactory overall, and adverse effects are very rare [4].

Lacrystim® is a new device (***Fig. 5***) that delivers polychromatic intense pulsed light across a spectrum ranging from 610 to 1200 nm, with a 610-nm filter to block out UVA, UVB and UVC rays. Thanks to this filter, less light is absorbed by the melanin in the skin, which means it can be used to treat all phototypes. The total energy delivered is between 8 and 12 J/cm$^2$, and the use of pulses limits thermal damage to the skin, inflammatory reactions and temperature increase in body tissue. The single handpiece includes an integrated water-based cooling system. The only consumable required is a transparent gel, which greatly reduces the cost of use.

The patient sits in a slightly inclined chair and wears protective eye goggles.


**Fig. 5:** Treatment with the Lacrystim® IPL system.

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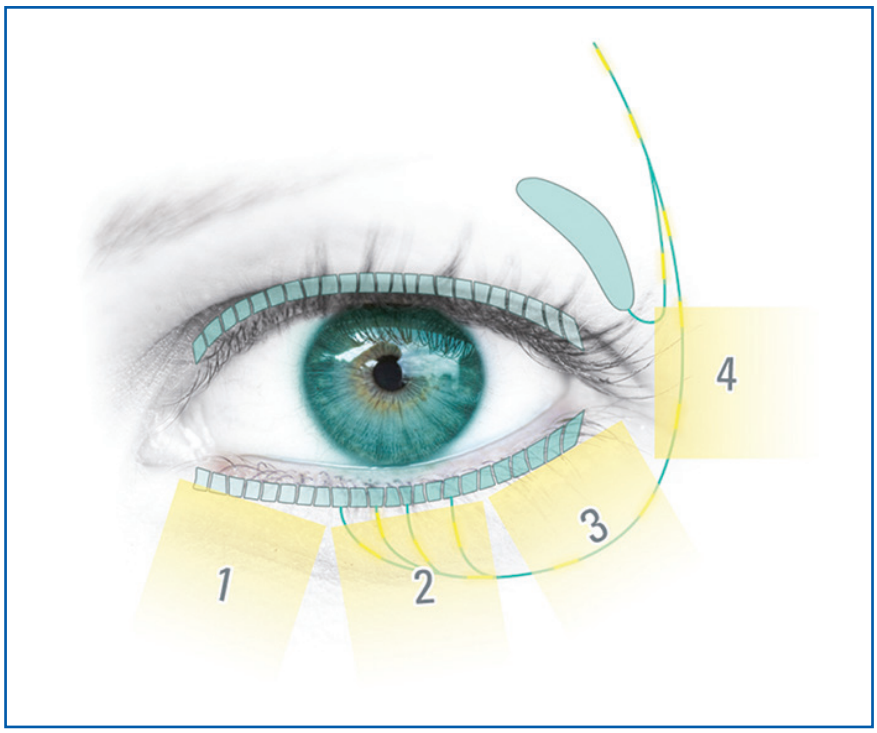


**Fig. 6:** Lacrystim® treatment protocol.

Beauty spots and tattoos must be protected. A thin layer of conductive gel is applied to the treatment zone. The standard protocol is four shots beneath the lower eyelid (three vertical shots below and one vertical shot temporally) (***Fig. 6***). The treatment lasts an average of five minutes and is painless.

At the end of the session, the patient is advised to avoid sun exposure and use sunblock. Three to four sessions are typically recommended: on D0, D15 and D45, with an additional session if required. Lacrystim® treatment can be offered alone or in combination with other treatments to all patients with moderate-to-severe MGD, patients for whom other treatments did not work and those with poor compliance with massage, particularly children.

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