



Meibomian Gland
Dysfunction (MGD)

Ocular Surface
Diagnosis

Veterinary
practitioner

Non invasive
break up time
(NIBUT)

Veterinary
Ophthalmologist

DRY EYE DISEASE

Ophthalmic diagnostics
anywhere, anytime



I.C.P. MGD ANALYSIS MEIBOMIAN GLAND DISEASE

Through an acquisition of images, or by infrared camera, it allows the evaluation of the gland.

The dysfunction of the Meibomian Glands (MGD, Meibomian Gland Dysfunction) is caused by a chronic alteration of the sebaceous glands that are located inside the eyelids.

Thanks to the modular double LED illumination, the image will result ever without reflections and side effects. The instrument has the possibility to be used in a portable way wherever you need it.



TECHNICAL SPECIFICATIONS

TPOLOGY	Device for evaluation of the meibomian glands
CAMERA	Colour,sensitive to infrared (NIR)
RESOLUTION	8 MPx
LIGHT SOURCE	Infrared LED
PART EXAMINED	Upper and lower eyelids
RATING	Calculation of the percentage of functional glands in the area selected by the operator Calculation of percentage of missing glands
GRAPHIC RESULT	Pointing out by colour the areas with and without glands
TOOLS	Editor to highlight the area of the glands to be evaluated

Invented and developed 100% in Italy

Medical instrument in CLASS I registered to the Ministry of Health

Medical electrical equipment CLASS I complies with the norm En. 60601-1.

The technical features of the instrument and its accessories can be improved in any time and without notice.

An updated description is available at www.sbmsistemi.com



**I.C.P. MGD
MICROSOFT VERSION BY PLUG CABLE
CONNECTION
IOS VERSION BY WI-FI CONNECTION**

System analysis of the images obtained through a sensitive infrared camera (NIR) in order to locate in a guided way:

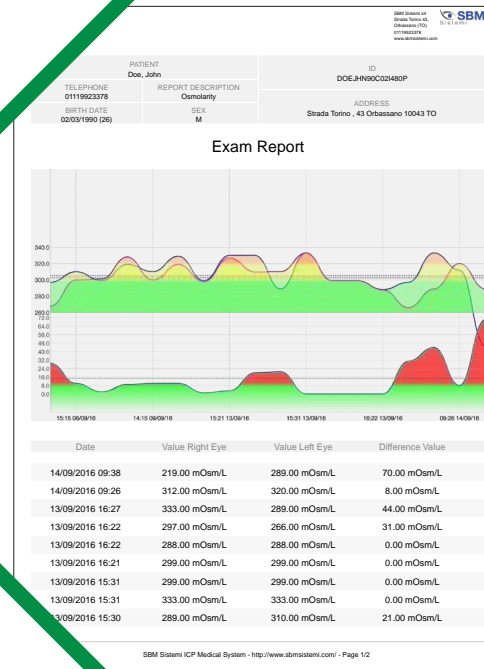
- The position detected from the image, valid both for the upper and lower eyelids
- The percentage of the functional glands in the area selected by the operator
- Calculating the percentage of functional glands in the area selected by the operator
- Pointing out by colour the areas with and without glands
- Classification in 4 different degrees
- Loss between 0 and 25%
- Loss between 25 and 50% in yellow
- Loss between 50 and 75% in orange
- Loss between 75 and 100% in red
- Through the editor system it is possible to modify the brightness of the picture for a better evaluation.

Meibography

Meibography allows to evaluate the morphology and drop out of the Meibomian Glands and to make the diagnosis of Meibomian Gland Dysfunction (MGD).

Meiboscopy is the visualization of the glands through trans-illumination of the eyelid with infrared light.

The software allows to analyze the functional and non functional areas, and to evaluate the extension of the affected area.





Automatic detection of Meibomian Glands

ICP allows to examine by infrared meibography good quality images in a guided way to detect the length and width of Meibomian glands without requiring any input from the user.

The images are then automatically classified.

A convenient hand held device with two infrared filters and a built in camera. Utilising WIFI connectivity the MGD device captures and displays images of the meibomian glands straight on to your iPad

Features:

- Seamless and wireless capturing of images for added convenience
- Image capture button freezes live images which are instantly displayed on the iPad
- Captured image enhancement tools: contrast, brightness and hue settings to improve and highlight captured images
- Define area for analysis and visible area of glands. Calculations of gland loss is then displayed graphically over the glands
- Progression analysis provides a split screen for side by side image comparisons over time



Normal Meibomian glands



Distichiasis and Meibomian glands dysfunction



Meibomian gland dysfunction (MGD) is a frequent finding in dogs and cats

Meibomian gland dysfunction (MGD) is a chronic, diffuse abnormality of the meibomian glands, commonly characterized by terminal duct obstruction and/or qualitative/quantitative changes in the glandular secretion. MGD may alter the tear film and cause clinical signs of eye irritation, clinically apparent inflammation, and ocular surface disease.



These glands produce oily lipid substances that are released to the eyelid margins reaching the tear film thanks to eyelid winks.

The oily lipid layer floating on the surface of the tear film reduce evaporation.

The MGD alters the lipid component of the tear film and cause an evaporative dry eye with its characteristic clinical signs.

In severe cases, the MGD can also cause blepharitis, inflammation of the eyelids. In dogs and cats blepharitis may induce MGD.





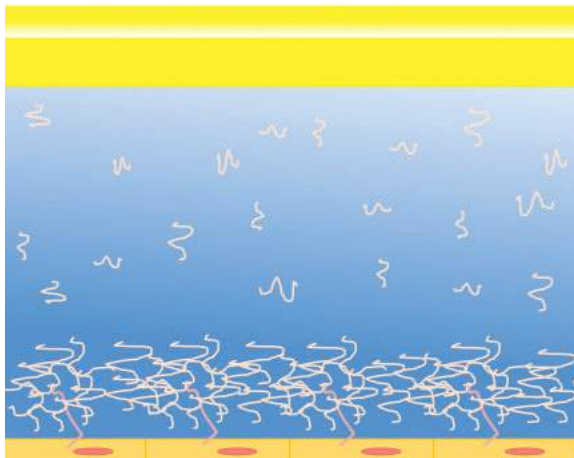
TEARSCOPE (Tear Film Screening)

The scattered light emitted by the I.C.P. allows to evaluate the interference fringes caused by the lipid layer of the tear film and to classify them in different patterns of tears.

The observation of the lipid layer allows to show the presence of lacrimal abnormalities and make a correct diagnosis.

The PTF is a hydrated mucin gel whose mucin concentration decreases with distance from the epithelial cell surface. It's stability is preserved by:

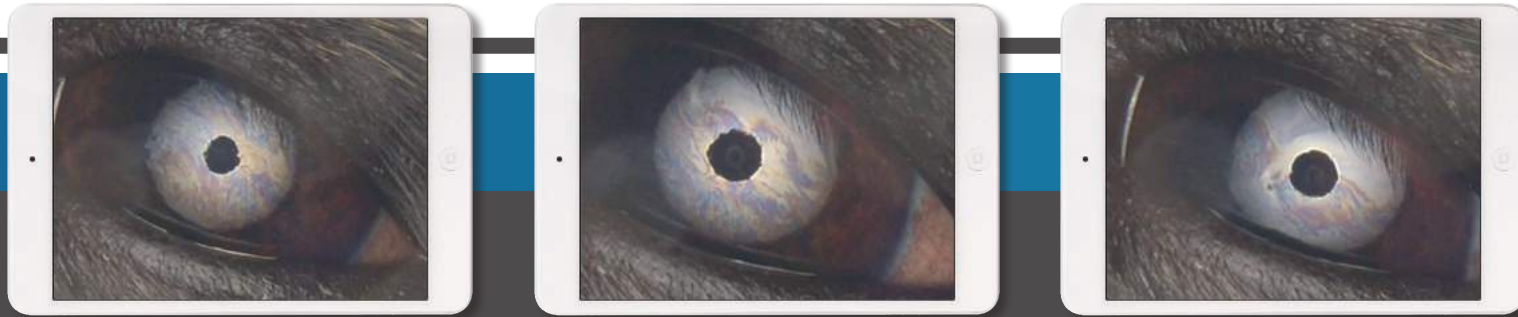
- The lipid superficial layer made of polar and not polar lipids
- The mucins secreted by the conjunctival goblet cells, dispersed in the aqueous layer
- The structural, cell membrane associated mucins, glycoproteins extending in the glycocalix, at the epithelial surface
- Quantitative test that evaluate the quantity of basal and/or reflected secretion



GRAPHIC REPRESENTATION OF THE TEAR FILM

The tear film is a hydrated mucin gel whose mucin concentration decreases with distance from the epithelial surface. It interacts with corneal and conjunctival epithelium via the membrane-spanning mucins. A superficial lipid layer, composed of polar and non polar lipids, limits evaporation of the aqueous layer.

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Lipid layer with coloured fringes. Estimated 120 nm

ICP Dry eye analysis

I.C.P. Tearscope is an instrument available to veterinary ophthalmologists and practitioners to evaluate the composition and stability of the precorneal tear film (PTF).

It allows to better evaluate PTF qualitative deficiencies and make an accurate diagnosis of evaporative Dry Eye Disease (DED) due to imbalance of the three main PTF components:

- Lipid
- Aqueous
- Mucin

Thanks to ICP Tearscope it is possible to identify the type of DED and determine which deficient layer is affected and select a specific treatment.

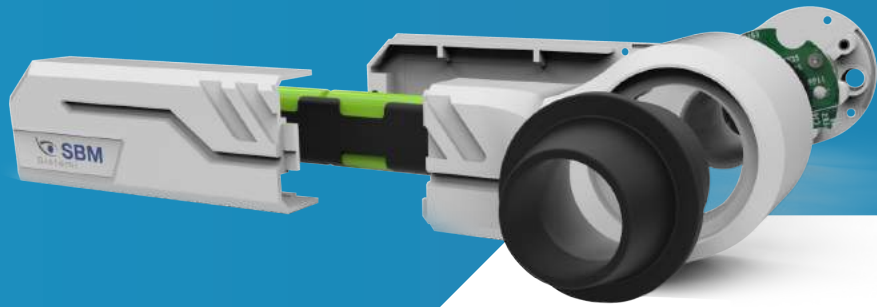
ICP Tearscope allows to quantify directly and indirectly each tear film layer

The white LEDs are used to display the phenomenon of interference fringes, allowing to evaluate the thickness of the lipid component of the tear and run the Break Up Time (NIBUT) and Non Invasive Dehydration Up Time (NIDUT).

The blue LED (when using fluorescein) allows you to observe the bulbar or corneal staining and run the Break Up Time (BUT).

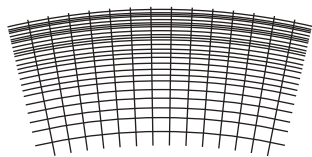
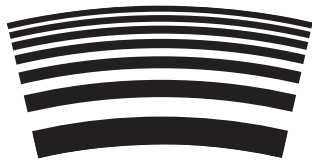
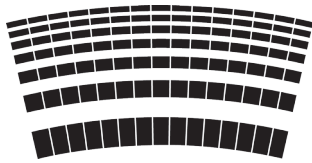
By evaluating the tear meniscus, it is possible to directly perceive and measure the PTF watery component.





Immediate interpretation and follow up

By using a dedicated lipid layer GRADING SCALE, each interference pattern may be examined in a simple and straightforward way



Supplied accessories

The system is provided with a kit of useful grids to perform various screening. All filters are already present in the Tearscope.

- Measurement of BLACK LINE (MLMI)
- Evaluation of the corneal surface to check for irregular patterns and structural defects
- Blue and white Led
- A thick grid to observe the quality of the tear film
- A fine grid to evaluate the quality and the structure of tear and measure the N.I.B.U.T.
- A Placido's disc to highlight possible distortions or corneal and tear film irregularities



NIBUT exam at start in a dog



NIBUT exam. Initial breaking



Lipid layer analysis

Through a quick and easy acquisition of a series of 3 blinks, ICP Tearscope allows to obtain the thickness of the single lipid layer of the tear film, classifying it in 3 to 5 different categories in a quick and precise way.

It is possible to refer to a grading scale for detailed classification and follow up.

For a detailed analysis of the mucin layer, ICP Tearscope evaluates the non invasive break up time and the lipid layer. By matching the two exams it's possible to better evaluate the stability of the precorneal tear film. By using the fluorescein stain, it's possible to perform the classic TBUT.

Tear meniscus height measurement

In dogs and cats the PTF thickness is about $8\ \mu$ on the cornea but it is much thicker at the meniscus, where in human being reaches up to 0,2 to 0,5 mm (200- 500 μ). By examining the meniscus it is possible to evaluate the lacrimal gland aqueous production.





I.C.P. OSA

I.C.P. OSA

A full assessment of the ocular surface through a combination of tests for dry eye diagnosis, from tear break up time to the tear volume production test.

MGD Analysis meibomian gland disease

Easily and efficiently integrates complex examinations such as meibography and tear film interferometry screening. Dry Eye is commonly by the Meibomian Gland Dysfunction (MGD). The Meibo-Scan shows the morphological changes in the glandular tissue.

System analysis of the images obtained through a sensitive infrared camera (NIR) allows to evaluate in a guided way:

- The presence and distribution of the Meibomian glands in the upper and lower eyelids
- The extension of the area with normal glands
- The percentage of the areas with or without altered glands
- The "absent" and "present" areas of different colour

For a better evaluation, the brightness of the picture can be modified by the editor system.

Integrated system for analysis of the ocular surface

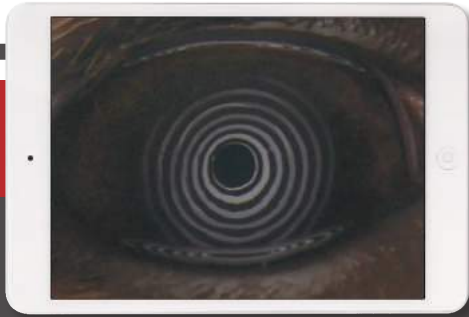
The instrument is designed to make all tear film tests and the analysis of Meibomian glands, as well as various measurements and classifications according to international grading scales.

Meibography

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Meiboscopy is the visualization of the glands through trans-illumination of the eyelid with infrared light.

The software allows to analyze the functional and non functional areas, and to evaluate the extension of the affected area.



Placido disc exam. Normal shaped cornea



Placido disc exam. Pigmented cornea in a KCS affected dog

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Features:

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TECHNICAL SPECIFICATIONS

IMAGE RESOLUTION	5 mp
ACQUISITION MODE	Multi shot, tube, movie
FOCUS	Autofocus, manual focus
ISO MANAGEMENT	Variable
GRIDS	Placido disc, NIBUT grid
CAMERA	Full-color, sensitive to infrared (NIR)
LIGHT SOURCE	Infrared LED - Blue and white Led





The scattered light emitted by the I.C.P. allows to evaluate the interference fringes caused by the lipid layer the tear film and to classify them in different patterns of tears.

The observation of the lipid layer allows to show the presence or not of lacrimal abnormalities and make a correct diagnosis.

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- The lipid superficial layer made of polar and not polar lipids
- The mucins secreted by the conjunctival goblet cells, dispersed in the aqueous layer
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- Lipid
- Aqueous
- Mucin

Thanks to ICP Tearscope it is possible to identify the type of DED, determine which deficient layer is affected and select a specific treatment.



Pigmented, irregular corneal surface
Irregular lipid layer (estimated 30-80 nm)



Irregularly shaped NIBUT grid

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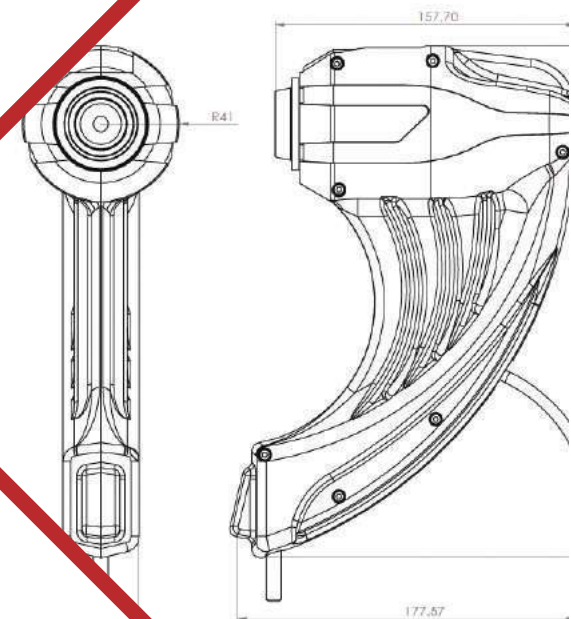
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By using a dedicated lipid layer GRADING SCALE, each interference pattern may be examined in a simple and straightforward way

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Tear meniscus-height

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By examining the meniscus it is possible to evaluate the lacrimal gland aqueous production.

N.I.B.U.T.

To evaluate the tear film break-up time in a non invasive and fully automated way. In the B U T test the presence of fluorescein in the tears may stimulate reflex tearing and may also change tear film properties. To overcome these potential inconvenients a non-invasive procedure may be used.

In the dog and the cat third eyelid movements may prevent NIBUT exam.

Lipid layer

EVALUATION OF THE LIPID LAYER THICKNESS

The color and structure of the lipid layer is visible and can be recorded. The lipid layer pattern depends on its thickness, which correlates with tear film evaporation and dry eye clinical signs.

White to white measurement

evaluation of corneal diameter from limbus to limbus (white-to-white distance, WTW).

Corneal placid plate warpage

To evaluate corneal distortion and tear film defects by the projection of Placido rings on ocular surface.

Supplied accessories

The system is provided with a kit of useful grids to perform various screening, all filters are already present in the system software to evaluate and diagnose dry eye.

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ACCESSORY



COMPLETE HOLDER FOR MGD



FOOT SENSOR USB
USB connection



HOLDER FOR REFRACTION UNIT

Usable on any slit lamp graft.
The tool supports the analysis of
Meibomian glands, tearscope etc.



SLIT LAMP HOLDER



SPARE PARTS



BRIEFCASE

The bags, made of material resistant to large stresses, have the particularity to be watertight with IP 67 impermeability and the perfect seal for liquids and dust. This is ensured by a rubber seal along the entire closure profile. In all models a balancing valve of the internal and external pressure is also present. Customizations are possible such as bespoke interior, screen prints or stickers.

XL	Dimension: 68x37x52 cm
BIG	Dimension: 52x41x25 cm
MEDIUM	Dimension: 42x29x16 cm
SMALL	Dimension: 34x30x15 cm

TEAR SCOPE FILMS

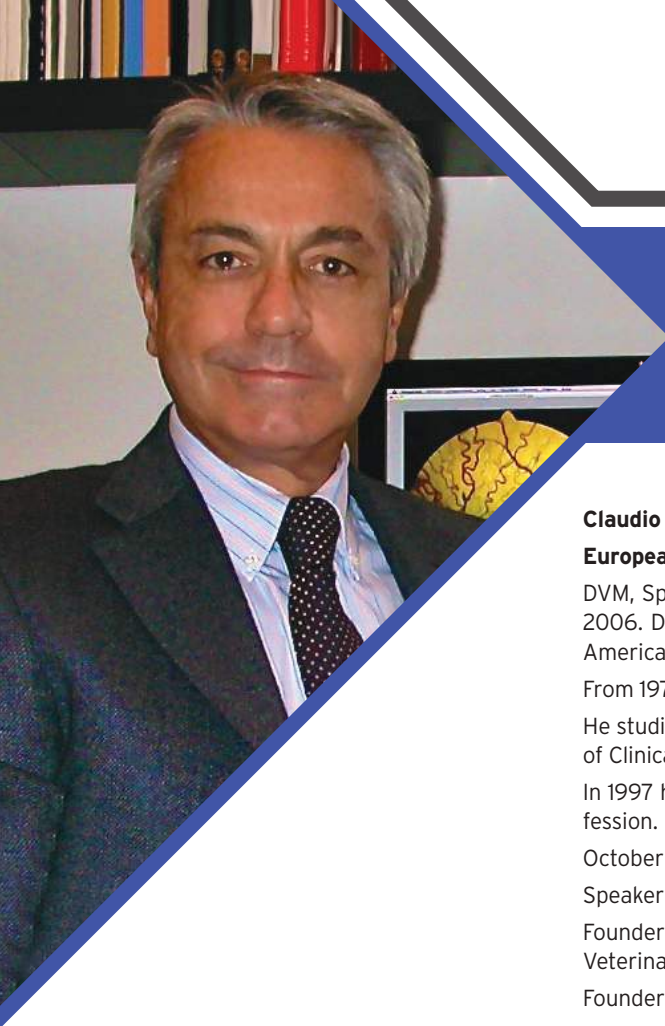


BATTERY



POLYMER CELLS	Thinner and lighter
ULTRA-LIGHT	It weighs only 72 grams
INPUT	5V DC 1000MA

HOLDER	Holder for 4 x AA type batteries
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SCIENTIFIC ADVISOR

Claudio Peruccio, DVM, SCMPA, DipECVO, Hon DipACVO, MRCVS

European & RCVS Specialist in Veterinary Ophthalmology

DVM, Specialist Small Animal Diseases (SCMPA). Associate Professor at the Faculty of Veterinary Medicine, University of Torino, Italy until 2006. Diplomate European College of Veterinary Ophthalmologists (ECVO) and founding member since 1993. Honorary Diplomate of the American College of Veterinary Ophthalmologists (ACVO). Member and Specialist of the Royal College of Veterinary Surgeons (MRCVS).

From 1974 his main interests are veterinary and comparative ophthalmology.

He studied at the Veterinary Colleges in Illinois, Pennsylvania, Florida and held the office of Adjunct Associate Professor at the Department of Clinical Medicine, College of Vet. Med., University of Illinois, Usa.

In 1997 he has been awarded the World Small Animal Veterinary Association (WSAVA) / WALTHAM Internation Award for Service to the Profession.

October 19, 2014 he has been nominated Honorary Diplomate of the American College of Veterinary Ophthalmologists (ACVO)

Speaker and lecturer in many meetings in Italy and other Countries, author of many scientific publications, chapters and textbooks.

Founder editor of international and national journals and newsletters: Progress in Veterinary and Comparative Ophthalmology, Progress in Veterinary Neurology, Veterinaria, Ippologia, Orizzonti Veterinaria, Hereditary Eye Disease, The Globe.

Founder member and member of the board of the following international and national organizations:

- European College of Veterinary Ophthalmologists (ECVO, President 2014-2016)
- International Society of Veterinary Ophthalmology (ISVO, President 1991-93)
- Italian Small Animal Veterinary Association (AIVPA, President 1982-84)
- Italian Companion Animal Veterinary Society (SCIVAC, Vice-president 1985-87)
- Italian Society of Veterinary Ophthalmology (SOVI, President 1989-98)
- Italian Society of Veterinary Neurology (SINVET, Vice-president 1989-92)

Present ongoing offices:

- ECVO Past-President
- Director CVITGroup Academy
- Editor of The Globe, ISVO Newsletter
- Consultant at Veterinary Ophthalmology Referrals in Torino, Milano, Samarate (Italy)

At present the main area of interest is Ocular Surface focusing on new diagnostic techniques and treatments

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