



icare  
TONOVET

DNA

+ CLINICAL STUDIES

ARTICLES

TESTIMONIALS



NO ANESTHESIA  
NO CALIBRATION

## FELINE BREEDS

# PREDISPOSED TO GLAUCOMA

Persians  
Siamese  
Domestic Short-Hair

## CANINE BREEDS

# PREDISPOSED TO GLAUCOMA

Afghan  
Akita  
Alaskan Malamute  
American Eskimo Dog  
Australian Cattle Dog  
Basset Hound  
Beagle  
Bedlington Terrier  
Bichon Frise  
Blue Healer  
Border Collie  
Boston Terrier  
Bouvier des Flanders Brittany  
Brittany  
Bullmastiff  
Cairn Terrier  
Cardigan Welsh Corgi  
Chihuahua  
Chow Chow  
Cocker Spaniel  
Dachshund

Dalmatian  
Dandie Dinmont Terrier  
English Cocker Spaniel  
English Springer Spaniel  
Entlebucher Mountain Dog  
Flat-coated Retriever  
Fox Terrier (all varieties)  
Golden Retriever  
Great Dane  
Greyhound  
Irish Setter  
Italian Greyhound  
Keeshond  
Labrador Retriever  
Lakeland Terrier  
Maltese  
Manchester Terrier  
Miniature Pinscher  
Newfoundland  
Norfolk Terrier  
Norwegian Elkhound

Norwich Terrier  
Pekingese  
Pembroke Welsh Corgi  
Petit Basset Griffon Vendéen  
Poodle (all varieties)  
Pug  
Saluki  
Samoyed  
Schnauzer (all varieties)  
Scottish Terrier  
Sealyham Terrier  
Shar Pei  
Shiba Inu  
Shih Tzu  
Siberian Husky  
Skye Terrier  
Tibetan Terrier  
Welsh Springer Spaniel  
Welsh Terrier  
West Highland Terrier

### ICARE TONOVET TECHNICAL INFORMATION

TYPE: TV01  
DIMENSIONS: 13 - 32 mm (W) \* 45 - 80 mm (H) \* 230 mm (L)  
WEIGHT: 155 g (without batteries), 250 g (4 x AA batteries)  
POWER SUPPLY: 4 x AA batteries  
DISPLAY RANGE: 0-99 mmHg  
ACCURACY OF DISPLAY: 1  
DISPLAY UNIT: Millimeter mercury (mmHg)  
STORAGE/TRANSPORTATION ENVIRONMENT:  
Temperature +5 to +40 °C  
Rel. humidity 10 to 80% (without condensation)  
The device conforms to CE regulations.  
For veterinary use only.  
There are no electrical connections from the tonometer to the patient.  
The device has B-type electric shock protection.



# FAQ

## **IS THE TONOVET MEASUREMENT PAINLESS?**

Measurement is painless, the light-weight probe touches the cornea momentarily and very gently, and most patients don't even notice the measurement.

## **IS THE TONOVET MEASUREMENT RESULT ACCURATE?**

Several independent studies prove the accuracy of TONOVET readings. Extensive bench testing and clinical studies have also been performed to ensure the accuracy and repeatability of measurements.

*More information in clinical studies, pages 20 - 31*

## **WHY SIX MEASUREMENTS?**

Six measurements are required to provide accurate measurement results by eliminating the variations caused by operator error and heart rate. The TONOVET software will discard the highest and lowest reading, and the final result is an average of the four single measurement.

## **CAN ANESTHESIA STILL BE USED?**

Icare TONOVET rebound tonometer is designed to be used without applying topical anesthetic. For most accurate measurements, we recommend not to apply topical anesthetic when measuring with the TONOVET. It is possible to measure anesthetized eye but the readings may be affected slightly by the swelling caused by topical anesthetic.

*More information in clinical studies, pages 20 - 31*

## **IS IT POSSIBLE TO LOAD PROBE WRONG WAY?**

No, it's not possible to load the probe wrong way. The mechanical design of probe and probe base makes it possible to insert the probe only in a correct way.

## **CAN THE PROBES BE RE-USED?**

TONOVET tonometer is designed to use single-use disposable probes. Probes should never be cleaned or sterilized because the process and handling can damage the probe resulting in unreliable measurement results or even damage the tonometer. However, same probe can be used for measuring the same patient within reasonably short time period.

## **CAN TONOVET BE USED WHEN THE EYE IS INFECTED?**

Yes. Just remember that the probe used to measure the infected eye cannot be used again, even for measuring the non-infected eye of the same patient.

## **CAN SAME PROBE BE USED TO MEASURE BOTH EYES OF ONE PATIENT?**

Yes, same probe can be used to measure both eyes of one patient if the patient's eyes are healthy. If the patient has infection in one eye or if there is any doubt that one eye may have a disease that can be transferred from eye to eye, the healthy eye should be measured first. A probe used to measure an infected eye should never be used to measure a healthy eye. If in doubt, always use a new probe.

## **HOW PROBES WILL BE DISPOSED OF?**

Probes can be disposed of according to the hospital/clinic/practice standard regulations. If such instructions do not exist, place the used probe back to the plastic tube to be disposed of.

## **DOES TONOVET REQUIRE CALIBRATION?**

Icare rebound tonometers do not require any maintenance calibration or regular service. The tonometers don't have any parts that wear out, except for the probe base, which can become dusty or collect some particles that affect the probe movement. The probe base can be changed by the user as described in the user manual. The calibration can be checked if there's doubt about the measurement results. In such case, you should contact your local dealer/distributor.

If the tonometer requires service, for example has been dropped to the floor, you should also contact your local dealer/distributor for further instructions.

## **CLEANING THE PROBE BASE**

The probe base should be cleaned regularly - eg every three months.

1. Unscrew the probe base collar and remove the probe base from the tonometer.
2. Carefully inject an alcohol solution through the inside of the probe base, for instance using a pipette or syringe.
3. Dry the probe base by blowing some clean canned or compressed air into it.
4. Reinsert the **completely dry** probe base and screw the collar back into the tonometer.

Please refer to the full manual for more detailed instructions.

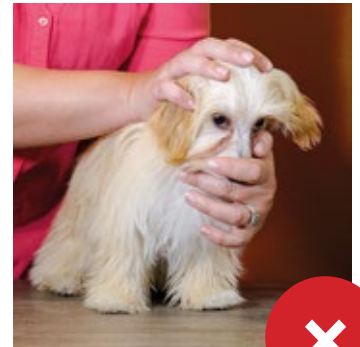
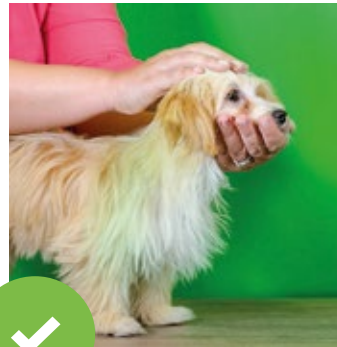
# MEASURING TIPS

## POSITIONING THE TONOMETER



## HOLDING THE PATIENT

When measuring IOP, excessive restraining of the patient should be avoided as it may alter the pressure within the eye. Patient's head should be held as lightly as possible; be careful not to put pressure on the neck or the eye ball. If a collar is worn; make sure it is not too tight or remove the collar for measurement.



## HOLDING THE TONOMETER

Pressing the measuring button with your index + thumb? Try both and find your personal fit. Both are correct, as long as you'll have a good grip to hold the tonometer steady.



## LEARNING TO MEASURE

It's good to practice measuring on your finger etc before measuring a patient. A balloon is also a great aid to learn the right technique.





# TONOMETRY

**Dr. Dan Wolf, DVM, ACVO Diplomate**  
*Southern Eye Clinic for Animals, Tampa, Florida*

Whenever a patient's eye is abnormal the intraocular pressure is an important piece of data in determining the pathology in the eye. Is the pressure above normal or below normal? Are the pressures in the two eyes nearly equal? Is the pressure higher or lower than one would expect with the appearance of the eye? Only with this information can we correctly assess an ophthalmic condition and formulate a plan for therapy. The ideal tonometer is one that is easy to use, gives quick, accurate, and reproducible results, is durable and requires minimal maintenance. The tonometer that fits this description nicely is the Icare TONOVET.

Rebound tonometry is based upon the principle that an object bouncing off a firm surface returns faster than the same object bouncing off a soft surface. In the case of the TONOVET a small plastic bead attached to a metal pin (= probe) is magnetically propelled against the cornea and returns through the magnetic field. The speed of return is proportional to the intraocular pressure and is converted to a digital readout in mm of mercury.

There are a few principles to remember to achieve reproducible and accurate results when using the TONOVET. The tonometer pin should be parallel to the floor, and positioned perpendicular to the corneal surface. The distance from the tip of the pin to the cornea should be about the length of the silver collar of the pin chamber.

Position the patient's head so that the eye to be measured is looking directly forward, not up or down, nor right or left. Steady your measuring hand against the patient's head or your hand on the patient's head. Place the tonometer near the eye, allow a few seconds for the patient to adapt to the situation. This minimizes menace response or "fright" blinking. Monitor the position and orientation of the tonometer and the pin in relation to the cornea. Always measure the eye pressure as close to the middle of the cornea as possible. Do not try to view the display at this time. When the distance between the bead and the cornea is as desired and the eye position and probe alignment are correct press the measuring button. A single beep tone indicates a successful reading. A double beep indicates an error and that reading is ignored. After the sixth successful reading there

is a longer beep. The display now shows the average of four of the readings after discarding the high and low extremes. This process should be repeated until a pressure result is duplicated. The lowest pressure that can be reproduced should be considered the intraocular pressure in the subject eye.

Error messages can indicate that starting position of the bead is too close to or too far from the cornea, or the angle of the tonometer is too big. Press the measuring button once to clear the error message and the process can be continued. The display also designates the quality of the measurement (the degree of variation of the readings). If a hyphen appears between the P (as in pressure) and the test result, there is excessive variation among the six readings and the trial should be repeated.

The TONOVET has settings for a dog, cat, and horse. The setting should be appropriate for the patient being tested. The d in front of the result stands for dog/cat, and h for the horse setting.

Several operator or patient variables can introduce errors, which result in erroneous results. The patient should be as relaxed as possible and subject to as little restraint as necessary. The head and neck should be oriented in the straight ahead position with no tension (up, down or sideways) in the neck. Avoid any pressure on the ventral portion of the neck as this can partially occlude the jugular vein and increase intraocular pressure. Apply no more traction to the eyelids than necessary to hold them open. Allow the patient a few moments to acclimate to the presence of the instrument so that the eye is not retracted into the orbit. Minimize distractions in the room as the patient's eye movements also temporarily increase intraocular pressure. Try to trigger the measure button when the eye is centrally oriented and not moving.

And don't forget to **always** measure both eyes so this important information can be compared and accurately interpreted in formulating a diagnosis. Practice on many patients and the TONOVET will be a joy to use and become an invaluable addition to your practice.

TONOVET'S PROBE IS ALSO KNOWN AS PIN, TIP OR BEAD.

**PROBE = PIN/TIP/BEAD**

# TONOVET REBOUND TONOMETRY BENEFITS

## RED EYE? CHECK THE PRESSURE!

Many eye problems in pets' eyes manifest as a "red eye". Intraocular pressure (IOP) is an essential measurement in evaluating the red eye. Too high pressure, too low pressure, or significant difference between the eyes can be the only clinical sign of serious eye disease. IOP measurement is especially important when evaluating a "red eye" in a breed predisposed to glaucoma.

## GLAUCOMA IS A COMMON BLINDING DISEASE ON PETS

The signs of glaucoma can be subtle and mimic other eye diseases; squinting, prominent nictitans, redness, cloudy cornea, excess tearing, dilated pupil or vision loss.

Early detection is important to minimize irreversible damage leading to blindness and severe pain. The use of a tonometer as a part of routine examinations can make a significant difference in saving a pet's vision.

## TRACING AND TREATING GLAUCOMA

Glaucoma, increased pressure within the eye, can rapidly destroy vision by damaging the optic nerve. Glaucoma can also develop slowly and destroy vision with only minimally visible clinical signs.

**Early detection, using tonometry, is the only way to control glaucoma.**

## IOP SHOULD BE MEASURED FROM:

- ALL RED EYE PATIENTS
- Young patients to establish baseline readings
- Patients older than 6-7 years
- Patients of breeds predisposed to glaucoma
- Ocular examination patients
- Head trauma patients
- Wellness plan patients



### REBOUND TECHNOLOGY ICARE TONOVET

- No anesthesia
- No calibration
- Easy to use, short learning curve
- Short preparation time
- Universal AA batteries

### APPLANATION TECHNOLOGY TONO-PEN VET, ACCUTOME

- Requires anesthesia
- Requires calibration
- Long learning curve
- Long preparation time
- Exclusive battery

### IOP RANGES\* These ranges are directional guide lines only.

	UVEITIS	NORMAL IOP	BORDERLINE	GLAUCOMA
DOG	< 10	10 - 20	20 - 25	> 25
CAT	< 10	10 - 20	20 - 25	> 25
HORSE	< 15	15 - 25	25 - 30	> 30

*Abstract:*

# DETERMINING INTRAOCULAR PRESSURE

David A. Wilkie, DVM, MS, DACVO  
*Ohio State University*

Determining intraocular pressure (IOP) is indicated in all blind or buphthalmic eyes and eyes with episcleral congestion, diffuse corneal edema, anisocoria, lens luxation, anterior uveitis, or fixed and dilated pupils. In addition, animals with medically or surgically managed glaucoma require sequential IOP evaluation to confirm adequate control. Animals with documented primary (breed-related) glaucoma require routine IOP monitoring in both the affected and unaffected (ie, at risk) eyes. Breeds predisposed to primary glaucoma should receive annual IOP monitoring. In dogs and cats, normal IOP values are between 10 and 20 mmHg; elevated IOP is indicative of glaucoma.

*February 2013 • clinician's brief*

*“Breeds predisposed  
to primary glaucoma  
should receive annual  
IOP monitoring.”*

# INTRAOCULAR PRESSURE (IOP) AND TONOMETRY

By Professor Ellen Bjerkås,  
Norwegian School of Veterinary Science

The pressure within the eye, the intraocular pressure (IOP), is based on the balance between production and drainage of aqueous humour. A balanced intraocular pressure is required to keep the eye in shape, provide nutrients to intraocular structures and maintain normal function of these structures.

Increased intraocular pressure occurs when there is a defective drainage of aqueous humour from the eye. Decreased intraocular pressure is the result of either reduced production, or in case of injury, leakage through a defect in the globe wall.

## TONOMETRY

Tonometry is the measurement of IOP. Tonometry is essential in the work-up of animals with ocular conditions. Thus, a reliable tonometer should be standard equipment in all companion animal practices.

Recommended types include rebound tonometer with a magnetized probe that bounces off the cornea when the cornea is touched with the probe (TONOVET) and applanation tonometer that measures the counter pressure when the probe touches the cornea (e.g. TonoPen).

The results of IOP measurements must always be correlated with clinical findings and must be compared with IOP in the fellow eye.

- Older animals have lower IOP than younger
- Debilitated animals have lower IOP than healthy ones
- IOP values increase if the animal is stressed
- IOP values increase if the animal is firmly restrained during measurement
- If IOP has been elevated over a period and the eye has become buphthalmic, the eye will not shrink noticeably even if the IOP is lowered

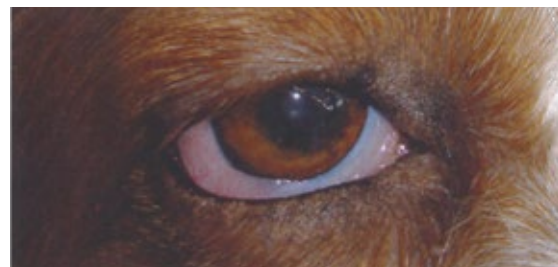
In order to evaluate the effect of treatment and correctly adjust therapy, IOP measurements should be repeated at regular intervals during the treatment period. This is as important in uveitis, as well as for glaucoma or combinations of uveitis and glaucoma.

## LOW INTRAOCULAR PRESSURE - OCULAR HYPOTENSION

The most common cause of ocular hypotension is intraocular inflammation (uveitis). Acute anterior uveitis (iritis) is a painful condition causing photophobia and blepharospasm.

Affected eyes are red, with both episcleral (deep) and conjunctival (superficial) hyperaemia. Small blood vessels may extend across the limbus, the junction between sclera and cornea. The cornea may be blue with loss of transparency, because of oedema. The iris is swollen, the pupil is miotic and more constricted than normal. In acute uveitis the composition of the exudate determines the appearance of the fluid in the anterior chamber where changes can easily be observed.

*“A reliable tonometer should be standard equipment in all companion animal practices.”*



*Conjunctival oedema and hyperaemia. Episcleral hyperaemia is not seen immediately. There is some swelling in the iris and the pupil is in a semiopen position. Here tonometry is necessary in order to assign the correct diagnosis and subsequently provide the correct treatment.*



Fibrinous exudate may cause adherence between the iris and lens (posterior synechia), resulting in aqueous being trapped behind the iris and subsequently a gradual increase in intraocular pressure. Inflammatory cells and fibrin blocking the iridocorneal angle may also cause secondary glaucoma. Inflammation in the posterior uvea, the choroid, causes less dramatic clinical signs, but the eye appears red with hyperaemia of episcleral blood vessels. Swelling of the choroid may cause fluid to accumulate behind the retina, resulting in retinal detachment and blindness. The retina may also be affected by concurrent inflammation, chorioretinitis.

A thorough work-up is recommended in all animals with uveitis, as uveitis can be associated with systemic diseases. The choice of treatment depends on primary diagnosis and severity of clinical signs. Treatment includes anti-inflammatory treatment/treatment of pain, mydriatics, plus antibiotics when necessary.

Occasional secondary ocular hypertension must be diagnosed and adequate drugs instilled. Long-term treatment is often required in uveitis. IOP measurement is an important diagnostic aid and should be monitored throughout the whole period of treatment. Treatment should not be stopped before IOP is back to normal.

#### HIGH INTRAOCULAR PRESSURE – OCULAR HYPERTENSION - GLAUCOMA

The most common cause of ocular hypertension is obstruction of outflow. Causes include abnormal development of the iridocorneal angle, resulting in insufficient drainage (primary glaucoma). This is a relatively common and breed-related disease that affects both eyes. Clinical signs develop in middle aged dogs, but not necessarily in both eyes simultaneously. **Secondary glaucoma develops as a sequel to other ocular disease**, either because of intraocular tumours, posterior synechia, or by obstruction of the iridocorneal angle and/or the ciliary cleft by inflammatory cells.

Early clinical signs of glaucoma include serous discharge, blepharospasm, hyperaemia of conjunctival, episcleral and scleral vessels, slow or absent pupillary light reflexes and mydriasis. Fundus is normal in early stages, except from the optic disc that appears pale, later cupped (pressed backwards). Clinical signs in more advanced stages include pain, mydriasis, corneal oedema, conjunctival, episcleral and scleral vessel congestion, buphthalmia, retinal degeneration and blindness.

- IOP > 30 mmHg over some days damages the optic nerve and retina
- IOP > 40 mmHg is painful and causes enlargement of the globe (buphthalmia)
- IOP > 40-50 mmHg leads to paralysis of the sphincter

The principles for treatment of primary glaucoma have been to reduce the intraocular pressure, either medically or by surgery. Newer research may indicate that other agents, i.e. neuroprotective agents, may also be helpful in maintaining vision in affected dogs. Nevertheless, even if adequately treated, glaucoma is a malignant disease with a guarded prognosis. In breed-related primary glaucoma close follow-up and treatment of the fellow, normotensive eye is indicated.



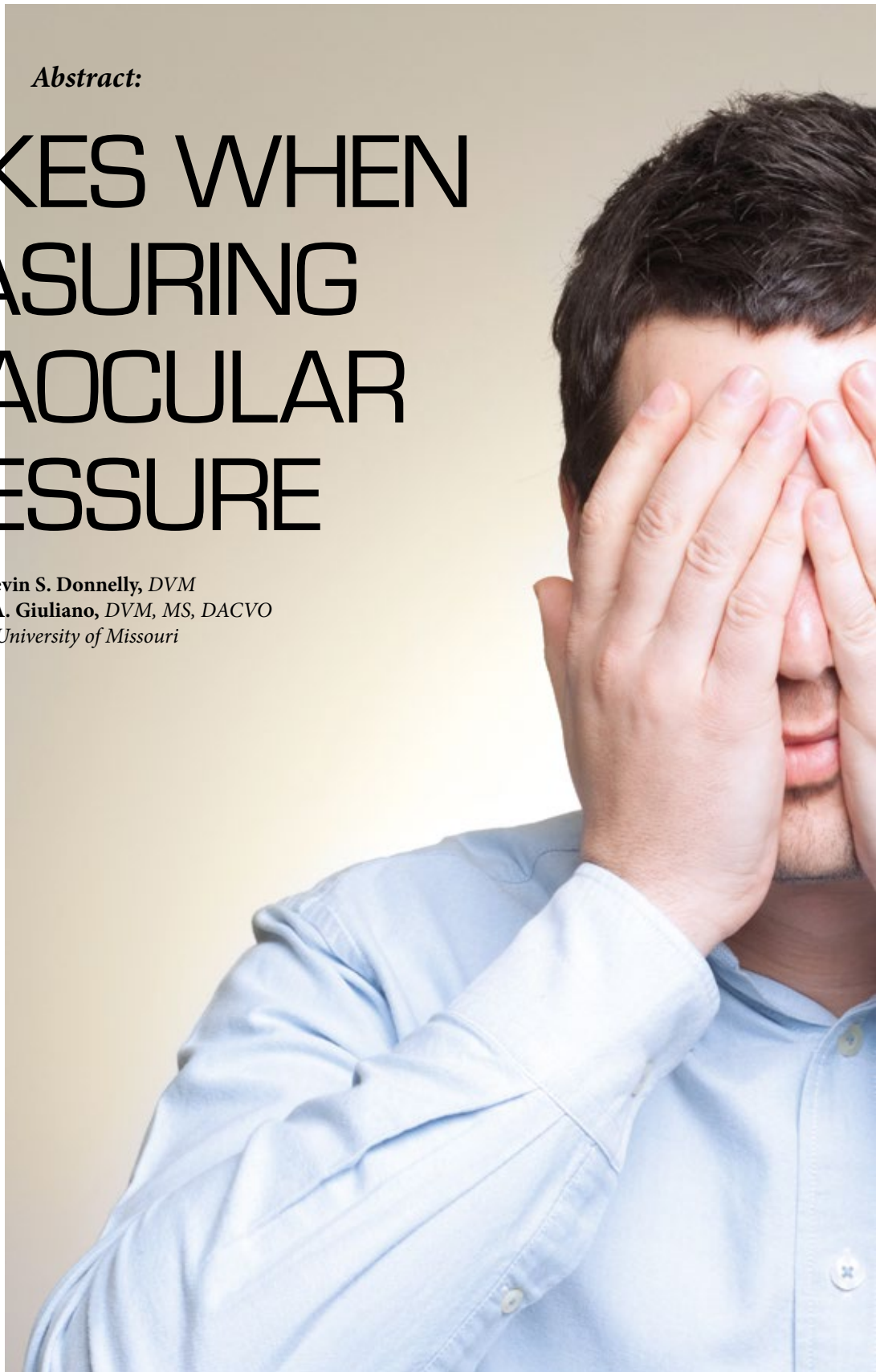
*IOP measurement is an essential part of work-up and treatment of all ocular conditions*

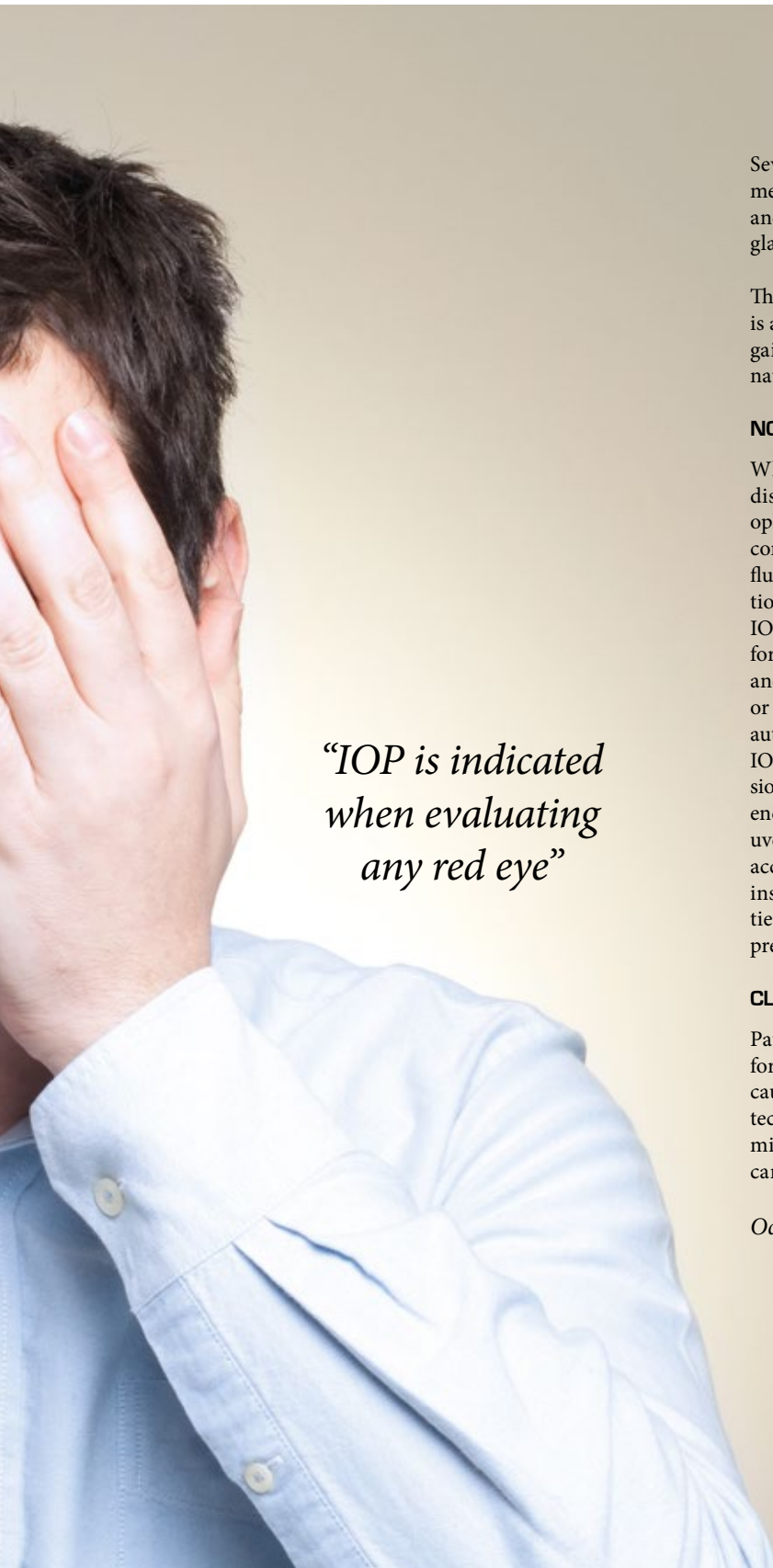
*“IOP measurement is an important diagnostic aid and should be monitored throughout the whole period of treatment.”*

*Abstract:*

# MISTAKES WHEN MEASURING INTRAOCULAR PRESSURE

Kevin S. Donnelly, DVM  
Elizabeth A. Giuliano, DVM, MS, DACVO  
*University of Missouri*





*“IOP is indicated  
when evaluating  
any red eye”*

Several methods of intraocular pressure (IOP) measurement, part of the complete ophthalmologic examination and critical to diagnosis and management of uveitis and glaucoma, have been used in veterinary patients.

The rebound tonometer (TONOVET, icaretonometer.com) is a reliable and convenient veterinary tonometer that is gaining popularity and, unlike the indentation or applanation tonometer, does not require topical anesthesia.

#### **NOT HAVING A TONOMETER**

When presented with any patient affected by ocular disease, veterinarians should perform a minimum ophthalmic database (ie, menace response, direct and consensual pupillary light reflexes, Schirmer tear test, fluorescein stain, IOP measurement). With rare exception (eg, descemetocoele, corneal rupture), measuring IOP is indicated when evaluating any red eye, as well as for all painful, cloudy, and/or blind eyes; eyes with fixed and dilated pupils; patients with anisocoria, cataracts, or uveitis; and breeds predisposed to glaucoma. In the authors' opinion, having no reliable means of measuring IOP represents a breach in today's practice standards. Vision can be easily and rapidly lost as a result of commonly encountered ophthalmic diseases that may affect IOP (eg, uveitis, glaucoma, lens luxation, cataracts). The ability to accurately diagnose a vision-threatening condition and institute prompt, appropriate therapy for IOP abnormalities is essential when striving to save a patient's vision and preserve ocular comfort.

#### **CLOSING THOUGHTS**

Patients are often referred to veterinary ophthalmologists for an ocular condition that has been misdiagnosed because tonometry was not performed or because incorrect technique led to inaccurate IOP values. By avoiding these mistakes, veterinarians can proactively improve patient care.

*October 2013 • clinician's brief*

# TONOVET USER FEEDBACK FROM JAPAN

## TONOVET HAND-HELD TONOMETER

We asked Dr. Kazunori Mikuni, Director of the Mikuni Veterinary Hospital/Ophthalmology Clinic in Sapporo, Hokkaido, and Dr. Kumiko Hata about the TONOVET tonometer.

*“Taking IOP measurements with animals that were previously difficult to measure has become easier.”*



**Dr. Tatsuhiko Fujioka,**  
Director



**Dr. Kumiko Hata**

## ITS SPECIAL SHAPE GIVES IT A FEELING OF STABILITY

**Q** What interested you in TONOVET?

What first interested me was its unusual shape.

It was not the shape I had imagined. When I tried using it, I realised the connection between its shape and the way it measures. With the tonometer I used to use, I sometimes dropped it if the animal moved while I was taking a measurement, because you only held it between your fingertips. Because you had to move your wrist or arm to take measurements, it was hard to keep the tonometer still, meaning that data readings could be unstable. The TONOVET is a little larger than ordinary tonometers, but it is easier to hold because the shape allows you to grip it properly with your hand. I also believe that it will produce reliable data, because taking measurements by just pressing a button means that it is easy to keep the device still and the measurement site is stable.

As it does not require anaesthetic eye drops, I tried it on myself, and it did not hurt. I decided to start using it because the short time from preparation to completion of the measurement made it very convenient, which I thought would be kinder to the animals, so that I could use it even for cases where it was previously difficult to take measurements.

**Q** How do you feel now that you have started using TONOVET?

I am very glad I started using it.

When I first started in ophthalmology, I used manual examination or a Schiotz tonometer to measure intraocular pressure (IOP). I later used a hand-held applanation tonometer, and now use TONOVET, so I have used all sorts of devices.

Owners who have been coming to the clinic for a long time and who had the impression that the older kinds of IOP measurement were time-consuming and unpleasant now say everything is ‘nice and quick’ since I started using TONOVET.



## ANESTHETIC EYE DROPS AND CALIBRATION ARE NO LONGER NECESSARY, AND THE NUMBER OF MEASUREMENTS HAS DOUBLED.

**Q** *What do you think about the advantage that anesthetic eye drops and calibrations are now unnecessary?*

The shorter pre-measurement preparation time is a great advantage.

Obviously, you do not have the trouble of administering eye drops, nor do you need to worry about causing discomfort with the anaesthetic drops or about changes in lachrymal fluid levels. Nor is there any worry about long-term side effects (such as dry eye). You have to be careful when using anesthetic eye drops in cats, so I think it is safer if you do not need eye drops.

Using older tonometers was sometimes time-consuming and frustrating because you had to keep recalibrating. If this kind of thing continues, you tend to become wary of using IOP measurement at all, but TONOVET takes away the stress of measurement, because it does not require calibration, and I have therefore become much keener to take IOP measurements - I had been negative about them. As a result I now take twice as many measurements. Animal hospitals require all kinds of tests, depending on each case, and it is important to be able to get these over with smoothly and quickly. I think TONOVET is the only tonometer that meets that requirement, as it allows simple and easy IOP measurements.

*“TONOVET takes away the stress of measurement”*

## IT'S EASY TO USE AND THE DATA ARE STABLE.

**Q** *How do you rate TONOVET's measurement data?*

My impression is that the instrument always produces stable, highly reproducible data.

The old tonometers had a large, flat contact panel, and the measurement was taken by pressing this against the cornea, so the data were affected by differences in things such as the position of the person taking the measurement and how they pressed the instrument against the eye, or the curvature of the cornea. On the other hand, with TONOVET, I think there are fewer mistakes with the size of the eyeball, the curvature of the cornea or the angle of contact, because the probe is smaller and the measurement is taken by bringing this into contact with the cornea at a single point.

**Q** *What do you think about IOP measurement and data for cats?*

In my experience, TONOVET produces slightly higher results in cats.

The problem with cats is that the inside of their cornea is uneven, with thicker areas and thinner areas, which in my opinion influences results.

There are always differences in the way that testing equipment, not just tonometers, produce data, so it is important for the person taking the measurement to get used to the equipment and understand its peculiarities.

It is therefore important to follow a train of thought that says 'data from this equipment produces this kind of result, which suggests this kind of illness.'

Because TONOVET allows anyone to easily measure IOP, I think it makes it easier to build up a lot of experience and thus create that association.

**Q** *What is the ratio of dogs to cats for IOP measurements?*

I would say about 8:2.

## IF THE ANIMALS ARE LESS STRESSED, I AM LESS STRESSED.

**Q** *How do the animals behave during the measurement, compared to when using existing tonometers?*

Taking IOP measurements with animals that were previously difficult to measure has become easier.

I think TONOVET keeps the stress on the animal to a minimum, because there is no need for anaesthetic eye drops, so the measurement is quicker.

It is very important not to cause stress, because if an animal has a bad experience, it will become difficult to examine and treat next time.

I am also less stressed, because fewer animals are impossible to measure, and the preparation/measurement time is shorter.

*“I now take twice as many measurements”*

Q

*Can you tell us how you use TONOVET now?*

We perform all of our IOP measurements with TONOVET.

However, we still also use the old type of tonometer, to double check, when the measurement produces a figure much higher than observation suggests.

TONOVET produces reliable results even in these cases. My assistant, Dr. Hata, can now also perform IOP measurements if I do not have time or am busy, and I can review them afterwards.

I find that, with TONOVET, the data is stable regardless of whoever does the measurement, as long as they know how to use the instrument.

At the moment, only Dr. Hata and I use it, but I think we will probably increasingly ask our veterinary nurses to perform IOP measurements.

Q

*Dr. Hata, have you ever used the old type of hand-held tonometer?*

I used the old type of tonometer for around six months.

Q

*What is the TONOVET like to use?*

It is easy to use for measuring animals with small eyes, such as shiba inu, because you can take a measurement even if the eyes do not open very wide.

With the old type of tonometer, there was concern that pressure on the eyeball while the eyelid was open would raise intraocular pressure, because you needed to bring a large surface area into contact with the eye.

With TONOVET you can be more confident of the mea-

Q

surement data, because this problem is removed. *Are there any points you have to be careful of when measuring IOP?*

You need to keep the TONOVET steady, and avoid shaking it.

In that way, you can get a good measurement, because the distance between the apex of the cornea and the probe remains steady.

I think the most important thing is the position of the animal and the person holding it.

At this clinic, we usually ask the owner to hold the animal, and we explain to them that they only need to hold up its chin, rather than pressing on its neck, so that the IOP is not increased by pressure on the area around the eyeball or on the neck.

Q

*Do the veterinary nurses also sometimes hold the animal?*

Yes, of course.

Sometimes, even when we ask the owner to hold it, they cannot because they are not used to dealing with it, or they might not be able to help if the animal dislikes being examined.

In my opinion, since we started using TONOVET, owners are more likely to come back to the clinic, and are happier to let their animal have an IOP test because the animals do not mind it and it is quick.

#### **SIGHT IS IMPORTANT FOR ANIMALS, TOO.**

Q

*You have been involved in veterinary ophthalmology for many years, but how do you make people aware of ophthalmic care?*

When I give an animal an all-over check, I ask the owner questions like, 'Do the animal's eyes get red? Do its eyes get itchy or bleary?'

In cases of this kind, or with owners of breeds which are prone to suffering from glaucoma, such as shiba inu, cocker or cavalier spaniels, shih-tzus, pugs, or Maltese terriers, when I perform a check-up along with their anti-rabies injection or vaccinations, I explain the importance of IOP tests and ask if they would like me to check the animal's eyes.

If the test results are in the grey zone, I have them come to the clinic about every three months and track their progress.

An owner once told me, 'yesterday, my animal suddenly seemed to go blind and has since been walking around bumping into things'. When I examined the animal, my observations suggested that it had probably lost sight in one eye



the day before, but it had not been able to see out of the other eye for some time. It is rare for both eyes to develop high IOP at the same time.

If the problem had been noticed, we might have been able to preserve the sight in the good eye for longer.

In some cases, we can prevent blindness occurring if an early diagnosis is made, but it is a great shame that, with animals, it is often too late.

Taking IOP measurements every time an animal has its inoculations is very helpful for the early diagnosis of glaucoma.

**Q** *Are there any particular illnesses or symptoms where you would measure IOP?*

If the eyeball is protruding, we measure IOP to determine whether it is due to glaucoma or an orbital lesion, and if the size of the pupil causes concern, we also take a measurement to determine whether it is due to a neurological illness. In many cases the IOP measurement shows that it is actually uveitis.

When we prescribe eye drops for glaucoma, it is important to measure IOP to check that the eye drops are working.

After cataract operations, we measure IOP to determine the extent of inflammation in the eye or the condition of the sutures. In this case, the eyelids cannot open much, because they are sewn up to protect the suture on the eyeball.

Similarly, in cases where the eyeball is damaged, such as corneal erosion or corneal ulcers, these are very painful and it is difficult to open the eyelids and hold the animal still. With TONOVET, you can measure IOP even in cases where the eyelids cannot open properly, because of the small area that comes into contact with the cornea.

With shiba inu, it is difficult to open the eyelids, because they have sunken eyes. We used to have to check their IOP by touch through the eyelids, because it was impossible to measure with the earlier tonometers, but we have seen a lot of cases where IOP measurement with TONOVET showed that they had quite high IOP.

I have realised how unreliable my own manual examinations were. There may have been a lot of cases that I missed.

**Q** *What kind of treatment do you use if you diagnose glaucoma early?*

It depends on the situation, but we usually lower the IOP with eye drops, drips, or oral medication.

If there is no improvement using eye drops, or if the animal will not take oral medication, we either carry out a cyclophotocoagulation operation using a laser diode, or insert a glaucoma valve.

**Q** *What are your thoughts on animals' sense of sight?*

I think sight is a very important sense for animals, too.

It is often said that animals do not rely on sight as much as humans, but I have seen many animals whose eyes I have examined and who have gone blind. Animals' lives, too, change the day they lose their sight. At meal times, they head in the direction from where they smell food, but once they get close, they have to start looking around for it. Similarly, they can no longer go to the toilet in the right place.

However, other than sight, dogs and cats have much keener senses than humans, so if they gradually lose their sight, or if several months have passed since this loss of sight, they can become reasonably adept at getting around specific places, if they use their other senses to the full, and adapt.

However, I believe that they largely depend on sight to recognise objects close to them.

*“In many cases the IOP measurement shows that it is actually uveitis.”*



*Holding the animal without causing it stress is key to the examination.*

*“In my opinion, since we started using TONOVET, owners are more likely to come back to the clinic, and are happier to let their animal have an IOP test because the animals do not mind it and it is quick.”*

# THE VET FIGHTS GLAUCOMA IN PETS

**Dr. J. Phillip Pickett** is a professor of ophthalmology in the Department of Small Animal Clinical Sciences at the Virginia-Maryland College of Veterinary Medicine at Virginia Tech and board certified by the American College of Veterinary Ophthalmologists. His clinical and research interests include genetic eye disease, glaucoma, equine corneal disease and equine uveitis.

## CHOSEN BY HIS PROFESSION

Animals have always been an important part of Dr. Pickett's life. Even today, full time professional work with animals has not stopped him having two dogs, three cats, and four chickens as pets.

At 8 years of age, little Phil Pickett came across his first patient case in veterinary ophthalmology. As a child, he raised box turtles in the summertime. One of them had badly infected eyes and appeared to be blind. The boy was so upset over this, that his mother – a nurse by profession – gave him some ophthalmic ointment to treat the turtle's eyes. Sure enough, in a couple of weeks one eye cleared and the turtle regained its vision.

The decision to become a veterinarian took form in his 9th grade civics class, when all the kids had to pick a career that interested them and research it for a class presentation. "I never swayed from that junior high school decision", says Pickett.

## TUTORED BY GREAT TEACHERS

In undergraduate school Phil Pickett worked one summer at the University of Arkansas Medical School with a lab animal veterinarian who did research work in cryosurgery. Those months were spent freezing "cancer eye" cows, skin tumors, etc. Somewhere during that summer the devoted student read all the texts on ocular anatomy and physiology he could get his hands on.

"It was great", he says.

As a first year vet student, he was lucky to have an anatomy professor, Dr. Y. Z. Abdelbaki, who was very interested in the eye and certainly contributed to the young man's choice of focus.

After graduation he worked in a rural, general practice in Arkansas for 3 years. Classmates and other local veterinarians who knew he enjoyed eye cases, would send him theirs, since the drive to the closest ophthalmologist would take about 7 hours.

All this finally led to the decision to pursue residency train-

ing. Pickett obtained a position at the University of Wisconsin under Dr. Cecil Moore. There was no turning back from a career that was already half passion, half profession.

## ALWAYS MOVED BY HIS PATIENTS

Most of Dr. Pickett's patients are dogs, cats and horses - in this order of numbers - but there are always some exotics, small ruminants, and occasionally cattle. The species most typically predisposed to glaucoma is most definitely the canine species. Dogs have primary glaucoma as well as all the different secondary glaucoma types, while other species generally have just the secondary glaucomas.

According to Dr. Pickett, the biggest challenges in treating glaucoma are:

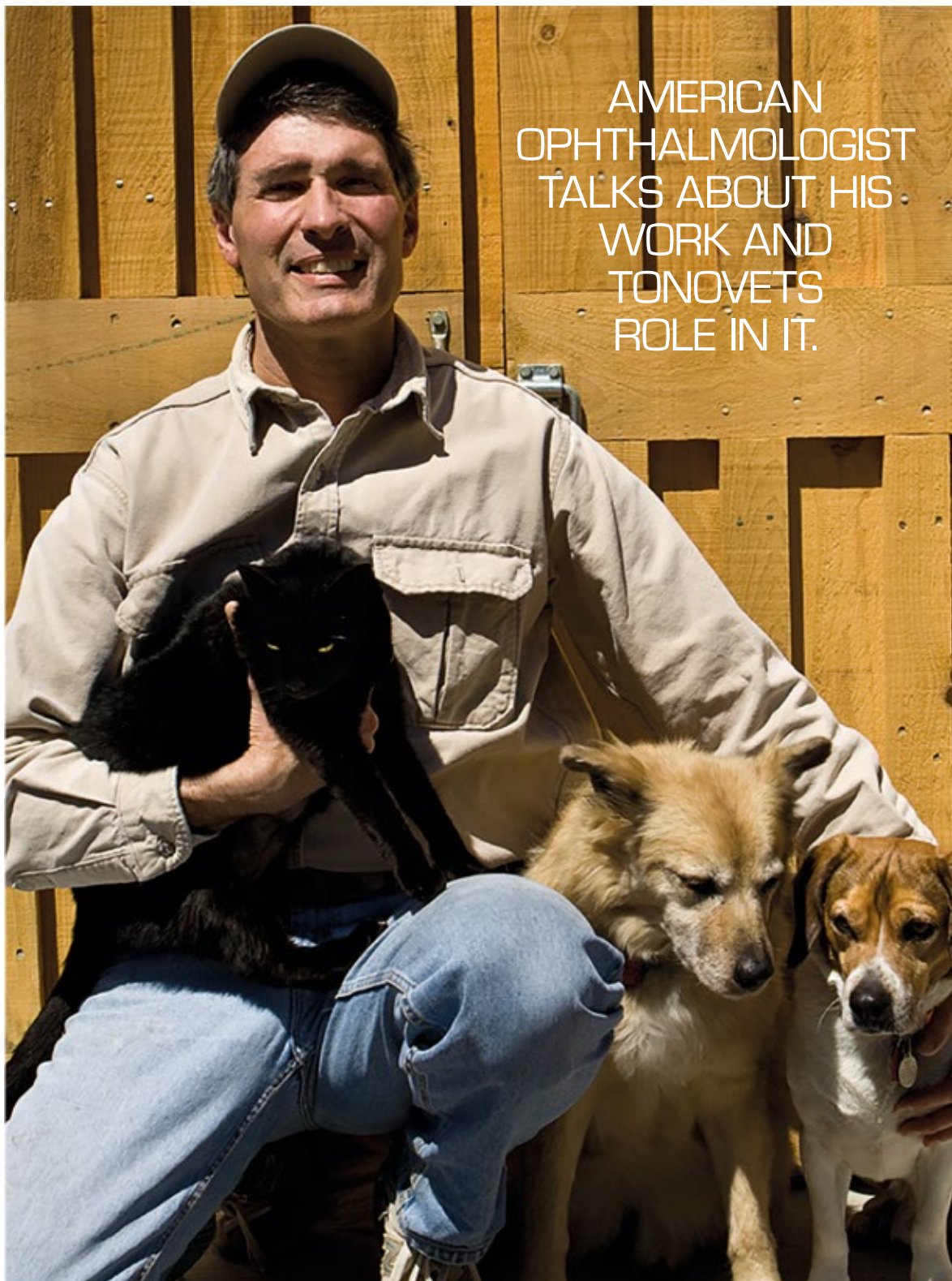
- An adequate, dependable measurement of IOP to initially diagnose the disease.
  - A coherent follow up on the success of therapy.
- Too often the referring veterinarians have no means of measuring the pressure accurately. Because of that, the cases will go undiagnosed for too long to be able to salvage the pet's vision by the time they come to Dr. Pickett. "We see a lot of irreversibly blind dogs on our first exam, unfortunately", says he.

## MOVING ON TO TOMORROW'S TOOLS

Lately the clinical staff working with Dr. Pickett is using the Icare TONOVET rebound tonometer more and more for measuring the intraocular pressure on animals. The reasons for that are numerous:

- Easy use. Especially students tend to prefer the TONOVET
- Short "learning curve" for becoming proficient and getting reliable readings.
- No need to use topical anesthesia to get a reliable reading.
- Patients tolerate the measuring procedure well, because it's short and painless.
- Tiny, very light probe works even with the smallest of animals and is especially good for monitoring post-cataract surgeries as it gives an accurate reading even with a partial temporary tarsorrhaphy in place.





*“IN COMPARISON  
TO OTHER DEVICES,  
THE TONOVET IS THE  
MOST UNIVERSAL  
AND EASY TO USE.”*





# TONOVET IN RUSSIA

*“In comparison to other devices, Icare TONOVET tonometer is most universal and easy to use”, says **Dr. Konstantin Perepechaev**, DVM, PhD, a veterinary ophthalmologist and microsurgeon from MOVET veterinary clinic in Moscow.*

Intraocular pressure measurement is a very important diagnosis tool in veterinary ophthalmology. It not only helps in the control and follow-up of various diseases, it also gives the veterinarian essential information on the general condition of any animal's eyesight.

Presently, as more and more surgical operations are done, the IOP control allows us to estimate the success or failure of the operation. In the Russian veterinary ophthalmology today a few different tonometers are in use: mostly we have been relying on the traditional applanation technology.

*“As no anesthesia is needed and the animal doesn't have to be held in place by force, there are fewer disturbances, which means more reliable results.”*

Recently the Icare TONOVET rebound tonometer – already well-known in many other countries – was introduced to the Russian market. Before purchasing it, I tested it for three weeks in our veterinary practice MOVET in Moscow.

*The gentle touch of the probe and the quickness of the procedure reduce stress in the animal.*

I found the device very useful, especially because we mostly work with smaller animals. **It practically allows us to measure the IOP of any animal, independently of its position: sitting, standing or lying down.** The small disposable probe allows measuring regardless of the eye size and the fact that anesthesia is not needed, reduces the time of the procedure.

Because of the ergonomic shape of the device, its operator doesn't need assistance during the IOP measurement. The Icare TONOVET is also a very accurate instrument. The gentle touch of the probe and the quickness of the procedure reduce stress in the animal. As no anesthesia is needed and the animal doesn't have to be held in place by force, there are fewer disturbances, which means more reliable results. The measuring can also be repeated as many times as necessary to confirm the readings.

Now that this device is available in Russia, it opens many new opportunities for the clinical use of IOP control and guarantees better healthcare services for all our veterinary practices. However, we always have to remember, that any disease diagnosis in animals is a complex process influenced by many factors.



# A TYPICAL CASE OF MISSED GLAUCOMA

*Every year many dogs lose their vision in one or both eyes due to sudden onset of glaucoma. Bouvier des Flandres dog Morris is one of them. When Morris one evening became very agitated, squinted and clawed at his right eye, the eye pressure in the affected eye had already risen to dangerous levels.*

## GLAUCOMA IS COMMONLY MISDIAGNOSED

Symptoms of glaucoma are subtle and often mimic other eye diseases. Ulrika Lindfors-Davis's Bouvier des Flandres dog, Morris', eye had been bloodshot and runny for several months and Rosalie Palmer, DVM, diagnosed it as conjunctivitis.

"Morris was treated three different times with eye drops but the problem kept returning," Ulrika says, "until one day when the symptoms suddenly became much worse. It was evident that he was in much pain and we all had a restless night."

"I immediately suspected glaucoma," Rosalie says, "but this could unfortunately not be confirmed at the time as there was no tonometer available."

A correct diagnosis in the early stages of glaucoma is important before irreversible damage in the eye leads to blindness and pain. Early detection also yields an improved prognosis for retention of sight.

All dogs and cats that display red eyes where the cause is not immediately obvious should have their eye pressure measured, especially if the dog or cat is of a breed that is predisposed to glaucoma.

Other symptoms that should warrant an immediate measurement are a dilated pupil, enlargement of the eye, cloudiness within the cornea, excessive tearing, visual impairment or any head or eye trauma. The use of a tonometer such as TONOVET in regular checkups in breeds predisposed to glaucoma and in elderly dogs can make a significant difference in saving a pet's vision.

## ELEVATED EYE PRESSURE REVEALS GLAUCOMA

After a few weeks Veterinarian Rosalie Palmer received a TONOVET tonometer and she could confirm the diagnosis. "The lightweight probe did not even make Morris blink," Ulrika says. "I was relieved that the procedure was so easy and pain free." The first reading was available after just a few seconds. "The eye pressure in the healthy eye was 14 mmHg which is normal, but unfortunately the pressure in the glaucomatous eye read close to 50 mmHg, which certainly caused him discomfort and pain," Rosalie explains. Normal eye pressure for a dog or cat is 10-20 mmHg and a pressure over 25 mmHg is considered glaucoma. An eye with an intraocular pressure above 50 mmHg is in almost every case irrevocably blind. Subsequent measurements revealed that the pressure in Morris' right eye never went below 45 mmHg, even with medication increased eye pressure is painful. Humans with glaucoma have described the pain as an excruciating constant headache or migraine. Dogs and cats often show this discomfort by rubbing their eye with a paw or against the floor, by exhibiting decreased activity and less desire to play, irritability or decreased appetite. The pain fluctuates with the pressure in the eye, which will increase and decrease due to various circumstances.

"It was evident that the vision in Morris' right eye was not going to return and he was diagnosed with chronic glaucoma," Rosalie says.

"We don't know if Morris' healthy eye will eventually develop glaucoma," Ulrika says, "but if it does, we know that the prognosis will be much better and that we can begin treatment as soon as possible, thanks to regular checkups with the TONOVET tonometer."



***"I WAS RELIEVED THAT  
THE PROCEDURE  
WAS SO EASY AND  
PAIN FREE."***



#### **VETERINARIAN' S OPINION**

Rosalie Palmer, DVM, Åland,  
Finland

##### **Is the TONOVET easy to use?**

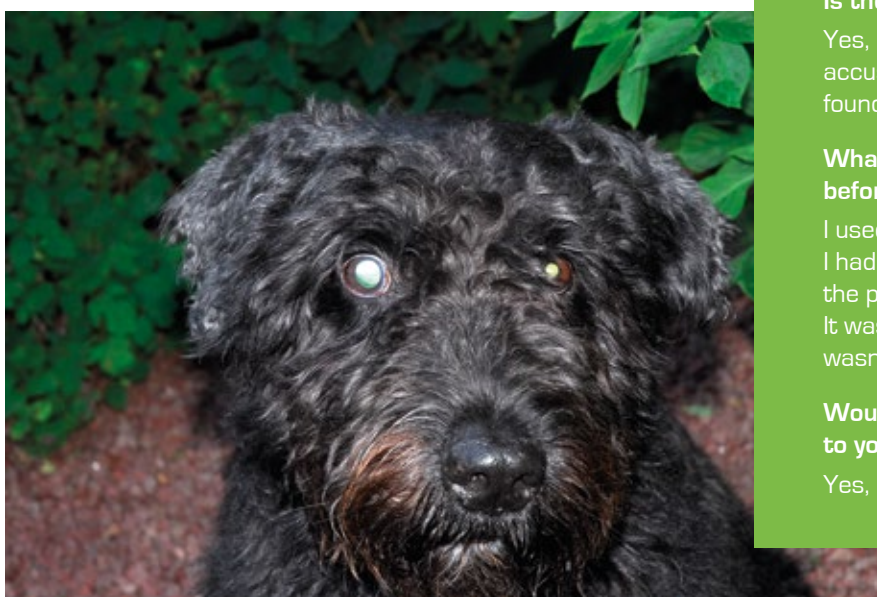
Yes, it took some time to get accustomed to it, but after that I found it rather easy to use.

##### **What tonometer did you use before the TONOVET?**

I used a Schiotz tonometer where I had to apply topical anesthetic to the pet's eye before measurement. It was not very easy if the pet wasn't extremely compliant.

##### **Would you recommend TONOVET to your colleagues?**

Yes, I would recommend it.





# TESTIMONIALS

## OPHTHALMOLOGISTS



"We purchased our TONOVET several years ago primarily for equine work. It's easy, accurate, fast and not prone to artifact. We then started to use it on cats. They are a species that don't tolerate exam room insults. The greatest insult to a cat is topical anesthesia. It stings when it goes in and the exam is over! Cats tolerate pressure checks with the TONOVET. Birds, reptiles, tortoises and other exotics are the same. Our technicians perform most of the tonometry and much prefer the TONOVET rebound tonometry on all species because of the reliability and lack of artifact. We will be moving to rebound tonometry as a sole means of pressure assessments. I am a convert."

- **Ann Gratzek, DVM, DipACVO, Aptos, CA, USA** -

"The TONOVET is an excellent product for small animal clinics. It is accurate, easy for doctors and technicians to master and gentle on patients. It does not require topical anesthesia and only contacts a very small area of the cornea, making it ideal for fractious or painful patients."

- **K. Myrna, DVM, MS, DipACVO, Athens, GA, USA** -

"The TONOVET rebound tonometer is easy to use, there is no use for the topical anesthesia to get the reliable readings and patients tolerate the measuring procedure well. Furthermore the measurements are reliable even with very low intraocular pressures"

- **Prof. Esmeralda, DVM, Portugal** -

"I love the TONOVET, I've used it for 4 years now and it works really nice. Now I'm able to take IOP on very small animals and birds that were not possible to measure with other tonometers. TONOVET does not need topical anesthesia, which is GREAT!"

- **Rui Oliveira, DVM, CertOphthal MRCVS, Lissabon, Portugal** -

"I love TONOVET, it's brilliant. It can be used on various animals without any pain or anesthetic. I have just used it on a small bird, a rat etc."

- **David Williams, MA, VetMB, PhD, CertVOphthl, UK** -

"I have been using the TONOVET for several years after switching from using a tono-pen. I find the TONOVET to be much easier to use and feel that it gives much more consistent results. It is particularly useful in cooperative patients as it requires minimal restraint to use. TONOVET is ideal for general practice use as it is so user friendly and do not require very frequent use to be able to use accurately."

- **Matthew Fife, DVM, DipACVO, Orlando, FL, USA** -

"TONOVET is suitable for eyes with topical pain or for very small eyes."

- **Areerat Kongcharoen, Nakhon Pathom, Thailand** -

The TONOVET is unreservedly the best tonometer I have used. It is so easy to use and the animals hardly even notice the tonometry. No topical anaesthetic is required, head positioning is not critical and restraint required is minimal. It can be used on patients post surgery when the eye is very tender, and even in the waiting room. Results are consistent and reliable. It is easy to use the TONOVET on almost every patient, even aggressive ones, and because it is so easy to use we use it on nearly all our patients, with the result that we are now diagnosing glaucomas in patients with normal looking eyes that we would not have bothered to performed tonometry on in the past. I can highly recommend the TONOVET.

- **Anita Dutton, DVM, Perth Veterinary Ophthalmologists, Australia** -

## PRACTITIONERS



"We are very excited about the recent purchase of a TONOVET tonometer which allows us to quickly and accurately diagnose potentially severe eye diseases in both dogs and cats. This very basic looking instrument is actually extremely high tech and takes rapid precise measurements of the fluid pressures inside the eye."

The tonometer takes the measurement safely and pain free with the vast majority of patients not knowing that anything happened. The instruments used in the past were very poor in measuring subtle changes to pressures in the eye, while the TONOVET tonometer allows us to diagnose diseases such as glaucoma and uveitis in the early stages with amazing ease and confidence."

- **Morgan Animal Hospital, Niagara Falls, ON, Canada** -



"Since purchasing the TONOVET we use it on every exam whether it is a routine exam or not. We feel it creates value and impresses the client. I would say 95% of both dogs and cats tolerate it very well. We have diagnosed borderline glaucoma several times without clinical signs."

- **Brent Husband, DVM, Animal Care Clinic, Wilsonville, USA** -



"In our equine practice, the TONOVET has been very helpful with the 'abnormal' eye. I do not have to do nerveblocks or topical numbing to get an accurate reading, and I rarely need to tranquilize a patient. Easy to use and consistent results once you are comfortable using it."

- **Ken Kuckler, DVM, Burton, USA** -



"The TONOVET has made it very easy to measure the IOP. I use it to horses, dogs, cats and all rodents, and the animals are all just fine during and after the examination. The probe is easy to change and no calibration is needed."

- **Pernille Enggraff, DVM, Copenhagen, Denmark** -

"I was trained with the Tonopen and was comfortable with it. However, I had a 'test' TONOVET trial at Braden River Animal Hospital and liked it. The results are reliable and accurate even for the technicians use. My results always comply with the ophthalmologists and the test is well tolerated."

- **Shannon Ives, DVM, Tarpon Springs, FL, USA** -

"Tonometry made easy! Very user friendly + reliable. The entire team can use this product with repeatable results. Very quick + easy measurements increasing medical care without much investment of time or expense."

- **Jenna Richards, DVM, Richmond Hill, ON, Canada** -

"This is the best way to do animal tonometry. It is ALWAYS well accepted by all the patients we see in our small animal hospital. It is accurate and user-friendly. It is also durable + practical to transport between clinics. I really like this practice tool."

- **Barbara O'Neill, DVM, Gananoque, ON, Canada** -

"Measuring IOP before the TONOVET was difficult, and reliability was questionable. We now use TONOVET on a regular basis and find it easy and reliable. It made a major difference in our ophthalmic examinations techniques and was a great help to us and our patients. We love it!"

- **M. Mesher, DVM, Sydney, N.S, Canada** -

"Is easy to use, it is good value for the money."

- **G.j.w. Degeven, DVM, Dier En Dongen, Holland** -



"We've had our TONOVET for over 2 years now and use it regularly with confidence. The cats and dogs don't mind it all. I often take five measurements and record the average result but find that there is very good reproducibility with the measurements. I am currently rechecking a dog that was referred for bilateral cataracts surgery. It wouldn't be possible for me to do the rechecks without the TONOVET!"

- **Gina Bowen, DVM, Manitoba, Canada** -

"I worked in private practice for 10 years before making the (long overdue) decision to purchase a TONOVET. I can honestly say this was a medically and economically smart decision. Having a TONOVET allows me to practice better veterinary medicine and ultimately provides my patients with better veterinary health care. I find myself checking IOPs on far more at risk/suspect patients than I had in the past. Looking back, I can hardly believe I even practiced without one."

I would strongly recommend that a TONOVET be a part of the basic core equipment at any veterinary practice."

- **Audrey Tataryn, DVM, Langenburg, Canada** -

"TONOVET has completely revolutionized the way we perform ophthalmic exams. The simplicity of its use has allowed us to incorporate IOP measurement into all our eye exams. The consistency of its readings has made our TONOVET one the most valuable diagnostic tools in the hospital. We've even seen referrals for tonometry from other clinics since we started using the device. It would be very difficult to manage ophthalmic cases without it."

- **Jonas Watson, DVM, Winnipeg, Canada** -

"Is easy to use, the procedure is fast. The learning curve is short and there is no need of topical anesthetic, which is good. It is also suitable in eye with ocular pain (blepharospasm)."

- **Naline Tuntivanich, DVM, Bangkok, Thailand**

"Well tolerated by all animals. Easy to use. Does not cause a detectable change to any part of the eye."

- **Aree Thayanaphat, DVM, Bangkok, Thailand** -

"I have been to many ophthalmology continuing education lectures and all the specialists stress the importance of checking intraocular pressure on every 'red eye' that presents. With the TONOVET, I find I am able to easily and effectively do this. Using a manual tonometer was so difficult and awkward to perform, I usually only did IOP on really suspect cases of glaucoma. The TONOVET is the instrument I need to get fast, accurate intraocular pressures. It has been very helpful in diagnosing cases of uveitis as well. I feel I can provide a higher standard of care for my patients using the TONOVET."

- **Ashley Boulton, DVM, Canada** -

## TECHNICIANS

"Have used the TONOVET many times and it is very user friendly and find that the animals are less agitated with the use as well. Very fast to use and easy to learn how to use. I recommend this product to everyone!"

- **Tania Boyd, Ajax, Canada** -

"We LOVE it - refuse to use anything else - as does our ER department after using ours!"

- **Becca Rose, Leesburg, VA, USA** -

"We, as technicians, love them! Cats & dogs do so much better, much more comfortable, even after surgery!"

- **Jennifer Jones, Medford, USA** -



# CLINICAL STUDIES

## VALIDATION OF THE TONOVET REBOUND TONOMETER IN NORMAL AND GLAUCOMATOUS CATS

*Gillian J. McLellan, Jeremy P. Kemmerling and Julie A. Kiland*

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### OBJECTIVE

To validate intraocular pressure (IOP) readings obtained in cats with the TONOVET tonometer.

### ANIMALS STUDIED

IOP readings obtained with the TONOVET were compared to IOP readings determined by manometry and by the Tono-Pen XL in 1 normal cat and two glaucomatous cats. TONOVET and Tono-Pen XL readings were also compared in a further six normal and nine glaucomatous cats.

### PROCEDURES

The anterior chambers of both eyes of three anesthetized cats were cannulated and IOP was varied manometrically, first increasing from 5 to 70 mmHg in 5 mmHg increments, then decreasing from 70 to 10 mmHg in 10 mmHg decrements. At each point, two observers obtained three readings each from both eyes, with both the TONOVET and Tono-Pen XL. IOP was measured weekly for 8 weeks with both tonometers in six normal and nine glaucomatous unselected cats. Data were analyzed by linear regression. Comparisons between tonometers and observers were made by paired student t-test.

### RESULTS

The TONOVET was significantly more accurate than the Tono-Pen XL ( $P = 0.001$ ), correlating much more strongly with manometric IOP. In the clinical setting, the Tono-Pen XL underestimated IOP when compared with the TonoVet.

### CONCLUSIONS

Both the TONOVET and Tono-Pen XL provide reproducible IOP measurements in cats; however, the TONOVET provides readings much closer to the true IOP than the Tono-Pen XL. The TONOVET is superior in accuracy to the Tono-Pen XL for the detection of ocular hypertension and/or glaucoma in cats in a clinical setting.

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*“The TONOVET is superior in accuracy to the Tono-Pen XL”*



# CLINICAL COMPARISON OF THE TONOVET REBOUND TONOMETER AND THE TONO-PEN VET APPLANATION TONOMETER IN DOGS AND CATS WITH OCULAR DISEASE: GLAUCOMA OR CORNEAL PATHOLOGY

*Lena von Spiessen, Julia Karck, Karl Rohn and Andrea Meyer-Lindenberg*

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## OBJECTIVE

To compare the TONOVET rebound tonometer with the Tono-Pen Vet applanation tonometer in a larger number of glaucomatous eyes and to evaluate the effect of different corneal pathologies on both tonometers.

## PROCEDURE

In 26 eyes with clinical signs of glaucoma, intraocular pressure (IOP) was measured using the TONOVET followed by the Tono-Pen Vet. In 29 eyes with focal corneal pathology (e.g., corneal scarring, edema, pigmentation), both tonometers were used successively to measure IOP in one unaffected area of the cornea, as well as on the lesion itself. Impact on measurement results was assessed comparing the deviation in IOP readings of each tonometer between the two localizations. Statistical data analysis included paired t-tests and regression analysis using SAS software (version 9.2; SAS Institute, Cary, NC).

## RESULTS

In glaucomatous eyes, the TONOVET consistently yielded higher values of IOP than the Tono-Pen Vet as can be quantified by the regression equation  $IOP\ (TonoVet)\ [mmHg] = 1.12 * IOP\ (Tono-Pen\ Vet)\ [mmHg] + 11.5$  with  $R^2 = 0.91$  and  $P < 0.0001$ . Depending on the type and degree of corneal pathology, the deviation in IOP resulting from measurements on altered cornea ranged from 6 to 16 mmHg for the TONOVET and 7 to 20 mmHg for the Tono-Pen Vet, respectively.

On average, the effect of corneal disease on IOP measurements was lower for the TonoVet by 1.14 mmHg.

## CONCLUSIONS

Rebound tonometry appears to be a valuable alternative to established applanation tonometry in patients with ocular disease such as glaucoma and corneal disorders. In patients suffering from glaucoma, the same type of tonometer should be used for follow-up examinations, as measurement results of the TONOVET and the Tono-Pen Vet differ substantially with increasing IOP. Corneal pathology has considerable influence on both tonometers with the degree of over- or underestimation of IOP depending on the alteration of biomechanical properties of the cornea inflicted by various corneal pathologies.

## REFERENCE INTERVALS FOR INTRAOCULAR PRESSURE MEASURED BY REBOUND TONOMETRY IN TEN RAPTOR SPECIES AND FACTORS AFFECTING THE INTRAOCULAR PRESSURE

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### ABSTRACT

Intraocular pressure (IOP) was measured with the TONOVET rebound tonometer in 10 raptor species, and possible factors affecting IOP were investigated. A complete ophthalmic examination was performed, and IOP was assessed in 2 positions, upright and dorsal recumbency, in 237 birds belonging to the families Accipitridae, Falconidae, Strigidae, and Tytonidae. Mean IOP values of healthy eyes were calculated for each species, and differences between families, species, age, sex, left and right eye, as well as the 2 body positions were evaluated. Physiologic fluctuations of IOP were assessed by measuring IOP serially for 5 days at the same time of day in 15 birds of 3 species. Results showed IOP values varied by family and species, with the following mean IOP values (mm Hg  $\pm$  SD) determined: white-tailed sea eagle (*Haliaeetus albicilla*), 26.9  $\pm$  5.8; red kite (*Milvus milvus*), 13.0  $\pm$  5.5; northern goshawk (*Accipiter gentilis*), 18.3  $\pm$  3.8; Eurasian sparrowhawk (*Accipiter nisus*), 15.5  $\pm$  2.5; common buzzard (*Buteo buteo*), 26.9  $\pm$  7.0; common kestrel (*Falco tinnunculus*), 9.8  $\pm$  2.5; peregrine falcon, (*Falco peregrinus*), 12.7  $\pm$  5.8; tawny owl (*Strix aluco*), 9.4  $\pm$  4.1; long-eared owl (*Asio otus*), 7.8  $\pm$  3.2; and barn owl (*Tyto alba*), 10.8  $\pm$  3.8. No significant differences were found between sexes or between left and right eyes. In goshawks, common buzzards, and common kestrels, mean IOP was significantly lower in juvenile birds than it was in adult birds. Mean IOP differed significantly by body position in tawny owls ( $P = .01$ ) and common buzzards ( $P = .04$ ). By measuring IOP over several days, mean physiologic variations of  $\pm 2$  mm Hg were detected. Differences in IOP between species and age groups should be considered when interpreting tonometric results. Physiologic fluctuations of IOP may occur and should not be misinterpreted. These results show that rebound tonometry is a useful diagnostic tool in measuring IOP in birds of prey because it provides rapid results and is well tolerated by birds.

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*“These results show that rebound tonometry is a useful diagnostic tool in measuring IOP in birds of prey because it provides rapid results and is well tolerated by birds.”*

## EVALUATION OF REBOUND TONOMETRY IN NON-HUMAN PRIMATES

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### ABSTRACT

To determine the accuracy and reproducibility of intraocular pressure (IOP) measurements obtained with the TONOVET® rebound tonometer in cynomolgus macaques and to determine the effects of corneal thickness on measurements obtained by the TONOVET®. The anterior chambers of both eyes of anesthetized monkeys were cannulated with branched 23-G needles; one branch was connected to a vertically adjustable reservoir and the other to a pressure transducer. IOP was increased by 5 mmHg increments and then decreased by 10 mmHg decrements. IOP was measured using the TONOVET® at each increment and decrement by 2 independent observers and at every other increment and every decrement by a single observer using 'minified' Goldmann applanation tonometry. Central corneal thickness was measured with a PachPen(TM) ultrasonic pachymeter. TONOVET® readings correlated well with manometric IOP (slope = 0.972, r(2) coefficient = 0.955). No significant differences were observed when comparing eyes or operators; however there was a non-significant trend for TONOVET® readings taken in right eyes to be closer to manometric IOP than those taken in left eyes. The TONOVET® had a non-significant tendency to underestimate manometric IOP. TONOVET® readings obtained during the decremental phase of the experiment were significantly closer ( $p < 0.004$ ) to manometric IOP than those obtained during the incremental phase. Central corneal thickness significantly increased ( $p < 0.0001$ ) over the course of the experiment. The TONOVET® rebound tonometer is a reliable and accurate tool for the measurement of IOP in cynomolgus macaques. This tonometer has several advantages, including portability, ease of use, and brief contact with the corneal surface making topical anesthetics unnecessary.

© Exp Eye Res. 2011



*“This tonometer has several advantages, including portability, ease of use, and brief contact with the corneal surface making topical anesthetics unnecessary.”*

## EFFECT OF CENTRAL CORNEAL THICKNESS ON INTRAOCULAR PRESSURE WITH THE REBOUND TONOMETER AND THE APPLANATION TONOMETER IN NORMAL DOGS

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### OBJECTIVE

To evaluate the effect of central corneal thickness (CCT) on the measurement of intraocular pressure (IOP) with the rebound (TONOVET) and applanation (TonoPen XL) tonometers in beagle dogs.

### ANIMAL STUDIED

Both eyes of 60 clinically normal dogs were used.

### PROCEDURES

The IOP was measured by the TONOVET®, followed by the TonoPen XL® in half of the dogs, while the other half was measured in the reverse order. All CCT measurements were performed 10 min after the use of the second tonometer.

### RESULTS

The mean IOP value measured by the TONOVET® ( $16.9 \pm 3.7$  mmHg) was significantly higher than the TonoPen XL® ( $11.6 \pm 2.7$  mmHg;  $P < 0.001$ ). The IOP values obtained by both tonometers were correlated in the regression analysis ( $\gamma^2 = 0.4393$ ,  $P < 0.001$ ). Bland-Altman analysis showed that the lower and upper limits of agreement between the two devices were  $-0.1$  and  $+10.8$  mmHg, respectively. The mean CCT was  $549.7 \pm 51.0 \mu\text{m}$ . There was a correlation between the IOP values obtained by the two tonometers and CCT readings in the regression analysis (TONOVET® :  $P = 0.002$ , TonoPen XL® :  $P = 0.035$ ). The regression equation demonstrated that for every  $100 \mu\text{m}$  increase in CCT, there was an elevation of 1 and 2 mmHg in IOP measured by the TonoPen XL® and TONOVET®, respectively.

### CONCLUSIONS

The IOP obtained by the TONOVET and TonoPen XL would be affected by variations in the CCT. Therefore, the CCT should be considered when interpreting IOP values measured by tonometers in dogs.

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## FELINE GLAUCOMA – A COMPREHENSIVE REVIEW

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### ABSTRACT

Cats with glaucoma typically present late in the course of disease. It is likely that glaucoma in cats is under-diagnosed due to its insidious onset and gradual progression, as well as limitations of some commonly used tonometers in this species. Treatment of glaucoma in feline patients presents a clinical challenge, particularly as glaucoma is often secondary to other disease processes in cats. In this review, we consider the clinical features, pathophysiology, and classification of the feline glaucomas and provide current evidence to direct selection of appropriate treatment strategies for feline glaucoma patients.

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## INTRAOCULAR PRESSURE IN CAPTIVE BLACK-FOOTED PENGUINS (*SPHENISCUS DEMEVUS*) MEASURED BY REBOUND TONOMETRY

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### ABSTRACT

Intraocular pressure (IOP) measurement is a common procedure during eye examinations in birds. Differences in the IOP between avian species have been reported, which suggests the need to establish species-specific reference ranges. To determine IOP values of captive black-footed penguins (*Spheniscus demersus*), we obtained IOP readings with the use of a rebound tonometer by using two established calibration settings (dog and horse). No difference was seen in the IOP between the left and right eye when the horse setting was used; however, a difference was present when using the dog setting. No significant difference between the IOP of male and female penguins was seen in both eyes when the dog or horse setting was used. Rebound tonometry appears to be a safe and repeatable method to obtain IOP values in blackfooted penguins.

© J Avian Med Surg. 2010



*“Rebound tonometry appears to be a safe and repeatable method to obtain IOP values in blackfooted penguins.”*

## EVALUATION OF A REBOUND TONOMETER (TONOVET) IN CLINICALLY NORMAL CAT EYES

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### OBJECTIVE

To determine the accuracy of and to establish reference values for a rebound tonometer (TONOVET) in normal feline eyes, to compare it with an applanation tonometer (Tonopen Vet) and to evaluate the effect of topical anesthesia on rebound tonometry.

### PROCEDURES

Six enucleated eyes were used to compare both tonometers with direct manometry. Intraocular pressure (IOP) was measured in 100 cats to establish reference values for rebound tonometry. Of these, 22 cats were used to compare rebound tonometry with and without topical anesthesia and 33 cats to compare the rebound and applanation tonometers. All evaluated eyes were free of ocular disease.

### RESULTS

Both tonometers correlated well with direct manometry. The best agreement with the rebound tonometer was achieved between 25–50 mmHg. The applanation tonometer was accurate at pressures between 0 and 30 mmHg. The mean IOP in clinically normal cats was 20.74 mmHg with the rebound tonometer and 18.4 mmHg with the applanation tonometer. Topical anesthesia did not significantly affect rebound tonometry.

### CONCLUSIONS

As the rebound tonometer correlated well with direct manometry in the clinically important pressure range and was well tolerated by cats, it appears suitable for glaucoma diagnosis. The mean IOP obtained with the rebound tonometer was 2–3 mmHg higher than that measured with the applanation tonometer. This difference is within clinically acceptable limits, but indicates that the same type of tonometer should be used in follow-up examinations in a given cat.

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## ACCURACY AND REPRODUCIBILITY OF THE TONOVET REBOUND TONOMETER IN BIRDS OF PREY

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### OBJECTIVE

To examine the accuracy and reproducibility of intraocular pressure (IOP) measurements obtained by the TONOVET rebound tonometer.

### ANIMALS STUDIED

Freshly enucleated healthy eyes of 44 free-ranging birds of prey out of the species *Haliaeetus albicilla*, *Accipiter gentilis*, *Accipiter nisus*, *Buteo buteo*, *Falco tinnunculus*, *Strix aluco*, *Asio otus* and *Tyto alba* euthanized because of unrelated health problems.

### PROCEDURES

IOP readings from the TONOVET were compared with a manometric device, with IOP being set from 5 to 100 mmHg in steps of 5 mmHg by adjusting the height of a NaCl solution reservoir connected to the eye. Reproducibility of the TONOVET readings was determined by repeated measurements.

### RESULTS

TONOVET and manometer values showed a strong linear correlation. In the Accipitridae, the TONOVET tended to increasingly overestimate IOP with increasing pressure, while in the other families, it increasingly underestimated it. In the Sparrowhawk, the values almost represent the ideal line. Reproducibility of TONOVET values decreases with increasing pressure in the clinically important range from 5 to 60 mmHg.

### CONCLUSION

IOP values measured with the TONOVET demonstrated species specific deviation from the manometric measurements. These differences should be considered when interpreting IOP values. Using the regression formula presented, corrected IOP values could be calculated in a clinical setting.

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## USE OF REBOUND TONOMETRY AS A DIAGNOSTIC TOOL TO DIAGNOSE GLAUCOMA IN THE CAPTIVE CALIFORNIA SEA LION

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### PURPOSE

One of the most common medical problems seen in the California sea lion (*Zalophus californianus*) is ocular disease. Glaucoma is a disease that has not been evaluated extensively in the sea lion. Observing clinical signs and measuring intraocular pressures (IOP) is critical for early diagnosis. The objective of this project is to measure IOP in clinically normal captive sea lions without ocular pathology to establish a normal range.

### METHODS

The TONOVET (Webster Veterinary) was selected to be used in the study. The TONOVET uses a new non-invasive, rebound method to estimate IOP. An electrical magnetic tonometer probe comes into contact with and rebounds from the corneal surface to estimate an IOP. In order to record an accurate IOP, six measurements were taken and averaged resulting with the mean value. A complete ophthalmic examination has been performed on all sea lions by a veterinary ophthalmologist.

### RESULTS

Currently, there are twenty sea lions in the study with no clinical ocular pathology. Overall mean in 39 healthy eyes was 32.8 mmHg with a SD  $\pm$  3.2 at a 95% CI of 26.4 to 39.1.

### CONCLUSION

We have established a normal baseline range for IOP values in captive sea lions without ocular pathology. This range is higher than the generally accepted range using other tonometers (e.g., Tono-Pen Vet). This is likely due to the increased thickness of the pinniped cornea as well as the different mechanism of the instrument itself. This range will provide a comparative measurement when evaluating a diseased eye. By measuring the IOP regularly in juvenile sea lions, veterinarians will be able to determine when IOP's.



## COMPARISON OF THE REBOUND TONOMETER (TONOVET) WITH THE APPLANATION TONOMETER (TONOPEN XL) IN NORMAL EURASIAN EAGLE OWLS (BUBO BUBO)

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### OBJECTIVE

To examine the feasibility and accuracy of a handheld rebound tonometer, TONOVET, and to compare the intraocular pressure (IOP) readings of the TONOVET with those of an applanation tonometer, TonoPen XL , in normal Eurasian Eagle owls.

### ANIMALS STUDIED

Ten clinically normal Eurasian Eagle owls (20 eyes).

### PROCEDURES

Complete ocular examinations, using slit-lamp biomicroscopy and indirect ophthalmoscopy, were conducted on each raptor. The IOP was measured bilaterally using a rebound tonometer followed by a topical anesthetic agent after 1 min. The TonoPen XL tonometer was applied in both eyes 30 s following topical anesthesia.

### RESULTS

The mean  $\pm$  SD IOP obtained by rebound tonometer was  $10.45 \pm 1.64$  mmHg (range 7-14 mmHg), and by applanation tonometer was  $9.35 \pm 1.81$  mmHg (range 6-12 mmHg). There was a significant difference ( $P = 0.001$ ) in the IOP obtained from both tonometers. The linear regression equation describing the relationship between both devices was  $y = 0.669x + 4.194$  ( $x$  = TonoPen XL and  $y$  = TONOVET). The determination coefficient ( $r^2$ ) was  $r^2 = 0.550$ .

### CONCLUSIONS

The results suggest that readings from the rebound tonometer significantly overestimated those from the applanation tonometer and that the rebound tonometer was tolerated well because of the rapid and minimal stress-inducing method of tonometry in the Eurasian Eagle owls, even without topical anesthesia. Further studies comparing TONOVET with manometric measurements may be necessary to employ rebound tonometer for routine clinical use in Eurasian Eagle owls.

## OPHTHALMIC EXAMINATION FINDINGS IN ADULT PYGMY GOATS (*CAPRA HICUS*)

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Virginia-Maryland Regional College of Veterinary Medicine, Virginia Polytechnic Institute and  
State University, Blacksburg, VA 24061, USA

### OBJECTIVE

To document normal ophthalmic findings and ocular abnormalities in captive adult pygmy goats.

### ANIMALS STUDIED

Ten healthy adult pygmy goats (five male, five female; 5–11 years of age; 26–45 kg body mass) underwent complete ophthalmic examinations.

### PROCEDURE

Direct illumination, diffuse and slit-beam biomicroscopy, indirect ophthalmoscopy, IOP measurements and Schirmer tear tests were performed. TONOVET rebound tonometry, followed by topical application of 0.5% ophthalmic proparacaine, and Tono-Pen XL® applanation tonometry were performed in each eye to obtain estimates of IOP.

### RESULTS

Ophthalmic abnormalities included corneal scars and pigmentation, incipient cataracts, lenticular sclerosis, and vitreal veiling. Mean STT values were 15.8 mm/min, with a range of 10–30 mm/min. Mean IOP values were 11.8 mmHg for TONOVET-D, with a range of 9–14 mmHg; 7.9 mmHg for TONOVET-P, with a range of 6–12 mmHg; and 10.8 mmHg for Tono-Pen XL®, with a range of 8–14 mmHg.

### CONCLUSIONS

Ophthalmic examination findings in adult pygmy goats, including normal means and ranges for STT and IOP measurements, using applanation and rebound tonometry, are provided.

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## COMPARISON OF THE USE OF NEW HANDHELD TONOMETERS AND ESTABLISHED APPLANATION TONOMETERS IN DOGS

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Sylvia C. Djajadiningrat-Laanen, DVM; Michael H. Boevé, DVM, PhD

### OBJECTIVE

To examine the practical aspects, accuracy, and reproducibility of 2 new automatic handheld tonometers in dogs and compare them with results for 2 established applanation tonometers.

### ANIMALS

15 freshly enucleated canine eyes for manometric evaluation and 20 conscious research dogs, 20 client-owned dogs, and 12 dogs with acute glaucoma for clinical tonometry.

### PROCEDURE

Calibration curves were determined for all 4 tonometers on 15 enucleated canine eyes. Intraocular pressure (IOP) was measured with each tonometer consecutively in conscious dogs, with the MacKay-Marg applanation tonometer as the reference device. Measurements were repeated in 20 sedated dogs. An induction-impact tonometer was evaluated clinically on dogs with acute glaucoma. Additionally, measurements obtained by an experienced and an inexperienced examiner and with or without use of topical anesthesia were compared.

### RESULTS

The portable pneumatonometer was cumbersome and time-consuming. Compared with results for the reference applanation tonometer, and confirmed by manometry, the portable pneumatonometer increasingly underestimated actual IOP values with increasing IOP. The induction-impact tonometer provided accurate and reproducible measurement values. There was a significant strong correlation between the IOP values obtained by the 2 examiners ( $r^2$ , 0.82) and also with or without topical anesthesia ( $r^2$ , 0.86). In dogs with glaucoma, the fitted line comparing values for the reference applanation tonometer and induction-impact tonometer closely resembled an ideal 1:1 relationship.

### CONCLUSIONS AND CLINICAL RELEVANCE

Use of the portable pneumatonometer in dogs appears to have disadvantages. **The induction impact tonometer** appears to provide a promising alternative to the use of applanation tonometers in dogs. (Am J Vet Res 2006;67:134–144)

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*“There was a significant strong correlation between the IOP values obtained by the 2 examiners”*



*Induction Impact tonometer = TONOVET*



# PROFITABLE TONOMETRY

*Tonometry without pressure*



Accurate ocular tonometry is possible in every veterinary practice. Modern digital tonometers are reliable, easy to use and also profitable.

The importance of diagnostic tonometry is well established. Glaucoma and ocular hypertension are significant threats to the vision of veterinary patients. As primary care providers, it is important that general practitioners are able to recognize and document increases in intraocular pressure.

If digital tonometers are reliable, easy to use, and well tolerated by patients, why are they not a standard in every general practice?

Practices assume the investment required (in the low thousands, US dollars) will not allow a return on investment. "If a tonometer costs several thousand dollars, if we only use it occasionally, and if our fee for each use can't be too high, then we will never pay for it, much less make it profitable."

Thankfully, even small, general practices have proved that wrong. Many are delivering elevated quality eye care using digital tonometers, while finding their tonometers are significant profit centers as well.

According to **John Godbold**, D.V.M., Stonehaven Park Veterinary Hospital, Jackson, Tennessee "Our digital tonometer has been the most profitable investment in equipment we have made". He notes: "We invested in a digital tonom-

eter to improve our quality of patient care. It has done that. We deliver better primary eye care now." And, he adds "It has been a pleasant surprise that, with very frequent use, and modest, client friendly fees, **our tonometer has been enormously profitable.**"

How has Dr. Godbold done this in his small volume, one veterinarian practice? He uses his tonometer **to establish baseline readings** on all patients during their first presentation, or in the first few years of life. For patients **predisposed to glaucoma** (42 canine breeds as well as mixes of the breeds), he monitors eye pressure annually or more often. Pressures are checked during **all ophthalmological examinations**, in **all head or eye trauma patients**, and in **all patients over 6-7 years of age**.

*"Practices can deliver improved patient care and still enjoy healthy return on investment. Tonometry without pressure is the new paradigm for eye care!"*

## PAY BACK ANALYSIS

EXAMPLE - PRICES MAY VARY PER MARKET

Number of exams / week	5				10				50			
Examination charge / test	10	20	30	40	10	20	30	40	10	20	30	40
Examination cost / test	3 (probe + time)											
Examination income / test	7	17	27	37	7	17	27	37	7	17	27	37
Number of examinations / year	260				520				2600			
Total income / year	1,820	4,420	7,020	9,620	3,640	8,840	14,040	19,240	18,200	44,200	70,200	96,200
Total investment	3,300											
Pay back time / weeks	94.3	38.8	24.4	17.8	47.1	19.4	12.2	8.9	9.4	3.9	2.4	1.8

ADD VALUE & CARE ► INCREASE PROFIT

# ACCURATE, EASY-TO-USE TONOMETER IS A MUST-HAVE DEVICE FOR EVERY CLINIC

*How many red eyes do you see at your clinic daily?  
The IOP of every red eye should always be measured.*



“Most eyediseases cause redness of the eye. Intraocular pressure should always be measured from all red eye patients. Intraocular pressure measuring is quick and easy with the TONOVET tonometer. Discreet measurement is painless for the animal and does not require topical anaesthetic. Fast, in less than a minute made measurement will give important information; high or low eye pressure may often be the only distinctive symptom between serious and harmless eye problems.”

- **Elina Pietilä**, DVM, DipECVO  
Clinical Lecturer in Veterinary Ophthalmology,  
University of Helsinki, Finland -



“The red eye is one of the most common presentations in veterinary ophthalmology. The differential diagnosis for this presentation is very broad, including ocular diseases that require immediate surgical or medical intervention to save the vision of our patients. Glaucoma is threatening ocular disease which, in the early stage, can be presented as a mild to moderate conjunctival congestion, with no other ocular signs. This disease may go unnoticed by general clinician if the IOP is not measured. In my opinion, the TONOVET is easy-to-use tonometer which does not bother patients and can be used even in very small patients.”

- **Marta Leiva**, DVM, PhD, DipECVO  
Clinical Lecturer in Veterinary Ophthalmology,  
University of Barcelona, Spain -



“The measurement of IOP is an important part of the complete ophthalmic examination and is particularly applicable in the diagnosis and management of uveitis and glaucoma. An easy to use and reliable tonometer is thus an essential piece of equipment for both the general practitioner and ophthalmologist alike. The TONOVET has become extremely popular among veterinary ophthalmologists because it is portable, easy to use, very well tolerated and does not require prior topical anaesthesia or calibration by the operator.”

- **James Oliver**, DVM, BVSc, CertVOphthal, DipECVO, MRCVS  
Senior Ophthalmologist, Centre for Small Animal Studies,  
Animal Health Trust, Kentford, UK -



“The intraocular pressure should not only be measured in the cases of red eyes, but also in the cases of corneal edema, orbital diseases and a history of glaucoma or lens luxation in the opposite eye. Too high or too low pressure can cause by a variety of serious ocular diseases. Increased intraocular pressure, glaucoma, is a common eye disease in dogs, cats and horses and usually causes irreversible blindness and pain. Certain breeds of dog are commonly affected by glaucoma, but any dog – mixed or purebred – can be affected. One of the procedures that is principally useful in diagnosis of glaucoma is tonometry.

In conclusion, the intraocular pressure should be measured in all patients presented for ophthalmic examination.”

- Assoc.Prof. **Preenun Jitasombuti**, DVM, MSc  
The President of Thai Society of Veterinary Ophthalmology  
Practitioners, Thailand -

**icare**  
**TONOVET**

## RED EYE NOW WHAT?

**RED EYE SHOULD ALWAYS BE MEASURED – IT COULD SAVE YOUR PET'S VISION**

Most eye diseases cause redness of the eye. Fast, discreet measurement supplies important information; high or low eye pressure may often be the only distinctive symptom between serious and harmless eye problems.

### GLAUCOMA IS A COMMON BLINDING DISEASE IN PETS

The symptoms of glaucoma are subtle and often mimic other eye diseases; dilated pupil, enlargement of the eye, cloudiness within the cornea, excessive tearing, visual impairment or any head or eye trauma.

Early detection is important before irreversible damage in the eye lead to blindness and severe pain. The use of a tonometer in regular check ups can make a significant difference in saving a pet's vision.

Painless measurement doesn't require topical anesthesia and yet is barely noticed by the animal.

### CANINE BREEDS PRE-DISPOSED TO GLAUCOMA

Algher	Chihuahua	Komondor
Akita	Chow Chow	Labrador Retriever
American Mastiff	Cocker Spaniel	Manchester Terrier
American Eskimo Dog	Dachshund	Mastiff
Australian Cattle Dog	Dalmatian	Miniature Pinscher
Basset Hound	Dandie Dinmont Terrier	Newfoundland
Beagle (Field Trial)	English Cocker Spaniel	Norfolk Terrier
Bedlington Terrier	English Springer Spaniel	Norwegian Elkhound
Bichon Frise	Entlebucher Mountain Dog	Norwich Terrier
Black Heeler	Falcohnian Retriever	Pekingese
Border Collie	Fox Terrier	Pembroke Welsh Corgi
Border Terrier	Glenn Schaeffer	Pied Blooded Griffon Vendéen
Bouvier des Flandres Brittany	Golden Retriever	Poodle (all varieties)
Boxer	Great Dane	Pug
Bulldog	Greyhound	Sakshi
Cairn Terrier	Irish Setter	Samoyed
Cardigan Welsh Corgi	Kelley Greyhound	

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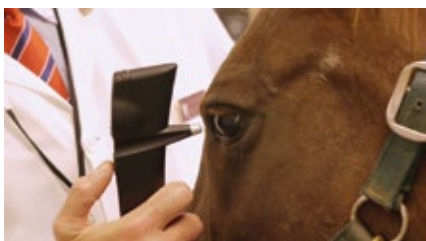
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**NO ANESTHESIA  
NO CALIBRATION**

**CE**

