

Detecting Your Pet's Pain Level Is Easier Than You Ever Thought Possible

If your pet could talk, he'd tell you how badly he was hurting. But since he can't, this tool that allows vets to noninvasively detect pain levels is a real godsend. It removes a lot of the guesswork, and is also valuable for monitoring how well they're responding to treatments.

Reviewed by [Dr. Becker](#)

STORY AT-A-GLANCE

- Researchers are using thermography, a noninvasive imaging technique, to learn about canine emotions
- In three studies, remote infrared thermography cameras were used to aid researchers in evaluating dogs' physiological and emotional responses to both positive and negative events
- In evaluating the physical condition of pets, thermography can often identify potential areas of concern much earlier than standard imaging tests
- Thermography applications in veterinary medicine are wide ranging and include assessing pets with neurological dysfunction, musculoskeletal injuries and inflammation
- Thermography is also an extremely valuable tool for "seeing" pain in animals, as well as monitoring their healing and response to treatment

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Apparently, researchers have been hard at work using infrared thermography (IRT) to determine how dogs are feeling in certain situations. How cool is that?

Thermography is a noninvasive technique that allows for the visualization of temperature changes in the body, affording researchers the ability to evaluate physiological changes, and perhaps emotional states, in a wide variety of animals (including humans). Julie Hecht, writing for Scientific American, describes it this way:

“When you are frightened, blood rushes away from your extremities to get your muscles ready to go, which means your extremities get cooler as your core gets warmer. Infrared thermography, which captures changes to body surface temperature, is going to pick this up.

The tip of a scared person’s nose gets cooler (more blue) under an infrared camera, and studies find that when scared or distressed, rat paws and tails appear cooler, as do the outer parts of sheep and rabbit ears.”¹

Thermography Shows Dogs' Eyes Heat Up During Veterinary Exams

In one study, a team of university scientists in Italy used IRT to investigate the emotional responses of a group of 14 healthy adult dogs to an unpleasant, **stressful event**.²

First, the researchers did a preliminary test to “evaluate the correlation between eye temperature and rectal temperature in dogs in a stressful situation.” Then the dogs were observed during a veterinary exam conducted by an unfamiliar vet, with the dogs’ owners present.

The behavior and eye temperatures of the dogs were recorded before the vet visit, during the exam and when it was over. The researchers observed that the activity level of the dogs and their stress-related behaviors changed depending on which phase of the event they were in.

The dogs had an increase in eye temperature and a significant decrease in activity during the exam. However, the researchers also learned that the thermographic camera, even though it was a distance away, upset the dogs. They tended to look away from it when it was turned in their direction.

The researchers concluded their study results “suggest that IRT may represent a useful tool to investigate emotional psychogenic stress in dogs,” but more research is needed.

Eye Temps Also Increase During Pleasant Events

The same team of researchers conducted another study using IRT plus behavioral measures, heart rate and heart rate variability to evaluate dogs’ emotional reactions to receiving delicious treats from their owners.³

The study involved 19 adult dogs, 11 males and eight females. They completed a 30-minute experiment consisting of three 10-minute phases. Phase 1 was the baseline, phase 2 was the administration of the treats and phase 3 measured the dogs’ “post-feeding condition.”

Not surprisingly, the researchers observed that the dogs’ eye temperatures and heart rates increased significantly during phase 2 when they were receiving treats.

During this phase the dogs also “engaged in behaviors indicating a positive emotional state and a high arousal, being focused on food treats and increasing tail wagging.” Once again, the researchers concluded, “IRT may be a useful tool in assessing emotional states in dogs in terms of arousal.”

Dogs' Ears Heat Up in the Presence of Humans and Cool Down When They're Left Alone

In one study, researchers in the U.K. conducted remote thermographic stress monitoring of six dogs to evaluate their response to being separated from humans.⁴

The camera was set up in the corner of the room, and the temperature of the pinnae (the earflap) of both ears of each dog was measured.

The researchers observed that the temperatures of both ear pinnae decreased during periods of separation from humans, and increased when either the dogs' owners or a stranger was present.

The researchers concluded that "Long distance thermographic measurement is a promising technique for noninvasive remote stress assessment," with the caveat that dogs with very furry ears don't make suitable study subjects!

Use of Thermography in Veterinary Medicine

Changes in skin temperature are controlled by the autonomic nervous system, which also controls other "unconscious" bodily functions such as breathing, heartbeat and digestion.

Thermograms are unique thermal "fingerprints" that in healthy animals show significant symmetry between the right and left sides of the body. When a pet's body is experiencing dysfunction or disease, the thermal fingerprint will be altered, which is a sign of a problem brewing.

Thermography isn't intended to replace standard imaging tests such as x-rays, magnetic resonance imaging (MRI), computed tomography (CT) scans or ultrasounds. Rather, its value is in its ability to screen for and detect a problem early, often weeks before it would be picked up on a standard diagnostic test.

Thermography can also be very cost effective because it allows veterinarians to zero in on the location of the dysfunction, which can eliminate the need for a battery of expensive and unnecessary tests. The procedure is noninvasive, radiation-free, requires no sedation or **anesthesia** and is FDA-approved.

Veterinary Applications

According to the Animal Specialty Group in Los Angeles, a multidisciplinary veterinary hospital that offers thermography, there are many applications for its use, including:⁵

- Evaluating pain
- Neurological dysfunction
- **Wellness screening/early detection**
- Malignancies
- Assessing lameness
- Vascular dysfunction
- Infections
- Stress fractures
- Inflammation
- Musculoskeletal injuries
- Ligament, tendon and/or muscle sprains and strains
- Monitoring healing and response to treatment

Another tremendous benefit of thermography is it can help veterinarians "see" pain in animal patients who can't tell us where or how badly it hurts, or whether the pain meds we're giving are relieving their discomfort. Whether your companion is a dog, cat or another species, deciding if they're hurting or how much they're hurting can be extremely difficult, because it is the nature of non-human animals to be stoic.

Thermography can take some of the guesswork out of rating a pet's pain level because it provides a "graphic display of the subjective feeling of pain" by revealing the changes in skin surface temperature that are markers for pain. "Giving an objective measure of the pain response is one of the most relevant uses for veterinary thermography, as the foundation for quality of life is comfort," says the Animal Specialty Group.

Sources and References

¹ [Scientific American, October 31, 2016](#)

² [Journal of Veterinary Behavior: Clinical Applications and Research, Volume 10, Issue 1, January-February 2015, Pages 17-23](#)

³ [Physiology & Behavior, Volume 159, 15 May 2016, Pages 80-87](#)

⁴ [Physiology & Behavior, Volume 167, 1 December 2016, Pages 86-91](#)

⁵ [Animal Specialty Group](#)
