*A special advertising section*

# What do you see when performing a digital thermal imaging screen of the patient?

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**For the Education Center**

Veterinarians don't have the luxury of verbally communicating with their patients. "How are you feeling today?" initially can be answered only by taking a thorough history and performing a comprehensive physical exam. This leads us to a preliminary list of differentials and a strategy to optimize care for our patients.

Digital thermal imaging (DTI) provides us with another measurement of our patient's symptomatology. This technology provides information that allows a more thorough exam—a physiological exam. All anatomical areas that would benefit from a more thorough examination and further diagnostic evaluation are identified. The more information we can collect from our patients, the better we can care for them.

DTI is a measurement of energy radiating from the surface of the patient. As with the mercury thermometer, which has been used since the dawn of modern medicine, temperature changes indicate a physiological change within the patient. Digital infrared thermal imaging provides a scientific evidenced based accurate, noncontact, quantifiable and noninvasive map of the energy being radiated from the skin surface of the patient. It is an expansion of our visual perception that emphasizes changes within the circulatory, nervous and musculoskeletal systems that require further evaluation.

## Digital Thermal Imaging vs. Digital Palpation

If the skin of your fingertips is within the neutral thermal range of 30 to 36 C, the threshold for detecting a decrease in temperature (cold) is half that of detecting an increase in skin temperature (warmth), and the better a site is at detecting cold, the better it is at detecting warmth. When palpating the anatomical structures of your patients with your fingertips, the threshold for detecting an increase in temperature is 1.0 to 1.5 C and is 0.3 to 0.5 C for detecting a decrease.[1]

Medical digital infrared thermal imaging equipment should have a thermal sensitivity of <.05 C. However, a sensitivity of <.02 C is preferred, as it allows a better visualization of the small temperature changes on our patients with thick haircoats. This correlates to 20 times the sensitivity of our fingertips to detect increases in temperature and 10 times the sensitivity to detect decreases. The thermal sensitivity of the equipment is paramount to the ability to detect even the slightest changes in the amount of radiant energy being emitted from the dermis. These changes in thermal sensitivity then are converted, via software, to a visual image divided into precise quantitative thermal gradients within a specific anatomical area.

Therefore, digital infrared thermal imaging is a very sensitive, accurate and visual physiological evaluation of specific anatomical sites within our patients.

## Interpretation of Digital Thermal Imaging

Interpretation and evaluation of infrared thermal images is accomplished easily by comparing one area of the patient to the corresponding contralateral area; a comparison of thermal symmetry. Each patient serves as its own control. When comparing differences between the contralateral areas in the normal patient (human studies), the thermal symmetry only varies 0.24 +/- 0.073 C.[2,3] Our patients maintain a significant haircoat, so thermal differences in symmetry within contralateral anatomical areas greater than 1 degree Centigrade and representing a larger thermal area are considered meaningful and warrant further evaluation.

Asymmetrical areas of increased (hyperthermic) thermal gradient correlate with an increase within the circulation. Asymmetrical decreases (hypothermic) within the thermal gradients indicate an irritation along the nerve pathway, resulting in a sympathetic vasoconstrictive response. Asymmetry within the expected symmetrical thermal patterns indicates a thermal pathology. When these asymmetrical thermal gradients are evaluated further, they will:

- Identify areas requiring further evaluation;
- Provide early detection of an impending problem;
- Present supporting visual evidence to the findings of the physical exam;
- Objectively monitor any therapeutic plan; albeit modality or pharmaceutical;
- Identify secondary and tertiary compensatory areas necessitating examination and therapy; and
- Serve as a client education tool to allow understanding and compliance with suggested treatment.

The following case examples will clarify the simplicity in the interpretation of these images:

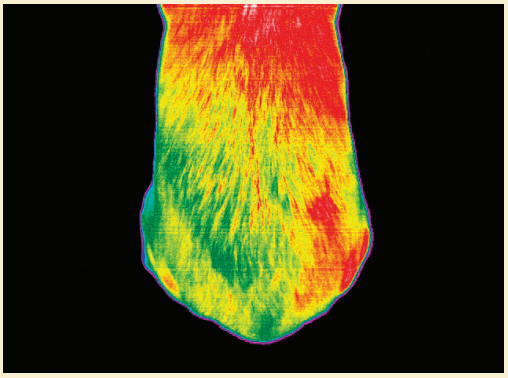
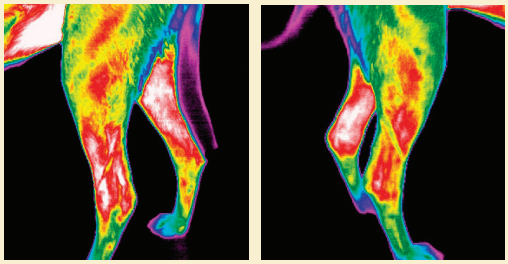


Image captured with Digatherm IR 640 camera



Images captured with Digatherm IR 640 camera

**Case No. 1—Female spayed Labrador; weight, 75 lb.; age, 8 years**
**Client stated:** Intermittent quivering of left hind leg, engages in normal activity of chasing deer with a normal gait; favors left hind when rising from rest but only one or two steps
**PE:** Relative atrophy of upper left hind limb, no pain elicited upon palpation of coxofemoral or stifle joints
**Digital thermal image exam:** Significant asymmetry between right and left gluteal areas
Asymmetrical increased (hyperthermic) thermal gradient over right hip and periarticular soft tissues. This is the result of secondary compensatory weight bearing off left hind limb. Hypothermic area over left hip and gluteal area correlates to muscle atrophy.

Asymmetrical increases proximal to and within both tarsi with that increase on the left hindlimb being far greater than right.

Digital thermal imaging of this patient allowed visualization of this area to the client who was then very receptive and compliant to a radiographic evaluation.

The increased thermal gradients corresponded directly with the finding of an osteosarcoma. The remaining radiographic images were nonremarkable.

Digital thermal imaging provides an accurate, noninvasive, quantitative, qualitative and visual instrument to allow us to better care for our patients.

REFERENCES

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2. Uematsu S. et al. "Quantification of thermal symmetry, Part I: Normal values and reproducibility." J Neurosurg. 69:552-5, 1988.

3. Uematsu S. et al. "Quantification of thermal symmetry, Part II: Application in low-back pain and sciatica." J Neurosurg. 69:556-61, 1988.

*Note: Case No. 1 courtesy of Dr. Paul K. Johnson, 488 E. Main St., Middletown, NY 10940*

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