AAT Thermography Facts and Information

**What is Thermology?**

AAT has published internationally peer reviewed guidelines on Neuromusculoskeletal, Breast, Veterinary, and Oral Systemic Thermography.

Medical Thermographic studies performed according to guidelines and under cold stress in humans are sympathetic skin response studies that involve the use of infrared imaging. Skin galvanic impedance, vasomotor and sudomotor physiology can be assessed through infrared skin response studies.

Medical Thermology is completely non-contact and involves no form of energy imparted onto or into the body. Medical disciplines that may have interest in Medical Thermology include neurology and neurosurgery, physiatry, pain specialists, orthopedics, occupational medicine, vascular medicine, oncology, and dentistry.

Sympathetic skin response studies such as cold stress infrared imaging provide valuable diagnostic tools for the study of complex regional pain syndromes (CRPS), reflex sympathetic dystrophy (RSD), thoracic outlet syndrome (TOS), vasomotor headache and Barre-Lieou. Other established clinical indications include venous and peripheral arterial disorders such as insufficiency or vasospastic disease, rheumatic inflammation, trauma and post-operative or fracture pain.

Breast Thermal imaging is not a diagnostic test for breast cancer but is a breast health risk assessment tool. It is an adjunct test to other breast imaging studies such as Mammography, MRI, or Ultrasound. Extensive literature exists on the use of infrared imaging as a breast risk health assessment. Estrogen dominance, ductal congestion, lymphatic congestion, and angiogenesis are all breast health risk factors that breast thermal imaging can help to identify.

Oral Systemic Thermography can play an important adjunctive role in the assessment of Dental-Oral and certain Systemic Health related illnesses, diseases, and in their clinical diagnosis. Other structural imaging technologies such as X-Ray, Ultrasound, CT, and MRI, do not provide the information offered by Dental/Systemic Health Thermal Imaging. The clinical application of Thermography can help physicians both understand patho-physiology and improve patient outcomes.

Medical Infrared Thermal Imaging also has utility in Veterinary Medicine. While large animal (equine) applications predominate Veterinary Medicine, recently there has been more activity in the small animal arena as well.
Specific AAT Guidelines Include the following:

1) Neuromusculoskeletal Thermography

Statement of Need

Pre-existing vasomotor tone and vasomotor capacitance plays a significant role in thermoregulation, clinical symptomatology and manifestations of systemic illness.

Infrared Thermal Imaging is the only non-invasive technology available to image and map microcirculatory shunting (vasomotor instability) associated with these disorders. It can play an important role in clinical diagnosis and may be helpful distinguishing between central and peripheral changes affecting the sympathetic nervous system. Infrared SSR infrared imaging may also be valuable to document drug induced symptoms and paradoxical responses to sympathetic and peripheral nerve blockade.

Other technologies like PET scan, MRI, Spectroscopy, Electrodiagnostics or EEG do not provide the same information offered by Medical Thermal imaging. The clinical application of Infrared Thermal and SSR imaging may be instrumental in understanding the pathophysiology associated with these changes and improve patient outcomes.

The mission and bylaws of the American Academy of Thermology support the incorporation of thermal imaging into clinical medicine. The AAT recognizes a current and ongoing need to promulgate CME in the science and methods of thermal imaging and the clinical application of heat asymmetry patterns obtained from thermal imaging among both physicians and thermal technologists.

Purpose

Infrared Neuromusculoskeletal and SSR evaluations are performed to provide an overview of the location, extent and severity of sympathetic skin response abnormalities. When abnormalities due to vasomotor/sudomotor dysfunction occur there are associated changes in skin galvanic impedance and skin temperature. Skin galvanic impedance changes map closely with skin temperature. In physics this is explained by the fractal nature of infrared waves and their relationship to resistance and conductivity. The SSR evaluation can be performed from the cranium to the base of the spine (inclusive of all segments) and torso to the extremities, extended to the fingers and toes.

Common Indications

Some of the common indications for performance of extremity and spine infrared SSR imaging include:

- Evaluation or follow-up of patients with known or suspected vasomotor instability.
- Assessment of patients with presumptive Complex Regional Pain Syndrome (CRPS) Type I or II – formally known as Reflex Sympathetic Dystrophy (RSD), Thoracic Outlet Syndrome, Vaso-motor Headache and Barre’-Leiou Syndrome.
- Pre-procedure assessment for planning of interventional therapeutics.
Follow-up to determine technical adequacy of surgical intervention, i.e., sympathetic block, sympathectomy, peripheral nerve implantation and/or spinal cord stimulator placement.

Follow-up to detect improvement, progression or spread of disease, which may reflect change in condition.

Evaluation of vasospastic disorders, rheumatic inflammation, and unexpected post-operative or post fracture pain.

Evaluation of sports injuries, tendinopathies, ligamentous strain, and persistent or aberrant soft-tissue pain.

Evaluation of somato-autonomic and viscero-autonomic responses which may be present secondary to acute trauma or disease.

Evaluation of other disorders associated with autonomic dysfunction such as shoulder hand syndrome.

Evaluation of non-myelinated neuropathies (small fiber neuropathies).

Mapping of the extent of vasomotor instability to guide sympathetic response generator identification.

Mapping of the location of vasomotor instability for impairment rating purposes.

Confirmation of diagnostic inclusion criteria for clinical diagnostic purposes.

Confirmation of diagnostic inclusion criteria for research purposes.

Documentation for medical and medicolegal expert purposes.

**Contraindications and Limitations**

Contraindications for extremity and spinal infrared SSR imaging include the following:

- Presence of casts, bandages or other technical factors that preclude the ability to expose skin to a temperature equilibration environment.
- An uncooperative patient.

**2) Breast Thermography**

**Statement of Need**

Thermography is a non-invasive technology available to image and map micro-circulatory shunting associated with breast circulatory changes in the skin. It can play an important adjunctive role in the assessment of allostasis in breast health, clinical diagnosis, and in distinguishing between benign, early, advanced, and progressive disease. Breast thermography can also play a useful role in monitoring treatment effects.

In addition, measuring both elevated and other skin temperature aberrations provides important insight into physiologic manifestations of illness. Further since vascularity plays an important role in cancer growth thermal imaging has particular application for breast health.

Other structural imaging technologies such as Mammography, Breast Ultrasound, MRI, and Breast CT do not provide skin vascular and metabolic information offered by Medical Thermal imaging. The clinical application of Thermography can help physicians both understand breast patho-physiology and improve patient outcomes.

The American Academy of Thermology supports the incorporation of infrared thermal imaging into clinical medicine and its specific application in monitoring breast health. The AAT recognizes a current and ongoing need to
promulgate continuing medical education in the science and methods of thermal imaging and in the practical clinical application of variant heat patterns obtained from thermal imaging.

**Purpose**

Infrared imaging (thermography) is a physiologic study that can assess the earliest possible changes in breast tissue by providing an accurate and reproducible high resolution image of skin temperature. This image can be analyzed both qualitatively for thermovascular mapping and quantitatively for minute changes in skin heat emission. As with most physiologic studies, anatomic findings may not correlate and may not even be present.

**Indications**

- Vasomotor mapping of breast temperature and skin vascular patterning
- Serial evaluation for change in baseline physiology
- Documentation of breast temperature and Thermobiological (TH) classification
- Monitoring of physiologic responses of breast tissue
- Adjunctive monitoring of breast temperature and vascular patterning in the presence of:
  - Small breasts
  - Dense breasts
  - Fibrocystic disease
  - Post mastectomy
  - Post breast reconstruction
  - Placement of prosthesis
  - Radiation exposure concerns

- Adjunctive information for other structural breast imaging studies such as Mammography, Ultrasound or MRI
- Adjunctive monitoring of breast temperature and vascular patterning in conjunction with or in the absence of other interventions (including, but not limited to radiation and chemotherapy)
- Adjunctive monitoring of breast temperature and vascular patterning in the perioperative and post-operative patient.

**Contraindications and Limitations:**

- Contraindications include the uncooperative patient or those patients with medical morbidity that precludes obtaining a proper exam with full consent.
- Since breast thermography operates under the premise that the body is fundamentally a symmetrical entity (with allowances for innate variation from side to side) the post-mastectomy patient represents a unique situation. Specific protocols have been established for this situation.
- While generally considered to be rare, it is possible that symmetric, bilateral pathologies can co-exist and a false negative study would result.
The American Academy of Thermology's Position on Breast Thermography:

What it is:

Breast thermography is a breast health risk assessment tool.

Historically the Food and Drug Administration approved medical thermography as an adjunctive test for breast cancer screening in 1982.

We believe that valuable information can be garnered from thermography of the breast.

Breast thermography is a physiologic test that offers individuals and healthcare practitioners insight which permits for a proactive approach to breast health on important issues including hormone imbalance, angiogenesis, lymphatic congestion, and other soft tissue abnormalities associated with breast health.

Women with dense breasts, fibrocystic disease, small breasts, or who have a strong family history for breast disease and want to be more proactive in their breast care often consider breast thermography to help accomplish this need.

Breast thermal imaging provides this information from a noninvasive format which does not expose the individual to radiation or compression.

What It Is Not:

We do not now and have never supported the notion that breast thermography is a stand-alone diagnostic test for breast cancer.

It is not our intent to compare thermography with mammography, ultrasound, MRI, or any other diagnostic test.

While much of the information garnered in a Breast Thermographic examination does address risk factors that may be associated with changes in breast health, thermographic imaging in and of itself is not a competitor to, alternative, or replacement for any other diagnostic test.

3) Oral Systemic Thermography

Statement of Need

Thermography is a non-invasive technology available to image and map microcirculatory shunting associated with circulatory changes in the skin. It can play an important adjunctive role in the assessment of Dental-Oral and certain Systemic Health related illnesses, diseases, and in their clinical diagnosis. When performed and interpreted within the scope of this Guideline Dental/Systemic Health Thermography can also play a useful role in monitoring treatment effects of dental-oral and specified systemic health conditions.

Other structural imaging technologies such as X-Ray, Ultrasound, CT, and MRI, do not provide the information offered by Dental/Systemic Health Thermal Imaging. The clinical application of Thermography can help physicians both understand patho-physiology and improve patient outcomes.

The American Academy of Thermology supports the incorporation of infrared thermal imaging into clinical medicine and its specific utility in the monitoring of dental-oral and applicable systemic health conditions. The AAT recognizes a current and ongoing need to promulgate continuing dental/systemic health education in the science and
methods of thermal imaging and in the practical clinical application of variant heat patterns obtained from thermal imaging.

**Purpose:**

Medical Infrared imaging (thermography) is a physiologic study that can provide an accurate and reproducible high resolution image of skin temperature. This image can be analyzed both qualitatively for thermovascular mapping and quantitatively for minute changes in skin heat emission. As with most physiologic studies, anatomic findings may not correlate and may not even be present.

**Common Indications:**

Some of the common indications for performance of Dental-Oral and Systemic Health studies include:

- Evaluation or follow-up of patients with known or suspected temporal – mandibular dysfunction and other occlusive disorders.
- Evaluation or follow-up of patients with known or suspected oral-facial pain and myofascial conditions of the head and neck.
- Evaluation or follow-up of Inflammatory and infectious conditions related to the teeth, gingiva, and mouth.
- Evaluation or follow-up of caries and decay.
- Assessment of those systemic or organ specific disorders, or otherwise unclassified indications that have generally accepted skin surface thermal signatures including:
  - cerebral vascular disease in the distribution of the ophthalmic artery
  - thyroid disease
  - hepatic overload or portal congestion
  - peripheral arterial disease
  - deep and superficial venous disorders
  - inflammatory and obstructive lymphatic disorders
  - pressure ulcers
  - perforator and vascularization assessment
  - varicocele
  - dermatologic and immunologic conditions, including superficial skin vascular responses to environmental impacts such as mold or other allergens
  - psychological manifestations that may impact skin surface temperature
  - community health fever screening

- Pre-procedure assessment for planning of interventional therapeutics.
- Follow-up to determine technical result of medical or surgical interventions, such as corrective dental measures, anesthetic injection, vascularization, environmental and liver detoxification, restoration of NEI imbalance, and emotional restructuring.
- Follow-up to detect improvement, progression or spread of disease, which may reflect change in condition.
- Mapping of the extent of vasomotor instability to guide generator identification.
- Mapping of the location of vasomotor instability for impairment rating purposes.
- Confirmation of diagnostic inclusion criteria for clinical diagnostic purposes.
- Confirmation of diagnostic inclusion criteria for research purposes.

Contraindications and Limitations:

Contraindications Dental/Systemic Health Thermal Imaging include:

- Presence of casts, bandages or other technical factors that preclude the ability to expose skin to a temperature equilibration environment.
- An uncooperative patient.

4) Veterinary Thermography

Purpose

Veterinary medicine is a unique branch of the health sciences that involves multiple species many of which are not domesticated. Regardless, any can be dangerous to the examiner. Furthermore, veterinary patients do not seek medical attention, rather the owner, rider, trainer, or caretaker seeks medical advice based on their observations. Thus, veterinary examinations must be very thorough with attention to basic clinical signs that provide insight to potential inflammatory conditions. Unfortunately, not all veterinary patients can be examined without them being anesthetized or heavily sedated. Since heat is one of the five cardinal signs of inflammation, the ability of infrared imaging to detect changes in the heat patterns of skin make it an invaluable tool in the clinical assessment of veterinary patients with certain types of problems. The thermal examination can be performed from the cranium to the base of the spine, from the torso to the extremities, including the digits and may include the oral and abdominal cavities.

Common Indications:

There are 4 common uses for infrared imaging in veterinary medicine:

1. As a diagnostic aid where changes in the thermal patterns of scanned areas suggest a regional diagnosis where anatomic imaging modalities can be used to characterize the nature of the problem

2. As a method to enhance clinical assessment of the veterinary patient to include:
   Evaluation or follow-up of patients with known or suspected vasomotor instability.
   Pre-procedure assessment for planning of interventional therapeutics or diagnostics
   Follow-up to detect improvement, progression or spread of disease, which may reflect change in condition.
   Evaluation of muscle circulation
   Evaluation of post surgical swelling and local circulation
   Evaluation of unexpected post operative or post fracture pain.
   Qualitative assessment of the vasculature and blood flow to tissues
   Evaluation of peripheral neuropathies.
   Evaluation of inflammation around teeth
To determine if areas of palpable soreness are associated with heat

Monitoring extremities post cast application

3. As a method to assess musculoskeletal stress caused by training
To determine the presence of subclinical inflammation
Assess hoof and shoe balance in horses
Assess saddle fit of horses
Assess the effect of the rider on the horse’s back

4. For regulatory medicine to determine welfare compliance in jumping horses and Tennessee Walking Horses
Assess limb temperature changes for limb sensitivity in show jumpers
Assess for abnormal cold on the distal limb of TWHs suggestive of foreign substance application
Assess thermal patterns on the palmar pastern of TWHs suggestive of abnormal scar formation
Assess thermal patterns of TWHs distal limbs consistent with application of “soring” agents

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