

Breast Thermography

Presented by:

George E. Chapman, DC, CCSP, DABCT, DIACT, DICTACT, DNBC#, FIACA, FIACT
Victoria Lea, MLS, CBPM, HHP, CTT

Thermography in Breast Cancer Detection

Thermography is exceptional in detecting breast cancer within the first year of development, as well as detecting and recording more advanced stages of breast malignancy. Infrared imaging shows subtle and dramatic temperature differences that correlate with various types of breast pathology. Thermal imaging is also of great value in monitoring the effectiveness of treatment.

Thermography is different than other invasive techniques, such as mammography and x-ray that penetrate the body with harmful radiation, whereas thermography is non-invasive and radiation free. Most other diagnostic equipment detects anatomical issues, but thermography investigates physiological patterns. The thermogram, using proper protocol, detects changes in the skin microcirculation as a result of temperature and chemical changes. (13)

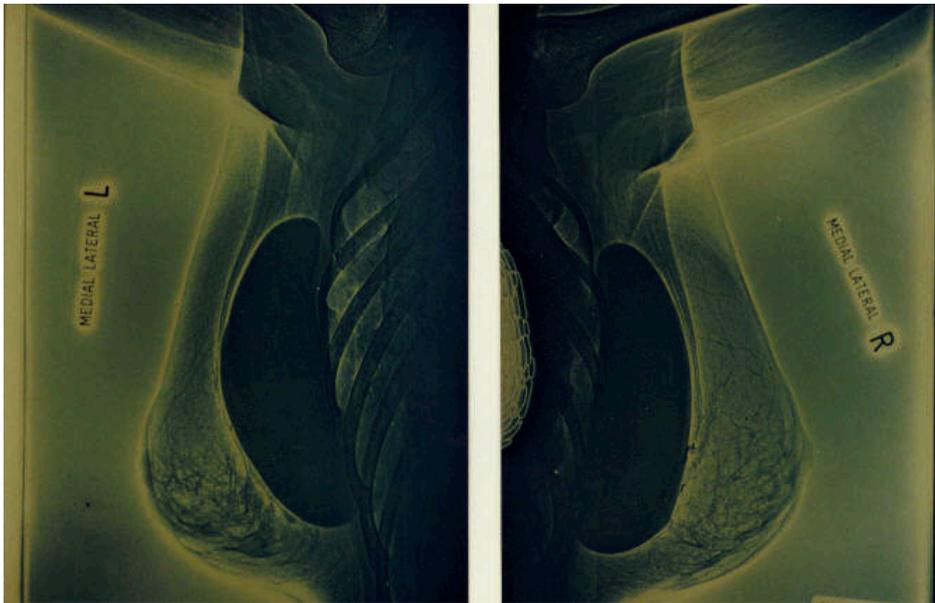
The skin is the largest organ of the body and contains approximately 25% of the body's blood. The skin measures about 21 square feet in an average adult and accounts for 15% of body weight. One of the skin's primary roles is protection from environmental temperature change. The skin's temperature controlling mechanism has a unique and distinct microcirculation that distributes the thermal excesses produced in the body, and 2) protects the thermal needs by adjustment of the circulation. (11)

Thermographic examinations are performed in a controlled 20°C or 68°f ambient room to challenge the body, noting a neutral normal skin temperature is 30°C or 86°f. The microcirculation of the skin is under the control of the sympathetic nervous system and the colder temperature causes a "fight or flight" response to occur. This, in turn, causes the cutaneous blood vessels to constrict forcing blood inward to the muscles and vital organs, as a protective response.

The nitric oxide that is present, as a result of malignant tumor development, does not allow the blood vessels to constrict near the tumor. Only the normal vessels constrict and the abnormal vessels tend to remain dilated when challenged with the cold-water hand soak. The main purpose of a second, or comparative study, is to determine the functional physiological response to a cold-water challenge. Temperature changes measured from first to second studies provide one of the most important factors for evaluation of the breasts.

Clinical experiments by Draper, indicate that only heat brought to within 6mm (~1/4") of the surface of the dermis is emitted. Thermography only detects heat within this range (skin microcirculation).

The films below demonstrate that even implants do not affect microcirculation. Since we are seeing alteration in the microcirculation as a result of nitric oxide blocking normal vasoconstriction in a cold room, or enhanced perfusion of new or existing blood vessels, detection of cancer is considered 92-97% accurate showing thermography to be the most accurate screening test for breast cancer detection, currently available. (11, 13)



Breast tissue is unique due to the mechanism of the mammary vessels, fatty tissue and skin temperatures. Early development of breast cancer, as well as risk, can be determined with the proper protocol that includes cooling the body to 68°f for 15 minutes, taking a series of thermographic images, then performing provocative testing with cold water, taking a second series of images, and comparing the temperature between series one and series two.(8) If temperatures cool, a normal physiological response is suggested. If temperatures remain unchanged or warm following the stress test, an abnormal response to the cold water challenge is observed.(9)

Clinical Thermography Associates has established 26 qualitative and quantitative features that can be observed to determine a patient's score, and establish the level of concern or risk.(12) The sensitivity and selectivity (1) are highly accurate and provide distinctive information concerning risk factors for malignancy, hormone imbalance (estrogen/ progesterone), and cystic/fibrocystic breasts. The accuracy level for a thermographic reading, starts at 82-90%, and increases to 92-97% with comparative follow-up readings.

Several advantages for breast thermography are:

- * Entire chest is observed, neck to abdomen and armpit to armpit.
- * Ability to examine dense breast tissue in young women, even children.
- * Ability to examine breast tissue in men.
- * Ability to observe inflammatory breast cancer (IBC).
- * Can monitor treatment effectiveness.

- * Identifies fibrocystic tissue, showing benignity vs. malignancy.
- * Non-invasive: no radiation or harmful effects.
- * No compression of tissue, which can spread in situ carcinoma (Lancet 1995).
- * Ability to examine breasts with implants without risk of damage.
- * Repeatability: Thermograms can be taken as often as desired.

Research over the past 40 years has shown that breast thermography significantly augments the long-term survival rates of recipients. When used as part of a three-phase approach, including clinical examination, mammography and breast thermography 95% of early stage cancers will be detected. (1)

In 1972, the Department of Health, Education and Welfare declared in a paper by director Thomas Tierney, that "...thermography was beyond experimental in the following areas:

- Evaluation of the female breast.
- Vascular analysis.
- Extra-cranial evaluations.
- Neuromusculoskeletal analysis."

On January 29, 1982, the Bureau of Medical Devices, U.S. Federal Drug Agency (FDA), published approval and classification for the use of thermography as an adjunctive screening procedure for the detection of breast cancer and the following:

- Abnormalities of the female breast.
- Peripheral vascular disease.
- Musculoskeletal disorders.
- Extra-cranial cerebral vascular disease.
- Abnormalities of the thyroid gland.
- Various neo-plastic and inflammatory conditions

Actually, thermal imaging of the breasts may have vital prognostic value, since it may correlate with specific pathologic features, such as tumor size, tumor grade, lymph node status and markers of tumor growth (5).

Breast Thermography Common Pathology Visualized with Thermal Imaging

The first use of thermography known to evaluate breasts was by Gorman in 1939 that evaluated changes in vascular structure in breasts during pregnancy with infrared photography. Lawson-1956, 57 and Amalrie-1957(2) initially published research regarding thermography and breast cancer in an effort to determine if breast cancer could be detected non-invasively. They suspected this would work because of hypermetabolic activity (inflammation) of malignancy and possibly hypervascularization due to angiogenesis.

In 1963, Lawson and Chughtai (3) demonstrated empirical evidence that breast malignancy alters regional skin surface temperature. They demonstrated that the increase in regional skin temperature associated with breast malignancy was related to venous convection, which added to previous research suggesting that infrared findings were associated with both increased vascular flow and increased metabolism.

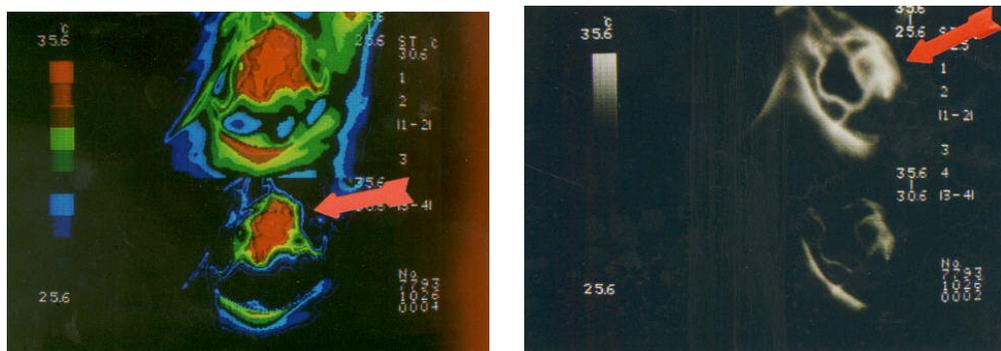
According to Gautherie and Hobbins 1982, hyperthermia and hypervascularity correlate with the degree of biological activity. (16) This suggests that thermal response observed in neoplasia appears to be proportional to the biological significance of the tumor.

At the 1989 Diplomate program at Cleveland University, Chapman (4) identified a third cause for aberrant thermal heat present in breast malignancy as a thermoregulatory dysfunction due to the “host immune response.” Amber (5) further clarified this in 1994, suggesting the presence of nitric oxide may be associated with the thermoregulatory response.

Hyperthermic Patterns with Malignancy (11)

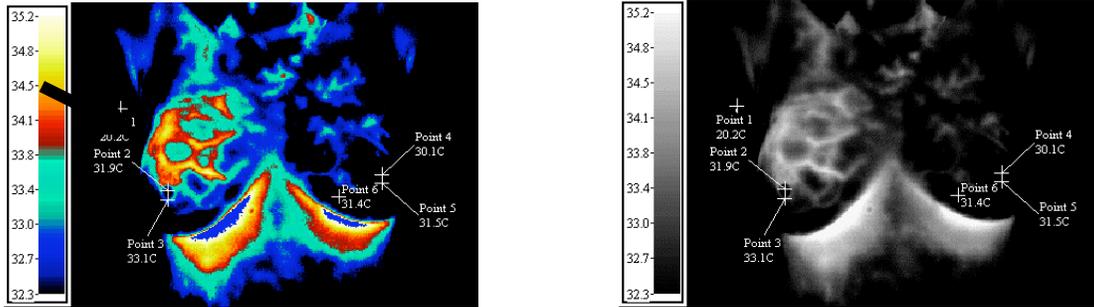
- Increased metabolism. (Lawson 1956, 57 and Amalrie 1957, Lawson and Chughtai 1963 (3))
- Hypervascularity, including angiogenesis and release of angiogenic factors. (Lawson 1956, 57 and Amalrie 1957, and Chughtai 1963)
- Thermoregulatory Dysfunction, including the presence of nitric oxide (6, 7, 8) and “host immune response” (11). (Chapman 1989, Head, Elliott 1993, Ambar 1994)

Increased metabolism affects thermal image in more advanced or rapid growing carcinomas and those closest to the skin, below:



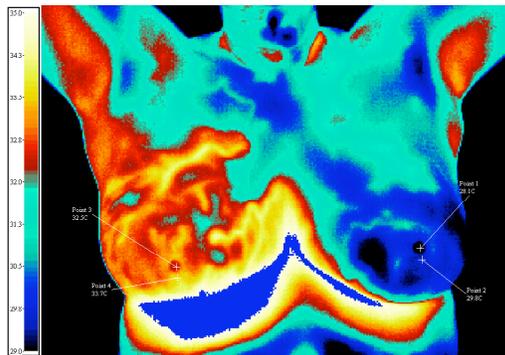
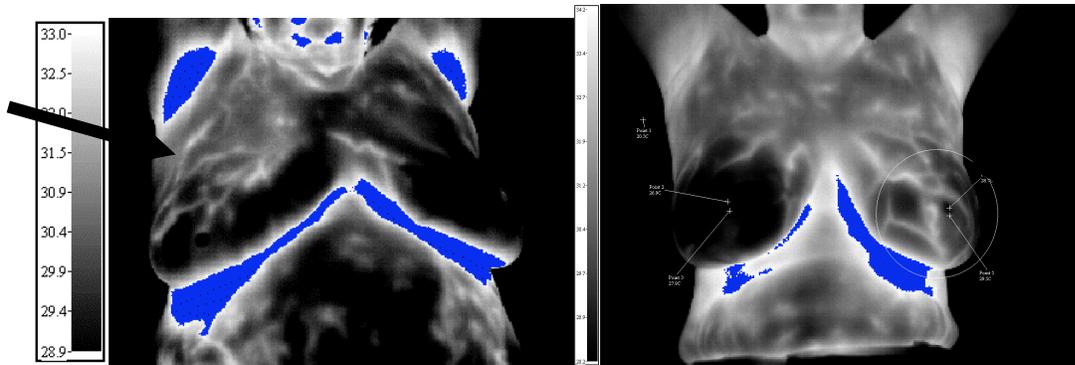
FlexiTherm Mark V split screen. Screen is split with top half in a 10°C thermal window and the bottom half of the screen in a 5.0°C thermal window. Primary tumour is observed at the red arrow in color and in black/white.

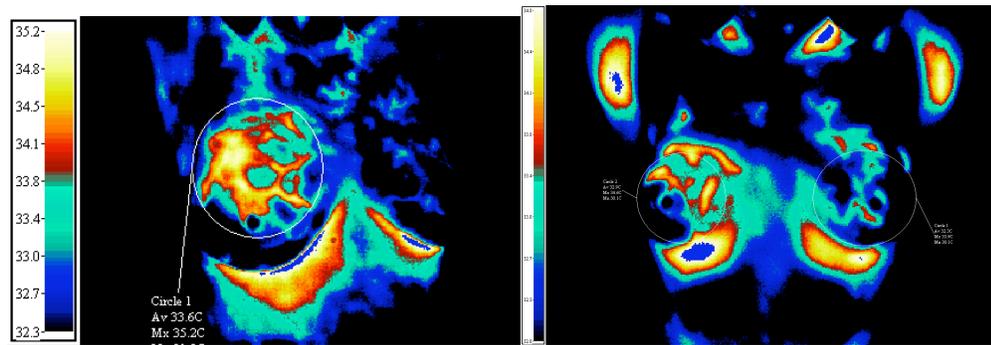
Increased Metabolism



Films taken with the Flir A-40 Thermal scanner.

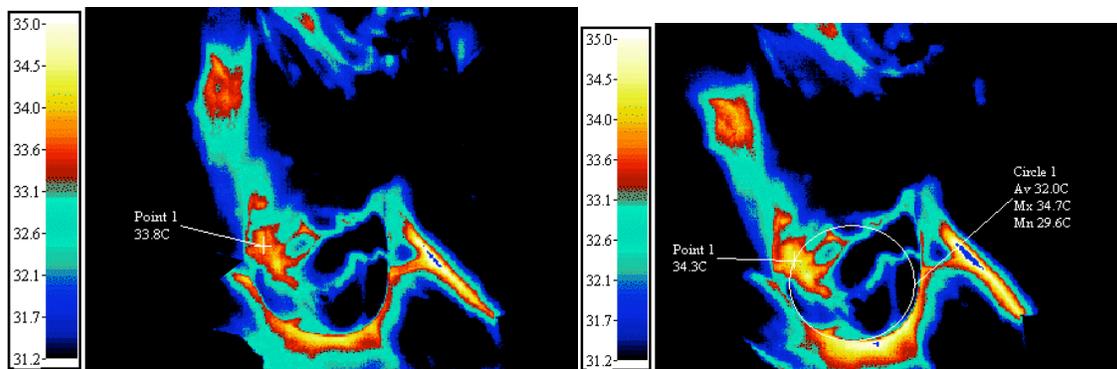
Hypervascularity is shown below by the appearance of asymmetry $\geq 25\%$ of one breast when compared to the contra lateral breast (Chapman 1978, Haberman 1984):





- Increased skin temperature noted with cancerous breasts, may be due to enhanced blood flow from the core temperature through the affected breast.(8)
- Increased blood flow can be a result of hypervascularization associated with the new blood vessel growth as a result of the malignancy or enhanced blood flow through existent microvascular structures. (11)
- In his textbook Atlas of Mammography-New Early Signs in Breast Cancer, Gamagami studied angiogenesis with infrared imaging and indicated that hypervascularity and hyperthermia could be shown in 86% of non-palpable breast cancer. (12)
- Established as a significant risk factor by Chapman in 1978. Additionally, research conducted by Dr. Joan Haberman and presented in an article entitled “Breast Cancer Detection by Absolute Temperature Thermography and Computer Techniques,” indicated this feature to be one of the four primary factors associated with breast cancer, as determined by thermography.(15)

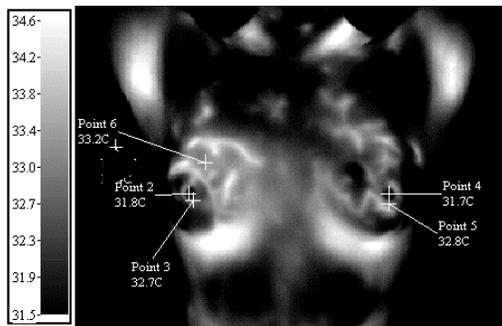
Thermoregulatory Dysfunction, Presence of Nitric Oxide, causing local blood vessels to dilate, and preventing the normal vascular response to constrict with the cold room and cold-water challenge.



Study # 1: Right breast regional hyperthermia series one = 33.8°C (first picture)
 Study # 2: Right breast regional hyperthermia series two = 34.3°C (Right picture)
 $\Delta T = 0.5^{\circ}\text{C}$. Primary Risk Factor (confirmed cancer with biopsy)

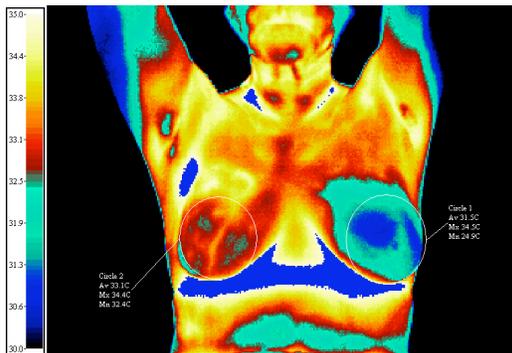
- Area of heat (arrow) increases in temperature following a cold-water challenge. This is not a normal occurrence and the thermal image demonstrates a primary risk factor of increased heat. (8)

Thermoregulatory Dysfunction, Host Immune Response in Inflammatory Breast Cancer (IBC).



Global Heat Auto Immune Response Thermoregulatory Dysfunction (11)

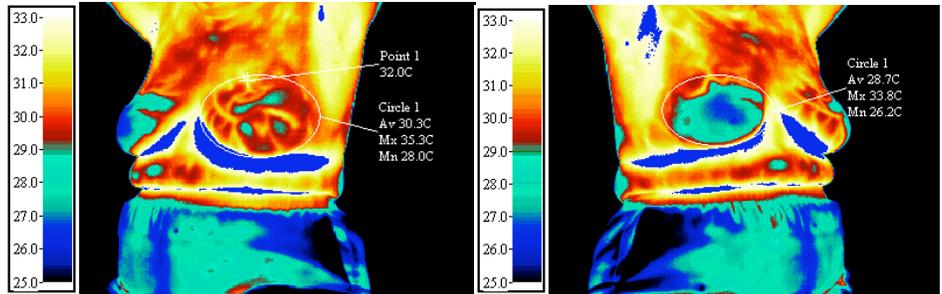
- Symptoms of IBC Include:
- Rapid increase in breast size.
 - Redness
 - Skin hot to the touch
 - Persistent itching
 - Thickening of breast tissue
 - Sometimes an inverted nipple (normally backed by heat)



Mammogram, ultrasound and MRI were performed two weeks prior to thermogram and did not detect patient's cancer in the right breast (left in picture). Finding is quite clear and dramatic with the thermogram demonstrating IBD of the right breast.

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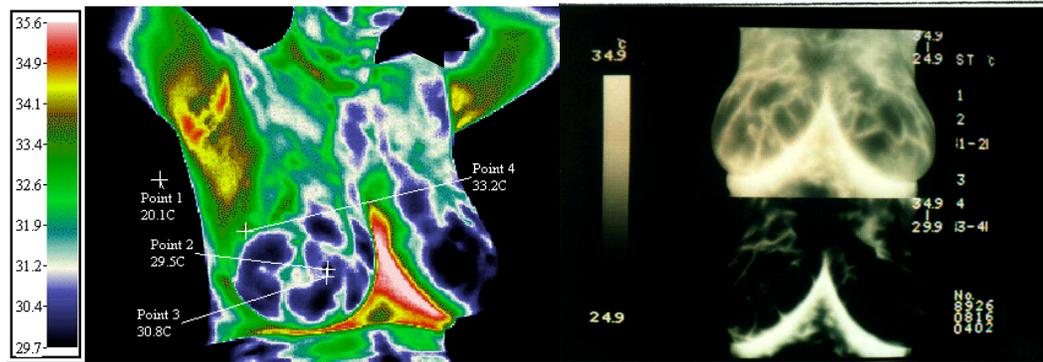
Thermographic series (entire thermarray) demonstrating global hyperthermia with the left breast. Finding was positive for IBC.



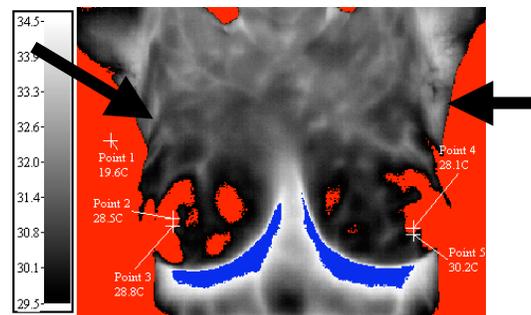
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Benign Breast Disorders:

Cystic/fibrocystic Breasts:

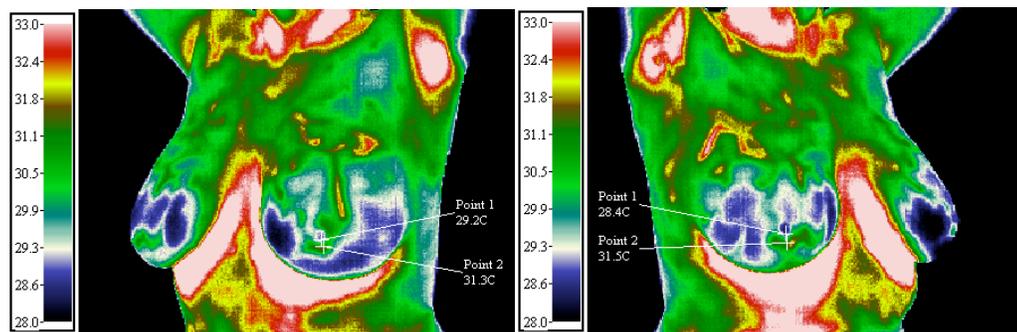


- Cystic and fibrocystic breasts are characterized with the dark circular areas in the above films. The circular areas are hypothermic or cold. Frequently associated with hormone imbalance (estrogen/progesterone) or iodine deficiency. (13)



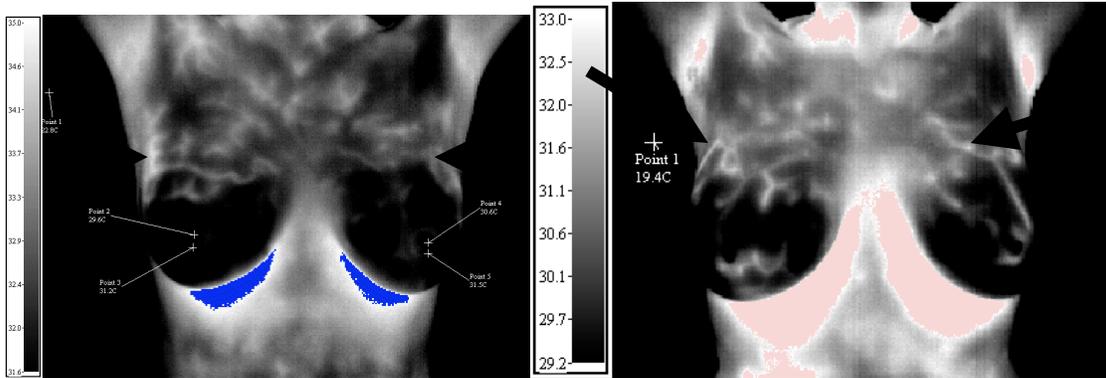
Estrogen Dominance (characterized by)
Curvilinear thermovascular patterns mid chest and cystic/fibrocystic breasts
Demonstrated with red circular regions of hypothermia

- Fibrocystic breasts are thought to be an overgrowth of normal breast tissue as a result of excessive exposure to estrogen over a prolonged period of time. According to John Lee, M.D., this is referred to as “estrogen dominance” and is reportedly a sign that the ovaries are not producing enough progesterone compared with estrogen intake.

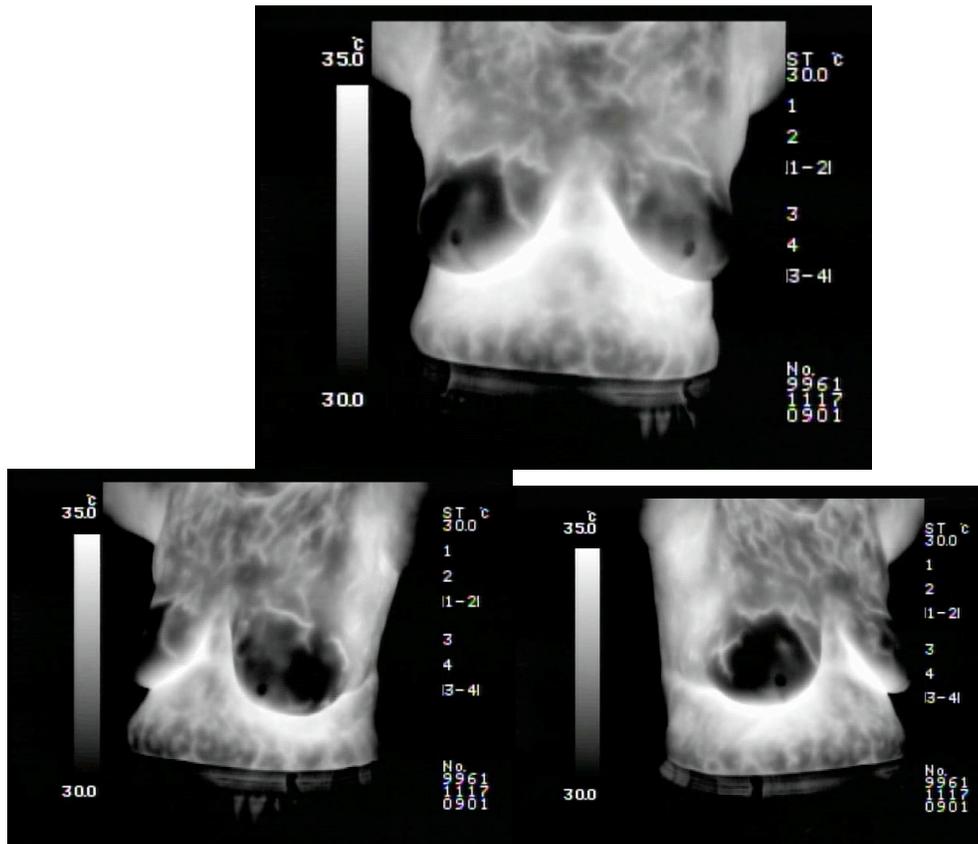


Films with regional hypothermia demonstrating cystic/fibrocystic breasts

Hormone Imbalance:



- Both studies present with curvilinear thermovascular patterns mid chest and upper breast. Finding is frequently associated with hormone imbalance (Estrogen/progesterone). (13) Finding normally is identified with estrogen dominance and low progesterone (11, 13, and 14)



Curvilinear thermovascular patterns mid chest and over both breasts. Indicative of hormone imbalance (estrogen/progesterone) and cystic/fibrocystic breasts.

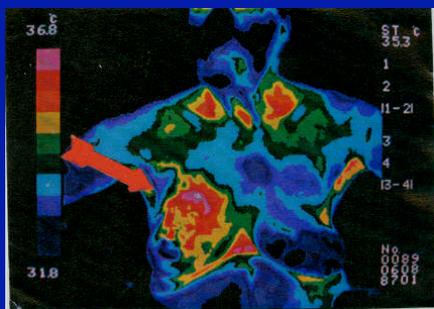
Conclusion:

Based on over 150,000 patient studies evaluated with breast thermography at CTA Laboratories, it has become clear that thermography provides significant data for interpreting risk of developing or presence of breast malignancy. Findings can be used objectively to discover hidden pathology/cancer, in therapeutic decision making, to monitor treatment effectiveness, and to establish a risk marker or baseline in order to detect the early development of breast cancer.

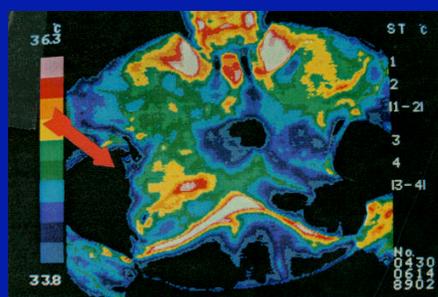
Because there is an unequivocal relationship between heat production and tumor doubling time (1), thermographic monitoring of treatment effectiveness is a tremendously useful test for anyone undergoing cancer therapy. Regardless of the type of treatment being rendered (traditional medical care, complimentary alternative medicine, experimental or untested treatments) being able to detect and analyze the response to treatment is invaluable. There is a old chiropractic adage that says, "...to see is to know, not to see is to guess." (Author unknown) I strongly agree.

Thermography can provide immediate and short-term monitoring of a patient's treatment effectiveness. It is not expensive; it is non-invasive, radiation free and extremely accurate. It provides both qualitative (analysis of features or patterns) and quantitative analysis (specific temperatures) of area(s) in question. Research indicates it is one of the most specific and objective tests for the detection of breast cancer and correlating research continues to be published in standard traditional medical and chiropractic journals world wide.

Thermal Imaging and Treatment Monitoring



Breast Cancer 6-8-87



Improvement 6-14-89 with
Tamoxifen Citrate therapy

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