

Breast Thermography – An Adjunctive Approach to Breast Health Evaluation

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Overview

Breast thermography is a diagnostic imaging procedure which measures the thermal signature of the breast. This procedure has been approved by the US Food and Drug Administration, Bureau of Medical Devices, since 1982. Both quantitative and qualitative representations of the thermal signature are made and this information is represented in the form of a thermogram. Both individual and serial thermograms can be used diagnostically for breast health screening. Thermography is noninvasive, painless, 100% safe, and there are absolutely no side effects.

"Clinical thermography is a physiologic imaging technology that provides information on the normal and abnormal functioning of the sensory and sympathetic nervous systems, vascular system, musculoskeletal system, and local inflammatory processes. The procedure also provides valuable diagnostic information with regard to dermatologic, endocrine, and breast conditions."¹

The Problem

The statistics for breast cancer are staggering. According to the National Breast Cancer Coalition, over 250,000 women will be diagnosed with breast cancer in 2002. Other disturbing data provided by the National Breast Cancer Coalition include:

- One in eight (some stats say 1 in 7) women will develop breast cancer in their lifetime (1 in 11 in 1975)
- A new case of breast cancer will be diagnosed every 2 minutes and a woman will die every 13 minutes
- Little change in mortality rates over the last 4 decades (about 3-4% improvement since 1990)
- About 90 percent of women who develop breast cancer have no family history

Some may argue these statistics are not completely accurate, but there is little doubt breast cancer is wide spread, and causes significant morbidity and mortality to the women it touches.

Commonly used breast screening methods include breast self exam (BSE), clinical breast exam, mammography, ultrasonography and most recently, breast MRI.

Recent evidence has cast doubt on the benefits of mammography and even BSE. Observational studies, including cohort and case-control studies, have examined the effects of BSE in specific populations of women. An attempt was made to ascertain if BSE in fact reduced mortality from breast cancer. Although

¹ Dr William Cockburn, Isabelle Tracy Breast Health Foundation

observational studies may have inherent flaws, the conclusion, in spite of some conflicting results, failed to show BSE offered any benefit to women.²

A recently published review of mammography cites methodological problems in the original clinical trials of mammography.³ This combined with recent evidence has cast doubt on mammography's ability to impact the death rates from breast cancer.

The reasons for the apparent failure of BSE and mammography to reduce mortality rates are many, and not subject to discussion in this paper.

For additional information in this area, and to read the NBCC position on screening mammography and BSE, see the National Breast Cancer Coalition web site at www.natlbcc.org.

It is not the intent of the paper to take a position on current breast cancer screening methods, but rather to point out the need for another approach. At this time, breast thermography should not be used to replace any form of screening, but rather it should be used as an adjunctive procedure to provide an improved approach to early detection.

Thermography – An Adjunctive Approach

Breast thermography is a measure of physiology rather than anatomy. This allows for an expanded approach to breast health screening. Breast thermography makes use of the principle that cancer cells generally have a greater metabolic rate than healthy tissue and require increased vascularization to support their growth. Thermography, more specifically, Digital Infrared Thermal Imaging (DITI), is able to measure these temperature differences to within 0.1 degree C, and to do so in a very accurate and reproducible manner. Additionally, increased vascularization can often times be seen and evaluated for normal physiologic response. Normal physiologic response is often times absent in malignant tissue.

Breast thermography offers many benefits as an adjunctive screening procedure, but equally important is the fact that there are no side effects, no exposure to ionizing radiation, and no body contact. Surgical procedures such as implants, reductions, and biopsies do not interfere with infrared imaging. Breast thermography is perfectly safe precedure during pregnancy or when nursing. It is important to note that changes occurring in the breast during pregnancy and lactation will impact the clinical usefulness of a breast thermogram. The procedure may also be preformed during any part of

² Holmberg L, Ekblom A, Calle E, et al. Breast cancer mortality in relation to self-reported use of breast self-examination. A cohort study of 450,000 women. *Breast Cancer Res Treat* 1997;43:137-40.

Harvey BJ, Miller AB, Baines CJ, Corey PN. Effect of breast self-examination techniques on the risk of death from breast cancer. *CMAJ* 1997;157(9):1205-12.

Muscat JE, Huncharek MS. Breast self-examination and extent of disease: a population-based study. *Cancer Detect Prev* 1991;15:155-9. Newcomb PA, Weiss NS, Storer BE, et al. Breast self-examination in relation to the occurrence of advanced breast cancer. *J Natl Cancer Inst* 1991;83:260-5.

Gastrin G, Miller AB, To T, et al. Incidence and mortality from breast cancer in the Mama Program for Breast Screening in Finland, 1973-1986. *Cancer* 1994;73:2168-74. Thomas DB, Gao DL, Ray RM, et al.

Randomized trial of breast self-examination in Shanghai: Final Results. *J Natl Cancer Inst* 2002;94(19):1445-57.

³ Olsen O, Gotzsche PC. Cochrane review on screening for breast cancer with mammography. *Lancet* 2001;358(9290):1340-2.

the menstrual cycle, and in women with dense breasts, without affecting the diagnostic quality of the images.

Known benefits of thermography include:

- Has an average sensitivity and specificity of 90%.⁴
- An abnormal thermogram is the single most important marker of high risk for developing breast cancer, eight times more significant than a first order family history.⁴
- Because of thermography's extreme sensitivity to temperature and vascular changes in the breast, signs of possible precancerous and cancerous conditions may be detected up to 10 years prior to mammography or other diagnostic methods.⁵
- Can be used in women with implants, in pregnant and nursing women, and it is 100 percent safe and non-invasive.

Breast thermography has over 30 years of research behind it and over 800 peer reviewed studies involving over 250,000 women, exist in the index-medicus. According to the International Academy of Clinical Thermology (IACT), a "persistent abnormal thermogram carries with it a 22x higher risk of future breast cancer. When added to a woman's regular breast health checkups, a 61% increased survival rate has been realized. Finally, when used as part of a multimodal approach (clinical examination + mammography + thermography), 95% of early stage cancers will be detected.

Breast thermography is very accurate when used and interpreted correctly. The reported accuracy varies around the world with reported accuracy ranging from 87-96%, depending on how old the literature is. The 96% reference is from 1999, one of the more recent published studies. (USC Norris Cancer Center, Parisky, M.D., et al.)

It is important to note that an abnormal breast thermogram does not necessarily indicate a cancerous or precancerous condition. An abnormal thermogram can indicate the presence of fibroadenomas, mastitis, trauma, and other pathology. Thermography identifies pathology based on thermal and vascular changes. It can not specify the type of pathology. The greater the temperature delta between areas of interest on the breasts and the more abnormal the vascular patterning, the more likely a malignancy exists. An abnormal thermogram requires a clinical assessment and appropriate anatomical imaging to further define the problem. The American College of

⁴ P.Haehnel, M.D., Gautherine, Ph.D.; Long Term Assessment of Breast Cancer Risk by Thermal Imaging. In: Biomedical Thermology, 1980; 279-301

⁵ M.Gautherine, Ph.D.; Thermobiological Assessment of Benign and Malignant Breast Diseases. American Journal Obstetrics and Gynecology., 1983; V 147, No. 8: 861-869. P. Gamigami, M.D.: Atlas of Mammography: New Early Signs in Breast Cancer. Blackwell Science, 1996. J. Keyserlingk, M.D.: Time to Reassess the Value of Infrared Breast Imaging? Oncology News Int., 1997; V 6, No. 9. P. Ahlgren, M.D., E. Yu, M.D., J Keyserlingk, M.D.; Is it Time to Reassess the Value of Infrared Breast Imaging? Primary Care & Cancer (NCI), 1998; V 18, No.2. N. Belliveau, M.D., J. Keyserlingk, M.D., et al; Infrared Imaging of the Breast: Initial Reappraisal Using High Resolution Digital Technology in 100 Successive Cases of Stage I and II Breast Cancer. Breast Journal, 1998; V4, No 4.

Obstetricians and Gynecologists policy on thermography states that any equivocal or abnormal thermogram should have clinical correlation with a mammogram.

Research reported in the Journal of Radiology in January 2003 used breast thermography to predict whether a mammographically located mass was malignant or benign. Five institutions gathered the data on almost 800 women. The negative predictive value was in the 97 percent range. Although biopsy is the standard of care for unidentified masses, what role could thermography play in your practice when a woman locates a lump or other tissue changes that appear benign and rather than biopsy you decide to take a wait and see approach. Thermography can add additional information to assist you in clinical decision making. Obviously a lump that you are considering a wait and see approach, would deserve more aggressive attention if the thermogram indicated an abnormal temperature delta.

The strengths of thermal imaging can be found in its ability to visualize the thermal signature of a patient and identify the very early changes which may represent a cancerous or precancerous state. In patients without cancer, serial thermograms can be used to indicate the level of possible future cancer risk.⁶

Expressed another way, thermography is not intended to be a stand alone diagnostic procedure. Because it is a measure of physiology rather than anatomy, thermography may provide evidence of malignancy prior to other methods of breast screening. All abnormal thermograms require additional assessment. As previously stated, thermography provides another piece of information when combined with clinical assessment, anatomical imaging, and lab analysis can result in approximately 95 percent accuracy in identifying early stage cancers.

A considerable amount of research is available. A Medline search will result in hundreds of hits. Professor Ring from the University of Glamorgan has put together a CD titled, An Archive of Infrared Thermal Imaging in Medicine Papers. This disk contains a searchable data base covering research on thermal imaging dating as far back as several decades. It is also inclusive of ACTA Thermographica Vol 1-6 (1976-1982), and Journal of Thermology Vol 1-3 (1985-1991)

Two non-commercial sources of information on the web are:

www.breastthermography.org (Isabelle Tracey Breast Health Foundation)

www.iact-org.org International Academy of Clinical Thermography (IACT)

Two individuals involved in thermography for many years, and an excellent resource, are William Hobbins, M.D., FACS, FIACT, and William Cockburn, DC.

⁶ C.Gros, M.D., M Gautherie, PhD.; Breast Thermography and Cancer Risk Prediction. Cancer, 1980; V 45, No 1: 51-56. P. Haehnel, M.D., M. Gautherie, PhD., et al; Long term Assessment of Breast Cancer Risk by Thermal Imaging. In: Biomedical Thermology, 1980: 279-301.

Dr. Hobbins has produced a considerable amount of research in thermography over the last few decades. He is currently vice president of IACT (International Academy of Clinical Thermology).

William Cockburn, DC, FIACT, FABFE, is a prominent name in thermal imaging and is past president of IACT. He is founder of the Isabelle Tracey Breast Health Foundation, and his web site is breastthermography.org. Dr. Cockburn can be reached at docbill@earthlink.net

Other thermography organizations include:
International Thermographic Society, American Academy of Clinical Thermography, American Board of Medical Infrared Imaging, European Academy of Thermology.

Imaging Protocol

Current recommendations are for women to receive their first thermogram at 20 years of age. When the thermogram is normal, follow-up thermograms should be done every 1-3 years, depending on risk factors, until age 30. After age 30, yearly thermograms should be obtained.

Because of the possibility of thermal artifact rendering a thermogram useless, a strict imaging protocol is followed. The protocol involves strict environmental control, patient temperature equilibration to the room environment and a variety of activities to avoid. Some of these activities include the avoidance of bathing, exercise, massage, and acupuncture, etc., for a specified period of time prior to the imaging session.

Interpretation

The first part of accurate screening involves properly trained technicians and imaging protocol. The next phase involves accurate interpretation. Standard interpretation parameters for thermographic interpretation have been in place since the early 1980's. Proper interpretation of thermal images requires specialized training.

Summary

The current state of breast cancer screening is inadequate and has resulted in minimal improvement in survival rates. Breast thermography is a completely safe, non-invasive imaging procedure that when combined with other diagnostic procedures, greatly increases the chance of locating a breast cancer in the very early stages of its evolution. Additionally, the research shows precancerous conditions can often times be located, closely monitored and treated. Recent research supports the use of thermography in monitoring the success or failure of breast cancer therapies.

Given the research supporting the use of breast thermography and the weaknesses inherent in current screening methods, it is clear an adjunctive screening procedure is needed. Properly performed thermography may provide the clinician with the additional information required to reduce morbidity and mortality in the female population.

If you desire additional information, or have questions, I can be reached at 745-7928