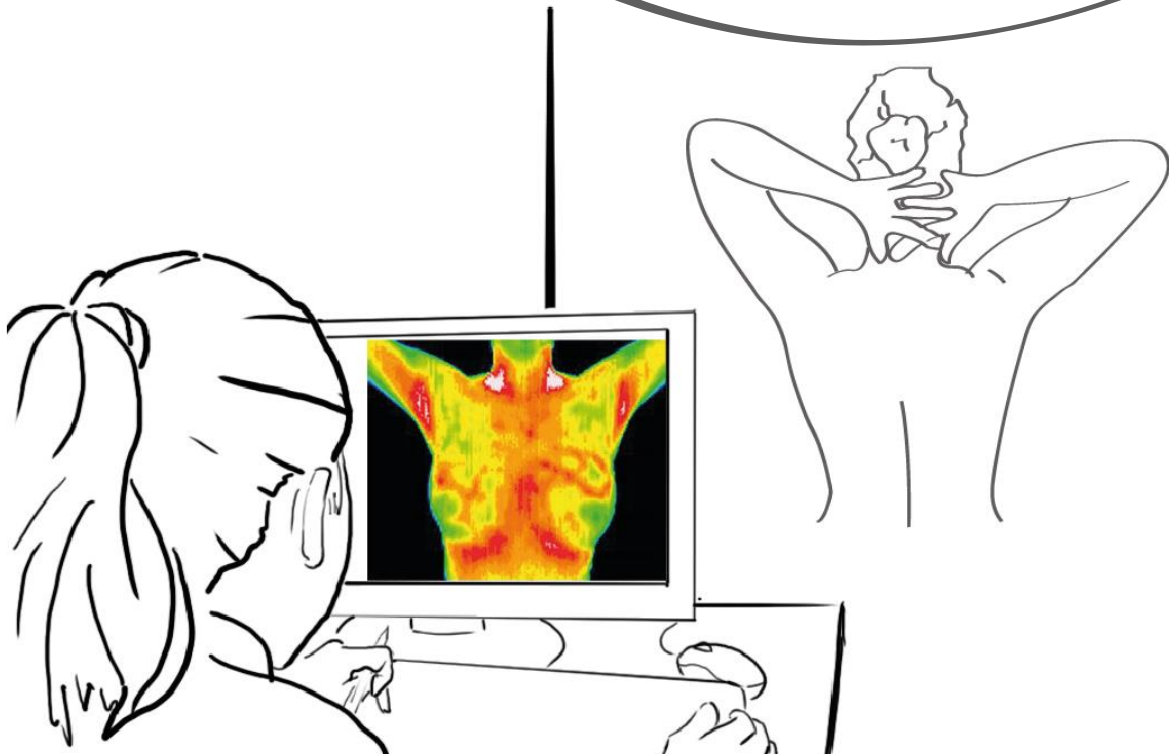





Niramai

Niramai Health Analytix Pvt. Ltd.

is a HealthTech company with a mission to create a Universal Screening Method that can save lives by detecting cancer at an early stage.





I congratulate Team Niramai for developing an innovative thermal analytics based Breast Cancer Solution for early stage breast cancer detection. This Non-Invasive Risk Assessment with Machine Intelligence, cancer screening solution is relevant for women of all ages and poses minimal health hazard since it is contact and radiation free. I believe Niramai will enable easy adoption for early cancer screening and will play a key role in improving outcomes in our ongoing battle against breast cancer. I am delighted to support this initiative.

*- Dr. Kiran Mazumdar-Shaw
Chairperson & Managing
Director, Biocon Limited*

CASE STUDY

Kaveri (name changed) and her family were in a dilemma. She had expressed pain in her right breast and consulted multiple experts. There was a great deal of uncertainty about presence of malignant lump in her breast. She was advised to get X-Ray Mammography done at a diagnostic center which noted the evidence of soft tissue density lesion. She was then asked to undergo MRI. The combined results of MRI and Mammography showed a lesion with 29% to 77% chance of malignancy. They were advised to proceed with surgery for removal of the lump, followed by biopsy to ascertain whether or not it is cancerous.

In the meantime, the family decided to get Niramai test done as well. The report showed minimal thermal activity and suggested a low Thermobiological score. The test concluded absence of malignancy and recommended regular check-up. Niramai communicated the same to the family.

Patient's family was still concerned and decided to go with the follow-up treatment plan based on findings of Mammography, Ultrasound and MRI. The patient underwent excision surgery where breast region sized 7.5mm X 5mm X 2.5mm was removed. The biopsy found calcified nodule with no Malignancy, proving Niramai analysis to be correct.

When all other tests said it was suspicious and did not give us any clarity, only Niramai report confidently said it was benign.”, said her daughter-in-law. “Their services are needed for humanity.”

Thermography can detect breast cancer in ways that are non-invasive, non-ionizing and non-traumatizing. In addition to detecting tumor growth earlier, this innovation can bring breast cancer screening to the doorsteps of women all over the world. I am happy to partner with Niramai on this journey.

*- Dr. H V Ramprakash
Senior Radiologist and
Expert Thermographer*



BENEFITS

NIRAMAI test is complementary to Mammography and Sono-mammography. Here are some benefits of using Thermalytix along with the current tests:

- (a) Automatic Tumour Localization support by NIRAMAI saves precious Radiologist time on Ultrasound scanning**
- (b) Increased confidence in diagnosis for younger women with dense breasts**
- (c) Easy screening for post-surgery patients**
- (d) Diagnosis of recurrent malignancy in follow-up patients**

In addition, following benefits make it a suitable test for community screening as well:

- Age agnostic - It is density-agnostic and is effective even on women under 40 years, for whom mammography is not recommended
- High Reliability – It detects tumors significantly smaller than what can be detected with physical examination.
- Ease of interpretation - Niramai's automated solution processes 400000 temperature values per person process and generates a report with quantitative clinical parameters and a breast health score that can be used by medical specialists to make accurate diagnosis of the patient condition.
- Safety – Thermalytix does not use radiation of any form, and just measures temperature on the body.
- Non-contact, absolutely private screening - Our equipment is placed at 3 feet from the patient. This no-touch no-see screening makes it a painless procedure. It enables post-surgery follow-ups and monitoring during treatment procedures.
- Portable equipment - The thermal sensor used by Niramai can be carried to any location in an ordinary backpack and works with normal 220V power connectivity.
- Low cost per screening - Cost per screening is low and comes down with large volumes

WE PROVIDE COMPLETE HARDWARESOFTWARE SOLUTION FOR BREAST CANCER SCREENING TAILORED TO SUIT YOUR NEEDS:

- *Breast cancer screening solution suitable for hospitals and diagnostic centres available for upfront purchase as well as monthly subscription payment options.*
- *Portable solution for on-site screening for employees of a corporate, or rural screenings as a part of your outreach efforts, available at volume discounted prices.*

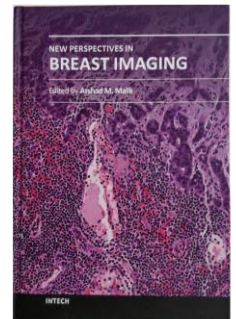
"NIRAMAI - A THOUGHT LEADER"

5 GRANTED US PATENTS and 5 more pending grant in US Patent and Trademark Office

9 INTERNATIONAL PUBLICATIONS IN PEER-REVIEWED JOURNALS:

1. "Exploring Deep Learning Networks for Tumour Segmentation in Infrared Images", 14th Quantitative InfraRed Thermography Conference, June 25-29 2018, Berlin, Germany
2. Thermalytix, An Advanced Artificial Intelligence based solution for Non-Contact Breast Screening, 20th International Conference on Breast Cancer Management, Amsterdam, February, 12-13, 2018
3. Machine Learning over Thermal Images for Accurate Breast Cancer Screening, International Journal of Medical and Health Sciences, Vol:12, No:2, 2018
4. "Automatic Determination of Hormone Receptor Status in Breast Cancer using Thermography". 19th International Conference on Medical Image Computing & Computer Assisted Intervention October 17-21, 2016, Athens, Greece.
5. "Extraction of Medically Interpretable Features for Classification of Malignancy in Breast Thermography". 38th Annual International Conference of the IEEE Engineering in Medicine and Biology Society, Orlando, USA, August 17 – 20, 2016.
6. "Automated Blood Vessel Extraction in Two-Dimensional Breast Thermography". 23rd IEEE The International Conference on Image Processing, Phoenix, Arizona, USA, on September 25–28, 2016.
7. "Semi-automated breast cancer tumor detection with thermographic video imaging," IEEE Int. Conf. Engineering, Medicine and Biology Society, August 2015, Milan.
8. "Initial evaluation of human supervised automated breast cancer screening using thermography," Quantitative InfraRed Thermography Asia Conference, July 6-10, 2015, Mamallapuram.
9. "Method for classifying cancerous and normal regions in breast thermography for small size tumors," Quantitative InfraRed Thermography Asia Conference, July 6-10, 2015, Mamallapuram.

NIRAMAI was Invited to author a Chapter on "Advances in Breast Thermography" in Book titled "NEW PERSPECTIVES IN BREAST IMAGING" by Ingres Publications, available Online with Open Access



AWARDS AND RECOGNITIONS



Indian Cancer Congress
Winner Startup Idea
in Cancer care



Call4ideas 2017
Best idea in preventive
insurance - BNP Paribas



Google Launchpad
Selected among
30 start-ups globally



Philips Healthworks
Among 4 Indian startups
selected by Philips



Amazon AI Conclave
Winner in AI for
Healthcare category



Aegis Graham Bell Award
Winner of Data Science
Category



Startup India
Recognised by
Startup India



Elevate 100
100 Most innovative start
ups in Karnataka



Incub@te
Selected for Tata
Incub@te program



Tech30
Top 30 most disruptive
startups of 2017

THERMALYTIX™ Significantly Enhances THERMOGRAPHY

Thermography is an FDA approved adjunct modality for breast cancer screening. There are over 800 studies that prove the efficacy of thermography for breast cancer screening on thousands of subjects. However, the adoption remained limited due to difficulties in visual interpretation of colored heatmaps. The vast and complex thermal data could not be effectively processed by human eye. As a result, medical practitioners so far, saw limited success with accurate analysis of thermal images using simple visualization tools only.

Niramai's Thermalytix™ technology takes thermography to the next level by coupling the power of Artificial Intelligence and Machine Learning with advanced thermal imaging. With the improved accuracy and ease of interpretation brought in by Thermalytix, thermal imaging is now ready to be in the mainstream for detecting breast abnormalities.

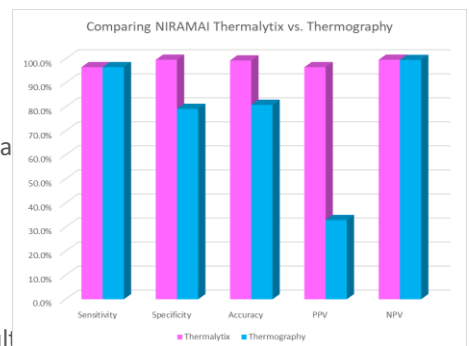
Results of two Thermalytix clinical trials have been published in international Conferences and peer-reviewed Journals.

1. Machine Learning over Thermal images for accurate Breast Cancer Screening, International Journal of Medical and Health Sciences Vol:12, No:4, 2018.

Objective: To compare the efficacy of AI-based Thermalytix with Expert Interpretation of Thermal images for Breast Cancer Screening.

Method: This comparative study was performed on 303 patients in Anjana Diagnostics, on patients who came for preventive screening or with a breast complaint.

Results: The semi-automated interpretation provided by Thermalytix was seen to perform much better than visual interpretation. Accuracy of Thermalytix was found to be equivalent to the accuracy of combined result of thermography and ultrasound, which was the ground truth.



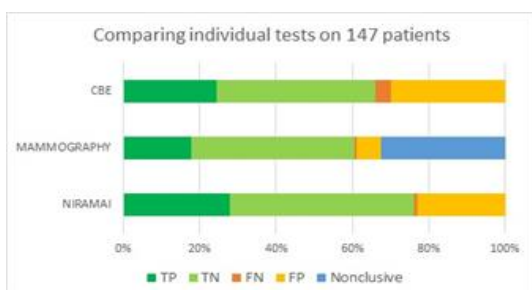
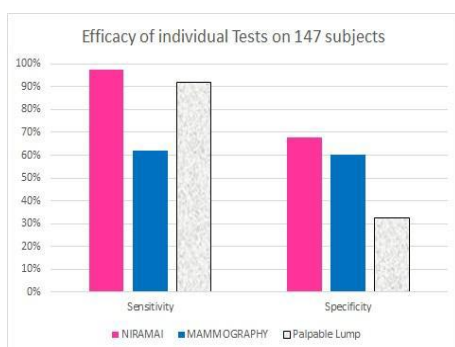
The trial clearly showed that Thermalytix, with its automated machine learning algorithm was superior in performance to visual interpretation. Thermalytix had a sensitivity of 96.6% and specificity of 99.6% with just one false positive in 303 subjects. When compared with visual interpretation, the specificity of thermal image analysis increased by 20.4% by including Thermalytix AI module in the workflow. PPV was seen to increase by 60%. This showed that Thermalytix addressed the gap in traditional Thermography systems, and can be an effective breast cancer screening modality.

2. Thermalytix, An Advanced Artificial Intelligence based solution for Non-Contact Breast Screening, 20th International Conference on Breast Cancer Management, Amsterdam, February, 12-13, 2018

Objective: To evaluate the efficacy of Thermalytix as a Breast Cancer screening modality in comparison with Clinical Breast Examination and Mammography.

Method: A 3-test comparative analysis of Mammography, Clinical breast examination and Thermalytix was conducted on 147 women of all age groups. Niramai Thermalytix was performed on all patients before they underwent mammography and ultrasound screening. The ground truth was taken to be Mammography followed by Sono-mammography and histopathology when applicable.

Results: Thermalytix showed sensitivity of 98% and higher specificity than Mammography, with no breast density issues. Thermalytix was able to detect all malignant cases except one, which did not have an associated biopsy report. 32% of the cases were inconclusive by Mammography, and including that reduced the sensitivity of Mammography from 96% to 62%. So, Thermalytix is an excellent test even for younger women and women with heterogeneously dense breasts. A further analysis of the subjects to compare Thermalytix with Clinical Breast Examination was done. 6 malignant subjects did not have a palpable lump and Niramai test was able to find all of them. Early detection of breast abnormalities by Thermalytix makes it ideal for population screening as well.



Breast Cancer is the leading cause of cancer deaths in women today. 1 in 17 women worldwide develop some form of breast problem in their life time. Early diagnosis is very critical in saving lives.

Niramai's breast cancer screening solution is non-contact, non-invasive and has the ability to detect early stage malignancy in women of all age groups in a privacy-aware manner. It uses FDA and CE approved device and has also been cleared by DCGI.

Niramai's solution is based on their patented technique called Thermalytix™ that uses sophisticated artificial intelligence techniques over thermal images to automatically identify potentially malignant patients. Our solution uses a thermal sensing device to capture 400,000 temperature values per patient and automatically analyzes them across 50+ parameters to look for signs of suspected malignancy.

How to reach us

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