

Analysis On Imaging Techniques For Diagnosing The Breast Cancer

A.Thilaka

Department of Computer Science
Research Scholar, School Of Computer Science, Bharathidasan University, Trichy, India

Abstract- In this world, Cancer is the leading cause for human death, the reason for cancer death is it is not known in early period i.e., starting stage. Breast Cancer is one of the most common forms of cancer. It cause not only for women, it also cause for men. We can identify and detect this breast tumor through the mammography screening. In the survey factors of women's mammography screening behavior, the majority of women supported to participate in regular mammography screening and they agreed, it will be detected the early stage of breast cancer. There are many treatment techniques were developed in the world. In that way Ultrasound screening test is the most popular. Ultrasound image is the detailed study of imaging function and structure of breast image. The screening tests are used to identify the malignant and benign tissue in human body also used to detect the cancer. This literature gives the brief introduction to the available imaging systems used to diagnose the breast cancer.

Keywords: Mammograms, Magnetic Resonance Imaging (MRI), Ultrasound, Thermal Imaging.

I. INTRODUCTION

Cancer is a Group of diseases. Breast cancer is the most diagnosed cancer and the second leading cause of cancer death among the women in America. A few years before, the odds of developing breast cancer were reported as 1 in 13, but now the chance is 1 in 9. The term breast cancer basically refers to a malignant tumor that has developed cells in the breast. Usually the breast cancer begins in the cells of the lobules (milk producing glands/ducts). The breast cancer typically is identified either during a screening examinations, weather before symptoms have developed or after symptoms have developed. This literature gives the brief introduction to the available imaging systems used to diagnose the breast cancer.

II. REAST CANCER

Breast cancer is the malignant tumor that starts in the cells of the breast. A cancerous tumor is a group of malignant cells that can grow into surrounding tissues or spread to distant area of the human body [2]. heat transfer coefficients. However, the literature search did not reveal any convection

data for water cooling in conditions corresponding to turning [1].

The Normal Breast:

To understand the breast cancer it helps to have some knowledge about the breast. The milk producing part of the breast is organized into 15 to 20 sections, called lobes. Within each lobe are small structures, called lobules, where milk is produced. The milk travels through a network of tiddly tubes called ducts. The ducts are connects and come together into the nipple. The breast also contains blood vessels, lymph vessels, and lymph nodes [1]. The basic structure of the breasts, shown in the breast image below,

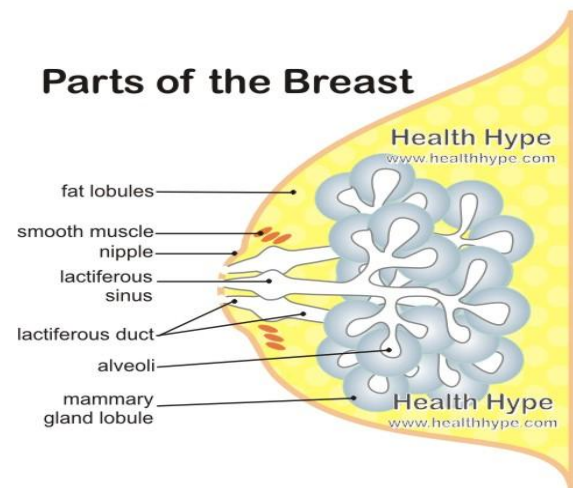


Figure 1: side view of breast

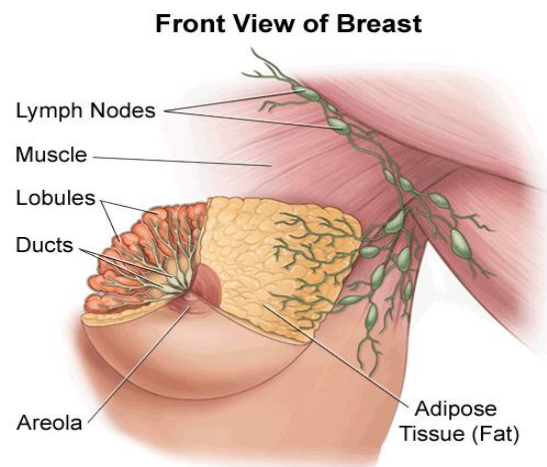


Figure 2: Front view of breast

III. BREAST IMAGING MODALITIES

A. Mammography

Mammography is a special type of x-ray imaging technique used to create detailed images of the breast. Per year it is estimated that 48 million mammograms are performed in the United States. Mammography uses low dosage x-ray, high contrast, higher-resolution film and an x-ray system designed for imaging the breasts [2]. The successful designed of breast cancer depends on this early diagnosis.

If a breast abnormality is found or confirmed with the mammography screening, additional breast imaging tests such as ultrasound or a breast biopsy may be performed. Mammography technique is dividing in two types. They are screening mammography and diagnostic mammography [2].

Screening Mammography:

Screening mammography is used to look for signs of the breast disease when the breasts do not have any symptoms or problems. A mammogram detect cancer in it's early stages, even before a lump can be felt [1], [2]. When treatment can be most successful because of screening mammograms usually takes x-ray pictures of each breast from two different angles. Screening mammography is recommended by the American Cancer Society everyone to two years for women once they reach 40 years of age and every year once until they reach 50 years of age [8].

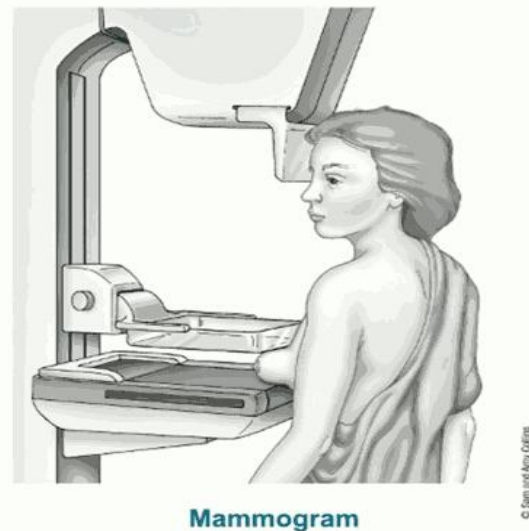
Diagnostic Mammography:

A diagnostic mammography is an x-ray examination of the breast in a women who has a breast complaint like, a breast lump, nipple discharge or has had an abnormality found during the screening mammography. Here the Diagnostic mammography is more involved and time consuming than screening mammography and it is used to determine exact size of the breast abnormalities. During the diagnostic mammography typically, several additional views of the breast are imaged and interpreted [3]. Thus, diagnosing mammography is more expensive than screening mammography. Diagnostic mammography, in some cases special images known as spot views or magnification views are used to make a small area of cancer easier to evaluate.

How Is Mammography Done?

When you have a mammogram, yours breast is briefly compressed between two plates attached to the mammogram machine an adjustable plastic plate on top and a fixed x-ray

plate on the bottom. Here the bottom plate holds the x-ray film or the digital image detector that records the breast image clearly. And the technologist compresses the breast to keep it from moving, and to make the layer of breast tissue thinner. A more slimline layer of breast tissue allows the x-ray disclose to be reduced and makes the picture very sharper [2], [8]. The compression can feel uncomfortable and even painful for some women. It is needed to take a best picture and only lasts a few seconds needed to take the x-ray. If you have pain during the test you must talk to the technologist. They can reposition you to make the pressure as comfortable as possible. The sample mammogram image is given below,



B. Ultrasound:

Ultrasound is also known as Sonography. When a suspicious site is detected in the breast through a breast self exam or on a screening mammogram, then the doctor may request an ultrasound of the breast tissue. The detailed image can be generated by the ultrasound is called sonogram. The sonography is very helpful when a lump is large enough to be easily felt, and the images can be used to further measure abnormality [1], [9]. Breast ultrasound is not routinely used for screening. Even ultrasound is less sensitive than MRI. It has become a valuable tool to use along with mammograms because it's widely available for, non-invasive, and less costs and than other options [2]. Here the value of an ultrasound test depends on the operator's level of skill and experience of in the test.

How is Ultrasound Done?

In this ultrasound techniques, uses to take a sound waves to look inside a part of the body. The sample Ultrasound image is given below,



A breast ultrasound can give the evidence about whether the lump is a solid mass, or a cyst filled with fluid mass or a combination of the two. From these two, cysts are typically not cancerous, and a solid lump may be a cancerous tumor. A gel is put on the top of the skin of the breast and a hand-held instrument called a transducer is rubbed with gel and pressed against the skin. It emits the sound waves and picks up the echoes as they bounce off the body tissue. The echoes are sequentially converted by a computer into a black and white image on a computer screen. This ultrasound test is painless and it does not expose you to any radiation [8].

C. Breast MRI (Magnetic Resonance Imaging)

Magnetic Resonance Imaging is a diagnostic exam that uses a combining of a large magnet, radio waves and a computer and it develop detailed images of organs and structures inside the body. It is helpful to bring a variety of images. If your sign exams are not conclude, your doctor may recommend a breast MRI for assess the extract of the disease. Some doctors trust MRI can recognize a breast cancer from normal breast gland tissue better than the other diagnosing techniques [12]. But breast MRI is more expensive and it requires highly specified equipment and highly trained experts for the test [12]. It is mainly used for assessing a person who has a palpable mass (a mass that can be felt) that isn't visible with ultrasound or mammography screening. Eventually MRI scans use for other parts of the body, such as the brain, spinal cord, and bones [2], [4]. The breast MRI is mainly useful for the people who are known or suspected to have metastatic breast cancer (cancer that moved outside the breast to other areas of the body).

How is MRI Done?

An MRI exam gets no pain you will need to lie still when the test is complete. Too much movement can confuse the original MRI images and cause any errors. You will wear a hospital

gown or clothes without any metal snaps or zipper, such as a Jewells. Because some types of metals can create a blurry images. The MRI machine is a large, cylindrical (tube-shape) machine that creates a solid magnetic field around the patient. That magnetic field, only with radio waves, varies the hydrogen atoms naturals alignment in the body. The computers are used to build a two-dimensional (2D) image of a body structure or based on the action of the hydrogen atoms. MRI does not use any radiation compare to x-rays or computed tomography (CT-scans) [8], [2], [12]. The radio waves criticize the nuclei of the atoms in your body out of their normal position. And they send out the radio signals. These radio signals are obtained by a computer that examines and converts them in to an image. This image are appears on a viewing into the monitor. The sample image for breast MRI is given below,



Photo Courtesy of GE Healthcare

D. Thermal Imaging:

The most commonly use of this thermal imaging is for the breast health screening. Thermograph is a wonderful tool for evaluating physiological varies associated with fibrocystic breast disease, mastics and mammary dysplasia and even cancer. A cancer is more metabolically active can be seen in its early-stages up to 10 years before a tumor is seeable on a mammogram [2]. Thermograph is an excellent tool for measuring overall breast health; we use digital infrared breast imaging and comprehensive treatment protocols to assist of all ages preserve healthy breast for long and healthy lives [8], [4], [13].

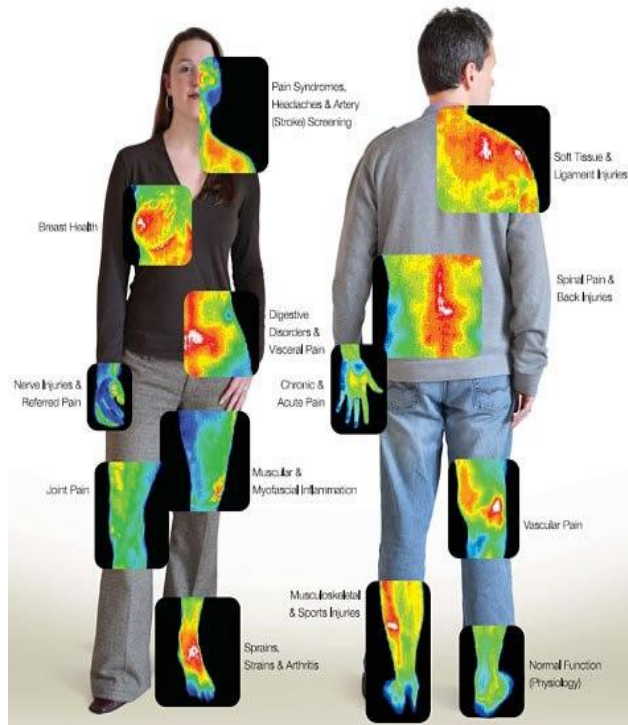
It is mainly used for catching the breast conditions in women off all sizes, as well as for young women. This test is completely safe since the camera is only obtaining information from your body and it does not itself emit anything. It does not require any painful compression of breast tissue that may increase the opportunities of cancer spread [13].

How is Thermal Imaging Done?

Thermograph is basically exposure of the heat produced by the body. The body is constantly giving out heat as infrared radiation from it's surface. A thermograph camera takes an

image of these rays. areas of the body that are more than metabolically active and have more blood flow will raise more infrared rays. Once a picture is taken then the image is analyzed by a board certified thermologist [2].

As a result, thermograph is especially useful to the military and other users of surveillance cameras. Firefighters also use thermograph to locate the basis of fire [8]. The sample body scan in thermal imaging is given below,



IV. CONCLUSION

In this survey paper, explained about the existing breast modalities such as Mammography, Ultrasound, MRI, Thermal Imaging can be produced. These modalities are most powerful for diagnose the breast cancer at early stage. All the techniques are having advantageous and limitations also. Non-transferability, low-cost, completely noninvasive, a steady method is Ultrasound. This Ultrasound has more advantages compare to other diagnosing techniques. My further works may be conducted to develop the Ultrasound technique.

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