

## **SUMMARY**

Improvement in the treatment and outcome of patients with breast cancer requires the development of diagnostic tools that can help in the differentiation between benign and malignant breast lesions in a noninvasive and reliable manner.

The classic mammographic signs of malignancy are clustered microcalcifications and stellate masses. Other indirect signs of malignancy include areas of asymmetry and architectural distortion, dilated lactiferous ducts, and skin or nipple thickening or retraction. Some breast changes, including lumps that can be felt, do not show up on a mammogram. Changes can be difficult to spot in the dense, glandular breasts of younger women.

Mammographic changes that require biopsy after follow-up include masses that increase in size, circumscribed or dense masses with blurring or changes of the margins, microcalcifications that increase in number and density, masses that persists after ultrasonographic aspiration, and increased architectural distortions compared with the contralateral breast.

Using ultrasound, malignant breast lesions are variable in their shapes, deeper than wider in their alignment, being perpendicular to the tissues of the breast. They have irregular or spiculated margins with a surrounding echogenic halo. Calcification, intraductal

extension and infiltration across tissue planes increasing the echogenicity of the surrounding fat are important ultrasound signs of malignant breast lesions. Though breast ultrasound has excellent contrast resolution, it lacks the detail (spatial resolution) of conventional mammography.

In MRI The diagnostic criteria consist of both lesion morphology and enhancement kinetics .Well-defined margins indicate benignity, while ill-defined or spiculated lesions are suggestive of malignancy. Enhancement in benign lesions is homogeneous .Benign lesions also usually enhance less and do so more slowly than malignant lesions. In malignant lesions enhancement is often inhomogeneous.

MRS has the unique ability to measure the biochemical content of living tissue in a dynamic and non invasive manner. This technique has provided substantial information on cellular metabolism and energy status in a variety of tissues and organs and, in particular, in tumor tissues and malignant cell cultures. The ability to follow the cell metabolism pattern in malignant cells before, during, and after drug treatment may assist the prognosis of treatment success.

This opens a new avenue for identifying the metabolic profiles of breast tumors with more exact anatomical localization and spectral data on tumor metabolism. The applications of these techniques can also be extended to a non invasive metabolic investigation of other cancers.

MRS is a quantitative method of display of non-aqueous proton signals that correspond to certain biological molecules in the tissues. The spectrum is a graph of the relative concentrations of these molecules based on their discrete radio-frequency signal. A high peak means that the molecule at that radiofrequency location exists in greater concentration than an adjacent low peak. To be precise, it is the area under the peak that is relevant. Applying appropriate calibrations, the concentration of a given metabolite is calculated from the peak area

Researchers in the field of breast cancer have developed a magnetic resonance spectroscopy (MRS) method that quantifies breast tissue levels of choline (Cho) compounds, which the study found to be elevated in malignant lesions. Cho concentrations to be significantly higher in malignancies than in benign lumps and normal breast tissues using this quantitative method.

It can also be used for differentiating fibrotic scar after breast surgery and reccuring breast cancer after conservative surgery. The new method can be used for follow up of the response to chemotherapy.