

# Evaluation of Sentinel node with High Resolution Magic Angle Proton Magnetic Resonance Spectroscopy in breast cancer patients: A pilot study

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## INTRODUCTION:

The extent of axillary lymph node involvement by the breast cancer is the dominant prognostic indicator for later systemic disease. Therefore, an adequate axillary lymph node dissection (ALND) along with mastectomy or other breast conserving procedures is an established way to achieve a cure. However, the procedure carries a significant morbidity in the form of sensory neuropathy, loss of shoulder mobility, shoulder pain and lymphedema of breast and arm. Intra operative frozen section biopsy of the sentinel node (s) is supposed to be an alternative to the standard axillary clearance however it has limited sensitivity of 60% to 75%<sup>1</sup>. The technique of MR spectroscopy can be utilized as a rapid and effective tool to assess the axillary nodal status in breast cancer in per-operative sentinel node biopsy. The present work was carried out to discover the value of HRMAS in detecting axillary nodal metastasis.

## MATERIALS AND METHODS

Axillary lymph nodes (n= 17) obtained after sentinel node biopsy from seventeen individual patients were blindly subjected to 400 MHz high resolution magic angle proton magnetic resonance spectroscopy. The tissue specimens used for HRMAS analysis were sent for histo-pathological examination (HPE) and the metabolic profile of these nodes were correlated with the routine histo-pathological findings.

## RESULTS:

On histopathological examination, seven nodes were positive for malignant cells whereas no evidence of metastasis was seen in 10 nodes. The spectra of nodes (n= 7) found positive for malignant cells were exclusively dominated by signals from choline containing compounds at the region of 3.2 ppm, glycine at 3.56 ppm and by lactate at 4.12 ppm in all the samples.

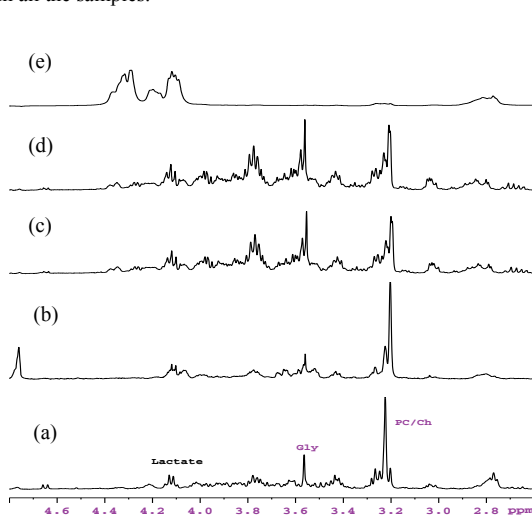


Fig.1 A portion of CPMG stack plot spectra of various lymph nodes.

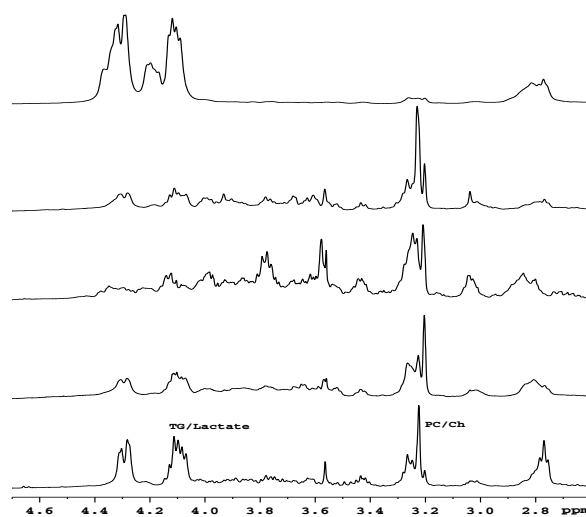


Fig.2 A portion of <sup>1</sup>H NMR stack plot spectra of various lymph nodes

a-d = involved lymph node (positive for metastasis); e = non-involved lymph node

	HPE +ve	HPE - ve	Total
HRMAS + ve	7	0	7
HRMAS - ve	0	10	10
Total	7	10	

Sensitivity: 100%, Specificity: 100%, Positive Predictive Value: 100%, Negative Predictive Value: 100%

## DISCUSSION & CONCLUSIONS:

Metastatic and non involved lymph nodes in breast cancer can be accurately distinguished based on its chemical profile. Of all the alterations in the metabolic profile detected by the HRMAS spectra, the region of 3.2ppm demonstrated the most useful metabolite choline and choline-containing compounds (Phosphocholine) and lactate at 4.12ppm<sup>2,3</sup>. Choline and its derivatives are one of the important building blocks of cell physiology and represents accelerated cell proliferation in the presence of malignancy and lactate represents anaerobic mode of metabolism in malignant tissues. The technique of HRMAS NMR spectroscopy can be utilized effectively in enhancing the sensitivity of sentinel node biopsy and may replace frozen section histopathology.

## REFERENCES:

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