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**Scientific Abstract**

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**Monitoring Treatment Response To Neoadjuvant Chemotherapy In Locally Advanced Breast Cancer Using Diffusion Weighted-MRI (DWI) And Intravoxel Incoherent Motion (IVIM) MRI Technique.**

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**Background and Purpose:**

Investigate MRI-DWI and changes in IVIM parameters of breast carcinoma in patients undergoing neoadjuvant chemotherapy (NACT). To evaluate baseline MRI imaging phenotypes of breast tumour(ADC and IVIM parameters). Prove that DWI as useful adjunct to dynamic contrast enhanced breast (DCE) MRI to characterize cellularity of breast lesions. IVIM is useful to study micro capillaries property in tumour cells.

**Methods:**

A prospective study involving women with invasive breast carcinoma (n= 14) between the age of 29 to 66 years (mean age=43.9) underwent 6 cycles of NACT prior to mastectomy. MRI performed at 3 different intervals (Pre-NACT, after first and third cycles of chemotherapy). The IVIM parameters (from multiple b values) were also calculated and compared.

**Results:**

Mean ADC values for malignant breast mass is  $(0.81 \times 10^{-3} \text{ mm}^2 / \text{s})$  as compared to normal contralateral breast tissue  $(1.90 \times 10^{-3} \text{ mm}^2 / \text{s})$ . Following the three cycles of NACT, quantitative findings showed increase in mean ADC values  $(1.12 \times 10^{-3} \text{ mm}^2 / \text{s})$ . IVIM parameters showed increase in True Diffusion (Dt) value which reflects reduce in cellularity post NACT.

**Conclusion:**

DWI is useful to characterize breast tumour cellularity. ADC values showed significant increase as early as first cycle of NACT. IVIM parameters provides noninvasive sensitivity to micro perfusion properties of malignant breast mass, thus it can be used as alternatives to monitor the response to NACT for patients with contraindication to gadolinium. These tools are useful adjuncts for monitoring treatment response of cancerous lesions in the breast.