Should Internal Medicine Physicians Reconsider the Lymphatic Examination in Breast Cancer Patients? A Cadaveric Study of Axillary Lymph Node Enlargement.

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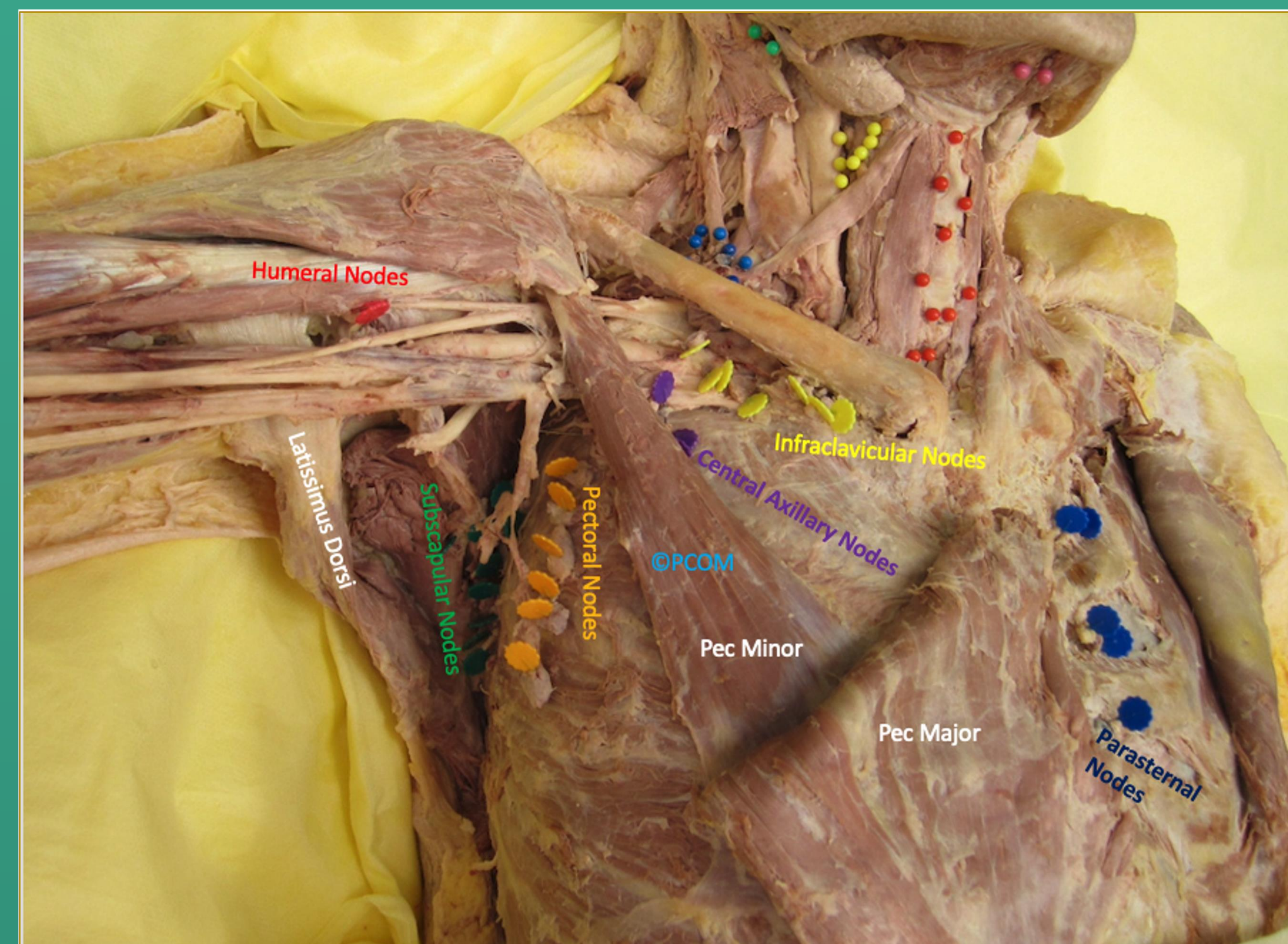
Introduction

Axillary lymph node status is a critical prognostic factor in breast cancer, guiding staging and treatment decisions[1, 2]. While physical examination remains a standard part of clinical evaluation, particularly in primary care and internal medicine, it has limited sensitivity, detecting only 30–40% of node-positive cases[3]. Recent studies have found that patients with microscopic or small metastases had negative physical exams despite imaging or pathology evidence of disease[4]. Imaging modalities such as ultrasound, MRI, and PET/CT improve detection, but their accuracy varies, and small metastases frequently go undetected. Imaging studies have been shown to have high false-negative rates when assessing residual nodal disease after neoadjuvant therapy[5]. Interpretation is further complicated by natural variation in lymph node size and distribution across individuals[6].

Cadaveric studies provide a unique opportunity to establish baseline differences in lymph node size without the confounding effects of treatment, disease progression, or imaging limitations[7,8]. These insights may support internal medicine physicians in refining the lymphatic examination, thereby enhancing early detection and timely referral in breast cancer care. This study addresses this gap by directly comparing axillary lymph node size differences in breast cancer versus non-cancer populations, and the results may have a broader implication for lymphatic examination.

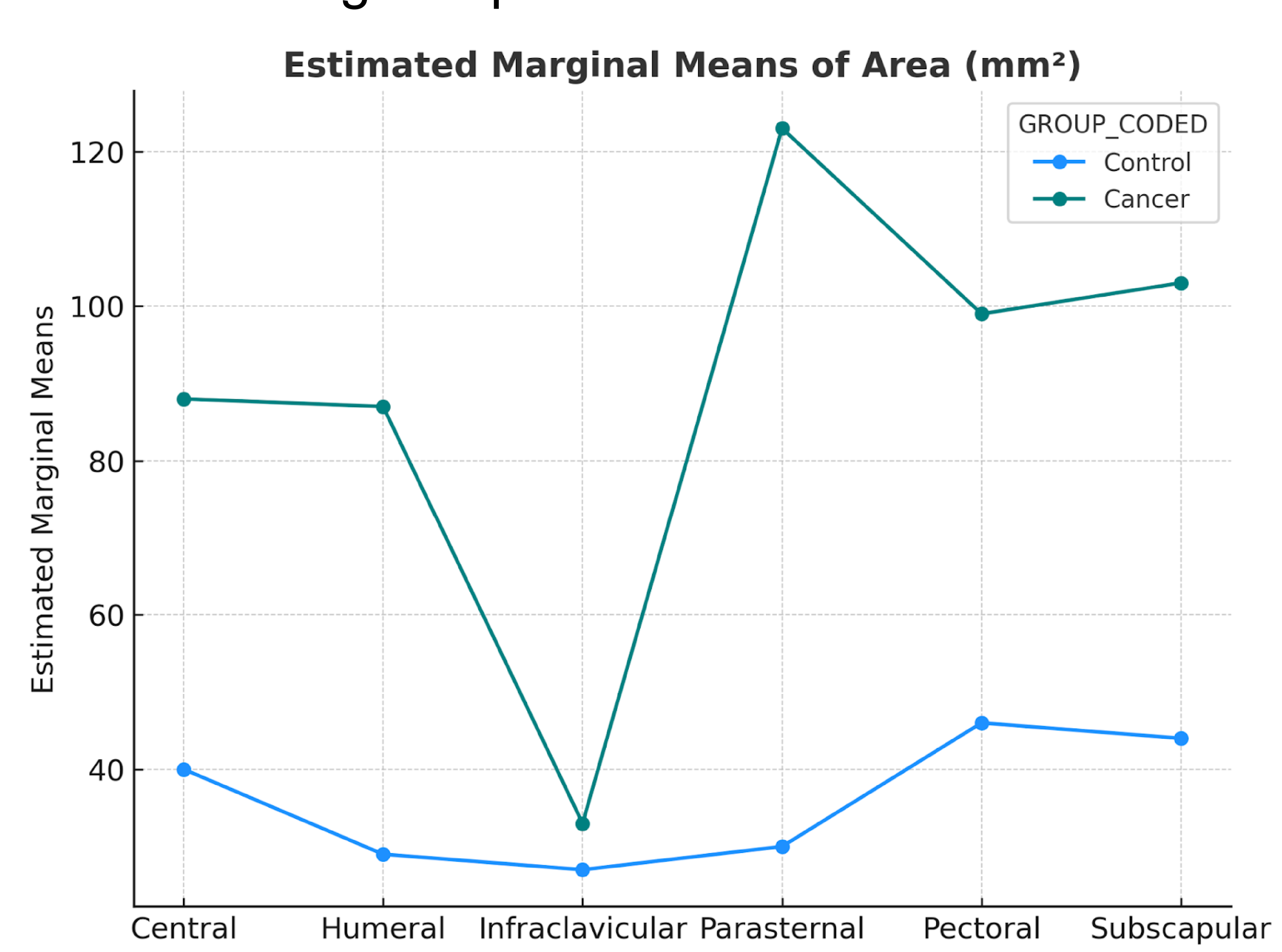
Methodology

Twenty-nine female cadavers (8 with breast cancer, 21 controls) were dissected to collect axillary lymph nodes from six chains: central, humeral, infraclavicular, parasternal, pectoral, and subscapular. Lymph node area (mm²) was measured, and outliers ($z \geq 3$) were excluded. Welch's t-test was used to compare overall node size between groups. A two-factor ANOVA assessed the effects of group, location, and their interaction on node size. Statistical significance was set at $\alpha = 0.05$.



Results

Breast cancer cadavers exhibited significantly larger lymph node areas than controls across nearly all nodal chains (mean difference = 56.7 mm², $p < 0.001$). Two-way ANOVA revealed significant main effects of group ($p < 0.001$) and nodal location ($p = 0.014$), but the group × location interaction was not significant ($p = 0.103$), indicating a consistent pattern of enlargement across all lymph node regions. Although the parasternal chain showed the largest estimated group difference based on marginal means, the lack of a significant interaction suggests a generalized increase in lymph node size rather than region-specific effects.



Conclusions

This cadaveric study demonstrated that axillary lymph nodes were significantly larger in breast cancer cadavers compared to controls, consistent with metastatic involvement or reactive hyperplasia[1]. Enlargement was observed across all chains, with the pectoral and parasternal regions showing the greatest differences, though no group × location interaction was detected. These findings support the link between tumor progression and nodal involvement and may inform more comprehensive lymphatic assessment in clinical practice.

Limitations and Future Direction

Interpretation is limited by small sample size, lack of histologic confirmation, homogeneity of the cadaver population, and potential embalming effects on nodal size. Future research should incorporate histology, expand cadaver diversity, explore additional nodal chains, and examine other cancer types to confirm and extend these results.

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