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Correlation between apparent diffusion coefficient values in breast magnetic resonance imaging and prognostic factors of breast invasive ductal carcinoma

Background: We wanted to examine whether the apparent diffusion coefficient values obtained by diffusion-weighted imaging techniques could indicate an early prognostic assessment for patients with invasive ductal carcinoma and, therefore, influence the treatment decision making.

Objectives: The main objective was to evaluate the correlation between the apparent diffusion coefficient values obtained by diffusion-weighted imaging and the key prognostic factors in breast invasive ductal carcinoma. Secondary objectives were to analyze the eventual correlations between magnetic resonance imaging findings and prognostic factors in breast cancer; and to perform a comparison between results in 1.5 and 3.0 T scanners.

Methods: Breast magnetic resonance imaging with diffusion-weighted imaging sequence was performed on 100 patients, who were proven histopathologically to have breast invasive ductal carcinoma. We compared the apparent diffusion coefficient values, obtained previous to biopsy, with the main prognostic factors in breast cancer: tumor size, histologic grade, hormonal receptors, Ki67 index, human epidermal growth factor receptor type 2, and axillary lymph node status. The Mann-Whitney U test and the Kruskal-Wallis analysis were used to establish these correlations.

Results: The mean apparent diffusion coefficient value was inferior in the estrogen receptor-positive group than in the estrogen receptor-negative group (1.04 vs 1.17 x10–3mm2/s, p=0.004). Higher histologic grade related to larger tumor size (p=0.002). We found association between spiculated margins and positive axillary lymph node status [OR=4.35 (1.49-12.71)]. There were no differences in apparent diffusion coefficient measurements between 1.5 and 3.0T magnetic resonance imaging scanners (p=0.513).

Conclusions: Low apparent diffusion coefficient values are related with positive expression of estrogen receptor. Larger tumors and spiculated margins are associated to worse prognosis. Rim enhancement is more frequently observed in estrogen receptor-negative tumors. There are no differences in apparent diffusion coefficient measurements between different magnetic resonance imaging scanners.

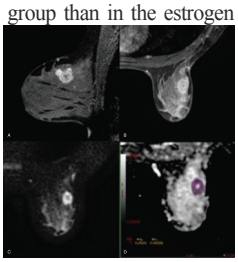

Figure 1. A 38-year-old woman with invasive ductal carcinoma in the upper external quadrant of the left breast

Biography

Ricardo is a Portuguese resident Medical Doctor at Hospital do Barlavento Algarvio in Portimão, Portugal. Studied Pharmaceutical Sciences in the Faculty of Pharmacy (Porto University) in Portugal. Graduated in Medicine by the Universidad Europea de Madrid in Spain. During his internship, he joined the Clinical Radiology Department in the Hospital Universitario Quirónsalud Madrid, in Spain, where he developed great interest in breast pathology, namely diagnosis and treatment for breast cancer. Clinical Internship in the Hospital da Beneficiência Portuguesa de São Paulo in 2015, during a period of 12 months, granted by the Universidade Anhembi Morumbi, São Paulo, Brazil. He published his work about the "Correlation Between Apparent Diffusion Coefficient Values in Breast Magnetic Resonance Imaging and Prognostic Factors of Breast Invasive Ductal Carcinoma" under the supervision of Dr. Vicente Vega Martínez, Head of the Clinical Radiology Department. Article published on July 2018 in the "Porto Biomedical Journal". Received the CIMQ17 1st prize award on best investigational work in 2017, by the Faculty of Medicine of Compostela University in Santiago de Compostela, Spain. He has a major research interest, taking part on several projects on Molecular Research and Cancer Diagnosis and Treatment. Reviewer for several peer-reviewed journals, both national and internationally.

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