

Accepted Manuscript

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PII: S0899-7071(18)30071-8
DOI: doi:[10.1016/j.clinimag.2018.03.022](https://doi.org/10.1016/j.clinimag.2018.03.022)
Reference: JCT 8426

To appear in:

Received date: 5 September 2017
Revised date: 8 March 2018
Accepted date: 30 March 2018

Please cite this article as: Safiye Tokgoz Ozal, Ercan Inci, Aysegul Akdogan Gemici, Hurriyet Turgut, Murat Cikota, Mehmet Karabulut , Can 3.0 Tesla diffusion tensor Imaging parameters be prognostic indicators in breast cancer?. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Jct(2017), doi:[10.1016/j.clinimag.2018.03.022](https://doi.org/10.1016/j.clinimag.2018.03.022)

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Can 3.0 Tesla Diffusion Tensor Imaging parameters be prognostic indicators in breast cancer?

Purpose: To investigate the relationship between diffusion tensor imaging (DTI) parameters such as fractional anisotropy (FA), mean diffusivity (MD), relative anisotropy (RA), and volume ratio (VR) values, and prognostic factors of invasive breast cancer.

Materials and Methods: This retrospective study examined 63 patients with pathologically confirmed invasive breast cancers. The patients underwent pre-operative diffusion-weighted magnetic resonance imaging (MRI) at 3.0 Tesla. The relationship between DTI parameters and tumor size, histologic and nuclear grade, axillary lymph node status, lymphovascular and perineural invasion status, estrogen receptor (ER), progesterone receptor (PR), CERB-B2, and Ki-67 were analyzed.

Results: Patients with lymph node metastasis ($p=0.018$; $p<0.05$) and/or lymphovascular invasion ($p=0.001$; $p<0.01$) and/or histologic grade 3 tumors ($p<0.05$) had statistically significantly low MD values. There was a statistically significant relationship between ER and MD ($r=0.452$, $p<0.01$), PR and MD ($p=0.001$, $p<0.01$); CERB-B2 and RA ($p=0.047$, $p<0.05$); Ki-67 and RA ($p=0.026$; $p<0.05$); Ki-67 and VR ($p=0.021$; $p<0.05$); and lymphovascular invasion and FA ($p=0.045$, $p<0.05$) values.

Conclusion: DTI parameters of malignant masses in breast cancer patients correlate with tumor size, lymph node status, histologic grade, lymphovascular invasion, Ki-67, CERB B2, ER, and PR.

Introduction

Breast cancer is a heterogeneous disease with its histologic and biologic factors and prognosis [1]. Prognosis of invasive breast cancer is determined by several factors, such as patient age, tumor size, lymph node and vascular invasion status, histologic grade, hormonal receptors [estrogen receptors (ER), progesterone receptors (PR)], and CERB-B2 expression and Ki-67 protein levels [2].

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