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乳腺癌(breast cancer, BC)是我国女性发病率最高的恶性肿瘤,其死亡率位居我国女性恶性肿瘤第4位。乳腺癌属于激素依赖性肿瘤,其风险的增加与激素失衡密切相关,特别是雌激素。雌激素由雌激素受体(estrogen receptor, ER)、孕激素受体(progesterone receptor, PR)介导参与细胞增殖,在不同乳腺癌患者中的表达具有差异,临床治疗方案及预后亦有不同。根据ER、PR表达状态的不同将乳腺癌分为Luminal型(PR和ER任意一项阳性)和非Luminal型(PR和ER均为阴性),其中Luminal型最常见,约占乳腺癌的70%。

Ki-67增殖指数被认为代表肿瘤增殖状态,较高的Ki-67增殖指数与预后不良相关。术前影像学标志物可以帮助评估乳腺癌分型及整个肿瘤的细胞增殖情况,扩散加权成像(diffusion weighted imaging, DWI)和表观扩散系数(apparent diffusion coefficient, ADC)值通常与肿瘤细胞密度或较少的细胞外空间相关。有研究已经证明了DWI及ADC值可以有效地区分乳腺癌恶性程度和乳腺癌的分级及分子亚型,但DWI和ADC值对于乳腺癌分子亚型的鉴别价值因不同研究而异。另有研究发现可通过DWI定量参数评估乳腺癌的分子亚型与Ki-67增殖指数的相关性。

本研究回顾性分析Luminal型乳腺癌和非Luminal型乳腺癌的最小ADC值(ADCmin)、平均ADC值(ADCmean)、相对最小ADC值(rADCmin)和相对平均ADC值(rADCmean),使用独立样本t检验或Mann-Whitney U检验进行组间差异比较,并绘制受试者工作特征(receiver operating characteristic, ROC)曲线评估各ADC值对Luminal型和非Luminal型乳腺癌的鉴别效能。同时,采用Pearson相关系数分析评估乳腺癌ADCmin、ADCmean和rADCmin、rADCmean与Ki-67增殖指数间的相关性。结果显示Luminal型乳腺癌组的ADCmin、ADCmean、rADCmin和rADCmean均低于非Luminal型乳腺癌组,组间差异具有统计学意义(P均<0.05)。ROC结果显示各ADC值均能对Luminal型与非Luminal型乳腺癌进行有效区分。同时,发现乳腺癌ADCmin、ADCmean、rADCmin和rADCmean与Ki-67增殖指数间均呈不同程度的负相关关系,可在一定程度上评估肿瘤细胞增殖活性。详见内文第51页。

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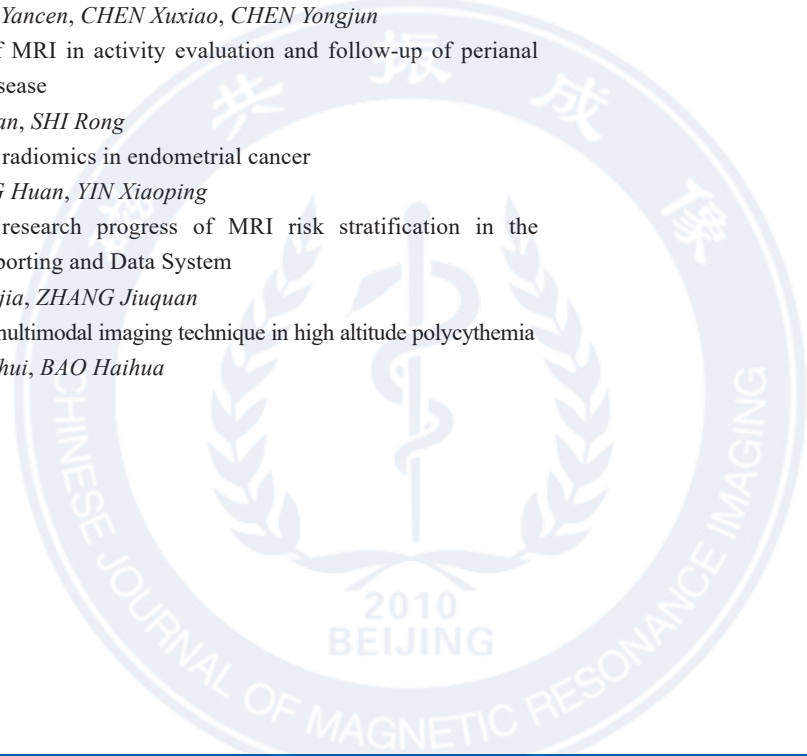
## About the cover

Breast cancer (BC) is the malignant tumor with the highest incidence, and its mortality rate ranks the fourth among female malignant tumors in China. BC is a hormone-dependent tumor, and its increased risk is closely related to hormonal imbalance. Estrogen is mediated by estrogen receptor (ER) and progesterone receptor (PR), which is different expression in different breast cancer patients with different clinical treatment plan and prognosis. According to the ER and PR expression status, breast cancer was divided into Luminal type (PR and ER either positive) and non-Luminal type (both PR and ER were negative), among which Luminal type was the most common, accounting for about 70% of breast cancer.

The Ki-67 value is considered to represent the tumor proliferation status, and a higher Ki-67 value is associated with a poor prognosis. Preoperative imaging markers can help assess breast cancer classification and cell proliferation of the entire tumor. Diffusion weighted imaging (DWI) and apparent diffusion coefficient (ADC) values are usually associated with tumor cell density or less extracellular space. Some studies have proved that DWI and ADC values can effectively distinguish the grade and molecular subtypes of breast tumors, but the identification efficiency of DWI and ADC values for molecular subtypes of breast cancer varies according to different studies. Another study found that the correlation between the breast cancer and Ki-67 proliferation index could be assessed by quantitative DWI parameters.

In this study, the minimum ADC value (ADC<sub>min</sub>), mean ADC value (ADC<sub>mean</sub>), relative minimum ADC value (rADC<sub>min</sub>) and relative mean ADC value (rADC<sub>mean</sub>) for Luminal type and non-Luminal type breast cancer were analyzed using independent sample *t*-test or Mann-Whitney *U* test, and receiver operating characteristic (ROC) curves were used to evaluate the differentiation efficacy of each ADC value between Luminal type and non-Luminal type breast cancer. Meanwhile, Pearson correlation coefficient analysis was used to assess the correlation between ADC values and Ki-67 proliferation index. The results showed that the ADC<sub>min</sub>, ADC<sub>mean</sub>, rADC<sub>min</sub> and rADC<sub>mean</sub> values of Luminal type breast cancer group were lower than those of non-Luminal type breast cancer group, and the difference between the groups was statistically significant ( $P < 0.05$ ). The ROC results showed that each ADC value can effectively distinguish Luminal type from non-Luminal type breast cancer. Meanwhile, ADC values were inversely related with Ki-67 proliferation index, which can evaluate the proliferative activity of BC cells. Please see text page 51.

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