磁共振成像

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脑转移瘤是最常见的颅内恶性肿瘤，其中肺癌是脑转移瘤最常见的原发病灶来源。肺癌脑转移患者预后很差，接受放疗、化疗、手术治疗等常规治疗的总生存期仅为4~15个月。目前，针对存在表皮生长因子受体（epidermal growth factor receptor，EGFR）基因突变的肺癌脑转移患者，采用表皮生长因子受体酪氨酸激酶抑制剂（epidermal growth factor receptor-Tyrosine kinase inhibitor，EGFR-TKI）进行靶向治疗能够显著改善患者的预后。然而，明确脑转移瘤的EGFR基因突变状态需要对其活检或手术切除后进行病理检测，可能会导致术后出血、肺栓塞和脑脊液漏等严重并发症。因此，如何无创、精准预测肺癌脑转移瘤的EGFR基因突变状态，对于筛选EGFR-TKI靶向治疗的潜在受益患者，改善肺癌脑转移瘤患者的预后具有重要价值。

近年来，影像组学技术快速发展，可以从影像图像中提取大量形状、纹理等特征，无创、定量评估肿瘤的异质性，在肿瘤的"虚拟活检"方面展现出重要的应用价值。

本研究提取了肺癌脑转移患者脑转移瘤术前T2WI和增强T1WI图像的影像组学特征，以脑转移瘤术后的EGFR基因检测结果为金标准，通过mRMR和LASSO-logistic筛选出与脑转移瘤EGFR基因突变状态相关性强的影像组学特征，采用logistic回归构建了肺癌脑转移瘤EGFR基因突变状态的预测模型，通过受试者工作特征曲线、Hosmer-Lemeshow检验和决策曲线评估模型性能。结果显示，该模型对脑转移瘤EGFR基因突变状态具有良好的预测效能，能够有效区分EGFR突变型和野生型的脑转移瘤。本研究为肺癌患者提供一种无创、准确的评估脑转移瘤EGFR基因突变状态的方法，将为肺癌脑转移瘤患者的EGFR-TKI用药选择提供帮助。详见内文第86页。

综 述

CHINESE JOURNAL OF MAGNETIC RESONANCE IMAGING

CHINESE JOURNAL OF MAGNETIC RESONANCE IMAGING

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About the cover

Brain metastasis is the most common intracranial malignant tumor, with lung cancer being the most common primary source of brain metastases. Patients with lung cancer brain metastases have a poor prognosis, with a median overall survival of only 4 to 15 months when treated with conventional therapies such as radiotherapy, chemotherapy and surgery. Currently, targeted therapy with epidermal growth factor receptor-tyrosine kinase inhibitors (EGFR-TKIs) has shown significant improvement in the prognosis of lung cancer patients with brain metastases who have EGFR gene mutation. However, determining the EGFR mutation status of brain metastases usually requires pathological testing through biopsy or surgical resection, which can lead to serious complications such as postoperative bleeding, pulmonary embolism, and cerebrospinal fluid leakage. Therefore, it is of great value to non-invasively and accurately predict the EGFR mutation statu of lung cancer brain metastases in order to identify potential beneficiaries of EGFR-TKI targeted therapy and improve the prognosis of patients with lung cancer brain metastases.

In recent years, the rapid development of radiomics, an imaging-based approach that extracts quantitative features such as shape and texture from medical images, has shown important applications in the field of "virtual biopsy" for tumors and the non-invasive evaluation of tumor heterogeneity.

In this study, radiomics features were extracted from preoperative T2-weighted and contrast-enhanced T1-weighted images of lung cancer brain metastases. The EGFR gene testing results after brain metastasis surgery were used as the gold standard. Using mRMR and LASSO-logistic regression, radiomics features significantly correlated with the EGFR mutation status of brain metastases were selected. A logistic regression model was constructed to predict the EGFR mutation status of lung cancer brain metastases, and the model performance was evaluated using receiver operating characteristic curves, the Hosmer-Lemeshow test, and decision curves. The results showed that the model had good predictive performance for the EGFR mutation status of brain metastases, effectively distinguishing between mutant EGFR and wild-type EGFR brain metastases. This study provides a non-invasive and accurate method for assessing the EGFR mutation status of brain metastases in lung cancer patients, which can assist in the selection of EGFR-TKI therapy for lung cancer brain metastases. Please see text page 86.

EXPERIENCE EXCHANGES

CASE REPORT

REVIEWS