A glioma grading method based on radiomics

基于影像组学的脑胶质瘤分级方法

<Abstract>: Objective To explore the classification of gliomas according to the theory and method of radiomics. Methods In this study, 161 pathologically confirmed glioma patients were retrospectively selected from 2012 to 2016 including 52 low-grade gliomas and 109 high-grade gliomas. Three hundred and forty-six quantization features were extracted from the MRI images, including shape, density, texture and wavelet imaging features. Mutual information and logistic regression model were used to select feature reduction and prediction model. The predictive ability of the model was validated using 10-fold cross-validation. Results Nineteen radiomics features were chosen from 346 quantization features. The sensitivity of the model was 96.3% (105/109), the specificity was 78.8% (41/52), the area under the curve (AUC) was 0.952 7, and the accuracy was 90.7%(146/161). Conclusion The solution proposed in this paper showed that radiomics can non-invasively and quickly provide an adjunct to the clinical grade of glioma with high accuracy.

摘要: 目的 探讨依照影像组学的理论和方法对脑胶质瘤进行分级的可行性. 方法 2012至2016年回顾性纳入161例经病理证实的脑胶质瘤患者，其中低级别胶质瘤52例，高级别胶质瘤109例. 对所有患者的MRI图像进行高通量的数据采集，提取形状、密度、纹理、小波等346个量化特征，利用互信息和logistic回归模型，进行特征降维和预测模型选择，最后在数据集上使用十折交叉验证对模型的预测能力进行验证. 结果 本研究预测模型最终获得19个特征. 模型的敏感度为96.3% (105/109)，特异度为78.8%(41/52)，曲线下面积(AUC)为0.9527，模型准确率为90.7%(146/161). 结论 本研究提出的影像组学方法具有无创、计算速度快、正确率高等优点，可以为脑胶质瘤的临床分级提供辅助手段.

影像组学及其未来机遇与挑战

影像小科普

由于成像技术的迅速发展，医学影像已成为疾病管理中的重要模式，为临床提供了全面的视角和丰富的信息，在疾病筛查、早期诊断、治疗选择和预后评估等方面发挥着举足轻重的作用。现已知病灶形态或功能上的变化是由患者个体的基因、细胞、生理微环境、生活习惯和生存大环境等诸多因素共同决定的。若在常规影像学诊断基础上，通过深度挖掘数据，寻找出疾病的内涵特征，从而反映人体组织、细胞和基因水平的变化，将会对临床医学产生重大影响。基于这一理论，**影像组学**（radiomics）应运而生。它从 医学影像中提取高通量特征来量化肿瘤等重大疾病，在肿瘤表型分型、治疗方案选择和预后分析等方面表现出巨大优势，是临床医学和生物医学工程的研究热点。本文系统梳理影像组学历史，从多方面论述这学科的应用和发展。