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抑郁症是一种常见的精神疾病,主要表现为持续性情绪低落,常伴有认知功能障碍和社会行为改变。抑郁症的终生患病率约为16%,加重了全球疾病和残疾负担。自杀是世界范围内一个严重的公共卫生问题,抑郁症患者因自杀死亡的风险约为10%~15%。因此,深入了解伴自杀意念的抑郁症患者的神经影像学机制可以早期采取干预措施,从而改善患者的预后。

fMRI 技术为探索抑郁症患者的大脑功能异常提供了新方向。以往的研究表明抑郁症患者的大脑半球内和半球间存在功能连接的异常改变,且与临床特征具有相关性,提示大脑半球的功能不对称可能与抑郁症患者的情绪和认知功能障碍密切相关。

然而,大脑半球水平功能连接模式与抑郁症患者的自杀意念之间的关系目前尚不清楚。与传统的基于感兴趣区的功能连接分析不同,功能连接密度(functional connectivity density, FCD)算法是一种基于图论的数据驱动方法,可以反映功能连接的核心节点分布。

本研究采用FCD算法研究伴自杀意念抑郁症患者、不伴自杀意念抑郁症患者和健康志愿者静息态下半球间和半球内FCD的差异。基于Matlab平台,通过计算一个体素与剩余体素功能连接的数量获得全脑FCD图。然后根据种子体素和目标体素的相对位置,将全脑FCD分解为同侧(半球内)FCD和对侧(半球间)FCD。使用SPM 12.0软件对三组的FCD图进行单因素方差分析,然后提取三组差异脑区的FCD值进行事后分析。使用Pearson或Spearman相关分析探讨伴自杀意念组差异脑区的FCD值与临床量表评分之间的关系。结果显示伴自杀意念抑郁症患者半球间和半球内的功能连接存在异常,主要分布在默认网络、躯体感觉区域。这一发现为大脑半球功能连接的研究提供了新的见解,有助于更好地理解伴自杀意念的抑郁症患者大脑之间的相互作用。详见内文第1~4、14页。

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About the cover

Depression is a common mental disorder, characterized by persistent depression, usually accompanied by cognitive impairment and impaired social function. The lifetime prevalence of depression is estimated to be 16%, which increases the global burden of diseases and disabilities. Suicide is a serious public health problem worldwide. The risk of death of depression patients due to suicide is about 10%-15%. Therefore, an in-depth understanding of the neuroimaging mechanism of depression patients with suicidal ideation can take early intervention measures to improve the prognosis of patients.

fMRI technology provides a new direction for exploring brain dysfunction in depression patients. Previous studies have observed that abnormal changes in intra- and interhemispheric functional connectivity are linked to clinical features in depression, suggesting that the functional asymmetry of cerebral hemispheres may be closely related to emotional and cognitive dysfunction of depression patients.

However, the relationship between the functional connectivity patterns of cerebral hemisphere and suicidal ideation of depression patients is still unclear. Different from the functional connectivity analysis based on region of interest, functional connectivity density (FCD) algorithm is a data-driven method based on graph theory analysis, which can be used to reflect the distribution of core nodes of functional connectivity.

In this study, FCD algorithm was performed to investigate the differences of inter- and intrahemispheric functional connectivity among depression patients with suicidal ideation, depression patients without suicidal ideation and healthy volunteers. Based on Matlab platform, we first calculated the global FCD at each voxel as the number of functional connectivity between this voxel and all the other voxels. Then, the global FCD was decomposed into ipsilateral (or intrahemispheric) FCD and contralateral (or interhemispheric) FCD based on the relative positions of seed and target voxels. One-way ANOVA was employed on the FCD maps to analyze the differences among three groups using SPM 12.0 toolbox. Post hoc comparisons were performed after the FCD values in abnormal brain regions of three groups were extracted. Pearson or Spearman correlation analysis was used to explore the relationship between clinical scale score and FCD values in abnormal brain regions of suicidal ideation group. Our results suggest intra- and interhemispheric functional connectivity alterations in default mode network and somatosensory areas. Furthermore, our study provides new insights for the investigation of functional connectivity of cerebral hemispheres, which is helpful to better understand the interaction of brain hemispheres in depression patients with suicidal ideation. Please see pages 1-4, 14.

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