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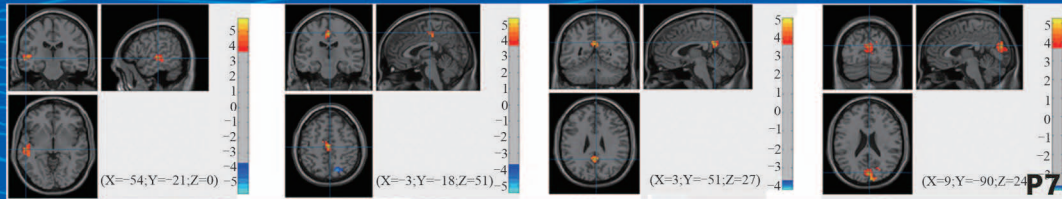
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封面文章

最近世界卫生组织在一个大规模调研中发现,有高达30%以上的中国人存在失眠问题。长期失眠会增加精神障碍、心脑血管疾病、代谢性疾病、肿瘤等的发生率,严重影响人类的生活健康。临床长期药物治疗具有药物依赖及一系列副作用。目前临床上非药物辅助治疗失眠障碍(insomnia disorder, ID)的方法主要是认知行为疗法(cognitive behavioral therapy, CBT)和神经反馈。然而, CBT目前存在一定的盲目性,不能实时观察大脑活动的变化,无法阐明其有效的神经生物学机制。

实时功能磁共振成像的神经反馈(real-time functional magnetic resonance imaging neurofeedback, rtfMRI-NF)具有空间分辨率和定位精度高等优点,可以实时分析、快速采集、有针对性地同步反馈给受试者大脑神经活动信息,受试者根据接收到的反馈信息进行训练并自主调节脑靶区激活水平,进而提高受试者神经可塑性及学习能力。许多使用rtfMRI-NF训练的研究通过回忆积极的自传体记忆帮助患者调节左侧杏仁核的活动,成功改变了大脑功能与临床症状。

本研究采用rtfMRI-NF技术上调ID患者左侧杏仁核活动,比较干预前后双侧杏仁核与全脑体素功能连接(functional connectivity, FC)的变化,对rtfMRI-NF技术改善ID的静息态功能磁共振成像作用进行研究。结果显示,rtfMRI-NF技术可改善ID患者睡眠质量和情绪状态,其机制可能与左侧杏仁核和默认网络、情绪调节、认知相关脑区之间的FC变化有关,进而揭示了ID大脑神经生物学水平变化,为rtfMRI-NF技术改善ID提供客观的神经影像学依据。详见内文第5页。

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The latest World Health Organization in a large-scale survey found that up to 30% of the Chinese people have insomnia problems. Long-term insomnia will increase the incidence of mental disorders, cardiovascular and cerebrovascular diseases, metabolic diseases, tumors, etc., seriously affecting human life and health. Clinical long-term drug treatment has drug dependence and a series of side effects. At present, the main clinical non-medication-assisted treatment for insomnia disorder (ID) is cognitive behavioral therapy (CBT) and neurofeedback. However, CBT currently has a certain blindness, unable to observe changes in brain activity in real time, and unable to elucidate its effective neurobiological mechanisms.

Real-time functional magnetic resonance imaging neurofeedback (rtfMRI-NF) has the advantages of high spatial resolution and positioning accuracy. It can analyze, quickly collect, and synchronously feed back neural activity information to the subject's brain in real time. At the same time, the subjects trained according to the received feedback information and autonomously adjusted the activation level of the brain target area, thus improving the neural plasticity and learning ability of the subjects. Many studies using rtfMRI-NF training have successfully altered brain function and clinical symptoms by helping patients regulate activity in the left amygdala by recalling positive autobiographical memories.

In this study, rtfMRI-NF technology was used to up-regulate the activity of the left amygdala in patients with ID, and the changes of bilateral amygdala and whole brain functional connectivity (FC) before and after the intervention were compared. The effect of rtfMRI-NF technology on the improvement of ID by rest-state functional magnetic resonance imaging was studied. The results showed that rtfMRI-NF technology could improve the sleep quality and emotional state of patients with ID, and the mechanism may be related to the FC changes between the left amygdala and the default network, emotional regulation, and cognitive-related brain areas, which further revealed the changes in the neurobiological level of the ID brain and provided objective neuroimaging basis for the improvement of ID by rtfMRI-NF technology. Please see text page 5.

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