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目次

论著

临床研究

- MR引导下聚焦超声治疗特发性震颤术后静息态脑功能局部一致性研究
.....邓林林,林家骥,王晓玉,陆皓璇,熊永琴,边祥兵,周珈右,潘隆盛,娄昕(1)
- 特发性正常压力脑积水颅内体积参数与认知功能障碍相关性研究
.....孔双艳,李洪亮,魏友平,刘春艳,刘丽娟,吴玉冰,刘星,邢岩(7)
- 轻度创伤性脑损伤急性期及亚急性期局部自发脑活动改变的元分析
.....袁文欢,罗琳,王云玲,金涛,喻大华(13)
- 多参数扩散加权成像对乳腺TIC-II型病变良、恶性的鉴别价值
.....王洪杰,王唯伟,吕四强,褚瑶,刘尚宽,朱来敏,陈月芹,孙占国(18)
- Kaiser评分与ADC值对乳腺BI-RADS 4类病变的诊断效能评价
.....任晓梦,刘晓春,代天姿,张晖,郑国娜,韩丽娜(25)
- 基于多模态MRI图像的3D卷积神经网络对肝纤维化分类的价值研究
.....樊凤仙,胡万均,姜艳丽,邹婕,杨品,张静(30)
- 钆塞酸二钠增强MRI T1 mapping定量参数与肝细胞癌Ki-67表达的相关性研究
.....刘子蔚,杨少民,陈海雄,郭保亮,张榕,周翠钊,李晓虹,胡秋根(35)
- 淋巴结包膜外侵犯的影像表现与前列腺癌病理分级的相关性研究
.....韩晔,任静,肖遵健,焦建华,秦卫军,曹琪,宦怡(41)
- 酰胺质子转移成像与体素内不相干运动成像评估子宫内腺癌组织学分级的价值
.....孔雅晴,曲倩倩,明蕾,王哲,邓凯(46)
- MR集成序列在慢性冈上肌肌腱炎中的应用研究
.....倪亚博,田兆荣,杨建平,孙杰,王志军(53)
- 基于MRI影像组学模型识别三角纤维软骨复合体损伤
.....滕佩宏,张卜天,杨慧敏,任玲玲,李晓静,白应洁,刘桂锋(58)
- 基于磁共振mDIXON-Quant技术对健康受试者股骨近端骨髓脂肪定量研究
.....王明,张平,白琳,王亚丽,侯子硕,任聪聪,赵建(63)
- #### 基础研究
- 磁共振T2-mapping定量成像评估兔急性肠系膜上动脉缺血小肠肠壁损伤的实验研究
.....陈梦莎,祖涵瑜,钟晓飞,李敏敏,曹璋,韩慧婷,曹赫,姜兴岳(69)
- #### 技术研究
- 多次激发平面回波扩散加权成像在颅底成像中的应用
.....罗贺丹,张浩南,胡帅,卢绪论,王楠,苗延巍,刘爱莲,林良杰,宋清伟(75)

经验交流

- 磁共振扩散峰度成像技术在帕金森病早期诊断中的价值
.....戴凯峰, 陈向荣, 许淑惠, 林钱森, 蔡雅丽, 陈杰云 (81)
- 扩散加权成像联合扩散峰度成像对脑胶质瘤的分级诊断及预后评估的价值
.....王绍凯, 韩向军, 朱静怡, 赵宇, 李松柏 (86)
- 局部进展期直肠癌新辅助放化疗后肿瘤退缩分级: MRI 与病理对照研究
.....董龙春, 李一鸣, 孙超, 包翠萍, 杨筠, 张明庆, 杨正多, 钟进 (91)
- 子宫腺肌症四种亚型的 MRI 特征及其 HIFU 治疗相关参数的差异性研究
.....钟雨晴, 刘洋, 胡艳, 刘宇航, 吕发金 (95)

病例报告

- Dyke-Davidoff-Masson 综合征一例
.....张小旭, 刘雅文, 杨艳萍, 黄中霞, 余晖 (100)
- 小脑成人型弥漫性胶质瘤一例
.....张闰海, 程新歌, 曾宪春, 徐睿 (102)
- 第四脑室脂肪神经细胞瘤一例
.....努尔比亚·克然木, 王红 (104)
- MRI 诊断眶内视神经鞘非典型脑膜瘤一例
.....宋晓涵, 王丽君, 于伟凡 (106)
- 肺包虫病误诊为肺癌一例
.....刘倩倩, 孙玉今 (108)
- 乳房外佩吉特病并肝转移瘤应用磁共振脂肪及铁定量技术一例
.....郭茜, 尚全良 (110)
- 腹膜后巨大脊索瘤误诊一例
.....马运婷, 郑月, 沙立辉, 赵新湘 (112)
- 胆管腺瘤一例
.....温馨如, 毕建钢, 鲍世韵, 龚静山 (114)

综述

- 静息态功能 MRI 不同分析方法在非痴呆型血管性认知障碍中的研究进展
.....蔡丽娜, 李晓陵, 崔璇, 王鹏, 佟欣, 魏泽宜, 高胜兰, 韩胜旺, 侯玉 (116)
- 针刺后溪穴脑效应机制 fMRI 研究进展
.....夏美卉, 张秦宏, 蔡丽娜, 岳金换, 李晓陵, 崔璇, 高瑞雪, 佟欣, 王杨 (120)
- 儿童髓鞘少突胶质细胞糖蛋白抗体相关疾病的 MRI 研究进展
.....李婷, 陈欣, 王浩入, 何玲 (123)
- MRI 新技术在新生儿缺氧缺血性脑病预后评估的研究进展
.....何青, 王娟, 马学进, 李仕广 (127)
- 磁共振成像技术在脑小血管疾病与血管性认知障碍中的应用及研究进展
.....康晓萌, 李华兵 (132)
- 磁共振 T2-FLAIR 错配征在预测较低级别胶质瘤分子分型中的研究进展
.....王瀚苇, 曾琳岚, 陈立朝, 王舒楠 (136)
- 抗 N-甲基-D-天冬氨酸受体脑炎的磁共振成像研究进展
.....刘涵静, 罗天友 (139)

封面文章

特发性震颤(essential tremor, ET)是最常见的运动障碍性疾病,其症状严重影响患者生活质量,甚至致残。目前,控制 ET 患者的震颤症状主要以普萘洛尔和扑米酮为主的药物方式,但仍有高达 50% 的患者对药物治疗反应欠佳。

随着无创功能神经外科技术的发展,以丘脑腹侧中间核(ventral intermediate thalamic nucleus, VIM)为消融靶点的 MR 引导下聚焦超声(MR-guided focus ultrasound, MRgFUS)技术成为控制药物难治性 ET 患者震颤的有效方式。同时,静息态功能磁共振成像(resting state functional magnetic resonance imaging, rs-fMRI)技术对于揭示运动障碍性疾病的发病机制、疗效评价及预后发挥了重要作用,逐渐成为研究 MRgFUS 导致的术后神经重塑等相关改变的评价手段。

既往研究发现局部一致性(regional homogeneity, ReHo)指标可用于区分 ET 患者与健康对照组,并揭示了其内在的大脑活动。然而,ET 患者 MRgFUS 术后是否存在静息状态下局部脑功能改变尚不清楚,同时也缺乏长期纵向的研究评价 MRgFUS 术后神经功能恢复情况。

因此,本研究以接受 MRgFUS 治疗的 ET 患者为研究对象,通过收集基线、MRgFUS 术后 6 个月及术后 2 年的 rs-fMRI 及临床数据,采用 ReHo 指标分析 MRgFUS 术后局部脑功能活动变化情况,及其与震颤改善之间的关系。结果发现 MRgFUS 能有效调节 ET 患者的右侧中央后回神经功能活动,其 ReHo 变化趋势与震颤改善密切相关,提示 ReHo 指标有望成为预测 MRgFUS 术后震颤缓解的神经影像标志物,对理解 MRgFUS 术后震颤改善机制提供了神经影像学依据。详见内文第 1 页。

压缩感知技术在颅脑 MRI 的临床应用进展
杨婧, 苗延巍 (144)

磁共振非对比增强三维冠状动脉成像研究进展
伍希, 唐露, 岳汛, 彭鹏飞, 邓巧, 吴韬, 孙家瑜 (148)

术前 MRI 预测乳腺癌腋窝淋巴结转移的研究进展
马芹芹, 冯雯, 陈圆圆, 王莎, 雷军强 (151)

功能磁共振成像技术评估肝细胞癌生物学行为的研究进展
周怡然, 朱绍成 (156)

影像基因组学在预测结直肠癌肝转移基因突变中的应用进展
马佳琪, 肖玲清, 李晓夫 (160)

MRI 评估直肠癌新辅助放化疗后肿瘤反应的研究进展
刘丹, 张胜潮 (163)

踝关节软骨损伤的功能磁共振成像研究进展
高艺洋, 李相生 (167)



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Contents

ORIGINAL RESEARCH

CLINICAL ARTICLES

- 1 Regional homogeneity changes after MR-guided focused ultrasound thalamotomy in essential tremor: A rs-fMRI study
DENG Linlin, LIN Jiaji, WANG Xiaoyu, LU Haoxuan, XIONG Yongqin, BIAN Xingbing, ZHOU Jiayou, PAN Longsheng, LOU Xin
- 7 Correlation between intracranial volume parameters and cognitive impairment in idiopathic normal pressure hydrocephalus
KONG Shuangyan, LI Hongliang, WEI Youping, LIU Chunyan, LIU Lijuan, WU Yubing, LIU Xing, XING Yan
- 13 Meta-analysis of local spontaneous brain activity changes in acute and subacute mild traumatic brain injury
YUAN Wenhuan, LUO Lin, WANG Yunlin, JIN Tao, YU Dahua
- 18 Value of multi-parameter diffusion weighted imaging in the differential diagnosis of benign and malignant TIC type II breast lesions
WANG Hongjie, WANG Weiwei, LÜ Siqiang, CHU Yao, LIU Shangkuan, ZHU Laimin, CHEN Yueqin, SUN Zhanguo
- 25 Comparative assessment of MRI BI-RADS 4 breast lesions with Kaiser score and apparent diffusion coefficient value
REN Xiaomeng, LIU Xiaochun, DAI Tianzi, ZHANG Hui, ZHENG Guona, HAN Lina
- 30 The value of 3D convolution neural network based on multimodal MRI images in the classification of liver fibrosis
FAN Fengxian, HU Wanjun, JIANG Yanli, ZOU Jie, YANG Pin, ZHANG Jing
- 35 Correlation between Gd-EOB-DTPA enhanced MRI T1 mapping and Ki-67 expression in hepatocellular carcinoma
LIU Ziwei, YANG Shaomin, CHEN Haixiong, GUO Baoliang, ZHANG Rong, ZHOU Cuiru, LI Xiaohong, HU Qiugen
- 41 The investigation of association between radiologic extranodal extension and pathological grades of prostate cancer
HAN Ye, REN Jing, XIAO Zunjian, JIAO Jianhua, QIN Weijun, CAO Qi, HUAN Yi
- 46 Value of amide proton transfer imaging and intravoxel incoherent motion imaging in estimating histologic grades of endometrial adenocarcinoma
KONG Yaqing, QU Qianqian, MING Lei, WANG Zhe, DENG Kai
- 53 Magnetic resonance image compilation in the assessment of chronic supraspinatus tendinitis
NI Yabo, TIAN Zhaorong, YANG Jianping, SUN Jie, WANG Zhijun
- 58 Identify the injury of triangular fibrocartilage complex based on MRI radiomics model
TENG Peihong, ZHANG Butian, YANG Huimin, REN Lingling, LI Xiaojing, BAI Yingjie, LIU Guifeng

- 63 Quantitative assessment of bone marrow fat fraction of proximal femur in healthy subjects based on MRI mDIXON-Quant technique
WANG Ming, ZHANG Ping, BAI Lin, WANG Yali, HOU Zishuo, REN Congcong, ZHAO Jian

ORIGINAL ARTICLE

- 69 Experimental study on the evaluation of acute mesenteric artery ischemia in the small intestine wall injury of rabbits by quantitative magnetic resonance T2-mapping technique
CHEN Mengsha, ZU Hanyu, ZHONG Xiaofei, LI Minmin, CAO Zhang, HAN Huiting, CAO He, JIANG Xingyue

TECHNICAL ARTICLE

- 75 Application of multi-shot echo planar imaging diffusion weighted imaging in the skull base
LUO Hedan, ZHANG Haonan, HU Shuai, LU Xulun, WANG Nan, MIAO Yanwei, LIU Ailian, LIN Liangjie, SONG Qingwei

EXPERIENCE EXCHANGES

- 81 The value of diffusion kurtosis imaging in the early diagnosis of Parkinson's disease
DAI Kaifeng, CHEN Xiangrong, XU Shuhui, LIN qiansen, CAI Yali, CHEN Jieryun
- 86 Value of diffusion-weighted imaging combined with diffusion kurtosis imaging in the hierarchical diagnosis and prognosis assessment of glioma
WANG Shaokai, HAN Xiangjun, ZHU Jingyi, ZHAO Yu, LI Songbai
- 91 Tumor regression grade after neoadjuvant chemoradiotherapy for locally advanced rectal cancer: MRI and pathological control study
DONG Longchun, LI Yiming, SUN Chao, BAO Cuiping, YANG Jun, ZHANG Mingqing, YANG Zhengduo, ZHONG Jin
- 95 Difference of MRI characteristics and HIFU related parameters of four subtypes of adenomyosis
ZHONG Yuqing, LIU Yang, HU Yan, LIU Yuhang, LÜ Fajin

CASE REPORTS

- 100 Dyke-Davidoff-Masson syndrome: One case report
ZHANG Xiaoxu, LIU Yawen, YANG Yanping, HUANG Zhongxia, YU Hui
- 102 Adult-type diffuse gliomas in cerebellum: One case report
ZHANG Runhai, CHENG Xinge, ZENG Xianchun, XU Rui
- 104 Liponeurocytoma of the fourth ventricle: One case report
NUERBIYA-Keranmu, WANG Hong
- 106 MRI diagnosis of atypical optic nerve sheath meningioma in orbit: One case report
SONG Xiaohan, WANG Lijun, YU Weifan
- 108 Pulmonary echinococcosis misdiagnosed as lung cancer: One case report
LIU Qianqian, SUN Yujin
- 110 Extramammary Paget's disease complicated with liver metastases by magnetic resonance fat and iron quantification: One case report
GUO Xi, SHANG Quanliang
- 112 Misdiagnosis of retroperitoneal giant chordoma: One case report
MA Yunting, ZHENG Yue, SHA Lihui, ZHAO Xinxiang
- 114 Bile duct adenoma: One case report
WEN Xinru, BI Jiangang, BAO Shiyun, GONG Jingshan

About the cover

Essential tremor (ET) is the most common movement disorders diseases and its symptoms seriously affect the quality of life of patients, and even cause disability. Currently, the main pharmacological modalities for controlling tremor symptoms in ET patients are propranolol and paromidone, but up to 50% of patients still respond poorly to drug therapy.

With the development of noninvasive functional neurosurgery techniques, MR-guided focused ultrasound (MRgFUS) techniques using the ventral intermediate thalamic nucleus (VIM) of the thalamus as the ablation target has become an effective way to control tremors in patients with drug-refractory ET. Meanwhile, resting state functional magnetic resonance imaging (rs-fMRI) technique has played an important role in revealing the pathogenesis, efficacy evaluation and prognosis of movement disorder diseases, and is gradually becoming an important tool to study the postoperative neural remodeling and other related changes caused by MRgFUS.

Previous studies have found that the regional homogeneity (ReHo) index can be used to distinguish ET patients from healthy controls and reveal their intrinsic brain activity. However, it is unclear whether ET patients have resting-state local brain function changes after MRgFUS surgery, and there is also a lack of long-term longitudinal studies evaluating neurological recovery after MRgFUS.

Therefore, in this study, ET patients treated with MRgFUS surgery were studied, and rs-fMRI and clinical data were collected from patients at baseline, 6 months after MRgFUS, and 2 years after MRgFUS, and the ReHo index was used to analyze the changes in local brain functional activity after MRgFUS surgery and the relationship between the changes and the improvement of tremor. The findings revealed that MRgFUS surgery effectively modulates the neurological functional activity of the right postcentral gyrus in ET patients, and the trend of ReHo changes in the right postcentral gyrus is closely correlated with tremor improvement, suggesting that the ReHo index is expected to be a neuroimaging marker for predicting tremor remission after MRgFUS surgery, which provides a neuroimaging basis for understanding the mechanism of tremor improvement after MRgFUS surgery. Please see page 1.

REVIEWS

- 116 Research progress of different analysis methods of resting state magnetic resonance imaging in vascular cognitive impairment no dementia
CAI Lina, LI Xiaoling, CUI Xuan, WANG Peng, TONG Xin, WEI Zeyi, GAO Shenglan, HAN Shengwang, HOU Yu
- 120 Research progress of brain fMRI by acupuncture at Houxi acupoint
XIA Meihui, ZHANG Qinrong, CAI Lina, YUE Jinhuan, LI Xiaoling, CUI Xuan, GAO Ruixue, TONG Xin, WANG Yang
- 123 Research progress of MRI on myelin oligodendrocyte glycoprotein antibody disease in children
LI Ting, CHEN Xin, WANG Haoru, HE Ling
- 127 Research progress of new MRI technology in prognosis evaluation of neonatal hypoxic-ischemic encephalopathy
HE Qing, WANG Juan, MA Xuejin, LI Shiguang
- 132 Application and research progress of MRI on cerebral small vessel disease and vascular cognitive impairment
KANG Xiaomeng, LI Huabing
- 136 Research progress of T2-FLAIR mismatch sign in predicting molecular typing of lower-grade glioma
WANG Hanwei, ZENG Linlan, CHEN Lizhao, WANG Shunan
- 139 Research progress in MRI of anti-N-methyl-D-aspartate receptor encephalitis
LIU Hanjing, LUO Tianyou
- 144 Progress in the clinical application of compressed sensing technology in brain MRI
YANG Jing, MIAO Yanwei
- 148 Research progress of magnetic resonance non-contrast three-dimensional coronary imaging
WU Xi, TANG Lu, YUE Xun, PENG Pengfei, DENG Qiao, WU Tao, SUN Jiayu
- 151 Research progress in predicting axillary lymph node metastasis of breast cancer by preoperative MRI
MA Qinqin, FENG Wen, CHEN Yuanyuan, WANG Sha, LEI Junqiang
- 156 Research progress of functional magnetic resonance imaging in evaluating biological behavior of hepatocellular carcinoma
ZHOU Yiran, ZHU Shaocheng
- 160 Application progress of radiogenomics in the prediction of liver metastasis gene mutations in colorectal cancer
MA Jiaqi, XIAO Lingqing, LI Xiaofu
- 163 Progress of MRI in predicting of the tumor response after neoadjuvant chemoradiotherapy for rectal cancer
LIU Dan, ZHANG Shengchao
- 167 The latest research progress of functional MRI in traumatic cartilage injury of ankle joint
GAO Yiyang, LI Xiangsheng