

磁共振成像

月刊
总第172期
2010年1月创刊

2026年第17卷第10期
2026年10月20日出版

刊名题写：时任第十一届全国人大常委会副委员长韩启德

主管单位 中华人民共和国国家卫生
健康委员会

主办单位
中国医院协会
首都医科大学附属北京天坛医院

终身名誉主编 **戴建平**

主 编 金征宇
副主编 陈 敏 程敬亮 付海鸿
贺光军 洪 楠 刘士远
马 林 宋 彬 田 捷
王梅云 鲜军舫 严福华
赵心明

社 长 贺光军
编辑部主任 王志强
责任编辑 王 婷 顾立萍
江 俊 王志强
贺光军
责任校对 张 琴 江 俊
出版单位 《磁共振成像》
杂志社有限公司

地 址 北京市西城区宣武门东大街
22号楼一层020号

发行范围 公开
发行单位 本刊发行部

国内发行 中国邮政集团有限公司
北京市报刊发行局
邮发代号 2-855
国外总发行 中国国际图书贸易集团有限公司
国外发行代号 M 8958
印刷单位 北京科信印刷有限公司

电 话 010-67113815
E-mail editor@cjmri.cn
网 址 www.chinesemri.com
定 价 每册30元

国内统一连续出版物号
CN 11-5902/R

国际标准连续出版物号
ISSN 1674-8034

广告发布登记证号 京西市监广登字20170242号
本刊刊出的所有论文不代表本刊编委
会的观点，除非特别声明

目 次

论 著

临床研究

脑灰质体积与血清维生素D水平在注意缺陷多动障碍共患孤独症谱系

障碍儿童中的相关性研究：一项基于体素的形态学分析

……………韦冰瑶，王钰冰，冯占起，李梦圆，赵正阳，
李心琦，王长浩，曹沂蒙，赵保涵，赵鑫（1）

基于体素的形态学测量与Allen基因图谱的阿尔茨海默病脑结构改变及

关键分子通路识别

……………樊丽华，魏伟，田欣，陈媛媛，杨艺超，王渊，周锋，郑运松（11）

自由水成像指标升高介导老年高血压患者脑白质损伤及认知功能下降的MRI研究

……………王铭梁，杨茗茗，张隽杰，余蒙蒙（21）

人工智能自动脑区分割技术在海马和杏仁核亚区体积与脑小血管认知障碍

相关性研究中的应用价值

……………梁秀琴，刘擘，郝晓勇，李伟荣，王建红，吴江（28）

基于网络攻击与度分布的额颞叶痴呆脑结构协变网络拓扑鲁棒性及度分布特征研究

……………姜茂，杨玥，樊丽华，田欣，陈媛媛，强昆，
魏伟，周锋，张中旭，郑运松（37）

多模态定量MRI联合评估阿尔茨海默病的临床诊断价值

……………吴雅琪，魏鼎泰，陈秋雁，李朝阳，郑雨杉，彭晓澜（44）

联合MRI影像标志物与血清生化标志物构建脑小血管病相关认知功能障碍的

列线图预测模型

……………杨李，陈然，卢文俐，祝胜男，张津硕，季丽雅，李澄，周丹（55）

基于MRS与rs-fMRI的阿尔茨海默病默认模式网络兴奋/抑制失衡研究：

Glx/GABA+比值与局部脑活动的关联分析

……………肖姚，董科，李昕雨，胡春洪，戴慧（63）

基于DTI与DKI的轻度创伤性脑损伤急性期全脑微结构改变研究

……………刘伟，蔚巍，杨东奎，郑雷，王海辰，宗敦伟，
杨翠柳，郝艳霞，吕国士（76）

联合T1 mapping、T2 mapping和DKI的多参数MRI模型在唾液腺肿瘤鉴别

诊断中的价值

……………张子瑞，邵硕，杨欢，王宁，庞国勋，郑宁（84）

基于心脏磁共振衍生的血流动力学参数预测早期扩张型心肌病患者发生

不良心血管事件

……………李瑗，马丽媛，牛媛媛，李锐，马宁，朱力（94）

静脉期光谱CT参数联合MRI术前评估乳腺肿瘤Ki-67表达水平

.....支云霏, 喻晓庆, 汤卫霞, 王天乐, 盛美红 (102)

IVIM-DWI联合临床病理参数预测子宫内膜癌无病生存期的价值

.....王裴培, 张琦, 王婷婷, 陈东, 张中原, 董江宁 (109)

基于T2加权MRI生境影像组学术前预测上皮性卵巢癌盆腔外腹膜转移

.....魏明翔, 王心怡, 储潇, 柏根基, 陈双庆 (117)

基于多参数MRI的影像组学列线图鉴别卵巢O-RADS 4分肿块良恶性的价值

.....王子堂, 张凌霄, 柏天军, 陈超, 曾庆师 (125)

基础研究

IVIM定量评估经介入栓塞法制备的小型猪急性心肌梗死模型心肌组织特征

.....宋辉, 李栋学, 刘新峰, 廖旦, 吴曙光, 王荣品 (134)

Fe₃O₄-PSMA前列腺癌纳米分子成像探针的制备及其荷瘤小鼠磁共振成像

实验研究

.....王静, 刘姝邑, 崔元龙, 田蔚莉, 卿园园 (142)

技术研究

人工智能辅助压缩感知联合深度学习重建在5.0 T MRI乳腺高清T2加权成像中的

比较研究

.....潘紫薇, 丁婕, 马敏佳, 杨杰, 陈大治, 周立强, 高永斌, 朱蓉蓉 (153)

病例报告

脊髓内室管膜下瘤伴软脊膜强化一例

.....汪旭亮, 赵雪莲, 谭婉晴, 樊凤仙, 刘光耀 (161)

综述

多示踪剂PET/MRI在AD诊断及免疫治疗监测中的应用进展

.....伍曦, 许欣茹, 张鑫, 张冰 (164)

针刺治疗阿尔茨海默病的神经影像学研究进展

.....李丽, 赵雅茹, 王岩, 谢雯婷, 张认真, 马翠, 魏玉婷, 严兴科 (173)

磁共振形分析在脑胶质瘤中的研究进展

.....李文汇, 谭艳 (182)

多模态MRI与影像组学在脑膜瘤术后复发/进展预测中的研究进展

.....司翼华, 韩涛, 孙嘉晨, 周俊林 (188)

基于脑心轴的“癫痫心”磁共振研究进展

.....刘炜, 冉海峰, 张体江 (195)

相位分辨功能肺MRI在肺部疾病中的临床应用研究进展

.....牛玉文, 杨腾月, 党珊, 于楠 (202)

影像组学与深度学习在炎症性肠病中的应用进展

.....郑婷, 朱桂庆, 郭颖华 (211)

封面文章

扩张型心肌病(dilated cardiomyopathy, DCM)是心力衰竭、恶性心律失常及心源性猝死等主要不良心血管事件(major adverse cardiovascular events, MACE)的主要病因之一。指南将左心室射血分数(left ventricular ejection fraction, LVEF) <35%作为植入型心律转复除颤器一级预防核心指标,但其对纽约心脏病协会(New York Heart Association, NYHA)心功能分级I/II级早期DCM患者风险识别不足,尚缺乏针对性评估工具。

心脏磁共振(cardiac magnetic resonance, CMR)可无创评估心肌结构与功能。其中延迟钆强化(late gadolinium enhancement, LGE)虽能识别纤维化,但多数早期DCM无明显纤维化,且LGE阴性者预后仍有差异,提示其无法完全反映早期心肌力学损伤。

血流动力学参数(hemodynamic force, HDF)来源于左心室内压力梯度总和,可客观反映心肌收缩力的空间分布平衡状态;其中侧壁-间隔壁血流压力梯度积分(lateral-septal pressure gradient integral, L-S)为侧壁-室间隔压力梯度在左心室容积上的积分值。既往研究提示HDF能识别左心室收缩及舒张功能中的亚临床异常,但其对NYHA I/II级DCM患者MACE的独立预测价值尚不明确。

本研究回顾性纳入NYHA I/II级DCM患者,按随访期是否发生MACE分组,主要终点为MACE复合事件。采用Medis软件分析左心功能、LGE及HDF指标;以多因素Cox回归筛选独立危险因素,校正LVEF等指标进行敏感性分析;采用Firth罚分Cox回归、Bootstrap内部验证及Maxstat、Kaplan-Meier、Log-rank分析评估L-S风险分层效能。

结果显示,校正性别和年龄后,L-S与MACE显著相关,模型区分效能良好;Firth罚分Cox回归及Bootstrap内部验证提示L-S效应稳健,敏感性分析未出现效应翻转;男性亚组中,高L-S组MACE累积发生率显著高于低L-S组,提示L-S具有良好风险分层效能。本研究提示,L-S可作为早期DCM患者预后评估的潜在影像学标志物,有助于识别早期男性高危DCM患者,为个体化风险评估提供影像学参考,但仍需多中心研究验证。详见内文第94页。

基于形态测量和定量MRI技术在膝关节创伤性骨关节炎中的研究进展

.....蒋宗楷，张庆婷，杨元山，黄劲柏（218）

多参数磁共振成像与肿瘤微环境病理特征空间对照的研究进展

.....于畅，崔湧（225）



磁共振成像
办精品期刊 促学科发展 惠百姓健康

官方网站	在线投稿	知乎平台	官方微博	搜狐平台	网易平台	哔哩哔哩	企鹅号	微信平台

CHINESE JOURNAL OF MAGNETIC RESONANCE IMAGING

磁共振成像 杂志社
www.chinesemri.com

CHINESE JOURNAL OF MAGNETIC RESONANCE IMAGING

ISSN 1674-8034, CN 11-5902/R, CODEN CCIHBW, Established in 2010 Monthly Vol. 17, No. 10, Oct 20, 2026

Responsible Institution

National Health Commission of the
People's Republic of China

Sponsor

Chinese Hospital Association
Beijing Tiantan Hospital of Capital
Medical University

Lifetime Honorary Editor-in-Chief

DAI Jianping

Editor-in-Chief

JIN Zhengyu

Associate Editor-in-Chief

CHEN Min	CHENG Jingliang
FU Haihong	HE Guangjun
HONG Nan	LIU Shiyuan
MA Lin	SONG Bin
TIAN Jie	WANG Meiyun
XIAN Junfang	YAN Fuhua
ZHAO Xinming	

President

HE Guangjun

Editing

Editorial Board of Chinese Journal of
Magnetic Resonance Imaging

Publishing

Publishing House of Chinese Journal
of Magnetic Resonance Imaging

Address

Room 020, 1st Floor, Building 22, Xuanwumen
East Street, Xicheng District, Beijing, China

General Distributor

Domestic: Beijing Newspaper and
Periodical Distribution Bureau of China
Post Group Co., Ltd.
Postal Code: 2-855
Overseas: China International Book
Trade Group Co., Ltd., P.O. Box 399,
Beijing, China
Code No.: M 8958

Tel & Fax 8610-67113815

E-mail editor@ejmri.cn

Website www.chinesemri.com

Price: USD 30.00

Contents

ORIGINAL RESEARCH

CLINICAL ARTICLES

- 1 Changes in gray matter volume in children with ADHD comorbid ASD and its relationship with serum vitamin D levels: A voxel-based morphometry study
WEI Bingyao, WANG Yubing, FENG Zhanqi, LI Mengyuan, ZHAO Zhengyang, LI Xinqi, WANG Changhao, CAO Yimeng, ZHAO Baohan, ZHAO Xin
- 11 Identification of brain structural alterations and key molecular pathways in Alzheimer's disease using voxel-based morphometry and the Allen Human Brain Atlas
FAN Lihua, WEI Wei, TIAN Xin, CHEN Yuanyuan, YANG Yichao, WANG Yuan, ZHOU Feng, ZHENG Yunsong
- 21 Elevated free water imaging metrics mediate white matter injury and cognitive decline in elderly patients with hypertension: An MRI study
WANG Mingliang, YANG Mingming, ZHANG Junjie, YU Mengmeng
- 28 Application value of artificial intelligence-based automatic brain region segmentation technology in the study of the correlation between the volumes of hippocampal and amygdalar subfields and cerebral small vessel disease-related cognitive impairment
LIANG Xiuqin, LIU Bo, HAO Xiaoyong, LI Weirong, WANG Jianhong, WU Jiang
- 37 Topological robustness and degree distribution characteristics of structural covariance networks in frontotemporal dementia based on network attack and degree distribution analyses
JIANG Mao, YANG Yue, FAN Lihua, TIAN Xin, CHEN Yuanyuan, QIANG Kun, WEI Wei, ZHOU Feng, ZHANG Zhongxu, ZHENG Yunsong
- 44 Clinical diagnostic value of multimodal quantitative MRI in the combined evaluation of Alzheimer's disease
WU Yaqi, WEI Dingtai, CHEN Qinyan, LI Zhaoyang, ZHENG Yushan, PENG Xiaolan
- 55 Construction of a nomogram for predicting cerebral small-vessel disease-related cognitive impairment by combining MRI imaging biomarkers and serum biochemical biomarkers
YANG Li, CHEN Ran, LU Wenli, ZHU Shengnan, ZHANG Jinshuo, JI Liya, LI Cheng, ZHOU Dan
- 63 Excitation/inhibition imbalance in the default mode network of Alzheimer's disease based on MRS and rs-fMRI: Association of Glx/GABA ratio with regional brain activity
XIAO Yao, DONG Ke, LI Xinyu, HU Chunhong, DAI Hui
- 76 Research on acute whole-brain microstructural changes in mild traumatic brain injury based on DTI and DKI
LIU Wei, WEI Wei, YANG Dongkui, ZHENG Lei, WANG Haichen, ZONG Dunwei, YANG Cuiliu, HAO Yanxia, LÜ Guoshi

- 84 Value of a multiparametric MRI model incorporating T1 mapping, T2 mapping, and DKI for differential diagnosis of salivary gland tumors
ZHANG Zirui, SHAO Shuo, YANG Huan, WANG Ning, PANG Guoxun, ZHENG Ning
- 94 Prediction of adverse cardiovascular events in patients with early-stage dilated cardiomyopathy using cardiac magnetic resonance-derived hemodynamic force parameters
LI Yuan, MA Liyuan, NIU Yuanyuan, LI Rui, MA Ning, ZHU Li
- 102 Venous phase spectral CT parameters combined with MRI for preoperative assessment of Ki-67 expression levels in breast tumors
ZHI Yunfei, YU Xiaoqing, TANG Weixia, WANG Tianle, SHENG Meihong
- 109 The value of IVIM-DWI combined with clinical parameters in predicting disease-free survival of endometrial cancer
WANG Peipei, ZHANG Qi, WANG Tingting, CHEN Dong, ZHANG Zhongyuan, DONG Jiangning
- 117 Preoperative prediction of extra-pelvic peritoneal metastasis in epithelial ovarian cancer using habitat radiomics from T2-weighted MRI
WEI Mingxiang, WANG Xinyi, CHU Xiao, BAI Genji, CHEN Shuangqing
- 125 The value of radiomics nomogram based on multiparametric MRI in differentiating benign and malignant ovarian O-RADS 4 masses
WANG Zitang, ZHANG Lingxia, BAI Tianjun, CHEN Chao, ZENG Qingshi

ORIGINAL ARTICLES

- 134 Quantitative assessment of myocardial tissue characteristics using intravoxel incoherent motion in a minipig model of acute myocardial infarction induced by transcatheter embolization
SONG Hui, LI Dongxue, LIU Xinfeng, LIAO Dan, WU Shuguang, WANG Rongpin
- 142 Preparation of Fe₃O₄-PSMA nanomolecular imaging probe for prostate cancer and its magnetic resonance imaging study in tumor-bearing mice
WANG Jing, LIU Shuyi, CUI Yuanlong, TIAN Weili, QING Yuanyuan

TECHNICAL ARTICLE

- 153 A comparative study of AI-assisted compressed sensing combined with deep-learning reconstruction for high-resolution T2-weighted breast imaging at 5.0 T MRI
PAN Ziwei, DING Jie, MA Minjia, YANG Jie, CHEN Dazhi, ZHOU Liqiang, GAO Yongbin, ZHU Rongrong

CASE REPORT

- 161 Intramedullary spinal subependymoma with pial enhancement: A case report
WANG Xuliang, ZHAO Xuelian, TAN Wanqing, FAN Fengxian, LIU Guangyao

REVIEWS

- 164 Advances in the application of multi-tracer PET/MRI for AD diagnosis and immunotherapy monitoring
WU Xi, XU Xinru, ZHANG Xin, ZHANG Bing
- 173 Advances in neuroimaging studies of acupuncture for Alzheimer's disease
LI Li, ZHAO Yaru, WANG Yan, XIE Wenting, ZHANG Renzhen, MA Cui, WEI Yuting, YAN Xingke

About the cover

Dilated cardiomyopathy (DCM) is a major cause of heart failure, malignant arrhythmia, and sudden cardiac death, and is one of the leading causes of major adverse cardiovascular events (MACE). Guidelines use left ventricular ejection fraction (LVEF) <35% as a core criterion for primary prevention with implantable cardioverter-defibrillator (ICD) therapy; however, this metric has limited risk discrimination in patients with early-stage DCM at New York Heart Association (NYHA) class I/II, and targeted risk assessment tools remain lacking.

Cardiac magnetic resonance (CMR) is a non-invasive technique for assessing myocardial structure and function. Late gadolinium enhancement (LGE) can identify fibrosis, but most patients with early-stage DCM have no obvious fibrosis, and LGE-negative patients still show prognostic heterogeneity, suggesting that LGE cannot fully reflect early myocardial mechanical injury.

Hemodynamic force (HDF) parameters are derived from the sum of left ventricular pressure gradients and can objectively reflect the spatial distribution balance of myocardial contractility. The lateral-septal pressure gradient integral (L-S) is the integral of the lateral-septal pressure gradient over left ventricular volume. Previous studies have suggested that HDF can identify subclinical abnormalities in left ventricular systolic and diastolic function, but its independent predictive value for MACE in patients with NYHA class I/II DCM remains unclear. This study retrospectively enrolled patients with NYHA class I/II DCM and grouped them according to MACE occurrence during follow-up. The primary endpoint was a composite MACE endpoint. Medis software was used to analyze left ventricular function, LGE, and HDF indices. Multivariable Cox regression was used to identify independent risk factors, and sensitivity analyses were performed with adjustment for LVEF and other indices. Firth's bias-reduced Cox regression, Bootstrap internal validation, and Maxstat, Kaplan-Meier, and Log-rank analyses were used to evaluate the risk-stratification efficacy of L-S.

After adjustment for sex and age, L-S was significantly associated with MACE, and the model showed good discrimination. Firth's bias-reduced Cox regression and Bootstrap internal validation indicated that the effect of L-S was robust, and sensitivity analyses showed no reversal of the effect direction. In the male subgroup, the cumulative incidence of MACE was significantly higher in the high-L-S group than in the low-L-S group, suggesting good risk-stratification performance. L-S may serve as a potential imaging biomarker for prognostic evaluation in patients with early-stage DCM, help identify high-risk male patients, and provide an imaging reference for individualized risk assessment; however, multicenter validation is still needed. See the main text for details. Please see text page 94.

- 182 Research progress of MRI fractal analysis in glioma
LI Wenhui, TAN Yan
- 188 Research progress on multimodal MRI and radiomics for predicting postoperative recurrence/progression in meningioma
SI Yihua, HAN Tao, SUN Jiachen, ZHOU Junlin
- 195 Advances in magnetic resonance imaging research on the "epileptic heart" based on the brain-heart axis
LIU Wei, RAN Haifeng, ZHANG Tijiang
- 202 Research progress of phase-resolved functional lung MRI in clinical applications of pulmonary diseases
NIU Yuwen, YANG Tengyue, DANG Shan, YU Nan
- 211 Advances in the application of radiomics and deep learning in inflammatory bowel disease
ZHENG Ting, ZHU Guiqing, WU Yinghua
- 218 Research progress of morphometry and quantitative MRI techniques in knee post-traumatic osteoarthritis
JIANG Zongkai, ZHANG Qingting, YANG Yuanshan, HUANG Jinbai
- 225 Research progress on spatial correlation between multiparametric magnetic resonance imaging and pathological features of the tumor microenvironment
YU Chang, CUI Yong

