

# 中国医学物理学杂志

CHINESE JOURNAL OF MEDICAL PHYSICS

月刊 1984 年创刊 2020 年 11 月 25 日第 37 卷第 11 期(总第 208 期)



## 主 管

南方医科大学

## 主 办

南方医科大学  
中国医学物理学会

## 编 辑

《中国医学物理学杂志》编委会

## 主 编

胡逸民

## 编辑部主任

卢广文

## 出 版

《中国医学物理学杂志》编辑部

## 通讯地址

广州市同和南方医科大学  
生物医学工程学院  
电话:020-61648280  
传真:020-61360581  
邮编:510515  
网址:www.cjomp.com  
E-mail:YXWL@263.net.cn  
微信号:cjomp001

## 印 刷

广州市艺彩印务有限公司

## 国内订阅

全国各地邮政局  
邮发代号: 46-259

## 国外订阅

中国出版对外贸易总公司  
(北京 782 信箱)

## 国外发行代号

DK44009

## 邮 购

《中国医学物理学杂志》编辑部

## 定 价

每册 15.00 元;全年 180.00 元

## 中国标准连续出版物号

ISSN 1005-202X  
CN 44-1351/R

## 目 次

### 医学放射物理

鲁棒性优化在质子调强放射治疗中的应用

.....王先良,黎杰,王培(1345)

基于知识的放射治疗技术研究

.....陈思佳,石丽婉,林勤(1350)

螺旋断层动态钨门技术在宫颈癌术后放疗中的应用

.....吴骏翔,刘敏,康盛伟,王培,黎杰,唐斌,吴凡(1356)

摆位误差对肝癌立体定向放射治疗剂量学的影响

.....陆世培,陈昱汐,盘茵琳,黄思娟,杨鑫(1360)

鼻咽癌放疗中 T 形口腔固定器的研制及其摆位误差和剂量影响研究

.....丘敏敏,徐圆,钟嘉健,邓永锦,周凌宏(1367)

### 医学影像物理

基于病理“金标准”标记脊髓损伤慢性期 MRI 图像坏死区域的方法

.....包星星,赵璨,包书圣,饶家声,杨朝阳,李晓光(1373)

原发性失眠患者大脑结构磁共振成像研究

.....谢东东,程永欣,田时雨,崔永婷,王宪福,刘畅,薛婷,喻大华(1380)

MRI 征象鉴别 IDH-1 突变型与野生型较低级别胶质瘤

.....薛彩强,柯晓艾,邓娟,李昇霖,刘显旺,周俊林(1384)

小剂量造影剂联合不同电压对 CT 肺动脉造影图像质量的影响

.....尹晓霞,张振明,董险峰,李立强,曾凡学,杜小蕊,王海滨(1389)

超声引导下双侧多点竖脊肌平面阻滞在后路脊柱侧凸矫正融合术中的应用

.....刘苹,吴茜,杨磊,姚尚龙(1394)

3D 肝脏容积加速采集动态增强联合 DWI 评估子宫内膜癌病理分期的价值

.....涂永波,陈凤喜,李康,李国熊,冉熊,兰慧,周帮建(1398)

不同剂量 CT 肺动脉成像评估肺动脉高压严重程度

.....麻祯媛,邹莹,廖玉荣,曹治婷,陆柳媚(1403)

### 医学信号处理与医学仪器

磁共振主动式射频开关设计方法研究

.....黄清明,李想,郑刚(1408)

基于光电容积脉搏波的心房颤动识别方法

.....张悦,陈真诚,梁永波,朱健铭(1416)

可植入人体医疗设备的无线能量传输系统仿真分析 .....冯雪娇,陈小强(1421)

基于小波包变换的癫痫脑电棘波检测 .....朱宁宁,李皓,邓小乔,于明,李效龙(1428)

不同运动速率下心率检测算法效果评估 .....段博,李建清,蔡志鹏,孙琦,刘澄玉(1436)

基于高斯模型的心电特征提取研究 .....孙树平,杨文博,董增奇,张弼强,黄婷婷(1441)

医学生物物理

超声刺激对神经递质的调节作用 .....刘亮,随力,吴拾瑶,杨兰(1448)

青光眼药物跨角膜输运数学模型及特性分析 .....黄飞,徐洪涛,雷苑,屈治国(1453)

静磁场生物效应的研究进展 .....李义伟,王建国(1459)

生物力学与材料

双层压膜与3D打印导板在托槽间接粘接中准确性的对比研究.....杨椿浩,李岩峰,夏冬,施婷婷(1464)

医学人工智能

改进型深度学习模型在乳腺肿瘤良恶性鉴别中的应用 .....邓竹琴,俞永伟(1469)

医疗新技术

3D打印技术辅助肱骨髁间骨折治疗 .....龚灏,陈峰嵘,刘好源(1474)

责任编辑:薛泽玲

责任校对:黄开颜      陈丽霞      谭斯允

英语校对:陈水平      谭斯允

编      务:廖艳玲

期刊基本参数:CN44-1351/R \* 1984 \* M \* A4 \* 136 \* zh \* P \* ¥ 15.0 \* 800 \* 24 \* 2020-11

**Responsible Institution**

Southern Medical University

**Sponsored by**Southern Medical University  
Chinese Society of Medical Physics**Edited by**Editorial Board of Chinese  
Journal of Medical Physics**Editor-in-Chief**

HU Yimin

**Editorial Director**

LU Guangwen

**Published by**Editorial Department of Chinese  
Journal of Medical Physics**Address**School of Biomedical Engineering,  
Southern Medical University,  
Tonghe, Guangzhou  
Postal code: 510515  
Tel: 86-20-61648280  
Fax: 020-61360581  
Http://www.cjomp.com  
E-mail: YXWL@263.net.cn  
Wechat: cjomp001**Printed by**Guangzhou Yi Cai Printing  
Co., Ltd**Domestic Subscription**Post offices all over China  
Post office subscription code:  
46-259**Overseas Subscription**China National Publishing  
Industry Trading Corporation  
(P.O.Box. 782, Beijing, China)**Mail Order**Editorial Department of Chinese  
Journal of Medical Physics**China Standard Serial Numbering**ISSN 1005-202X  
CN 44-1351/R**CONTENTS****Medical radiation physics**

Applications of robust optimization in intensity modulated proton therapy .....(1345)

WANG Xianliang, LI Jie, WANG Pei

Research on knowledge-based radiation therapy .....(1350)

CHEN Sijia, SHI Liwan, LIN Qin

Application of dynamic jaw technique in helical tomotherapy for postoperative cervical cancer  
.....(1356)

WU Junxiang, LIU Min, KANG Shengwei, WANG Pei, LI Jie, TANG Bin, WU Fan

Effects of setup error on the dosimetry of stereotactic body radiotherapy for liver cancer  
.....(1360)

LU Shipai, CHEN Yuxi, PAN Yinlin, HUANG Sijuan, YANG Xin

Development of T-shaped oral fixator and its effects on setup errors and dosimetric change in  
nasopharyngeal carcinoma radiotherapy .....(1367)

QIU Minmin, XU Yuan, ZHONG Jiajian, DENG Yongjin, ZHOU Linghong

**Medical imaging physics**Study on the method of marking the necrotic area of MRI image in chronic spinal cord injury based  
on pathological "gold standard" .....(1373)

BAO Xingxing, ZHAO Can, BAO Shusheng, RAO Jiasheng, YANG Zhaoyang, Li Xiaoguang

Structural magnetic resonance imaging of primary insomnia patients' brain regions .....(1380)

XIE Dongdong, CHENG Yongxin, TIAN Shiyu, CUI Yongting, WANG Xianfu, LIU Chang,  
XUE Ting, YU DahuaMRI signs in differentiation of IDH-1 mutant type and wild type of lower-grade gliomas  
.....(1384)

XUE Caiqiang, KE Xiaoi, DENG Juan, LI Shenglin, LIU Xianwang, ZHOU Junlin

Effects of low-dose contrast agent combined with different voltage on image quality of CT  
pulmonary angiography .....(1389)YIN Xiaoxia, ZHANG Zhenming, DONG Xianfeng, LI Liqiang, ZENG Fanxue, DU Xiaorui,  
WANG HaibinApplication of erector spinae plane block to the posterior scoliosis correction and fusion with the  
guidance of ultrasonic .....(1394)

LIU Ping, WU Qian, YANG Lei, YAO Shanglong

Clinical value of 3D LAVA dynamic enhancement combined with DWI in evaluating pathological  
staging of endometrial carcinoma .....(1398)

TU Yongbo, CHEN Fengxi, LI Kang, LI Guoxiong, RAN Xiong, LAN Hui, ZHOU Bangjian

Assessment of the severity of pulmonary hypertension by CT pulmonary artery imaging with  
different doses .....(1403)

MA Zhenyuan, ZOU Ying, LIAO Yurong, CAO Zhiting, LU Liumei

**Medical signal processing and medical devices**

Research on design method of active radio frequency switch for magnetic resonance .....(1408)

HUANG Qingming, LI Xiang, ZHENG Gang

Atrial fibrillation identification based on photoplethysmography .....(1416)

ZHANG Yue, CHEN Zhencheng, LIANG Yongbo, ZHU Jianming

|   |        |
|---|--------|
| Simulation analysis on wireless power energy transmission system of implantable human medical devices ..... | (1421) |
| FENG Xuejiao, CHEN Xiaoqiang  |        |
| Detection of epileptic spikes in EEG based on wavelet packet transform .....                                | (1428) |
| ZHU Ningning, LI Hao, DENG Xiaoqiao, YU Ming, LI Xiaolong   |        |
| Evaluation of heart rate detection algorithms at different motion rates .....                               | (1436) |
| DUAN Bo, LI Jianqing, CAI Zhipeng, SUN Qi, LIU Chengyu  |        |
| Electrocardiogram feature extraction based on Gaussian model .....  | (1441) |
| SUN Shuping, YANG Wenbo, DONG Zengqi, ZHANG Biqiang, HUANG Tingting   |        |

## Medical biophysics

|  |        |
|--|--------|
| Regulation effect of ultrasound stimulation on neurotransmitters .....                                 | (1448) |
| LIU Liang, SUI Li, WU Shiyao, YANG Lan   |        |
| An analysis on mathematical model of glaucoma drug delivery across cornea and its characteristic ..... | (1453) |
| HUANG Fei, XU Hongtao, LEI Yuan, QU Zhiguo   |        |
| Current research progress on biological effects of static magnetic field.....                          | (1459) |
| LI Yiwei, WANG Jianguo   |        |

## Biomechanics and materials

|   |        |
|---|--------|
| Comparative study on the accuracy of double laminated film guide and 3D printed guide in indirect bonding ..... | (1464) |
| YANG Chunhao, LI Yanfeng, XIA Dong, SHI Tingting  |        |

## Medical artificial intelligence

|   |        |
|---|--------|
| Application of improved deep learning model in differential diagnosis of benign and malignant breast tumors ..... | (1469) |
| DENG Zhuqin, YU Yongwei   |        |

## New medical techniques

|  |        |
|--|--------|
| 3D printing technology: an aid to the treatment of humeral intercondylar fractures ..... | (1474) |
| GONG Hao, CHEN Fengrong, LIU Haoyuan   |        |

**Executive Editor:** XUE Zeling

**Executive Proofreaders:** HUANG Kaiyan      CHEN Lixia      TAN Siyun

**English Editor:** CHEN Shuiping      TAN Siyun

**Editorial Assistant:** LIAO Yanling