

中华生殖与避孕杂志[®]

原刊名《生殖与避孕》

CHINESE JOURNAL OF REPRODUCTION AND CONTRACEPTION

月刊 1980年12月创刊 第45卷 第11期 2025年11月25日出版



官方微信

主 管

中国科学技术协会

主 办

中华医学会
上海市生物医药技术研究院
复旦大学附属妇产科医院

编 辑

中华生殖与避孕杂志
编辑委员会
200237,上海市老沪闵路779号
电话:(021)64438169
传真:(021)64438975
Email:rande@sibpt.cn
http://zhshzybyzz.yiigle.com

总编辑

乔 杰

编辑部主任

王 健

出 版

《中华医学杂志》社有限责任公司
100710,北京市东四西大街42号
电话(传真):(010)51322059
Email:office@cmaph.org

印 刷

上海界龙中报印务有限公司

发 行

范围:公开
国内:中国邮政集团公司
上海分公司
国外:中国国际图书贸易集团
责任有限公司
(北京399信箱,100048)
代号 BM 389

订 购

全国各地邮政局
邮发代号4-928

邮 购

中华生殖与避孕杂志编辑部
200237,上海市老沪闵路779号
电话:(021)64438169,64438975
Email:rande@sibpt.cn

定 价

每期35.00元,全年420.00元

中国标准连续出版物号

ISSN 2096-2916
CN 10-1441/R

2025年版权归主办者所有

未经授权,不得转载、摘编本刊
文章,不得使用本刊的版式设计

除非特别声明,本刊刊出的所有
文章不代表中华医学会和本刊
编委会的观点

本刊如有印装质量问题,请向本刊
编辑部调换

目 次

述 评

- 放射性核素对男性生殖的负效应 1081
朱伟杰

规范与标准

- 控制性卵巢刺激前性激素类药物预处理的专家共识(2025年) 1087
中国女医师协会生殖医学专业委员会
青春期前男性恶性肿瘤患者生育力保存专家共识(2025年) 1096
中国妇幼保健协会生育力保存专业委员会 中国医师协会生殖医学专业
委员会生殖男科学组

生殖衰老专栏

- 卵泡液NGF浓度与多囊卵巢综合征不孕患者月经周期紊乱
相关性研究 1106
娄艳茹 田甜 巩建飞 韩健 田梦圆 何晓晴 徐晓琳 杨金泽
刘晨虹 李佳林 刘平 李蓉 杨蕊 严杰 乔杰
温阳化浊方对脾肾阳虚型高龄不孕患者自然妊娠结局的影响 1113
徐佳洪 赵晓丽 温子木 贾滢瑛 夏天
子宫内膜上皮细胞衰老对子宫内膜容受性影响的研究进展 1119
胡琴 李辉 杨天丽 李艳萍 赵静
男性睾丸衰老新视角:睾丸支持细胞溶酶体功能障碍
及其干预靶点 1124
林韞知 熊玉林 邓植文 李铮 周智

临床研究

- 基于囊胚质量的第4天胚胎评分方案建立及临床效能比较 1131
耿亚松 郑波 戴豪杨 陶林林 李国臻 杨志伟 王树松 戴芳芳
独立微滴与连接微滴时差成像培养对胚胎发育及妊娠
结局的影响 1139
王琪 薛侠 赵正豪 李伟 高飞强 施文浩 周梁 师娟子

临床报道

- 年轻卵巢储备功能减退患者行宫腔内人工授精妊娠结局分析:
一项倾向性评分匹配队列研究 1148
贾琪 杜晓芳 任炳楠 李嘉恒 管一春
脂肪质量和肥胖相关蛋白表达与多囊卵巢综合征合并代谢
综合征的相关性分析 1152
刘航 秦琦 张利群

现场调查

输精管结扎手术意愿量表的研制及信度效度评估 1158
黄振宇 刘煜坤 Enayatullah Nabizada Huleang Keo 阳建福 彭东毅 徐龙 王龙
何乐业 蒋先镇 龙智

个案报道

PKD2致病突变合并罗氏易位患者行胚胎植入前遗传学检测助孕的1例病案报道 1163
崔凤姬 江玉华 于鹏 孙丙成 白春英 郝海艳
恶性腹膜间皮瘤细胞减灭术联合腹腔热灌注化疗后行IVF-ET助孕治疗的1例病案报道 1171
罗婷 王云燕 袁彩霞 宋海霞

综 述

人工智能在子宫内膜容受性评估的应用进展 1175
马梦琪 熊正方
输卵管积水及其治疗策略对卵巢反应和胚胎质量影响的研究进展 1179
张淑蕾 王秋敏 吴忱 颜磊
人乳头瘤病毒感染与男性不育相关性研究进展 1184
龙彦 王天池 朱勇

《中华生殖与避孕杂志》第三届编辑委员会成员名单 1112
《中华生殖与避孕杂志》第三届通讯编辑委员会成员名单 1157
《中华生殖与避孕杂志》稿约 封三
本期责任编辑 曹云霞 孙宁霞 严杰 本期责任编辑 宋培培 本期责任编辑 年丽红

CHINESE JOURNAL OF REPRODUCTION AND CONTRACEPTION

(Original title: *Reproduction and Contraception*)

Monthly

Established in December 1980

Volume 45, Number 11

November 25, 2025



Responsible Institution

China Association for Science and Technology

Sponsor

Chinese Medical Association,
Shanghai Institute for Biomedical and Pharmaceutical Technologies,
Obstetrics and Gynecology Hospital of Fudan University

Editing

Editorial Board of Chinese Journal of Reproduction and Contraception
779 Laohumin Road, Shanghai 200237, China
Tel: 0086-21-64438169
Fax: 0086-21-64438975
Email: rande@sibpt.cn
<http://zhshzybyzz.yiigle.com>

Editor-in-Chief

Qiao Jie

Managing Director

Wang Jian

Publishing

Chinese Medical Journals
Publishing House Co., Ltd.
42 Dongsi Xidajie, Beijing 100710, China
Tel(Fax): 0086-10-51322059
Email: office@cmaph.org

Printing

Shanghai Jielong Zhongbao Printing Co., Ltd

Overseas Distributor

China International Book
Trading Corporation
P.O. Box 399, Beijing 100048, China
Code No.M389

Mail-Order

Editorial Board of Chinese Journal of Reproduction and Contraception
779 Laohumin Road, Shanghai 200237, China
Tel: 0086-21-64438169
Fax: 0086-21-64438975
Email: rande@sibpt.cn

CSSN

ISSN 2096-2916
CN 10-1441/R

Copyright © 2025 by the all sponsors

No content published by the journals of Chinese Medical Association may be reproduced or abridged without authorization. Please do not use or copy the layout and design of the journals without permission.

All articles published represent the opinions of the authors, and do not reflect the official policy of the Chinese Medical Association or the Editorial Board, unless this is clearly specified.

CONTENTS IN BRIEF

Editorial

- Negative effects of radionuclides on male reproduction.....1081
Zhu Weijie

Standards and Specifications

- Expert consensus on sex hormone pretreatment before controlled ovarian stimulation (2025).....1087
Reproductive Medicine Professional Committee of the Chinese Women's Medical Association
- Expert consensus on fertility preservation for prepubertal male patients with malignant tumors (2025) 1096
Fertility Preservation Committee of Chinese Maternal and Child Health Association, Reproductive Andrology Group Reproductive Medicine Professional Committee of Chinese Medical Doctor Association

Reproductive Aging Column

- NGF concentration in follicular fluid associated with abnormal menstrual cycle in patients with PCOS with ovulation disorder 1106
Lou Yanru, Tian Tian, Gong Jianfei, Han Jian, Tian Mengyuan, He Xiaoqing, Xu Xiaolin, Yang Jinze, Liu Chenhong, Li Jialin, Liu Ping, Li Rong, Yang Rui, Yan Jie, Qiao Jie
- Impact of Wenyang Huazhuo Formula on spontaneous pregnancy outcomes in advanced-age infertile patients with spleen-kidney yang deficiency syndrome 1113
Xu Jiaqi, Zhao Xiaoli, Wen Zimu, Jia Yingying, Xia Tian
- Research advances on the impact of endometrial epithelial cell senescence on endometrial receptivity 1119
Hu Qin, Li Hui, Yang Tianli, Li Yanping, Zhao Jing
- A novel perspective on male testicular aging: Sertoli cell lysosomal dysfunction with intervention targets 1124
Lin Yunzhi, Xiong Yulin, Deng Zhiwen, Li Zheng, Zhou Zhi

Clinical Studies

- Establishment and clinical efficacy comparison of day 4 embryo evaluation protocol based on blastocyst quality 1131
Geng Yasong, Zheng Bo, Dai Haoyang, Tao Linlin, Li Guozhen, Yang Zhiwei, Wang Shusong, Dai Fangfang
- Effects of individual versus connected microdroplet culture in a time-lapse imaging system on embryo development and pregnancy outcomes 1139
Wang Qi, Xue Xia, Zhao Zhenghao, Li Wei, Gao Feiqiang, Shi Wenhao, Zhou Liang, Shi Juanzi

Clinical Reports

- Pregnancy outcomes analysis in young patients with diminished ovarian reserve undergoing intrauterine insemination: a propensity score-matched cohort study 1148
Jia Qi, Du Xiaofang, Ren Bingnan, Li Jiaheng, Guan Yichun

Correlation analysis of FTO protein expression with the onset of polycystic ovary syndrome and its coexistence with metabolic syndrome	1152
<i>Liu Hang, Qin Qi, Zhang Liqun</i>	
Field Investigation	
Development and evaluation on reliability and validity of vasectomy intention scale	1158
<i>Huang Zhenyu, Liu Yushen, Enayatullah Nabizada, Huleang Keo, Yang Jianfu, Peng Dongyi, Xu Long, Wang Long, He Leye, Jiang Xianzhen, Long Zhi</i>	
Case Reports	
A case report of preimplantation genetic testing for assisted reproduction in a patient with <i>PKD2</i> pathogenic mutation and Robertsonian translocation	1163
<i>Cui Fengji, Jiang Yuhua, Yu Peng, Sun Bingcheng, Bai Chunying, Xi Haiyan</i>	
One case report of IVF-ET for a patient with malignant peritoneal mesothelioma after cytoreductive surgery combined with hyperthermic intraperitoneal chemotherapy	1171
<i>Luo Ting, Wang Yunyan, Yuan Caixia, Song Haixia</i>	
Reviews	
Application progress of artificial intelligence in the evaluation of endometrial receptivity	1175
<i>Ma Mengqi, Xiong Zhengfang</i>	
Advances in the study of tubal hydrosalpinx and the effect of its treatment strategy on ovarian response and embryo quality	1179
<i>Zhang Shulei, Wang Qiumin, Wu You, Yan Lei</i>	
Research progress on the correlation between human papillomavirus infection and male infertility	1184
<i>Long Yan, Wang Tianchi, Zhu Yong</i>	

DOI: 10.3760/cma.j.cn101441-20250725-00314

收稿日期 2025-07-25 本文编辑 王李艳

引用本文:朱伟杰. 放射性核素对男性生殖的负效应[J]. 中华生殖与避孕杂志, 2025, 45(11): 1081-1086.

DOI: 10.3760/cma.j.cn101441-20250725-00314.

放射性核素对男性生殖的负效应

朱伟杰

暨南大学生命科学技术学院生殖免疫研究所, 广州 510632

Email: tzhuwj@jnu.edu.cn

【摘要】 男性生殖系统的细胞具有与放射性核素结合并蓄积的分子基础。放射性核素通过电离辐射, 可引发生殖系统局部热效应和氧化应激反应, 导致生殖细胞结构损伤与功能障碍。这些效应不仅可引起细胞死亡, 还可能诱发遗传物质稳定性改变和基因突变, 从而增加子代出现遗传性或表观遗传性缺陷的风险。鉴于放射性核素对男性生殖系统潜在的危害, 亟需加强其防护、监控与研究, 以有效地预防其对男性生殖健康和后代安全的不良影响。

【关键词】 放射性核素; 电离辐射; 男性生殖; 睾丸; 精子

Negative effects of radionuclides on male reproduction

Zhu Weijie

Institute of Reproductive Immunology, College of Life Science and Technology, Jinan University, Guangzhou 510632, China

Email: tzhuwj@jnu.edu.cn

【Abstract】 The cells within the male reproductive system have a molecular material basis for binding and retaining radionuclides. Radionuclides can cause ionizing radiation damage and genotoxicity to the cells of the male reproductive system through mechanisms such as thermal effects and oxidative stress, leading to corresponding changes in cell structure and function, even cell death, and inducing nuclear genetic material abnormalities or even mutagenesis, resulting in a high risk of genetic or epigenetic defects in offspring. Strengthening the protection, monitoring, and investigation of radionuclides in male reproduction will help prevent damage to the male reproductive system caused by radionuclides, thereby ensuring physical health, including male reproductive health.

【Key words】 Radionuclide; Ionizing radiation; Male reproduction; Testis; Sperm

DOI: 10.3760/cma.j.cn101441-20250424-00202

收稿日期 2025-04-24 本文编辑 宋培培

引用本文: 中国女医师协会生殖医学专业委员会. 控制性卵巢刺激前性激素类药物预处理的专家共识 (2025 年) [J]. 中华生殖与避孕杂志, 2025, 45(11): 1087-1095. DOI: 10.3760/cma.j.cn101441-20250424-00202.

控制性卵巢刺激前性激素类药物预处理的专家共识 (2025 年)

中国女医师协会生殖医学专业委员会

通信作者: 王琼, 中山大学附属第一医院生殖医学中心, 广州 510045,

Email: wqiong@mail.sysu.edu.cn; 乔杰, 北京大学第三医院生殖医学

中心, 北京 100191, Email: jie.qiao@263.com

【摘要】 控制性卵巢刺激 (controlled ovarian stimulation, COS) 是辅助生殖技术的重要环节, 而 COS 前使用性激素类药物进行预处理在临床实践中已经被广泛运用, 其目的包括调控月经周期、安排治疗时间、预防卵巢囊肿形成、增加卵泡同步性等。部分专家已经将性激素药物预处理作为常规 COS 方案的组成部分, 如多囊卵巢综合征患者卵巢刺激前常规使用孕激素或者口服避孕药物进行预处理。近年来, 国内外关于性激素药物预处理对卵巢刺激方案、卵母细胞数量与质量、子宫内膜容受性, 以及妊娠率、活产率和流产率等临床结局影响的研究证据显著增加。本共识梳理了国内外研究证据, 综合专家意见, 探讨 COS 前性激素类药物预处理中的关键问题, 旨在给性激素类药物预处理的临床应用提供参考, 为临床工作提供参考, 推动其标准化。

【关键词】 生殖技术; 辅助; 控制性卵巢刺激; 性激素类药物; 预处理

基金项目: 广州市科技计划项目重点研发项目 (重点研发计划, 2024B03J1251)

实践指南注册: 国际实践指南注册与透明化平台, PREPARE-2025CN019

Expert consensus on sex hormone pretreatment before controlled ovarian stimulation (2025)

Reproductive Medicine Professional Committee of the Chinese Women's Medical Association

Corresponding authors: Wang Qiong, Reproductive Medicine Center of the First Affiliated Hospital, Sun Yat-sen University, Guangzhou 510045, China, Email: wqiong@mail.sysu.edu.cn; Qiao Jie, Reproductive Medicine Center of Peking University Third Hospital, Beijing 100191, China, Email: jie.qiao@263.com

【Abstract】 Controlled ovarian stimulation (COS) is a critical component of assisted reproductive technology. The pretreatment with sex hormone medications prior for COS has been widely adopted in clinical practice for purposes including menstrual cycle regulation, scheduling of treatment, prevention of ovarian cyst

formation, and improving follicular synchrony. Some experts have included sex hormone medications pretreatment as a routine component of COS, such as the routine use of progesterone or oral contraceptive drugs for pretreatment before ovarian stimulation in patients with polycystic ovary syndrome. In recent years, numerous new research findings have emerged globally regarding the effects of sex hormone medications pretreatment on COS protocols, oocyte quantity and quality, endometrial receptivity, as well as clinical outcomes such as pregnancy rate, live birth rate, and miscarriage rate. To provide enhanced guidance for the clinical application of sex hormone medications pretreatment, this consensus document synthesizes current research evidence and expert opinions to address key issues in sex hormone medications pretreatment before COS. The aim is to support clinical practice and promote standardization of sex hormone medications pretreatment protocols.

【 Key words 】 Reproductive techniques, assisted; Controlled ovarian stimulation; Sex hormone medications; Pretreatment

Fund program: Guangzhou Municipal Science and Technology Project (Key R&D plan, 2024B03J1251)

Practice guideline registration: Practice Guideline REgistration for transPAREncy, PREPARE-2025CN019

规范与标准

DOI: 10.3760/cma.j.cn101441-20250717-00302

收稿日期 2025-07-17 本文编辑 宋培培

引用本文: 中国妇幼保健协会生育力保存专业委员会, 中国医师协会生殖医学专业委员会生殖男科学组. 青春期前男性恶性肿瘤患者生育力保存专家共识 (2025 年) [J]. 中华生殖与避孕杂志, 2025, 45(11): 1096-1105. DOI: 10.3760/cma.j.cn101441-20250717-00302.

青春期前男性恶性肿瘤患者生育力保存专家共识 (2025 年)

中国妇幼保健协会生育力保存专业委员会 中国医师协会生殖医学专业委员会生殖男科学组

通信作者: 熊承良, 华中科技大学同济医学院生殖医学中心, 武汉 430030, Email: clxiong951@sina.com; 李文, 上海交通大学医学院附属国际和平妇幼保健院生殖医学中心 上海市胚胎源性疾病重点实验室, 上海 200030, Email: liwen@shsmu.edu.cn; 许蓬, 海南菁华生殖妇产医院生殖医学科, 海口 570100, Email: 2285852636@qq.com

【摘要】 随着肿瘤治疗手段的进步, 儿童恶性肿瘤患者的长期生存率不断提高, 但肿瘤治疗的生殖毒性将严重威胁患者未来的生育力。在中国, 青春期前恶性

肿瘤患者的生育力保存日益受到重视，临床工作逐渐普及，但也面临诸多挑战。为此，中国妇幼保健协会生育力保存专业委员会和中国医师协会生殖医学专业委员会生殖男科学组联合多学科专家，结合国内外临床指南、研究证据以及实践经验，在中国法律及伦理框架下，制定了青春期前男性恶性肿瘤患者的生育力保存专家共识。本共识系统梳理和总结了肿瘤治疗对生育力的影响、未来生育风险评估与生育力保存建议，提出了基于多学科团队合作的规范化诊疗路径，并探讨了实践中的伦理问题，旨在为青春期前男性患者在肿瘤治疗中的生育力保存提供指导，最大程度保护患者生育潜力，改善其远期生活质量。

【关键词】 青春期前； 男性； 恶性肿瘤； 生育力保存； 专家共识

基金项目：国家重点研发计划（2022YFC2703002）；国家自然科学基金（U24A20658、82371726、72104144）；上海申康医院发展中心市级医院诊疗技术推广及优化管理项目（SHDC22022303-A）；上海市高水平地方高校创新团队（SHSMU-ZDCX20212200）；中央级公益性科研院所基本科研业务费专项科技创新重大项目（2022GJZD01、2022GJZD0101）

Expert consensus on fertility preservation for prepubertal male patients with malignant tumors (2025)

Fertility Preservation Committee of Chinese Maternal and Child Health Association; Reproductive Andrology Group, Reproductive Medicine Professional Committee of Chinese Medical Doctor Association

Corresponding authors: Xiong Chengliang, Reproductive Medicine Center, Tongji Medical College, Huazhong University of Science and Technology, Wuhan 430030, China, Email: clxiong951@sina.com; Li Wen, Reproductive Medicine Center, International Peace Maternity and Child Health Hospital, Shanghai Jiao Tong University School of Medicine, Shanghai Key Laboratory of Embryo Original Disease, Shanghai 200030, China, Email: liwen@shsmu.edu.cn; Xu Peng, Department of Reproductive Medicine, Hainan Jinghua Reproductive and Maternity Hospital, Haikou 570100, China, Email: 2285852636@qq.com

【Abstract】 With advances in oncologic therapies, long-term survival rates among pediatric cancer patients have significantly improved. However, the gonadotoxic effects of cancer treatments pose a substantial risk to the future fertility of these patients. In China, fertility preservation for pediatric populations has garnered increasing attention, and clinical implementation is expanding; nonetheless, considerable challenges persist. To address this issue, the Fertility Preservation Committee of Chinese Maternal and Child Health Association and Reproductive Andrology Group of the Reproductive Medicine Professional Committee of Chinese Medical Doctor Association, in collaboration with multidisciplinary experts, has developed a consensus guideline on fertility preservation for prepubertal male pediatric cancer patients in China. This expert consensus integrates domestic and international clinical practice guidelines, current evidence, and clinical experience, framed within the context of Chinese legal and ethical regulations. The document systematically reviews the impact of oncologic treatments on fertility, outlines risk assessment protocols, and provides evidence-based recommendations for fertility preservation strategies. It advocates

for a standardized diagnostic and therapeutic workflow through multidisciplinary team coordination and discusses pertinent ethical considerations in clinical practice. This consensus aims to guide fertility protection measures for prepubertal male patients undergoing cancer therapy, thereby optimizing their reproductive potential and enhancing long-term quality of life.

【Key words】 Prepubertal; Male; Malignant tumor; Fertility preservation; Expert consensus

Fund program: National Key Research and Development Program of China (2022YFC2703002); National Natural Science Foundation of China (U24A20658, 82371726, 72104144); Shanghai Shenkang Hospital Development Centre Municipal Hospital Treatment Technology Promotion and Optimization Management Project (SHDC22022303-A); Innovative Research Team of High-Level Local Universities in Shanghai (SHSMU-ZDCX20212200); Non-profit Central Research Institute Fund of National Research Institute for Family Planning (2022GJZD01, 2022GJZD0101)

生殖衰老专栏

DOI: 10.3760/cma.j.cn101441-20250211-00054

收稿日期 2025-02-11 本文编辑 王李艳

引用本文: 姜艳茹, 田甜, 巩建飞, 等. 卵泡液神经生长因子浓度与多囊卵巢综合征不孕患者月经周期紊乱相关性研究 [J]. 中华生殖与避孕杂志, 2025, 45(11): 1106-1112. DOI: 10.3760/cma.j.cn101441-20250211-00054.

卵泡液神经生长因子浓度与多囊卵巢综合征不孕患者月经周期紊乱相关性研究

姜艳茹 田甜 巩建飞 韩健 田梦圆 何晓晴 徐晓琳 杨金泽
刘晨虹 李佳林 刘平 李蓉 杨蕊 严杰 乔杰

女性生育力促进全国重点实验室 北京大学第三医院妇产科, 北京 100191

通信作者: 严杰, Email: yanjiebjmu@bjmu.edu.cn

【摘要】 目的 探讨多囊卵巢综合征 (polycystic ovary syndrome, PCOS) 不孕患者卵泡液神经生长因子 (nerve growth factor, NGF) 与月经周期紊乱的相关性。方法 选取 2017 年 3 月至 2019 年 6 月至北京大学第三医院妇产科行体外受精-胚胎移植助孕的 PCOS 不孕患者 100 例进行回顾性队列研究。基于 PCOS 患者卵泡液 NGF 浓度的中位数 (1 644.03 ng/L) 作为参考值, 将患者分为低 NGF 组 ($n=50$) 和高 NGF 组 ($n=50$), 比较两组患者的一般资料、月经周期状态 (反映排卵障碍的指标) 及临床结局指标; 采用多元线性回归分析卵泡液 NGF 浓度对月经周期长度的影响。结果 ①低 NGF 组患者的体质量指数 [$(27.24 \pm 5.17) \text{ kg/m}^2$] 和白细胞

计数 $[7.31 (5.99, 8.43) \times 10^9/L]$ 显著高于高 NGF 组 $[(25.03 \pm 4.46) \text{ kg/m}^2, P=0.024; 5.95 (5.08, 7.01) \times 10^9/L, P=0.001]$, 而血脂高密度脂蛋白胆固醇 $[1.15 (0.98, 1.36) \text{ mmol/L}]$ 和基础卵泡刺激素水平 $[5.63 (5.00, 6.70) \text{ U/L}]$ 显著低于高 NGF 组 $[1.36 (1.09, 1.52) \text{ mmol/L}, P=0.039; 6.51 (5.10, 7.95) \text{ U/L}, P=0.040]$ 。②低 NGF 组患者月经周期天数 $[60.00 (35.00, 180.00) \text{ d}]$ 显著高于高 NGF 组 $[32.50 (27.00, 67.50) \text{ d}, P=0.001]$ 。③多元线性回归分析结果显示, 在调整体质指数、年龄、不孕年限、不孕类型、糖脂代谢指标之后, 卵泡液 NGF 浓度对月经周期长度具有独立影响作用, 呈显著负相关 ($P<0.05$)。④卵泡液 NGF 浓度与辅助生殖技术结局不相关。结论 卵泡液 NGF 浓度与 PCOS 患者月经周期异常程度密切相关。

【关键词】 神经生长因子; 多囊卵巢综合征; 排卵障碍; 月经周期

基金项目: 国家自然科学基金 (82171632、T2293764、82201805、82301860、82288102); 国家重点研发计划 (2016YFC1000201)

Nerve growth factor concentration in follicular fluid associated with abnormal menstrual cycle in patients with PCOS

Lou Yanru, Tian Tian, Gong Jianfei, Han Jian, Tian Mengyuan, He Xiaoqing, Xu Xiaolin, Yang Jinze, Liu Chenhong, Li Jialin, Liu Ping, Li Rong, Yang Rui, Yan Jie, Qiao Jie

State Key Laboratory of Female Fertility Promotion, Department of Obstetrics and Gynecology, Peking University Third Hospital, Beijing 100191, China

Corresponding author: Yan Jie, Email: yanjiebjmu@bjmu.edu.cn

【Abstract】 **Objective** To investigate the relationship between nerve growth factor (NGF) concentration in follicular fluid and abnormal menstrual cycle in infertile patients with polycystic ovary syndrome (PCOS). **Methods** A retrospective cohort study was conducted on 100 infertile patients with PCOS who underwent *in vitro* fertilization and embryo transfer (IVF-ET) at Department of Obstetrics and Gynecology, Peking University Third Hospital from March 2017 to June 2019. For comparison, the 100 patients with PCOS were divided into low NGF group ($n=50$) and high NGF group ($n=50$) based on the median NGF concentration ($1\ 644.03 \text{ ng/L}$) in follicular fluid. Baseline characteristics, menstrual status and clinical outcomes of assisted reproductive technology were compared. We performed multiple linear regression analysis to examine the effect of NGF in follicular fluid on menstrual cycle length for multivariate analysis. **Results** 1) PCOS patients in the low NGF group had significantly higher body mass index $[(27.24 \pm 5.17) \text{ kg/m}^2]$ and white blood cell count $[7.31(5.99, 8.43) \times 10^9/L]$ than those in the high NGF group $[(25.03 \pm 4.46) \text{ kg/m}^2, P=0.024; 5.95(5.08, 7.01) \times 10^9/L, P=0.001]$, while high-density lipoprotein cholesterol $[1.15 (0.98, 1.36) \text{ mmol/L}]$ and basic follicle-stimulating hormone level $[6.51 (5.10, 7.95) \text{ U/L}]$ in the low NGF group were significantly lower than those in the high NGF group $[1.36 (1.09, 1.52) \text{ mmol/L}, P=0.039; 6.51 (5.10, 7.95) \text{ U/L}, P=0.040]$. 2) PCOS patients in the low NGF group had significantly higher menstrual cycle length $[60.00 (35.00, 180.00) \text{ d}]$ than the high NGF group $[32.50 (27.00, 67.50) \text{ d}, P=0.001]$. 3) Multiple linear regression analysis revealed that after adjustment for body mass index, age, infertility duration, infertility type, and glucose and lipid metabolic parameters, the

NGF concentration in the follicular fluid independently and negatively correlated with menstrual cycle length ($P<0.05$). 4) The NGF concentration in follicular fluid was not correlated with assisted reproductive outcomes. **Conclusion** NGF concentration in follicular fluid is closely related to the degree of menstrual cycle abnormalities in patients with PCOS.

【Key words】 Nerve growth factor; Polycystic ovary syndrome; Ovulation disorder; Menstrual cycle

Fund program: National Natural Science Foundation of China (82171632, T2293764, 82201805, 82301860, 82288102); National Key Research and Development Program of China (2016YFC1000201)

生殖衰老专栏

DOI: 10.3760/cma.j.cn101441-20250530-00246

收稿日期 2025-05-30 本文编辑 王李艳

引用本文: 徐佳淇, 赵晓丽, 温子木, 等. 温阳化浊方对脾肾阳虚型高龄不孕患者自然妊娠结局的影响[J]. 中华生殖与避孕杂志, 2025, 45(11): 1113-1118. DOI: 10.3760/cma.j.cn101441-20250530-00246.

温阳化浊方对脾肾阳虚型高龄不孕患者自然妊娠结局的影响

徐佳淇 赵晓丽 温子木 贾滢瑛 夏天
天津中医药大学第一附属医院生殖医学科 国家中医针灸临床医学研究中心, 天津 300193
通信作者: 夏天, Email: xiatian76@163.com

【摘要】 目的 探讨温阳化浊方对脾肾阳虚型高龄不孕患者自然妊娠结局的影响。方法 采用回顾性队列研究, 收集 2019 年 6 月至 2023 年 6 月于天津中医药大学第一附属医院生殖医学科就诊的 303 例脾肾阳虚型高龄不孕患者的临床资料。根据治疗方案, 将患者分为基础治疗组 (非暴露组, $n=151$) 与基础治疗联合中药温阳化浊方组 (暴露组, $n=152$)。对比分析两组患者一年内的妊娠等待时间 (time to pregnancy, TTP)、持续妊娠率及临床妊娠率等妊娠结局指标。此外, 根据年龄及抗苗勒管激素 (anti-Müllerian hormone, AMH) 水平进行分层分析, 采用离散时间 Cox 比例风险模型评估温阳化浊方对不同亚组患者妊娠结局的影响。结果 与非暴露组相比, 暴露组患者的 TTP 显著缩短 ($HR=1.70$, 95% CI : 1.12~2.57, $P=0.013$), 持续妊娠率 [28.29% (43/152)] 与临床妊娠率 [33.55% (51/152)] 均显著高于非暴露组 [13.91% (21/151), $P=0.020$; 21.85% (33/151), $P=0.023$], 早期流产率 [15.69% (8/51)] 显著低于非暴露组 [36.36% (12/33), $P=0.031$]。年龄分层分析显示, 对于 35~37 岁患者, 暴露组的 TTP 显著缩短 ($HR=1.67$, 95% CI : 1.03~2.70, $P=0.038$), 而 38~44 岁患者两组间 TTP 差异无统计学意义 ($HR=1.78$, 95% CI : 0.77~4.10, $P=0.174$); 持续妊娠率方面, 仅 35~37 岁患者中暴露组 [31.31%

(31/99)] 显著高于非暴露组 [13.91% (15/112) , $P=0.022$] , 38~44 岁患者组间差异无统计学意义 ($P=0.386$)。AMH 水平分层分析显示,无论低 AMH 水平 ($<1.68 \mu\text{g/L}$) 还是高 AMH 水平 ($\geq 1.68 \mu\text{g/L}$) 患者,暴露组 TTP 均较非暴露组显著缩短 ($HR=8.07$, 95% CI : $1.04\sim 62.52$, $P=0.046$; $HR=1.57$, 95% CI : $1.01\sim 2.43$, $P=0.044$) , 持续妊娠率较非暴露组均显著提高 [13.64% (6/44) 比 0% (0/29) , $P=0.038$; 34.26% (37/108) 比 17.21% (21/122) , $P=0.028$] 。与低 AMH 水平患者相比,暴露组和非暴露组高 AMH 水平患者的 TTP 均显著缩短 ($HR=1.91$, 95% CI : $1.02\sim 3.69$, $P=0.043$; $HR=9.48$, 95% CI : $1.30\sim 69.22$, $P=0.002$) , 持续妊娠率均显著提高 ($P=0.014$; $P=0.008$) 。结论 温阳化浊方能显著缩短脾肾阳虚型高龄不孕患者的 TTP, 并有效提高其持续妊娠率与临床妊娠率, 降低其早期流产率。

【关键词】 妊娠结局; 不孕症; 妊娠等待时间; 温阳化浊方; 高龄女性

基金项目: 国家自然科学基金 (82205172、82274570)

Impact of Wenyang Huazhuo Formula on spontaneous pregnancy outcomes in advanced-age infertile patients with spleen-kidney yang deficiency syndrome

Xu Jiaqi, Zhao Xiaoli, Wen Zimu, Jia Yingying, Xia Tian

Department of Reproductive Medicine, First Teaching Hospital of Tianjin University of Traditional Chinese Medicine; National Clinical Research Center for Chinese Medicine Acupuncture and Moxibustion, Tianjin 300193, China

Corresponding author: Xia Tian, Email: xiatian76@163.com

【 Abstract 】 Objective To evaluate the therapeutic efficacy of the Wenyang Huazhuo Formula on spontaneous pregnancy outcomes in advanced-age infertile patients with spleen-kidney yang deficiency syndrome. **Methods** A retrospective cohort study design was employed to gather clinical data from 303 advanced-age infertile patients with spleen-kidney yang deficiency syndrome who sought treatment at the Department of Reproductive Medicine in the First Teaching Hospital of Tianjin University of Traditional Chinese Medicine between June 2019 and June 2023. Patients were categorized into two groups based on their treatment regimens: a basic treatment group (non-exposed group, $n=151$) and a group receiving basic treatment in conjunction with the Wenyang Huazhuo Formula (exposed group, $n=152$). The study compared and analyzed pregnancy outcomes, including time to pregnancy (TTP) within one year, ongoing pregnancy rate, and clinical pregnancy rate, between the two groups over a one-year follow-up period. Additionally, stratified analyses were performed based on age and anti-Müllerian hormone (AMH) levels to evaluate the impact of Wenyang Huazhuo Formula on pregnancy outcomes across different patient subgroups. **Results** The TTP in the exposed group was significantly reduced compared with the non-exposed group ($HR=1.70$, 95% CI : $1.12\sim 2.57$, $P=0.013$), suggesting a significant shortening of their TTP, and the ongoing pregnancy rate [28.29% (43/152)] and the clinical pregnancy rate [33.55% (51/152)] were significantly higher than those in the non-exposed group [13.91% (21/151), $P=0.020$; 21.85% (33/151), $P=0.023$], and the early abortion rate [15.69% (8/51)] was significantly reduced compared with the

non-exposed group [36.36% (12/33), $P=0.031$]. Stratified analyses by age revealed that for patients aged 35–37 years, the exposed group exhibited a significantly shorter TTP ($HR=1.67$, 95% CI : 1.03–2.70, $P=0.038$), while no significant difference in TTP was observed in the 38–44-year old patients ($HR=1.78$, 95% CI : 0.77–4.10, $P=0.174$). Regarding the ongoing pregnancy rate, the exposed group showed a significant higher rate [31.31% (31/99)] than the non-exposed group [13.91% (15/112), $P=0.022$] among patients aged 35–37 years, whereas no significant difference was observed in the 38–44 years old group ($P=0.386$). Stratified analysis based on AMH levels showed that both low AMH levels ($<1.68\text{ }\mu\text{g/L}$) and high AMH levels ($\geq 1.68\text{ }\mu\text{g/L}$) patients in the exposed group experienced a significant reduction in TTP compared with the non-exposed group ($HR=8.07$, 95% CI : 1.04–62.52, $P=0.046$; $HR=1.57$, 95% CI : 1.01–2.43, $P=0.044$, respectively), along with a notable improvement in the ongoing pregnancy rate [13.64% (6/44) vs. 0% (0/29), $P=0.038$; 34.26% (37/108) vs. 17.21% (21/122), $P=0.028$, respectively]. Further stratified analysis indicated that, compared with patients with low AMH levels, both the exposed group and the non-exposed group of patients with high AMH levels exhibited a significantly shorter TTP ($HR=1.91$, 95% CI : 1.02–3.69, $P=0.043$; $HR=9.48$, 95% CI : 1.30–69.22, $P=0.002$, respectively), along with a significantly higher ongoing pregnancy rate ($P=0.014$; $P=0.008$). **Conclusion** The Wenyang Huazhuo Formula significantly shortens TTP, enhances both the clinical pregnancy rate and the ongoing pregnancy rate and reduces the early abortion rate in advanced-age infertile women diagnosed with spleen-kidney yang deficiency syndrome.

【Key words】 Pregnancy outcome; Infertility; Time to pregnancy; Wenyang Huazhuo Formula; Advanced-age women

Fund program: National Natural Science Foundation of China (82205172, 82274570)

生殖衰老专栏

DOI: 10.3760/cma.j.cn101441-20250403-00167

收稿日期 2025-04-03 本文编辑 李天琦

引用本文: 胡琴, 李辉, 杨天丽, 等. 子宫内膜上皮细胞衰老对子宫内膜容受性影响的研究进展[J]. 中华生殖与避孕杂志, 2025, 45(11): 1119–1123. DOI: 10.3760/cma.j.cn101441-20250403-00167.

子宫内膜上皮细胞衰老对子宫内膜容受性影响的研究进展

胡琴 李辉 杨天丽 李艳萍 赵静

中南大学湘雅医院生殖医学中心, 长沙 410008

通信作者: 赵静, Email: zjclivia@csu.edu.cn

【摘要】 随着全球生育年龄的不断推迟, 女性生育能力下降已成为日益严峻的公共健康问题。以往研究多聚焦于卵巢功能的衰退, 近年研究显示子宫内膜衰老与子宫内膜容受性下降具有很强的相关性, 是引发反复种植失败、复发性流产等生育力减退疾病的重要诱因。本综述旨在探讨年龄相关及病理相关子宫内膜上皮细胞衰老对内膜容受性受损的影响, 重点解析衰老相关分泌表型、氧化应激、细胞水平变化 (如纤毛比例与功能异常) 及子宫内膜微环境等关键因素在子宫内膜容受性下降中的关键作用, 期望能阐明子宫内膜上皮细胞衰老的分子机制及信号通路, 开发切实有效的干预措施, 为改善高育龄女性子宫内膜容受性、提高其生育能力提供新的治疗策略。

【关键词】 子宫内膜; 衰老; 子宫内膜容受性; 衰老相关分泌表型
基金项目: 国家自然科学基金面上项目 (82571921)

Research advances on the impact of endometrial epithelial cell senescence on endometrial receptivity

Hu Qin, Li Hui, Yang Tianli, Li Yanping, Zhao Jing

Department of Reproductive Medicine, Xiangya Hospital, Central South University, Changsha 410008, China

Corresponding author: Zhao Jing, Email: zjclivia@csu.edu.cn

【Abstract】 With the global trend of delaying childbearing, the decline in female fertility has emerged as a critical public health concern. While previous research predominantly focused on ovarian failure, recent studies have revealed that endometrial aging and impaired endometrial receptivity are closely associated, serving as significant contributors to reproductive failures such as embryo implantation failure and recurrent miscarriage. This review aims to explore the impact of age-related and pathological endometrial epithelial cell senescence on the impairment of endometrial receptivity, with a focus on key factors including the senescence-associated secretory phenotype, oxidative stress, cellular-level alterations (e.g., abnormalities in cilia proportion and function), and the endometrial microenvironment. By elucidating the molecular mechanisms and signaling pathways underlying endometrial epithelial senescence, this review seeks to advance the development of effective interventions, offering novel therapeutic strategies to enhance endometrial receptivity and improve fertility outcomes among advanced-age women.

【 Key words 】 Endometrium; Senescence; Endometrial receptivity; Senescence-associated secretory phenotype

Fund program: General Program of National Natural Science Foundation of China (82571921)

生殖衰老专栏

DOI: 10.3760/cma.j.cn101441-20250731-00321

收稿日期 2025-07-31 本文编辑 孙敏

引用本文：林韞知，熊玉林，邓植文，等. 男性睾丸衰老新视角：睾丸支持细胞溶酶体功能障碍及其干预靶点 [J]. 中华生殖与避孕杂志, 2025, 45(11): 1124-1130. DOI: 10.3760/cma.j.cn101441-20250731-00321.

男性睾丸衰老新视角：睾丸支持细胞溶酶体功能障碍及其干预靶点

林韞知¹ 熊玉林¹ 邓植文¹ 李铮² 周智¹

¹上海科技大学生命与技术学院, 上海 201210; ²上海交通大学医学院附属第一人民医院泌尿外科, 上海 200080

通信作者：周智, Email: zhoushi@shanghaitech.edu.cn

【摘要】 男性睾丸衰老表现为睾丸结构和功能的退行性变化, 涉及多种细胞的变化, 其中支持细胞的溶酶体功能障碍尤为关键。近来研究表明, 支持细胞溶酶体酸化异常导致吞噬体降解能力下降, 无法维持正常的营养循环, 进而加剧睾丸微环境的损伤。此外, 内质网应激、线粒体功能障碍以及表观遗传变化也是导致睾丸衰老的重要因素。因此, 靶向溶酶体功能障碍、线粒体氧化应激和内质网应激的分子干预策略, 如使用溶酶体激动剂 ML-SA1 和抗氧化剂, 可能为缓解男性生殖衰老提供新的治疗方向。未来的研究需要进一步探索这些机制之间的相互作用以及潜在的干预靶点, 以改善中老年男性的生殖健康和生活质量。

【关键词】 睾丸; 衰老机制; 支持细胞; 溶酶体功能障碍

基金项目：中国医学科学院中央级公益性科研院所基本科研业务费专项资金 (2024-JKCS-09)

A novel perspective on male testicular aging: Sertoli cell lysosomal dysfunction with intervention targets

Lin Yunzhi¹, Xiong Yulin¹, Deng Zhiwen¹, Li Zheng², Zhou Zhi¹

¹ School of Life Science and Technology, Shanghai Tech University, Shanghai 201210, China; ² Department of Urology, Shanghai General Hospital, Shanghai Jiao Tong University School of Medicine, Shanghai 200080, China

Corresponding author: Zhou Zhi, Email: zhoushi@shanghaitech.edu.cn

【Abstract】 Male reproductive aging is characterized by degenerative changes in the structure and function of the testes. Testicular aging involves alterations in various types of cells, among which lysosomal dysfunction in Sertoli cells is particularly critical. Recent studies have shown that abnormal lysosomal acidification leads to impaired phagosome degradation, which fails to maintain normal nutrient cycling and thereby exacerbates damage to the testicular microenvironment. In addition, endoplasmic reticulum stress, mitochondrial dysfunction, and epigenetic changes are also important factors contributing to reproductive aging. Therefore, molecular intervention strategies targeting lysosomal dysfunction, mitochondrial oxidative stress, and endoplasmic reticulum stress, such as the use of lysosomal activators like ML-SA1 and antioxidants, may

offer new therapeutic directions for alleviating male reproductive aging. Future research should further explore the interactions between these mechanisms and potential intervention targets to improve reproductive health and quality of life in middle-aged and older men.

【Key words】 Testis; Aging mechanism; Sertoli cells; Lysosomal dysfunction

Fund program: Non-profit Central Research Institute Fund of Chinese Academy of Medical Sciences (2024-JKCS-09)

临床研究

DOI: 10.3760/cma.j.cn101441-20250515-00230

收稿日期 2025-05-15 本文编辑: 孙敏

引用本文: 耿亚松, 郑波, 戴豪杨, 等. 基于囊胚质量的第4天胚胎评分方案建立及临床效能比较[J]. 中华生殖与避孕杂志, 2025, 45(11): 1131-1138. DOI: 10.3760/cma.j.cn101441-20250515-00230.

基于囊胚质量的第4天胚胎评分方案建立及临床效能比较

耿亚松¹ 郑波¹ 戴豪杨¹ 陶林林¹ 李国臻¹ 杨志伟¹ 王树松²
戴芳芳¹

¹邢台美和生殖与遗传医院生殖医学中心 邢台市生殖医学重点实验室, 邢台 054000; ²河北省生殖健康医院 河北省生殖医学重点实验室, 石家庄 050051

通信作者: 戴芳芳, Email: daifangfang123@163.com

【摘要】 目的 分析第4天胚胎特征对囊胚形成的影响, 制定第4天胚胎评价方案并验证其临床效能。方法 本研究为回顾性队列研究, 纳入2018年1月至2024年4月在邢台美和生殖与遗传医院生殖医学中心接受体外受精-胚胎移植 (*in vitro* fertilization and embryo transfer, IVF-ET) 治疗的1 037例患者临床资料, 患者均行第4天新鲜胚胎移植, 受精后(92±2) h对第4天胚胎进行形态学观察, 1 326枚胚胎选择行新鲜胚胎移植, 余2 723枚胚胎进行了囊胚培养。评分方案主要根据优质囊胚形成率。通过多因素二元logistic回归分析第4天发育阶段、碎片率、具有特定阶段的卵裂模式及多核或空泡化对囊胚形成率和优质囊胚形成率的影响。根据回归系数确定各参数对优质囊胚形成率的影响权重, 制定第4天胚胎评分方案, 并对第4天不同等级胚胎的可移植囊胚形成率、优质囊胚形成率和种植率进行了比较以验证评分方案的效能。所有胚胎根据已报道的3个评分方案Feil 2008、Gemma 2015和欧洲人类生殖与胚胎学学会(European Society of Human Reproduction and Embryology, ESHRE) 2011进一步重新评估, 使用受试者工作特征(receiver operating characteristic, ROC) 曲线下面积(area under the curve, AUC) 比较3种第4天评分方案与本研究建立的第4天评分方案在可移植

囊胚形成率、优质囊胚形成率和种植率的预测价值。结果 对于优质囊胚的预测，早期囊胚比卵裂球数量比率 <1.2 的影响权重最高 ($B=3.398$, $OR=29.915$, $P<0.001$)，其次是碎片率 $<10\%$ 比 $\geq 50\%$ ($B=1.263$, $OR=3.535$, $P<0.001$)，最后为具有特定阶段的卵裂模式 ($B=0.903$, $OR=2.467$, $P=0.005$)以及无多核或空泡 ($B=0.797$, $OR=2.218$, $P=0.007$)。本研究制定的第4天胚胎评分方案将第4天胚胎评为A、B、C、D和E五个级别，优质囊胚形成率分别为51.42% (162/315)、35.46% (111/313)、20.04% (100/499)、9.47% (56/591)、3.98% (40/1005)，可移植囊胚形成率分别为88.57% (279/315)、76.99% (241/313)、56.11% (280/499)、40.27% (238/591)、14.22% (143/1005)，组间比较差异均有统计学意义 (均 $P<0.005$)。A到E不同等级移植胚胎种植率 [63.18% (381/603)、56.19% (322/573)、38.29% (54/141)、26.53% (13/49)、9.67% (3/31)] 依次下降。本研究提出的第4天胚胎评分标准在预测可移植囊胚形成率 (AUC=0.812)、优质囊胚形成率 (AUC=0.804) 和种植率 (AUC=0.603) 的效能均显著高于 Feil 2008 (AUC=0.797, $P<0.001$; AUC=0.781, $P<0.001$; AUC=0.585, $P<0.001$)、Gemma 2015 (AUC=0.773, $P<0.001$; AUC=0.771, $P<0.001$; AUC=0.542, $P=0.006$) 和 ESHRE 2011 (AUC=0.710, $P<0.001$; AUC=0.745, $P<0.001$; AUC=0.592, $P<0.001$)。本研究观察到假性致密化的胚胎，其可移植囊胚形成率为38.28% (49/128)，优质囊胚形成率为7.03% (9/128)，发育潜能类似于卵裂球数量比率 ≥ 1.2 的卵裂期胚胎。结论 本研究构建的第4天胚胎评分方案对形成可移植囊胚和优质囊胚的能力具有良好的预测价值，并能有效预测种植率。

【关键词】 胚胎移植； 胚胎种植； 桑葚胚； 胚胎致密化； 第4天胚胎评分

基金项目：河北省医学科学研究课题计划 (20240234)；邢台市重点研发计划项目 (2023ZC246)

Establishment and clinical efficacy comparison of day 4 embryo evaluation protocol based on blastocyst quality

Geng Yasong¹, Zheng Bo¹, Dai Haoyang¹, Tao Linlin¹, Li Guozhen¹, Yang Zhiwei¹, Wang Shusong², Dai Fangfang¹

¹ Center for Reproductive Medicine, Xingtai Meihe Reproductive and Genetic Hospital; Xingtai Key Laboratory of Reproductive Medicine, Xingtai 054000, China; ² Hebei Key Laboratory of Reproductive Medicine, Hebei Reproductive Health Hospital, Shijiazhuang 050051, China

Corresponding author: Dai Fangfang, Email: daifangfang123@163.com

【Abstract】 **Objective** To establish a day 4 embryo evaluation protocol by analyzing embryonic characteristics affecting blastocyst formation, and validate its clinical effectiveness. **Methods** This retrospective cohort study included clinical data from 1 037 patients who underwent fresh *in vitro* fertilization and embryo transfer (IVF-ET) on day 4 in Center for Reproductive Medicine of Xingtai Meihe Reproductive and Genetic Hospital between January 2018 and April 2024. Morphological assessments were performed at (92 $\pm$ 2) h post-fertilization. After excluding 1 326 embryos selected for fresh transfer, 2 723 embryos underwent blastocyst culture. To address selection bias in transferred embryos, the scoring system was primarily based on high-quality blastocyst formation rates.

Multivariate binary regression analysis evaluated how day 4 developmental stage, fragmentation rate, stage-specific cleavage patterns, multinucleation/vacuolization affected transferable blastocyst formation rate and high-quality blastocyst rate. Regression coefficients determined parameter weights for high-quality blastocyst formation, establishing a day 4 embryo scoring protocol that compared outcomes across different grades. The scoring system was validated by comparing transferable blastocyst formation rate, high-quality blastocyst rate, and implantation rate among different day 4 embryo grades. All embryos were further rescored according to three previously reported evaluation schemes [Feil 2008, Gemma 2015, and European Society of Human Reproduction and Embryology (ESHRE) 2011]. The predictive values of these three day 4 scoring systems and the day 4 scoring system established in this study were compared using the area under the curve (AUC) receiver operating characteristic (ROC) curve in predicting the formation rate of transferable blastocyst, the formation rate of high-quality blastocyst, and implantation rate. **Results** In the prediction of high-quality blastocyst formation, early blastocyst showed the highest influence weight compared to embryos with the ratio of blastomere numbers on day 4 to those on day 3 (BNR) <1.2 ($B=3.398$, $OR=29.915$, $P<0.001$), followed by fragmentation $<10\%$ versus $\geq 50\%$ ($B=1.263$, $OR=3.535$, $P<0.001$), a stage-specific cleavage pattern ($B=0.903$, $OR=2.467$, $P=0.005$), and absence of multinucleation or vacuoles ($B=0.797$, $OR=2.218$, $P=0.007$). Using the newly developed day 4 scoring system, embryos were graded A, B, C, D, E. Transferable blastocyst formation rates were 88.57% (279/315), 76.99% (241/313), 56.11% (280/499), 40.27% (238/591) and 14.22% (143/1005), respectively; high-quality blastocyst rates were 51.42% (162/315), 35.46% (111/313), 20.04% (100/499), 9.47% (56/591) and 3.98% (40/1005). All inter-group differences were statistically significant (all $P<0.005$). Implantation rates for transferred embryos of grades A–E declined sequentially: 63.18% (381/603), 56.19% (322/573), 38.29% (54/141), 26.53% (13/49) and 9.67% (3/31). The day 4 embryo scoring system proposed in this study demonstrated significantly higher predictive efficacy for transferable blastocyst formation rate (AUC=0.812), high-quality blastocyst formation rate (AUC=0.804), and implantation rate (AUC=0.603) compared with Feil 2008 (AUC=0.797, $P<0.001$; AUC=0.781, $P<0.001$; AUC=0.585, $P<0.001$), Gemma 2015 (AUC=0.773, $P<0.001$; AUC=0.771, $P<0.001$; AUC=0.542, $P=0.006$), and ESHRE 2011 (AUC=0.710, $P<0.001$; AUC=0.745, $P<0.001$; AUC=0.592, $P<0.001$). We also observed the presence of pseudo-compacted embryo, whose transferable blastocyst formation rate [38.28% (49/128)] and high-quality blastocyst formation rate [7.03% (9/128)] were similar to those of cleavage-stage embryos with a BNR ≥ 1.2 . **Conclusion** The established day 4 morphological assessment system reliably predicts the potential to transferable blastocyst and high-quality blastocyst, and effectively forecasts implantation rates.

【 Key words 】 Embryo transfer; Embryo implantation; Morula; Compaction; Day 4 embryo scoring

Fund program: Hebei Provincial Medical Research Project (20240234);
Xingtai Key R&D Program (2023ZC246)

临床研究

DOI: 10.3760/cma.j.cn101441-20250619-00270

收稿日期 2025-06-19 本文编辑 孙敏

引用本文: 王琪, 薛侠, 赵正豪, 等. 独立微滴与连接微滴时差成像培养对胚胎发育及妊娠结局的影响[J].
中华生殖与避孕杂志, 2025, 45(11): 1139-1147. DOI: 10.3760/cma.j.cn101441-20250619-00270.

独立微滴与连接微滴时差成像培养 对胚胎发育及妊娠结局的影响

王琪 薛侠 赵正豪 李伟 高飞强 施文浩 周梁 师娟子

西北妇女儿童医院生殖中心, 西安 710000

通信作者: 师娟子, Email: shijuanzi@126.com

【摘要】 目的 探讨时差成像 (time-lapse, TL) 培养箱中独立与连接微滴培养模式对全胚养囊患者胚胎发育参数及妊娠结局的影响。方法 采用回顾性队列研究, 分析 2019 年 1 月至 2023 年 12 月于西北妇女儿童医院生殖中心行全胚养囊策略的 3 507 个新鲜囊胚移植周期的临床资料。根据培养模式不同分为两组: 连接组 ($n=2\ 446$, 使用连接微滴培养) 和独立组 ($n=1\ 061$, 使用独立微滴培养), 比较两组的基线特征、胚胎发育指标、妊娠及新生儿结局, 并通过广义线性模型对混杂因素进行校正, 分析培养模式的影响效应。结果 胚胎发育评估显示, 连接组第 3 天 (day 3, D3) 优质胚胎率 [60.12% (12 136/20 187)] 显著低于独立组 [63.62% (4 705/7 395), $P<0.001$], 而优质囊胚形成率 [34.93% (7 052/20 187)] 和可利用囊胚形成率 [56.07% (11 319/20 187)] 均显著高于独立组 [33.08% (2 446/7 395), $P=0.004$; 51.45% (3 805/7 395), $P<0.001$], 差异均具有统计学意义。妊娠结局比较显示, 连接组种植率 [67.40% (1 774/2 632)]、临床妊娠率 [70.20% (1 717/2 446)] 及活产率 [60.66% (1 469/2 446)] 均显著高于独立组 [63.40% (724/1 142), $P=0.017$; 66.73% (708/1 061), $P=0.041$; 55.89% (593/1 061), $P=0.021$], 差异均具有统计学意义。两组新生儿结局差异均无统计学意义 (均 $P>0.05$)。通过广义线性模型校正混杂因素后, 相较于独立组, 连接组 D3 优质胚胎率 (aMD=-0.017, 95% CI: -0.034~0.000, $P=0.046$) 较低, 优质囊胚形成率 (aMD=0.020, 95% CI: 0.002~0.037, $P=0.026$)、可利用囊胚形成率 (aMD=0.032, 95% CI: 0.015~0.048, $P<0.001$) 及活产率 (aOR=1.182, 95% CI: 1.006~1.388, $P=0.042$) 较高, 但两组间 D3 可用胚胎率、临床妊娠率、早期流产率比较差异均无统计学意义 (均 $P>0.05$)。结论 TL 培养系统中独立与连接微滴培养模式在胚胎发育各阶段效应不同, 独立微滴培养能显著增强卵裂期胚胎质量, 而连接微滴培养更利于提高囊胚形成率和囊胚质量, 最终提升活产率且不增加新生儿风险。

【关键词】 妊娠结局; 胚胎发育; 囊胚质量; 连接微滴培养; 时差成像培养系统

基金项目: 陕西省重点研发计划 (2024SF2-GJHX-20)

Effects of individual versus connected microdroplet culture in a time-lapse imaging system on embryo development and pregnancy outcomes

Wang Qi, Xue Xia, Zhao Zhenghao, Li Wei, Gao Feiqiang, Shi Wenhao, Zhou Liang, Shi Juanzi

Reproductive Medical Center, Northwest Women's & Children's Hospital, Xi'an 710000, China

Corresponding author: Shi Juanzi, Email: shijuanzi@126.com

【 Abstract 】 Objective To investigate the effects of individual versus connected microdroplet culture modes in time-lapse (TL) incubators on embryo development parameters and pregnancy outcomes in patients undergoing whole embryo culture to blastocyst stage. **Methods** Using a retrospective cohort study, clinical data from 3 507 fresh blastocyst transfer cycles were analyzed. These cycles involved patients who underwent assisted reproductive technology treatment with whole embryo culture to blastocyst stage at the Reproductive Medical Center of Northwest Women's and Children's Hospital between January 2019 and December 2023. Based on different culture modes, patients were divided into two groups, connected group ($n=2\ 446$, using connected microdroplet culture) and individual group ($n=1\ 061$, using individual microdroplet culture). Baseline characteristics, embryo development parameters, pregnancy outcomes, and neonatal outcomes were compared between the two groups. Generalized linear models (GLM) were used to adjust for confounding factors and analyze the effect of culture mode. **Results** Embryo development assessment showed the day 3 (D3) high-quality embryo rate in the connected group [60.12% (12 136/20 187)] was significantly lower than that in the individual group [63.62% (4 705/7 395), $P<0.001$], whereas the high-quality blastocyst formation rate [34.93% (7 052/20 187)] and the available blastocyst formation rate [56.07% (11 319/20 187)] were both significantly higher than those in the individual group [33.08% (2 446/7 395), $P=0.004$; 51.45% (3 805/7 395), $P<0.001$], with statistically significant differences. The implantation rate [67.40% (1 774/2 632)], the clinical pregnancy rate [70.20% (1 717/2 446)], and the live birth rate [60.66% (1 469/2 446)] in the connected group were all significantly higher than those in the individual group [63.40% (724/1 142), $P=0.017$; 66.73% (708/1 061), $P=0.041$; 55.89% (593/1 061), $P=0.021$], with statistically significant differences. Neonatal outcomes showed no statistically significant difference between the two groups (all $P>0.05$). After adjusting for confounding factors using GLM, connected culture was an independent influencing factor for D3 high-quality embryo rate (aMD=-0.017, 95% CI: -0.034-0.000, $P=0.046$), high-quality blastocyst formation rate (aMD=-0.020, 95% CI: 0.002-0.037, $P=0.026$), available blastocyst formation rate (aMD=0.032, 95% CI: 0.015-0.048, $P<0.001$), live birth rate (aOR=1.182, 95% CI: 1.006-1.388, $P=0.042$). However, it had no effect on D3 available embryo rate, clinical pregnancy

rate, or early miscarriage rate (all $P>0.05$). **Conclusion** In TL incubator systems, individual and connected microdroplet culture modes exert different effects at various stages of embryo development. Individual microdroplet culture can significantly enhance cleavage-stage embryo quality, whereas the connected microdroplet culture was more beneficial for enhancing the blastocyst formation rate and quality, ultimately improving the live birth rate without increasing neonatal risks.

【Key words】 Pregnancy outcome; Embryo development; Blastocyst quality; Connected microdroplet culture; Time-lapse culture system

Fund program: Key Research and Development Program of Shaanxi Province (2024SF2-GJHX-20)

临床报道

DOI: 10.3760/cma.j.cn101441-20250520-00235

收稿日期 2025-05-20 本文编辑 王李艳

引用本文: 贾琪, 杜晓芳, 任炳楠, 等. 年轻卵巢储备功能减退患者行宫腔内人工授精妊娠结局分析: 一项倾向性评分匹配队列研究 [J]. 中华生殖与避孕杂志, 2025, 45(11): 1148-1151. DOI: 10.3760/cma.j.cn101441-20250520-00235.

年轻卵巢储备功能减退患者行宫腔内人工授精妊娠结局分析: 一项倾向性评分匹配队列研究

贾琪 杜晓芳 任炳楠 李嘉恒 管一春
郑州大学第三附属医院生殖健康医院, 郑州 450052
通信作者: 管一春, Email: lisamayguan1@126.com

【摘要】 目的 探讨年龄 ≤ 35 岁的卵巢储备功能减退 (diminished ovarian reserve, DOR) 患者接受宫腔内人工授精 (intrauterine insemination, IUI) 治疗的妊娠结局。方法 采用回顾性队列研究, 对 2016 年 6 月至 2024 年 3 月在郑州大学第三附属医院生殖健康医院行 IUI 助孕的年龄 ≤ 35 岁患者的 6 229 个周期的临床资料进行分析。根据研究对象血清抗苗勒管激素 (anti-Müllerian hormone, AMH) 水平将其分为两组, AMH $<1.1 \mu\text{g/L}$ 为 DOR 组 (489 个周期), AMH $\geq 1.1 \mu\text{g/L}$ 为正常卵巢储备 (normal ovarian reserve, NOR) 组 (5 740 个周期), 通过倾向性评分匹配 (propensity score matching, PSM) 方法控制混杂因素, 经 PSM 1:1 匹配后每组各纳入 486 个周期。采用广义估计方程对比分析匹配后两组患者的临床妊娠率、流产率、活产率、生化妊娠率及异位妊娠率。结果 DOR 组临床妊娠率为 21.19% (103/486), NOR 组临床妊娠率为 24.07% (117/486), 两组差异无统计学意义 ($P=0.294$)。DOR 组活产率为 18.31% (89/486), NOR 组活产率为 20.16% (98/486), 组间差异无统计学意义 ($P=0.469$)。此外, 两组流产率、生化妊娠

率、异位妊娠率差异均无统计学意义 (均 $P>0.05$)。结论 年龄 ≤ 35 岁的 DOR 患者与年轻 NOR 患者行 IUI 的妊娠结局相当。

【关键词】 宫腔内人工授精; 卵巢储备功能减退; 年龄; 临床妊娠率

基金项目: 河南省医学科技攻关计划联合共建项目 (LHGJ20210467、LHGJ20210472)

Pregnancy outcomes analysis in young patients with diminished ovarian reserve undergoing intrauterine insemination: a propensity score-matched cohort study

Jia Qi, Du Xiaofang, Ren Bingnan, Li Jiaheng, Guan Yichun

Reproductive Health Hospital of the Third Affiliated Hospital of Zhengzhou University, Zhengzhou 450052, China

Corresponding author: Guan Yichun, Email: lisamayguan1@126.com

【 Abstract 】 Objective To investigate the pregnancy outcomes in patients ≤ 35 years old with diminished ovarian reserve (DOR) undergoing intrauterine insemination (IUI). **Methods** A retrospective cohort study was conducted by analyzing the clinical data of 6 229 IUI cycles performed in patients aged ≤ 35 years at the Reproductive Health Hospital of the Third Affiliated Hospital of Zhengzhou University between June 2016 and March 2024. Based on serum anti-Müllerian hormone (AMH) levels, the subjects were divided into two groups: patients with AMH <1.1 $\mu\text{g/L}$ were classified as the DOR group (489 cycles), and patients with AMH ≥ 1.1 $\mu\text{g/L}$ were classified as the normal ovarian reserve (NOR) group (5 740 cycles). Propensity score matching (PSM) was applied to control for confounding factors, after 1 : 1 PSM matching, 486 cycles were included in each group. Clinical pregnancy rate, miscarriage rate, live birth rate, biochemical pregnancy rate, and ectopic pregnancy rate were compared between the two groups by generalized estimating equations. **Results** The clinical pregnancy rate was 21.19% (103/486) in DOR group and 24.07% (117/486) in NOR group, with no statistically significant difference ($P=0.294$). The live birth rate was 18.31% (89/486) in DOR group and 20.16% (98/486) in NOR group, also without significant difference ($P=0.469$). Additionally, no significant differences were observed in miscarriage rate, biochemical pregnancy rate, or ectopic pregnancy rate between the two groups (all $P>0.05$). **Conclusion** In patients aged ≤ 35 years with DOR, pregnancy outcomes from IUI are comparable to those in young patients with NOR.

【Key words】 Intrauterine insemination; Diminished ovarian reserve; Age; Clinical pregnancy rate

Fund program: Joint Construction Project of Henan Medical Science and Technology Research Plan (LHGJ20210467, LHGJ20210472)

·临床报道·

DOI: 10. 3760/cma. j. cn101441-20250426-00206

收稿日期 2025-04-26 本文编辑 王李艳

引用本文: 刘航, 秦琦, 张利群. 脂肪质量和肥胖相关蛋白表达与多囊卵巢综合征合并代谢综合征的相关性分析 [J]. 中华生殖与避孕杂志, 2025, 45(11): 1152-1157. DOI: 10.3760/cma.j.cn101441-20250426-00206.

脂肪质量和肥胖相关蛋白表达与多囊卵巢综合征合并代谢综合征的相关性分析

刘航 秦琦 张利群

吉林大学第一医院妇科, 长春 130021

通信作者: 张利群, Email: zllq0812@163.com

【摘要】 目的 揭示脂肪质量和肥胖相关 (fat mass and obesity associated, FTO) 蛋白与多囊卵巢综合征 (polycystic ovary syndrome, PCOS) 合并代谢综合征 (metabolic syndrome, MS) 患者疾病发生的相关性。方法 采用回顾性病例对照研究, 收集 2023 年 12 月至 2024 年 10 月就诊于吉林大学第一医院妇科的 50 例 PCOS 患者 (PCOS 组) 与 54 例健康人群 (对照组) 的一般临床资料及实验室检测指标, PCOS 组根据是否合并 MS 分为 PCOS 未合并 MS 亚组 (PCOS+nMS 亚组, 25 例) 和 PCOS 合并 MS 亚组 (PCOS+MS 亚组, 25 例), 用酶联免疫吸附法检测血清 FTO 蛋白水平。比较 PCOS 组及其亚组与对照组间的临床资料及代谢特征; 分析血清 FTO 蛋白水平与 PCOS 合并 MS 的相关性; 绘制受试者工作特征曲线分析血清 FTO 蛋白水平对 PCOS 合并 MS 的预测能力; 通过多因素 logistic 回归模型评估血清 FTO 蛋白水平与 PCOS 患者合并 MS 的相关性。结果 PCOS 组患者血清 FTO 蛋白水平 [57.42 (45.87, 68.53) $\mu\text{g/L}$] 与 PCOS+nMS 亚组血清 FTO 蛋白水平 [48.41 (37.84, 64.30) $\mu\text{g/L}$] 均显著高于对照组 [45.70 (36.41, 52.86) $\mu\text{g/L}$, $P<0.001$; 校正后 $P=0.016$]; PCOS+MS 亚组血清 FTO 蛋白水平 [60.31 (50.99, 72.28) $\mu\text{g/L}$] 显著高于 PCOS+nMS 亚组 (校正后 $P=0.013$) 及对照组 (校正后 $P<0.001$)。PCOS 组血清 FTO 蛋白水平与体质指数、腹围、收缩压、舒张压、低密度脂蛋白胆固醇、空腹胰岛素、胰岛素抵抗指数均呈正相关 (均 $P<0.05$)。血清 FTO 蛋白水平对 PCOS 预测曲线下面积 (area under the curve, AUC) 值为 0.725 (95% CI: 0.627~0.824); 血清 FTO 蛋白水平对 PCOS 合并 MS 预测 AUC 值为 0.869 (95% CI: 0.762~0.976)。多因素 logistic 回归分析显示, PCOS 患者血清 FTO 蛋白水平对其合并 MS 有显著正向影响 ($OR=1.092$, 95% CI: 1.010~1.180, $P=0.026$)。结论 PCOS 患者血清 FTO 蛋白水平高于健康女性, PCOS 合并 MS 患者血清 FTO 蛋白水平高于未合并 MS 患者。血清 FTO 蛋白水平对 PCOS 发生及 PCOS 合并 MS 有良好预测价值, 且是 PCOS 发生 MS 的独立危险因素。

【关键词】 多囊卵巢综合征; 脂肪质量和肥胖相关蛋白; 代谢综合征

基金项目: 吉林省科技厅自然科学基金 (学科布局项目) (20200201476JC)

Correlation analysis of FTO protein expression with the onset of polycystic ovary syndrome and its coexistence with metabolic syndrome

Liu Hang, Qin Qi, Zhang Liqun

Department of Gynecology, First Hospital of Jilin University, Changchun 130021, China

Corresponding author: Zhang Liqun, Email: zllq0812@163.com

【Abstract】 Objective To reveal the relationship between fat mass and obesity associated (FTO) protein and the occurrence of diseases in patients with polycystic ovary syndrome (PCOS) combined with metabolic syndrome (MS). **Methods** A retrospective case-control study was conducted, and general clinical data and laboratory test indicators of 50 PCOS patients (PCOS group) and 54 healthy individuals (control group) were collected from December 2023 to October 2024. The PCOS group was divided into the PCOS without MS subgroup (PCOS+nMS subgroup, $n=25$) and the PCOS with MS subgroup (PCOS+MS subgroup, $n=25$) based on whether MS was present or not. The expression level of serum FTO protein was detected by enzyme-linked immunosorbent assay method. The clinical data and metabolic characteristics of PCOS patients were analyzed, as well as the correlation between serum FTO protein level and the occurrence of PCOS with MS. Receiver operating characteristic (ROC) curves were drawn to analyze the predictive ability of serum FTO protein level for PCOS combined MS, and the correlation between serum FTO protein level and metabolic status of PCOS patients was evaluated through logistic regression model. **Results** The level of serum FTO protein in the PCOS group [57.42 (45.87, 68.53) $\mu\text{g/L}$], and PCOS+nMS subgroup [48.41 (37.84, 64.30) $\mu\text{g/L}$] was all significantly higher than that in the control [45.70 (36.41, 52.86) $\mu\text{g/L}$, $P<0.001$; adjusted $P=0.016$]. The expression level of serum FTO protein in PCOS+MS subgroup [60.31 (50.99, 72.28) $\mu\text{g/L}$] was significantly higher than that in PCOS+nMS subgroup (adjusted $P=0.013$) and the control (adjusted $P<0.001$). The serum FTO protein expression level in the PCOS group was significantly positively correlated with body mass index, waist circumference, systolic blood pressure, diastolic blood pressure, low density lipoprotein cholesterol, homeostasis model to assess insulin resistance index (all $P<0.05$). The expression level of serum FTO protein had a certain predictive value for PCOS, with an area under the curve (AUC) value of 0.725 (95% CI : 0.627–0.824) and a better predictive value for the occurrence of MS in PCOS, with an AUC value of 0.869 (95% CI : 0.762–0.976) as shown by the ROC curve. Multivariate logistic regression analysis indicated that in PCOS patients, the expression level of serum FTO protein had a significant positive effect on the coexistence of MS, ($OR=1.092$, 95% CI : 1.010–1.180, $P=0.026$). **Conclusion** PCOS patients have higher serum FTO protein levels than healthy women, and PCOS patients with MS have higher serum FTO protein levels than those without MS. The serum FTO protein level has a good predictive value for the occurrence of PCOS and PCOS complicated with MS, and is an independent risk factor for the occurrence of MS in PCOS.

【Key words】 Polycystic ovary syndrome; FTO protein, human; Metabolic syndrome

Fund program: Natural Science Foundation of Jilin Provincial Department of Science and Technology (Discipline Layout Project) (20200201476JC)

DOI: 10.3760/cma.j.cn101441-20250228-00095

收稿日期 2025-02-28 本文编辑 王李艳

引用本文: 黄振宇, 刘煜坤, Enayatullah Nabizada, 等. 输精管结扎手术意愿量表的研制及信度效度评估[J]. 中华生殖与避孕杂志, 2025, 45(11): 1158-1162. DOI: 10.3760/cma.j.cn101441-20250228-00095.

输精管结扎手术意愿量表的研制及信度效度评估

黄振宇 刘煜坤 Enayatullah Nabizada Huleang Keo 阳建福 彭东毅 徐龙 王龙 何乐业 蒋先镇 龙智
中南大学湘雅三医院泌尿外科男性病中心 中南大学性健康研究中心,
长沙 410013
通信作者: 龙智, Email: longzhi522@163.com

【摘要】 目的 编制输精管结扎手术意愿量表并进行信度效度检验, 为测量男性结扎意愿提供评估工具。方法 基于计划行为理论, 并结合文献分析、课题组讨论、专家咨询及预调查研制输精管结扎手术意愿量表, 选取 2023 年 12 月至 2024 年 12 月在中南大学湘雅三医院泌尿外科男性病中心咨询输精管结扎手术的 264 名男性作为调查对象, 通过信度效度检验评价该量表的可靠性与有效性。结果 输精管结扎手术意愿量表包含 3 个维度 (“背景” “立场行为” 及 “信息”) 11 个条目。量表的 Cronbach's α 系数为 0.739, 且各维度与总量表间相关系数分别为 0.849 (“背景” 维度)、0.744 (“立场行为” 维度) 及 0.440 (“信息” 维度), 均大于各维度间的相关系数 (0.145~0.312)。调查结果中, 高意愿男性手术率为 65.7% (92/140), 中等意愿男性手术率为 28.9% (33/114), 低意愿男性手术率为 0% (0/11), 不同意愿水平的男性手术率差异存在统计学意义 ($\chi^2=43.42$, $P<0.001$)。结论 输精管结扎手术意愿量表的信度、效度良好, 可用于测量男性输精管结扎手术意愿强度。

【关键词】 输精管结扎术; 计划行为理论; 信度效度; 问卷调查

Development and evaluation on reliability and validity of vasectomy intention scale

Huang Zhenyu, Liu Yushen, Enayatullah Nabizada, Huleang Keo, Yang Jianfu, Peng Dongyi, Xu Long, Wang Long, He Leye, Jiang Xianzhen, Long Zhi
Andrology Center, Department of Urology, the Third Xiangya Hospital of Central South University; Center for Sexual Health Research, Central South University, Changsha 410013, China

Corresponding author: Long Zhi, Email: longzhi522@163.com

【Abstract】 Objective To develop a vasectomy intention scale (VIS) and evaluate its reliability and validity for assessing men's intentions toward

vasectomy. **Methods** Based on the Theory of Planned Behavior, the VIS was developed through a process that included literature review, panel discussions, expert consultations, and a pilot survey. A total of 264 men seeking vasectomy consultation at the Andrology Center, Department of Urology, the Third Xiangya Hospital of Central South University between December 2023 and December 2024 were recruited to assess reliability and validity of the VIS. **Results** The VIS comprises 11 items across three dimensions: "background" factors, "stance and behavior" factors and "information" factors. The scale demonstrated satisfactory internal consistency (Cronbach's $\alpha=0.739$). Correlations between each dimension and the total scale ("background" factors $r=0.849$, "stance and behavior" factors $r=0.744$, "information" factors $r=0.440$) exceeded inter-dimension correlations (ranging from 0.145 to 0.312), confirming robust construct validity. The vasectomy rates among men with different intention levels were 65.7% (92/140) in the high-intention group, 28.9% (33/114) in the moderate-intention group, and 0% (0/11) in the low-intention group, with a statistically significant difference ($\chi^2=43.42$, $P<0.001$). **Conclusion** The VIS exhibits strong reliability and validity, serving as a validated instrument for measuring the strength of men's vasectomy intentions.

【 Key words 】 Vasectomy; Theory of planned behavior; Reliability and validity; Surveys and questionnaires

个案报道

DOI: 10.3760/cma.j.cn101441-20250509-00223

收稿日期 2025-05-09 本文编辑 宋培培

引用本文: 崔凤姬, 江玉华, 于鹏, 等. *PKD2* 致病突变合并罗氏易位患者行胚胎植入前遗传学检测助孕的 1 例病案报道 [J]. 中华生殖与避孕杂志, 2025, 45(11): 1163-1170. DOI: 10.3760/cma.j.cn101441-20250509-00223.

PKD2 致病突变合并罗氏易位患者行胚胎植入前遗传学检测助孕的 1 例病案报道

崔凤姬¹ 江玉华¹ 于鹏¹ 孙丙成¹ 白春英² 郝海艳¹
¹赤峰市妇产医院生殖医学中心, 赤峰 024000; ²赤峰学院内蒙古人类遗传病研究自治区高等学校重点实验室, 赤峰 024000
通信作者: 郝海艳, Email: cf.wul@163.com

【摘要】 本文报道 1 例常染色体显性遗传多囊肾病 2 型 (polycystic kidney disease type 2, PKD2) 合并罗氏易位患者的胚胎植入前遗传学检测 (preimplantation genetic testing, PGT) 成功案例。患者携带 *PKD2* 基因 c.428del (p. Gly143Alafs*90) 杂合移码突变及 14/15 号染色体罗氏易位, 通过植入前单基

因遗传病检测/植入前染色体结构异常检测/植入前非整倍体检测, 从 6 枚囊胚中筛选出 1 枚未携带致病突变且染色体正常的胚胎进行移植, 最终成功分娩健康女婴。随访至 2025 年 6 月显示婴儿各项发育指标良好。本案例证实 PGT 技术可有效阻断单基因病与染色体异常的双重遗传风险, 为复杂遗传背景患者的优生优育提供了重要临床参考。

【关键词】 生殖技术, 辅助; 常染色体显性遗传多囊肾病; 罗氏易位; 植入前遗传学检测

基金项目: 内蒙古人类遗传病研究自治区高等学校重点实验室开放课题 (YC202501); 内蒙古医学科学院公立医院联合基金项目 (2024GLLH1048)

A case report of preimplantation genetic testing for assisted reproduction in a patient with *PKD2* pathogenic mutation and Robertsonian translocation

Cui Fengji¹, Jiang Yuhua¹, Yu Peng¹, Sun Bingcheng¹, Bai Chunying², Xi Haiyan¹

¹ Reproductive Medicine Center of Chifeng Maternity and Child Health Hospital, Chifeng 024000, China; ² Inner Mongolia Key Laboratory of Human Genetic Diseases Research, Chifeng University, Chifeng 024000, China

Corresponding author: Xi Haiyan, Email: cf.wul@163.com

【Abstract】 This article reports a successful case of preimplantation genetic testing (PGT) in a patient with autosomal dominant polycystic kidney disease type 2 (*PKD2*) combined with Robertsonian translocation. The patient carried a heterozygous frameshift mutation (*PKD2* c.428del, p.Gly143Alafs*90) and a Robertsonian translocation between chromosomes 14 and 15. Through combined PGT for monogenic disorders, structural rearrangements and aneuploidy screening, one euploid blastocyst free of the *PKD2* mutation was selected from six embryos for transfer, resulting in the successful delivery of a healthy female infant. Follow-up until June 2025 confirmed normal developmental milestones. This case demonstrates that PGT can effectively mitigate dual genetic risks (monogenic disease and chromosomal abnormality), providing critical clinical insights for optimizing reproductive outcomes in patients with complex genetic backgrounds.

【Key words】 Reproductive techniques, assisted; Autosomal dominant polycystic kidney disease; Robertsonian translocation; Preimplantation genetic testing

Fund program: The Open Project of Inner Mongolia Autonomous Region Higher Education Key Laboratory of Human Genetic Diseases (YC202501); Joint Fund Project of Inner Mongolia Medical Science Academy and Public Hospitals(2024GLLH1048)

个案报道

DOI: 10.3760/cma.j.cn101441-20250605-00255

收稿日期 2025-06-05 本文编辑 李天琦

引用本文: 罗婷, 王云燕, 袁彩霞, 等. 恶性腹膜间皮瘤细胞减灭术联合腹腔热灌注化疗后行 IVF-ET 助孕治疗的 1 例病案报道 [J]. 中华生殖与避孕杂志, 2025, 45(11): 1171-1174. DOI: 10.3760/cma.j.cn101441-20250605-00255.

恶性腹膜间皮瘤细胞减灭术联合腹腔热灌注化疗后行 IVF-ET 助孕治疗的 1 例病案报道

罗婷¹ 王云燕² 袁彩霞² 宋海霞²

¹山西医科大学第五临床医学院, 太原 030012; ²山西省人民医院生殖医学科, 太原 030012

通信作者: 宋海霞, Email: 271905774@qq.com

【摘要】 恶性腹膜间皮瘤 (malignant peritoneal mesothelioma, MPM) 作为一种高度侵袭性的腹膜原发性恶性肿瘤, 其治疗过程会导致女性生殖器官结构受损和功能减退。本文报道 1 例经细胞减灭术 (cytoreductive surgery, CRS) 联合腹腔热灌注化疗 (hyperthermic intraperitoneal chemotherapy, HIPEC) 治疗后的 MPM 患者, 成功实施体外受精-胚胎移植并获得活产的临床案例, 并复习相关文献报道, 讨论获益和潜在风险。MPM 患者在接受 CRS 联合 HIPEC 的综合治疗后, 存在成功妊娠的可能性, 但此类患者的妊娠过程伴随着不容忽视的临床风险。当前循证数据有限, 尚需更为充分的临床证据予以支持。

【关键词】 体外受精; 不孕; 胚胎移植; 腹膜间皮瘤

One case report of IVF-ET for a patient with malignant peritoneal mesothelioma after cytoreductive surgery combined with hyperthermic intraperitoneal chemotherapy

Luo Ting¹, Wang Yunyan², Yuan Caixia², Song Haixia²

¹ The Fifth Clinical Medical College of Shanxi Medical University, Taiyuan 030012, China; ² Reproductive Center, Shanxi Provincial People's Hospital, Taiyuan 030012, China

Corresponding author: Song Haixia, Email: 271905774@qq.com

【 Abstract 】 Malignant peritoneal mesothelioma (MPM), as a highly aggressive primary malignant tumor of the peritoneum, often leads to structural damage and functional impairment of female reproductive organs during its treatment course. This study presents a clinical case of an MPM patient who underwent cytoreductive surgery (CRS) combined with hyperthermic intraperitoneal chemotherapy (HIPEC), subsequently achieving successful live birth through *in vitro* fertilization and embryo transfer. A comprehensive review of relevant literature was conducted to analyze both the potential benefits and associated risks. While the possibility of successful pregnancy exists for MPM patients following combined CRS and HIPEC treatment, significant clinical risks during the gestational process cannot be overlooked. Current evidence remains limited, necessitating more robust clinical data to substantiate these findings.

【Key words】 *In vitro* fertilization; Infertility; Embryo transfer; Peritoneal mesothelioma

综述

DOI: 10.3760/cma.j.cn101441-20250508-00222

收稿日期 2025-05-08 本文编辑 宋培培

引用本文: 马梦琪, 熊正方. 人工智能在子宫内膜容受性评估的应用进展[J]. 中华生殖与避孕杂志, 2025, 45(11): 1175-1178. DOI: 10.3760/cma.j.cn101441-20250508-00222.

人工智能在子宫内膜容受性评估的应用进展

马梦琪¹ 熊正方²

¹青海大学研究生院, 西宁 810016; ²青海省人民医院生殖中心, 西宁 810007

通信作者: 熊正方, Email: bearandcow200348@163.com

【摘要】 成功的胚胎着床需要高质量的胚胎和具有高容受性的子宫内膜。然而, 目前尚无公认的评估子宫内膜容受性 (endometrial receptivity, ER) 的权威技术, 近年来, 人工智能 (artificial intelligence, AI) 技术在 ER 评估中的应用取得了显著进展, 在超声图像分析中, AI 通过深度学习技术提高了子宫内膜分割和测量的精确性, 并能够结合临床数据进行妊娠结局预测。在组织学分析中, AI 算法能够快速准确地识别子宫内膜组织学特征, 并分析上皮和间质细胞的比例。在基因组诊断中, AI 通过机器学习方法分析子宫内膜基因表达, 为个性化胚胎移植提供了科学依据。尽管 AI 在 ER 评估中展现出巨大潜力, 但其应用仍面临数据标准化、算法泛化能力等挑战。未来应进行更多大样本、前瞻性、随机对照研究, 提升 AI 工具的稳定性及泛化能力。本文对 AI 在 ER 评估中的应用进行综述, 总结最新研究进展, 为进一步研究提供参考。

【关键词】 人工智能; 子宫内膜; 机器学习; 子宫内膜容受性; 种植窗

Application progress of artificial intelligence in the evaluation of endometrial receptivity

Ma Mengqi¹, Xiong Zhengfang²

¹ Graduate School of Qinghai University, Xining 810016, China; ² Reproductive Center of Qinghai Provincial People's Hospital, Xining 810007, China

Corresponding author: Xiong Zhengfang, Email: bearandcow200348@163.com

【Abstract】 Successful embryo implantation requires high-quality embryos and endometrium with high receptivity. However, there is no universally recognized authoritative technique for evaluating endometrial receptivity (ER) at present. In recent years, the application of artificial intelligence (AI) technology in the assessment of ER has achieved remarkable progress. In ultrasound image

analysis, AI has improved the accuracy of endometrial segmentation and measurement through deep learning technology, and can combine clinical data for pregnancy outcome prediction. In histological analysis, AI algorithms can quickly and accurately identify histological features of the endometrium and analyze the ratio of epithelial and stromal cells. In genomic diagnosis, AI analyzes endometrial gene expression through machine learning methods to provide scientific basis for personalized embryo transfer. Although AI shows great potential in the assessment of ER, its application still faces challenges such as data standardization and algorithm generalization ability. In the future, through multi-center data sharing and algorithm optimization, AI is expected to play a greater role in assisted reproductive technology. This article reviews the application of AI in ER assessment, summarizes the latest research progress, and provides references for further research.

【 Key words 】 Artificial intelligence; Endometrium; Machine learning; Endometrial receptivity; Window of implantation

综述

DOI: 10.3760/cma.j.cn101441-20250513-00226

收稿日期 2025-05-13 本文编辑 王李艳

引用本文: 张淑蕾, 王秋敏, 吴忧, 等. 输卵管积水及其治疗策略对卵巢反应和胚胎质量影响的研究进展[J]. 中华生殖与避孕杂志, 2025, 45(11): 1179-1183. DOI: 10.3760/cma.j.cn101441-20250513-00226.

输卵管积水及其治疗策略对卵巢反应和胚胎质量影响的研究进展

张淑蕾¹ 王秋敏² 吴忧¹ 颜磊¹

¹山东大学附属生殖医院妇科 山东大学国家辅助生殖与优生工程技术研究中心, 济南 250012; ²浙江大学医学院附属妇产科医院生殖医学科, 杭州 310006

通信作者: 颜磊, Email: yanlei@sdu.edu.cn

【摘要】 输卵管积水是女性不孕的常见原因之一, 也是慢性输卵管炎症中较为常见的类型, 其可能通过对胚胎的机械性冲刷、胚胎毒性、降低子宫内膜容受性、抑制卵巢功能等多种机制降低辅助生殖技术的成功率。现有研究中输卵管积水及其治疗策略对控制性超促排卵时卵巢反应的影响尚存争议, 且输卵管积水对胚胎质量影响方面的研究较少。本文通过阐明输卵管积水的病理生理机制, 分析其对卵巢反应和胚胎质量的潜在影响, 并进一步探讨输卵管积水的治疗策略对辅助生殖结局的影响。

【关键词】 生殖技术, 辅助; 输卵管积水; 卵巢反应; 胚胎质量
基金项目: 国家自然科学基金 (82571902)

Advances in the study of tubal hydrosalpinx and the effect of its treatment strategy on ovarian response and embryo quality

Zhang Shulei¹, Wang Qiumin², Wu You¹, Yan Lei¹

¹ Department of Gynaecology, Reproductive Hospital Affiliated to Shandong University; National Research Center for Assisted Reproductive Technology and Reproductive Genetics, Shandong University, Jinan 250012, China; ² Reproductive Medicine Department, Obstetrics and Gynecology Hospital, School of Medicine, Zhejiang University, Hangzhou 310006, China

Corresponding author: Yan Lei, Email: yanlei@sdu.edu.cn

【Abstract】 Hydrosalpinx is one of the common causes of female infertility and a more common type of chronic tubal inflammation. Hydrosalpinx may reduce the success of assisted reproductive technology (ART) through a variety of mechanisms, including mechanical flushing of the embryo, embryo toxicity, reduced endometrial receptivity, and suppression of ovarian function. The effect of hydrosalpinx and its treatment strategy on ovarian response during controlled superovulation is controversial in existing studies, and there are fewer studies on the effect of hydrosalpinx on embryo quality. In this article, we clarify the pathophysiological mechanisms of hydrosalpinx, analyze its potential impact on ovarian response and embryo quality, and further explore the impact of therapeutic strategies for tubal hydrosalpinx on ART outcomes.

【Key words】 Reproductive technology, assisted; Hydrosalpinx; Ovarian response; Embryo quality

Fund program: National Natural Science Foundation of China (82571902)

综述

DOI: 10.3760/cma.j.cn101441-20250507-00221

收稿日期 2025-05-07 本文编辑 孙敏

引用本文: 龙彦, 王天池, 朱勇. 人乳头瘤病毒感染与男性不育相关性研究进展[J]. 中华生殖与避孕杂志, 2025, 45(11): 1184-1188. DOI: 10.3760/cma.j.cn101441-20250507-00221.

人乳头瘤病毒感染与男性不育相关性研究进展

龙彦¹ 王天池¹ 朱勇²

¹ 南京中医药大学研究生院, 南京 210023; ² 南京中医药大学附属盐城中医院男科, 盐城 224001

通信作者: 朱勇, Email: yczyнк@126.com

【摘要】 男性不育的发病率逐年上升, 其发病机制尚未完全明确, 与多种因素相关。其中性传播感染是导致男性不育的重要因素之一。性传播感染由包括人乳头瘤病毒 (human papillomavirus, HPV) 等在内的多种病原体引起, 可通过多种病理生理机制影响男性生育能力。然而, 目前对 HPV 感染影响男性生育能力的研究

仍然有限。本文对 HPV 感染对男性生殖系统结构与功能、精液参数及精子质量的影响进行综述, 探讨 HPV 相关临床管理与男性生育力保护之间的关联。通过深入解析 HPV 对男性生殖系统的致病机制, 追溯其导致男性不育的潜在病因, 旨在为优化生育指导策略和开发潜在抗病毒治疗方案提供理论依据。

【关键词】 人乳头瘤病毒; 性传播疾病; 男性不育症

基金项目: 江苏省科技厅科研项目 (BRA2019214) ; 江苏省老年健康科研项目 (LR2021051) ; 江苏省研究生实践计划项目 (SJCX24_1031)

Research progress on the correlation between human papillomavirus infection and male infertility

Long Yan¹, Wang Tianchi¹, Zhu Yong²

¹ Graduate School of Nanjing University of Chinese Medicine, Nanjing 210023, China; ²

Department of Andrology Yancheng Traditional Chinese Medicine Hospital; Affiliated to Nanjing University of Chinese Medicine, Yancheng 224001, China

Corresponding author: Zhu Yong, Email: yczyнк@126.com

【 Abstract 】 The incidence of male infertility has been progressively increasing, its pathogenesis still incompletely elucidated and associated with multifactorial etiologies. Among these, sexually transmitted infections (STIs) constitute a significant contributing factor to male infertility. STIs, caused by various pathogens including human papillomavirus (HPV), may impair male fertility through diverse pathophysiological mechanisms. Nevertheless, current investigations into the impact of HPV infection on male reproductive capacity remain limited. This review critically examines the effects of HPV infection on the anatomical and functional integrity of the male reproductive system, semen parameters, and sperm quality, while exploring the correlation between HPV-related clinical management and male fertility preservation. Through comprehensive elucidation of HPV's pathogenic mechanisms within the male reproductive system and identification of its potential etiological contributions to male infertility, this review aims to provide theoretical foundations for optimizing fertility guidance protocols and developing novel antiviral therapeutic interventions, thereby advancing clinical strategies for reproductive health management and inform future research directions in antiviral treatment development.

【 Key words 】 Human papillomavirus; Sexually transmitted diseases; Male infertility

Fund program: Scientific Research Program of Jiangsu Provincial Science and Technology Department (BRA2019214); Elderly Health Research Program of Jiangsu Province (LR2021051); Postgraduate Research & Practice Innovation Program of Jiangsu Province (SJCX24_1031)