

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41卷 第5期 2021年5月25日出版

主 管

中国科学技术协会

主 办

中华医学会
上海市计划生育科学研究所
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:randc@sippr.org.cn
http://zhszybyzz.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

广告发布登记号

京东市监广登字20200006号

印 刷

上海商务联西印刷有限公司

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,100044)
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:randc@sippr.org.cn

定 价

每期30.00元,全年360.00元

中国标准连续出版物号

ISSN 2096-2916

CN 10-1441/R

2021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

规范与标准

女性生育力保存临床实践
中国专家共识中国妇幼保健协会生育力保存专业委员会 383

子宫内腔容受性专栏

低氧诱导因子-1 α 与子宫内腔容受性相关性及其分子机制
研究进展梁利霞 刘艳玲 张秀萍等 392
富血小板血浆改善子宫内腔容受性的
研究进展李丽斐 张克樊 张学红 398
脂代谢对子宫内腔容受性的影响林韵颖 孙贇 402
宫腔粘连对子宫内腔容受性的影响与治疗研究进展常亚楠 段华 408
辅助生殖治疗中子宫内腔容受性评估相关临床指标的
研究进展谢宛喬 李蓉 413

临床研究

倾向性得分匹配分析卵巢储备功能减退人群拮抗剂方案
延迟启动的效果韩艳 邓星 彭伟等 419
腹腔镜下输卵管近端结扎联合远端造口术与IVF-ET间隔时间对
妊娠结局和子代出生情况影响的研究范丽娟 李小娟 师娟子等 425
两种钙离子载体A23187和离子霉素对卵母细胞
激活效果的比较贾磊 何姝婧 苏文龙等 432

流行病学研究

人工流产史与死胎死产的关系:云南17万妇女的前瞻性
队列研究姜楠 赵子高 车焱等 440

综 述

免疫代谢调控子宫内腔微环境和母-胎免疫耐受的
研究进展刁梁辉 蔡松辰 刘苏等 448
营养物质对精子发生和精液质量影响的
研究进展何起娜 马艳 姚桂东等 456

实验室管理

关于新型冠状病毒肺炎疫情暴发期间IVF实验室防护的
探讨徐鸿毅 陈鑫 田佳蓉等 462

热点追踪

女性生殖医学研究热点——基于科学知识图谱的
文献计量分析王亚辉 袁天蔚 李大金 467

《女性生育力保存临床实践中国专家共识》知识问答 412

《中华生殖与避孕杂志》稿约封三

本期责任编辑 李蓉 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 41, Number 5

May 25, 2021



Responsible Institution

China Association for Science and Technology

Sponsor

Chinese Medical Association, Shanghai Institute of Planned Parenthood Research, 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: randc@sippr.org.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

Business Book Printing Shop Shanghai Printing Co., LTD

Overseas Distributor

China International Book Trading Corporation
P.O. Box 399, Beijing 100044, 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: randc@sippr.org.cn

CSSN

ISSN 2096-2916
CN 10-1441/R

Copyright © 2021 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

Standards and Specifications

Chinese expert consensus on clinical practice of female fertility preservation ...383
Fertility Preservation Committee of Chinese Maternal and Child Association

Endometrial Receptivity Column

Advances in molecular mechanisms of the association between hypoxia inducible factor-1 α and endometrial receptivity392

Liang Lixia, Liu Yanling, Zhang Xiuping, et al

Research of platelet-rich plasma on endometrial receptivity398

Li Lifei, Zhang Kefan, Zhang Xuehong

Effect of lipid metabolism on endometrial receptivity402

Lin Yunying, Sun Yun

Progress in the effect and treatment of intrauterine adhesions on endometrial receptivity408

Chang Yanan, Duan Hua

Clinical index of endometrial receptivity in assisted reproductive therapy413

Xie Wanyi, Li Rong

Clinical Studies

Propensity score matching analysis of delayed start protocol with gonadotropin-releasing hormone antagonist in patients with diminished ovarian reserve419

Han Yan, Deng Xing, Peng Wei, et al

Effects of the interval between laparoscopic proximal hydrosalpinx ligation combined with salpingostomy operation and IVF-ET on pregnancy and neonate outcomes425

Fan Lijuan, Li Xiaojuan, Shi Juanzi, et al

Effects of artificial oocyte activation with A23187 versus ionomycin on clinical outcomes432

Jia Lei, He Shujing, Su Wenlong, et al

Epidemiological Studies

Association of induced abortion history with subsequent stillbirth: a prospective population-based cohort study including 170 thousand women in Yunnan Province, China440

Jiang Nan, Zhao Zigao, Che Yan, et al

Reviews

Advances on the immunometabolism in regulating the endometrial microenvironment and maternal-fetal tolerance448

Diao Lianghui, Cai Songchen, Liu Su, et al

Advances on the effects of nutrients on male spermatogenesis and semen quality456

He Qina, Ma Yan, Yao Guidong, et al

Laboratory Management

Management strategies and suggestions for *in vitro* fertilization laboratory during the epidemic period of novel coronavirus pneumonia462

Xu Hongyi, Chen Xin, Tian Jiarong, et al

Hot Topics

Hot topics of female reproductive medicine: bibliometric analysis based on scientific knowledge map467

Wang Yahui, Yuan Tianwei, Li Dajin

DOI: 10.3760/cmaj.cn101441-20210228-00092

收稿日期 2021-03-04 责任编辑 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. 女性生育力保存临床实践中国专家共识[J]. 中华生殖与避孕杂志, 2021, 41(5): 383-391. DOI: 10.3760/cmaj.cn101441-20210228-00092.

女性生育力保存临床实践中国专家 共识

中国妇幼保健协会生育力保存专业委员会

通信作者: 李文, Email: liwen@smmu.edu.cn, 电话: +86-

13601858540; 千日成, Email: rchian@126.com, 电话: +86-

18917687092

【摘要】 近年来随着女性生育力保存的需求日益增加, 生育力保存相关技术和方法不断得以完善。为了建立适合我国女性生育力保存的实践体系, 中国妇幼保健协会生育力保存专业委员会组织专家参考多国的最新指南, 结合国内临床实践情况和专家意见, 编写了本共识, 包括女性生育力保存的适应证以及生育力保存技术和方法两部分内容, 为临床常见的适合生育力保存的疾病提供诊疗路径, 为生育力保存技术的临床应用提供实践指南, 从而规范临床诊疗, 推动我国生育力保存工作有序发展。

【关键词】 生育力保存; 肿瘤; 生殖技术, 辅助; 卵母细胞冷冻; 卵巢组织冷冻

Chinese expert consensus on clinical practice of female fertility preservation

Fertility Preservation Committee of Chinese Maternal and Child Association

Corresponding author: Li Wen, Email: liwen@smmu.edu.cn, Tel: +86-13601858540; Qian Richeng, Email: rchian@126.com, Tel: +86-18917687092

【Abstract】 Recently, with the increasing demand for female fertility preservation, fertility preservation related technologies have been improved. In order to establish the practice program of female fertility preservation in China, referring to the current clinical practice guideline of some countries, combined with our clinical practice and expert opinions, Chinese Maternal and Child Health Association Affiliated Fertility Preservation Professional Committee organized some specialists to comply this consensus. The consensus includes two parts: indications of female fertility preservation and fertility preservation techniques, seeking to be

inclusive regarding indications for fertility preservation, and provide practical guidance for the clinical application of fertility preservation technologies.

【Key words】 Fertility preservation; Neoplasms; Reproductive techniques, assisted; Oocyte cryopreservation; Ovarian tissue cryopreservation

·子宫内膜容受性专栏·

DOI: 10.3760/cmaj.cn101441-20200706-00380

收稿日期 2020-07-10 本文编辑 孙敏

引用本文: 梁利霞, 刘艳玲, 张秀萍, 等. 低氧诱导因子-1 α 与子宫内膜容受性相关性及其分子机制研究进展[J]. 中华生殖与避孕杂志, 2021, 41(5): 392-397. DOI: 10.3760/cmaj.cn101441-20200706-00380.

低氧诱导因子-1 α 与子宫内膜容受性相关性及其分子机制研究进展

梁利霞 刘艳玲 张秀萍 张志平 武学清

山西省妇幼保健院生殖医学中心, 太原 030013

通信作者: 武学清, Email: xueqingwu416@126.com, 电话: +86-13643457285

【摘要】 子宫内膜容受性异常导致胚胎着床失败是复发性流产 (recurrent spontaneous abortion, RSA) 和胚胎反复种植失败 (recurrent implantation failure, RIF) 的重要原因。子宫内膜容受性的建立是多种细胞因子、化学分子参与的一个复杂的生理过程, 其机制尚不明确。胚胎着床过程中, 子宫内膜处于生理性低氧、低能量供给状态, 此时细胞内低氧应答机制启动。低氧诱导因子-1 α (hypoxia inducible factor-1 α , HIF-1 α) 通过对血管生成、糖代谢、自噬等多种机制的调节参与了子宫内膜蜕膜化, 从而使着床顺利进行。本文就 HIF-1 α 在子宫内膜的表达及其在子宫内膜容受性的建立过程中可能的分子机制进行阐述。

【关键词】 低氧诱导因子-1 α ; 血管内皮生长因子; 糖代谢; 自噬; 子宫内膜容受性

基金项目: 国家自然科学基金 (81001534); 山西省妇幼保健院级科研课题 (202014)

Advances in molecular mechanisms of the association between hypoxia inducible factor-1 α and endometrial receptivity

Liang Lixia, Liu Yanling, Zhang Xiuping, Zhang Zhiping, Wu Xueqing

Center for Reproductive Medicine, Shanxi Maternal and Child Health Hospital, Taiyuan 030013, China

Corresponding author: Wu Xueqing, Email: wuxueqq@126.com, Tel: +86-13643457285

【Abstract】 It is well known that not only the embryo quality but also the endometrial receptivity leads to the unsuccessful embryo implantation, which is the cause of recurrent spontaneous abortion (RSA) and recurrent implantation failure (RIF). The establishment of endometrial receptivity is a complex physiological process involving multiple cytokines and chemical moleculars, and the mechanisms are not yet clear. During embryo implantation, the endometrium is in a state of physiological hypoxia and low energy supply. At this time, the intracellular hypoxia response mechanism is activated. Hypoxia inducible factor-1 α (HIF-1 α) participates in endometrial decidualization by regulating various molecular mechanisms, such as angiogenesis, glucose metabolism and autophagy, thereby enabling implantation to proceed smoothly. This article describes the expression of HIF-1 α in the endometrium and its possible molecular mechanism during the establishment of endometrial receptivity.

【Key words】 Hypoxia inducible factor-1 α ; Vascular endothelial growth factor; Glucose metabolism; Autophagy; Endometrial receptivity

Fund program: National Natural Science Foundation of China (81001534); Hospital Foundation of Shanxi Maternal and Child Health Hospital (202014)

·子宫内膜容受性专栏·

DOI: 10.3760/cmaj.cn101441-20200422-00237

收稿日期 2020-04-30 责任编辑 李天琦

引用本文: 李丽斐, 张克樊, 张学红. 富血小板血浆改善子宫内膜容受性的研究进展[J]. 中华生殖与避孕杂志, 2021, 41(5): 398-401. DOI: 10.3760/cmaj.cn101441-20200422-00237.

富血小板血浆改善子宫内膜容受性的研究进展

李丽斐¹ 张克樊² 张学红¹

¹兰州大学第一医院生殖医学中心 730000; ²兰州大学医学院 730000

通信作者: 李丽斐, Email: candyjoe34@yahoo.com, 电话: +86-

13893103726

【摘要】 胚胎着床和妊娠的维持是多因素参与且相互影响的过程。子宫内膜容受性异常是反复种植失败患者的重要病因之一。目前提高内膜容受性的方法主要有宫腔搔刮、各种药物宫腔灌注、封闭抗体治疗及针灸等, 治疗后受益有限。近年来有研究采用富血小板血浆 (platelet-rich plasma, PRP) 宫腔灌注的治疗方法试

图对种植窗期子宫内膜进行调节，受到众多关注。本文对 PRP 在改善子宫内膜容受性方面的应用进行了综述， 以期 为 临 床 治 疗 及 未 来 科 学 研 究 提 供 参 考。

【关键词】 反复种植失败； 子宫内膜容受性； 富血小板血浆

基金项目：兰州大学第一医院院内基金（LDYYN2018-65）

Research of platelet-rich plasma on endometrial receptivity

Li Lifei¹, Zhang Kefan², Zhang Xuehong¹

¹ Reproductive Medicine Center of the First Hospital of Lanzhou University, Lanzhou 730000, China; ² Medicine College of Lanzhou University, Lanzhou 730000, China

Corresponding author: Li Lifei, Email: candyjoe34@yahoo.com, Tel: +86-13893103726

【Abstract】 Embryo implantation and pregnancy maintenance are multiple factors involved and interactive processes. Abnormal endometrial receptivity is one of the important causes of repeated implantation failure. At present, the main methods to improve endometrial receptivity are uterine curettage, uterine perfusion with various drugs, blocking antibody therapy and acupuncture, but the benefit is limited. Recently more attention has been paid to the treatment of uterine perfusion with platelet-rich plasma in order to regulate the endometrial receptivity during implantation window. In this paper, we reviewed the clinical application of platelet-rich plasma for clinical treatment and future research.

【Key words】 Repeated implantation failure; Endometrial receptivity; Platelet-rich plasma

Fund program: Hospital Fund of the First Hospital of Lanzhou University (LDYYN2018-65)

·子宫内膜容受性专栏·

DOI: 10.3760/cmaj.cn101441-20200929-00540

收稿日期 2020-10-12 本文编辑 孙敏

引用本文: 林韵颖, 孙贇. 脂代谢对子宫内膜容受性的影响[J]. 中华生殖与避孕杂志, 2021, 41(5): 402-407.

DOI: 10.3760/cmaj.cn101441-20200929-00540.

脂代谢对子宫内膜容受性的影响

林韵颖 孙贇

上海交通大学医学院附属仁济医院生殖医学中心, 上海市辅助生殖与优

生重点实验室 200135

通信作者: 孙贇, Email: syun163@163.com

【摘要】 胚胎反复植入失败是目前生殖医学领域的重要难题之一, 而子宫内膜容受性降低在胚胎反复植入失败中发挥重要作用。随着脂质组学、代谢组学等技

术的发展,研究表明通过调控脂代谢可影响子宫内膜容受性,且推测该过程以调控前列腺素的生成为中心环节。增进对子宫内膜脂代谢的理解,有助于确定胚胎移植的准确时间,降低植入失败率。本文将系统阐述磷脂代谢产物、胆固醇及脂肪代谢对于子宫内膜容受性的影响,为预测和改善子宫内膜容受性提供新思路。

【关键词】 子宫内膜容受性; 脂代谢; 前列腺素; 溶血磷脂酸; 内源性大麻素

Effect of lipid metabolism on endometrial receptivity

Lin Yunying, Sun Yun

Centre for Reproductive Medicine, Renji Hospital, Shanghai Jiao Tong University School of Medicine, Shanghai Key Laboratory for Assisted Reproduction and Reproductive Genetics, Shanghai 200135, China

Corresponding author: Sun Yun, Email: syun163@163.com

【Abstract】 Repeated implantation failure is currently one of the most difficult problems in reproductive medicine, and impaired endometrial receptivity plays an important role in repeated implantation failure. In recent years, with the development of lipidomics and metabolomics, it has been found that the endometrial receptivity can be affected by the regulation of lipid metabolism, and it is hypothesized that prostaglandins may be the intersection of the underlying mechanism. Enhancing the understanding of endometrial lipid metabolism helps to determine the exact time for embryo transfer and reduce the rate of implantation failure. In this article, we systematically review the effects of phospholipid metabolites, cholesterol and fat metabolism on endometrial receptivity, providing new ideas for predicting and improving endometrial receptivity.

【Key words】 Endometrial receptivity; Lipid metabolism; Prostaglandins; Lysophosphatidic acid; Endocannabinoids

·子宫内膜容受性专栏·

DOI: 10.3760/cmaj.cn101441-20200910-00493

收稿日期 2020-09-16 责任编辑 宋培培

引用本文: 常亚楠, 段华. 宫腔粘连对子宫内膜容受性的影响与治疗研究进展[J]. 中华生殖与避孕杂志, 2021, 41(5): 408-412. DOI: 10.3760/cmaj.cn101441-20200910-00493.

宫腔粘连对子宫内膜容受性的影响与治疗研究 进展

常亚楠 段华

首都医科大学附属北京妇产医院妇科微创中心 100006

通信作者: 段华, Email: duanhuasci@163.com, 电话: +86-10-65235524

【摘要】 子宫内膜容受性在胚胎着床中起重要作用。子宫内膜损伤所致的宫腔粘连是子宫性不孕的常见原因。对子宫内膜容受性的影响除了引起内膜及宫腔的形态结构改变, 还从分子生物学方面影响相关因子的表达。宫腔粘连的治疗采用以手术为主的综合治疗方案, 对重塑内膜和宫腔的形态有一定的效果, 但患者的妊娠率及活产率仍不理想。近年来, 改善子宫内膜容受性进而达到功能性修复子宫内膜越来越成为研究的焦点, 并且已有研究取得初步进展。本文从形态学和分子生物学水平阐述宫腔粘连对子宫内膜容受性的影响, 并在此基础上对相关治疗进展进行综述。

【关键词】 宫腔粘连; 子宫内膜容受性; 治疗
基金项目: 国家重点研发计划(2018YFC1004803)

Progress in the effect and treatment of intrauterine adhesions on endometrial receptivity

Chang Yanan, Duan Hua

Department of Minimally Invasive Gynecology, Beijing Obstetrics and Gynecology Hospital, Capital Medical University, Beijing 100006, China

Corresponding author: Duan Hua, Email: duanhuasci@163.com, Tel: +86-10-65235524

【Abstract】 Endometrial receptivity plays an important role in embryo implantation. Intrauterine adhesions induced by endometrial damage are a common cause of uterine infertility. The influence on endometrial receptivity includes not only the changes in the morphology and structure of endometrium, but also the expression of related factors of molecular biology. The comprehensive treatment of intrauterine adhesions based on surgery has a certain effect on remodeling the endometrium and the morphology of the uterine cavity, however, the pregnancy rate and live birth rate are both still unsatisfactory. Recently, improving endometrial receptivity to achieve functional repair of endometrium has become the focus of research, and some progress has been made. This article reviews the influence of intrauterine adhesions on endometrial receptivity and the progress of related treatment.

【Key words】 Intrauterine adhesions; Endometrial receptivity; Treatment

Fund program: National Key Research and Development Program of China (2018YFC1004803)

·子宫内膜容受性专栏·

DOI: 10.3760/cmaj.cn101441-20200226-00086

收稿日期 2020-03-02 本文编辑 王李艳

引用本文: 谢宛裔, 李蓉. 辅助生殖治疗中子宫内膜容受性评估相关临床指标的研究进展[J]. 中华生殖与避孕杂志, 2021, 41(5): 413-418. DOI: 10.3760/cma.j.cn101441-20200226-00086.

辅助生殖治疗中子宫内膜容受性评估相关临床指标的研究进展

谢宛裔 李蓉

北京大学第三医院妇产科生殖医学中心 100191

通信作者: 李蓉, Email: roseli001@sina.com, 电话: +86-

15611908999

【摘要】 近年来辅助生殖技术(assisted reproductive technology, ART)不断发展,但目前单次移植的临床妊娠率仅为30%~40%。反复种植失败是困扰患者和临床医生的重要难题,子宫内膜容受性和胚胎质量这两大因素影响着妊娠结局。如何合理、客观地评价子宫内膜容受性一直是备受关注的问题。本文主要综述目前用于评估子宫内膜容受性的临床指标、形态学特征、细胞因子及各类受体、子宫内膜容受性芯片评估方法,总结分析各种评估方法目前的临床运用及对辅助生殖助孕结局的预测作用,以期临床工作者对子宫内膜容受性的评估及改善治疗带来一定的帮助,提高ART妊娠率。

【关键词】 生殖技术, 辅助; 反复种植失败; 子宫内膜容受性; 超声; 分子标志物

基金项目: 首都医学科学发展科研基金(2018-1-4091)

Clinical index of endometrial receptivity in assisted reproductive therapy

Xie Wanyi, Li Rong

Center for Reproductive Medicine, Department of Obstetrics and Gynecology, Peking University Third Hospital, Beijing 100191, China

Corresponding author: Li Rong, Email: roseli001@sina.com, Tel: +86-15611908999

【Abstract】 Although there has been exponential progress in the assisted reproductive technology (ART) in recent years, the clinical pregnancy rate of single embryo transfer hovers between 30%–40%. Recurrent implantation failure, which is mainly affected by the endometrial receptivity and the quality of the embryo, has been an important problem for patients and clinicians. Therefore, how to evaluate the endometrial receptivity objectively and appropriately has become a concern. In this review, the current relative factors of endometrium in different aspects are summarized from many studies, including clinical index, morphological characteristics, cytokines, different kinds of receptors and endometrial receptivity array. The current clinical application of various evaluation methods and their predictive function on the outcome of ART were summarized and analyzed. This

review aims to help clinicians to make better assessment of the endometrial receptivity and improve therapeutic strategies to raise the pregnancy rate of ART.

【Key words】 Reproductive technology, assisted; Recurrent implantation failure; Endometrial receptivity; Ultrasound; Molecular marker

Fund program: Capital Medical Development Research Fund (2018-1-4091)

·临床研究·

DOI: 10.3760/cmaj.cn101441-20200606-00332

收稿日期 2020-06-11 本文编辑 宋培培

引用本文: 韩艳, 邓星, 彭伟, 等. 倾向性得分匹配分析卵巢储备功能减退人群拮抗剂方案延迟启动的效果[J]. 中华生殖与避孕杂志, 2021, 41(5): 419-424. DOI: 10.3760/cmaj.cn101441-20200606-00332.

倾向性得分匹配分析卵巢储备功能 减退人群拮抗剂方案延迟启动的效 果

韩艳 邓星 彭伟 李清 段超群 刘珍

宜春市妇幼保健院生殖科 336000

通信作者: 韩艳, Email: peiyanhan1234@163.com, 电话: +86-

15160028685

【摘要】 目的 探讨卵巢储备功能减退人群采用拮抗剂方案延迟启动时间的临床效果及费效比。方法 回顾性队列研究分析 2017 年 7 月至 2019 年 12 月期间在宜春市妇幼保健院生殖科采用拮抗剂方案促排卵后行体外受精/卵胞质内单精子显微注射(*in vitro* fertilization/intracytoplasmic sperm injection, IVF/ICSI)的卵巢储备功能减退患者, 根据启动时机分为延迟启动组和正常启动组, 其中延迟启动组共 43 个周期, 启动时间为月经第 7~10 日, 正常启动组共 333 个周期, 启动时间为月经第 2~4 日, 比较两组患者控制性卵巢刺激(controlled ovarian stimulation, COS)的促排卵情况、临床结局及费效比。将两组患者的年龄、不孕年限、体质量指数、启动日卵泡刺激素(follicle-stimulating hormone, FSH)、窦卵泡数(antral follicular count, AFC)、抗苗勒管激素(anti-Müllerian hormone, AMH)及促性腺激素(gonadotropin, Gn)启动剂量进行倾向性得分匹配(propensity score matching, PSM), 匹配后再次分析, 以减少数据分组不均带来的误差。结果 PSM 前 Gn 使用时间[(8.0±2.0) d]、Gn 使用总量[(1 740.1±561.2) IU]、人绒毛膜促性腺激素(human chorionic

hormone, hCG)注射日雌二醇[(1 371.2±1 203.3) ng/L]、获卵数[(5.1±5.1)枚]、M_{II}卵数[(4.4±4.3)枚]延迟启动组低于正常启动组[(9.0±2.0) d, $P<0.001$; (2 055.1±634.7) IU, $P<0.001$; (1 853.5±1 351.5) ng/L, $P=0.03$; (7.0±5.5)枚, $P=0.03$; (6.1±4.8)枚, $P=0.03$], 正常受精率(71.7%±32.1%)高于正常启动组(58.9%±31.2%, $P=0.01$), 每一启动周期总费用[(14 179.9±2 909.4)元]低于正常启动组[(16 003.6±2 543.1)元, $P<0.001$]。PSM后两组比较hCG注射日雌二醇、获卵数、M_{II}卵数差异均无统计学意义(P 均 >0.05), 延迟启动组Gn使用时间[(7.9±2.0) d]、Gn使用总量[(1 729.8±563.8) IU]低于正常启动组[(8.8±1.5) d, $P=0.03$; (2 021.5±726.1) IU, $P=0.04$], 正常受精率(71.0%±32.2%)高于正常启动组(55.4%±37.5%, $P=0.04$), 每一启动周期总费用[(14 232.5±2 923.9)元]低于正常启动组[(15 590.2±3 116.9)元, $P=0.04$]。PSM前后新鲜胚胎移植率、周期取消率和临床妊娠率两组差异均无统计学意义($P>0.05$)。结论 卵巢储备功能减退人群拮抗剂方案延迟启动时间可以改善正常受精率, 减少Gn使用时间和Gn使用总量, 降低每一启动周期总费用。

【关键词】 卵巢储备; 拮抗剂方案; 启动时机; 费效比
基金项目: 宜春市科技计划项目(JXYC2019KSB070)

Propensity score matching analysis of delayed start protocol with gonadotropin-releasing hormone antagonist in patients with diminished ovarian reserve

Han Yan, Deng Xing, Peng Wei, Li Qing, Duan Chaoqun, Liu Zhen

Department of Reproduction, Yichun Maternal and Child Health Hospital, Yichun 336000, China

Corresponding author: Han Yan, Email: peiyanhan1234@163.com, Tel: +86-15160028685

【Abstract】 **Objective** To explore the clinical effect and cost-effectiveness of a delayed start protocol with gonadotropin-releasing hormone (GnRH) antagonist in patients with diminished ovarian reserve (DOR). **Methods** A retrospective study was performed in 376 cycles of DOR patients undergoing *in vitro* fertilization (IVF)/intracytoplasmic sperm injection (ICSI) from July 2017 to December 2019 in Reproductive Center of Yichun Maternal and Child Health Hospital who had GnRH antagonist protocol to ovarian stimulation. According to the start time, those patients were divided into two groups, the delayed start group including 43 cycles (the start time at day 7–10 of menstruation), the conventional start group including 333 cycles (start normally at day 2–4 of menstruation). The ovulation induction results, clinical outcomes and cost-effectiveness ratio of the two groups with controlled ovarian stimulation (COS) were compared. Propensity score matching (PSM) was performed on age, duration of infertility, body mass index, follicle-stimulating hormone (FSH) level on the first day of gonadotropin (Gn) used, the dosage of Gn used on the first day, antral follicle count (AFC), anti-Müllerian hormone (AMH) were analyzed again after PSM to reduce the influence of unequal characters between the two groups. **Results** Before matching, the conventional start protocol patients' FSH level of the first day of Gn used was lower than that of

the delayed start protocol, the results of ovarian stimulation such as the total duration of Gn used $[(8.0 \pm 2.0) \text{ d}]$, the total dosage of Gn used $[(1\ 740.1 \pm 561.2) \text{ IU}]$, estradiol level on human chorionic hormone (hCG) injection day $[(1\ 371.2 \pm 1\ 203.3) \text{ ng/L}]$, total number of oocytes retrieved (5.1 ± 5.1) , number of M_{II} oocytes retrieved (4.4 ± 4.3) were lower $[(9.0 \pm 2.0) \text{ d}, P < 0.001; (2\ 055.1 \pm 634.7) \text{ IU}, P < 0.001; (1\ 853.5 \pm 1\ 351.5) \text{ ng/L}, P = 0.03; 7.0 \pm 5.5, P = 0.03; 6.1 \pm 4.8, P = 0.03]$, but the two pronuclei fertilization rate $(71.7\% \pm 32.1\%)$ was higher than that in the conventional start protocol patients $(58.9\% \pm 31.2\%, P = 0.01)$. We also found the total costs of per cycle $[(14\ 179.9 \pm 2\ 909.4) \text{ yuan}]$ was less than that of the conventional protocol $[(16\ 003.6 \pm 2\ 543.1) \text{ yuan}, P < 0.001]$. After matching, the two groups had the same estradiol level on hCG injection day, total number of oocytes retrieved, number of M_{II} oocytes retrieved $(P > 0.05)$, but the total duration of Gn used $[(7.9 \pm 2.0) \text{ d}]$, the total dosage of Gn used $[(1\ 729.8 \pm 563.8) \text{ IU}]$, the total cost per cycle $[(14\ 232.5 \pm 2\ 923.9) \text{ yuan}]$ of delayed protocol remain lower and the two pronuclei fertilization rate $(71.0\% \pm 32.2\%)$ was also higher than those of the conventional protocol $[(8.8 \pm 1.5) \text{ d}, P = 0.03; (2\ 021.5 \pm 726.1) \text{ IU}, P = 0.04; (15\ 590.2 \pm 3\ 116.9) \text{ yuan}, P = 0.04; 55.4\% \pm 37.5\%, P = 0.04]$. There was no difference in the fresh embryo transfer rate, the cycle cancellation rate and the clinical pregnancy rate between the two groups neither before nor after PSM. **Conclusion** The delayed start antagonist protocol maybe improve the normal fertilization rate and reduce the total days of Gn used, the total dosage of Gn used so as to have less total cost of each cycle in patients with DOR.

【Key words】 Ovarian reserve; Gonadotropin-releasing hormone antagonist; Start time; Cost-effectiveness

Fund program: Yichun Science and Technology Project (JXYC2019KSB070)

·临床研究·

DOI: 10.3760/cmaj.cn101441-20200409-00204

收稿日期 2020-04-10 本文编辑 王李艳

引用本文: 范丽娟, 李小娟, 师娟子, 等. 腹腔镜下输卵管近端结扎联合远端造口术与 IVF-ET 间隔时间对妊娠结局和子代出生情况影响的研究 [J]. 中华生殖与避孕杂志, 2021, 41(5): 425-431. DOI: 10.3760/cmaj.cn101441-20200409-00204.

腹腔镜下输卵管近端结扎联合远端 造口术与 IVF-ET 间隔时间对妊娠 结局和子代出生情况影响的研究

范丽娟 李小娟 师娟子 段海霞

西北妇女儿童医院, 西安 710000

通信作者: 段海霞, Email: hx840315@126.com, 电话: +86-

15991261332, 传真: +86+29-87241713

【摘要】 目的 探讨腹腔镜下输卵管积水近端结扎联合远端造口术与体外受精-胚胎移植 (*in vitro* fertilization-embryo transfer, IVF-ET) 间隔时间对妊娠结局和子代出生情况的影响。方法 采用回顾性队列研究分析 2017 年 1 月至 2018 年 9 月期间在西北妇女儿童医院行腹腔镜下输卵管积水近端结扎联合远端造口后实施 IVF-ET 的 274 例患者, 按间隔时间分为 3 组。A 组: 手术与 IVF-ET 间隔 1 个月 ($n=114$); B 组: 手术与 IVF-ET 间隔 2 个月 ($n=92$); C 组: 手术与 IVF-ET 间隔 3 个月或以上 ($n=68$)。主要观察指标为临床妊娠率和活产率, 次要观察指标为人绒毛膜促性腺激素 (human chorionic gonadotropin, hCG) 阳性率、胚胎种植率、异位妊娠率、流产率和子代出生情况 (包括新生儿出生孕周、出生体质量和出生缺陷)。因移植胚胎种类可能影响上述观察指标, 所以本研究对卵裂期胚胎和囊胚进行分别比较。结果 三组患者行卵裂期胚胎移植或囊胚移植后, 临床妊娠率和活产率差异均无统计学意义 (P 均 >0.05), hCG 阳性率、胚胎种植率、异位妊娠率和流产率组间比较差异均无统计学意义 (P 均 >0.05)。在子代出生情况方面, 移植卵裂期胚胎后单胎分娩新生儿中 B 组出生体质量 [(3.61 ± 0.31) kg] 显著高于 C 组 [(3.25 ± 0.60) kg, $P=0.014$]; 移植囊胚后双胎分娩新生儿中 C 组出生孕周 [(36.22 ± 1.44) 周] 显著大于 B 组 [(34.14 ± 3.11) 周, $P=0.012$]。结论 腹腔镜下输卵管积水近端结扎联合远端造口术后间隔 1 个月、2 个月或 ≥ 3 个月行胚胎移植不影响妊娠结局, 但可能对子代出生孕周和出生体质量有一定影响。

【关键词】 输卵管疾病; 输卵管造口术; 受精, 体外; 胚胎移植; 妊娠结局

Effects of the interval between laparoscopic proximal hydrosalpinx ligation combined with salpingostomy operation and IVF-ET on pregnancy and neonate outcomes

Fan Lijuan, Li Xiaojuan, Shi Juanzi, Duan Haixia

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

Corresponding author: Duan Haixia, Email: hx840315@126.com, Tel: +86-15991261332, Fax: +86+29-87241713

【Abstract】 Objective To investigate the effects of the interval between laparoscopic proximal hydrosalpinx ligation combined with salpingostomy operation and *in vitro* fertilization-embryo transfer (IVF-ET) on pregnancy and neonate outcomes. **Methods** The data of 274 of infertile patients who underwent IVF-ET after laparoscopic proximal hydrosalpinx ligation combined with salpingostomy operation from January 2017 to September 2018 were analyzed by a cohort respective study. All patients were divided into three groups according to the interval between operation and embryo transfer, group A: one month interval ($n=114$); group B: two months interval ($n=92$); group C: the interval was three

months or above ($n=68$). Main outcomes were clinical pregnancy rate and live birth rate; secondary outcomes included human chorionic gonadotropin (hCG) positive rate, implantation rate, ectopic pregnancy rate, abortion rate and neonate outcomes (birth weight, gestational age of delivery and birth defect rate). Cleavage embryo transfer outcomes and blastocyst transfer outcomes were analyzed retrospectively. **Results** There were no significant differences among the three groups in clinical pregnancy rate and live birth rate after cleavage embryo transfer or blastocyst transfer. In addition, there were no significant differences among the three groups in hCG positive rate, implantation rate, ectopic pregnancy rate and abortion rate. In cleavage embryo transfer cycles, twin birth weight of group B was heavier than that of group C [(3.61±0.31) kg vs. (3.25±0.60) kg, $P=0.014$]. In blastocyst transfer cycles, twin gestational age of delivery in group C was elder than that of group B [(36.22±1.44) weeks vs. (34.14±3.11) weeks, $P=0.012$]. **Conclusion** The interval between laparoscopic proximal hydrosalpinx ligation combined with salpingostomy operation and IVF-ET does not affect pregnancy outcome, but it may affect neonate outcome to some extent.

【Key words】 Fallopian tube diseases; Salpingostomy; Fertilization *in vitro*; Embryo transfer; Pregnancy outcome

·临床研究·

DOI: 10.3760/cma.j.cn101441-20200524-00304

收稿日期 2020-05-28 本文编辑 王李艳

引用本文: 贾磊, 何姝婧, 苏文龙, 等. 两种钙离子载体 A23187 和离子霉素对卵母细胞激活效果的比较[J]. 中华生殖与避孕杂志, 2021, 41(5): 432-439. DOI: 10.3760/cma.j.cn101441-20200524-00304.

两种钙离子载体 A23187 和离子霉素对卵母细胞激活效果的比较

贾磊 何姝婧 苏文龙 郭映纯 周怡 方丛

中山大学附属第六医院生殖医学研究中心, 广州 510655

通信作者: 方丛, Email: fangcong@mail.sysu.edu.cn, 电话: +86-

20-38254159

【摘要】 目的 比较两种不同钙离子载体 A23187 和离子霉素对卵母细胞的受精率、胚胎发育潜能和临床结局的影响。方法 采用回顾性队列研究方法, 收集 2010 年 5 月至 2019 年 12 月期间在中山大学附属第六医院生殖医学研究中心、

因既往卵胞质内单精子注射 (intracytoplasmic sperm injection, ICSI) 受精失败/受精率低或严重少弱畸形精子症而采用 A23187 或离子霉素行人工卵母细胞激活 (artificial oocyte activation, AOA) 的 65 名患者资料。根据激活剂的不同分为 A23187-AOA 组和离子霉素-AOA 组; 再根据不同精子来源分为两个亚组: 射出精子组和睾丸精子组比较组间的受精率、胚胎发育潜能及临床结局。结果 离子霉素-AOA 组的双原核 (two pronuclei, 2PN) 受精率 [55.0% (116/211)]、2PN 卵裂率 [97.4% (113/116)] 及囊胚形成率 [69.1% (38/55)] 均显著高于 A23187-AOA 组 [43.3% (135/312), $P=0.008$; 90.4% (122/135), $P=0.023$; 45.2% (14/31), $P=0.029$]。在射出精子组, 离子霉素-AOA 组的 2PN 卵裂率 [97.1% (68/70)]、第 3 日 (day 3, D3) 可移植胚胎率 [92.6% (63/68)] 均显著高于 A23187-AOA 组 [85.8% (91/106), $P=0.013$; 73.6% (67/91), $P=0.002$]; 在睾丸精子组, 离子霉素-AOA 组的 2PN 受精率 [55.4% (46/83)]、囊胚形成率 [93.3% (14/15)]、种植率 [38.9% (7/18)] 和累积临床妊娠率 [66.7% (6/9)] 均显著高于 A23187-AOA 组 [37.7% (29/77), $P=0.024$; 20.0% (1/5), $P=0.005$; 5.6% (1/18), $P=0.041$; 10.0% (1/10), $P=0.019$]。入组的 65 名患者共活产婴儿 20 例, 均未见出生缺陷与先天畸形。结论 对于因既往 ICSI 受精失败/受精率低或严重少弱畸形精子症行 AOA 的患者, 离子霉素可以获得比 A23187 更好的受精率及胚胎发育潜能; 对于睾丸来源的严重少弱畸形精子, 与 A23187 相比, 离子霉素可以令患者获得更好的临床结局。

【关键词】 卵母细胞激活; A23187; 离子霉素

基金项目: 国家自然科学基金 (81871214); 国家重点研发计划 (2017YFC1001603); 广东省医学科学技术研究基金 (A2020226)

Effects of artificial oocyte activation with A23187 versus ionomycin on clinical outcomes

Jia Lei, He Shujing, Su Wenlong, Guo Yingchun, Zhou Yi, Fang Cong

Reproductive Medicine Research Center, Sixth Affiliated Hospital of Sun Yat-sen University, Guangzhou 510655, China

Corresponding author: Fang Cong, Email: fangcong@mail.sysu.edu.cn, Tel: +86-20-38254159

【Abstract】 **Objective** To compare the fertilization rate, embryonic developmental potential, and clinical outcomes following the applications of A23187 and Ionomycin. **Methods** A total of 65 patients whose oocytes were exposed to either the A23187 or Ionomycin for artificial oocyte activation (AOA) due to total failed fertilization/lower fertilization rate in the previous intracytoplasmic sperm injection (ICSI) cycles or severe oligo-astheno-teratozoospermia at Reproductive Medicine Research Center of the Sixth Affiliated Hospital of Sun Yat-sen University from May 2010 to December 2019 were enrolled in this retrospective cohort study. All patients were categorized into two groups: A23187-AOA group and Ionomycin-AOA group. And each group was divided into two subgroups according to sperm origin (ejaculated or testicular sperm). The fertilization rate, embryo development potential and clinical outcome were compared between the two groups. **Results** The two pronuclei (2PN) fertilization rate [55.0% (116/211) vs. 43.3% (135/312), $P=0.008$], 2PN cleavage rate [97.4% (113/116) vs. 90.4% (122/135), $P=0.023$] and

blastocyst formation rate [69.1% (38/55) vs. 45.2% (14/31), $P=0.029$] in the Ionomycin-AOA group were significantly higher than those in the A23187-AOA group. In the ejaculated spermatozoa subgroup, the 2PN cleavage rate [97.1% (68/70) vs. 85.8% (91/106), $P=0.013$] and the rate of day 3 (D3) transferable embryos [92.6% (63/68) vs. 73.6% (67/91), $P=0.002$] in the Ionomycin-AOA group were higher than those in the A23187-AOA group; in the testicular spermatozoa subgroup, the 2PN fertilization rate [55.4% (46/83) vs. 37.7% (29/77), $P=0.024$], the blastocyst formation rate [93.3% (14/15) vs. 20.0% (1/5), $P=0.005$], the implantation rate [38.9% (7/18) vs. 5.6% (1/18), $P=0.041$] and the cumulative clinical pregnancy rate [66.7% (6/9) vs. 10.0% (1/10), $P=0.019$] in the Ionomycin-AOA group were higher than those in the A23187-AOA group. A total of 20 healthy neonates were delivered in 65 patients. None of the congenital anomalies (birth defects) was found in fetuses after AOA. **Conclusion** Ionomycin may be superior to A23187 for improving fertilization rate and embryonic developmental potential. And compared with A23187, Ionomycin may be a more efficient means to benefit the patients with testicular-origin severe oligo-astheno-teratozoospermia.

【Key words】 Artificial oocyte activation; A23187; Ionomycin

Fund program: National Natural Science Foundation of China (81871214); National Key R&D Program of China (2017YFC1001603); Medical Scientific Technology Research Foundation of Guangdong Province of China (A20200226)

·流行病学研究·

DOI: 10.3760/cmaj.cn101441-20200623-00353

收稿日期 2020-06-29 本文编辑 宋培培

引用本文: 姜楠, 赵子高, 车焱, 等. 人工流产史与死胎死产的关系: 云南 17 万妇女的前瞻性队列研究[J]. 中华生殖与避孕杂志, 2021, 41(5): 440-447. DOI: 10.3760/cmaj.cn101441-20200623-00353.

人工流产史与死胎死产的关系: 云南 17 万妇女的前瞻性队列研究

姜楠¹ 赵子高² 车焱³ 王涛² 张妍³ 李玉艳³ 叶汉风²

¹复旦大学公共卫生学院, 上海 200032; ²云南省人口和计划生育科学

技术研究所国家卫生健康委西部孕前优生重点实验室, 昆明 650021;

³ 复旦大学生殖与发育研究院上海市计划生育科学研究所，国家卫生健

康委员会计划生育药具重点实验室 200032

姜楠和赵子高对本文有同等贡献

通信作者：李玉艳，Email: lyy1033@163.com，电话：+86-21-

64771670；叶汉风，Email: 1640683205@qq.com，电话：+86-871-

65113271

【摘要】 目的 研究人工流产对再次妊娠发生死胎死产的影响。方法 基于 2010 至 2017 年云南省“国家免费孕前优生检查”项目登记计划妊娠妇女的基本信息、病史、体格检查及其他检查结果，追踪随访妊娠结局。运用 SPSS20.0 和 SAS9.4 描述研究对象的基本特征、死胎死产发生率，并进行分层分析和多因素 logistic 回归分析。结果 最终纳入研究 174 782 例，死胎死产发生率为 0.64% (1119/174 782)；人工流产组（暴露组）的死胎死产发生率为 0.83% (333/40 216)，显著高于无人工流产组（非暴露组）发生率为 0.58% (786/134 566)。非条件多因素 logistic 回归结果显示，与非暴露组相比，暴露组人工流产 1 次和≥2 次者死胎死产发生率高 20%~40% ($OR=1.22$, 95% $CI=1.05\sim1.41$; $OR=1.33$, 95% $CI=1.08\sim1.64$)。2011 至 2016 年死胎死产率低于 2010 年 ($OR=0.66$, 95% $CI=0.51\sim0.85$)。此外，多因素分析结果显示，死胎死产发生率与民族、年龄、学历、产次、孕前体质量指数 (body mass index, BMI) 有关，与母亲职业、自然流产史、早产史、死胎死产史无统计学关联。结论 既往人工流产将增加其后妊娠死胎死产的风险，民族、年龄、文化程度、产次、孕前 BMI 与死胎死产发生的风险有关，孕前超重和肥胖是发生死胎死产的危险因素。

【关键词】 人工流产； 妊娠结局； 死胎死产； 前瞻性研究； 影响因素

Association of induced abortion history with subsequent stillbirth: a prospective population-based cohort study including 170 thousand women in Yunnan Province, China

Jiang Nan¹, Zhao Zigao², Che Yan³, Wang Tao², Zhang Yan³, Li Yuyan³, Ye Hanfeng²

¹ School of Public Health, Fudan University, Shanghai 200032, China; ² NHC Key Laboratory of Periconception Health Birth in Western China (Yunnan Population and Family Planning Research Institute), Kunming 650021, China; ³ Key Lab. of National Health Commission for Family Planning and Contraceptives, Shanghai Institute of Planned Parenthood Research, Institute for Reproduction and Development of Fudan University, Shanghai 200032, China

Jiang Nan and Zhao Zigao contributed equally to the article

Corresponding author: Li Yuyan, Email: lyy1033@163.com, Tel: +86-21-64771670; Ye Hanfeng, Email:1640683205@qq.com, Tel: +86-871-65113271

【Abstract】 Objective To explore the association of induced abortion with subsequent stillbirth. **Methods** The data collected from the National Free Pre-Pregnancy Health Examination Project in Yunnan Province between 2010 and 2017 were used in this analysis. Information on women's background characteristics, pregnant history, disease history, physical examination, etc. were recorded. After their pre-pregnancy health examination, women were routinely followed up and any pregnancies and pregnancy outcomes were recorded. By using SPSS20.0 and SAS9.4 software, we employed description analysis, Chi-square tests, stratified analysis and multivariate logistic regression for data analysis. **Results** A total of 174 782 pregnancies were included in this analysis, and the total incidence rate of stillbirths was 0.64% (1119/174 782). The incidence rate of stillbirths in the group of women who had a previous history of induced abortion (exposed group) was 0.83% (333/40 216), which was significantly higher than 0.58% (786/134 566) in the non-induced abortion group (unexposed group). Results of unconditional multivariate logistic regression analysis demonstrated that, compared with unexposed group, the risk of stillbirth in exposed group was higher in those with 1 and 2 or more induced abortions ($OR=1.22$, 95% $CI=1.05-1.41$; $OR=1.33$, 95% $CI=1.08-1.64$). The risk of stillbirth was significant lower in women who conceived in 2011–2016 than in 2010 ($OR=0.66$, 95% $CI=0.51-0.85$). Mother's ethnicity, age, education level, parity and body mass index (BMI) before pregnancy were significantly associated with the risk of stillbirth. Women's occupation, previous histories of premature birth, stillbirth and natural abortion were not associated with subsequent stillbirth. **Conclusion** Induced abortion is associated with an increase of the risk of subsequent stillbirth. Mother's ethnicity, age, education level, parity and BMI are significantly associated with the risk of stillbirth. Overweight and obesity before pregnancy increase the risk of stillbirth.

【Key words】 Induced abortion; Pregnancy outcome; Stillbirth; Prospective study; Influencing factors

·综述·

DOI: 10.3760/cma.j.cn101441-20200323-00152

收稿日期 2020-03-26 本文编辑 宋培培

引用本文: 刁梁辉, 蔡松辰, 刘苏, 等. 免疫代谢调控子宫内膜微环境和母-胎免疫耐受的研究进展[J]. 中华生殖与避孕杂志, 2021, 41(5): 448-455. DOI: 10.3760/cma.j.cn101441-20200323-00152.

免疫代谢调控子宫内膜微环境和母-胎免疫耐受的研究进展

刁梁辉 蔡松辰 刘苏 黄春宇 李龙飞 李玉叶 曾勇

深圳市围产期生殖免疫重点实验室, 深圳中山生殖与遗传研究所, 深圳中山泌尿外科医院生殖医学临床研究中心 518045

通信作者: 刁梁辉, Email: l.diao@pku.edu.cn, 电话: +86-755-88361001*9723

【摘要】 子宫内膜微环境和妊娠免疫调控是近年来生殖免疫研究的重点和难点。在妊娠建立过程中, 免疫细胞通过适应性重塑, 以协助构建胎儿友好的免疫微环境, 使胚胎获得“免疫豁免”。免疫代谢作为近十年快速发展的新兴研究领域, 重点关注免疫和代谢的相互作用及其在生理病理中的机制。但是目前对于免疫代谢如何参与调控子宫内膜微环境和母-胎免疫耐受的报道还相对不足。本文从肿瘤免疫代谢对妊娠免疫代谢的启示出发, 综述了免疫细胞分化和功能的代谢通路在母-胎耐受微环境塑造中的潜在调控作用, 分析代谢和营养异常与妊娠疾病的关系, 并从临床应用角度探讨了代谢抑制剂和饮食干预对改善妊娠结局的可能性。

【关键词】 免疫调节; 代谢; 子宫内膜; 细胞微环境; 胚胎种植; 免疫耐受; 妊娠免疫

基金项目: 国家重点研发计划(2018YFC1003900/2018YFC1003904); 国家自然科学基金青年项目(81701529); 深圳市医疗卫生三名工程项目(SZSM201502035); 深圳市自然科学基金面上项目(JCYJ20190813161801676)

Advances on the immunometabolism in regulating the endometrial microenvironment and maternal-fetal tolerance

*Diao Lianghui, Cai Songchen, Liu Su, Huang Chunyu, Li Longfei, Li Yuye, Zeng Yong
Shenzhen Key Laboratory for Reproductive Immunology of Peri-implantation,
Shenzhen Zhongshan Institute for Reproductive Medicine and Genetics, Clinical
Research Center for Reproductive Medicine, Shenzhen Zhongshan Urology Hospital,
Shenzhen 518045, China*

*Corresponding author: Diao Lianghui, Email: l.diao@pku.edu.cn, Tel: +86-755-88361001*9723*

【Abstract】 The endometrial microenvironment and the immune regulation of pregnancy is a recent focus and challenge in the field of reproductive immunology. During the establishment of pregnancy, the immune cells assist in shaping a fetus-friendly immune microenvironment through adaptive reprogramming, thereby allowing the embryo to obtain "immune privilege". Immunometabolism is an emerging research field that has been developing rapidly in the last decade, focusing on the interaction between the immunology and metabolism and their roles in the physiopathology. However, the current evidence regarding how immunometabolism is involved in the regulation of the endometrial microenvironment and maternal-fetal immune tolerance is insufficient. In light of the implications of tumor immunometabolism for immunometabolism in pregnancy, the metabolic pathways of immune cell differentiation and function are reviewed for their potential regulatory role in shaping the maternal-fetal tolerance microenvironment. The

relationship between metabolic and nutritional abnormalities and pregnancy disorders is analyzed. Finally, the possibility of improving pregnancy outcomes through immunometabolic inhibitors or dietary interventions is explored from a clinical application perspective.

【Key words】 Immunomodulation; Metabolism; Endometrium; Cellular microenvironment; Embryo implantation; Immune tolerance; Pregnancy immunity

Fund program: National Key R&D Program of China (2018YFC1003900/2018YFC1003904); National Natural Science Foundation of China (81701529); Sanming Project of Medicine in Shenzhen (SZSM201502035); Natural Science Foundation of Shenzhen [JCYJ20190813161801676]

·综述·

DOI: 10.3760/cmaj.cn101441-20200325-00158

收稿日期 2020-04-13 本文编辑 李天琦

引用本文: 何起娜, 马艳, 姚桂东, 等. 营养物质对精子发生和精液质量影响的研究进展[J]. 中华生殖与避孕杂志, 2021, 41(5): 456-461. DOI: 10.3760/cmaj.cn101441-20200325-00158.

营养物质对精子发生和精液质量影响的研究进展

何起娜¹ 马艳² 姚桂东¹ 孙莹璞¹

¹ 郑州大学第一附属医院生殖医学中心 450052; ² 郑州大学第一附属医院营养科 450052

通信作者: 孙莹璞, Email: syp2008@vip.sina.com, 电话: +86-

371-66913311, Fax: +86-371-66913635

【摘要】 随着全球不孕不育发病率的不断升高, 有关环境因素、生活方式和营养物质等对生殖健康的影响逐渐引起了人们的重视。研究表明, 男性日常生活中的营养物质摄入情况与精液质量具有明显相关性。多种营养物质包括微量营养素、氨基酸与其衍生物、植物来源提取物以及褪黑素等都对男性精子发生过程以及精液质量参数产生影响, 而营养物质的种类及其在人体内的含量也与男性精液质量显著相关。本文就营养物质对男性精子发生和精液质量的影响及其作用机制进行综述。

【关键词】 营养物质; 精子发生; 精液质量; 作用机制

基金项目: 国家自然科学基金 (U1904138)

Advances on the effects of nutrients on male spermatogenesis and semen quality

He Qina¹, Ma Yan², Yao Guidong¹, Sun Yingpu¹

¹ Center for Reproductive Medicine, the First Affiliated Hospital of Zhengzhou University, Zhengzhou 450052, China; ²Department of Nutrition, the First Affiliated Hospital of Zhengzhou University, Zhengzhou 450052, China

Corresponding author: Sun Yingpu, Email: syp2008@vip.sina.com, Tel: +86-371-66913311, Fax: +86-371-66913635

【Abstract】 With the increasing incidence of infertility in the world, the impact of environmental factors, lifestyles and nutrients on reproductive health has gradually attracted attention. Many studies have shown that there is a significant correlation between the intake of nutrients and semen quality. A variety of nutrients, including micronutrients, vitamins, amino acids and derivatives, plant-derived extracts, melatonin, have effects in male spermatogenesis and semen parameters, and the types and content of nutrients in the body are also significantly related to male semen quality. This article reviews the effects and mechanisms of nutrients on men spermatogenesis and semen quality.

【Key words】 Nutrients; Spermatogenesis; Semen quality; Mechanism

Fund program: National Natural Science Foundation of China (U1904138)

·实验室管理·

DOI: 10.3760/cmaj.cn101441-20200730-00423

收稿日期 2020-08-11 责任编辑 宋培培

引用本文: 徐鸿毅, 陈鑫, 田佳蓉, 等. 关于新型冠状病毒肺炎疫情暴发期间 IVF 实验室防护的探讨[J]. 中华生殖与避孕杂志, 2021, 41(5): 462-466. DOI: 10.3760/cmaj.cn101441-20200730-00423.

关于新型冠状病毒肺炎疫情暴发期间 IVF 实验室防护的探讨

徐鸿毅 陈鑫 田佳蓉 张昌军

十堰市人民医院(湖北医药学院附属人民医院)生殖医学中心 442000

通信作者: 张昌军, Email: 542690700@qq.com, 电话: +86-719-

8637028

【摘要】 自 2019 年 12 月出现新型冠状病毒肺炎(COVID-19)以后, 全国各地均启动了突发公共卫生事件一级响应, 实行了强有力的防疫措施。医院是患者聚集之地, 各个科室都可能存在感染风险, 生殖医学中心同时也面临着重大考验,

体外受精 (*in vitro* fertilization, IVF) 实验室在生殖医学中心承担着授精、胚胎培养、胚胎冷冻储存等重要任务,同时也是医患交汇之处,存在潜在的交叉污染风险,因此有必要制定有效的防范措施和流程,以降低风险,保障辅助生殖技术安全及应对将来可能发生类似突发性的大面积感染事件。本文在近期新型冠状病毒流行期间针对 IVF 实验室防护进行探索,结合我们的实践对出入实验室的医务人员、患者、污物、耗材以及净化系统、配子、胚胎管理的防护流程进行探讨。

【关键词】 新型冠状病毒肺炎; IVF 实验室; 风险管理; 三区五通道

Management strategies and suggestions for *in vitro* fertilization laboratory during the epidemic period of novel coronavirus pneumonia

Xu Hongyi, Chen Xin, Tian Jiarong, Zhang Changjun

Reproductive Medicine Center, Renmin Hospital, Hubei University of Medicine, Shiyan 442000, China

Corresponding author: Zhang Changjun, Email: 542690700@qq.com, Tel: +86-719-8637028

【Abstract】 Since the emergence of novel coronavirus pneumonia (COVID-19) appeared in December 2019, all nationwide have started a public health emergency one-level response and implemented strong epidemic prevention measures. Hospitals are places where patients gather, and all departments may have infection risks, and every reproductive medicine center also faces a major test, the IVF laboratory in reproductive medicine centers undertakes important tasks such as *in vitro* fertilization, embryo culture, frozen storage, and at the same time, there is a potential risk of cross-contamination at the intersection of doctors and patients, so it is necessary to develop effective preventive measures and procedures to reduce risks, ensuring assisted reproductive technology safety and deal with potentially similar outbreaks of large-scale infection in the future. During the recent novel coronavirus epidemic period, this paper explored the protection methods of IVF laboratory, combined with the practice about entering and leaving of medical personnel, patients, dirt, consumptive material and purification system, gametes and embryo management protection process.

【Key words】 COVID-19; IVF laboratory; Risk management; Three zones and five channels flow chart

·热点追踪·

DOI: 10.3760/cmaj.cn101441-20200312-00125

收稿日期 2020-03-12 本文编辑 王李艳

引用本文: 王亚辉, 袁天蔚, 李大金. 女性生殖医学研究热点——基于科学知识图谱的文献计量分析[J]. 中华生殖与避孕杂志, 2021, 41(5): 467-476. DOI: 10.3760/cmaj.cn101441-20200312-00125.

女性生殖医学研究热点——基于科学知识图谱的文献计量分析

王亚辉¹ 袁天蔚² 李大金¹

¹复旦大学附属妇产科医院, 上海 200090; ²中国科学院上海生命科学信息中心, 中国科学院上海营养与健康研究所, 中国科学院大学 200031

通信作者: 李大金, Email: djli@shmu.edu.cn, 电话: +86-21-63457331

【摘要】 目的 通过文献计量分析全面描述女性生殖医学领域研究成果的知识基础和发展趋势, 为准确、科学地把握今后的研究方向提供借鉴。方法 检索 Web of Science 数据库核心合集中 2009 年至 2018 年女性生殖医学相关文献, 利用 CiteSpace 和 VOSviewer 软件分析、绘制文献数据的时空分布、国家合作网络、共被引关键词等知识图谱, 梳理本领域研究成果的知识基础、主题演变进而归纳热点。结果 共检索得到文献 19 759 篇。2009 年至 2018 年, 本领域年发文量维持在 1600~2000 篇。美国、中国和法国为发文量最多的国家, 分别为 6451 篇 (32.65%)、1376 篇 (6.96%) 和 1072 篇 (5.43%)。美国及其机构的论文数量和影响力均位于领先地位, 美国和欧洲国家形成较密切的合作网络。该领域重要杂志包括 *American Journal of Obstetrics and Gynecology*、*Fertility and Sterility* 和 *Obstetrics and Gynecology* 等; 主要研究内容包括子宫内膜异位症的病因学、妇科肿瘤的治疗、多囊卵巢综合症的诊断、生育力保存和辅助生殖技术等。肥胖相关生殖内分泌疾病治疗、产前诊断、不孕症治疗和妇科肿瘤新辅助化疗技术等成为关注的热点。结论 新辅助化疗和胚胎植入前遗传学筛查在未来仍有较高关注度; 多学科合作和交叉, 如生物医学工程在妇科重大疾病诊疗中的进一步应用, 以及基于循证医学的诊治规范、操作指南的完善是重要的发展方向。

【关键词】 生殖医学; 研究热点; 知识图谱

Hot topics of female reproductive medicine: bibliometric analysis based on scientific knowledge map

Wang Yahui¹, Yuan Tianwei², Li Dajin¹

¹Obstetrics and Gynecology Hospital, Fudan University, Shanghai 200090, China;

²Shanghai Information Center for Life Sciences, Shanghai Institute of Nutrition and Health, University of Chinese Academy of Sciences, Chinese Academy of Sciences, Shanghai 200031, China

Corresponding author: Li Dajin, Email: djli@shmu.edu.cn, Tel: +86-21-63457331

【Abstract】 Objective To generate the knowledge structure, emerging trends and frontier field from researches of female reproductive medicine by bibliometric analysis. **Methods** Web of Science was used as the literature search engine. CiteSpace and VOSviewer were used to construct the knowledge map. Important countries were analyzed. Common key word and co-citation were used for analysis process. **Results** A total of 19 759 bibliographic records were retrieved on the data source of Web of Science between 2009 and 2018 based on a topic search in titles, abstracts or indexing terms. Annual publication was from 1600 to 2000. The United States, China and France were the top countries that had published the most amount of papers with 6451 (32.65%), 1376 (6.96%), and 1072 (5.43%) papers respectively. The United States and its institutions played an important role both in number and influence of literatures, and a closer cooperation network has formed between the United States and European countries. *American Journal of Obstetrics and Gynecology*, *Fertility and Sterility*, and *Obstetrics and Gynecology* were the top-3 most important journals in female reproductive medicine. Etiology of endometriosis, gynecology cancer treatment, polycystic ovary syndrome diagnosis, fertility preservation, and assisted reproductive technology were the main topics in the field of reproductive medicine. In recent years, obesity-related reproductive endocrine disorders, prenatal diagnosis, infertility treatment, and neoadjuvant chemotherapy of gynecology cancer were becoming the hotspots. **Conclusion** New concept and technological innovations in neoadjuvant chemotherapy and preimplantation genetic diagnosis are still hot topics in recent future. Multidisciplinary and multisectoral cooperation, such as further application of medical engineering and biotechnology in treatment of gynecological diseases, is important in further, as well as clinical practice or guidelines improvement through evidence-based research.

【Key words】 Reproductive medicine; Hot topics; Knowledge map