

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8期 2021年8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:rande@sippr.org.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

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:rande@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

输卵管通畅性检查专家共识 输卵管通畅性检查专家共识编写组 669

避孕节育专栏

计划生育技术服务新进展 张艺珊 顾向应 675

我国避孕器具应用现状及其时间、空间

和人间分布 车焱 丁璟 张妍 680

避孕药具不良反应监测在宫内节育器

有效性评价中的应用 巴磊 施雯慧 王冠融等 688

中国现行注册的含铜宫内节育器

及其性能评价项目 刘文博 赵燕 史新立等 694

含铜宫内节育器异常出血不良反应机制的

研究进展 胡世福 夏伟 朱长虹 702

手术终止10周内早期妊娠技术进展 李红叶 龚文霞 江静 705

RISUG男性避孕针研究进展 刘晃 张欣宗 712

兼具预防性传播感染功能的

避孕药具研发进展 王玉柱 杨明俊 田芳等 717

激素避孕药具的非避孕用途及安全性研究进展 朱焰 王健 723

基于药理学视角的女性避孕节育器具

研发的思考 曾佳 李芳 陈建兴等 731

临床研究

月经规律女性体质量指数对体外受精-胚胎移植治疗卵巢

反应性及妊娠结局的影响 应瑛 丘福满 刘见桥等 739

实验研究

孕晚期宫内高雄激素环境对SD子代雌鼠持续性低度炎症状态

及胰岛素敏感性的影响 黄媛 陈敏 徐雯等 747

临床报道

复发性子宫瘢痕妊娠的高危因素

及处理方式分析 曾薇薇 刘炳光 郭吉敏等 754

综 述

环状RNA与多囊卵巢综合征关系的

研究进展 郑秋云 刘朝奇 李志英 759

《输卵管通畅性检查专家共识》知识问答 679

《中华生殖与避孕杂志》第二届编辑委员会成员名单 687

《中华生殖与避孕杂志》稿约 封二

本期责任编辑 顾向应 车焱 本期责任编辑 孙敏 本期责任编辑 年利红

CHINESE JOURNAL OF REPRODUCTION AND CONTRACEPTION

(Original title: *Reproduction and Contraception*)

Monthly

Established in December 1980

Volume 41, Number 8

August 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

- Expert consensus on the assessment of tubal patency**669
The Assessment of Tubal Patency Consensus Writing Committee

Contraception Column

- New progress in family planning**675
Zhang Yishan, Gu Xiangying

- Contraceptive prevalence and pattern of method mix in China: current
situation and changes of temporal, spatial and population
distribution of contraceptive use**680
Che Yan, Ding Jing, Zhang Yan

- Application of contraceptive adverse reaction surveillance in effectiveness
evaluation of intrauterine device**688
Ba Lei, Shi Wenhui, Wang Guanrong, et al

- The current registered copper bearing intrauterine devices in China
and their performance**694
Liu Wenbo, Zhao Yan, Shi Xinli, et al

- Research progress of abnormal bleeding in copper bearing
intrauterine device**702
Hu Shifu, Xia Wei, Zhu Changhong

- Technical progress of surgical abortion of within 10 weeks pregnancy**705
Li Hongye, Gong Wenxia, Jiang Jing

- Research progress of reversible inhibition of sperm under guidance
male contraceptive needle**712
Liu Huang, Zhang Xinzong

- Research and development of anti-sexually transmitted
infections contraceptives**717
Wang Yuzhu, Yang Mingjun, Tian Fang, et al

- Progress in non-contraceptive effects and safety of hormonal contraceptives**723
Zhu Yan, Wang Jian

- Thoughts on research and development of female contraceptives from
the perspective of pharmaceuticals**731
Zeng Jia, Li Fang, Chen Jianxing, et al

Clinical Studies

- Influence of body mass index on ovarian response and pregnancy
outcome in ovulatory women undergoing *in vitro* fertilization-embryo
transfer**739
Ying Ying, Qiu Fuman, Liu Jianqiao, et al

Laboratory Studies

- Effect of intrauterine hyperandrogen exposure in late-gestation on chronic
low-grade inflammation and insulin sensitivity in offspring female SD
rats**747
Huang Yuan, Chen Min, Xu Wen, et al

Clinical Reports

- Risk factors and treatments of recurrent cesarean scar pregnancy**754
Zeng Weiwei, Liu Bingguang, Guo Jimin, et al

Reviews

- Research progress on the relationship between circular RNA and polycystic
ovary syndrome**759
Zheng Qiuyun, Liu Zhaoqi, Li Zhiying

DOI: 10.3760/cma.j.cn101441-20201112-00618

收稿日期 2020-12-22 本文编辑 李天琦

引用本文: 输卵管通畅性检查专家共识编写组. 输卵管通畅性检查专家共识[J]. 中华生殖与避孕杂志, 2021, 41(8): 669-674. DOI: 10.3760/cma.j.cn101441-20201112-00618.

输卵管通畅性检查专家共识

输卵管通畅性检查专家共识编写组

通信作者: 曹云霞, Email: caoyunxia6@126.com, 电话: +86-

551-65908442

【摘要】 输卵管因素是不孕症的最主要病因。输卵管通畅性检查方法有多种, 各级临床医生诊断操作技术水平亦有较大差别, 且对于方法的选择和应用缺乏明确的指南或专家共识指导。为提高对输卵管通畅性检查方法的认识, 规范输卵管通畅性检查方法的选择和应用, 妇幼健康研究会生殖内分泌专业委员会发起并组织相关专家成立编写组, 结合近年来国内外相关领域研究进展, 制订输卵管通畅性检查专家共识, 供临床医师参考。

【关键词】 输卵管通畅性; 专家共识; 不孕症; 子宫输卵管造影

基金项目: 国家重点研发计划(2018YFC1002104)

指南注册号: IPGRP-2020CN096

Expert consensus on the assessment of tubal patency

The Assessment of Tubal Patency Consensus Writing Committee

Corresponding author: Cao Yunxia, Email: caoyunxia6@126.com, Tel: +86-551-65908442

【Abstract】 Tubal factor is the primary cause of female infertility. Currently, there are various diagnostic methods for tubal patency. The problem faced is that the technical skills of clinicians are uneven and lack of instructional recommendations by guidelines or expert consensus. Therefore, in order to standardize the application and improve the understanding of tube patency examination method, Reproductive Endocrine Committee of Association for Maternal and Child Health Studies put forward the consensus of tubal patency examination by reviewing the recent clinical evidences and progressions.

【 Key words 】 Tubal patency; Expert consensus; Infertility; Hysterosalpingography

Fund program: National Key Research and Development Program(2018YFC1002104)

Guide registration number: IPGRP-2020CN096

DOI: 10.3760/cma.j.cn101441-20210122-00034

收稿日期 2021-01-27 本文编辑 王李艳

引用本文: 张艺珊, 顾向应. 计划生育技术服务新进展[J]. 中华生殖与避孕杂志, 2021, 41(8): 675-679.

DOI: 10.3760/cma.j.cn101441-20210122-00034.

·避孕节育专栏·

计划生育技术服务新进展

张艺珊 顾向应

天津医科大学总医院妇产科 300052

通信作者: 顾向应, Email: gxy6283@163.com, 电话: +86-

18622186957

【摘要】 新时期、新形势下的计划生育学专业领域应涵盖避孕节育、优生优育、不孕不育三大方面,旨在面向育龄人群的健康生育需求,通过研发新型避孕药具、优化终止妊娠技术、开展遗传优生筛查,并结合妇科相关疾病慢病管理,为育龄女性提供贯穿全生育周期的计划生育优质服务,通过避免非意愿妊娠、保护生育力、形成合理的生育间隔,促进生殖健康水平的提升。

【关键词】 计划生育; 全生命周期; 生殖健康

New progress in family planning

Zhang Yishan, Gu Xiangying

Department of Gynecology and Obstetrics, Tianjin Medical University General Hospital, Tianjin 300052, China

Corresponding author: Gu Xiangying, Email: gxy6283@163.com, Tel: +86-18622186957

【Abstract】 The professional areas of family planning in the new period and situation should cover the contraception, birth defects, and infertility, aiming to meet reproduction need of women in reproductive age. Performing technical services with good quality over women's life course through developing new contraceptives, optimizing techniques of termination of pregnancy, carrying out birth defects screening in combination with chronic diseases in gynecology, to avoid unintended pregnancy, to protect fertility and ensure appropriate birth spacing, so as to promote the reproductive health level.

【Key words】 Family planning; Full life cycle; Reproductive health

DOI: 10.3760/cma.j.cn101441-20210426-00191

收稿日期 2021-04-27 本文编辑 孙敏

引用本文：车焱, 丁璟, 张妍. 我国避孕药具应用现状及其时间、空间和人间分布[J]. 中华生殖与避孕杂志, 2021, 41(8): 680-687. DOI: 10.3760/cma.j.cn101441-20210426-00191.

·避孕节育专栏·

我国避孕药具应用现状及其时间、空间和人间分布

车焱 丁璟 张妍

上海市生物医药技术研究院, 国家卫生健康委员会计划生育药具重点实验室 200237

通信作者：车焱, Email: cheyan2004@163.com, 电话: +86-21-

64771556

【摘要】 避孕药具的应用与人口发展和健康密切相关, 了解我国避孕药具应用现状及其在时间、空间和人间变化趋势是避孕政策制定和避孕技术服务的基础。本文对国家卫生健康年鉴以及国家权威多中心大样本计划生育调查相关数据进行分析, 结果显示我国综合避孕率在缓慢下降, 其中以绝育术和宫内节育器为主的长效避孕措施使用率和构成比大幅下降, 以避孕套为主的短效避孕措施比例大幅上升。东部沿海发达地区短效避孕药具构成比以及人工流产活产比均显著升高。半数以上产后和人工流产后妇女以及未婚女性以避孕套为首选。建议政府主管部门和计划生育行业组织出台相关政策和服务指南, 引导和推广长效避孕药具在我国的应用; 建议由国家避孕药具管理中心与药具生产企业进行价格谈判, 为各省市避孕药具政府采购获取最优的价格和最佳的避孕产品; 建议在国家基本公共卫生服务工作规范中, 将未婚育龄人群纳入国家免费避孕药具服务对象。

【关键词】 避孕药具; 避孕率; 构成比; 三间分布

基金项目: 上海市计划生育科学研究所科技攀登项目 (PD2017-10)

Contraceptive prevalence and pattern of method mix in China: current situation and changes of temporal, spatial and population distribution of contraceptive use

Che Yan, Ding Jing, Zhang Yan

NHC Key Lab of Reproduction Regulation (Shanghai Institute for Biomedical and Pharmaceutical Technologies), Fudan University, Shanghai 200237, China

Corresponding author: Che Yan, Email: cheyan2004@163.com, Tel: +86-21-64771556

【Abstract】 Contraceptive use is closely associated with population development and health. We aimed to understand the pattern and changes of temporal, spatial and population distribution of contraceptive use in China in this study. The data we used were from previous national family planning/reproductive

health surveys during last two decades, 2019 national health yearbook, and several large multi-center investigations in abortion/postpartum/migrant women in China. Findings of this study show that contraceptive prevalence slightly declined during last two decades. Proportion of long-acting methods, including sterilization and intrauterine devices, dropped sharply, and that of short-acting methods, in particular condoms, increased fast. The proportion of short-acting methods and abortion-birth ratios in eastern coastal developed provinces were far more higher than those in most other provinces. Condom was the first choice in more than a half of postpartum women, women with an induced abortion history, and those unmarried. We recommended that the administration authorities and family planning associations in China advocate long-acting reversible methods through policy-making and service guideline development. We also suggested that the national administrative center for contraceptive methods lead the negotiation on decision of purchasing the methods with production enterprises so as to acquire the best prices and best products. Furthermore, the unmarried people at reproductive age should be included in the national basic public health services projects to provide free contraceptive services.

【Key words】 Contraceptive methods; Contraceptive prevalence; Proportion; Temporal, spatial and population distribution

Fund program: Science and Technology Climbing Fund of SIPPR (PD2017-10)

DOI: 10.3760/cma.j.cn101441-20210309-00114

收稿日期 2021-03-10 本文编辑 王李艳

引用本文: 巴磊, 施雯慧, 王冠融, 等. 避孕药具不良反应监测在宫内节育器有效性评价中的应用[J]. 中华生殖与避孕杂志, 2021, 41(8): 688-693. DOI: 10.3760/cma.j.cn101441-20210309-00114.

·避孕节育专栏·

避孕药具不良反应监测在宫内节育器有效性评价中的应用

巴磊 施雯慧 王冠融 林洁 杨月华 周健 孙志明

国家卫健委计划生育药具不良反应监测中心, 江苏省卫生健康发展研究中心, 南京 210036

通信作者: 孙志明, Email: 109616029@qq.com, 电话: +86-25-

86576001

【摘要】 目的 对常见宫内节育器 (intrauterine device, IUD) 的有效性进行分析评估, 为临床合理使用 IUD 提供参考建议。方法 收集 2011 年至 2020 年江苏省内国家避孕药具不良反应监测点上报的使用 IUD 后发生意外妊娠的不良事件报告, 与该地区新放置 IUD 的人群数据库进行记录联接, 比较不同类型 IUD 妊娠发生粗率和累计发生粗率, 评价避孕效果。结果 共收集常见 10 种不同类型 IUD 的妊娠对象 4788 例, 新放置 IUD 的人群 294 834 例。妊娠对象中, 异位妊娠占比 1.88% (90/4788); IUD 脱落和位置形状改变分别占 16.90% (809/4788) 和 32.31% (1547/4788)。放置 IUD 后第一年妊娠发生粗率为 0.53%, 随着使用时间的延长, 各种 IUD (安舒环除外) 妊娠粗率呈逐年下降趋势。TCu220C 累计 3 年、5 年和 8 年的妊娠粗率均居 10 种 IUD 的首位, 并显著高于平均发生粗率, 相对危险度 (relative risk, *RR*) 分别为 1.45 (95% *CI*=1.37~1.55)、1.35 (95% *CI*=1.28~1.43) 和 1.31 (95% *CI*=1.24~1.38)。无论是否考虑脱器妊娠, 吉妮累计 3 年、5 年、8 年和花式 IUD 累计 3 年、5 年的妊娠粗率均显著低于平均水平, 剔除脱落对象, 吉妮 *RR* 分别为 0.58 (95% *CI*=0.49~0.70)、0.55 (95% *CI*=0.47~0.66) 和 0.63 (95% *CI*=0.53~0.75), 花式 IUD 分别为 0.36 (95% *CI*=0.25~0.51) 和 0.45 (95% *CI*=0.33~0.61)。结论 目前常见 IUD 均具有较好的避孕效果, 吉妮和花式 IUD 的有效性更高。建议对 IUD 放置初期对象继续加强影像学随访检查, 减少因脱落和位置改变导致的意外妊娠。

【关键词】 宫内节育器; 意外妊娠; 异位妊娠; 不良事件; 有效性; 记录联接

基金项目: 江苏省妇幼健康重点学科项目 (FXK201755); 江苏省卫健委指导课题 (Z2017003); 江苏省青年医学重点人才项目 (QNRC2016555); 江苏省科技厅项目 (BM2018033-2)

Application of contraceptive adverse reaction surveillance in effectiveness evaluation of intrauterine device

Ba Lei, Shi Wenhui, Wang Guanrong, Lin Jie, Yang Yuehua, Zhou Jian, Sun Zhiming

State Contraceptives Adverse Reaction Surveillance Center, Jiangsu Health Development Research Center, Nanjing 210036, China

Corresponding author: Sun Zhiming, Email: 109616029@qq.com, Tel: +86-25-86576001

【Abstract】 **Objective** To analyze and evaluate the effectiveness of common intrauterine device (IUD), and to provide reference for clinical use of IUD. **Methods** The IUD adverse events of unexpected pregnancy reported by the National Contraceptive Adverse Reaction Surveillance Sites in Jiangsu Province from 2011 to 2020 were collected, and the records were linked with the population database of IUDs placement in the region. The pregnancy incidence and cumulative incidence of different IUDs were compared to evaluate the contraceptive effect. **Results** A total of 4788 pregnant women with 10 common IUDs were collected, and 294 834 IUDs were placed. Among the pregnant women, ectopic pregnancy accounted for 1.88% (90/4788); IUD expulsion and position change accounted for 16.90% (809/4788) and 32.31% (1547/4788) respectively. The incidence of pregnancy in the first year after IUD placement was 0.53%. The incidence of pregnancy in all kinds of IUDs (except for Anshu-IUD) decreased gradually with the

extension of using time. The cumulative incidence of TCu220C in 3, 5, 8 years was significantly higher than the average incidence. The relative risk (*RR*) was 1.45(95% *CI*=1.37–1.55), 1.35(95% *CI*=1.28–1.43) and 1.31(95% *CI*=1.24–1.38), respectively. Regardless of expulsion, Ginny's cumulative in 3, 5, 8 years and Hu280's cumulative 3- and 5-year incidence were significantly lower than the average level. Excluding expulsion, Ginny's *RR* was 0.58(95% *CI*=0.49–0.70), 0.55(95% *CI*=0.47–0.66) and 0.63(95% *CI*=0.53–0.75), Hu280's *RR* was 0.36(95% *CI*=0.25–0.51) and 0.45(95% *CI*=0.33–0.61), respectively. **Conclusion** The common IUD has a good contraceptive effect, and Ginny and Hu280 are more effective. It is suggested that the imaging follow-up examination should be strengthened in the early stage of IUD placement to reduce the accidental pregnancy caused by expulsion and position change.

【 Key words 】 Intrauterine device; Unintended pregnancy; Ectopic pregnancy; Adverse events; Effectiveness; Recorded linkage

Fund program: Key Subject Project of Maternal and Child Health of Jiangsu Province (FXK201755); Jiangsu Health Commission Program (Z2017003); Key Youth Medical Talents Project of Jiangsu Province (QNRC2016555); Project of Jiangsu Science and Technology Department (BM2018033-2)

DOI: 10.3760/cma.j.cn101441-20210222-00079

收稿日期 2021-02-24 本文编辑 孙敏

引用本文: 刘文博, 赵燕, 史新立, 等. 中国现行注册的含铜宫内节育器及其性能评价项目[J]. 中华生殖与避孕杂志, 2021, 41(8): 694-701. DOI: 10.3760/cma.j.cn101441-20210222-00079.

·避孕节育专栏·

中国现行注册的含铜宫内节育器及其性能评价项目

刘文博¹ 赵燕² 史新立¹ 赵鹏¹ 邢丽娜¹ 黄长瑾¹ 赵一飞²

¹ 国家药品监督管理局医疗器械技术审评中心, 北京 100081; ² 国家药

品监督管理局药品评价中心, 北京 100022

刘文博和赵燕对本文有同等贡献

通信作者: 刘文博, Email: bobole@live.cn, 电话: +86-10-86452675;

赵燕, Email: zhaoyan@cdr-adr.org.cn, 电话: +86-10-85243768

【摘要】 含铜宫内节育器(copper bearing intrauterine device, Cu-IUD)是我国育龄妇女使用广泛的避孕方法,在妇女卫生健康领域受到较多关注。本文对我国合法上市且目前注册证书在有效期内的 31 个 Cu-IUD 产品进行了信息综述,包括产品名称、生产企业名称、IUD 结构及组成、示意图等。从 Cu-IUD 的安全性和有效性角度,本文综述评价了 Cu-IUD 植入妇女宫腔避孕应具备的相关性能,包括物理性能、化学性能、生物相容性研究、与临床应用相关的性能研究等。

【关键词】 含铜宫内节育器; 结构及组成; 性能评价; 生物相容性

The current registered copper bearing intrauterine devices in China and their performance

Liu Wenbo¹, Zhao Yan², Shi Xinli¹, Zhao Peng¹, Xing Lina¹, Huang Changjin¹, Zhao Yifei²

¹ Center for Medical Device Evaluation, National Medical Products Administration, Beijing 100081, China; ² Center For Drug Reevaluation, National Medical Products Administration, Beijing 100022, China

Liu Wenbo and Zhao Yan contributed equally to the article

Corresponding author: Liu Wenbo, Email: bobole@live.cn, Tel: +86-10-86452675; Zhao Yan, Email: zhaoyan@cdr-adr.org.cn, Tel: +86-10-85243768

【Abstract】 Copper bearing intrauterine device (Cu-IUD) is a widely used contraceptive method for women of childbearing age in China. It plays an important role in family planning and population control in China. In recent years, Cu-IUD is still used by hundreds of millions of women in China, and such devices still attract more attention in the field of women's health. This paper collects the information of all the 31 Cu-IUD products with valid registration certificate in China, including product name, manufacturer name, IUD structure and composition, schematic diagram, etc. From the perspective of safety and effectiveness evaluation of IUD, this paper reviewed and evaluated the relevant properties of Cu-IUD implanted in uterine cavity, including physical properties, chemical properties, biocompatibility evaluation, and clinical application related performance studies.

【 Key words 】 Copper bearing intrauterine device; Structure and composition; Performance evaluation; Biocompatibility

DOI: 10.3760/cmaj.cn101441-20210507-00200

收稿日期 2021-06-01 本文编辑 孙敏

引用本文: 胡世福, 夏伟, 朱长虹. 含铜宫内节育器异常出血不良反应机制的研究进展[J]. 中华生殖与避孕杂志, 2021, 41(8): 702-704. DOI: 10.3760/cmaj.cn101441-20210507-00200.

·避孕节育专栏·

含铜宫内节育器异常出血不良反应机制的研究进展

胡世福¹ 夏伟² 朱长虹²

¹ 华中科技大学同济医学院附属协和医院妇产科, 武汉 430030; ² 华中

科技大学同济医学院生殖健康研究所, 武汉 430030

胡世福和夏伟对本文有同等贡献

通信作者: 朱长虹, Email: reprodcentre@163.com, 电话: +86-27-

83693057

【摘要】 宫内节育器 (intrauterine device, IUD) 是一种广泛应用的女性长效避孕方法之一, 具有安全、有效、简便、经济的优点。尽管 IUD 有诸多优点, 但仍存在一些不良反应影响其使用, 尤其是异常出血占有很大比重。对异常出血不良反应的机制研究具有重要的意义, 可以为新型 IUD 的设计及开发提供理论依据及新思路。本文对含铜 IUD 异常出血不良反应机制的研究进展做一综述。

【关键词】 含铜宫内节育器; 异常出血; 作用机制

基金项目: 国家自然科学基金项目 (81971435)

Research progress of abnormal bleeding in copper bearing intrauterine device

Hu Shifu¹, Xia Wei², Zhu Changhong²

¹Obstetrics and Gynecology Department, Union Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan 430030, China; ²Institute of Reproductive Health, Tongji Medical College, Huazhong University of Science and Technology, Wuhan 430030, China

Hu Shifu and Xia Wei contributed equally to the article

Corresponding author: Zhu Changhong, Email: reprodcentre@163.com, Tel: +86-27-83693057

【Abstract】 The intrauterine device (IUD) is one of the widely used long-acting contraceptive methods for women, which has the advantages of safety, effectiveness, simplicity and economy. Although the IUD has many advantages, there are still some side effects that affect its use, especially abnormal bleeding occupies a large proportion. It is of great significance to study the mechanism of abnormal bleeding, which can provide theoretical basis and new ideas for the design and development of new IUDs. This article gives an overview of the research progress of abnormal bleeding in copper bearing IUD.

【Key words】 Copper bearing intrauterine device; Abnormal bleeding; Mechanism

Fund program: National Natural Science Foundation of China (81971435)

DOI: 10.3760/cmaj.cn101441-20210227-00091

收稿日期 2021-02-27 本文编辑 孙敏

引用本文: 李红叶, 龚文霞, 江静. 手术终止 10 周内早期妊娠技术进展[J]. 中华生殖与避孕杂志, 2021, 41(8): 705-711. DOI: 10.3760/cmaj.cn101441-20210227-00091.

·避孕节育专栏·

手术终止 10 周内早期妊娠技术进展

李红叶 龚文霞 江静

河北医科大学第二医院妇产科, 石家庄 050000

通信作者: 江静, Email: jiangjing011@sina.com, 电话: +86-

13780307399

【摘要】 人工流产是避孕失败的有效补救措施, 终止早期妊娠的人工流产方法包括手术流产和药物流产。随着医疗技术提高, 越来越多新技术被应用于手术流产, 如何保证手术流产的安全性和有效性、提供高质量的流产服务, 成为临床工作者关注的重点。本文汇总了手术终止 10 周内早期妊娠的技术进展, 以期临床工作提供参考。

【关键词】 手术流产; 早期妊娠; 10 周内; 安全性; 并发症

Technical progress of surgical abortion of within 10 weeks pregnancy

Li Hongye, Gong Wenxia, Jiang Jing

Department of Obstetrics and Gynecology, the Second Hospital of Hebei Medical University, Shijiazhuang 050000, China

Corresponding author: Jiang Jing, Email: jiangjing011@sina.com, Tel: +86-13780307399

【 Abstract 】 Artificial abortion is an effective remedy for female contraceptive failure. Termination of first-trimester pregnancy includes surgical abortion and medical abortion. Along with the progress of medical technology, more and more new technologies are applied to surgical abortion. How to ensure the safety and effectiveness of surgical abortion and offer a high-quality abortion service have become the focus of clinical workers. This article analyzed the technical progress of surgical abortion of within 10 weeks pregnancy as to provide clinical reference.

【Key words】 Surgical abortion; First-trimester pregnancy; Within 10 weeks; Safety; Complication

DOI: 10.3760/cmaj.cn101441-20210218-00072

收稿日期 2021-03-03 责任编辑 宋培培

引用本文: 刘晃, 张欣宗. RISUG 男性避孕针研究进展[J]. 中华生殖与避孕杂志, 2021, 41(8): 712-716.
DOI: 10.3760/cma.j.cn101441-20210218-00072.

·避孕节育专栏·

RISUG 男性避孕针研究进展

刘晃 张欣宗

国家卫生健康委男性生殖与遗传重点实验室, 广东省生殖科学研究所,
广东省生殖医院, 广东省人类精子库, 广州 510600

通信作者: 张欣宗, Email: 13857170787@139.com, 电话: +86-
18588747273

【摘要】 自 1984 年印度医学家报道“在指导下对精子的可逆性抑制”(reversible inhibition of sperm under guidance, RISUG) 在男性避孕节育中有良好效果, 并被宣布作为可以解放女性避孕痛苦的男性避孕药以来, 国际上对 RISUG 的研究也有近 40 年时间。然而不同学者报道其研究结果差异甚大, 部分学者报道该药效果不明显, 部分报道其不良反应较大而无法深入研究。因此, 该药物的有效性和安全性一直以来成为各家争论的焦点, 其临床进展也缓慢不前, 除药物效果值得推敲, 其本身的安全性亦尚有待于进一步探讨和分析。本文就 RISUG 男性避孕针的研究背景、作用机理、实验基础、研究方法(包括给药方式、给药剂量、起效时间、作用效果、逆转方式、安全性等), 以及所面临的问题和发展前景等方面作一综述。

【关键词】 可逆性精子抑制剂; 避孕; 男性; 进展

基金项目: 广东省自然科学基金(2021A1515011544); 广东省医学科研基金项目(B2021453、A2021259); 广东省计划生育科学技术研究所科创团队培育计划项目(C01)

Research progress of reversible inhibition of sperm under guidance male contraceptive needle

Liu Huang, Zhang Xinzong

NHC Key Laboratory of Male Reproduction and Genetics, Guangdong Provincial Reproductive Science Institute, Guangdong Provincial Fertility Hospital, Human Sperm Bank of Guangdong Province, Guangzhou 510600, China

Corresponding author: Zhang Xinzong, Email: 13857170787@139.com, Tel: +86-18588747273

【Abstract】 Since 1984, Indian medical experts reported that reversible inhibition of sperm under guidance (RISUG) had a good effect in male contraception, and was announced as a male contraceptive which could relieve female contraceptive pain, the international research on RISUG male contraceptive had

been done nearly for 40 years. However, different studies had reported that the results were very different. Some scholars reported that the effect of the drug was not obvious, and some scholars reported that the side effects of the drug were too serious to be studied in depth. Therefore, the effectiveness and safety of the drug had always been the focus of debate, so its clinical progress was slow. In addition to the effect of the drug, its safety also needed to be further explored and analyzed. In this paper, the research background, action mechanism, experimental basis, research methods (including administration mode, administration and dose, onset time, action and effect, reversal mode and effect, safety evaluation, etc.), as well as the problems and development prospects of RISUG male contraceptive needle were reviewed.

【Key words】 RISUG; Contraception; Male; Progress

Fund program: Natural Science Foundation of Guangdong Province (2021A1515011544); Medical Research Fund Project of Guangdong Province (B2021453, A2021259); Science and Innovation Team Cultivation Program of Family Planning Research Institute of Guangdong Province (C01)

DOI: 10.3760/cma.j.cn101441-20210301-00095

收稿日期 2021-03-03 本文编辑 王李艳

引用本文: 王玉柱, 杨明俊, 田芳, 等. 兼具预防性传播感染功能的避孕药具研发进展[J]. 中华生殖与避孕杂志, 2021, 41(8): 717-722. DOI: 10.3760/cma.j.cn101441-20210301-00095.

·避孕节育专栏·

兼具预防性传播感染功能的避孕药具研发进展

王玉柱 杨明俊 田芳 夏敏杰 李卫华

上海市生物医药技术研究院, 国家卫生健康委员会计划生育药具重点实验室 200032

通信作者: 李卫华, Email: iamliweihua@foxmail.com, 电话: +86-21-64437475

【摘要】 多功能预防技术(multipurpose prevention technologies, MPTs)可以同时避孕和预防获得性免疫缺陷综合征(acquired immunodeficiency syndrome, AIDS)或其他性传播感染(sexually transmitted infections, STIs), 对我国公共卫生具有重要意义。MPTs 可以是针对不同适应证的多种药物的组合, 也可以是具有多种适应证的单一产品。通过使用 MPTs 可解决多种性与生殖健康问题, 提高产品的可及性和依从性。目前国际上有二十余个 MPTs 产品处于研发的不同阶段, 绝大多数产品为阴道局部给药, 包括女用避孕套、缓释阴道环、阴道凝

胶、阴道薄膜、皮埋剂、口服片剂和微针贴片等。本文对国内外兼具预防 AIDS/STIs 和避孕功能产品的研发进展、研发趋势以及面临的挑战作一综述。

【关键词】 避孕药具； 性传播感染； 获得性免疫缺陷综合征

基金项目：国家重点研发计划（2016YFC1000905）；上海市科委项目（21S11901000、18431900200）

Research and development of anti-sexually transmitted infections contraceptives

Wang Yuzhu, Yang Mingjun, Tian Fang, Xia Minjie, Li Weihua

NHC Key Lab of Reproduction Regulation (Shanghai Institute for Biomedical and Pharmaceutical Technologies), Fudan University, Shanghai 200032, China

Corresponding author: Li Weihua, Email: iamliweihua@foxmail.com, Tel: +86-21-64437475

【Abstract】 Multipurpose prevention technologies (MPTs) are an innovative class of products that deliver varied combinations of acquired immunodeficiency syndrome (AIDS) prevention, other sexually transmitted infections (STIs) prevention and contraception. It is of great significance to China's public health. MPTs can be combinations of multiple drugs for different indications, or they can be a single product with multiple indications. Currently, there are more than 20 MPTs products in various stages of development, including female condoms, sustained release vaginal rings, vaginal gels, vaginal films, implants, oral tablets and microarray patches. Most of the products are for vaginal topical delivery. In this paper, the research and development progress, research trends and development challenges of anti-AIDS/STIs contraceptive products at home and abroad are reviewed.

【Key words】 Contraceptive devices; Sexually transmitted infections; Acquired immunodeficiency syndrome

Fund program: National Key Research and Development Program of China (2016YFC1000905); Shanghai Municipal Science and Technology Commission (21S11901000, 18431900200)

DOI: 10.3760/cmaj.cn101441-20210512-00209

收稿日期 2021-05-12 本文编辑 孙敏

引用本文：朱焰, 王健. 激素避孕药具的非避孕用途及安全性研究进展[J]. 中华生殖与避孕杂志, 2021, 41(8): 723-730. DOI: 10.3760/cmaj.cn101441-20210512-00209.

·避孕节育专栏·

激素避孕药具的非避孕用途及安全性研究进展

朱焰 王健

上海市生物医药技术研究院, 国家卫生健康委员会计划生育药具重点实验室 200032

通信作者: 朱焰, Email: zhuyan@sippr.org, 电话: +86-21-64438416

【摘要】 我国目前同时面临着人工流产率不断攀升、辅助生育市场蓬勃发展的奇特现象,表明育龄人群的生育力受到损伤。避孕药具是防止非意愿妊娠、减少人工流产唯一有效的方法,其带来的获益远远大于人工流产带来的风险。一些避孕药还具有非避孕益处以及额外的治疗价值,但同时也伴随着一定的不良反应。深入了解激素类避孕药的药理特性和安全性,为不同年龄和不同需求的人群提供适宜的避孕药具有助于促进避孕药具正确、合理地应用,使之成为保护育龄人群生育功能的重要措施。本文将追踪和介绍近十年来国外新型激素避孕药具产品、非避孕用途和安全性研究进展,为国内避孕药具的研发和应用提供参考。

【关键词】 激素避孕药; 非避孕用途; 药理特性; 不良反应

基金项目: 上海市自然科学基金(20ZR1448200); 国家重点研发项目(2016YFC1000904)

Progress in non-contraceptive effects and safety of hormonal contraceptives

Zhu Yan, Wang Jian

NHC Key Lab of Reproduction Regulation (Shanghai Institute for Biomedical and Pharmaceutical Technologies), Fudan University, Shanghai 200032, China

Corresponding author: Zhu Yan, Email: zhuyan@sippr.org, Tel: +86-21-64438416

【Abstract】 China is currently facing an abnormal phenomenon in which both artificial abortion rate and assisted reproductive market are rising, suggesting that the fertility of women has been injured. Contraceptives are the only effective way to reduce the artificial abortion from unintended pregnancy, and the benefits they bring far surpass the risks of abortion, and some of contraceptives have extra therapeutic value. However, the efficacy of hormonal contraceptives is also accompanied by unwanted adverse effects as well. Understanding the pharmacological properties and the adverse effects of the contraceptives will conduce to use them properly according to the requirements of all ages, making the contraceptives an important measure to protect the fertility of women. This article will summarize the progress in research and development, non-contraceptive uses and the safety of the contraceptives in the past 10 years, providing new information for the readers.

【Key words】 Hormonal contraceptives; Non-contraceptive application; Pharmacological profile; Adverse effect

Fund program: Shanghai Municipality Natural Science Foundation (20ZR1448200); National Key R&D Program of China (2016YFC1000904)

DOI: 10.3760/cmaj.cn101441-20210601-00250

收稿日期 2021-06-01 本文编辑 孙敏

引用本文：曾佳, 李芳, 陈建兴, 等. 基于药剂学视角的女性避孕节育药具研发的思考[J]. 中华生殖与避孕杂志, 2021, 41(8): 731-738. DOI: 10.3760/cmaj.cn101441-20210601-00250.

·避孕节育专栏·

基于药剂学视角的女性避孕节育药具研发的思考

曾佳 李芳 陈建兴 陈良康 俸灵林

上海市生物医药技术研究院, 国家卫生健康委员会计划生育药具重点实验室, 上海

生殖健康药具工程技术研究中心 200032

通信作者：俸灵林, Email: fenglinglinxin@163.com, 电话: +86-

21-64438657

【摘要】 近年来, 国际社会将家庭计划作为改善妇幼健康的优先战略, 我国也将生殖健康纳入国家发展战略。其中, 育龄女性采取安全有效的避孕方法防止意外妊娠、降低人工流产是提高其生殖健康水平的重要举措。本文简述了女性避孕节育产品的全球市场需求, 并以全球需求及市场为导向的长效生物降解型埋植剂和长效微球注射剂为例, 分别从原辅料选择、处方前研究、处方工艺研究等前期开发环节入手, 探讨女性避孕节育药具的研发思路。最后, 展望了3D打印技术、计算机仿真技术和人工智能技术等前沿技术在该领域的应用前景。跨学科整合药学和计算机科学等研究方式, 有望改变传统制剂的开发模式, 助力加速推动女性避孕节育药具的产业化转化步伐。

【关键词】 避孕节育; 长效制剂; 可生物降解; 微球; 埋植剂; 前沿技术

Thoughts on research and development of female contraceptives from the perspective of pharmaceutics

Zeng Jia, Li Fang, Chen Jianxing, Chen Liangkang, Feng Linglin

NHC Key Lab of Reproduction Regulation (Shanghai Institute for Biomedical and Pharmaceutical Technologies), Fudan University, Shanghai Engineering Research Center of Reproductive Health Drug and Devices, Shanghai 200032, China

Corresponding author: Feng Linglin, Email: fenglinglinxin@163.com, Tel: +86-21-64438657

【Abstract】 In recent years, the world community has aroused interest in family planning as a prioritized strategy to improve maternal health, and China has also incorporated reproductive health into its national development strategies. Safe and effective contraceptive methods for women of childbearing age to prevent

unwanted pregnancy and reduce abortion, is an important measure to improve their reproductive health. This paper firstly summarizes the global market demand for female contraceptive products. Then, starting from the early research and development (R&D) stages such as raw materials selection, pre-formulation and formulation investigations, this paper discusses the R&D thoughts of contraceptives including long-acting biodegradable implants and microsphere injections. Finally, we review the application prospects of 3D printing, computer simulation and artificial intelligence in this field. Interdisciplinary integration of pharmaceutical and computer science is expected to inspire and change the development mode of traditional preparations, as well as to help accelerate the industrialization of contraceptives.

【Key words】 Contraception; Long-acting preparation; Biodegradable; Microsphere; Implant; Frontier technologies

DOI: 10.3760/cma.j.cn101441-20200814-00447

收稿日期 2020-08-24 本文编辑 李天琦

引用本文: 应瑛, 丘福满, 刘见桥, 等. 月经规律女性体质量指数对体外受精-胚胎移植治疗卵巢反应性及妊娠结局的影响研究[J]. 中华生殖与避孕杂志, 2021, 41(8): 739-746. DOI: 10.3760/cma.j.cn101441-20200814-00447.

·临床研究·

月经规律女性体质量指数对体外受精-胚胎移植治疗卵巢反应性及妊娠结局的影响

应瑛¹ 丘福满² 刘见桥¹ 李斯晨¹ 黄青¹ 刘海英¹

¹广州医科大学附属第三医院, 广东省产科重大疾病重点实验室, 妇产科, 生殖医学中心 510150; ²广州医科大学公共卫生学院 511436

应瑛和丘福满对本文有同等贡献

通信作者: 刘海英, Email: liuhaiying0606@163.com, 电话: +86-

18127862132

【摘要】 目的 探究月经规律女性体质量指数 (body mass index, BMI) 与超促排卵卵巢反应性及体外受精-胚胎移植 (*in vitro* fertilization-embryo

transfer, IVF-ET) 结局是否存在关联。方法 本研究为回顾性队列研究, 收集 2019 年 1 月至 2020 年 4 月期间在广州医科大学附属第三医院行 IVF 助孕患者资料, 根据世界卫生组织 (World Health Organization, WHO) 推荐的亚洲人 BMI 分级标准, 将符合纳入标准的患者分为低 BMI 组 ($\text{BMI} < 18.5 \text{ kg/m}^2$, $n=212$)、正常 BMI 组 ($\text{BMI} 18.5 \sim 23.0 \text{ kg/m}^2$, $n=1076$)、高 BMI 组 ($\text{BMI} 23.0 \sim 25.0 \text{ kg/m}^2$, $n=308$) 和肥胖组 ($\text{BMI} \geq 25.0 \text{ kg/m}^2$, $n=287$) 4 个队列, 主要结局指标为获卵数、卵巢反应性和持续妊娠率。结果 各组的获卵数和卵巢反应性差异均无统计学意义 (P 均 > 0.05)。高 BMI 组和肥胖组的 M_{II} 卵率、受精卵子数、可用胚胎数、优质胚胎数和移植胚胎数与正常 BMI 组比较差异均无统计学意义 (P 均 > 0.05)。各组的移植优质胚胎比例、因卵巢过度刺激综合征 (ovarian hyperstimulation syndrome, OHSS) 风险全胚冷冻率、种植率、临床妊娠率、早期流产率、持续妊娠率等差异均无统计学意义 (P 均 > 0.05)。此外, 通过 logistic 回归分析校正混杂因素后仍未显示 BMI 与卵巢反应性及持续妊娠率之间存在关联。结论 月经规律的女性 BMI 增高不影响卵巢反应性及 IVF 妊娠结局。

【关键词】 体质量指数; 卵巢反应性; 受精, 体外; 胚胎移植; 妊娠结局

基金项目: 国家自然科学基金青年科学基金项目 (81701518、81801532)

Influence of body mass index on ovarian response and pregnancy outcome in ovulatory women undergoing *in vitro* fertilization-embryo transfer

Ying Ying¹, Qiu Fuman², Liu Jianqiao¹, Li Sichen¹, Huang Qing¹, Liu Haiying¹

¹ Center for Reproductive Medicine, Department of Obstetrics and Gynecology, Key Laboratory for Major Obstetric Diseases of Guangdong Province, the Third Affiliated Hospital of Guangzhou Medical University, Guangzhou 510150, China; ² The School of Public Health, Guangzhou Medical University, Guangzhou 511436, China

Ying Ying and Qiu Fuman contributed equally to the article

Corresponding author: Liu Haiying, Email: liuhaiying0606@163.com, Tel: +86-18127862132

【Abstract】 **Objective** To explore whether the body mass index (BMI) of women with regular menstruation is associated with ovarian response to ovarian hyperstimulation and the outcome of *in vitro* fertilization-embryo transfer (IVF-ET).

Methods This retrospective cohort study uses data of IVF during the study period from the Center for Reproductive Medicine of the Third Affiliated Hospital of Guangzhou Medical University. According to the Asian BMI classification standard recommended by World Health Organization (WHO), the patients who met the inclusion criteria were divided into 4 groups: low BMI group ($\text{BMI} < 18.5 \text{ kg/m}^2$, $n=212$), normal BMI group ($\text{BMI} 18.5 \sim 23.0 \text{ kg/m}^2$, $n=1076$), high BMI group ($\text{BMI} 23.0 \sim 25.0 \text{ kg/m}^2$, $n=308$) and obesity group ($\text{BMI} \geq 25.0 \text{ kg/m}^2$, $n=287$). The main outcome measures were the number of oocytes retrieved, ovarian response and ongoing pregnancy rate. **Results** There were no significant differences in the number of oocytes retrieved and ovarian response among the four groups ($P > 0.05$). Outcomes of embryo culture (including M_{II} oocyte rate, fertilized number, numbers of available embryos and high-quality embryos) and the number of transferred

embryos were not statistically significant in high BMI group and obesity group when compared with normal BMI group ($P>0.05$). Furthermore, no significant differences were found in the rate of high-quality embryo transferred, the freeze-all rate due to ovarian hyperstimulation syndrome (OHSS) risk, rates of implantation, clinical pregnancy, early miscarriage and ongoing pregnancy among the four groups ($P>0.05$). In addition, after adjusting for confounding factors by logistic regression analysis, no association was found between BMI and ovarian response and ongoing pregnancy rate. **Conclusion** The increase of BMI in women with regular menstruation has no influence on ovarian response and IVF pregnancy outcome.

【Key words】 Body mass index; Ovarian response; Fertilization *in vitro*; Embryo transfer; Pregnancy outcome

Fund program: National Natural Science Foundation of China (81701518, 81801532)

DOI: 10.3760/cma.j.cn101441-20210312-00126

收稿日期 2021-03-15 本文编辑 王李艳

引用本文: 黄媛, 陈敏, 徐雯, 等. 孕晚期宫内高雄激素环境对 SD 子代雌鼠持续性低度炎症状态及胰岛素敏感性的影响[J]. 中华生殖与避孕杂志, 2021, 41(8): 747-753. DOI: 10.3760/cma.j.cn101441-20210312-00126.

·实验研究·

孕晚期宫内高雄激素环境对 SD 子代雌鼠持续性低度炎症状态及胰岛素敏感性的影响

黄媛¹ 陈敏² 徐雯¹ 曹琦¹ 苏椿淋¹ 孙晓溪³

¹ 复旦大学附属妇产科医院, 上海 200032; ² 上海市交通大学医学院附属仁济医院生殖中心 200127; ³ 复旦大学附属妇产科医院 上海集爱遗传与不育诊疗中心 200011

通信作者: 苏椿淋, Email: Ceilingsu@126.com

【摘要】 目的 动态观察孕晚期宫内高雄激素环境下子代 SD 雌性大鼠新生期、青春期、成年期的体质量、体脂分布、持续性低度炎症状态及胰岛素敏感性。方法 通过对妊娠 18~20 d SD 孕鼠皮下注射 2 mg 睾酮获取孕晚期宫内高浓度

睾酮组（简称宫内高雄组）的子代雌鼠（ $n=15$ ），并以等体积生理盐水皮下注射孕晚期 SD 孕鼠获取子代雌鼠为对照组（ $n=15$ ），观察新生期（4 d）、青春期（15 d）、成年期（35 d）子代雌鼠的体质量、体脂体质量比；酶联免疫吸附法检测各时期子代雌鼠肿瘤坏死因子（tumor necrosis factor, TNF）- α 、单核细胞趋化因子（monocyte chemotactic factor, MCP）-1 的浓度；荧光染色方法检测腹膜脂肪组织中 CD16 的表达情况；取青春期、成年期子代雌鼠行腹腔注射葡萄糖耐受试验（intraperitoneal glucose tolerance test, IGTT）。结果 ①宫内高雄组子代雌鼠新生期、青春期的体质量〔（101.17 \pm 9.19）g、（211.61 \pm 11.94）g〕高于对照组〔（71.59 \pm 7.56）g, $P<0.001$ ；（189.85 \pm 6.97）g, $P=0.003$ 〕，体脂体质量比（0.16 \pm 0.18、0.27 \pm 0.20）高于对照组（0.11 \pm 0.17, $P=0.002$ ；0.21 \pm 0.18, $P=0.006$ ），而成年期子代雌鼠与对照组差异无统计学意义（ $P>0.05$ ）。②宫内高雄组子代雌鼠不同时期（新生期、青春期、成年期）的体脂肌肉比（0.05 \pm 0.04、0.08 \pm 0.05、0.12 \pm 0.04）均高于对照组（0.08 \pm 0.05、0.13 \pm 0.07、0.18 \pm 0.06），差异均有统计学意义（ $P=0.031$ 、 $P=0.007$ ， $P=0.005$ ）。③宫内高雄组子代雌鼠各时期血清中 TNF- α 含量及 MCP-1 含量较对照组均显著增加（ $P<0.001$ ， $P=0.004$ ）；且腹膜脂肪组织中 CD16 表达较对照组明显增加（ $P=0.018$ ， $P=0.031$ ， $P=0.004$ ）。④宫内高雄组青春期 IGTT 中 120 min 血糖〔（165.00 \pm 58.68）mg/dL〕明显高于对照组〔（123.90 \pm 65.16）mg/dL, $P=0.028$ 〕，成年期的 60 min〔（189.73 \pm 69.87）mg/dL〕、120 min 血糖〔（136.67 \pm 37.14）mg/dL〕明显高于对照组〔（170.18 \pm 32.66）mg/dL、（102.56 \pm 12.27）mg/dL〕（ $P=0.035$ 、 $P=0.008$ ）。结论 孕晚期宫内高雄激素环境可导致子代雌鼠新生期、青春期雄激素过多及向心性肥胖，但该效应未延续至成年期；且可能对出生后子代的肌肉形成产生不利影响。另外孕晚期高雄激素暴露可使出生后子代雌鼠脂肪组织中的巨噬细胞向 M1 型转化持续至成年，并长期处于低度炎症状态；孕晚期高雄激素暴露可使出生后子代雌鼠胰岛素敏感性可从青春期末至成年期持续下降，而且成年期表现更明显。

【关键词】 宫内高雄激素环境； 子代； 持续低度炎症； 胰岛素敏感性

基金项目：国家自然科学基金（81701409）；上海市自然科学基金（12ZR441400）

Effect of intrauterine hyperandrogen exposure in late-gestation on chronic low-grade inflammation and insulin sensitivity in female SD offspring of rats

Huang Yuan¹, Chen Min², Xu Wen¹, Cao Qi¹, Su Chunlin¹, Sun Xiaoxi³

¹Department of Obstetrics and Gynecology, Hospital Affiliated to Fudan University, Shanghai 200011, China; ²Reproductive Center, Renji Hospital Affiliated to Shanghai Jiao Tong University School of Medicine, Shanghai 200127, China; ³Shanghai JiAi Genetics & IVF Institute, Obstetrics & Gynecology Hospital Affiliated to Fudan University, Shanghai 200011, China

Corresponding author: Su Chunlin, Email: Ceilingsu@126.com

【Abstract】 **Objective** To observe the weight, fat distribution, persistent low-grade inflammation and insulin sensitivity of SD female rats in neonatal, adolescent and adult periods, which were exposed with intrauterine high androgen. **Methods** Fifteen offspring female rats which were exposed to high level of intrauterine testosterone in late pregnancy were obtained by subcutaneous

injection of 2 mg testosterone into pregnant SD rats at 18–20 d of gestation. They were ascribed to the intrauterine testosterone group. At the same time, fifteen female offspring obtained from the pregnant SD rats injected with the same volume saline were as control group. The weight and body fat content were observed in neonatal stage (4 d), adolescent stage (15 d) and adult stage (35 d) of offspring female rats. Tumor necrosis factor (TNF)- α and monocyte chemotactic factor (MCP)-1 were tested by enzyme-linked immunosorbent assay (ELISA). The expression of CD16 in peritoneal adipose tissue was detected by immune fluorescence staining. Intraperitoneal glucose tolerance test (IGTT) was performed in adolescent and adult female rats. **Results** 1) The weight of neonatal and adolescent female offspring in intrauterine testosterone group were significantly increased compared with control group [(101.17 \pm 9.19) g vs. (71.59 \pm 7.56) g, P <0.001; (211.61 \pm 11.94) g vs. (189.85 \pm 6.97) g, P =0.003]. Similarly, there was a significant difference in the ratio of fat and weight between the two groups (0.16 \pm 0.18 vs. 0.11 \pm 0.17, P =0.002; 0.27 \pm 0.18 vs. 0.21 \pm 0.18, P =0.006), while there were no obvious significance in adult offspring between the two groups (P >0.05). 2) The body fat and muscle ratio of female offspring in intrauterine testosterone group were higher than those in control group during neonatal, adolescent and adult periods (0.05 \pm 0.04 vs. 0.08 \pm 0.05, P =0.031; 0.08 \pm 0.05 vs. 0.13 \pm 0.07, P =0.007; 0.12 \pm 0.04 vs. 0.18 \pm 0.06, P =0.005). 3) The serum TNF- α and MCP-1 levels in intrauterine testosterone group were higher than those in control group (P <0.001, P =0.004), and the expression of CD16 in peritoneal adipose tissue was significantly increased (P =0.018, P =0.031, P =0.004). 4) Following IGTT, compared with control group, the intrauterine testosterone group in puberty showed significantly higher 120 min glucose level [(165.00 \pm 58.68) mg/dL vs. (123.90 \pm 65.16) mg/dL, P =0.028] and the adulthood showed higher 60 min [(189.73 \pm 69.87) mg/dL vs. (136.67 \pm 37.14) mg/dL, P =0.035] and 120 min [(170.18 \pm 32.66) mg/dL vs. (102.56 \pm 12.27) mg/dL, P =0.008] glucose level. **Conclusion** The hyperandrogen exposure at late-gestation can lead to the excessive androgen and centripetal obesity of female offspring from newborn to adolescence, but the adverse effect on muscle formation can extend to adulthood. The intrauterine high testosterone environment facilitated to promote macro-phage to M1-subtype and maintain chronic low-degree inflammation. In addition, the insulin sensitivity decreased from puberty to adulthood, which was even worsen in adulthood.

【Key words】 Intrauterine hyperandrogen exposure; Offspring; Chronic low-grade inflammation; Insulin sensitivity

Fund program: National Natural Science Foundation of China (81701409); Shanghai Municipal Natural Science Youth Found (12ZR1441400)

·临床报道·

DOI: 10.3760/cma.j.cn101441-20200501-00258

收稿日期 2020-05-26 本文编辑 李天琦

引用本文：曾薇薇, 刘炳光, 郭吉敏, 等. 复发性子宫瘢痕妊娠的高危因素及处理方式分析[J]. 中华生殖与避孕杂志, 2021, 41(8): 754-758. DOI: 10.3760/cmaj.cn101441-20200501-00258.

复发性子宫瘢痕妊娠的高危因素及处理方式分析

曾薇薇¹ 刘炳光² 郭吉敏² 苏圣梅¹ 古衍¹ 姚吉龙¹

¹ 南方医科大学深圳妇幼保健院妇产科 518028; ² 南方医科大学
附属深圳妇幼保健院放射科 518028

通信作者：姚吉龙, Email: yaojilong369@163.com, 电话: +86-
13823556088

【摘要】 目的 探讨复发性子宫瘢痕妊娠 (recurrent cesarean scar pregnancy, RCSP) 的高危因素及处理方式。方法 回顾性病例对照分析 2014 年 1 月至 2018 年 12 月期间于南方医科大学深圳妇幼保健院妇产科住院的子宫瘢痕妊娠 (cesarean scar pregnancy, CSP) 患者临床资料, 根据是否复发分成复发组 12 例, 对照组 36 例, 比较患者妊娠、手术等情况。结果 患者子宫下段瘢痕厚度复发组 [(1.81 ± 1.12) mm] 较对照组 [(2.80 ± 1.56) mm] 薄, 差异有统计学意义 ($P=0.031$)。两组主要手术方式为清宫术, 次要手术方式为瘢痕妊娠物清除+瘢痕修补术, 术前必要时行预防性子宫动脉栓塞术。复发组 12 例患者中有 11 例治愈, 对照组 36 例患者全部治愈。logistic 回归分析显示: 人工流产次数 ≥ 3 次 ($P=0.007$)、子宫下段瘢痕处厚度 < 3 mm ($P=0.013$) 是 CSP 复发的高危因素。结论 人工流产次数 ≥ 3 次、子宫下段瘢痕部位厚度 < 3 mm 为 CSP 复发的高危因素。清宫术可作为 RCSP 的首选治疗方式, 术前必要时可进行预防性子宫动脉栓塞术。

【关键词】 子宫瘢痕妊娠; 复发; 高危因素; 清宫术; 瘢痕修补术
基金项目: 深圳市科技创新委员会项目 (JCYJ20160427191746242)

Risk factors and treatments of recurrent cesarean scar pregnancy

Zeng Weiwei¹, Liu Bingguang², Guo Jimin², Su Shengmei¹, Gu Yan¹, Yao Jilong¹

¹ Department of Obstetrics and Gynecology, Shenzhen Maternity & Child Healthcare Hospital Affiliated to Southern Medical University, Shenzhen 518028, China; ² Department of Radiology, Shenzhen Maternity & Child Healthcare Hospital Affiliated to Southern Medical University, Shenzhen 518028, China

Corresponding author: Yao Jilong, Email: yaojilong369@163.com, Tel: +86-13823556088

【Abstract】 Objective To investigate the risk factors and treatments of recurrent cesarean scar pregnancy (RCSP). **Methods** A retrospective case-controlled study was performed in 48 cesarean scar pregnancy (CSP) patients in Shenzhen Maternity & Child Healthcare Hospital from January 2014 to December 2018. Recurrent group consisted of 12 patients with RCSP, while control group consisted of 36 patients experienced single CSP. The information of pregnancy, surgery and other factors of the two groups was compared. **Results** Thickness of lower uterine segment in recurrent group was thinner than that in control group [(1.81±1.12) mm vs. (2.80±1.56) mm, $P=0.031$]. Dilation and curettage (D&C) was the main treatment method, and scar repair was the secondary treatment in these two groups. Patients may receive prophylactic uterine artery embolization (UAE) to prevent catastrophic bleeding during surgery when necessary. Totally 11 of 12 patients were cured in recurrent group, while all of 36 patients were cured in control group. Univariate analysis showed that artificial abortions ≥ 3 times ($P=0.007$), type of CSP and thickness of lower uterine segment <3 mm ($P=0.013$) had a significant correlation with the RCSP. **Conclusion** Artificial abortions ≥ 3 times and thickness of lower uterine segment <3 mm were the independent risk factors of RCSP. D&C can be used as the first line treatment of RCSP, and prophylactic UAE should be performed when necessary.

【Key words】 Cesarean scar pregnancy; Recurrent; Risk factors; Dilation and curettage; Scar repair

Fund program: Project of Shenzhen Science and Technology Innovation Committee (JCYJ20160427191746242)

·综述·

DOI: 10.3760/cma.j.cn101441-20201111-00616

收稿日期 2020-11-27 本文编辑 王李艳

引用本文: 郑秋云, 刘朝奇, 李志英. 环状 RNA 与多囊卵巢综合征关系的研究进展[J]. 中华生殖与避孕杂志, 2021, 41(8): 759-763. DOI: 10.3760/cma.j.cn101441-20201111-00616.

环状 RNA 与多囊卵巢综合征关系的研究进展

郑秋云¹ 刘朝奇² 李志英¹

¹ 三峡大学附属仁和医院妇产科, 宜昌 443001; ² 三峡大学肿瘤微环境

与免疫治疗湖北省重点实验室, 宜昌 443002

通信作者：李志英，Email：782019628@qq.com，电话：+86-13617175605

【摘要】 多囊卵巢综合征（polycystic ovary syndrome, PCOS）是临床常见的生殖内分泌疾病，发病率逐年增高。PCOS 的发生发展与多种因素有关，其中遗传因素可能起着关键作用。环状 RNA（circular RNA, circRNA）是一种新型的通用且多样化的内源非编码 RNA。circRNA 的 3'和 5'末端可以通过共价键连接在一起，导致其形成环化结构。此外，circRNA 在 RNA 核酸外切酶介导下，能够抵抗降解，保持了高度稳定性。circRNA 还具有细胞特异性、组织特异性和时序特异性。与微小 RNA 相比，circRNA 是更理想的疾病生物标志物，为后续治疗各种疾病提供了新的靶点。越来越多的研究表明 circRNA 与 PCOS 的病理生理有关，在内分泌激素分泌、卵泡发育、颗粒细胞增殖与凋亡、遗传倾向等中发挥作用，参与了 PCOS 发生发展的各个环节。本文综述了近年来 circRNA 与 PCOS 关系的相关研究进展，希望能为 PCOS 的诊断和治疗研究提供新的思路。

【关键词】 多囊卵巢综合征； 环状 RNA； 颗粒细胞； 排卵障碍
基金项目：湖北省卫健委联合基金（WJ2019H535）

Research progress on the relationship between circular RNA and polycystic ovary syndrome

Zheng Qiuyun¹, Liu Zhaoqi², Li Zhiying¹

¹ Department of Gynaecology and Obstetrics, Ren-he Hospital, Affiliated of China Three Gorges University, Yichang 443001, China; ² Hubei Key Laboratory of Tumor Microenvironment and Immunotherapy, China Three Gorges University, Yichang 443002, China

Corresponding author: Li Zhiying, Email: 782019628@qq.com, Tel: +86-13617175605

【 Abstract 】 Polycystic ovary syndrome (PCOS) is a common clinical reproductive endocrine disease, and its incidence is increasing year by year. The occurrence and development of PCOS are related to many factors, among which genetic factors may play a key role. Circular RNA (circRNA) is a new type of universal and diverse endogenous non-coding RNA. The 3' and 5' ends of circRNA can be covalently linked together, causing it to form a circular structure. In addition, circRNA can resist degradation and maintain a high degree of stability under the mediation of RNA exonuclease. CircRNA also has cell specificity, tissue specificity and timing specificity. Compared with microRNA, circRNA is a more ideal disease biomarker, providing a new target for subsequent treatment of various diseases. An increasing number of studies have shown that circRNA is related to the pathophysiology of PCOS, and plays a role in endocrine hormone secretion, follicle development, granulosa cell proliferation and apoptosis, and genetic tendency, and participates in each link of the occurrence and development of PCOS. This article reviews the research reports on the relationship between circRNA and PCOS in recent years, hoping to provide new ideas for the diagnosis and treatment of PCOS.

【Key words】 Polycystic ovary syndrome; Circular RNA; Granulosa cells;
Ovulation disorders

Fund program: Hubei Provincial Health Commission Joint Fund
(WJ2019H535)