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·专家建议·

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新冠病毒奥密克戎毒株流行性感染下辅助生殖机构及精子库疫情防控管理建议（第一版）

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【摘要】 在当前新冠病毒奥密克戎毒株大流行的形势下，为尽可能满足不育患者的生育需求，本建议专家组在回顾国内外文献的基础上，结合我国目前的疫情流行现况和防控政策，并充分考虑我国辅助生殖机构和精子库的服务流程及场所特点，针对机构防控管理和新冠病毒感染者就诊及手术管理提出具体建议，以指导和规范辅助生殖机构和精子库的相关工作。在实际应用过程中，各省市辅助生殖机构和精子库可结合当地政府疫情防控要求和本机构实际情况，因地制宜，制定个性化的机构防控措施和患者就诊管理流程。

【关键词】 新型冠状病毒；　生殖技术，辅助；　奥密克戎毒株；　精子库；　专家建议

基金项目：国家重点研发计划（2022YFC2702500）

Recommendations for the prevention and control measurements in assisted reproductive institutions and human sperm banks during the pandemic of COVID-19 Omicron strain (first edition)

Wang Yuanyuan[1], Liu Hanyan[2], Liu Jianqiao[2], Li Rong[1], Yang Rui[1], Lin Yanshan[2], Chen Zhichong[2], Xu Zijin[2], Cao Mingzhu[2]

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【Abstract】 In order to meet the fertility needs of infertile patients as much as possible during the pandemic of COVID-19 Omicron strain, this expert group reviewed global and domestic literature, combined with the current epidemic situation and prevention and control policies, fully considered the service procedures and characteristics of assisted reproductive institutions and sperm banks in China, and then put forward specific recommendations on institutional prevention and control management, and treatment and surgical management of COVID-19 infected patients, so as to guide and standardize the related practices in assisted reproductive institutions and sperm banks. In the practical application process, assisted reproductive institutions and sperm banks in various provinces and cities should develop personalized institutional prevention and control measures and patient management procedures based on local prevention and control requirements and the actual situation of their own institutions.

【Key words】 COVID-19; Reproductive technology, assisted; Omicron strain; Sperm bank; Expert recommendations

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·健康生育专栏·

健康生育——从生命起源守护人口健康

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【摘要】 人口健康不仅是指一代人的生育全周期的健康，还包括通过维护健康生育来保障跨代际的健康，是实现人口长期均衡发展的基石。本文围绕"健康生育"的内涵与范畴，针对我国正面临的育龄人群生育力下降、高龄妊娠及危重妊娠期并发症增多、出生缺陷防控难以取得进一步突破、女性恶性肿瘤患者生育力保存的需求上升、新发重大传染病威胁加重等严重影响健康生育的问题和挑战，从生育政策、基础研究、临床研究、学科布局及协同创新等方面探讨健康生育领域的中长期发展布局与战略规划，旨在从生命起源守护健康，保障人口健康高质量发展。

【关键词】 生殖健康； 孕产妇健康； 婴儿健康； 社会规划； 健康生育； 母婴健康； 中长期发展规划

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Healthy birth--protecting health from the origin of life

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【**Abstract**】 Population health not only refers to the whole reproductive health cycle of a generation, but also to safeguard cross-generational health and development through maintaining "healthy birth", which is the cornerstone to realize the sustainable development of the national population. Therefore, this article introduced and extended the concept of "healthy birth"; analyzed the main health problems and challenges in this field, such as the sustained fall of birth population, the fecundity decline among couples at reproductive age, advanced maternal age and severe complications during pregnancy, birth defects, female malignant tumor and fertility preservation, and threats from emerging major infectious disease; and then discussed the medium-term and long-term development layout and planning in the field of healthy birth, covering the aspects of population policy, basic research, clinical research, discipline layout and collaborative innovation, so as to protect health from the origin of life and ensure the high-quality development of population health.

【**Key words**】 Reproductive health; Maternal health; Infant health; Social planning; Healthy birth; Maternal and infant health; Medium- and long-term development plan

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低生育率下我国生育健康的挑战与展望

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【摘要】 低生育率成为我国经济社会发展需要考虑的人口基本特征。生育健康并非孤立存在，而受到人们婚育观念和行为的影响。低生育率下人们婚育观念和行为已发生了深刻复杂的变化，必将引发生育健康领域的新问题。本研究从人口学视角分析年轻一代婚育观念和行为变化特征，并分析这些特征带来的生育健康领域的一系列新挑战，突出表现在，已婚和未婚人群避孕服务需求更为多元和迫切，人工流产形势更加严峻；剖宫产率上升，分娩镇痛需求更为强烈；出生缺陷防治难度增加，产后抑郁风险增加；不孕不育率不断上升，辅助生殖需求不断扩容。鉴于这些新挑战，本文针对当前和未来一个时期的生育健康的卫生政策制定、卫生服务和医学技术发展提出了宏观思路。

【关键词】 生育健康； 低生育率； 卫生政策

Challenges and prospects of fertility health under low fertility

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【Abstract】 Low fertility rate has become a basic demographic factor that needs to be considered in Chinese economic and social development. Reproductive health does not exist in isolation, but is influenced by people's concepts and behaviors of marriage and childbearing. Under the low fertility rate, people's concepts and behaviors of marriage and childbearing have undergone profound and complex changes, which will inevitably lead to new problems in the field of reproductive health. From the perspective of demography, this study analyzed the changing characteristics of marriage and childbearing concepts and behaviors of the young generation, and analyzed a series of new challenges brought by these characteristics in the field of reproductive health. The prominent features are that married and unmarried people have more diversified and urgent needs for contraceptive services, and the situation of induced abortion is more severe. The rate of cesarean section increased, and the need for analgesia in childbirth became more intense; increased difficulty in preventing birth defects and increased risk of postpartum depression; the infertility rate is rising, and the need for assisted reproduction is increasing. In view of these new challenges, this paper proposed

macro ideas for health policy formulation, health services and medical technology development of reproductive health in the current and future periods.

【**Key words**】 Reproductive health; Low fertility; Health policy

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·健康生育专栏·

孕前优生检查：生育健康的第一道防线

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【摘要】 孕前健康是生育健康的重要组成部分，孕前保健对改善育龄夫妇及子代的健康至关重要。孕前优生检查是通过对育龄夫妇孕前进行一系列的健康教育、健康体检、疾病筛查、医学干预等措施，将育龄夫妇的健康风险控制在很低水平，保障育龄夫妇在最佳的身体状态下孕育子代，是生育健康的第一道防线。本文总结了孕前优生检查项目及其促进人群生育健康的研究进展，并对孕前优生检查未来可能的研究方向进行展望。

【关键词】 生育健康； 妊娠； 孕前优生检查； 育龄夫妇

Preconception health examination: the first line of defense for reproductive health

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【**Abstract**】 Preconception health is an important part of reproductive health, and preconception health care is very important to improve the health of reproductive-age couples and their offspring. Preconception health examination is the first line of defense for reproductive health by carrying out a series of health education, physical examination, disease screening, and medical intervention measures for reproductive-age couples before pregnancy to control the health risks of reproductive-age couples at a very low level and to ensure that reproductive-age couples can conceive children in the best physical state. This article summarized the research progress of the preconception health examination and its promotion of population reproductive health and suggests the possible research directions for the preconception health examination in the future.

【 **Key words** 】 Reproductive health; Pregancy; Preconception health examination; Reproductive-age couples

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·健康生育专栏·

人工流产对女性再次妊娠的影响

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【摘要】 在我国生育政策放宽的背景下，人口出生率和人口出生数双双下降，但人工流产总数持续居高不下，使得人工流产对女性再次妊娠的影响在我国备受关注。本文从生殖流行病学视角，探讨人工流产对女性再孕能力，以及对自然流产、早产、低出生体质量、小于胎龄儿等不良妊娠结局的影响，并从研究设计、对照组的选择、统计方法、潜在研究方向提出了一些问题和建议，以期为女性生育力保护提供决策依据。

【关键词】 流产，人工； 妊娠结局； 流行病学； 女性； 再次受孕
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Impact of induced abortion on women's subsequent fertility and pregnancy outcomes

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【Abstract】 In the context of the relaxation of China's population policy with the declines of both the birth rate and number of births in recent years, the number of induced abortion continues to be high, which makes the impact of induced abortion on women's subsequent fertility and pregnancy outcomes becomes an important public concern. This review evaluated the potential impacts of induced abortion on women's subsequent fertility (in terms of subsequent pregnancy, secondary infertility, and treatment seeking of *in vitro* fertilization) and adverse pregnancy outcomes, including preterm birth, low birth weight, and small gestational age. Some limitations regarding the study design, control selection, and

statistical methods of included studies were discussed, and future study topics were proposed in this paper.

【**Key words**】 Abortion, induced; Pregnancy outcome; Epidemiology; Female; Subsequent fertility

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·健康生育专栏·

子宫内膜疾病对女性生育健康影响的研究进展

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【摘要】 子宫内膜在胚胎着床过程发挥着至关重要的作用，内膜异常可直接导致不孕。除机械性因素外，子宫内膜良性和恶性疾病导致生育力下降的具体机制尚不详，治疗方式与助孕时机也存在争议。本文从常见的子宫内膜良性和恶性疾病的临床流行病学特点、与不孕的相关性及其病理生理机制、主要干预措施及效果等方面追踪了国内外基础与临床研究进展，系统分析了其对女性生育力的影响，为有效地制定临床治疗策略、进一步提高临床疗效提供借鉴和参考。

【关键词】 生育力； 女性； 子宫内膜疾病； 不孕症

Research update on the impact of endometrial diseases on women's reproductive health

Yang Zixuan, Wang Yang, Li Rong

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【**Abstract**】 The endometrium plays a crucial role in the process of embryo implantation, and abnormalities of the endometrium can directly lead to infertility. In addition to mechanical factors, the specific mechanism of impaired fertility caused by benign and malignant endometrial diseases is still unknown. Also, the treatment and appropriate timing of assisted reproduction are controversial. This review tracked recent basic and clinical researches both national and international, and made a summarize from the point of view of epidemiological characteristics,

correlation with infertility, pathophysiological mechanisms, main interventions of common benign and malignant endometrial diseases. The main goal is to systematically evaluate the impact of endometrial diseases on female fertility, and provides a reference for clinical intervention strategies to improve clinical efficacy further.

【Key words】 Fertility; Female; Endometrial disease; Infertility

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·健康生育专栏·

基因检测为反复 IVF/ICSI 助孕失败患者提供理论参考

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【摘要】 不孕不育已经成为 21 世纪除癌症和心血管疾病外的人类第三大疾病。如今，辅助生殖技术是治疗不孕不育的常规手段，而其成功率只有 30%~40%。遗传或非遗传因素影响了患者的精子或卵子质量，从而无法通过辅助生殖技术得到可用胚胎。近年来，随着生殖遗传学的研究成果逐渐积累，基因检测技术不断进步，基因检测在生殖医学中发挥越来越重要的作用。在辅助生殖技术中应用基因检测能够帮助患者寻找不孕不育症的原因，同时为个体化治疗提供理论参考。本文就辅助生殖技术中出现的异常生殖表型及其致病基因和基因检测作一论述，以期为反复助孕失败患者的诊治提供新的思路。

【关键词】 生殖技术，辅助； 基因检测； 不孕不育症； 遗传因素

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Genetic tests provide information and guidance for patients with repeated IVF/ICSI failures

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【Abstract】 Infertility has become the third largest disease in the 21st century after cancer and cardiovascular diseases. Currently, assisted reproductive technology (ART) has become a routine treatment for infertility, whose success rate is only 30%–40%. Genetic or non-genetic factors affect the quality of sperm and oocytes retrieved from patients, leading to no viable embryos by *in vitro* fertilization (IVF) or intracytoplasmic sperm injection (ICSI). In recent years, with the development of reproductive genetics and genetic tests, genetic tests are becoming increasingly relevant in reproductive medicine. The application of genetic tests in IVF/ICSI can help patients identify the infertility causes and guide a personalized diagnostic and therapeutic treatment approach. In this paper, the abnormal reproductive phenotypes discovered in ART, corresponding pathogenic genes and genetic testing were discussed in order to provide a new idea for the diagnosis and treatment of patients with repeated IVF/ICSI failures.

【Key words】 Reproductive techniques, assisted; Genetic testing; Infertility; Genetic factors

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·临床研究·

不同卵巢反应性患者血清及卵泡液 AMH 与 IVF 结局的相关性分析

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【摘要】 目的 探讨不同卵巢反应性患者血清及卵泡液抗苗勒管激素（anti-Müllerian hormone， AMH）水平与单次促排卵周期优质胚胎数、新鲜周期移植妊娠结局及累积妊娠结局的相关性。方法 采用回顾性队列研究的方法，首先选择2017 年 10 月至 2018 年 1 月期间在北京大学第三医院妇产科生殖医学中心行体外受精/卵胞质内单精子注射和胚胎移植（*in vitro* fertilization/intracytoplasmic sperm injection and embryo transfer， IVF/ICSI-ET）的患者为研究对象，共 714 例，收集临床资料并对取卵日卵泡液进行 AMH 水平检测，根据卵巢反应分为卵巢正常反应组 401 例，卵巢低反应组 124 例，卵巢高反应组 189 例，比较 3 组患者的一般临床特征、基础血清 AMH 及取卵日卵泡液 AMH 水平、优质胚胎数、新鲜周期移植妊娠及活产率、累积妊娠及累积活产率等相关指标，并进行 IVF 结局的相关影响因素分析。结果 卵巢低反应组、卵巢正常反应组和卵巢高反应组患者基础血清 AMH 及卵泡液 AMH 分别为（0.71±0.77） μg/L、（2.72±3.02） μg/L、（5.90±4.42） μg/L 以及（3.31±3.37） μg/L、（4.43±5.03） μg/L、（6.20±5.37） μg/L，差异均具有统计学意义（均 $P<0.001$）。卵巢低反应组与卵巢正常反应组单个促排卵周期累积妊娠率及活产率分别为 21.31% （13/61）、41.18% （140/340）以及 16.39% （10/61）、36.76% （125/340），差异均具有统计学意义（均 $P<0.001$），而卵巢高反应与正常反应组差异均无统计学意义（均 $P>0.05$）。年龄与血清 AMH（$P=0.045$、$P=0.017$）、年龄与卵泡液 AMH （$P<0.001$、$P=0.026$）对卵巢正常反应组优质胚胎数的影响具有统计学意义。卵泡液 AMH 水平为卵巢正常反应组新鲜周期移植妊娠率及累积妊娠率的影响因素（$P=0.009$、 $P=0.047$）。以累积妊娠为标准计算卵泡液 AMH cut-off 值为 3.50 μg/L。结论 年龄与血清 AMH、卵泡液 AMH 为卵巢正常反应组优质胚胎数的影响因素。卵泡液 AMH 为卵巢正常反应组新鲜周期及累积妊娠率的影响因素。

【关键词】 妊娠率； 抗苗勒管激素； 卵泡液； 受精，体外； 胚胎移植

Correlation between serum and follicular fluid AMH and IVF outcome in patients with different ovarian response

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【Abstract】 Objective To investigate the correlation between the levels of anti-Müllerian hormone (AMH) in serum and follicular fluid and the number of high-quality embryos in a single ovulation cycle, the pregnancy outcome of fresh cycle transplantation and cumulative pregnancy outcome in patients with different ovarian response. **Methods** Totally 714 patients who underwent *in vitro* fertilization/intracytoplasmic sperm injection and embryo transfer (IVF/ICSI-ET) in the Reproductive Medical Center, Department of Obstetrics and Gynecology of Peking University Third Hospital from October 2017 to January 2018 were retrospectively analyzed. Clinical data and follicular fluid on the day of oocyte collection were collected for AMH detection. According to the ovarian response, they were divided into three groups: 401 cases in the normal ovarian response group, 124 cases in the low ovarian response group and 189 cases in the high ovarian response

group. The general clinical characteristics, basic serum AMH and follicular fluid AMH level on the day of oocyte collection, the number of high-quality embryos, pregnancy rate and live birth rate of fresh cycle transfer, cumulative pregnancy rate and cumulative live birth rate were compared, and the related influencing factors of IVF outcome were analyzed. **Results** The basic serum AMH and follicular fluid AMH of the low ovarian response group, the normal ovarian response group and the high ovarian response group were (0.71±0.77) μg/L, (2.72±3.02) μg/L, (5.90±4.42) μg/L and (3.31±3.37) μg/L, (4.43±5.03) μg/L, (6.20±5.37) μg/L, respectively, the differences were statistically significant (all *P*<0.001). The cumulative pregnancy rate and the cumulative live birth rate of a single ovulation cycle in the low ovarian response group and the normal ovarian response group were 21.31% (13/61), 41.18% (140/340) and 16.39% (10/61), 36.76% (125/340), respectively, with statistical significances (all *P*<0.001), while the differences between the high ovarian response group and the normal response group were not statistically significant (all *P*>0.05). The effects of age and serum AMH (*P*=0.045, *P*=0.017), age and follicular fluid AMH (*P*<0.001, *P*=0.026) on the number of high-quality embryos in the normal ovarian response group were statistically significant. Follicular fluid AMH was the influencing factor of fresh cycle transplantation pregnancy rate and cumulative pregnancy rate in the normal ovarian response group (*P*=0.009, *P*=0.047), the follicular fluid AMH cut-off value was 3.50 μg/L. **Conclusion** Age, serum and follicular fluid AMH were the influencing factors of the number of high-quality embryos in the normal ovarian response group. Follicular fluid AMH was the influencing factor of the fresh cycle and cumulative pregnancy rate in the normal ovarian response group.

【**Key words**】 Pregnancy rate; Anti-Müllerian hormone; Follicular fluid; Fertilization *in vitro*; Embryo transfer

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·临床研究·

多囊卵巢综合征女性胰岛素抵抗对体外受精-胚胎移植助孕结局的影响

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【摘要】 目的 探讨多囊卵巢综合征（polycystic ovary syndrome， PCOS）患者胰岛素抵抗（insulin resistance，IR）对行体外受精-胚胎移植（*in vitro* fertilization and embryo transfer， IVF-ET）助孕结局的影响。方法 采用回顾性队列研究，分析 2018 年 1 月至 2020 年 12 月期间在河南省人民医院生殖医学中心首次行 IVF 助孕的 1 105 例 PCOS 女性的资料，并收集 2 136 例同时期因单纯输卵管因素行 IVF 助孕女性的资料作为对照。根据是否合并 IR 分为四组：PCOS 合并 IR 组（记为 A1 组）、PCOS 非 IR 组（记为 A2 组）、对照合并 IR 组（记为 B1 组）和对照非 IR 组（记为 B2 组）。分析其控制性促排卵指标及移植后临床结局。采用二元逻辑回归校正混杂因素，分析早期自然流产的影响因素。结果 ①A1、A2、B1、B2 四组间穿刺卵泡数［（16.8±8.1）枚、（17.8±7.9）枚、（12.6±6.2）枚、（13.4±6.2）枚，*P*<0.001］、获卵数［（14.2±7.9）枚、（15.3±7.7）枚、（11.5±6.0）枚、（12.3±6.3）枚，*P*<0.001］、获卵率［84.6%（8 518/10 070）、86.1%（7 738/8 986）、91.8%（8 346/9 096）、91.9%（17 367/18 898），*P*<0.001］、M_{II} 卵子数［（12.1±7.0）枚、（13.0±7.0）枚、（9.7±5.3）枚、（10.4±5.5）枚，*P*<0.001］、双原核（two pronuclei，2PN）卵裂数（8.2±5.3、9.0±5.4、6.7±4.1、7.4±4.3，*P*<0.001）、可利用胚胎数［（7.1±4.8）枚、（7.6±4.9）枚、（5.7±3.7）枚、（6.4±3.9）枚，*P*<0.001］、可利用胚胎率［82.3%（4 207/5 110）、82.2%（3 851/4 684）、82.3%（4 124/5 008）、83.9%（8 972/10 690），*P*=0.008］、优质胚胎数［（3.7±3.4）枚、（4.0±3.5）枚、（3.2±2.7）枚、（3.5±2.9）枚，*P*<0.001］、优质胚胎率［42.8%（2 185/5 110）、43.5%（2 037/4 684）、45.7%（2 290/5 008）、46.9%（5 009/10 690），*P*<0.001］差异均有统计学意义；M_{II} 卵率、2PN 卵裂率、可利用囊胚形成率差异均无统计学意义（均 *P*>0.05）。②四组间早期流产率差异有统计学意义［16.3%（63/387）、9.7%（34/351）、12.1%（56/464）、8.7%（82/939），*P*=0.001］，临床妊娠率、胚胎种植率、异位妊娠率差异均无统计学意义（均 *P*>0.05）。进一步组间比较显示，A1 组的早期流产率［16.3%（63/387）］显著高于 A2 组［9.7%（34/351），*P*=0.008］及 B2 组［8.7%（82/939），*P*<0.001］，差异均有统计学意义。③采用 logistic 回归分析早期流产的影响因素显示，IR 是早期流产率的独立影响因素［*OR*=1.464，95% *CI*：1.361~2.065，*P*=0.019］。结论 PCOS 女性合并 IR 对 IVF 助孕后首次胚胎移植的早期流产结局有一定的影响。

【关键词】 多囊卵巢综合征； 胰岛素抵抗； 受精，体外； 胚胎移植；助孕结局

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Effect of insulin resistance in PCOS on clinical outcomes during the first embryo transfer in *in vitro* fertilization treatment

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【**Abstract**】 **Objective** To explore the effect of insulin resistance (IR) on clinical outcomes after first embryo transfer during *in vitro* fertilization (IVF) treatment in polycystic ovarian syndrome (PCOS) patients. **Methods** In this retrospective study, a total of 1 105 PCOS patients and 2 136 non-PCOS (control) patients with first embryo transfer from January 2018 to December 2020 in Reproductive Medical Center, Henan Provincial People's Hospital were recruited. All the patients were divided into four groups according to whether they had IR or not: PCOS with IR group (group A1); PCOS without IR (group A2); control with IR (group B1); control without IR (group B2). Baseline data and clinical outcomes were compared among the four groups. **Results** 1) There were significant differences in number of oocytes punctured (16.8±8.1, 17.8±7.9, 12.6±6.2, 13.4±6.2; *P*<0.001), number of oocytes retrieved (14.2±7.9, 15.3±7.7, 11.5±6.0, 12.3±6.3; *P*<0.001), the rate of oocytes retrieved [84.6% (8 518/10 070), 86.1% (7 738/8 986), 91.8% (8 346/9 096), 91.9% (17 367/18 898); *P*<0.001], the number of mature oocytes (12.1±7.0, 13.0±7.0, 9.7±5.3, 10.4±5.5; *P*<0.001), the number of two pronuclei (2PN) cleavage embryos (8.2±5.3, 9.0±5.4, 6.7±4.1, 7.4±4.3; *P*<0.001), the number of available embryos (7.1±4.8, 7.6±4.9, 5.7±3.7, 6.4±3.9; *P*<0.001), the rate of available embryos [82.3% (4 207/5 110), 82.2% (3 851/4 684), 82.3% (4 124/5 008), 83.9% (8 972/10 690); *P*=0.008], the number of high-quality embryos (3.7±3.4, 4.0±3.5, 3.2±2.7, 3.5±2.9; *P*<0.001), and the rate of high-quality embryos [42.8% (2 185/5 110), 43.5% (2 037/4 684), 45.7% (2 290/5 008), 46.9% (5 009/10 690); *P*<0.001], among group A1, group A2, group B1 and group B2 while the M_{II} rate, 2PN cleavage rate and available blastocyst formation rate were similar among the four groups (all *P*>0.05). 2) The rate of early miscarriage rate was significantly different among the four groups [16.3% (63/387), 9.7% (34/351), 12.1% (56/464), 8.7% (82/939); *P*=0.001], while the clinical pregnancy rate, the implantation rate and the ectopic rate were comparable (all *P*>0.05). Further subgroup analysis showed that the early miscarriage rate of group A1 [16.3% (63/387)] was significantly higher than that of group A2 [9.7% (34/351), *P*=0.008] and group B2 [8.7% (82/939), *P*<0.001]. 3) Multivariate logistic regression analysis suggested that IR was the independent factor of early miscarriage (*OR*=1.464, 95% *CI*: 1.361–2.065, *P*=0.019). **Conclusion** IR may play an important role in the early miscarriage results in PCOS patients during IVF treatment.

【**Key words**】 Polycystic ovary syndrome; Insulin resistance; Fertilization *in vitro*; Embryo transfer; Clinical outcomes

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·临床研究·

不同体质量指数对 PCOS 患者冻融胚胎移植围产结局及新生儿结局的影响

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【摘要】 目的　探讨不同体质量指数（body mass index，BMI）的多囊卵巢综合征（polycystic ovary syndrome，PCOS）患者对冻融胚胎移植围产结局及新生儿结局的影响。方法　采用回顾性队列研究，纳入安徽医科大学第一附属医院生殖中心 2016 年至 2020 年期间由于 PCOS 不孕进行冻融胚胎移植、年龄≤35 岁且临床妊娠为单胎的患者临床资料，共 1 481 个周期，根据 BMI 值分为 4 组，偏瘦组 75 个周期（BMI<18.5 kg/m^2），正常体质量组 793 个周期（18.5 kg/m^2≤BMI<24.0 kg/m^2），超重组 468 个周期（24.0 kg/m^2≤BMI<28.0 kg/m^2），肥胖组 145 个周期（BMI≥28.0 kg/m^2），比较各组一般资料、促排卵情况、围产结局以及新生儿结局的差别。结果　相较于超重组、正常体质量组和偏瘦组，肥胖组的早期流产率最高［23.4%（34/145）比 15.8%（74/468）比 14.0%（111/793）比 9.3%（7/75），*P*=0.014］，活产率最低［68.3%（99/145）比 76.7%（359/468）比 79.7%（632/793）比 88.0%（66/75），*P*=0.003］。肥胖组和超重组的妊娠期糖尿病发病率［6.9%（10/145）、4.5%（21/468）］高于正常体质量组［2.3%（18/793），肥胖组比正常体质量组 *P*=0.005，超重组比正常体质量组 *P*=0.028］肥胖组和超重组的剖宫产率［81.8%（81/99）、74.9%（269/359）］高于正常体质量组和偏瘦组［67.6%（427/632）、57.6%（38/66），肥胖组比正常体质量组 *P*=0.005，肥胖组比偏瘦组 *P*=0.001，超重组比正常组 *P*=0.015，超重组比偏瘦组 *P*=0.004］，巨大儿出生率［18.2%（18/99）、15.6%（56/359）］也高于正常体质量组和偏瘦组［10.1%（64/632）、6.1%（4/66），肥胖组比正常体质量组 *P*=0.018，肥胖组比偏瘦组 *P*=0.025，超重组比正常组 *P*=0.011，超重组比偏瘦组 *P*=0.041］。各组在晚期流产率、妊娠期高血压、宫外孕以及新生儿的早产率、Apgar 评分、身高、出生缺陷等

差异均无统计学意义（均 *P*>0.05）。结论　肥胖和超重影响 PCOS 患者的围产结局和新生儿结局。在临床工作中，需重视 PCOS 患者的体质量管理。

【关键词】 多囊卵巢综合征； 体质量指数； 冻融胚胎移植； 围产结局；新生儿结局

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Effects of different body mass index on perinatal and neonatal outcomes of frozen-thawed embryo transfer in PCOS patients

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【Abstract】 Objective To investigate the influence of polycystic ovary syndrome (PCOS) patients with different body mass index (BMI) on perinatal and neonatal outcomes of frozen-thawed embryo transfer. **Methods** A retrospective cohort study was performed on the clinical data of patients with PCOS infertility who underwent cryopreservation transplantation in Reproductive Center of the First Affiliated Hospital of Anhui Medical University from 2016 to 2020. The clinical pregnancy was singleton, a total of 1 481 cycles were divided into 4 groups according to BMI value. There were 75 cycles in the underweight group (BMI<18.5 kg/m^2), 793 cycles in the normal weight group (18.5 kg/m^2≤BMI<24.0 kg/m^2), 468 cycles in the overweight group (24.0 kg/m^2≤BMI<28.0 kg/m^2), 145 cycles in the obese group (BMI≥28.0 kg/m^2). The differences of general information, perinatal outcome and neonatal outcome were compared among the four groups. **Results** Compared with the overweight group, the normal weight group and the underweight group, the obesity group had the highest early abortion rate [23.4% (34/145) *vs.* 15.8% (74/468) *vs.* 14.0% (111/793) *vs.* 9.3% (7/75), *P*=0.014], and the lowest live birth rate [68.3% (99/145) *vs.* 76.7% (359/468) *vs.* 79.7% (632/793) *vs.* 88.0% (66/75), *P*=0.003]. The incidence of gestational diabetes in the obesity group and the overweight group [6.9% (10/145) and 4.5% (21/468)] was higher than that in the normal weight group [2.3% (18/793)] (the obesity group *vs.* the normal weight group *P*=0.005, the overweight group *vs.* the normal weight group *P*=0.028). The rate of cesarean section in the obesity group and the overweight group [81.8% (81/99), 74.9% (269/359)] was higher than that in the normal weight group [67.6% (427/632)] and the underweight group [57.6% (38/66), the obesity group *vs.* the normal weight group *P*=0.005, the obesity group *vs.* the underweight group *P*=0.001, the overweight group *vs.* the normal weight group *P*=0.015, the overweight group *vs.* the underweight group *P*=0.004]. The macrosomia birth rate [18.2% (18/99), 15.6% (56/359)] was also higher than that of the normal weight group [10.1% (64/632)] and the underweight group [6.1% (4/66), the obesity group *vs.* the normal weight group *P*=0.018, the obesity group *vs.* the underweight group *P*=0.025, the overweight

group *vs.* the normal weight group *P*=0.011, the overweight group *vs.* the underweight group *P*=0.041]. There were no significant differences in late abortion rate, gestational hypertension, ectopic pregnancy and premature birth rate, Apgar score, height and birth defects (all *P*>0.05). **Conclusion** Obesity and overweight affect the perinatal outcomes and neonatal outcomes in patients with PCOS. In clinical work, attention should be paid to the weight management of PCOS patients.

【Key words】 Polycystic ovary syndrome; Body mass index; Frozen-thawed embryo transfer; Perinatal outcome; Neonatal outcome

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·循证医学·

妊娠期接种新冠疫苗与常见妊娠并发症和不良出生结局发生风险的meta 分析

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【摘要】 目的 分析妊娠期接种新冠疫苗与孕妇妊娠并发症和新生儿不良出生结局发生风险的关系，为改进孕妇接种新冠疫苗策略提供依据。方法 以“covid-19 vaccines”“covid19”“covid 19”“vaccin*”“neonatal outcomes”“perinatal outcomes”“pregnancy outcomes”“premature birth”“新型冠状病毒疫苗”“妊娠并发症”“出生结局”“围产期结局”为主要检索词，采用主题词+自由词的方法，在 PubMed、Web of Science、Scopus、Cochrane library、中国知网、万方数据库、维普中文期

刊服务平台、中国生物医学文献数据数据库中进行检索。检索时间为 2020 年 1 月 1 日至 2022 年 5 月 27 日。使用 Stata16.0 进行 meta 分析，计算合并后的效应值，进行异质性检验、敏感性分析和发表偏倚评估。结果　共检索到 482 篇相关文献，根据纳入和排除标准，共纳入 12 篇英文文献，有 88 682 名孕妇在妊娠期接种疫苗。meta 分析结果显示孕妇在妊娠期接种新冠疫苗不会增加妊娠高血压、产后出血、新生儿早产、小于胎龄儿和新生儿 5 min Apgar 评分<7 的发生风险，合并后的相对危险度（relative risk，*RR*）及 95%置信区间（95% confidence interval，95% *CI*）分别为 0.97（0.91~1.05）、1.01（0.83~1.23）、0.92（0.77~1.10）、0.97（0.90~1.04）和 0.93（0.87~1.00）。孕妇是否接种新冠疫苗两组间的新生儿出生体质量差异无统计学意义，合并后的均数差（mean difference，MD）及 95% *CI* 为−18.26（−40.39~3.87）g。但结果显示孕妇在妊娠期接种新冠疫苗可能会增加妊娠糖尿病的发生风险，合并后的 *RR*（95% *CI*）为 1.14（1.03~1.26）。此外，敏感性分析表明结果可靠性较好，　Egger's 检验和 Begg's 检验结果均表明纳入文献之间不存在发表偏倚。结论　基于国外 7 个国家的研究提供的证据不支持孕妇在妊娠期接种新冠疫苗会增加常见妊娠并发症和新生儿不良出生结局的发生风险，但仍需更多国内的研究为孕妇接种新冠疫苗提供安全性证据。

【关键词】　新冠疫苗；　妊娠并发症；　Meta 分析；　围产期；　出生结局

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Association between COVID-19 vaccination during pregnancy and the risk of common pregnancy complications and adverse birth outcomes: a meta-analysis

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【**Abstract**】　**Objective**　To evaluate the associations of COVID-19 vaccination during pregnancy with the risk of pregnancy complications and neonatal adverse birth outcomes, and to provide evidence for improving strategies for COVID-19 vaccination during pregnancy. **Methods**　"covid-19 vaccines" "covid19" "covid 19" "vaccin*" "neonatal outcomes" "perinatal outcomes" "pregnancy outcomes" "premature birth" were used as the main search terms. Articles published from January 1st 2020 to May 27th 2022 were searched in PubMed, Web of Science, Scopus, Cochrane library, CNKI, Wanfang Database, VIP Database and Chinese Biomedical Literature Database by adopting the method of the combination of MeSH words and free words. Stata16.0 software was used to calculate pooled effect values, perform heterogeneity test and sensitivity analysis and assess publication bias. **Results**　According to the inclusion and exclusion criteria, a total of 12 English papers were included from 482 relevant literatures retrieved, with 88 682 pregnant women vaccinated during pregnancy. Meta-analysis results showed that COVID-19

vaccination in pregnancy did not increase the risk of gestational hypertension, postpartum hemorrhage, neonatal preterm birth, small-for-gestational-age infants, and 5 min Apgar score<7, with pooled relative risk (*RR*) and 95% confidence interval (95% *CI*) of 0.97 (0.91–1.05), 1.01 (0.83–1.23), 0.92 (0.77–1.10), 0.97 (0.90–1.04) and 0.93 (0.87–1.00), respectively. There was no significant difference in neonatal birth weight between the two groups of pregnant women who received COVID-19 vaccine or not, and the combined mean difference (MD) and 95% *CI* was −18.26 (−40.39–3.87) g. However, COVID-19 vaccination in pregnancy may increase the risk of gestational diabetes and the combined *RR* (95% *CI*) was 1.14 (1.03–1.26). In addition, sensitivity analysis showed that the results were stable and reliable. Egger's test and Begg's test showed that there was no publication bias among the included studies. **Conclusion** This study does not support the increased risk of pregnancy complications and neonatal adverse birth outcomes for pregnant women vaccinated against COVID-19, but more researches are still needed to provide evidence of the safety of COVID-19 vaccination in pregnancy.

【Key words】 COVID-19 vaccines; Pregnancy complications; Meta-analysis; Perinatal period; Birth outcomes

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·临床报道·

MUM1 在反复种植失败患者子宫内膜中的表达及对其慢性子宫内膜炎的诊断价值

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【摘要】 目的 探讨多发性骨髓瘤癌基因 1（multiple myeloma oncogene l，MUM1）在反复种植失败（recurrent implantation failure，RIF）患者子宫内膜中

的表达及其对慢性子宫内膜炎（chronic endometritis，CE）的诊断价值。方法　采用队列研究收集 2019 年 10 月至 2021 年 10 月期间在郑州大学第二附属医院生殖医学中心就诊的 RIF 患者资料 112 例。患者均行宫腔镜检查，取子宫内膜组织，采用免疫组织化学染色法检测子宫内膜组织 MUM1、CD138 阳性表达情况，比较子宫内膜 MUM1 和 CD138 阳性表达率；采用 Kappa 检验比较宫腔镜检查联合 MUM1 与联合 CD138 免疫组织化学染色诊断 CE 的一致性；采用四格表法比较 MUM1 和 CD138 诊断 CE 的灵敏度。结果　112 例 RIF 患者宫腔镜检查诊断 CE 共 55 例，检出率为 49.11%。子宫内膜 MUM1 阳性表达率高于 CD138［52.68%（59/112）比 41.07%（46/112），*P*<0.001］；宫腔镜检查联合 MUM1 与联合 CD138 免疫组织化学染色诊断 CE 的 Kappa 值为 0.794；子宫内膜 MUM1 免疫组织化学染色诊断 CE 的灵敏度及阴性预测值均高于 CD138［分别为 100%（59/59）比 77.97%（46/59）和 100%（53/53）比 80.31%（53/66），均 *P*<0.001］。结论　对 RIF 患者，宫腔镜检查联合子宫内膜 MUM1 免疫组织化学染色可作为一种更精准的诊断 CE 方法。

【关键词】　多发性骨髓瘤癌基因 1；　反复种植失败；　慢性子宫内膜炎；子宫内膜；　免疫组织化学染色；　诊断价值

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Expression of MUM1 in endometrium of patients with recurrent implantation failure and its diagnostic value in chronic endometritis

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【Abstract】　Objective　To investigate the expression of multiple myeloma oncogene 1 (MUM1) in patients with recurrent implantation failure (RIF) and its diagnostic value in chronic endometritis (CE). **Methods**　The data of 112 patients with RIF treated in the Reproductive Medicine Centre of the Second Affiliated Hospital of Zhengzhou University from October 2019 to October 2021 were collected by cohort study. All patients underwent hysteroscopy, endometrial tissue was collected and the positive expressions of MUM1 and CD138 in endometrial tissue were detected by immunohistochemistry　staining; the differences in the positive expression rates of MUM1 and CD138 in endometrium were compared; the consistency of hysteroscopy combined with MUM1 and combined with CD138 immunohistochemistry staining in the diagnosis of CE was compared by Kappa test; the sensitivity　of MUM1 and CD138 in diagnosing CE was compared by four-tabular method. **Results**　There were 55 cases of CE diagnosed by hysteroscopy in 112 patients with RIF, and the incidence was 49.11%. The positive expression rate of MUM1 was higher than that of CD138 [52.68% (59/112) *vs.* 41.07% (46/112), *P*<0.001] in endometrium of 112 RIF patients; the Kappa value of hysteroscopy combined with MUM1 and combined with CD138 immunohistochemistry staining in the diagnosis of CE was 0.794; the sensitivity and negative predictive value of endometrial MUM1 immunohistochemistry staining in the diagnosis of CE were

higher than those of CD138 [100% (59/59) *vs.* 77.97% (46/59) and 100% (53/53) *vs.* 80.31% (53/66), all *P*<0.001]. **Conclusion** In patients with RIF, hysteroscopy combined with endometrial MUM1 immunohistochemistry staining can be used as a more accurate method for diagnosing CE.

【Key words】 Multiple myeloma oncogene l; Recurrent implantation failure; Chronic endometritis; Endometrium; Immunohistochemistry staining; Diagnostic value

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·个案报道·

极体测序技术在 Van der Woude 综合征患者胚胎植入前遗传学检测中的应用

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【摘要】 目的 探讨极体测序技术在 Van der Woude 综合征患者胚胎植入前单基因遗传病检测中的应用价值。方法 对 1 例因 *IRF6* 基因新发变异导致的 Van der Woude 综合征女性患者，应用极体测序技术进行胚胎植入前遗传学检测。6 枚卵经卵胞质内单精子注射（intracytoplasmic sperm injection，ICSI）受精后，分别顺序活检第一极体、第二极体和囊胚滋养外胚层细胞。活检细胞经全基因组扩增后，利用 PCR 联合 Sanger 测序的方法检测极体和胚胎的致病变异携带状态，推断对应胚胎的致病性。为预防因囊胚培养失败造成无可移植胚胎的情况，在囊胚形成前对 1 枚致病性低的优质胚胎进行玻璃化冷冻。此外，通过在夫妇双方以及特定基因型的极体和胚胎样本中对变异位点及其上下游 1M 区域内的 175 个单核苷酸多态性

（single nucleotide polymorphism，SNP）位点进行靶向捕获高通量测序，连锁分析构建单体型。选择致病性低的胚胎移植，成功妊娠后进行产前诊断以及跟踪随访。结果　成功获得第一极体和第二极体各 6 枚，其中 11 枚极体的变异位点检测成功。6 枚胚胎中，1 枚预测致病性低的胚胎在患者知情同意后于第 4 日（day 4，D4）玻璃化冷冻；1 枚胚胎成功发育至囊胚，但致病性高；4 枚胚胎囊胚培养失败。连锁分析成功构建出与致病变异紧密连锁的 SNP 单体型，胚胎单体型分析与 Sanger 测序结果吻合。移植致病性低的 D4 期冷冻胚胎，成功妊娠后，患者夫妇拒绝有创产前诊断。出生后新生儿随访未发现唇腭裂，脐血基因检测不携带致病变异。结论　本研究利用卵母细胞极体测序的检测方法，为 1 例因 *IRF*6 基因新发变异导致的 Van der Woude 综合征女性患者进行胚胎植入前单基因遗传病检测，成功阻断了该病向子代传递。

【关键词】 Van der Woude 综合征；　新发变异；　胚胎植入前遗传学检测；　极体测序；　等位基因脱扣

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Application of polar body sequencing for preimplantation genetic testing of a female patient with Van der Woude syndrome

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【Abstract】　Objective　To explore the value of polar body sequencing in preimplantation genetic testing (PGT) for monogenic disease of a female patient with Van der Woude syndrome. **Methods**　PGT based on polar body sequencing was performed for a female patient with Van der Woude syndrome caused by a *de novo* *IRF*6 pathogenic variant. Totally six oocytes were fertilized by intracytoplasmic sperm injection (ICSI). The first, second polar bodies and the trophoblast ectoderm cells of blastocysts were biopsied respectively. Sanger sequencing was used to detect the pathogenic variant in the biopsied cells after genome-wide amplification. The genotypes and pathogenic possibilities of the embryos were inferred according to the genotypes of corresponding tested polar bodies. In order to prevent the absence of transplantable embryos due to the failure of blastocyst culture, vitrification was performed on an embryo with good morphology and low pathogenic possibility before blastocyst formation. The 175 single nucleotide polymorphisms (SNPs) within the 1M region upstream and downstream from the pathogenic variant location were tested by targeted capture sequencing in the couple and selected polar bodies and embryos to construct the haplotypes. An embryo with low pathogenic possibility was transferred. Prenatal diagnosis was strongly recommended after successful pregnancy. Prenatal and postnatal follow-up were performed. **Results** Totally six first polar bodies and six second polar bodies were obtained. The

pathogenic variant was successfully sequenced in 11 polar bodies. Among the six embryos, one embryo with low pathogenic possibility was vitrified on day 4 (D4) after fully informed consent of the couple; one embryo developed to blastocyst was detected with high pathogenic possibility; the other four embryos were degenerated during blastocyst culture. The SNP haplotypes closely linked to the pathogenic variant location were successfully constructed by linkage analysis. The haplotype analysis of the embryos was in consistent with Sanger sequencing. The D4 embryo with low pathogenic possibility was transferred. The couple refused to conduct invasive prenatal diagnosis after pregnancy. None orofacial clefts were detected after the baby was born, and the pathogenic variant was not detected in the neonatal cord blood either. **Conclusion** This study successfully blocked a female patient with Van der Woude syndrome caused by a *de novo IRF*6 pathogenic variant give birth to an affected baby by polar body sequencing based preimplantation genetic testing for monogenic disease.

【Key words】 Van der Woude syndrome; *De novo* variants; Preimplantation genetic testing; Polar body sequencing; Allele drop out

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·个案报道·

中国首次青春期前男孩睾丸组织冷冻保存 3 例报道并文献复习

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【摘要】 目的 探讨重度β地中海贫血（β-thalassemia，β-TM）青春期前男孩在性腺毒性治疗前进行生育力保存的方法。方法 报道3例重度β-TM男孩行造血干细胞移植（hematopoietic stem cell transplantation， HSCT）前，采用慢速程序化冷冻方法行睾丸组织冷冻保存，并结合文献对青春期前男孩进行生育力保存的必要性和地中海贫血男孩生育力监测、睾丸冷冻方法学及其相关流程进行阐述。结果 采用慢速程序化冷冻方法分别成功为3例男孩冷冻31块、31块、20块睾丸组织，冷冻过程顺利。结论 对拟行HSCT的重度β-TM男孩，青春期前睾丸组织冷冻可以保存其生育力，为其成年后孕育后代留下希望。

【关键词】 β地中海贫血； 睾丸组织冷冻； 慢速程序化冷冻； 男性；生育力保存

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First testis cryopreservation of prepuberty boys in China: a report of 3 cases and literature review

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【Abstract】 **Objective** To explore the method of fertility preservation in severe β-thalassemia prepubertal boys who cannot produce sperm before gonadotoxicity therapy. **Methods** Three cases of severe β-thalassemia patients who were going to undergo hematopoietic stem cell transplantation (HSCT) were reported. They were received testis cryopreservation by slow-rate freezing. The necessity of fertility preservation in prepubertal boys and the methods of fertility persevation, testicular cryopreservation and the downstream techniques were stated. **Results** Totally 31, 31, 20 pieces of testicular tissue were frozen by slow-rate freezing in three boys respectively and the freezing process went smoothly. **Conclusion** The cryopreservation of testicular tissue can preserve the fertility of severe β-thalassemia prepuberty boys who will receive HSCT, leaving hope for offspring.

【Key words】 β-thalassemia; Testicular tissue freezing; Controlled slow freezing; Male; Fertility preservation

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·综述·

hCG 共培养自体 PBMC 宫腔灌注治疗反复种植失败的研究进展

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【摘要】 近年来不孕妇女在体外受精-胚胎移植（*in vitro* fertilization and embryo transfer，IVF-ET）支持下妊娠率提高，然而部分患者在 IVF-ET 后未成功妊娠，提高反复种植失败（recurrent implantation failure，RIF）妊娠率成为亟待解决的难题。人绒毛膜促性腺激素（human chorionic gonadotropin，hCG）共培养自体外周血单个核细胞（peripheral blood mononuclear cell，PBMC）宫腔灌注是改善 RIF 患者妊娠结局的新型治疗方法，在改善子宫内膜容受性及宫内微环境中发挥重要作用。本文对 hCG 共培养自体 PBMC 宫腔灌注在 RIF 中的应用进行综述，旨在对改善 RIF 妊娠结局机制进行探讨。

【关键词】 反复种植失败；　自体外周血单个核细胞；　人绒毛膜促性腺激素；　子宫内膜容受性；　宫腔灌注

基金项目：国家自然科学基金面上项目（81973894、81574014）

Progress in intrauterine administration of autologous hCG-activated peripheral blood mononuclear cells for repeated implantation failure treatment

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【**Abstract**】 In recent years, *in vitro* fertilization and embryo transfer (IVF-ET) improves the pregnancy rates in patients with recurrent implantation failure (RIF). However, some patients did not get pregnant successfully after IVF-ET. Improving the pregnancy rates in patients with RIF becomes a difficult problem to be solved. Intrauterine administration of autologous human chorionic gonadotropin (hCG)-activated peripheral blood mononuclear cell (PBMC) is a new treatment to improve pregnancy outcome and plays an important role in improving endometrial receptivity and intrauterine microenvironments. This article reviews the application of intrauterine administration of autologous hCG-activated PBMC in RIF, in order to discuss the mechanism of improving the pregnancy outcome of RIF.

【**Key words**】 Recurrent implantation failure; Peripheral blood mononuclear cell; Human chorionic gonadotropin; Endometrial receptivity; Intrauterine administration

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·综述·

多不饱和脂肪酸在女性不孕症及辅助生殖中的研究进展

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【摘要】 多不饱和脂肪酸（polyunsaturated fatty acids， PUFA）是含有两个或两个以上不饱和双键的脂肪酸，主要包括 n-3 PUFA 和 n-6 PUFA。PUFA 具有广泛的生物学功能，包括氧化供能、调节炎症等作用。近年来研究显示 PUFA 在卵子及胚胎的早期发育中发挥重要作用，并影响女性生育力及辅助生殖助孕的结局，但结论不一。本文就 PUFA 在女性不孕症及辅助生殖领域中的研究进行综述。

【关键词】 生殖技术，辅助； 多不饱和脂肪酸； 不孕症

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Role of polyunsaturated fatty acids in female infertility and ART treatment

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【Abstract】 Polyunsaturated fatty acids (PUFA) are fatty acids containing two or more unsaturated double bonds, mainly including n-3 PUFA and n-6 PUFA. PUFAs have a wide range of biological functions, including supplements of energy and regulation of inflammation. In recent years, studies have found that PUFA plays an important role in oocytes and the early embryo development. Besides, PUFA affects female fecund ability and is related to the outcome of assisted reproduction, but the conclusions are different. This article reviews the research of PUFA in the field of female infertility and assisted reproduction.

【Key words】 Reproductive technology,assisted; Polyunsaturated fatty acids; Female infertility

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·综述·

非编码 RNA 调节子宫内膜容受性的研究进展

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【摘要】 子宫内膜容受性是胚胎着床的关键要素，评估并改善子宫内膜容受性有助于提高胚胎着床率。随着分子生物学及基因测序技术的发展，非编码 RNA 在机体生理和病理过程中的调控作用已被众多研究证实，在辅助生殖领域的研究也备受关注，非编码 RNA 通过调控相关基因、细胞因子的表达，或作为竞争性内源

RNA，在子宫内膜容受性的形成过程中发挥重要作用。本文对近年来非编码 RNA 中的微小 RNA、长链非编码 RNA、环状 RNA 对子宫内膜容受性的调控作用及分子机制的研究进展进行了阐述。

【关键词】 子宫内膜容受性； 非编码 RNA； 微小 RNA； 长链非编码 RNA； 环状 RNA

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Research progress of non-coding RNA in regulating endometrial receptivity

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【Abstract】 Endometrial receptivity is a key element of embryo implantation, and the evaluation and improvement of endometrial receptivity is helpful to increase the rate of embryo implantation. With the development of molecular biology and gene sequencing technology, the regulatory role of non-coding RNA in physiological and pathological processes has been confirmed by many studies, and much attention has been paid in the field of assisted reproduction. Non-coding RNA plays an important role in the formation of endometrial receptivity by regulating the expression of related genes and cytokines or as a competitive endogenous RNA. In this review, we summarized the research progress of non-coding RNA, including miRNA, lncRNA and circRNA in the regulation and molecular mechanism on endometrial receptivity in recent years.

【Key words】 Endometrial receptivity; Non-coding RNA; MicroRNA; Long non-codingRNA; Circular RNA

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