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## ·卷首语·

## 凝心聚力,砥砺前行



伴随着国内外生殖医学事业的蓬勃发展,《中华生殖与避孕杂志》已走过了整整四十年的光辉历程。《中华生殖与避孕杂志》原名《生殖与避孕》,1980年在我国计划生育科技事业迅速发展应运而生。作为我国第一本计划生育科学的专业刊物,《生殖与避孕》一直以“认识、应用生殖规律,为人类的生育不断从必然走向自由开辟新途径”为奋斗目标,这也是刊物命名的原由所在。

四十年辛勤耕耘,四十年携手共进,四十年奋力前行!期刊在高怡生、龚岳亭、高尔生三位历届主编的努力及几代专家学者的支持下,始终坚持“引领学科发展、推动学术交流”的办刊方向和“为读者和作者服务”的宗旨,着眼基础理论,立足临床研究,伴随了一代又一代生殖学家的成长,见证了我国生殖生物学、计划生育学和生殖医学由弱变强的蓬勃发展过程。事业发展背后是合力的凝聚,在此,我要特别感谢不断发展壮大、更趋专业化和年轻化的编委队伍,是他们确保了杂志的学术权

威性和延续性;同时也为在背后默默付出,用严谨工作作风及敬业精神确保杂志编校和出版质量的编辑团队感到由衷欣慰与自豪。如今的《中华生殖与避孕杂志》已发展成为拥有高水准编委会、成熟作者队伍和稳定读者群体的高影响力精品期刊。

当前,我国生殖健康事业正处于重要战略地位,建设中国的世界一流科技期刊也是科技界和期刊界的重点任务。我们迎来了难得的发展机遇,同时也面临着众多新挑战:在医学技术发展日新月异和国际合作交流日益紧密的时代,我们如何敏锐洞悉生殖学科发展动向、定位选题,持续引领学科发展?如何保持自身优势,争取到优秀稿源?面对同行的激烈竞争,如何提高自身的影响力?在信息传播方式和接收行为变化的推动下,如何加强期刊数字化建设?这些都是我们在新的一年里和在今后,需要与时俱进、不断思考的问题。杰出的期刊不仅是知识的传播者,更应是科学理念的引领者。

新时代,新目标!面对种种机遇与挑战,我坚信,有着四十年光荣发展历史的《中华生殖与避孕杂志》,在各届领导的关心帮助下,在编委会和编辑们的共同努力下,在作者和读者们的支持下,一定会继续凝心聚力,砥砺前行,再创辉煌!

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## ·主任寄语·

## 有您相伴,永远“不惑”

2020 年如期而至,值此新春到来之际,衷心感谢各位专家对《中华生殖与避孕杂志》的真切关爱和辛勤付出,感谢各位作者能选择我们的杂志来展示您们的成果、分享您们的经验,感谢广大读者能选择我们的杂志作为您们学习和了解相关新知识、新经验、新技术的渠道。正因为有您们一以贯之的指导、支持、信任和厚爱,我们的杂志才得以不断成长、不断进步,成为在国内生育调节科技领域具有较高学术影响力的专业期刊。

《中华生殖与避孕杂志》的前身《生殖与避孕》创刊于 1980 年 12 月,今年已年届“不惑”。四十年来,在历任主编高怡生院士、龚岳亭院士、高尔生教授、乔杰院士的领导下,在历任编辑部主任张德玮老师、瞿敬贤老师、吕剑华老师、王黎茜老师的管理下,《中华生殖与避孕杂志》从初生走向成熟,栏目更加丰富、内容更加前沿、样式更加灵活,期刊影响因子逐年提升,充分体现了“开拓创新、追求卓越”的办刊精神。作为新上任的编辑部主任,我深感责任重大,我们要在国家“建设中国的世界一流科技期刊”的潮流中抓住机遇,及时识变、积极应变、主动求变,以进一步提升本刊的竞争力、提高本刊的影响力,致力于将本刊打造成中国生殖学科的品牌期刊。

今年,我们将组织创刊 40 周年庆祝活动,以感谢 40 年来社会各界对杂志的支持和关爱。我们希望通过这一系列庆祝活动,让杂志与编委、作者、读者更加心连心,齐心协力打造属于我们自己的精品期刊。同时,根据中华医学会杂志社对期刊编辑委员会人员和换届调整的相关规定,本刊今年还要开展杂志更名后的第二届编辑委员会的换届工作,希望能够得到本专业领域同仁们的更多关注和支持,吸收具有较高学术水平并且热爱杂志工作的专家加入编辑委员会,促进我国生育调节领域的知识传播和学术交流。

万里征途远,秣马再起程。回顾过去,总结经验提信心;展望未来,凝心聚力向前走。新年岁首,《中华生殖与避孕杂志》将立足新起点、着眼新目标、展现新作为、实现新跨越,力争为本领域的专业人员奉上更多有价值的学术盛宴。

感谢您过去的关爱,期待您未来的支持,有了您的相伴,我们才会永远“不惑”!

《中华生殖与避孕杂志》编辑部主任  
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# 宫腔操作前宫颈预处理专家共识

中华医学会儿科学分会

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**【摘要】** 宫腔操作是妇产科常用的一种诊治手段,包括手术流产、刮宫、放置或取出宫内节育器及宫腔镜诊治手术等。鉴于宫颈组织伸展性较差,宫腔操作前的宫颈预处理显得尤为重要,采用药物或机械性方法,可促进宫颈成熟,保证宫腔操作顺利进行,减少手术并发症。为提高宫腔操作的成功率和安全性,中华医学会儿科学分会参考多国/机构的最新推荐意见,结合国内临床实际情况和专家意见,编写了本专家共识,详细阐述妊娠期、非妊娠期和育龄期、绝经后等不同时期女性的各自宫颈预处理方法,以规范临床诊疗行为,指导临床工作。

**【关键词】** 宫腔操作; 手术流产; 宫腔镜; 宫内节育器; 宫颈预处理

## Expert consensus on cervical priming before intrauterine manipulation

Family Planning Branch of the Chinese Medical Association

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**【Abstract】** Intrauterine manipulation is a common diagnostic and therapeutic procedure in the department of obstetrics and gynecology, including surgical abortion, dilatation and curettage, placement or removal of intrauterine devices and hysteroscopy or hysteroscopic operation. Because of the poor extensibility of cervical tissue, cervical priming before intrauterine manipulation is particularly important. Medical or mechanical methods should be taken to promote cervical ripening, thus to ensure the satisfactory outcome of the procedure, and to reduce the complications of it. In order to increase the successful rate and to improve the safety of intrauterine manipulation, the Family Planning Branch of Chinese Medical Association composed this consensus, referring to the latest recommendations of other countries and worldwide authoritative agencies, and in combination with domestic published articles and experts' opinions. The detailed methods of cervical priming for women in different periods, including pregnancy, non-pregnancy, childbearing period and postmenopausal period, were described herein to standardize the clinical practice of cervical priming before intrauterine manipulation.

**【Key words】** Intrauterine manipulation; Surgical abortion; Hysteroscopy; Intrauterine devices; Cervical priming

# 40岁及以上的高龄不孕症患者体外受精多周期累积活产率及相关影响因素

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**【摘要】** 目的 探讨 $\geq 40$ 岁高龄女性多周期体外受精(*in vitro* fertilization, IVF)助孕的累积活产率及相关影响因素。方法 回顾性分析了2014年4月1日至2016年9月31日期间因不孕症在西北妇女儿童医院生殖中心首次行IVF/卵胞质内单精子显微注射(intracytoplasmic sperm injection, ICSI)助孕且年龄 $\geq 40$ 岁的603例不孕症的临床资料。根据患者年龄的不同分为4组:A组(40~41岁)、B组(42~43岁)、C组(44~45岁)和D组( $\geq 46$ 岁)。比较各组间基础卵泡数、产次、不孕因素、每移植周期活产率、多周期累积活产率等的差异,并对年龄、产次等对累积活产率的影响进行logistic多因素分析。结果 ① A组的每移植周期的妊娠率、每移植周期的活产率、多周期累积活产率较其他组高,差异具有统计学意义( $P < 0.05$ ); ② 至少1个周期无获卵的占比随着年龄增加明显增加( $P < 0.001$ ); ③ 经历3个周期的IVF助孕后,年龄 $\geq 40$ 岁开始进行IVF助孕的不孕症患者的累积活产率达到平台期。④ Logistic多因素分析表明:与A组相比,B~D组累积活产率明显降低,OR值分别为0.416(95% CI=0.259~0.668)、0.227(95% CI=0.114~0.453)、0.121(95% CI=0.036~0.410)。结论 累积活产率随着年龄的增加而明显降低,在进行3个周期的IVF助孕后,累积活产率并不随着IVF周期数的增加而明显提高。

**【关键词】** 高龄; 累积活产率; 受精, 体外

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## Cumulative live birth rates in women who underwent *in vitro* fertilization treatment at age 40 years or older

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Center of Assisted Reproductive Technology, Northwest Women and Children's Hospital, Xi'an 710003, China

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**【Abstract】 Objective** To investigate the cumulative live birth rates (CLBRs) and related influencing factors in women aged  $\geq 40$  years who underwent multi-cycle *in vitro* fertilization (IVF). **Methods** This was a retrospective study. A total of 603 patients aged  $\geq 40$  years who underwent their first IVF cycle in the Center of Assisted Reproductive Technology of Northwest Women and Children's Hospital enrolled from April 2014 to September 2016. Patients were categorized into four groups according to age: group A (40–41 years), group B (42–43 years), group C (44–45 years); and group D ( $\geq 46$  years). The differences in antral follicle



count (AFC), etiology of infertility and CLBR among the four groups were detailed compared. Some influencing factors related to CLBRs, such as age and parity, were also analyzed by logistic multivariate methods. **Results** The pregnancy rate per cycle, the live birth rates per cycle and the cumulative live birth rates were significantly higher in group A than those in other group, and the differences between the groups were statistically significant ( $P<0.05$ ). However, the number of patients with at least one cycle with no retrieval oocytes significantly enhanced ( $P<0.001$ ). After three IVF cycles, 122 patients achieved a live birth, which comprised 97.6% of the total live births. Compared with group A, CLBR significantly declined from group B to group D. The OR values of groups (B, C to D) were 0.416 (95% CI=0.259–0.668), 0.227 (95% CI=0.114–0.453) and 0.121 (95% CI=0.036–0.410), respectively. **Conclusion** CLBR significantly declined with age. After three cycles of treatment, the accrual in the CLBR becomes less pronounced for all the four age groups.

**【Key words】** Advanced age; Cumulative live birth rates; Fertilization *in vitro*

**Fund program:** Xi'an Science and Technology Fund Project  
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·临床研究·

## 冻融胚胎移植周期胚胎卵裂球损伤 对妊娠结局及子代出生情况的影响

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**【摘要】** 目的 分析冻融胚胎移植(FET)周期胚胎卵裂球损伤对妊娠结局及子代出生情况的影响。方法 回顾性分析 2016 年 1 月至 2017 年 12 月期间在同济大学附属第一妇婴保健院辅助生殖医学科行 FET 患者资料, 按移植胚胎卵裂球是否完整分为 2 组: A 组(移植的 2 枚胚胎卵裂球均完整), 共 809 例; B 组(移植胚胎中 2 枚均有卵裂球损伤), 共 64 例。比较两组的一般情况、妊娠结局及子代出生情况。结果 两组患者的基本情况组间差异无统计学意义( $P>0.05$ ), 组间具有可比性。A 组和 B 组在生化妊娠率、临床妊娠率、多胎妊娠率、异位妊娠率及流产率差异均无统计学意义( $P>0.05$ )。A 组的胚胎着床率(35.3%)要显著高于 B 组(25.8%,  $P=0.033$ ); A 组的胎儿出生率(29.9%)也显著高于 B 组(20.3%,  $P=0.026$ ); A 组和 B 组新生儿的孕周、出生体质量、身高、低体质量儿出生率、早产率、畸形率差异均无统计学意义( $P>0.05$ )。结论 FET 周期胚胎卵裂球损伤会降低胚胎的发育潜能, 影响着床率和出生率, 但对子代出生情况并无明显影响。

**【关键词】** 胚胎移植; 妊娠结局; 卵裂期胚; 子代

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**Influence of blastomeres loss in frozen-thawed embryo transfer cycles on the pregnancy outcomes and the birth condition of newborn infants**

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**【Abstract】 Objective** To analyze the effect of blastomeres loss of frozen-thawed cleavage-stage embryos on patients' pregnancy outcomes and the birth condition of newborn infants. **Methods** A total of 873 frozen-thawed embryo transfer (FET) cycles in Reproductive Medicine Center of the First Maternity and Infant Hospital Affiliated to Tongji University from January 2016 to December 2017 were analyzed retrospectively, then they were divided into two groups: group A (the blastomeres in both the transferred embryos were intact,  $n=809$ ), and group B (the blastomeres in both the transferred embryos were partly injured,  $n=64$ ). The general situations, clinical outcomes and birth condition of newborn infants between the two groups were compared. **Results** There was no statistically significant difference in the general situations between the two groups ( $P>0.05$ ). And there were also no significant differences between group A and group B in the biochemical pregnancy rate, the clinical pregnancy rate, the multiple pregnancy rate, the ectopic pregnancy rate and the abortion rate ( $P>0.05$ ). However, the embryo implantation rate (35.3%) and the neonatal birth rate (29.9%) in group A were significantly higher than those in group B (25.8%,  $P=0.033$ ; 20.3%,  $P=0.026$ ). There were no statistically significant difference in gestational week, birth weight and birth height, the low birth weight infant rate, the premature birth rate, the birth defect rate between the two groups ( $P>0.05$ ). **Conclusion** Blastomeres loss in frozen-thawed embryos would affect the development potential, and reduce the implantation rate and the birth rate, but it would not affect the birth condition of newborn infants.

**【Key words】** Embryo transfer; Pregnancy outcome; Cleavage embryo; Offspring

**Fund program:** National Nature Science Foundation of China (81801538)

·临床研究·

## 精子DNA碎片指数与精液常规参数和生活方式关系及其对夫精人工授精妊娠结局的影响

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**【摘要】 目的** 探讨精子DNA碎片指数(DFI)与男性精液常规参数的关系及其影响因素,以及DFI对夫精宫腔内人工授精(AIH-IUI)妊娠结局的影响。方法 回顾性分析郑州大学第一附属医院生殖中心2017年9月至2018年12月期间AIH-IUI的1185个周期妊娠结局与DFI的关系,比较低DFI组( $DFI<15\%$ )和高DFI组( $DFI\geq 15\%$ )的生化、临床妊娠率和早期流产率。同时结合男方生活方式及精液分析参数,分析精子DFI与精液常规参数及男性年龄、体质指数(BMI)、



吸烟、饮酒的关系。结果 低 DFI 组的 AIH-IUI 临床妊娠率为 16.0% (122/761), 高于高 DFI 组 [13.89% (59/424)], 但差异无统计学意义 ( $P=0.33$ ); 低 DFI 组 IUI 的早期流产率 [4.1% (5/122)] 显著低于高 DFI 组 [15.3% (9/59)] ( $P=0.02$ ); 低 DFI 组的各项精液常规参数指标 (精子浓度、活力和正常形态率) 均显著高于高 DFI 组 ( $P$  均  $<0.01$ )。相关性分析显示精子 DFI 与精子浓度、活力及精子正常形态率呈负相关, 与男方年龄、禁欲时间及不良的生活方式 (吸烟、饮酒) 呈正相关。结论 精子 DFI 增高虽不影响 IUI 的妊娠率, 但与 IUI 的早期流产风险相关; 精子 DFI 与精液参数有较强相关性, 吸烟、饮酒等不良生活方式会导致精子 DFI 升高。

【关键词】 精液分析; 宫腔内人工授精; 妊娠结局; 精子 DNA 碎片指数

### Relationship of sperm DNA fragments index to semen routine parameters and lifestyle and its effect on the pregnancy outcome of artificial insemination

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【Abstract】 **Objective** To explore the effect of sperm DNA fragments index (DFI) on artificial insemination by husband-intrauterine injection (AIH-IUI) pregnancy outcomes, and explore the relationship between sperm DFI and male semen parameters and its influencing factors. **Methods** The relationship between DFI and 1185 cycles pregnancy outcomes of AIH-IUI in Reproductive Medical Center of the First Affiliated Hospital of Zhengzhou University from September 2017 to December 2018 was retrospectively analyzed, and the pregnancy rate and early abortion rate in low-DFI group (DFI $<15\%$ ) and high-DFI group (DFI $\geq 15\%$ ) were compared. At the same time, the relationship between sperm DFI and male age, body mass index (BMI), smoking, drinking and semen routine parameters was analyzed in combination with male lifestyle and semen analysis parameters. **Results** IUI clinical pregnancy rate in low-DFI group [16.0% (122/761)] was higher than that in high-DFI group [13.89% (59/424)], but there was no statistical difference ( $P=0.33$ ). The early abortion rate of low-DFI group [4.1% (5/122)] was significantly lower than that of high-DFI group [15.3% (9/59),  $P=0.02$ ]. Correlation analysis showed that sperm DFI was negatively correlated with sperm concentration, motility and normal sperm morphology rate, while positively correlated with male partner's age, abstinence time and poor lifestyle (smoking and drinking). **Conclusion** Sperm DFI is closely related to semen parameters, smoking, drinking and other adverse lifestyle can affect sperm DFI. Although high sperm DFI does not affect the pregnancy rate of IUI, it was associated with the risk of early abortion of IUI.

【Key words】 Semen analysis; Intrauterine artificial insemination; Pregnancy outcome; Sperm DNA fraction index

# 雷帕霉素对小鼠始基卵泡激活及生长发育的作用研究

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**【摘要】** 目的 研究哺乳动物雷帕霉素靶蛋白(mTOR)特异性抑制剂雷帕霉素对小鼠始基卵泡激活及生长发育的作用。方法 选取 C57BL/6 雌性小鼠 40 只, 随机分为对照组( $n=20$ , 等体积生理盐水)和雷帕霉素处理组( $n=20$ , 雷帕霉素 5 mg/kg), 持续给药 30 d 后每组分别取 7 只小鼠, 取卵巢组织行石蜡切片, HE 染色观察组织形态学变化并进行卵泡分类计数, 免疫组织化学法检测 DDx4/MVH 和 Ki-67 分子的表达水平, 另提取卵巢组织蛋白, Western blotting 法检测 mTOR 及其下游信号分子的表达水平。停用雷帕霉素 8 周后, 对照组和雷帕霉素处理组分别取 6 只, 行始基卵泡计数, 免疫组织化学法检测抗苗勒管激素(AMH)和 Ki-67 分子的表达水平, 另取 7 只, 予孕马血清促性腺激素(PMSG)和人绒毛膜促性腺激素(hCG)促排卵, 24 h 后取材行 HE 染色观察组织形态学变化。结果 雷帕霉素处理组小鼠始基卵泡数量较对照组显著增多( $P=0.040$ ), 可见大量始基卵泡聚集, DDx4/MVH 分子的表达增加; 生长卵泡数量则明显减少( $P=0.002$ ), 且 Ki-67 表达水平降低。停用雷帕霉素 8 周后, 雷帕霉素处理组小鼠始基卵泡数量仍明显多于对照组, 小鼠卵巢中可见各级生长卵泡, 正常表达 Ki-67 和 AMH。促排卵后, 雷帕霉素处理组和对照组小鼠卵巢均可见大量成熟卵泡或黄体。Western blotting 结果显示雷帕霉素处理组小鼠卵巢 mTOR 及其下游信号分子 p70S6K、rpS6 和 eIF4B 磷酸化水平显著低于对照组( $P$ 均 $<0.05$ ), 而总的分子水平未发生明显变化( $P>0.05$ )。结论 雷帕霉素通过抑制 mTOR 信号通路分子磷酸化水平, 抑制始基卵泡的激活, 减缓始基卵泡向生长卵泡的转化速率, 并抑制卵泡生长发育, 从而保护卵泡储备功能。

**【关键词】** 雷帕霉素; 哺乳动物雷帕霉素靶蛋白; 始基卵泡; 卵巢储备

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## Effects of Rapamycin on the activation and growth of primordial follicles in mice

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**【Abstract】 Objective** To investigate the effects of Rapamycin, a mammalian target of rapamycin (mTOR) specific inhibitor, on the activation and growth of primordial follicles in mice from the signal transduction of follicular development. **Methods** A total of 40 C57BL/6 female mice were randomly divided into control group ( $n=20$ , same volume of saline) and Rapamycin treatment

group ( $n=20$ , 5 mg/kg Rapamycin). Seven mice in each group were treated after 30 d, and ovarian histomorphological changes were observed by HE staining, the expressions of DDx4/MVH and Ki-67 were detected by immunohistochemistry, the level of mTOR and its downstream molecules were detected by Western blotting. Eight weeks after administration, 6 mice in control group and Rapamycin treatment group were selected for follicle count, and the expressions of anti-Müllerian hormone (AMH) and Ki-67 were detected by immunohistochemistry. Another 7 mice of both groups were treated with pregnant mare serum gonadotropin (PMSG) and human chorionic gonadotropin (hCG) for ovulation induction. The ovaries were obtained for histomorphological observation by HE staining. **Results** The number of primordial follicle in Rapamycin treatment group was significantly increased compared with control group ( $P=0.040$ ), and a large number of primordial follicles were clustered, while the number of growing follicles was significantly decreased ( $P=0.002$ ). The number of primordial follicle, expressing DDx4/MVH molecule, was increased, while the expression of Ki-67 was decreased compared with control group. Eight weeks after Rapamycin treatment, the number of primordial follicles was still more than that in control group, and the expressions of Ki-67 and AMH in growing follicles were normal. After ovulation induction treatment, large numbers of mature follicles or corpus luteum could be observed in both two groups. Western blotting showed that the phosphorylation levels of mTOR and its downstream molecules p70S6K, rpS6 and eIF4B in Rapamycin treated group were significantly lower than those in control group, while the total molecular level did not change significantly ( $P>0.05$ ). **Conclusion** Rapamycin could inhibit the activation of primordial follicles by inhibiting the phosphorylation of mTOR signaling pathway, and slow down the transformation rate of primordial follicles to the growth follicles, and also inhibit the development of growing follicles, thus protect the ovarian reserve function.

**【Key words】** Rapamycin; Mammalian target of rapamycin; Primordial follicle; Ovarian reserve

**Fund program:** Surface Program of National Natural Science Foundation of China (81771587)

·流行病学研究·

## 亚洲地区 1990—2030 年避孕状况及未满足的计划生育需要

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**【摘要】** 目的 分析亚洲各地区已婚/同居育龄女性的避孕状况和未满足的计划生育需要, 为保障女性生殖健康权利和相关政策的制定提供依据。方法 选取 1990—2030 年间亚洲各地区避孕相关数据, 分析亚洲各地区已婚/同居育龄女性的避孕率、未满足的计划生育需要(数据来源于《全球避孕方法使用状况 2017》)。

结果 2017 年亚洲地区避孕率由 1990 年的 56.8% (95%  $CI=53.6\%\sim60.3\%$ ) 上升至 66.0% (95%  $CI=60.9\%\sim70.0\%$ )、未满足的计划生育需要由 1990 年的 14.2% (95%  $CI=12.6\%\sim16.3\%$ ) 下降至 10.1% (95%  $CI=8.5\%\sim12.4\%$ )。与 1990 年相比, 2017 年现代避孕方法使用比例升高。2017 年中国的避孕率为 83.3% (95%  $CI=70.8\%\sim91.0\%$ ), 与 1990 年的 78.3% (95%  $CI=70.8\%\sim84.5\%$ ) 相比有所升高, 但其差异无统计学意义; 现代避孕方法的比例由 1990 年的 98.6% 上升为 99.0%, 中国的避孕率高于全亚洲的平均水平。2017 年中亚、东亚、东南亚、南亚、西亚地区未满足的计划生育需要分别为 13.1% (95%  $CI=9.7\%\sim18.4\%$ )、4.6% (95%  $CI=2.4\%\sim9.5\%$ )、12.2% (95%  $CI=10.2\%\sim14.6\%$ )、13.2% (95%  $CI=10.3\%\sim16.7\%$ )、14.1% (95%  $CI=11.7\%\sim17.2\%$ )。中国未满足的计划生育需要较低 (3.7%, 95%  $CI=1.4\%\sim8.3\%$ )。预测至 2030 年, 中亚、东南亚、南亚及西亚未满足的计划生育需要将呈下降趋势 ( $P<0.001$ ), 但是中国和东亚地区未满足的计划生育需要率将呈上升趋势 ( $P<0.001$ ), 而未满足计划生育需要的绝对人数会逐年递减, 出现双向效应。结论 2017 年亚洲各地区避孕率升高, 未满足的计划生育需要有所下降。预测至 2030 年, 该状况仍有可能延续。但是中国应关注将会出现的计划生育需要率上升、绝对人数减少的双向效应, 及时做出相应的计划生育服务调整和满足。

【关键词】 避孕率; 未满足的计划生育需要; 现状; 趋势预测

基金项目: 国家十二五科技支撑计划课题项目 (2012BAI32B08)

#### Status and tendency projection of contraceptive prevalence and unmet need for family planning in Asian area from 1990 to 2030

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【Abstract】 **Objective** To ensure the promotion of reproductive health and formulation of related policies through the analysis and estimation of contraceptive prevalence and unmet need for family planning of married or in union women of reproductive age in Asian area. **Methods** Data were selected from the open database of World Contraceptive Use 2017 to analyze the current status (1990–2017) and estimation (2018–2030) of unmet need for family planning and contraceptive prevalence in Asian area. **Results** The contraceptive prevalence in Asia increased from 56.8% (95%  $CI=53.6\%\sim60.3\%$ ) in 1990 to 66.0% (95%  $CI=60.9\%\sim70.0\%$ ) in 2017, whereas unmet need for family planning decreased from 14.2% (95%  $CI=12.6\%\sim16.3\%$ ) to 10.1% (95%  $CI=8.5\%\sim12.4\%$ ) and there was a change for the composition of contraceptive methods with an increase for modern contraceptive methods. The contraceptive prevalence of China in 2017 was higher than the counterpart in 1990, despite no statistical difference. In 2017, the unmet need for family planning in Central Asia, Eastern Asia, Southeast Asia, Southern Asia and Western Asia were 13.1% (95%  $CI=9.7\%\sim18.4\%$ ), 4.6% (95%  $CI=2.4\%\sim9.5\%$ ), 12.2% (95%  $CI=10.2\%\sim14.6\%$ ), 13.2% (95%  $CI=10.3\%\sim16.7\%$ ), 14.1% (95%  $CI=11.7\%\sim17.2\%$ ) respectively. And the unmet need for family planning of China was 3.7% (95%  $CI=1.4\%\sim8.3\%$ ) in 2017. It was predicted that until 2030, the unmet need for family planning in Central Asia, Southeast Asia, Southern Asia and Western Asia would show a downward trend ( $P<0.001$ ) despite an upward trend of unmet need for family planning in China and Eastern Asia ( $P<0.001$ ) as well as a decrease in absolute terms, called “bi-directional effect”. **Conclusion** Contraception increased in Asia from 1990 to 2017, and unmet need for family planning decreased. The situation was predicted to continue until 2030. It was essential for China to attach attention to the

bi-directional effect with increase of unmet need of family planning and decrease of absolute number and make corresponding adjustment and promotion of family planning service.

**【Key words】** Contraceptive prevalence; Unmet need for family planning; Status; Tendency projection

**Fund program:** The 12th Five-year Plan of National Key Technology Research and Development Program of China (2012BAI32B08)

·流行病学研究·

## 孕期 Th1/Th2 型细胞因子对学龄前儿童过敏性疾病的影响

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**【摘要】** 目的 探讨孕期母体辅助性 T 细胞(Th)1、Th2 型细胞因子与儿童过敏性疾病(ADs)之间的关联。方法 采用前瞻性队列研究调查 2011 年 7 月至 2012 年 3 月期间在民乐县妇幼保健院产科门诊就诊的单胎健康孕妇,采用双抗体夹心酶联免疫吸附试验(ELISA)检测孕中期、孕后期血浆干扰素(IFN)- $\gamma$ 、白细胞介素(IL)-1 $\beta$ 、IL-18、IL-4 和 IL-10 水平;2017 年 9 月至 2019 年 5 月入户随访学龄前儿童喂养方式及特异性皮炎、过敏性鼻炎、哮喘等疾病发生情况;采用泊松回归模型进行关联分析。结果 研究共纳入 49 对母子,发生或正发生一种过敏性症状的学龄前儿童 9 例(18.4%),其中特异性皮炎 4 例、过敏性鼻炎 3 例、哮喘 1 例,过敏性鼻炎合并哮喘 1 例。与健康儿童比较,ADs 患儿母体孕后期血浆 IFN- $\gamma$  ( $P=0.03$ )、孕中期和孕后期 IL-1 $\beta$  显著性降低( $P=0.01$  和  $P=0.02$ ),孕后期 IL-18 水平临界降低( $P=0.05$ );两组 IL-4、IL-10 水平差异无统计学意义( $P>0.05$ );孕期尤其是孕后期 IFN- $\gamma$ 、IL-1 $\beta$  低水平(<P33.33 位点值)与学龄前儿童 ADs 存在显著关联,矫正母乳喂养时间及家族过敏史后 aRR 分别为 8.44(95% CI=1.21~59.03)和 10.29(95% CI=1.66~63.69)。结论 孕期母体 Th1 下调,可能导致胎儿免疫失衡,从而增加其出生后罹患过敏性疾病的风险。

**【关键词】** 过敏性疾病; 孕期; 细胞因子; 危险因素

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Effect of maternal Th1/Th2 cytokines during pregnancy on allergic disease in preschool children

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**【Abstract】 Objective** To explore the possible association between maternal helper T (Th)1 and Th2 cytokines during pregnancy and development of childhood allergic diseases (ADs). **Methods** Prospective cohort study was performed. Healthy women with singleton pregnancy in gestational weeks 16–24 who were admitted to the obstetric clinic of Minle Maternal and Child Health Hospital were investigated from July 2011 to March 2012. Plasma cytokine levels of interferon (IFN)- $\gamma$ , interleukin (IL)-1 $\beta$ , IL-18, IL-4, and IL-10 were measured with enzyme linked immunosorbent assay (ELISA) in the second and the third trimester. In-home survey was conducted from September 2017 to May 2019 to investigate the feeding patterns and ADs of preschool children. Association analysis were performed by Poisson regression model. **Results** Amongst 49 mother-child pairs, 9 (18.4%) preschool children were suffering or had suffered one or more allergic symptoms, including 4 cases of atopic dermatitis, 3 cases of allergic rhinitis, 1 case of asthma and 1 case of allergic rhinitis combined with asthma. Maternal plasma levels of IFN- $\gamma$  ( $P=0.03$ ) in the third trimester, IL-1 $\beta$  in the second and the third trimester ( $P=0.01$ ,  $P=0.02$ ) were significantly lower, and IL-18 in the third trimester was marginally lower ( $P=0.05$ ) in ADs group compared with those in healthy group. Maternal decreased IFN- $\gamma$  and IL-1 $\beta$  ( $<P33.33$ ) during pregnancy, especially in the third trimester were associated with an increased risk of ADs in preschool children, with aRR 8.44 (95% CI=1.21–59.03) and 10.29 (95% CI=1.66–63.69) respectively, adjusted for breastfeeding length and family history of ADs. **Conclusion** Maternal Th1 down-regulation during pregnancy may induce fetal immune unbalance, and increase the risk of ADs after birth.

**【Key words】** Allergic diseases; Pregnancy; Cytokine; Risk factors

**Fund program:** Shanghai Municipal Health and Family Planning Commission (201640249, 201640032)

·个案报道·

## 卵巢不敏感综合征不孕患者助孕病例分析及文献回顾

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**【摘要】 目的** 结合既往文献及临床病例, 总结卵巢不敏感综合征(ROS)诊疗特征。**方法** 回顾性分析北京大学第三医院生殖中心 4 例有生育要求的 ROS 病例特点及临床诊治特征。**结果** 不孕患者 ROS 的诊治往往曲折而成效有限。积极助孕失

败的 ROS 患者基础卵泡刺激素 (FSH) 水平升高明显, 往往>40 IU/L, 甚至高于 100 IU/L, 或存在长时间闭经; 下丘脑-垂体轴功能良好。促性腺激素释放激素类似物 (GnRHa) 长方案或超长方案、体外成熟 (IVM) 技术是 ROS 患者可选择的助孕方案。结论 体外受精助孕技术仍然是对于此类患者可能妊娠的有效治疗方法, 可以积极尝试 GnRHa 长/超长方案/IVM 方案助孕。

【关键词】 卵巢不敏感综合征; 辅助生殖; 卵巢刺激; 体外成熟  
基金项目: 国家自然科学基金 (81501324、81550022)

#### Case analysis and literature review of resistant ovary syndrome infertility

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【Abstract】 **Objective** To summarize the diagnosis and treatment characteristics of resistant ovary syndrome (ROS) combined with previous literature and clinical cases. **Methods** The clinical characteristics of 4 cases of ROS with reproductive requirements was retrospectively in Reproductive Medical Center of Peking University Third Hospital. **Results** The diagnosis and treatment of infertility ROS is often tortuous and limited. ROS patients with treatment failure often has significantly increased follicle stimulating hormone (FSH), which is more than 40 IU/L, or even more than 100 IU/L, and they often had long-term amenorrhea; the hypothalamic pituitary axis function was normal. Gonadotropin-releasing hormone analogue (GnRHa) long or pro-longed protocol, and *in vitro* maturation (IVM) are optional protocol. **Conclusion** *In vitro* fertilization is still an effective treatment for ROS patients for successful pregnancy. We can actively try GnRHa long/pro-longed/IVM protocol.

【Key words】 Resistant ovary syndrome; Assisted reproduction; Ovarian stimulation; *In vitro* maturation

**Fund program:** National Nature Science Foundation of China (81501324, 81550022)

## 综述

### 氧化应激对植入前胚胎发育的影响

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【摘要】 氧化应激是引起胚胎发育异常的重要原因之一, 活性氧 (reactive oxygen species, ROS) 在其中扮演了重要角色。胚胎内 ROS 来源于细胞自身各种代谢过程, 胚胎发育的不同阶段以及其所处的环境都会影响胚胎内的 ROS 水平。生理含量的 ROS 可作为第二信使参与信号转导, 但过量的 ROS 会引起胚胎内线粒体损伤、DNA 损伤、脂质过氧化甚至细胞凋亡, 进而导致胚胎发育阻滞。本文旨在综述 ROS 对植入前胚胎发育的双重作用及氧化应激损伤胚胎后挽救方案的研究进展, 以利于更深入地了解氧化应激对植入前胚胎发育的影响, 及选择恰当的挽救方案避免氧化应激影响植入前胚胎发育。



【关键词】 氧化应激; 活性氧; 植入前胚胎发育; 抗氧化剂  
基金项目: 国家自然科学基金(81471457); 南京市杰出青年基金(JQ16030)

# Effect of oxidative stress on pre-implantation embryo development

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【Abstract】 Oxidative stress is one of the important causes of abnormal embryonic development, in which reactive oxygen species (ROS) play an important role. Embryonic ROS was generated in various metabolic processes of cells, and ROS level can be affected by different stages of embryonic development and the environment around. Physiological level of ROS can work as a second messenger to participate in signal transduction. However, excessive ROS may cause mitochondrial damage, DNA damage, lipid peroxidation and even cell apoptosis in the embryo, resulting in developmental arrest of the embryo. This review aims to summarize the dual effects of ROS on pre-implantation embryo development and the research progress of the rescue plan after oxidative stress damages the embryo, which will help us get a deeper understanding of the influence of oxidative stress on pre-implantation embryo development, and choose an appropriate rescue plan to avoid the damage of oxidative stress to the pre-implantation embryo development process.

【Key words】 Oxidative stress; Reactive oxygen species;  
Pre-implantation embryo development; Antioxidant

Fund program: National Nature Science Foundation of China (81471457);  
Excellent Youth Foundation of Nanjing Scientific Committee (JQ16030)

## 综述

## 转录组学对评估胚胎发育潜能的研究进展

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【摘要】 近年来转录组学快速发展, 成为探索生殖细胞和人类早期胚胎发育机制的重要手段, 其中单细胞测序技术的出现更具有里程碑意义。在生殖细胞水平, 卵母细胞中 RNA 的稳定对于受精后胚胎的发育具有重要意义; 同时多项研究表明精子中存在着复杂的 RNA 分子调控系统, 可能与精子异常密切相关。精卵结合后, 受精卵的激活和分化发育涉及多个基因适时的激活和转录表达, 为后期着床进行铺垫。最新的技术能够同时对同一细胞进行多层面检测, 也深入揭示了甲基化与转录、遗传之间的关系。而随着“无创”概念深入人心, 囊胚培养液的检测愈发受到重视, 其中多个转录因子被证实与胚胎发育相关, 有可能成为优质胚胎新的评价体系。

【关键词】 转录组学; 胚胎; 发育潜能

## Advances in transcriptome analysis of embryo development potential

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**【Abstract】** In recent years, with the rapid development of transcriptomics, it has become an important approach to explore the development of germ cells and human embryos at the early stage and the emergence of single-cell sequencing technology has a milestone significance. At the germ cell level, scientists have found that the stabilization of RNA levels in oocytes is important for the development of embryos after fertilization. At the same time, many studies have shown that there are complex RNA molecular regulation systems in sperm, which may be closely related to sperm abnormalities. After sperm-egg binding, the activation and differentiation of fertilized eggs is an extremely precise process involving the timely activation and transcriptional expression of multiple genes, paving the way for late implantation. The discovery of these results is inseparable from the advancement of technology, since the latest technology enables simultaneous multi-layer detection of the same cell, and reveals the relationship among methylation, transcription, and inheritance. With the concept of “non-invasive” deeply rooted in people’s mind, the detection of blastocyst culture fluid has received more and more attention. Among them, several transcription factors have been confirmed to be related to embryonic development, and have the potential to become a new system for evaluating high-quality embryos.

**【Key words】** Transcriptome; Embryo; Developmental potentiality

## 综述

## 胚胎形态学评估的临床应用价值

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**【摘要】** 形态学评估是人类体外受精胚胎质量评价最主要的方法, 在受精之前的卵母细胞阶段、受精后的原核期阶段、胚胎分裂后的卵裂期阶段以及囊胚期阶段对胚胎的形态学特征进行观察, 并对其质量进行分级, 选择发育潜能良好的胚胎进行移植或者冷冻。胚胎形态学评估虽然存在主观因素影响, 且缺乏动态连续观察等缺点, 但是其对胚胎无损伤、操作简单、快速价廉的优点使其在胚胎实验室广泛应用。本文旨在对人类胚胎形态学评估的临床应用价值作一综述。

**【关键词】** 形态学评估; 卵母细胞; 原核; 卵裂期; 囊胚; 质量控制

## Clinical application significance of embryo morphological evaluation

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**【Abstract】** Morphological evaluation is the most important method for evaluating the quality of human *in vitro* fertilized embryos. Morphological characteristics of embryos in the oocyte stage before fertilization, the pronuclear stage after fertilization, the cleavage stage after embryonic division, and the blastocyst stage were observed and classified according to the quality. Then good developmental potential embryos were selected for transplantation or vitrification. Although morphological evaluation of embryos has the disadvantages of subjective factors and lack of dynamic continuous observation, its advantages of no damage to embryos, simple operation, and low cost make it widely used in embryonic laboratories. This article aims to provide an overview of the clinical application significance of morphology evaluation of embryos.

**【Key words】** Morphological evaluation; Oocyte; Pronucleus; Cleavage stage; Blastocyst; Quality control

## 综述

### 零原核来源胚胎的研究进展

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**【摘要】** 在辅助生殖工作中我们经常遇到卵子没有出现双原核但有 2 个极体, 称为零原核, 这可能是由于原核出现提前或者延后而导致未能在特定的原核观察时间点进行受精情况判断。由于目前零原核来源胚胎的临床应用仍存在困惑与争议, 大部分中心往往选择废弃, 这在一定程度上造成胚胎浪费, 从而降低卵子的利用率。近年来, 零原核来源胚胎越来越受到辅助生殖技术专家们的关注并取得一定的研究进展。本文就零原核来源胚胎的发生机制、影响因素、遗传属性、发育潜能、临床结局等方面的研究进展做一综述, 旨在为零原核来源胚胎的合理应用提供参考。

**【关键词】** 受精, 体外; 胚胎发育; 胚胎移植; 零原核胚胎

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#### Research progress on nonpronuclear embryos

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**【Abstract】** In assisted reproductive technology (ART), there is a common occurrence that mature oocytes have two polar bodies without two pronuclei after insemination, which named nonpronuclear. The pronuclei of those oocytes may appear in advance or delay at the time of fertilization checking, so the assessment of fertilization is inconclusive. Due to the confusion and controversy of

nonpronuclear-derived embryos (named nonpronuclear embryos) in clinical application at present, nonpronuclear embryos are usually discarded which may result in wasting available embryos even decreasing the utilization of the eggs. In recent years, nonpronuclear embryos get more and more attention in ART and have made certain research progress. The aim of this review is to summarize the mechanisms, influence factors, inheritance, embryonic development, clinical outcomes, and other applications about nonpronuclear embryos. The review may provide more basis for the reasonable application.

**【Key words】** Fertilization *in vitro*; Embryonic development; Embryo transfer; Nonpronuclear zygotes

**Fund program:** Guangxi Science Foundation (2018JB140142); Self-raised Foundation of Guangxi Health Commission (Z20180078)

## 综述

### 影响生长卵泡发育的相关因素

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**【摘要】** 卵泡发育可分为原始卵泡、生长卵泡和成熟卵泡 3 个阶段, 其中生长卵泡阶段又可分为窦前卵泡、窦卵泡及排卵前卵泡。卵泡发育过程受到来自卵母细胞、颗粒细胞、膜细胞、基质、血管等多方的因素相互作用, 变化丰富、复杂, 过程中任何一分子或信号通路的异常即有可能引起卵泡发育的障碍。本文就影响生长卵泡发育阶段的相关因素进行梳理与总结。

**【关键词】** 生长卵泡; 转化生长因子- $\beta$  超家族; 优势卵泡; 卵巢血管化; 内分泌腺性血管内皮生成因子

#### Relevant factors affecting growing follicles

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**【Abstract】** The process of follicular development can be divided into primordial follicle, growing follicles, and mature follicle. The phase of growing follicles can be divided into pre-antral follicle, antral follicle and pre-ovulatory follicle. Many factors from oocytes, granulosa cells, theca cells, matrix, blood vessels and so on have been changed richly with complex interactions. Any abnormal molecules or signaling pathways during the above process may cause problems of follicle development. This article will summarize the related factors of growing follicular phase.

**【Key words】** Growing follicle; Transforming growth factor  $\beta$  super family; Dominant follicle; Ovarian vascularization; Endocrine gland-derived vascular endothelial growth factor

## 人类合胞素在妊娠中的研究进展

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**【摘要】** 合胞素(syncytin)是一类由人类内源性逆转录病毒所编码的膜糖蛋白,在生理和病理情况下都起着至关重要的作用。近年来,合胞素的研究引起了越来越多的学者注意,并且迅速成为一个研究热点。基于目前的研究进展,本文主要介绍合胞素在母-胎界面中的生理功能,及合胞素的相关调控因子和通路,总结其表达异常和不同病理妊娠的关系,探讨合胞素是否可成为病理妊娠诊断的标志物之一。

**【关键词】** 合胞素; 生理功能; 表达调控因子和通路; 病理妊娠

### Research progress of human syncytin in pregnancy

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**【Abstract】** Syncytin, a class of membrane glycoprotein encoded by human endogenous retroviruses (HERV), plays a crucial role in both physiological and pathological conditions. In recent years, the research on syncytin boomingly developed into a hot topic and grasped the attention of more and more scientists. Therefore, based on the current research progress, this article will mainly describe the physiological functions of syncytin in maternal-fetal interface, and the related regulatory factors and pathways of syncytin, as well as its aberrant expression in various pathological pregnant situations which makes it likely to be one of diagnosis markers of pathological pregnancy.

**【Key words】** Syncytin; Physiological functions; Expression regulators and pathways; Pathological pregnancy

## 蜕膜自然杀伤细胞在子宫螺旋动脉重塑中的作用

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**【摘要】** 子宫螺旋动脉重塑是妊娠期子宫的重要生理变化,多种妊娠合并症如子痫前期、胎儿生长受限、复发性流产等均与螺旋动脉重塑受损有关,然而具体机制尚不明确。近年来,免疫细胞在螺旋动脉重塑中的调节作用逐渐为研究者所重视,其调控机制被进一步发现和证实,由于蜕膜自然杀伤(dNK)细胞是最丰富的蜕膜免疫细胞群,因此 dNK 细胞可能在子宫螺旋动脉重塑的过程中发挥积极的调控作用。本文就 dNK 细胞的功能和子宫螺旋动脉重塑的机制以及 dNK 细胞在重塑中所发挥的作用进行综述。

**【关键词】** 蜕膜自然杀伤细胞; 螺旋动脉重塑; 妊娠

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### **Role of decidual natural killer cells in uterine spiral artery remodeling**

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**【Abstract】** Uterine spiral artery remodeling is an important physiological change of the uterus during pregnancy. Many complications of pregnancy, such as preeclampsia, fetal growth restriction and recurrent abortion, are related to the damage of spiral artery remodeling, but the mechanism is not clear. In recent years, the regulatory role of immune cells in the remodeling of spiral arteries has been paid more and more attention by researchers, and its regulatory mechanism has been further discovered and confirmed. Decidual natural killer (dNK) cells may play an active role in the process of uterine spiral artery remodeling, because dNK cells are the most abundant decidual immune cell population. This article reviews the function of dNK cells, the mechanism of uterine spiral artery remodeling and the role of dNK cells in remodeling process.

**【Key words】** Decidual Natural killer cells; Spiral artery remodeling; Pregnancy

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