

• 实验研究 •

## 卵母细胞分泌因子在人卵丘颗粒细胞中的表达 及其与卵母细胞发育潜能的关系

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**【摘要】目的:** 探讨单卵母细胞所对应的卵丘颗粒细胞(cumulus cells, CCs)中生长分化因子-9(GDF-9)、骨形成蛋白-15(BMP-15)、转化生长因子 $\beta$ 1(TGF $\beta$ 1)、Smad3的表达与对应单卵母细胞质量及其发育潜能的关系以及在不同促排卵方案中的表达。**方法:** 因男方因素或曾有过体外受精(IVF)不受精史接受卵胞质内单精子显微注射(ICSI)治疗的患者41例, 单卵母细胞的CCs 332份(GnRH-a组21例172份CCs, 非垂体降调节组20例160份CCs)。拣卵后机械法剥离单卵子周围的CCs, 将卵母细胞与收集的CCs一一对应进行分析。M<sub>II</sub>卵均采用ICSI授精, 并观察其受精、卵裂及囊胚发育情况。采用Real-time PCR方法检测, 比较各组CCs中GDF-9、BMP-15、TGF $\beta$ 1和Smad3的相对含量。**结果:** ① CCs收集及PCR扩增产物可满足实验要求。② GnRH-a组及非垂体降调节组中, 上述4种卵母细胞分泌因子, 在正常受精组的相对含量均显著高于异常受精组; 优质卵裂胚形成组的相对含量均显著高于非优质卵裂胚形成组; 优质囊胚形成组中的相对含量显著高于非优质囊胚形成组。③ GnRH-a组的CCs中BMP-15的表达量相对更高; 而GDF-9、TGF $\beta$ 1和Smad3在非降调节组的CCs中相对表达量较高。**结论:** ① 采用单卵母细胞的CCs的RNA进行研究, 实际操作是可行的, RNA的质量和数量可达到实验要求。② GDF-9、BMP-15、TGF $\beta$ 1、Smad3可作为评价卵母细胞质量、预测卵母细胞发育潜能的客观指标。③ 降调节与否可能影响CCs中的卵母细胞分泌因子的表达水平, 且与M<sub>II</sub>期卵母细胞发育潜能有关。

**关键词:** 卵母细胞分泌因子(OSFs); 卵丘颗粒细胞(CCs); 卵胞质内单精子显微注射(ICSI); 胚胎发育潜能; 卵母细胞质量; GnRH-a长方案; 非降调节促排卵方案

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• 实验研究 •

## Expression of oocyte-secreted factors in human cumulus cells and its relationship with oocyte developmental potential

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**【ABSTRACT】 Objective:** To explore the prognostic value of oocyte-secreted factors (OSFs) for the quality and developmental potential of oocytes, expression of growth differentiation factor 9 (GDF-9), bone morphogenetic protein-15 (BMP-15), transforming growth factor- $\beta$ 1 (TGF $\beta$ 1) and Smad3 from individual cumulus cells (CCs) were analyzed corresponding to each cumulus cell-oocyte complex (COC) in two protocols that pituitary down-regulation and non-down-regulation. **Methods:** The individual CC masses of total 332 COCs from 41 women undergoing *in vitro* fertilization (IVF) were collected. The infertile women were determined to undergo intracytoplasmic sperm injection (ICSI) because of the male factor or with a history of failed/low fertilization at previous IVF. All CCs from each COCs were mechanically removed shortly after oocyte retrieval, and all M<sub>II</sub> oocytes were subject to ICSI, and subsequently assessed on the basis of their fertilization, cleavage, and blastocyst development. Total RNA was extracted from each CCs sample according to the manufacturers' protocols. RNA expression of GDF-9, BMP-15, TGF $\beta$ 1 and Smad3 was assessed using a step Real-time quantitative PCR assay. **Results:** 1) The quality and quantity of RNA extracted from CCs could meet the PCR experiment requirements. 2) In total individual CCs, the expression levels of GDF-9, BMP-15, TGF $\beta$ 1 and Smad3 were significantly higher in normal fertilization group than in abnormal fertilization group, were significantly higher in good-quality cleavage embryo group than in poor-quality cleavage embryo group, and were significantly higher in good-quality blastocyst group than in poor-quality blastocyst group. 3) The expression levels of BMP-15 were significantly increased in GnRH-a protocol. However, the expression levels of GDF-9, TGF $\beta$ 1 and Smad3 in non-pituitary down-regulation were significantly higher compared with GnRH-a protocol. **Conclusion:** 1) Gene expression data were available on CCs from all 332 individuals of COC, and met an accurated test requirements. 2) GDF-9, BMP-15, TGF $\beta$ 1 and Smad3 may be used as potential markers for predicting the oocytes developmental potential. 3) Gene expression level of CCs is different between down or non-down-regulation protocols that were associated with developmental potential of M<sub>II</sub> oocytes.

**Key words:** oocyte-secreted factors (OSFs); cumulus cells (CCs); intracytoplasmic sperm injection (ICSI); developmental potential of oocyte; quality of oocytes; GnRH-a protocol; non-down-regulation

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## 无创产前检测在高龄孕妇中 检测胎儿非整倍体的临床应用

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**【摘要】**目的: 探讨高通量测序(HTS)技术在高龄孕妇胎儿染色体非整倍体筛查中的临床应用。方法: 2 090例单胎高龄孕妇行无创产前检测(NIPT), 结果异常的孕妇再行羊膜腔穿刺, 羊水细胞培养后染色体G320显带核型分析。结果: 2 090例样本中, 高通量基因测序提示22例胎儿染色体非整倍体高风险, 19例孕妇自愿接受羊水产前诊断, 其中16例羊水G带核型结果与NIPT测序结果一致, 包括12例T21, 2例T18, 2例性染色体异常, 阳性预测值为84.2%(16/19)。结论: 对于拒绝接受介入性产前诊断的高龄孕妇, 临床可推荐无创的高通量基因测序产前检测技术, 进一步降低出生缺陷儿的发生率。

**关键词:** 高通量测序(HTS); 高龄; 无创产前检测(NIPT)

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## Application of high-throughput sequencing in the diagnosis of fetal aneuploidies in women with advanced maternal age

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**【ABSTRACT】 Objective:** To investigate the application of non-invasive prenatal testing (NIPT) in the diagnosis of fetal chromosomal aneuploidies in women with advanced maternal age. **Methods:** A total of 2 090 pregnant women with advanced maternal age conducted NIPT were collected. The cases of chromosomal abnormalities were advised to carry out prenatal fetal chromosomal karyotype analysis of amniotic fluid cells using G320-banding technique. **Results:** High-throughput sequencing (HTS) revealed 22 cases of chromosomal aneuploidies in 2 090 pregnant women. After receiving informed consent, 19 cases of pregnant women voluntarily received amniotic fluid prenatal diagnosis, of which 16 cases were consistent with the sequencing results, including 12 cases of T21, 2 cases of T18 and 2 cases of sex chromosomal abnormalities, positive predictive value was 84.2% (16/19). **Conclusion:** If those refuse to accept interventional prenatal diagnosis, pregnant women with advanced maternal age can be suggested to screen out birth defects by HTS, which will be useful to reduce the rate of birth defects.

**Key words:** high-throughput sequencing (HTS); advanced maternal age; non-invasive prenatal testing (NIPT)

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• 临床研究 •

## 诱发日内源性孕酮升高对PCOS患者的IVF/ICSI临床结局的影响

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**【摘要】**目的: 在高孕激素超促排卵(progesterin-primed ovarian stimulation, PPOS)及全胚胎冷冻移植的背景下, 探讨诱发排卵日内源性孕酮(P)水平与多囊卵巢综合征(polycystic ovary syndrome, PCOS)患者体外受精/卵胞质内单精子显微注射(IVF/ICSI)临床结局的关系。方法: 回顾性纳入180例PCOS患者行IVF/ICSI-冻融胚胎移植(FET)的资料, 所有患者均采用促性腺激素(gonadotropin, Gn)联合孕激素的超促排卵方案, 取卵后全部胚胎冷冻, 择期行FET, 根据诱发排卵日P水平分为A组( $P < 1.0 \mu\text{g/L}$ ,  $n=125$ )和B组( $P \geq 1.0 \mu\text{g/L}$ ,  $n=55$ ), 比较两组患者的促排卵结局和妊娠结局。结果: A组与B组的Gn总用量( $1950.8 \pm 384.5 \text{ IU}$  vs  $1931.2 \pm 308.9 \text{ IU}$ )及周期治疗时间( $11.2 \pm 1.4 \text{ d}$  vs  $11.1 \pm 1.1 \text{ d}$ )均无统计学差异( $P > 0.05$ )。A组诱发日直径 $>14 \text{ mm}$ 卵泡数( $14.1 \pm 7.7$  vs  $21.0 \pm 10.3$ )、获卵数( $14.0 \pm 7.8$  vs  $24.1 \pm 10.3$ )、成熟卵数( $12.1 \pm 7.1$  vs  $21.1 \pm 9.0$ )、正常受精卵数( $9.8 \pm 6.1$  vs  $16.8 \pm 8.2$ )及冷冻胚胎数( $5.3 \pm 3.6$  vs  $7.2 \pm 3.4$ )均较B组低, 且差异均具有统计学意义。成熟卵率、正常受精卵率、周期取消率、临床妊娠率及种植率组间均无统计学差异( $P > 0.05$ )。结论: 在FET的前提下, 高孕激素超促排卵过程中诱发日内源性P水平的升高提示卵巢反应良好, 对PCOS患者的IVF/ICSI临床结局无明显影响。

**关键词:** 多囊卵巢综合征(PCOS); 诱发日孕酮; 体外受精/卵胞质内单精子显微注射(IVF/ICSI)

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• 临床研究 •

## Effect of elevated progesterone on the trigger day on the clinical outcomes in polycystic ovary syndrome patients undergoing IVF/ICSI treatment

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**【ABSTRACT】 Objective:** To explore the effects of elevated progesterone (P) level on the trigger day undergoing the progestin-primed ovarian stimulation (PPOS) protocol combined with embryo cryopreservation on *in vitro* fertilization/intracytoplasmic sperm (IVF/ICSI) clinical outcomes in the patients with polycystic ovary syndrome (PCOS). **Methods:** A total of 180 patients diagnosed with PCOS according to Rotterdam criteria undergoing PPOS protocol were analyzed in this retrospective study and were divided into two groups according to the P levels on the trigger day: group A,  $P < 1.0 \mu\text{g/L}$ , group B,  $P \geq 1.0 \mu\text{g/L}$ . Gonadotropins (Gn) and medroxyprogesterone acetate (MPA) were used from the early follicle phase. The IVF embryological characteristics and the pregnancy results after frozen-thawed embryo transfer (FET) were compared between the two groups. **Results:** There was no significant difference in Gn dose ( $1\ 950.8 \pm 384.5 \text{ IU}$  vs  $1\ 931.2 \pm 308.9 \text{ IU}$ ,  $P > 0.05$ ) and stimulation duration ( $11.2 \pm 1.4 \text{ d}$  vs  $11.1 \pm 1.1 \text{ d}$ ,  $P > 0.05$ ) between the two groups. The number of follicles with diameter  $> 14 \text{ mm}$  on the trigger day ( $14.1 \pm 7.7$  vs  $21.0 \pm 10.3$ ), oocytes retrieved ( $14.0 \pm 7.8$  vs  $24.1 \pm 10.3$ ), mature oocytes ( $12.1 \pm 7.1$  vs  $21.1 \pm 9.0$ ), fertilization oocytes ( $9.8 \pm 6.1$  vs  $16.8 \pm 8.2$ ) and frozen embryos ( $5.3 \pm 3.6$  vs  $7.2 \pm 3.4$ ) were significantly decreased in group A compared with group B. However, there was no significant difference in the mature oocyte rate, the fertilization rate and the cancellation rate between the two groups. No significant differences were identified in the implantation rate ( $46.92\%$  vs  $45.38\%$ ,  $P > 0.05$ ) and the clinical pregnancy rate ( $63.43\%$  vs  $62.29\%$ ,  $P > 0.05$ ) per FET cycle between group A and group B, respectively. **Conclusion:** The pregnancy outcome of PCOS patients was not impacted, although they were at a status of elevated P level on the trigger day, which indicates a good ovarian response in the PPOS combined with embryo cryopreservation.

**Key words:** polycystic ovary syndrome (PCOS); progesterone (P) level on the trigger day; *in vitro* fertilization/intracytoplasmic sperm (IVF/ICSI)

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# 重度卵巢过度刺激综合征发病风险因素的预测研究

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**【摘要】**目的: 研究窦卵泡数、hCG 注射日血清 E<sub>2</sub> 水平、获卵数对于预测重度卵巢过度刺激综合征(OHSS)的作用, 特别是晚发型重度 OHSS 的可能危险作用。方法: 回顾性分析 IVF 周期早发型和晚发型重度 OHSS 患者的临床资料并与对照组相比。结果: 早发型重度 OHSS(n=184)与对照组(n=5 044)相比, 当获卵数 0~9 个/周期时, 患者年龄、获卵数、窦卵泡数的妊娠结局组间无统计学差异; 随着获卵数的增多, 总窦卵泡数、hCG 注射日 E<sub>2</sub> 水平、Gn 用量等组间有显著性差异; 晚发型重度 OHSS(n=279)与对照组(n=13 074)相比, 当获卵数 0~9 个/周期, 总窦卵泡数、hCG 注射日 E<sub>2</sub> 水平、Gn 用量组间有统计学差异; 随着获卵数的增多, 年龄、BMI、基础雄激素(A)、总窦卵泡数、hCG 注射日 E<sub>2</sub> 水平、Gn 用量、内膜厚度有差异; 随着获卵数增多(>20 个/周期), 患者 BMI、基础 FSH、总窦卵泡数、hCG 注射日 E<sub>2</sub> 水平、Gn 用量组间有差异。当获卵数>15 个/周期时, hCG 注射日血清 E<sub>2</sub>>12 000 pmol/L, 卵巢窦卵泡数>12 个/周期时, 重度 OHSS 的发病率明显上升。多因素 Logistic 回归分析筛选出: 获卵数、可移植胚胎数、hCG 注射日 E<sub>2</sub> 水平及总窦卵泡数为晚发型 OHSS 的危险因素。结论: 早发型重度 OHSS 与晚发型重度 OHSS 发生机制不同, 早发型和晚发型重度 OHSS 的发生与获卵数(>12 个/周期)、hCG 注射日 E<sub>2</sub> 水平(>12 000 pmol/L)、Gn 用量相关; 可移植胚胎多者建议全部胚胎冷冻, 减少晚发型 OHSS 发生。

**关键词:** 重度卵巢过度刺激综合征(OHSS); 窦卵泡数(AFC); 雌激素水平; 获卵数;  
可移植胚胎数

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## High risk factors of severe ovarian hyperstimulation syndrome

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**【ABSTRACT】 Objective:** To investigate the effect of the antral follicle count (AFC), estrogen (E<sub>2</sub>) level on hCG injection day, oocytes retrieved on ovarian hyperstimulation syndrome (OHSS), especially potential hazard effect of late OHSS. **Methods:** Data of the IVF patients were retrospectively analyzed, including the patients' age, oocytes retrieved, AFC, pregnancy outcome, and severe OHSS. **Results:** Compared between early OHSS patients and control group, when the oocytes retrieved are 0-9/cycle, there were no significant differences in the patients' age, oocytes retrieved, AFC, and pregnancy outcome. With the retrieved oocytes increasing, there were significant differences in AFC, E<sub>2</sub> level on hCG injection day and Gn consumption. Compared between late OHSS patients and control group, when the oocytes retrieved are 0-9/cycle, there were significant differences in AFC, E<sub>2</sub> level on hCG injection day, and Gn consumption. With the retrieved oocytes increasing (more than 20/cycle), there were significant differences in BMI, basal FSH, AFC, E<sub>2</sub> level on hCG injection day and Gn consumption. When retrieved oocytes were more than 15/cycle, E<sub>2</sub> level on hCG injection day was more than 12 000 pmol/L, and AFC was more than 12/cycle, the incidence of severe OHSS was significantly increased. Using multi-factor Logistic regression analysis, the risk factors of late severe OHSS were screened, including oocytes retrieved, transferable embryos, E<sub>2</sub> level on hCG injection day, and AFC. **Conclusion:** The mechanism of early OHSS and late OHSS is different, but the risk factors of them are both related to oocytes retrieved (more than 12/cycle), E<sub>2</sub> level on hCG injection day (more than 12 000 pmol/L), and Gn consumption. If the patient with multiple embryos could be transplanted, frozen-all embryos protocol was recommended, which may helpful to decrease the occurrence of late OHSS.

**Key words:** severe ovarian hyperstimulation syndrome (OHSS); antral follicle count (AFC); estrogen (E<sub>2</sub>) level; oocytes retrieved

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# 女性不孕症患者宫颈解脲尿原体亚群 检出情况的研究

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**【摘要】**目的: 比较女性不孕症患者生殖道内不同亚群解脲尿原体(UU)的检出情况。方法: 采用PCR方法分别对120例门诊不孕症患者(不孕症组)和同期正常体检女性(对照组)的宫颈分泌物进行UU生物亚群分型检测, 并比较其差异; 采用ELISA方法检测不同UU亚群感染单核细胞后巨噬细胞移动抑制因子(macrophage migration inhibitory factor, MIF)的表达水平。结果: ①检出率: 不孕症组UU1群(UU1)检出率为20.8%(25/120), 对照组为18.3%(21/120), 组间无统计学差异( $\chi^2=0.24$ ,  $P>0.05$ ); 不孕症组UU2群(UU2)检出率为45.8%(55/120), 对照组为21.7%(26/120), 具有显著统计学差异( $\chi^2=15.67$ ,  $P<0.01$ )。②MIF表达: UU浓度为 $10^4$ CCU/mL, MIF表达在UU1组、UU2组和对照组间无显著统计学差异( $P>0.05$ ); UU浓度分别为 $10^5$ CCU/mL和 $10^6$ CCU/mL时, 共培养18 h、24 h时UU2群MIF均表达增加, 与UU1群和对照组比较均有统计学差异( $P<0.05$ )。结论: UU2群在不孕症患者检出率高于正常女性, 且UU2群促单核细胞分泌MIF的能力高于UU1群, UU2群感染可能与女性不孕症具有一定的相关性, 其潜在致病机制有待进一步研究。

**关键词:** 解脲尿原体(UU); 生物亚群; 不孕症; 巨噬细胞移动抑制因子(MIF)

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## Prevalence of *Ureaplasma urealyticum* in cervical uteri of infertility women

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**【ABSTRACT】 Objective:** To study the prevalence of *Ureaplasma urealyticum* (UU) in cervical uteri of infertile women. **Methods:** Polymerase chain reaction technique was used to detect UU DNA of cervical secretion, including 120 infertile women and 120 normal females. ELASA method was used to detect the macrophage migration inhibitory factor (MIF) expression level in the supernatants of THP-1 cells infected with different UU concentration cultures. **Results:** 1) Detection rate: in the infertile group, UU biovar 1 was positive in 25 samples (20.8%, 25/120), biovar 2 was positive in 55 (45.8%, 55/120). While in control group, UU biovar 1 was positive in 21 samples (18.3%, 21/120), biovar 2 was positive in 26 (21.7%, 26/120). No significant difference was found between the two groups in biovar 1 ( $\chi^2=0.24$ ,  $P>0.05$ ). The detection rate of biovar 2 in the infertile group was significantly higher than that in control group ( $\chi^2=15.67$ ,  $P<0.01$ ). 2) MIF expression: there were no significant differences of MIF expression among the UU1 infection group, UU2 infection group and control group ( $P>0.05$ ) under UU culture concentration of  $10^4$  CCU/mL; however, there were significant differences among the UU1 infection group, UU2 infection group and control group ( $P<0.05$ ) after 18 h and 24 h infection under UU culture concentration of  $10^5$  CCU/mL and  $10^6$  CCU/mL. **Conclusion:** Detection rate of UU biovar 2 is higher in the infertile group than in the normal female, and MIF expression in UU2 group is higher than that in UU1 group and control group. UU2 infection may be associated with female infertility, and its potential mechanisms need further studies.

**Key words:** *Ureaplasma urealyticum* (UU); biological subgroup; female infertility; macrophage migration inhibitory factor; MIF

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• 流行病学研究 •

## 深圳坪山新区外来女工性行为 及安全套使用状况分析

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**【摘要】**目的: 了解深圳坪山新区外来女工性行为、安全套使用状况并分析其影响因素。方法: 采用整群随机抽样方法抽取该区8个工厂中符合纳入标准的外来女工, 对其性行为、安全套使用状况展开问卷调查。结果: 1 480例研究对象中, 920例(62.2%)有过性行为, 123例(13.4%)有过多性伴, 147例(16.0%)有过经期性行为。795例研究对象报告了近1年性行为中安全套使用状况, 其中200例(25.2%)报告每次都带, 93例(11.7%)报告经常带, 194例(24.4%)报告偶尔带, 308例(38.7%)报告从不带。文化程度高、非一线岗位、独自居住或与丈夫/男友一起居住的女工安全套使用频率较高。结论: 该区外来女工性行为活跃, 存在危险性行为, 安全套使用率低, 需要加大生殖卫生及安全套使用知识的推广。

**关键词:** 外来女工; 性行为; 安全套

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• 流行病学研究 •

**Study on the sexual behavior and the use of condom among the female migrant workers in Pingshan District of Shenzhen City**

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**【ABSTRACT】 Objective:** To investigate the sexual behavior and condom use among the female migrant workers in Pingshan New District of Shenzhen City, and to analyze the associated factors with condom use. **Methods:** Migrant females were sampled from 8 factories, then the information concerning their sexual behavior and condom use were collected using questionnaires. **Results:** Totally 920 (62.2%) out of 1 480 females had sexual experience, 13.4% had two or more sexual partners, while 16.0% had sexual intercourse during menstrual period. A total of 795 females answered the questions on condom use in the last year, of which 200 (25.2%) consistently using condoms, 93 (11.7%) often, 194 (24.4%) occasionally, and 308 (38.7%) never used condoms. Those female workers with higher education, non-frontline, living alone or cohabiting with their husbands or boyfriends were more likely to use condoms. **Conclusion:** Sexual intercourse was quite common among the female migrant workers in Pingshan New District of Shenzhen City. Unsafe sexual behaviors and poor condom use were observed. It is necessary to propagate reproductive health knowledge and promote the use of condom among the female migrant workers.

**Key words:** migrant workers; sexual behavior; condom

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• 综述 •

## 抑制素B在两性生殖生理和病理中的研究进展

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**【摘要】**抑制素 B(inhibin B, INHB)是由  $\alpha$  及  $\beta$ (B 型)亚单位构成的异源二聚体糖蛋白激素,属于转化生长因子  $\beta$ (transforming growth factor- $\beta$ , TGF $\beta$ )超家族的一员。INHB 在男性主要由睾丸支持细胞合成,在女性主要由卵巢的中、小窦卵泡颗粒细胞产生,其主要作用是通过负反馈机制抑制垂体促卵泡生成激素(follicular stimulation hormone, FSH)分泌,进而调节配子发生、发育,与雌雄两性生命活动密切相关。

**关键词:** 抑制素 B(INHB); 转化生长因子  $\beta$ (TGF $\beta$ ); 体外受精 - 胚胎移植(IVF-ET)

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• 综述 •

## Progresses of inhibin B in physiology and pathology of sexual reproduction

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**【ABSTRACT】** Inhibin B (INHB), a member of the transforming growth factor  $\beta$  superfamily (TGF $\beta$ ), is a heterodimeric glycoprotein hormone composed of  $\alpha$  and  $\beta$  subunit (B-type). In male, INHB is mainly produced by the sertoli cells of testes. In female, INHB is secreted by the granulosa cells of ovarian middle and small antral follicles. The primary function of INHB is selectively to inhibit the secretion of pituitary follicle-stimulating hormone (FSH) by negative feedback and then regulates the gametogenesis. Hence, there is a significant relationship between INHB and life activity in both sexes.

**Key words:** inhibin B (INHB); transforming growth factor  $\beta$  (TGF $\beta$ ); *in vitro* fertilization-embryo transfer (IVF-ET)

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## β-防御素在男性不育方面的研究进展

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**【摘要】** β-防御素(β-defensins)是一类在男性生殖系统中大量表达并与精子功能关系密切的天然抗菌肽, 与男性不育相关。β-防御素不仅通过其天然免疫活性, 保持附睾上皮、管腔环境的稳定, 还能中和脂多糖、抗炎并与精子直接作用而调节精子功能。最近, β-防御素已经作为精子功能检测、精子生育力评价的生物标志物被开发并连续报道。大量活性防御素的功能机制研究及其与男性不育的关系, 将成为进一步开发精子功能评价生物标志物的方向之一。本文主要从β-防御素家族的精子功能相关活性及机制研究方面的进展作一综述。

**关键词:** β-防御素; 生物标志物; 精子功能; 精子生育力

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## Research advances of $\beta$ -defensins in male infertility

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**【ABSTRACT】**  $\beta$ -defensins are male infertility related endogenous antimicrobial peptides and rich in male reproductive system.  $\beta$ -defensins not only play key roles in maintaining the micro-environment stability of reproductive tracts by innate immunity actions, but also regulate sperm functions through direct interaction with sperm. At present,  $\beta$ -defensins have been successively reported to be developed as biomarker candidates in the evaluation of sperm function and sperm fertility. In future, exploring the mechanism of  $\beta$ -defensins' sperm functions and the relationship between the active mechanism and male infertility is an alternative way to develop biomarkers for the evaluation of sperm functions. This review focuses on the research proceedings of  $\beta$ -defensin family regarding to its sperm function and mechanisms.

**Key words:**  $\beta$ -defensins; biomarkers; sperm function; sperm fertility

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## 高龄对卵母细胞质量的影响

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**【摘要】**随着我国“二孩”政策的放开,越来越多的高龄女性有生育要求,但高龄女性常有低妊娠率、高流产率等生育力低下的问题。高龄对女性最主要的影响体现在卵巢老化,主要表现为卵母细胞数量减少和卵母细胞质量下降,这两方面都是随着年龄进展的自然生理现象,但卵母细胞质量下降的原因较为复杂,主要可以概括为染色体非整倍体率增加、线粒体功能减退、端粒变短和端粒酶活性下降、超微结构改变等几方面。而改善卵母细胞质量的方法主要包括添加辅助药物及自体生殖系线粒体移植。

**关键词:** 高龄; 卵母细胞质量; 非整倍体; 线粒体; 端粒; 治疗对策

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## Impact of age on oocyte quality

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**【ABSTRACT】** With the release of the two-child policy, there will be more and more elder women who want to have the second child facing the decline of fertility. The advanced age usually leads to oocyte aging, which mainly reduces the number and the quality of oocytes. These two aspects are natural physiological phenomena developed with age. The reasons of oocyte quality decline are complicated, which can be concluded into four parts: the increase of aneuploid, the mitochondrial dysfunction, the telomere shorten and decline of telomerase activity, the ultrastructural changes. The current therapies to improve oocyte quality include medicine addition and autologous germline mitochondrial energy transfer.

**Key words:** advanced age; oocyte quality; aneuploid; mitochondrial; telomere; treatment strategy

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# hCG对卵泡及子宫内膜发育作用的研究进展

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**【摘要】**人绒毛膜促性腺激素(hCG)可以改善内膜容受性(ER)、延长种植窗口期,有利于胚胎着床,还可以调节子宫内膜的免疫耐受性,从而提高种植率;在卵泡早期或者中晚期添加低剂量的hCG可以提高卵子以及胚胎质量,从而获得更高的妊娠率。

**关键词:** 人绒毛膜促性腺激素(hCG); 卵泡发育; 子宫内膜

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## Effect of hCG on the development of follicle and endometrium

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**【ABSTRACT】** Extensive application of human chorionic gonadotropin (hCG) makes us pay more attention to its role in embryonic development and endometrium, which may improve endometrial receptivity (ER), extend implantation window period, promote embryo implantation, and regulate immune tolerance of the endometrium. All of these can enhance the implantation rate. Adding low doses of hCG in the early or late follicular period can improve the quality of oocyte and embryo, which can lead to a higher pregnancy rate.

**Key words:** human chorionic gonadotropin (hCG); follicular development; endometrium

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• 临床报道 •

## 不同剂量来曲唑预防早发型卵巢过度刺激综合征的临床研究

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**【摘要】**目的: 探讨卵巢过度刺激综合征(OHSS)高危患者在取卵后应用不同剂量来曲唑(LE)预防早发型 OHSS 发生的效果。方法: 88 例患者随机分为 4 组, A~C 组为 LE 组, 取卵即日起每日添加 LE, LE 剂量分别为 A 组( $n=21$ )2.5 mg/d, B 组( $n=23$ )5.0 mg/d, C 组( $n=20$ )7.5 mg/d, D 组为对照组( $n=24$ )。测患者黄体期内分泌、血管内皮细胞生长因子(VEGF)水平及中重度 OHSS 发生率。结果: hCG 注射后第 5 日始血清  $E_2$  水平随时间变化呈降低趋势, 随着 LE 剂量增加,  $E_2$  水平降低速度明显加快, 组间差异有统计学意义( $P<0.05$ )。血清 LH 水平在注射 hCG 后第 8 日、第 10 日随着 LE 剂量的增加而逐渐上升, P 水平却逐渐降低, 组间差异显著( $P<0.05$ )。血清 VEGF 水平从 hCG 注射后 5 日始, D 组呈上升趋势, 而其它三组呈下降趋势, 随着 LE 剂量的增加, 血中 VEGF 水平越低, 各组之间两两比较, 差异均具有统计学意义( $P<0.001$ )。C 组中重度 OHSS 发生率低于 D 组。结论: 不同剂量的 LE 均能一定程度降低血清  $E_2$  及 VEGF 水平, 当剂量增至 7.5 mg/d 时, OHSS 发生率最低。

**关键词:** 卵巢过度刺激综合征(OHSS); 体外受精(IVF); 来曲唑(LE); 黄体期

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• 临床报道 •

## Effects of letrozole with different doses on preventing the incidence of early-onset ovarian hyperstimulation syndrome

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**【ABSTRACT】 Objective:** To explore the effects of letrozole with different doses on the incidence of ovarian hyperstimulation syndrome (OHSS) after oocyte retrieval for patients with high-risk OHSS. **Methods:** According to the different doses of letrozole, 88 patients were randomly divided into group A (2.5 mg, 21 patients), group B (5.0 mg, 23 patients), group C (7.5 mg, 20 patients) and group D (control group, 24 patients). The levels of  $E_2$ , luteinizing hormone (LH), progesterone (P) and vascular endothelial growth factor (VEGF) on human chorionic gonadotrophin (hCG) injection day were determined in the four groups after 5 d, 8 d and 10 d of hCG injection day respectively. The incidence of moderate and severe OHSS was observed in the four groups. **Results:** From the fifth day after hCG injection, with time extension and the increase in letrozole dose,  $E_2$  level was significantly decreased ( $P<0.05$ ). With time extension, LH level was increased and P level was decreased on the eighth and tenth day after hCG injection. From the fifth day after hCG injection, VEGF level was increased in group D, but it was decreased in other groups in a dose-dependent matter with statistical significances among four groups on 5 d, 8 d and 10 d after hCG injection ( $P<0.001$ ). The incidence of moderate and severe OHSS was lower in group C than in group D ( $P<0.05$ ). **Conclusion:** Letrozole with different doses can decrease the levels of  $E_2$  and VEGF. OHSS incidence in 7.5 mg/d was the lowest among different dose groups.

**Key words:** ovarian hyperstimulation syndrome (OHSS); *in vitro* fertilization (IVF); letrozole; luteal phase

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# 卵巢储备正常者COH不同阶段添加高纯度人绝经期促性腺激素对IVF-ET结局的影响

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**【摘要】**目的: 探讨卵巢储备正常者在促排卵不同阶段添加高纯度人绝经期促性腺激素(highly purified human menopausal gonadotrophin, HP-hMG)对体外受精-胚胎移植(IVF-ET)结局的影响。方法: 收集接受IVF或单精子胞质内显微注射技术(ICSI)治疗的25~35岁卵巢储备功能正常的患者( $n=153$ ), 根据是否添加HP-hMG及添加时机分为A组(未添加HP-hMG), B组(Gn第1日添加HP-hMG)和C组(Gn第6~8日添加HP-hMG), 分析三组妊娠结局。结果: A组hCG注射日LH、 $E_2$ 水平低于B组及C组( $P<0.05$ ), A组hCG注射日P水平高于B组及C组( $P<0.05$ ), 获卵数及 $M_{II}$ 卵子数A组及C组高于B组( $P<0.05$ ), 优质胚胎率B组高于A组及C组( $P<0.05$ ), 累积妊娠率, C组(85%)高于A组(59.3%)及B组(67.6%), 差异有统计学意义( $P<0.05$ ), 3组受精率、成熟卵率、种植率差异无统计学意义( $P>0.05$ )。结论: 卵巢储备功能正常者在采用标准长方案促排卵时, 中晚期添加HP-hMG可改善累积妊娠结局; 卵泡发育不同阶段添加HP-hMG, 可能适用于不同的人群。

**关键词:** 高纯度人绝经期促性腺激素(HP-hMG); 体外受精(IVF); 妊娠结局

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## Effects of highly purified human menopausal gonadotrophin (HP-hMG) supplementation on IVF-ET outcomes in patients with normal ovarian reserve during different periods of controlled ovarian hyperstimulation

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**【ABSTRACT】 Objective:** To explore the effects of highly purified human menopausal gonadotrophin (HP-hMG) supplementation on *in vitro* fertilization-embryo transfer (IVF-ET) outcomes in patients with normal ovarian reserve during different periods of controlled ovarian hyperstimulation (COH). **Methods:** The patients ( $n=153$ ) with normal ovarian reserve who accepted IVF or a maceral intracytoplasmic sperm injection (ICSI) technology treatment were collected. According to whether supplement HP-hMG and supplementation time, the patients were divided into three groups, group A: did not supplement HP-hMG, group B: supplement HP-hMG on day 1 of Gonadotropin (Gn) therapy, group C: supplement HP-hMG on day 6–8 of Gn therapy. The clinical outcomes were compared among the three groups. **Results:** There were significant differences in serum LH,  $E_2$  and P levels on the day of hCG administration among groups A, B and C ( $P<0.05$ ). The number of oocytes retrieved and mature oocytes was significantly higher in groups A and C compared with group B ( $P<0.05$ ). The high-quality embryo rate was significantly higher in group B compared with groups A and C ( $P<0.05$ ), the cumulative clinical pregnancy rate in group C was higher than that in groups A and B, which showed a significant difference between groups C and A ( $P<0.05$ ), there were no significant differences in the rates of fertilization, mature oocyte and implantation among the three groups ( $P>0.05$ ). **Conclusion:** Patients with normal ovarian reserve, when using standard long methods for stimulating ovulation, supplementation of HP-hMG in the middle and late follicle phases can improve pregnancy outcome. Different periods of COH of supplementing HP-hMG may apply to different patients.

**Key words:** highly purified human menopausal gonadotrophin (HP-hMG); *in vitro* fertilization (IVF); pregnancy outcome

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## 辅助生殖技术助孕后的多胎妊娠 早孕期减胎 91 例分析

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**【摘要】**目的: 评价辅助生殖技术(ART)助孕后多胎妊娠早孕期减胎术的安全性及必要性。方法: 回顾性分析 91 例多胎妊娠 B 超引导下经阴道选择性减胎患者的临床资料, 统计其早期流产率、晚期流产率, 并将减胎后的患者分为单胎妊娠组及双胎妊娠组, 统计各组早产率、早产孕周、早产平均体质量及足月低体质量儿出生率, 并与同期施行 ART 助孕的单胎妊娠及未行减胎的双胎妊娠 4 623 例进行比较分析。结果: 减胎组早期流产率为 2.20%, 明显优于同期妊娠的早期流产率(10.96%), 组间有统计学差异。减胎后的单胎妊娠组早产率、早期流产率及晚期流产率均优于未行减胎的双胎妊娠组。结论: 早孕期施行 B 超引导下经阴道选择性减胎术是安全的, 且可有效减少多胎妊娠发生, 改善其不良妊娠结局。

**关键词:** 辅助生殖技术(ART); 多胎妊娠; 早孕期减胎术

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## Analysis of transvaginal ultrasound-guided multifetal pregnancy reduction in 91 cases after assisted reproduction

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**【ABSTRACT】 Objective:** To evaluate the safety and necessity of fetal reduction for multiple pregnancies during the period of early pregnancy after assisted reproductive technology (ART) treatments. **Methods:** This study was a retrospective analysis of the clinical data of 91 patients who received selective fetal reduction by transvaginal ultrasound-guide. Main outcomes such as premature gestational age, early and late abortion rates were compared. The patients were divided into single-pregnancy group and twin-pregnancy group. The preterm rate, the preterm gestational age, preterm and full-term average weight of low birth weight children were compared between the two groups. These parameters were also compared with the 4 623 cases of the single-pregnancy patients and the two-pregnancy patients who did not select fetal reduction during the same time. **Results:** The early abortion rate was significantly lower in fetal reduction group than that in the pregnant group with the same time (2.20% vs 10.96%). Compared with the twin pregnancy patients who did not select fetal reduction, the preterm rate, the early abortion rate and the late abortion rate were significantly lower in single pregnancy patients who selected fetal reduction. **Conclusion:** Selective fetal reduction surgery by transvaginal ultrasound-guide is safe and effective in reducing the incidence of multiple pregnancies during the period of early pregnancy, most of all, it also can improve its adverse pregnancy outcomes.

**Key words:** assisted reproductive technology (ART); multiple pregnancies; early fetal reduction

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## 热水浸浴对不育患者精子参数的影响

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**【摘要】**目的: 评价有热水浸浴习惯的不育患者精子参数的变化。方法: 精液标本按照男子既往热水浸浴习惯与否进行分组, A组: 26例, 婚后多年未育, 长期较热温度水(>37℃)浴缸浸浴习惯; B组, 26例, 婚后多年未育, 没有热水浸浴习惯。检测A、B组的精子活动率、前向运动精子率、精子浓度、精子畸形率和精子核空泡率。结果: 与B组的精子参数比较, A组的精子活动率、前向运动精子率、精子浓度和正常形态精子率均有显著降低( $P<0.01$ ), 精子核空泡率显著升高( $P<0.01$ )。结论: 较热温度水浸浴对睾丸精子发生过程有不良效应, 导致精子参数显著降低。

**关键词:** 精子发生; 精子; 睾丸; 热水浸浴

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## Influence of sperm parameters on infertile men with heat bathing habit

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**【ABSTRACT】 Objective:** To evaluate the influence of sperm parameters on infertile men with heat bathing habit. **Methods:** Based on their heat bathing habit, semen samples were divided into two groups: group A ( $n=26$ ), with heat bathing habit; group B ( $n=26$ ), without heat bathing habit. Sperm parameters including sperm motility, progressive motility, sperm concentration, sperm abnormal form, and sperm nuclear vacuole were determined. **Results:** Compared with group B, group A had lower sperm motility, progressive motility, sperm concentration, sperm normal form, and higher sperm nuclear vacuole ( $P<0.01$ ). **Conclusion:** Heat bathing would have deleterious effects on spermatogenesis, leading to abnormal sperm parameters.

**Key words:** spermatogenesis; testis; sperm; heat bathing

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