

# 自然排卵、促排卵和超促排卵状态下小鼠卵巢组织中生长分化因子-9(GDF-9)的表达

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**【摘要】**目的: 观察自然周期排卵、促排卵与控制性超促排卵(COH)状态下小鼠卵巢生长分化因子-9(growth differentiation factor, GDF-9)表达水平的变化情况。方法: 成年雌性小鼠随机分为3组, 每组10只, 分别为自然排卵组(对照组)、孕马血清(PMSG)促排卵组(PMSG组)、控制性超促排卵组(COH组), 各组小鼠取排卵期卵巢组织, 采用免疫组织化学方法检测GDF-9的表达与定位, 并分别采用Western blotting和实时荧光定量PCR法, 定量检测GDF-9蛋白与mRNA的含量。结果: 各组小鼠卵母细胞与颗粒细胞中均检测到GDF-9的表达, PMSG组与COH组GDF-9蛋白与mRNA的表达水平均显著高于对照组( $P < 0.05$ ), PMSG组的表达也明显弱于COH组( $P < 0.05$ )。结论: 促排卵可促进小鼠卵巢GDF-9的表达, 但COH降低促排卵小鼠卵巢GDF-9的表达。

**关键词:** 生长分化因子-9(GDF-9); 卵母细胞; 促排卵; 控制性超促排卵(COH)

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## Expression of Growth Differentiation Factor 9 (GDF-9) in Mouse Ovaries under Natural Ovulation, Induced Ovulation or Controlled Ovarian Hyperstimulation

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**【ABSTRACT】 Objective:** To investigate the expression of GDF-9 in mouse ovaries under natural ovulation, induced ovulation or controlled ovarian hyperstimulation (COH), respectively. **Methods:** Adult female mice were divided into three groups: natural ovulation group (the control), PMSG induced ovulation group (PMSG group) and controlled ovarian hyperstimulation group (COH group), 10 mice per group. Ovary tissues were collected on ovulation period, and the expression and the location of GDF-9 were detected by immunohistochemistry method. The GDF-9 protein was quantitated by Western blotting analysis and *GDF-9* mRNA was quantitated by real-time fluorescence quantitative PCR. **Results:** The expression of GDF-9 was detected both in oocytes and granulosa cells by immunohistochemistry in all the three groups. In PMSG group and COH group, the expression of GDF-9 protein and mRNA levels were dramatically increased compared with the control ( $P<0.05$ ). While the expression of GDF-9 was significantly down-regulated in COH mice compared with PMSG mice both in protein and mRNA levels ( $P<0.05$ ). **Conclusion:** The expression of GDF-9 in mouse ovary was increased by induced ovulation, but the COH procedure decreased the GDF-9 levels compared with the induced ovulation.

**Key words:** growth differentiation factor 9 (GDF-9); oocyte; induced ovulation; controlled ovarian hyperstimulation (COH)

# 抗苗勒氏管激素及其受体 II 的基因多态性与卵巢过度刺激综合征关系初探

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**【摘要】**目的: 初步探讨抗苗勒氏管激素(*AMH*)及其受体 II (*AMHR II*)的基因多态性与卵巢过度刺激综合征(OHSS)的关系。方法: 采用聚合酶链反应(PCR)和DNA测序法, 分别检测27例OHSS患者和22例促排卵后非OHSS患者(对照组)的*AMH*及其受体*AMHR II*的基因外显子DNA序列, 行单核苷酸多态性(SNP)分析。结果: OHSS组*AMH*的第1外显子146位G>T、第2外显子134位G>A基因型分布与对照组比较, 有统计学差异( $P<0.05$ )。OHSS组*AMH*基因的第1外显子303位G>A基因型与对照组比较, 无统计学差异( $P>0.05$ )。OHSS组和对照组*AMHR II*基因的1~11号外显子均未检测出SNP突变。结论: *AMH*基因多态性可能是导致卵巢对外源性激素敏感性增强、OHSS发病的因素之一。

**关键词:** 卵巢过度刺激综合征(OHSS); 抗苗勒氏管激素(*AMH*); 抗苗勒氏管激素受体 II (*AMHR II*); 单核苷酸多态性(SNP)

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## Relationship of Single Nucleotide Polymorphisms of *AMH/AMHR II* and Ovarian Hyperstimulation Syndrome

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**【ABSTRACT】 Objective:** To investigate the relationship between single nucleotide polymorphism (SNP) of anti-Müllerian hormone/anti-Müllerian hormone receptor II (*AMH/AMHR II*) and ovarian hyperstimulation syndrome (OHSS). **Methods:** A total of 27 patients with OHSS and 22 non-OHSS healthy controls were recruited in this study. Polymorphisms and genotype of *AMH* and *AMHR*II exons were detected by polymerase chain reaction (PCR) and DNA sequencing. **Results:** Statistically significant difference in the distribution of *AMH* first exon 146 G>T and *AMH* second exon 134 G>A genotypes was found between OHSS group and the control ( $P<0.05$ ). No significant difference in the distribution of *AMH* first exon 303 G>A was found between OHSS group and the control ( $P>0.05$ ). No mutation was found in *AMHR II* exons. **Conclusion:** The single nucleotide polymorphisms of *AMH* may associate with OHSS.

**Key words:** ovarian hyperstimulation syndrome (OHSS); anti-Müllerian hormone (AMH); anti-Müllerian hormone receptor II (*AMHR II*); single nucleotide polymorphism (SNP)

# 改良超长方案在卵巢储备功能低下 高龄患者中的应用

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**【摘要】**目的: 探讨改良超长方案行体外受精-胚胎移植(IVF-ET)助孕的高龄(年龄 $\geq 40$ 岁)且卵巢储备功能低下(窦卵泡3~7个)患者的治疗结局。方法: 采用随机对照前瞻研究的方法, 将行IVF-ET的120例高龄且卵巢储备功能低下患者随机分成: 改良超长方案组(A组,  $n=55$ )和拮抗剂方案组(B组,  $n=65$ ), 比较A、B组间IVF-ET结局。结果: A组的Gn使用总量( $3\,955.2 \pm 1194.3$  IU)、Gn使用天数( $11.7 \pm 1.9$  d)、hCG注射日 $E_2$ 水平( $2\,452.7 \pm 1\,285.6$  pg/ml), hCG注射日子宫内膜厚度( $12.1 \pm 2.3$  mm)均明显高于B组(分别为 $2\,022.5 \pm 610.1$  IU、 $9.1 \pm 1.7$  d、 $1\,257.7 \pm 696.0$  pg/ml、 $11.3 \pm 2.0$  mm),  $P < 0.05$ ; 周期取消率、优质胚胎率、妊娠率、着床率、流产率、宫外孕发生率组间均无统计学差异( $P > 0.05$ )。A组hCG注射日LH水平( $1.0 \pm 0.5$  mIU/ml)及 $P/E_2$ 值( $0.3 \pm 0.2$ )明显低于B组( $3.4 \pm 2.4$  mIU/ml及 $0.5 \pm 0.2$ ),  $P < 0.05$ 。结论: 改良超长方案经过GnRHa的预处理, 使患者充分降调节, hCG注射日可以获得良好的LH水平、 $P/E_2$ 值及内膜厚度; 而hMG的使用, 既可降低患者费用, 又可以适当补充LH, 提高子宫内膜容受性。因此, 对于高龄且卵巢储备功能低下的患者, 改良超长方案是一个经济有效的治疗选择。

**关键词:** 改良超长方案; 拮抗剂方案; 体外受精-胚胎移植(IVF-ET); 高龄; 卵巢储备功能低下

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## Use of Modified Ultra-long Protocol in Elder Women with Low Ovarian Reserve

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**【ABSTRACT】 Objective:** To compare IVF outcomes with ultra-long protocol and antagonist protocol in women of low ovarian reserve and advanced age ( $\geq 40$  years old). **Methods:** A total of 120 patients aging over 40 years old with low ovarian reserve undergoing IVF (total number of AFC was 3–7) were prospectively randomized into 2 groups: group A, 55 patients were down-regulated with two dosages of GnRH $\alpha$  (ultra-long protocol); group B, 65 patients were subjected to flexible antagonist. All participants met the following inclusion criteria: with less than 3 cycles, with no uterine abnormalities and hydrosalpinges. **Results:** Gn dosage ( $3\ 955.2 \pm 1\ 194.3$  IU vs  $2\ 022.5 \pm 610.1$  IU) and duration ( $11.7 \pm 1.9$  d vs  $9.1 \pm 1.7$  d), E<sub>2</sub> level ( $2\ 452.7 \pm 1\ 285.6$  pg/ml vs  $1\ 257.7 \pm 696.0$  pg/ml) and endometrial thickness ( $12.1 \pm 2.3$  mm vs  $11.3 \pm 2.0$  mm) on hCG injection day in group A were higher than those in group B. There were no significant differences in cancellation rate, the number of high-quality embryos, pregnancy rate, implantation rate, abortion rate and pregnancy rate between the two groups. The LH level ( $1.0 \pm 0.5$  mIU/ml) and P/E<sub>2</sub> ratio ( $0.3 \pm 0.2$ ) in group A were much lower than those in group B ( $3.4 \pm 2.4$  mIU/ml,  $0.5 \pm 0.2$ ). **Conclusion:** Abundant down-regulation with modified ultra-long GnRH $\alpha$  protocol results in a satisfying LH level, P/E<sub>2</sub> ratio and endometrial thickness. hMG used in ultra-long GnRH $\alpha$  protocol both decreases expenses and increases endometrial receptivity by supplying LH. Therefore, modified ultra-long GnRH $\alpha$  protocol is a cost-effective and proper choice to older women with low ovarian reserve.

**Key words:** modified ultra-long GnRH $\alpha$  protocol; flexible antagonist protocol; *in-vitro* fertilization and embryo transfer (IVF-ET); advanced reproductive age; low ovarian reserve

# 玻璃化冷冻与程序化冷冻对胚胎发育潜能及临床结局的影响

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**【摘要】**目的: 比较玻璃化冷冻与程序化冷冻对胚胎发育潜能及临床结局的影响。方法: 回顾性分析590个复苏周期, 比较2种冷冻方法的胚胎复苏率、临床妊娠率、胚胎种植率和流产率等各项指标。结果: 玻璃化冷冻组的平均移植胚胎数( $2.2 \pm 0.5$ 枚)显著少于程序化组( $2.5 \pm 0.6$ 枚) ( $P < 0.05$ ), 复苏率(94.4%)、完整胚胎率(73.7%)、临床妊娠率(50.8%)和种植率(30.2%)显著高于程序化组(77.2%、44.3%、36.2%、21.1%) ( $P < 0.05$ ), 而流产率和周期取消率组间均无统计学差异(16.6% vs 27.7%, 1.3% vs 2.3%) ( $P > 0.05$ )。程序化冷冻胚胎的种植率在完整胚胎(13.5%)和非完整胚胎(16.0%)组间无统计学差异 ( $P > 0.05$ ); 玻璃化冷冻完整胚胎组的种植率(30.4%)显著高于非完整胚胎组(20.1%) ( $P < 0.05$ ); 而2种冷冻方法的流产率完整胚胎组(35.7%, 15.1%)均显著高于非完整胚胎组(8.7%, 2.9%) ( $P < 0.05$ )。在玻璃化冷冻中, 卵裂期胚胎组的各项指标与囊胚期组相比均无统计学差异 ( $P > 0.05$ )。结论: 玻璃化冷冻法适用于人类胚胎的保存, 对卵裂期和囊胚期胚胎有同样理想的保存效果和临床结局, 玻璃化冷冻中, 胚胎完整性对胚胎种植率起着重要的作用。

**关键词:** 胚胎; 玻璃化冷冻; 程序化冷冻; 临床结局

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## Comparison of Development Potential of Embryos and its Clinical Outcome after Cryopreservation with Vitrification and Programmed Freezing

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**【ABSTRACT】 Objective:** To evaluate development potential of embryo and its clinical outcome after cryopreservation with vitrification and programmed freezing. **Methods:** A retrospective study was performed by analyzing the survival rate, the clinical pregnancy rate, the implantation rate and the miscarriage rate of 590 FET cycles with embryo vitrified or slow-frozen. **Results:** The average number of embryos transferred after vitrification ( $2.2 \pm 0.5$ ) was significantly lower than that of programmed freezing ( $2.5 \pm 0.6$ ,  $P < 0.05$ ), and the embryo survival rate, the fully intact embryo rate, the clinical pregnancy rate and the implantation rate of cycles with vitrification (94.4%, 73.7%, 50.8%, 30.2%) were significantly higher than those with programmed freezing (77.2%, 44.3%, 36.2%, 21.1%) ( $P < 0.05$ ). However, there were no significant differences in miscarriage rate and cycle cancellation rate between the two different freezing methods (16.6% vs 27.7%, 1.3% vs 2.3%,  $P > 0.05$ ). The implantation rate of intact embryos after vitrification (30.4%) was significantly higher than that of non-intact embryos (20.1%,  $P < 0.05$ ), while there were no differences in the implantation rate between intact embryos (13.5%) and non-intact ones (16.0%) with programmed freezing ( $P > 0.05$ ). The miscarriage rate of intact embryos (15.1% vs 35.7%) was significantly higher than that of non-intact embryos (2.9% vs 8.7%) in both groups ( $P < 0.05$ ). In cycles with vitrification, there were no significant differences of all indicators between embryos of cleavage stage and blastocyst stage ( $P > 0.05$ ). **Conclusion:** Vitrification can be applied to embryos of both cleavage stage and blastocyst stage for cryopreservation. In FET cycles after vitrification, the integrity of embryos plays an important role in embryo implantation rate.

**Key words:** embryo; programmed freezing; vitrification; clinical outcome



# 常规IVF-ET中完全体外受精失败发生的相关因素的探讨

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**【摘要】**目的: 探讨IVF-ET完全体外受精失败发生的相关危险因素。方法: 回顾性分析行常规体外受精-胚胎移植(IVF-ET)的2 429个周期。应用单因素及多因素Logistic回归分析夫妇之间受孕史、精子正常形态率、精液量、精液浓度、精液活力、男方生育史、女方年龄、女方原发/继发不孕、是否有输卵管性因素、不孕年限、获卵数、月经第3日的FSH、T、PRL、LH、E<sub>2</sub>、hCG注射前LH、E<sub>2</sub>、P对完全受精失败发生的影响。结果: IVF完全不受精发生率为5.7%。完全受精失败组的精子正常形态率(11.1 ± 5.8%)、a+b级百分比(47.4 ± 10.5%)显著低于受精组(13.4 ± 5.3%、50.1 ± 8.6%)( $P < 0.05$ ); 完全受精失败组的女方原发不孕构成比(69.1%)、男方原发不孕构成比(74.8%)、无管性因素构成比(30.2%)、夫妇间无受孕史构成比(79.1%)显著高于受精组(36.3%、41.7%、13.6%、44.3%)( $P < 0.05$ )。此外, 畸精组的完全不受精发生率(15.0%)显著高于精子形态正常组(5.2%)。Logistic回归分析亦显示精子正常形态率、精液浓度、夫妇间受孕史、不孕年限与完全受精失败有显著相关性( $P < 0.05$ )。结论: 对治疗周期中畸形精子症患者、精液浓度、活力偏低、男方原发不育、女方原发不孕、无输卵管性因素、不孕年限长、夫妇之间无受孕史的患者应纳入受精失败的高危人群, 考虑行部分ICSI, 以保障受精, 对防止完全不受精的发生具有积极意义。

**关键词:** 正常形态精子下限值; 体外受精; 完全失败

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## Factors Relating with Fertilization Failure in Conventional IVF-ET Cycles

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**【ABSTRACT】 Objective:** To analyze the factors relating with fertilization failure in conventional IVF cycles. **Methods:** The total fertilization failure rate of 2 429 IVF cycles were retrospectively analyzed. Risk factors were identified by univariate and multivariate logistic regression analyses. **Results:** The total fertilization failure rate of conventional IVF-ET rate was 5.7% (139/2 429). The percentage of morphologically normal sperm ( $11.1 \pm 5.8\%$  vs  $13.4 \pm 5.3\%$ ), progressive motility ( $47.4 \pm 10.5\%$  vs  $50.1 \pm 8.6\%$ ), percentage of couple primary infertility (79.1% vs 44.3%), percentage of female primary infertility (69.1% vs 36.3%), percentage of male primary infertility (74.8% vs 41.7%), percentage of without oviduct obstruction patients (30.2% vs 13.6%) and percentage of couples primary infertility (79.1% vs 44.3%) of the fertilization failure patients were significantly different from those of the fertilized patients ( $P < 0.05$ ). Besides, higher total fertilization failure rate was found in couples with isolated teratozoospermia than in couples with normal percentage of morphologically normal sperm (15.0% vs 5.2%). After that, it was found by multivariate logistic regression analyses that many factors including percentage of morphologically normal sperm, sperm concentration, couples primary infertility and female infertility years were related with fertilization failure. **Conclusion:** Patients with low percentage of morphologically normal sperm (<4%), low sperm concentration and motility, male primary infertility, female primary infertility, without oviduct obstruction, long female infertility years or/and couples primary infertility are at high risk of fertilization failure. More attention should be paid to these patients for avoiding the fertilization failure.

**Key words:** low limit of sperm with normal morphology; IVF-ET; total fertilization failure

# 血清前列腺素E<sub>2</sub>预测左炔诺孕酮缓释系统 治疗子宫腺肌病痛经效果的价值探讨

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**【摘要】**目的: 探讨子宫腺肌病(adenomyosis, ADS)患者血清前列腺素 E<sub>2</sub>(prostaglandin E<sub>2</sub>, PGE<sub>2</sub>)水平预测左炔诺孕酮缓释系统(levonorgestrel-releasing intrauterine system, LNG-IUS)治疗ADS痛经效果的可能性。方法: 因 ADS 痛经放置 LNG-IUS 的患者 41 例, 根据痛经缓解情况分为治疗有效组( $n=32$ )和治疗无效组( $n=9$ )。ELISA 法测定放置 LNG-IUS 前及放置后 6 个月血清 PGE<sub>2</sub> 水平并进行组内、组间比较, 分析 LNG-IUS 对 ADS 痛经患者血清 PGE<sub>2</sub> 水平的影响以及血清 PGE<sub>2</sub> 水平与 LNG-IUS 治疗痛经效果的相关性。结果: 有效组血清 PGE<sub>2</sub> 水平治疗前为  $20.95 \pm 3.07$  pg/ml, 治疗 6 个月后为  $5.56 \pm 1.72$  pg/ml, 差异有统计学意义( $P < 0.05$ )。无效组血清 PGE<sub>2</sub> 水平治疗前为  $5.74 \pm 1.12$  pg/ml, 治疗 6 个月后为  $4.95 \pm 1.39$  pg/ml, 两者无统计学差异( $P > 0.05$ )。治疗前有效组血清 PGE<sub>2</sub> 浓度显著高于无效组( $P < 0.05$ )。患者放置 LNG-IUS 6 个月后视觉模拟评分(visual analogue scale, VAS)变化与放置前血清 PGE<sub>2</sub> 水平呈正相关, 血清 PGE<sub>2</sub> 浓度越高, VAS 下降越明显( $P < 0.05$ )。结论: PGE<sub>2</sub> 可能与部分 ADS 患者痛经的发生有关, LNG-IUS 通过降低 PGE<sub>2</sub> 浓度而缓解痛经, 因此高水平 PGE<sub>2</sub> 患者可选择 LNG-IUS 治疗痛经, 低水平 PGE<sub>2</sub> 患者则建议选择其他方式治疗痛经。

**关键词:** 血清前列腺素 E<sub>2</sub>(PGE<sub>2</sub>); 左炔诺孕酮缓释系统(LNG-IUS); 子宫腺肌病(ADS); 痛经

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## Predicted Value of Serum Prostaglandin E<sub>2</sub> on the Dysmenorrheal Treatment Effect in Adenomyosis Patients with Levonorgestrel-releasing Intrauterine System

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**【ABSTRACT】 Objective:** To explore the possibility of the serum prostaglandin E<sub>2</sub> (PGE<sub>2</sub>) level predictive value on the dysmenorrheal treatment effect in the adenomyosis (ADS) patients with levonorgestrel-releasing intrauterine system (LNG-IUS). **Methods:** Forty-one ADS patients treated with LNG-IUS because of dysmenorrhea were collected. These patients were divided into effective group ( $n=32$ ) and noneffective group ( $n=9$ ) according to the effect of relieving dysmenorrhea. The serum PGE<sub>2</sub> level before and after 6 months of the LNG-IUS treatment were compared by ELISA, and the influence of serum PGE<sub>2</sub> level caused by LNG-IUS and the correlation between the serum PGE<sub>2</sub> level and the dysmenorrheal treatment effect with LNG-IUS were analyzed. **Results:** The serum PGE<sub>2</sub> concentrations were  $20.95 \pm 3.07$  pg/ml and  $5.56 \pm 1.72$  pg/ml in the effective group before and after 6 months with LNG-IUS treatment, there was a significant difference between them ( $P<0.05$ ). The serum PGE<sub>2</sub> concentrations were  $5.74 \pm 1.12$  pg/ml and  $4.95 \pm 1.39$  pg/ml in the noneffective group before and after 6 months with LNG-IUS treatment, there was no significant difference between them. The serum PGE<sub>2</sub> concentration in the effective group was significantly higher than that in the noneffective group ( $P<0.05$ ). The change of visual analogue scale (VAS) score after 6 months of LNG-IUS treatment had a positive correlation with the serum PGE<sub>2</sub> level before LNG-IUS treatment, the higher serum PGE<sub>2</sub> concentration was, the more obviously the VAS score decreased ( $r=0.845$ ,  $P<0.05$ ). **Conclusion:** PGE<sub>2</sub> might be involved in the occurrence of ADS dysmenorrhea and LNG-IUS relieved dysmenorrhea through decreasing the PGE<sub>2</sub> level. It is suggested that the patients with high PGE<sub>2</sub> level choose LNG-IUS to treat their dysmenorrhea and the patients with low PGE<sub>2</sub> level use other ways to treat dysmenorrhea.

**Key words:** serum prostaglandin E<sub>2</sub> (PGE<sub>2</sub>); levonorgestrel-releasing intrauterine system (LNG-IUS); adenomyosis (ADS); dysmenorrhea

# 卵巢早衰危险因素Meta分析

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**【摘要】**目的: 探讨卵巢早衰(premature ovarian failure, POF)的危险因素, 为该病的防治提供依据。方法: 运用Meta分析对国内、外发表的11篇关于POF的病例对照研究资料进行定量综合分析; 采用Stata11.0软件对所选的因素进行异质性检验、合并OR值及95%CI。结果: 与POF有关的因素主要包括遗传因素(家族史); 医源性因素(盆腔手术史、腹部及盆腔X线照射); 感染因素(腮腺炎病史); 饮食生活习惯(吸烟、饮酒、经常食用蔬菜、经常食用豆制品、染发); 心理因素(心情); 月经、婚育史(月经初潮早、离异或丧偶、口服避孕药、人工流产次数)。各因素合并OR值及95%CI分别为吸烟1.97(1.56, 2.48)、盆腔手术史3.88(2.77, 5.42)、腮腺炎病史8.77(1.62, 47.40)、离异或丧偶2.15(1.07, 4.32)、经常食用蔬菜0.54(0.42, 0.70)、饮酒2.19(1.36, 3.55)、人工流产次数1.52(1.23, 1.89)、经常食用豆制品0.65(0.25, 1.66)、心情0.16(0.11, 0.24)、口服避孕药2.47(0.97, 6.27)、月经初潮早1.38(0.59, 3.21)、家族史4.46(1.89, 10.53)、腹部及盆腔X线照射2.92(1.88, 4.54)、染发3.56(2.01, 6.31)。结论: 经常食用蔬菜和心情好是卵巢早衰的保护因素; 经常食用豆制品、口服避孕药及月经初潮早与POF的关联无统计学意义; 其余均为危险因素。

**关键词:** 卵巢早衰(POF); 危险因素; Meta分析

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## Meta-analysis of Risk Factors of Premature Ovarian Failure

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**【ABSTRACT】 Objective:** To explore risk factors of premature ovarian failure (POF), and provide the basis for the prevention and treatment of the disease. **Methods:** Eleven case-control studies about risk factors of POF at home and abroad were comprehensively analyzed by Meta-analysis. And statistical analysis was performed using Stata 11.0 software. **Results:** Related factors with POF were genetic factor (family history), iatrogenic factor (pelvic surgery history, abdominal and pelvic X-ray exposure history), infectious factor (mumps), dietary and habits (smoking, drinking, regular consumption of vegetables, regular consumption of soy products, dye hair), psychological factor (moods), menstrual and obstetrical history (early menarche, divorce or widow, oral contraceptives, the number of abortion). The pooled *OR* values (95%CI) of related factors were smoking 1.97 (1.56, 2.48), pelvic surgery history 3.88 (2.77, 5.42), mumps 8.77 (1.62, 47.40), divorce or widow 2.15 (1.07, 4.32), regular consumption of vegetables 0.54 (0.42, 0.70), drinking 2.19 (1.36, 3.55), the number of abortion 1.52 (1.23, 1.89), regular consumption of soy products 0.65 (0.25, 1.66), mood 0.16 (0.11, 0.24), oral contraceptives 2.47 (0.97, 6.27), early menarche 1.38 (0.59, 3.21), family history 4.46 (1.89, 10.53), abdominal and pelvic X-ray exposure history 2.92 (1.88, 4.54), and dye hair 3.56 (2.01, 6.31), respectively. **Conclusion:** Regular consumption of vegetables and good mood are protective factors of premature ovarian failure, there was no significant association among regular consumption of soy products, oral contraceptives and early menarche, and others are risk factors.

**Key words:** premature ovarian failure (POF); risk factors; Meta-analysis

# 附睾管腔酸性微环境的调节机制

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**【摘要】** 精子在睾丸生成之后进入并储存在附睾, 附睾管腔内的酸性微环境, 使得精子在附睾中维持静息状态和获得受精能力。附睾上皮细胞分布着种类不同的酸碱转运体, 参与调节管腔液体 $\text{HCO}_3^-$ 的重吸收和 $\text{H}^+$ 的分泌, 从而维持附睾管腔的酸性微环境。

**关键词:** 附睾;  $\text{HCO}_3^-$ ;  $\text{H}^+$ ; 酸性微环境

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## Regulation of Luminal Acidification in the Epididymis

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**【ABSTRACT】** After generation in the testis, the spermatozoa enter and store in the epididymis, where the acidic microenvironment of epididymal tract enable spermatozoa to stay in a immotile state and aquire their fertilizing capacity. Distinct sets of transporters, expressed in specific cell types of the epididymal epithelium, contribute to bicarbonate reabsorption and net proton secretion that occur as the fluid flows through the lumen, therefore maintain the acidic microenvironment in the epididymis.

**Key words:** epididymis; HCO<sub>3</sub><sup>-</sup>; H<sup>+</sup>; acidic microenvironment



# Y染色体微缺失与辅助生殖技术 关系的研究进展

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**【摘要】** Y染色体是男性特有的染色体, 其长臂上的无精子因子(AZF)区域具与男性不育密切相关的基因, 目前将该区域分为AZFa、AZFb、AZFc和AZFd4个区域。AZF缺失是导致男性不育的重要因素之一, 可以通过辅助生殖技术(ART)遗传给下一代引起不育。研究Y染色体微缺失分类与表型关系, 可以为临床治疗各种男性不育症提供分子或细胞水平的依据。Y染色体微缺失发生频率存在种族差异性; 目前Y染色体微缺失的检测方法仍然以多重PCR为主; 对于ICSI助孕的男性后代是否会出现新发Y染色体微缺失仍然存在争论。

**关键词:** Y染色体微缺失; 男性不育; 无精子因子(AZF); 序列标签位点(STS)

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## Progression of Y Chromosome Microdeletion and Assisted Reproductive Technology

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**【ABSTRACT】** Y chromosome is the specific chromosome of male, azoospermia factor (AZF) in the long arm has genes relating with male infertility. There are four AZF regions, AZFa, AZFb, AZFc and AZFd and their candidate genes. AZF deletion is one of the most important agents leading to male infertility and can be transmitted to the male offspring by ART. Y chromosome and AZF classification and its relationship with phenotype can provide molecular or cellular evidence to the male infertility. Ethnicity-specific STSs exists in Y chromosome microdeletion. Multiplex PCR is the usual test method of Y chromosome microdeletion. Debate on the Y chromosome microdeletion of ICSI male offspring is persistent.

**Key words:** Y chromosome microdeletion; male infertility; azoospermia factor (AZF); sequence-tagged site (STS)

# 流式细胞术在外用避孕药精子 功能评估中的应用

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**【摘要】**流式细胞术(flow cytometry, FCM)是一种单细胞快速定量分析技术,为精子功能研究提供了一种高通量、多参数的检测手段。FCM在外用避孕药对精子功能评估中的应用,主要包括精子质膜完整性、DNA完整性、顶体反应、线粒体功能、氧化应激和精子凋亡等方面。表明FCM是精子功能研究的有效工具,有助于阐明新型外用避孕药的药效和作用机制。

**关键词:**流式细胞术(FCM);外用避孕药;精子功能;评价

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## Application of Flow Cytometry in Evaluating Spermicidal Function of Topical Contraceptive

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**【ABSTRACT】** Flow cytometry (FCM) is a quantitative technology employed in cell counting, sorting, biomarker detection and protein engineering. It allows simultaneous multiparametric analysis of the sperm function. In this review we introduced the application of FCM in the evaluation of topical contraceptives, including plasma membrane integrity, DNA intactness, changes induced during capacitation, mitochondrial status, oxidative stress as well as apoptotic-like changes. It is concluded that FCM is an important tool in the research of sperm function, which helps to clarify the effect and mechanism of novel topical contraceptives.

**Key words:** flow cytometry (FCM); topical contraceptives; spermicidal function; evaluation

# 体外成熟卵母细胞体外受精方式的探讨

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**【摘要】**目的: 探讨经体外成熟卵母细胞是否可采用常规IVF方式授精。方法: 自愿捐献的常规废弃的未成熟卵母细胞经体外成熟后的卵母细胞206个, 随机分为3组: A组( $n=69$ ), 授精时尽可能保存卵丘细胞并行常规IVF授精; B组( $n=68$ ), 授精前将卵丘细胞完全拆除后行常规IVF授精; C组( $n=69$ ), 将卵丘细胞完全拆除后行ICSI授精。常规IVF授精的精/卵个数比约为50 000:1。比较3组卵子的受精率、卵裂率和优质胚胎率。结果: A组与C组在受精率(82.61% vs 85.51%)、卵裂率(94.74% vs 94.92%)、优质胚胎率(42.59% vs 46.43%)3个方面均无统计学差异( $P>0.05$ ), A组、C组的受精率、卵裂率均显著高于B组(14.71%, 50.00%)( $P<0.01$ ), B组没有优质胚胎出现。结论: 体外成熟后的卵母细胞在卵丘细胞较完整时可进行常规IVF方式授精。

**关键词:** 未成熟卵母细胞; 体外成熟培养(IVM); 体外授精(IVF); 卵丘细胞

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## A Study on the Approach of *In Vitro* Fertilization for Mature Oocytes from *In Vitro* Maturation

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**【ABSTRACT】 Objective:** To investigate the approach of *in vitro* fertilization for mature oocytes from *in vitro* maturation. **Methods:** A total of 206 mature oocytes from *in vitro* maturation (IVM) of scrap immature oocytes were selected and divided into 3 groups. Group A ( $n=69$ ): all of the oocytes were chosen for routine *in vitro* fertilization (IVF) and their oocyte cumulus complex (OCC) were remained for the best; group B ( $n=68$ ): all of the oocytes were chosen for routine IVF but their OCC were cut off; group C ( $n=69$ ): all of the oocytes were chosen for intracytoplasmic sperm injection. The ratio of sperm/oocyte was about 50 000 : 1 in routine IVF. Rates of fertilization, cleavage, and top-quality embryo were compared in the 3 groups. **Results:** There was no statistical difference in rates of fertilization (82.61% vs 85.51%), cleavage (94.74% vs 94.92%), and top-quality embryo (42.59% vs 46.43%) between group A and group C ( $P>0.05$ ), but the rates of fertilization (14.71%) and cleavage (50.00%) in group B were significantly lower when compared with group A and group C ( $P<0.01$ ), there was no top-quality embryo in group B. **Conclusion:** The mature oocytes from IVM can be fertilized in routine IVF when they had complete OCC.

**Key words:** immature oocytes; *in vitro* maturation (IVM); *in vitro* fertilization (IVF); cumulus cells

# 生长激素对不同年龄卵巢储备功能趋于低下患者IVF-ET治疗结局的影响

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**【摘要】**目的: 探讨生长激素(GH)对不同年龄卵巢储备功能趋于低下患者在IVF-ET中是否有影响。方法: 行IVF-ET的卵巢储备功能趋于低下的不孕患者240例, 均采用普通长方案降调节。观察不同年龄患者加用GH后的卵巢反应, 并以不加用GH者为对照组。结果: 年龄<35岁GH组81例, 对照组90例; 年龄≥35岁GH组39例, 对照组30例。年龄<35岁的不孕症患者Gn使用天数、Gn使用支数、hCG注射日E<sub>2</sub>水平、获卵数、2PN受精率、优质胚胎率、种植率、妊娠率等观察指标, 对照组和GH组间均无统计学差异( $P>0.05$ )。年龄≥35岁的不孕症患者Gn用量(Gn支数)实验组显著低于对照组, 有统计学差异( $P<0.05$ ); hCG注射日E<sub>2</sub>水平、获卵数实验组显著高于对照组, 差异有统计学意义( $P<0.05$ )。结论: GH对年龄<35岁卵巢储备功能低下患者的卵巢反应及IVF-ET治疗结局无影响; 而对年龄≥35岁则有一定影响, 可减少Gn使用量, 提高hCG注射日的E<sub>2</sub>水平, 增加获卵数。

**关键词:** 生长激素 (GH); 卵巢储备功能低下; 卵巢反应; IVF-ET; 治疗结局

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## Effect of Growth Hormone on the IVF Outcome of the Patients Decreased Ovarian Reserve at Different Age

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**【ABSTRACT】 Objective:** To discuss whether growth hormone (GH) positively affect the IVF outcome of patients with decreased ovarian reserve at different age. **Methods:** Two hundred and forty infertile patients with decreased ovarian reserve (basal FSH 10.0–15.0 mIU/ml) were enrolled into our study and divided into two parts according to the age of 35 year-old, each part was further divided into two groups by having used GH in their cycles or not. Patients received GH were taken as GH group, while those didn't were taken as control group. All the patients had been down-regulated according to the conventional long protocol in our centre. Ovarian response and outcomes of IVF were observed in both groups. **Results:** The group less than 35 years old included GH group with 81 cases and control group with 90 cases. The group equals to or more than 35 years old included GH group with 39 cases and control group with 30 cases. Effect of GH on patients under 35 years old with diminished ovarian reserve was as follows: no significant difference was observed in the dosage of Gn, its duration, the level of estradiol, the number of retrieved ovum, 2PN fertilization rate, good-quality embryo rate, implantation rate and clinical rate between the two groups (all  $P>0.05$ ). Effect of GH on patients equals to or more than 35 years old with diminished ovarian reserve was as follows: The dosage of Gn was significantly lower ( $P<0.05$ ), and its duration was shorter in GH group than those in the control. The level of estradiol and the number of retrieved ovum were significantly higher ( $P<0.05$ ) in GH group than those in the control. **Conclusion:** GH has no significant effect on the ovarian response and IVF outcome for the patients less than 35 years old with decreased ovarian reserve. GH may diminish the dosage of Gn, elevate the level of estradiol on the day of hCG injection and increase the number of retrieved ovum for the patients equal to or more than 35 years old with decreased ovarian reserve.

**Key words:** growth hormone (GH); decreased ovarian reserve; ovarian response; *in vitro* fertilization-embryo transfer (IVF-ET); treatment outcomes



# 辅助生殖技术(ART)助孕获得多胎妊娠 行减胎术后妊娠结局观察

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**【摘要】**目的: 探讨辅助生殖技术(ART)获得的多胎妊娠孕早期行经阴道减胎术的有效性和安全性。方法: 以经 ART 助孕获得多胎妊娠行经阴道减胎术的患者 123 例为减胎组, 根据减胎后保留的胎儿数分为双胎组(A组,  $n=90$ )和单胎组(B组,  $n=33$ )。另以同期经 ART 助孕获得单胎妊娠(C组,  $n=36$ )和双胎妊娠(D组,  $n=57$ )的患者为对照组。回顾性分析患者的妊娠结局及妊娠期并发症发生情况。结果: 减胎组的减胎成功率为 100.0%, 妊娠成功率为 91.9%。A 组胎膜早破发生率、早产发生率、新生儿低出生体质量发生率、新生儿重症监护室(NICU) 入住率均高于 B 组( $P<0.05$ )。结论: 多胎妊娠孕早期行经阴道减胎术安全、有效、可行。多胎妊娠实施减胎术中减为单胎更为安全。

**关键词:** 减胎术; 多胎妊娠; 辅助生殖技术(ART)

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## Observation of Pregnancy Outcomes of Multifetal Pregnancy Reduction by Assisted Reproductive Technology (ART)

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**【ABSTRACT】 Objective:** To explore the effectiveness and safety of multifetal pregnancy reduction after assisted reproduction technology (ART). **Methods:** A total of 123 cases received multifetal pregnancy reduction after ART were retrospectively analyzed. They were divided into twin pregnancies group (group A,  $n=90$ ) and single pregnancy group (group B,  $n=33$ ) according to the number of live fetus after multiple pregnancy reduction. Another 93 pregnancy cases after ART at the same period were set as the control, and were also divided into twin pregnancies group (group C,  $n=36$ ) and single pregnancy group (group D,  $n=57$ ). **Results:** 1) All 123 cases were successful, the successful rate of reduction was 100.0%, the successful rate of pregnancy was 91.9%. 2) The rate of premature rupture of membrane, premature delivery, occurrence rate of low birth weight and NICU occupancy in group A were higher than those in group B, the difference was statistically significant ( $P<0.05$ ). **Conclusion:** 1) Transvaginal ultrasound-guided multifetal pregnancy reduction in the first trimester is a safe, efficient and feasible method after ART. 2) It's much safer to reduce to a singleton in multifetal pregnancy reduction.

**Key words:** multifetal pregnancy reduction; multiple gestation; assisted reproduction technology (ART)

# 北京市无痛人工流产育龄妇女接受 流产服务的现状调查

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**【摘要】**目的: 了解选择行无痛人流术的育龄妇女接受流产服务的现状。方法: 采用分层随机抽样的方法在北京市18个区县中抽取6个区县的18家开展计划生育技术服务的医疗机构, 在门诊对早孕后选择终止妊娠的育龄妇女进行问卷调查。结果: 在至少有1次流产史的1 005例无痛人流人工流产调查对象中, 前次流产有49.2%的人选择了无痛人流, 在前次流产时有77.9%接受了避孕宣传教育, 只有50.1%获得了避孕药具, 前次流产告知流产后需避孕者其流产后首次性生活避孕的比例明显高于未告知者, 而且提供避孕宣传教育服务与流产的地点有关。本次流产83.6%为意外妊娠, 外地户籍、大学或大专学历、收入>3 000元、丈夫或性伴年龄<25岁的育龄妇女选择无痛人流的比例较高, 选择无痛人流的育龄妇女中有29.0%存在高危因素, 仅有61.9%被告知无痛人流可能发生并发症。结论: 无痛人流产育龄妇女高危流产的比例较高, 其流产前、后获得的知识与信息不足, 应开展多种形式的生殖健康知识宣传教育, 落实避孕措施, 减少非意愿妊娠。

**关键词:** 无痛人流; 育龄妇女; 流产服务; 避孕

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## Survey on Situation of Abortion Service among Women of Reproductive Age Seeking Painless Induced Abortion in Beijing

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**【ABSTRACT】 Objective:** To learn the situation of induced abortion services providing to the reproductive aged women who selected painless induced abortion. **Methods:** Eighteen hospitals which provided family planning services scattered in 6 districts were stratified randomly sampled. Questionnaire was performed to early pregnant women who wanted to terminate pregnancy in these clinics. **Results:** For the previous induced abortion, 49.2% selected painless induced abortion and 77.9% of them received contraceptive counseling before or after the abortion in 1 005 respondents of painless induced abortion. But only half of them were provided with contraceptive methods. Ratio of women who use contraceptive methods in those being told to use contraception for the first sexual intercourse after induced abortion was much higher than those who didn't, while the counseling providing was related to the hospital where women received the services. As for the induced abortion this time, 83.6% was unwanted pregnancy. Ratio of women who selected painless induced abortion was higher among the group of migrant women, high educational level group, their income more than RMB 3 000 Yuan per month and the age of their husband (partner) less than 25 years old. About 29% was at high risk among the target women while only 61.9% was informed the potential complications of the operation. **Conclusion:** The ratio of high-risk abortion was high among the women who selected painless induced abortion. The target women were lack of knowledge and information either pre- or post-abortion. Information education and communication on reproductive health and contraception should be carried on to promote the contraception and decrease the unwanted pregnancy.

**Key words:** painless induced abortion; women of reproductive age; abortion service; contraception