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# 体外受精 - 胚胎移植影响早期胎盘 Wnt 信号通路的研究

赵亮 孙丽芳 郑秀丽 刘静芳 郑蓉 张蕾 于丽 张晗

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**【摘要】目的** 研究体外受精 - 胚胎移植 (IVF-ET) 技术对早期胎盘滋养层细胞 Wnt 信号通路基因表达影响。**方法** 收集 IVF-ET 来源双胎移植妊娠 7~8 周, 经超声引导下减胎获得的胎盘绒毛组织作为 IVF-ET 组, 收集自然非意愿妊娠双胎 7~8 周人工流产中获得的胎盘绒毛组织作为对照组。利用 Affymetrix HG-U133 Plus 2.0 基因芯片对胎盘绒毛组织进行芯片杂交分析。用定量反转录聚合酶链反应 (qRT-PCR) 验证其中 8 个差异表达基因, 选取差异表达基因进行无监督聚类分析和 Gene Ontology(GO) 功能生物信息学分析。**结果** 获得 28 例 IVF-ET 减胎绒毛组织和 8 例自然妊娠人工流产绒毛组织, 其中 8 例胎盘绒毛组织 (IVF-ET 组 4 例, 对照组 4 例) 进行了基因芯片检测。IVF-ET 组与对照组胎盘 Wnt 信号通路中有 23 个基因差异表达, 差异表达倍数  $\geq 2$  倍, 其中 16 个基因上调, 7 个下调。上调基因是 *WIF1*、*FZD8*、*CXXC4*、*JUN*、*WNT5A*、*FZD2*、*TCF7L2*、*CAMK2D*、*PRKACB*、*CCND1*、*PRICKLE1*、*PLCB4*、*FZD7*、*LRP6*、*TCF7L1*、*APC*; 下调基因是 *MAPK9*、*PPARD*、*SIAH1*、*CSNK1E*、*WNT7A*、*WNT2*、*PORCN*。经 qRT-PCR 验证 IVF-ET 组与对照组胎盘中 8 个 Wnt 信号通路基因表达确实存在差异, 结果与基因芯片一致。Wnt 信号通路基因定位显示, IVF-ET 来源胎盘中受到影响的 Wnt 基因主要位于信号通路的上游。**结论** IVF-ET 和自然妊娠胎盘 Wnt 信号通路存在基因表达差异, 涉及多种 Wnt 信号通路关键功能, 可能影响 IVF-ET 胎盘早期发育和功能。

**【关键词】** 体外受精 - 胚胎移植 (IVF-ET); 胎盘; 滋养层细胞; Wnt 信号通路; 基因

**基金项目:** 国家自然科学基金面上项目 (81070493)

· 临床研究 ·

***In vitro* fertilization-embryo transfer affects Wnt signaling pathway in early placenta** Zhao Liang,

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**【Abstract】 Objective** To study the effect of *in vitro* fertilization-embryo transfer (IVF-ET) on the expression of Wnt signaling pathway in early placental trophoblast cells. **Methods** We collected 7–8 weeks of gestation placenta tissues as IVF-ET group by ultrasound guided reduction of fetal from double embryo transfer under IVF-ET technology. In control group, placenta tissues were obtained from the spontaneous abortion of natural unwanted twin pregnancy 7–8 weeks. Microarray hybridization analysis was performed on the placenta tissues of the two groups using the Affymetrix HG-U133 Plus 2.0 gene chip. Eight differentially expressed genes were identified by quantitative reverse transcription polymerase chain reaction (qRT-PCR), and unsupervised clustering analysis and Gene Ontology (GO) functional bioinformatics analysis were performed for differentially expressed genes. **Results** We obtained 28 cases of IVF-ET reduced placenta tissues and 8 cases of natural pregnancy induced abortion tissues. A total of 8 placental tissues were detected by gene microarray. Compared with control group, IVF-ET-derived placental Wnt signaling pathway had 23 differentially expressed genes. The expressional difference was greater than or equal to 2 times, of which 16 genes were up-regulated and 7 genes were down-regulated. The up-regulated genes were *WIF1*, *FZD8*, *CXXC4*, *JUN*, *WNT5A*, *FZD2*, *TCF7L2*, *CAMK2D*, *PRKACB*, *CCND1*, *PRICKLE1*, *PLCB4*, *FZD7*, *LRP6*, *TCF7L1*, *APC*, and the down-regulated genes were *MAPK9*, *PPARD*, *SIAH1*, *CSNK1E*, *WNT7A*, *WNT2*, *PORCN*. The expressions of 8 genes in Wnt signaling pathways between IVF-ET group and control group were confirmed by qRT-PCR, which was consistent with the result of gene chip detection. Wnt signal pathway gene mapping showed that the placenta Wnt signal pathway genes affected by the IVF-ET technology itself were mainly located in the signal pathway upstream. **Conclusion** There are differential gene expressions in the Wnt signaling pathway of early placenta between IVF-ET group and control group, and the differentially expressed genes are involved in the key functions of various Wnt signaling pathways, affecting the early development and function of IVF-ET placenta.

**【Key words】** *In vitro* fertilization-embryo transfer (IVF-ET); Placenta; Trophoblast cells; Wnt signaling pathways; Genes

**Fund program:** Surface Project of National Natural Science Foundation of China (81070493)

· 临床研究 ·

# 胚胎植入前遗传学诊断及筛查中 7- 细胞来源与 9- 细胞来源囊胚胚胎正常率和临床妊娠率的比较

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**【摘要】目的** 研究在胚胎植入前遗传学诊断及筛查 (PGD/PGS) 中 7- 细胞来源与 9- 细胞来源囊胚的胚胎正常率和临床妊娠率, 探讨胚胎体外培养第 3 日时的最适分裂速度。**方法** 回顾性分析 2014 年 4 月 1 日—2015 年 12 月 31 日期间 207 例 PGD/PGS 治疗周期的临床资料。比较 7- 细胞来源与 9- 细胞来源囊胚的胚胎正常率和临床妊娠率。**结果** 7- 细胞来源与 9- 细胞来源囊胚的胚胎正常率分别为 34.38% 和 52.63%, 两者比较差异有统计学意义 ( $\chi^2=4.100$ ,  $P=0.042$ )。7- 细胞来源与 9- 细胞来源囊胚的临床妊娠率分别为 55.56% 和 57.14%, 两者比较差异无统计学意义 ( $\chi^2=0.004$ ,  $P>0.05$ )。**结论** 在 PGD/PGS 中, 9- 细胞来源囊胚的胚胎正常率比 7- 细胞来源囊胚高, 移植的两类胚胎能够获得类似的临床妊娠率。在体外培养第 3 日选择胚胎移植时, 如果胚胎的分级相同, 那么 9- 细胞胚胎优于 7- 细胞胚胎。

**【关键词】** 植入前遗传学诊断及筛查 (PGD/PGS); 7- 细胞来源囊胚; 9- 细胞来源囊胚; 囊胚活检; 正常率; 临床妊娠率

· 临床研究 ·

**Comparison of the normal chromosome rate of embryos and the pregnancy rate between the blastocysts derived from 7-cell and 9-cell in preimplantation genetic diagnosis and screening**

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**【Abstract】 Objective** To compare the normal chromosome rate of embryos and the pregnancy rate between the blastocyst derived from 7-cell and the blastocyst derived from 9-cell in preimplantation genetic diagnosis and screening (PGD/PGS) and to investigate the optimal division speed of embryos on day 3 of culture.

**Methods** Retrospective analysis of 207 cycles with PGD/PGS in our hospital from April 1, 2014 to December 31, 2015 was conducted. The normal chromosome rate of embryos and the pregnancy rate were compared between the blastocyst derived from 7-cell and 9-cell. **Results** The rates of normal chromosomes between the blastocyst derived from 7-cell and 9-cell were 34.38% and 52.63%, respectively. There were statistical differences between them ( $\chi^2=4.100$ ,  $P=0.042$ ). The pregnancy rate between the blastocyst derived from 7-cell and 9-cell were 55.56% and 57.14%, respectively. There was no statistical difference between them ( $\chi^2=0.004$ ,  $P>0.05$ ).

**Conclusions** The normal chromosome rate of the blastocysts derived from 9-cell was higher than that of the blastocyst derived from 7-cell in PGD/PGS. And similar clinical pregnancy rates can be achieved in the two types of blastocyst transferred in PGD/PGS. If the grading of the embryos were the same, the 9-cell embryos were superior to the 7-cell embryos on day 3 of culture.

**【Key words】** Preimplantation genetic diagnosis and screening (PGD/PGS); Blastocyst derived from 7-cell; Blastocyst derived from 9-cell; Blastocyst biopsy; Normal chromosome rate; Clinical pregnancy rate

# 早卵泡期长方案治疗中促性腺激素时长对多囊卵巢综合征患者体外受精 - 胚胎移植助孕治疗结局的影响

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**【摘要】目的** 回顾性分析多囊卵巢综合征 (PCOS) 患者在体外受精 - 胚胎移植 (IVF-ET) 助孕治疗过程中不同促性腺激素 (Gn) 时长患者的临床妊娠结局及导致患者 Gn 时间延长的相关因素。**方法** 收集 2014 年 1 月—2017 年 5 月期间在本院生殖中心采用早卵泡期长方案行 IVF-ET 助孕治疗的 PCOS 患者临床资料, 根据 Gn 使用时间按四分位法分为 3 组 (A 组:  $<25\%$ , Gn 使用时间  $<11$  d, 共 182 个周期; B 组:  $25\% \sim 75\%$ , Gn 使用时间 11~15 d, 542 个周期; C 组:  $>75\%$ , Gn 使用时间  $>15$  d, 216 个周期), 比较各组间患者基础情况及治疗情况的相关指标。**结果** 3 组患者平均年龄、体质指数 (BMI)、基础卵泡刺激素 (FSH)、启动日的黄体生成素 (LH) 水平、Gn 总量、基础睾酮 (T) 水平及启动日 FSH 水平组间比较差异有统计学意义 ( $P < 0.05$ ); 3 组患者间的不孕年限、基础 LH 水平及基础雌二醇 ( $E_2$ ) 水平、降调节时间、Gn 启动剂量、启动日  $E_2$  水平差异均无统计学意义; 3 组患者间的获卵数、可利用胚胎数、周期取消率、新鲜胚胎移植率、临床妊娠率、胚胎种植率、早期流产率及中重度卵巢过度刺激综合征 (OHSS) 发生率比较差异均无统计学意义, 但中重度 OHSS 发生率 A 组较 B 组及 C 组有增高趋势。多因素 logistic 回归分析显示基础 FSH、基础 T 及 BMI 高水平为 Gn 使用时间延长的危险因素, 而启动日 FSH 及 LH 的水平恢复为 Gn 使用时间延长的保护因素。**结论** PCOS 患者行早卵泡期长方案治疗 Gn 使用时间的长短并不影响患者的临床治疗结局, 不建议因此而取消周期; 降调节后 Gn 启动日的 LH 水平低及基础 BMI 过高可能是导致 Gn 使用时间延长的主要因素。

**【关键词】** 多囊卵巢综合征 (PCOS); Gn 使用时间; 促性腺激素释放激素激动剂 (GnRH-a); 降调节; 临床妊娠率

· 临床研究 ·

**Impact of the duration of gonadotropin stimulation in women with polycystic ovary syndrom that using long-acting gonadotropin-releasing hormone agonist long protocol in follicular phase** Nie Ling, Zhao Yan

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**【Abstract】 Objective** To retrospectively analyze the clinical outcomes of patients with different duration of gonadotropin (Gn) stimulation during *in vitro* fertilization/intracytoplasmic sperm injection-embryo transfer (IVF/ICSI-ET) and the related factors that prolong the duration of gonadotropin stimulation in patients with polycystic ovary syndrome (PCOS). **Methods** Clinical data of PCOS patients treated by long-acting gonadotropin-releasing hormone agonist (GnRH-a) long protocol in follicular phase were collected from January 2014 to May 2017. According to the duration of Gn stimulation with the quartile method, patients were divided into three groups (group A: <25%, the duration of Gn used <11 d, 182 cycles; group B: 25%–75%, the duration of Gn used 11–15 d, 542 cycles; group C: >75%, the duration of Gn used > 15 d, 216 cycles), and the basic situation of patients and treatment-related indicators were compared among the groups. **Results** The average age, body mass index (BMI), basal follicle stimulating hormone (FSH), the level of luteinizing hormone (LH) on the start-up day, dosage of Gn used, basal testosterone (T) and the level of FSH on the start-up day were significant differences among the three groups ( $P<0.05$ ). The duration of infertility, basal LH and basal estradiol ( $E_2$ ), the duration of down-regulation, the dosage of Gn used and the level of  $E_2$  on start-up day were not significantly different among the three groups. There was no significant difference among the three groups in the number of oocytes retrieved, the number of available embryos, cycle cancellation rate, fresh embryo transfer rate, clinical pregnancy rate, embryo implantation rate, early miscarriage rate and moderate-to-severe ovarian hyperstimulation syndrome (OHSS) incidence. The incidence of moderate and severe OHSS in group A had an increased trend compared with group B and group C. Multi-factor logistic regression analysis showed that basal FSH, basal T and BMI were the risk factors of Gn prolongation, while the start-up day FSH and start-up day LH recover were protective factors of Gn prolongation. **Conclusion** Prolong the duration of Gn stimulation does not affect the clinical outcome of patients with PCOS using long-acting GnRH-a long protocol in follicular phase, suggesting not canceling cycles. Weight loss before the start of treatment and supplement exogenous LH are important to avoid the duration of Gn stimulation is too long.

**【Key words】** Polycystic ovary syndrome (PCOS); Duration of gonadotropin stimulation; Gonadotropin-releasing hormone agonist (GnRH-a); Down-regulation; Clinical pregnancy rate

# 阿托西班对激素替代周期解冻胚胎移植妊娠结局的影响

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**【摘要】目的** 探讨在行激素替代周期冻融胚胎移植的患者中, 阿托西班对移植前有子宫内膜异常蠕动波的患者妊娠结局的影响。**方法** 回顾性队列研究分析 172 例行激素替代周期冻融胚胎移植患者的临床资料, 根据移植前日观察子宫内膜是否有异常蠕动, 将有子宫内膜异常蠕动者归为 A 组 (104 例), 并依据是否移植日使用阿托西班分为治疗组 (A1, 63 例) 和对照组 (A2, 41 例), 将没有子宫异常蠕动者归为 B 组 (68 例); 分别比较各组的胚胎着床率、临床妊娠率、异位妊娠率及流产率。**结果** A 组和 B 组在一般资料及流产率、异位妊娠率差异均无统计学意义 ( $P>0.05$ ); A1 组的胚胎着床率 (41.18%) 和临床妊娠率 (46.03%) 均明显高于 A2 组 (27.42%, 26.83%), 差异均有统计学意义 ( $P=0.046$ ,  $P=0.049$ ); B 组的胚胎着床率及临床妊娠率 (39.82%, 45.59%) 均明显高于 A2 组 (27.42%, 26.83%), 差异也均有统计学意义 ( $P=0.049$ ,  $P=0.049$ )。**结论** 子宫内膜的异常蠕动可能会影响激素替代周期冻融胚胎移植的妊娠结局, 而移植前给予阿托西班治疗能有效抑制内膜的异常蠕动, 改善子宫内膜容受性, 提高着床率和临床妊娠率。

**【关键词】** 子宫内膜蠕动; 阿托西班; 冻融胚胎移植 (FET); 临床妊娠率

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· 临床研究 ·

**Effect of Atosiban on pregnancy outcome of patients undergoing hormone replacement cycle thawing transplantation** Hao Yi, Xu Ye, Jiao Tingting

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**【Abstract】 Objective** To analyze the effect of Atosiban on pregnancy outcomes in abnormal endometrial peristalsis patients during frozen-thawed embryo transfer (FET). **Methods** The clinical data of 172 patients who underwent hormone replacement cycle thawing transplantation were analyzed retrospectively. Atosiban pretreatment was performed on patients with abnormal endometrial peristalsis. According to the observation that whether there was an abnormal endometrial peristalsis the day before the transplantation, the patients with abnormal endometrial peristalsis were classified as group A (104 cases). Based on whether to use Atosiban on the transplantation day, they were divided into the treatment group (A1, 63 cases) and control group (A2, 41 cases). Patients with no abnormal endometrial peristalsis was assigned to group B (68 cases). The embryo implantation rate, the clinical pregnancy rate, the ectopic pregnancy rate and the abortion rate of groups A1 and A2, as well as groups A2 and B were compared respectively. **Results** Group A (A1, A2) and group B had no significant difference in general data, the abortion rate, and the ectopic pregnancy rate. However, in group A with abnormal endometrial peristalsis, the embryo implantation rate (41.18%) and the clinical pregnancy rate (46.03%) of group A1 were significantly higher than those in group A2 (27.42%, 26.83%), the differences were statistically significant ( $P=0.046$ ,  $P=0.049$ ). The embryo implantation rate and the clinical pregnancy rate in group B (39.82%, 45.59%) were significantly higher than those in group A2 (27.42%, 26.83%), and the differences were statistically significant ( $P=0.049$ ,  $P=0.049$ ). **Conclusion** Abnormal peristalsis of the endometrium may affect the pregnancy outcome of hormone replacement cycles thawing transplantation. However, the treatment of Atosiban before transplantation can effectively inhibit the abnormal peristalsis of the endometrium, improve endometrial receptivity, and improve the implantation rate and the clinical pregnancy rate.

**【Key words】** Atosiban; Uterine peristalsis; Frozen-thawed embryo transfer (FET); Clinical pregnancy rate

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· 临床研究 ·

# 经皮穴位电刺激对体外受精 - 胚胎移植妊娠率和活产率影响

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**【摘要】目的** 观察在胚胎移植前后经皮穴位电刺激 (TEAS) 对体外受精 - 胚胎移植 (IVF-ET) 者妊娠结局的影响。**方法** 选取行新鲜周期进行移植的患者, 共 1 707 例, 随机分为 A 组 ( $n=585$ ), B 组 ( $n=394$ ), C 组 ( $n=728$ )。A 组在移植前 24 h 内和移植当日 2 h 内进行 2 次 TEAS 治疗; B 组在 A 组的基础上, 在移植后第 2 日再进行 7 次 TEAS 治疗; C 组为对照组, 不加用 TEAS 干预。分别观察 3 组受试者的临床妊娠率、宫外孕率、早期流产率、晚期流产率、活产率。**结果** A 组临床妊娠率 (42.91%) 优于 C 组 (36.53%), 差异具有统计学意义 ( $P=0.027$ ), 而活产率组间差异无统计学意义 ( $P>0.05$ ); B 组临床妊娠率 (45.22%) 和活产率 (30.43%) 均优于 C 组, 差异具有统计学意义 ( $P$  值分别为 0.010 和 0.048); 与 C 组相比, A 组和 B 组宫外孕率、早期流产率和晚期流产率差异均无统计学意义 ( $P>0.05$ )。**结论** TEAS 可提高 IVF-ET 者妊娠率和活产率。

**【关键词】** 体外受精 - 胚胎移植 (IVF-ET); 经皮穴位电刺激 (TEAS); 活产率

· 临床研究 ·

**Effect of transcutaneous electrical acupoint stimulation on the clinical pregnancy rate and the live birth rate in *in vitro* fertilization-embryo transfer** Zhang Linxin, Zhong Jing

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**【Abstract】 Objective** To determine whether the pregnancy outcome associated with *in vitro* fertilization-embryo transfer (IVF-ET) were improved by transcutaneous electrical acupoint stimulation (TEAS). **Methods** Totally 1 707 patients undergoing fresh embryo transfer were collected in the study and were divided into three groups (group A, group B and group C) guided by the principles of randomized controlled trials. Group A was treated with TEAS treatment before and after embryo transfer, and group B was treated with TEAS for another 7 times. Group C was transferred without other therapy as control group. The primary outcome measure was clinical pregnancy rate, ectopic pregnancy rate, early and late abortion rate as well as live birth rate. **Results** Both the clinical pregnancy rate (45.22%) and live birth rate (30.43%) in group B were significantly higher than those in control group (36.53%, 24.61%) ( $P=0.010$ ,  $0.048$ ). No significant difference was noted in the live birth rate between group A and group C ( $P>0.05$ ). Both TEAS groups A and B showed no significant difference in the outcome measurements of ectopic pregnancy, early and late abortion rate compared with group C. **Conclusion** Our study preliminarily suggested that TEAS treatment would have the efficacy in improving pregnancy rate in IVF-ET.

**【Key words】** *In vitro* fertilization-embryo transfer (IVF-ET); Transcutaneous electrical acupoint stimulation (TEAS); Live birth rate

# $\beta$ 细胞营养因子与多囊卵巢综合征相关性的临床研究

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**【摘要】目的** 探讨  $\beta$  细胞营养因子与多囊卵巢综合征 (PCOS) 的相关关系。**方法** 选取 PCOS 患者和非 PCOS 对照组各 40 名作为研究对象, 测定性激素六项、生化指标及  $\beta$  细胞营养因子水平。PCOS 患者给予屈螺酮炔雌醇及二甲双胍治疗 3 个月后复查上述各项指标, 比较治疗前、后的变化。**结果** ① PCOS 患者的体质指数 (BMI)、腰臀比 (WHR)、甘油三酯 (TG)、胆固醇 (TC)、低密度脂蛋白胆固醇 (LDL-C)、空腹胰岛素 (FINS)、胰岛素评价指数 (HOMA-IR)、胰岛  $\beta$  细胞分泌指数 (HOMA- $\beta$ )、黄体生成素 (LH)、睾酮 (T)、 $\beta$  细胞营养因子水平均高于对照组。② PCOS 肥胖者 ( $\text{BMI} \geq 25 \text{ kg/m}^2$ ) 的空腹血糖 (FBS)、1 h 血糖 (BS 60 min)、2 h 血糖 (BS 120 min)、FINS、1 h 胰岛素 (INS 60 min)、2 h 胰岛素 (INS 120 min)、3 h 胰岛素 (INS 180 min)、HOMA-IR、HOMA- $\beta$  均高于非肥胖者。③ PCOS 肥胖组的  $\beta$  细胞营养因子水平明显高于 PCOS 非肥胖组及对照组。 $\beta$  细胞营养因子与年龄、BMI、T 水平呈正相关 ( $r=0.271$ ,  $r=0.262$ ,  $r=0.158$ ,  $P=0.023$ ,  $P=0.015$ ,  $P=0.026$ ), 与 WHR、FINS、HOMA-IR、HOMA- $\beta$  水平呈负相关 ( $r=-0.321$ ,  $r=-0.076$ ,  $r=-0.156$ ,  $r=-0.027$ ,  $P=0.021$ ,  $P=0.003$ ,  $P=0.006$ ,  $P=0.012$ )。④ PCOS 患者应用屈螺酮炔雌醇及二甲双胍治疗后 BMI、WHR、TG、TC、LDL-C、FINS、HOMA-IR、HOMA- $\beta$ 、LH、T、 $\beta$  细胞营养因子水平均比治疗前降低。**结论** PCOS 患者  $\beta$  细胞营养因子水平明显升高。屈螺酮炔雌醇与二甲双胍联合应用能有效地改善胰岛素抵抗, 降低  $\beta$  细胞营养因子水平, 是治疗 PCOS 较为有效的方法。

**【关键词】**  $\beta$  细胞营养因子; 多囊卵巢综合征 (PCOS); 胰岛素抵抗; 屈螺酮炔雌醇; 二甲双胍

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· 临床研究 ·

**Clinical study on the relationship between Betatrophin and polycystic ovary syndrome** Zhu Wenjing,

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**【Abstract】 Objective** To explore the relationship between Betatrophin and polycystic ovary syndrome (PCOS) by comparing Betatrophin and biochemical markers between patients with PCOS and normal controls. **Methods** Totally 40 patients with PCOS and 40 non-PCOS patients (control group) were asked their general indicators of measurement and measured their determination of biochemical indices and Betatrophin. PCOS patients were given drospirenone ethinylestradiol and metformin for three months after treatment. The above indicators were compared before and after treatment changes. **Results** 1) The levels of body mass index (BMI), waist-hip ratio (WHR), triglyceride (TG), total cholesterol (TC), low density lipoprotein-cholesterol (LDL-C), fasting insulin (FINS), homeostatic model assessment insulin resistance (HOMA-IR), homeostatic model assessment  $\beta$  cell function (HOMA- $\beta$ ), luteinizing hormone (LH), testosterone (T) and Betatrophin in the experimental group were higher than the control one. 2) In the experimental group, the levels of fasting blood glucose (FBS), BS 60 min, BS 120 min, FINS, INS 60 min, INS 120 min, INS 180 min, HOMA-IR, HOMA- $\beta$  in the obese group were higher than those in the non-obese one. 3) In the experimental group, the expression of Betatrophin in the obese group was higher than that in the non-obese one and the obese control group. In the analysis of linear correlation, there was a significantly positive correlation between Betatrophin and age, BMI and T ( $r=0.271$ ,  $r=0.262$ ,  $r=0.158$ ,  $P=0.023$ ,  $P=0.015$ ,  $P=0.026$ ), while Betatrophin was negatively correlated with WHR, HOMA-IR, HOMA- $\beta$  ( $r=-0.321$ ,  $r=-0.076$ ,  $r=-0.156$ ,  $r=-0.027$ ,  $P=0.021$ ,  $P=0.003$ ,  $P=0.006$ ,  $P=0.012$ ). 4) We treated PCOS patients with drospirenone ethinylestradiol and metformin, after which the levels of BMI, WHR, TG, TC, LDL-C, FINS, HOMA-IR, HOMA- $\beta$ , LH, T, Betatrophin were lower than those before. **Conclusion** Betatrophin levels were significantly elevated in PCOS patients. The combination of flextronine and metformin can effectively improve insulin resistance and reduce Betatrophin levels, which is a more effective treatment for PCOS.

**【Key words】** Betatrophin; Polycystic ovary syndrome (PCOS); Insulin resistance; Drospirenone ethinylestradiol; Metformin

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# 辅助生殖医学临床试验受试者顾虑量表的编制及因素分析

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**【摘要】目的** 编制辅助生殖医学临床试验受试者顾虑量表,在量表通过信度与效度分析的前提下,评价及筛选参与/拒绝临床试验的因素。**方法** 通过文献研究和专家咨询确定指标框架,形成预试量表,选取 46 名参与“拮抗剂固定方案和灵活方案在预估卵巢高反应性的中国女性不孕症患者控制性促排卵结果比较的前瞻性、非盲、随机、对照临床研究”(IISP: MISP53759)募集患者对预试量表进行条目及因素分析,调整量表的条目形成最终的正式量表。另外选取 86 名“IISP: MISP53759”募集患者对正式量表进行信效度评价。**结果** 总量表的 Cronbach's  $\alpha$  系数为 0.875, Spearman-Brown 折半信度为 0.874。条目内容效度为 0.832~0.909, 平均测量类内相关性为 0.874( $P<0.001$ ), 12 条目正式问卷适配度指标值在量表研制理论允许范围之内。75 例募集患者选择接受试验(接受组), 11 例拒绝参与 IISP 实验(拒绝组), 接受组和拒绝组间患者基本情况差异无统计学意义, 接受组患者对受试方法可靠性( $4.5\pm 1.1$ )比拒绝组更为关注( $3.8\pm 1.4$ ,  $P=0.04$ ,  $t=1.91$ ); 接受组患者自我压力( $2.9\pm 1.5$ )显著低于拒绝组( $3.8\pm 1.5$ ,  $P=0.02$ ,  $t=-1.86$ )。**结论** 辅助生殖医学临床试验受试者顾虑量表信度与效度良好,能够反映临床试验受试者顾虑,患者的自我压力及受试方法可靠性是患者参与受试的关键因素。

**【关键词】** 量表; 顾虑; 因素

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· 临床研究 ·

**The designing and analysis of worries scale questionnaires for patients participate in the research of assisted reproductive technology**

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**【Abstract】 Objective** To design the worries scale for patients who participate in the research of assisted reproductive technology and to check internal reliability and validity of the scale. To explore the factors that affect the decisions of patients who will likely or reject to participate in the clinical trial. **Methods** The preliminary survey questionnaire was developed based on literature research and professional consults. Totally 46 patients who participate in the “HSP: MISP53759” trial were chosen to complete the preliminary scale and the items were analyzed and revised to formulate the formal scale. Finally, 86 patients were selected for the formal survey of validity analysis and to explore possible affecting factors. **Results** The Cronbach's  $\alpha$ , Spearman-Brown validity of the scale were 0.875 and 0.874 respectively. Content validity and mean content survey correlation were 0.832–0.909 and 0.874 ( $P < 0.001$ ). Fitness of 12 items was inside the allowed range of the formal scale. A total of 75 patients chose to participate the trial while 11 patients reject to participate, demographic information between the two groups were not significantly different. The patients who will participate were more concerned about the reliability of the experimental methods ( $4.5 \pm 1.1$ ) than the patients who rejected ( $3.8 \pm 1.4$ ,  $P = 0.04$ ,  $t = 1.91$ ), the self-stress of the former group ( $2.9 \pm 1.5$ ) was significantly lower than the other group ( $3.8 \pm 1.5$ ,  $P = 0.02$ ,  $t = -1.86$ ). **Conclusion** The scale of the research is good at reliability and validity, and is suitable for measuring the worries of patients who were target population of the research. Reliability of experimental methods and self-stress of patients were two most important influential factors of participating the trial.

**【Key words】** Scale; Patients worries; Factors

**Fund program:** The Basic and Prospective Foundation of the Chongqing (cstc2016jcy JAX0007); the Basic and Prospective Foundation of the Yuzhong District, Chongqing (20150141)

# 初潮年龄对女性绝经年龄及围绝经期综合征影响的横断面研究

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**【摘要】目的** 分析不同月经初潮年龄对女性绝经年龄及围绝经期综合征的影响。**方法:** 采用多阶段整群随机抽样方法, 以在甘肃省居住 $\geq 1$ 年的40~55岁女性为研究对象, 于2016年3—11月期间展开横断面调查。**结果** ①共调查8 500人, 最终纳入分析7 236人。初潮年龄 $\leq 12$ 岁者461例(6.4%), 13~14岁初潮者2 335例(32.3%), 15~16岁初潮者2 838例(39.2%),  $\geq 17$ 岁初潮者1 602例(22.1%)。②共1 673例女性绝经, 平均绝经年龄为 $(47.9 \pm 3.3)$ 岁。随着初潮年龄的增加, 绝经年龄增加, 单因素方差分析显示组间数据差异有统计学意义( $F=12.741$ ,  $P=0.000$ ), 多因素Cox回归分析显示, 初潮年龄早是绝经年龄提前的危险因素。③随着初潮年龄增加, 围绝经期综合征发生率增加, 并且中、重度围绝经期综合征发生率增加( $P=0.000$ )。④多因素logistic回归分析显示, 初潮年龄与围绝经期综合征的严重程度发生无相关性。**结论** 月经初潮年龄越早, 绝经发生越早; 随着初潮年龄增加, 围绝经期综合征发生率增加, 初潮年龄与围绝经期综合征严重程度无相关性。

**【关键词】** 初潮年龄; 绝经年龄; 围绝经期综合征; 横断面研究

· 临床研究 ·

**A cross-sectional study on the effects of age at menarche on age at menopause and perimenopausal syndrome**

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**【Abstract】 Objective** To analyze the effects of different menarche ages on women's natural menopausal age and perimenopausal syndrome. **Methods** A multistage cluster random sampling method was used to study the cross-sectional survey between 40 and 55 years old women living in Gansu province for more than one year from March to November in 2016. **Results** A total of 8 500 people were surveyed and eventually included in the analysis of 7 236 people. There were 461 cases (6.4%) at the menarche age  $\leq 12$  years old, 2 335 cases (32.3%) at the menarche age 13–14 years old, 2 838 cases (39.2%) at the menarche age 15–16 years old, and 1 602 cases (22.1%) at the menarche age  $\geq 17$  years old. A total of 1 673 cases of female menopause, the average age of menopause was  $(47.9 \pm 3.3)$  years old. Univariate ANOVA analysis showed statistically significant differences among groups ( $F=12.741$ ,  $P=0.000$ ). Multivariate Cox regression analysis showed that earlier menarche age was the risk factor for menopausal age. With the increased age of menarche, the rate of perimenopausal syndrome increased, and the incidence of moderate and severe perimenopausal syndrome increased ( $P=0.000$ ). Multivariate logistic regression analysis showed that the menarche age was not associated with the severity of perimenopausal syndrome. **Conclusion** In Gansu province, women with earlier menarche age may be earlier menopause; with the age of menarche increased, the incidence of perimenopausal syndrome increased. The age of menarche had no correlation with the severity of perimenopausal syndrome.

**【Key words】** Age at menarche; Age at menopause; Perimenopausal syndrome; Cross-sectional study

# 脱氢表雄酮能促进体外人卵巢颗粒细胞——KGN 细胞的凋亡

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**【摘要】** 目的 观察脱氢表雄酮 (dehydroepiandrosterone, DHEA) 对体外人卵巢细胞——KGN 细胞株凋亡的影响。方法 用不同剂量的 DHEA (0.01  $\mu\text{mol/L}$ 、0.1  $\mu\text{mol/L}$ 、1  $\mu\text{mol/L}$ 、10  $\mu\text{mol/L}$ ) 处理体外培养的 KGN 细胞, 以不加 DHEA 为阴性对照组, 然后分别用 CCK-8 法和流式细胞术检测 KGN 细胞的活性和凋亡情况; 并通过实时荧光定量逆转录 - 多聚酶链反应 (real-time fluorescent quantitative reverse transcriptase polymerase chain reaction, qRT-PCR) 检测雄激素受体 (androgen receptor, AR)、B 淋巴细胞瘤 -2 (B-cell lymphoma-2, BCL-2) 和 BCL-2 相关 X 蛋白 (BCL-2 associated X protein, BAX) 基因 mRNA 的表达水平; 通过蛋白免疫印迹 (Western blotting) 检测 AR、BCL-2、BAX、细胞外调节蛋白激酶 (extracellular regulated protein kinases, ERK) 及磷酸化 ERK (P-ERK) 的表达水平。结果 与阴性对照组相比, 经 DHEA 处理的 KGN 细胞的活力显著下降 ( $P=0.000$ ), 而且随着 DHEA 剂量的增加, KGN 细胞的凋亡率也随之提高, 其中 10  $\mu\text{mol/L}$  DHEA 干预组的凋亡率与阴性对照组相比, 差异具有统计学意义 ( $P=0.019$ ); 用不同浓度 DHEA 处理 KGN 细胞后, 细胞中 BCL-2 蛋白的表达水平随着 DHEA 浓度的增加逐渐降低, 其中 10  $\mu\text{mol/L}$  DHEA 干预组与阴性对照组相比差异有统计学意义 ( $P=0.007$ ); 与阴性对照组相比, 0.1  $\mu\text{mol/L}$  和 10  $\mu\text{mol/L}$  DHEA 干预组细胞中 BCL-2 mRNA 的表达水平也显著降低 ( $P=0.007$ ,  $P=0.012$ ); 而细胞中 AR 和 BAX 的表达水平无显著变化 ( $P>0.05$ ); 此外, 虽然 DHEA 干预组 KGN 细胞中 ERK 蛋白的表达水平与阴性对照组相比, 差异无统计学意义 ( $P>0.05$ ), 但 P-ERK 蛋白的表达水平随着 DHEA 浓度的增加逐渐降低, 其中 10  $\mu\text{mol/L}$  DHEA 干预组细胞中 P-ERK 蛋白的表达水平显著降低 ( $P=0.005$ )。结论 DHEA 能抑制 KGN 细胞的生长而促进其凋亡, 并伴随着细胞中 BCL-2 蛋白和 P-ERK 蛋白表达水平的下降。

**【关键词】** 脱氢表雄酮 (DHEA); KGN 细胞; 细胞凋亡; B 淋巴细胞瘤 -2 (BCL-2); 磷酸化细胞外调节蛋白激酶 (P-ERK)

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· 实验研究 ·

**Dehydroepiandrosterone can promote the apoptosis of KGN in human ovarian granulosa cells** Tian

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**【Abstract】 Objective** To observe the effect of dehydroepiandrosterone (DHEA) on the apoptosis of KGN cell lines. **Methods** KGN cell line were treated with DHEA at different concentrations (0.01  $\mu\text{mol/L}$ , 0.1  $\mu\text{mol/L}$ , 1  $\mu\text{mol/L}$ , 10  $\mu\text{mol/L}$ ). The activity and apoptosis of KGN cells were detected by CCK-8 assay and flow cytometry respectively. Real-time fluorescent quantitative reverse transcriptase polymerase chain reaction (QRT-PCR) was used to detect the expression of androgen receptor (AR), B-cell lymphoma-2 (BCL-2) and BCL-2 associated X protein (BAX) gene mRNA expression levels. The expression of AR, BCL-2, BAX, extracellular regulated protein kinases (ERKs) and phosphorylated ERKs (P-ERKs) were detected by Western blotting. **Results** Compared with negative control group, cell viability of KGN treated with DHEA decreased significantly ( $P=0.000$ ), and the apoptosis rate of KGN cells increased with the increase of DHEA dose. The apoptosis of KGN treated with 10  $\mu\text{mol/L}$  DHEA was significantly different from that in negative control group ( $P=0.019$ ). The expression of BCL-2 protein gradually decreased with the increasing concentration of DHEA. Differences between DHEA 10  $\mu\text{mol/L}$  group and the negative control group were statistically significant ( $P=0.007$ ). Compared with control group, the expression of BCL-2 mRNA in the cells treated with 0.1  $\mu\text{mol/L}$  and 10  $\mu\text{mol/L}$  DHEA was significantly decreased ( $P=0.039$ ,  $P=0.012$ ), while the expression of AR and BAX in the cells did not change significantly ( $P>0.05$ ). In addition, although the expression level of ERK protein in KGN cells was not significantly different from that in the negative group ( $P>0.05$ ), the expression of P-ERK protein decreased gradually with the increase of DHEA concentration. The expression of P-ERK protein in 10  $\mu\text{mol/L}$  DHEA-treated group was significantly decreased ( $P=0.005$ ). **Conclusion** DHEA can inhibit the growth of KGN cells and promote its apoptosis with the decrease of BCL-2 and P-ERK protein expression, suggesting that DHEA may induce apoptosis of KGN cells through ERK-BCL-2 apoptotic signaling pathway.

**【Key words】** Dehydroepiandrosterone (DHEA); KGN cell line; Cell apoptosis; B-cell lymphoma-2 (BCL-2); Phosphorylated ERK (P-ERK)

**Fund program:** Key Project of Sichuan Provincial Department of Education (15ZA0097); Youth Scientific Research Innovation Team Project of Sichuan Province (17TD0014)

## 卵巢低反应患者卵泡周围血流参数与体外受精 - 胚胎移植结局的关系

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**【摘要】目的** 探讨在体外受精 - 胚胎移植 (IVF-ET) 周期中卵巢低反应患者在人绒毛膜促性腺激素释放激素 (hCG) 注射日卵泡周围血流参数与 IVF-ET 结局的关系。**方法** 收集自 2014 年 9 月—2015 年 9 月期间在本院接受 IVF-ET 治疗患者的临床资料进行回顾性队列分析。在 hCG 注射日行阴道彩色多普勒超声监测卵泡周围血流参数值, 比较收缩期最大血流速度 (PSV)、阻力指数 (RI)、搏动指数 (PI)、动脉收缩期峰值流速 / 舒张末期血流速度比值 (S/D) 4 个血流参数值与妊娠结局的关系。**结果** 154 个周期中, 52 个周期妊娠。①妊娠组 PSV 为  $(14.86 \pm 3.36)$  cm/s, 非妊娠组为  $(12.38 \pm 3.72)$  cm/s, 差异有统计学意义 ( $P=0.000\ 2$ )。而 PI, RI, S/D 组间差异无统计学意义 ( $P>0.05$ )。②随着 PSV 的升高, 且当  $PSV \geq 10.5$  cm/s 时, 直径  $\geq 14$  mm 卵泡数、hCG 注射日雌二醇 ( $E_2$ )、 $M_{II}$  卵细胞率、获卵数、优质胚胎率及临床妊娠率均显著增加, 而与年龄、hCG 注射日内膜厚度、Gn 用量、Gn 使用时间、不孕年限没有显著相关性。**结论** hCG 注射日卵泡周围血流参数  $PSV \geq 10$  cm/s 可以综合评价卵泡的质量及成熟度, 且 PSV 对预测妊娠结局有一定价值。

**【关键词】** 经阴道多普勒超声 (IV-CDS); 体外受精 - 胚胎移植 (IVF-ET); 超促排卵; 卵泡周围血流参数; 妊娠结局

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· 临床报道 ·

**Relationship of the blood flow parameters around the follicle and *in vitro* fertilization-embryo transfer outcome for patients with poor ovarian response**

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**【Abstract】 Objective** To explore the relationship between the blood flow parameters of poor ovarian response patients on human chorionic gonadotropin (hCG) injection day and the outcome of *in vitro* fertilization-embryo transfer (IVF-ET) cycle. **Methods** Patients who received IVF-ET from September 2014 to September 2015 in our hospital were selected. The blood flow parameters around the follicle were monitored by transvaginal color Doppler ultrasound on the day of hCG injection. The relationship between the four flow parameter values including systolic maximum blood flow velocity (PSV), resistance index (RI), pulse index (PI), the late arterial systolic/diastolic peak flow velocity blood flow velocity ratio (S/D), and pregnancy outcome were detected. **Results** 1) The PSV of the pregnancy group was  $(14.86 \pm 3.36)$  cm/s, and was  $(12.38 \pm 3.72)$  cm/s in non-gestation group, with statistically significant differences between the two groups ( $P=0.000$ ). And PI, RI, S/D was not statistically significant between the two groups. 2) With the increase of PSV, and when  $PSV \geq 10.5$  cm/s, the number of follicles with diameter  $\geq 14$  mm, estrogen ( $E_2$ ) on hCG injection day, M II rate of eggs, egg number, high-quality embryo rate and clinical pregnancy rate were significantly increased, but were not collected with age, endometrial thickness on hCG injection day and designed. the Gn used dosage, the Gn used days, infertility duration. **Conclusion** The quality and maturity of follicle can be evaluated comprehensively by the PSV of the surrounding blood flow parameters on hCG injection day, and the PSV has a certain value in predicting the outcome of pregnancy, while PI, RI, S/D cannot predict the pregnancy outcome well.

**【Key words】** Transvaginal doppler ultrasound; *In vitro* fertilization-embryo transfer (IVF-ET); Superovulation; The blood flow parameters around the follicle; Pregnancy outcomes

**Fund program:** Yunnan Health and Technology Planning Project (Z2016093, Z20170777); Applied Basic Research Self-Raised Fund Key Projects of Yunnan Province (2013FZ262)

## 腹腔镜子宫腺肌瘤切除联合子宫动脉阻断术对内膜白血病抑制因子的影响

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**【摘要】目的** 探讨腹腔镜子宫腺肌瘤切除术联合子宫动脉阻断对子宫内膜容受性的影响及意义。

**方法** 选取 2014 年 6 月—2015 年 6 月期间就诊福建省立医院妇科的子宫腺肌病(伴子宫腺肌瘤)患者共 42 例, 随机分对照组( $n=21$ )和观察组( $n=21$ ), 对照组行腹腔镜下子宫腺肌瘤剔除术, 观察组行腹腔镜子宫腺肌瘤剔除联合子宫动脉阻断术。所有患者术后均注射长效促性腺激素释放激素类似物(GnRHa)6 个月。比较两组患者平均年龄、最大腺肌瘤、子宫最大径线和 CA125 水平及患者术前、及术后 12 个月、24 个月子宫内膜容受性标志物——白血病抑制因子(LIF) mRNA 水平。**结果** 患者年龄、最大腺肌瘤径线、子宫最大径线及 CA125 水平组间比较差异均无统计学意义。两组患者术前 LIF mRNA( $0.73 \pm 0.17$ 、 $0.70 \pm 0.18$ )及术后 12 个月 LIF mRNA( $0.98 \pm 0.22$ 、 $0.99 \pm 0.22$ ) 分别比较差异无统计学意义( $P>0.05$ ); 术后 24 个月内膜 LIF mRNA 观察组( $1.02 \pm 0.21$ ) 明显高于对照组( $0.86 \pm 0.22$ )( $P=0.022$ )。**结论** 子宫腺肌瘤病灶切除术联合 GnRHa 治疗可改善 LIF mRNA 的转录; 联合子宫动脉阻断术可有助于子宫腺肌瘤病灶切除术的效用, 有助于改善子宫内膜容受性。

**【关键词】** 子宫腺肌瘤; 子宫动脉阻断术; 腹腔镜; 促性腺激素释放激素类似物(GnRHa); 白血病抑制因子(LIF)

· 临床报道 ·

**Impact of laparoscopic uterine artery occlusion combined with resection of adenomyoma on endometrial luekaemia inhibitory factor**     *Wu Qing, Lin Tan, Liu Yue*

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**【Abstract】 Objective** To observe the impact and the significance of laparoscopic operation of adenomyoma resection on endometrial receptivity with uterine artery occlusion in the operation. **Methods** Since June 2014 to June 2015, 42 patients with adenomyoma received surgery therapy in Department of Gynecology in Fujian Provincial Hospital, randomly divided into control group ( $n=21$ ) who received laparoscopic excision of adenomyoma; and observation group ( $n=21$ ) who received laparoscopic uterine artery occlusion plus excision of adenomyoma. All patients were injected gonadotrophin-releasing hormone analogue (GnRHa) for 6 months. Average age, diameter of the largest adenomyoma, length of uterine before operation and CA125 level were compared. Endometrial luekaemia inhibitory factor (*LIF*) mRNA level was also compared between the two groups which expressed before operation, the twelfth month after resection and the twenty-fourth month after resection. **Results** There were no significant differences in average age, diameter of the largest adenomyoma, length of uterine before operation and CA125 level between the two groups. Endometrial *LIF* mRNA of the two groups before operation ( $0.73 \pm 0.17$ ,  $0.70 \pm 0.18$ ) and the twelfth month after resection ( $0.98 \pm 0.22$ ,  $0.99 \pm 0.22$ ) showed no significance difference ( $P>0.05$ ) respectively. In the twenty-fourth month, endometrial *LIF* mRNA was  $0.86 \pm 0.22$  in control group and  $1.02 \pm 0.21$  in observation group, which showed a significance difference ( $P=0.022$ ). **Conclusion** Resection of adenomyoma combined GnRHa can improve endometrial *LIF* mRNA, combined uterine artery occlusion could enhance the long-term effect of adenomyoma resection which improve the receptivity of endometrial implantation.

**【Key words】** Adenomyoma; Uterine artery occlusion; Laparoscopy; Gonadotrophin-releasing hormone analogue (GnRHa); Luekaemia inhibitory factor (LIF)

## 易筋经对 60~69 岁男性性激素水平的影响

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**【摘要】目的** 探讨 3 个月易筋经锻炼对老年男性性激素水平的影响。**方法** 招募上海市 60~69 岁的无规律运动习惯的老年男性 30 名, 随机分为对照组和易筋经组, 各 15 人。易筋经组每周运动 5 次, 每次 30 min, 持续 3 个月。比较易筋经组与对照组雌二醇 ( $E_2$ )、卵泡刺激素 (FSH)、促黄体生成素 (LH)、泌乳素 (PRL)、孕酮 (PROG)、睾酮 (T)、雌雄激素比 ( $E_2/T$ ) 等性激素水平。**结果** 3 个月后, 易筋经组  $E_2/T$  ( $9.14 \pm 3.82$ ) 相对于对照组 ( $11.05 \pm 5.24$ ) 有显著的降低 ( $P=0.04$ ), T 水平有显著性地提高 [ $(14.54 \pm 4.80)$  nmol/L, ( $13.74 \pm 3.80$ ) nmol/L,  $P=0.02$ ], FSH 有显著性地提高 [ $(11.67 \pm 6.21)$  IU/L, ( $9.58 \pm 5.05$ ) IU/L,  $P=0.04$ ], LH 有显著性地提高 [ $(7.96 \pm 6.58)$  IU/L, ( $5.00 \pm 1.68$ ) IU/L,  $P=0.01$ ]。**结论** 易筋经锻炼能够促进性激素 T、FSH 和 LH 水平升高, 降低雌雄激素比例, 增强老年男性的身体健康。

**【关键词】** 易筋经; 性激素; 老年男性健康

**基金项目:** 上海市科技委员会科研计划项目 (13490503500); 上海体育学院研究生教育创新计划项目 (yjscx2016022)

· 临床报道 ·

**Effects of Yi Jin Jing on sex hormone in 60–69 years old men** *Chen Ting, Wang Ru, Wei Yuqin, Niu Zhanbin, Wang Yang, Liu Xiangyun*

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**【Abstract】 Objective** To explore the effect of Yi Jin Jing for three months on the sex hormones in 60–69 years old men. **Methods** Recruitment 30 elderly men in the age of 61–69 years old, who had irregular exercise habits and were randomly divided into control group or Yi Jin Jing group for 15 persons each group. The Yi Jin Jing group exercised for 5 times a week and 30 min each time for 3 months. The levels of sex hormones such as estradiol ( $E_2$ ), follicle stimulating hormone (FSH), luteinizing hormone (LH), prolactin (PRL), progesterone (P), testosterone (T),  $E_2/T$  were compared between the two groups. **Results** After 3 months,  $E_2/T$  had significantly reduced in Yi jin jing group ( $9.14 \pm 3.82$ ) compared with control group ( $11.05 \pm 5.24$ ) ( $P=0.04$ ), and T level had significantly increased [ $(14.54 \pm 4.80)$  nmol/L,  $(13.74 \pm 3.80)$  nmol/L,  $P=0.02$ ], FSH level had significantly increased [ $(11.67 \pm 6.21)$  IU/L,  $(9.58 \pm 5.05)$  IU/L,  $P=0.04$ ] and LH had significantly increased [ $(7.96 \pm 6.58)$  IU/L,  $(5.00 \pm 1.68)$  IU/L,  $P=0.01$ ]. **Conclusion** Yi jin jing could improve sex hormones levels of FSH, LH and T significantly, reduce the proportion of male and female hormones significantly, and improve the health of elderly men.

**【Key words】** Yi Jin Jing; Sex hormones; Health of elderly men

**Fund program:** Scientific Research Plan Project of Shanghai Science and Technology Commission (13490503500); Postgraduate Education Innovation Project of Shanghai University of Sport (yjscx2016022)

· 个案报道 ·

## 卵母细胞透明带形态异常 1 例病例报道与文献复习

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**【摘要】** 目的 介绍 1 例卵母细胞透明带形态异常不孕患者成功活产的病例。方法 对本院 1 例卵母细胞透明带形态异常不孕患者的临床资料进行分析, 并对相关文献进行系统性回顾。结果 患者孕 40<sup>+</sup> 周成功分娩一男活婴。结论 卵母细胞透明带形态异常可能影响受精、胚胎发育等, 改变受精方式和采用非常规的胚胎激光辅助孵化可获得良好的妊娠结局。

**【关键词】** 卵母细胞; 透明带; 形态异常

· 个案报道 ·

**A case of a morphological abnormality of oocyte zone pellucida resulting a live baby** Zhang Jing,  
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**【Abstract】 Objective** To report a rare case of morphological abnormality of oocyte zone pellucida resulting a live baby. **Methods** The clinical materials from one case with morphological abnormality of oocyte zone pellucida was retrospectively analyzed, and associated literatures were reviewed. **Results** The patient underwent low-segment cesarean section at 40<sup>+1</sup> weeks of gestation and acquired a live baby. **Conclusion** The morphological abnormality of oocyte zone pellucida may affect fertilization and embryo development, change fertilization way and unconventional embryo laser-assisted hatching may be elected.

**【Key words】** Oocyte; Zone pellucida; Morphological abnormality

· 个案报道 ·

## 体外受精 - 胚胎移植治疗过程中合并阑尾炎穿孔 1 例并文献复习

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**【摘要】目的** 探讨体外受精 - 胚胎移植 (IVF-ET) 治疗过程中合并阑尾炎穿孔的诊断及治疗方案。

**方法** 回顾性分析和总结本中心收治的 1 例 IVF-ET 中合并阑尾炎穿孔病例的诊断及治疗方案。**结果** 该患者入院诊断首先考虑为卵巢扭转而未诊断为阑尾炎, 入院后进一步检查及会诊后诊断为阑尾炎, 并行急诊手术治疗后病情恢复出院。**结论** IVF-ET 过程中合并阑尾炎的诊断易于卵巢扭转混淆, 易于穿孔。必要的外科手术干预, 可改善患者的预后。

**【关键词】** 体外受精 - 胚胎移植 (IVF-ET); 卵巢扭转; 阑尾炎穿孔; 卵巢过度刺激综合征 (OHSS)

· 个案报道 ·

**Perforative appendicitis during *in vitro* fertilization-embryo transfer: a case report and literature review**

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**【Abstract】 Objective** To investigate the diagnosis and treatment of perforative appendicitis during *in vitro* fertilization and embryo transfer(IVF-ET) to improve the understanding and reduce misdiagnosis of this disease. **Methods** The diagnosis and treatment of 1 case of IVF-ET with perforative appendicitis in our reproductive center were analyzed retrospectively. **Results** The patient was first diagnosed as ovarian torsion rather than appendicitis, but confirmed as appendicitis through further examinations and consultation after admission. The patient was discharged after emergency operation. **Conclusion** There is a trend of ovarian torsion in the process of IVF-ET because of the enlargement of ovary, especially at the right side, which increases the difficulty of diagnosis of appendicitis. And the ovarian hyperstimulation syndrome (OHSS) caused by IVF-ET will exacerbate the progress of appendicitis, making it easy to be perforative. The necessary surgical intervention can improve the prognosis of patients.

**【Key words】** *In vitro* fertilization and embryo transfer (IVF-ET); Ovarian torsion; Perforative appendicitis; Ovarian hyperstimulation syndrome (OHSS)

## 辅助生殖中电子标签应用于患者身份信息核对及配子的标记识别

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**【摘要】目的** 探讨基于无线射频识别技术 (radio frequency identification, RFID) 的电子标签在女性胚胎移植环节和男性精液收集 2 个关键环节的效率与可靠性。**方法** 电子标签中涵盖患者身份证、指纹及头像三重唯一信息, 本研究将 500 名胚胎移植患者随机分成传统标签 (A1) 组和电子标签 (A2) 组, 另将 500 名精液交样患者随机分成传统标签 (B1) 组和电子标签 (B2) 组, 分别比较这 2 个关键环节身份核对所需的工作量、核对所需时间及对掺杂近似姓名标签的纠错率。**结果** A2 组增加了腕带 RFID 标签环节, 在患者上手术台前, 有充分时间实施三重身份核对并扣带腕带式 RFID 标签, 这使得手术台上的术前身份确认需要的时间  $[(2.17 \pm 1.31) \text{ s}]$  明显短于 A1 组  $[(35.32 \pm 20.65) \text{ s}, P=0.00]$ , A1 组指纹核对一次识别失败比例达 17.0%, 需要多次调整按压位置。在精液收样时确认标签一致性的环节, B2 组的感应核对耗时  $[(2.02 \pm 1.41) \text{ s}]$  显著低于 B1 组的人工核对  $[(37.52 \pm 13.12) \text{ s}, P=0.00]$ , 且在模拟混杂近似标签时, 短时间内人工对传统标签的纠错率为 89.6%, 而感应器对电子标签的纠错率为 100% ( $P=0.00$ )。**结论** 采用含有三重信息的电子标签可以高效可靠地辨识患者身份信息, 保证人与标签的一致性、多个标签的一致性, 多个环节上优化身份核对流程, 提高了辅助生殖中门诊及胚胎实验室管理的效率与安全性。

**【关键词】** 电子标签; 指纹识别技术; 辅助生殖; 患者管理

**Use radio-frequency identification tags in assisted reproductive management to achieve more efficient and reliable identification of identity information**     *Li Dongying, Yan Zhiguang, Zhang Chunrong, Chen Qiuju,*

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**【Abstract】 Objective** To explore the efficiency and reliability of a triple identification system based on radio-frequency identification (RFID) tagging technology. **Methods** This study included two key processes of embryo transplantation and semen collection. Totally 500 women undergoing embryo transplantation were randomly divided into two groups (group A1: traditional tag group; group A2: RFID tag group); 500 men at the process of semen collection were randomly divided into two groups (group B1: traditional tag group; group B2: RFID tag group). The time required for identification was compared at the key processes and the correction rate for distinguishing the doped tags from those with approximate name was also compared between the two groups.

**Results** Group A2 added the wristband RFID tags process. Prior to the operation stage, there was sufficient time to carry out the triple identity check and buckle band RFID tag, which made the preoperative identification on the operating table shorter  $[(2.17 \pm 1.31) \text{ s}]$  than group A1  $[(35.32 \pm 20.65) \text{ s}, P=0.00]$ , and its once failure rate using traditional identification was 17.0%. In semen collection process, the time-consuming by checking the label consistency in group B2  $[(2.02 \pm 1.41) \text{ s}]$  was less than those in group B1  $[(37.52 \pm 13.12) \text{ s}, P=0.00]$ . The correction rate for differentiating the doped tags with approximate name was 89.6% in short time using traditional tags and manual work, however, this differentiating rate by the sensor of RFID tags was 100% ( $P=0.00$ ).

**Conclusion** Using RFID tags can quickly identify the consistency between the patients identity information and tags, the consistency between the tag and tag. So it can optimize the identity verification process, improve the efficiency and reliability of the identity verification.

**【Key words】** Radio-frequency identification (RFID); Identification technology; Fingerprint identification technology; Assisted reproduction; Patient management

· 综 述 ·

## 二步法 ( 序贯 ) 胚胎移植策略在体外受精 - 胚胎移植中的研究进展

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**【摘要】** 体外受精 - 胚胎移植中, 在胚胎质量和子宫内膜容受性良好的情况下, 胚胎与子宫内膜之间的“对话”是胚胎种植的关键。同一周期内胚胎分先后 2 次移植, 最大化地增加胚胎找到并识别子宫与胚胎“种植窗口”同步的机会, 获得较高的种植率。本文从应用进展、适用人群、作用机制、安全性及其未来方向等方面对第 2 日 (D2)/D5 或者 D3/D5 二步法 (序贯) 移植策略进行阐述和总结, 为生殖医生选择最佳的移植决策, 提高胚胎利用率, 从而获得较高的临床妊娠率提供参考, 具有重要的临床应用价值。

**【关键词】** 二步法 (序贯) 移植; 囊胚; 妊娠率; 种植率

**基金项目:** 国家自然科学基金 (81701435)

· 综 述 ·

**Research progress of two-step sequential embryo transfer strategy in *in vitro* fertilization-embryo transfer cycles** Lu Xinmei, Liu Suying, Dong Xi

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**【Abstract】** In *in vitro* fertilization-embryo transfer, the “dialogue” between the embryo and the endometrium is critical for embryonic planting, given the high quality of the embryo and good endometrial receptivity. Embryos were transplanted twice in the same cycle, maximizing the chance of the embryos finding and recognizing the synchrony of the uterus with the “planting window” of the embryos, resulting in higher planting rates. This article elaborates and summarizes the day 2 (D2)/D5 or D3/D5 two-step (sequential) transplantation strategy from the aspects of application progress, applicable population, mechanism of action, safety, and future direction, Which has important clinical application value for the reproductive doctor to select the best transplantation decision, improve the embryo utilization and obtain a higher reference rate of clinical pregnancy.

**【Key words】** Two-step (sequential) transplantation; Blastocyst; Pregnancy rate; Implantation rate

**Fund program:** National Natural Science Foundation of China (81701435)

· 综 述 ·

## 辅助生殖技术后代自闭症谱系障碍发病风险的研究进展

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**【摘要】** 辅助生殖技术 (assisted reproductive technology, ART) 与围产期不良妊娠结局如多胎妊娠、早产、低体质量出生、遗传印记紊乱等密切相关, 而上述不良妊娠结局同样是自闭症谱系障碍 (autistic spectrum disorder, ASD) 发病的危险因素。关于 ART 与后代 ASD 发病率之间是否存在关联一直饱受争议, 尚无定论。本文对既往观察性研究及系统评价进行综述, 以期对两者之间的关系展开初探, 为评估 ART 技术是否对后代长期的神经心理发育造成影响奠定基础。

**【关键词】** 辅助生殖技术 (ART); 自闭症谱系障碍 (ASD); 多胎妊娠; 早产; 低体质量出生; 遗传印记缺陷

· 综 述 ·

**Research advance in the risk of autism spectrum disorders in offspring of assisted reproductive technology**

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**【Abstract】** Assisted reproductive technology (ART) has been closely related to adverse perinatal pregnancy outcomes such as multiple pregnancy, premature birth, low birth weight, genetic imprinting disorders, which were also risk factors of autistic spectrum disorder (ASD). There has been a controversial issue about whether there was an association between ART and ASD, and the result is still inconclusive. Previous observational studies and systematic reviews have been summarized to expand research on the relationship between ART and ASD and to assess whether ART has bad influence on long-term neuropsychological development.

**【Key words】** Assisted reproductive technology (ART); Autistic spectrum disorder (ASD); Multiple pregnancy; Premature birth; Low birth weight; Genetic imprinting disorders

## 肥胖与多囊卵巢综合征的关联性及其潜在机制

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**【摘要】** 肥胖及其并发症已严重影响公众健康。多囊卵巢综合征 (PCOS) 是育龄期女性常见的内分泌代谢病, PCOS 女性易发生肥胖, 肥胖同样可影响 PCOS 的发生。肥胖型 PCOS 女性存在更为严重的内分泌激素紊乱和代谢功能异常。肥胖诱发的代谢紊乱, 包括胰岛素抵抗和高胰岛素血症, 脂肪酸分泌引起的脂毒性, 脂肪因子和慢性炎症反应, 可通过影响下丘脑 - 垂体 - 卵巢轴功能参与 PCOS 的发生、发展。此外, 肠道菌群谱改变和下丘脑炎症也可能是肥胖和 PCOS 关联的潜在机制。

**【关键词】** 肥胖; 多囊卵巢综合征 (PCOS); 体质量指数

**基金项目:** 国家自然科学基金 (81521002)

· 综 述 ·

**Relationship between obesity and polycystic ovary syndrome and its potential mechanisms** Mu Liangshan,

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**【Abstract】** Obesity and its complications have seriously affected public health. Polycystic ovary syndrome (PCOS) is a common endocrine and metabolic disease in women of reproductive age. PCOS women are prone to obesity, and obesity can also affect the occurrence of PCOS. Obese PCOS women have more severe endocrine disorders and metabolic dysfunction. Obesity induced metabolic dysfunction, including insulin resistance and hyperinsulinemia, abnormal secretion of fatty acid and adipokines, and chronic inflammation, lead to the hypothalamic-pituitary ovarian-axis dysfunction. In addition, alterations in gut microbiota and hypothalamic inflammation may also be the underlying mechanisms of obesity-induced PCOS.

**【Key words】** Obesity; Polycystic ovary syndrome (PCOS); Body mass index

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