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应用胚胎植入前遗传学检测技术阻断常染色体显性多囊肾病遗传的中国专家共识

PGT 阻断 ADPKD 遗传专家共识委员会

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【摘要】 常染色体显性多囊肾病 (autosomal dominant polycystic kidney disease, ADPKD) 是最为常见的遗传性肾病, 主要由 *PKD1* 和 *PKD2* 基因突变所致。该疾病的主要病理特点是肾脏囊肿进行性增大增多, 破坏正常肾脏结构, 最终导致终末期肾病。患者只能依靠透析或肾移植维持生命, 给家庭和社会带来沉重负担。应用胚胎植入前遗传学检测技术 (preimplantation genetic test, PGT) 阻断 ADPKD 致病基因遗传可极大地降低患儿出生率, 提高我国出生人口素质。为明确 PGT 阻断 ADPKD 遗传的适宜患者人群, 规范 PGT 阻断 ADPKD 遗传的诊治流程, 我们会同国内相关肾脏病和生殖遗传专家, 结合我国 PGT 的临床实践, 共同讨论和制定本专家共识, 供临床应用参考。

【关键词】 常染色体显性多囊肾病; 胚胎植入前遗传学检测; 遗传阻断; 专家共识

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A Chinese experts' consensus on blocking the inheritance of autosomal dominant polycystic kidney disease with preimplantation genetic test

Expert Consensus Committee of Blocking ADPKD Inheritance by PGT

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【Abstract】 Autosomal dominant polycystic kidney disease (ADPKD) is the most common hereditary kidney disease, and mainly caused by mutations in *PKD1* and *PKD2* genes. The main pathological features of ADPKD are progressive enlargement of renal cysts, destruction of normal renal structure, and eventually leading to end-stage renal disease. Many patients have to maintain life with dialysis or kidney transplantation, which brings heavy burden to the influenced families and society. Blocking the inheritance of ADPKD with preimplantation genetic test (PGT) can significantly reduce the incidence of ADPKD and improve the quality of population. In order to identify the suitable patients for blocking ADPKD inheritance with PGT and standardize the diagnosis and treatment process of blocking ADPKD inheritance with PGT, we discussed and formulated this expert consensus together with relevant domestic kidney disease and reproductive genetic experts, combined with the clinical practice of PGT in China.

【Key words】 Autosomal dominant polycystic kidney disease; Preimplantation genetic test; Blocking inheritance; Expert consensus

Fund program: National Key Research and Development Program of China (2016YFC0901502); National Natural Science Foundation of China (81670612, 81873595); Shanghai Top Priority Key Clinical Disciplines Construction Project (2017ZZ02009)

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宫腔内人工授精妊娠结局相关影响因素： 单中心十年 26 473 个周期回顾性队列研究

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【摘要】 目的 探讨宫腔内人工授精 (IUI) 妊娠结局的相关影响因素。方法 回顾性队列研究 2007 年 1 月至 2017 年 6 月期间在南京医科大学第一附属医院 / 江苏省人民医院生殖医学科就诊的 12 165 对夫妇共 26 473 个夫精人工授精 (AIH) 和供精人工授精 (AID) 周期的临床资料，数据来源于本中心临床辅助生殖技术管理系统 (CCRM) 数据库 (15.2 版本)，研究女方年龄、男方年龄、周期次数、不孕年限、不孕类型、不孕原因、治疗方案和授精时机与妊娠结局的关系。结果 ① AIH 中，女方年龄 ≥ 37 岁者活产率 (4.16%) 显著低于 < 37 岁者 (9.58%, $P < 0.001$)，合并男方年龄 ≥ 45 岁者无一例妊娠；3 个 AIH 周期后累积妊娠率和活产率不再显著增加；女方年龄 < 37 岁者，原发不孕和继发不孕患者不孕年限 ≥ 5 年者的活产率 (8.03%、5.75%) 显著低于不孕年限 < 5 年者 (9.96%、10.91%, $P = 0.001$ 、 $P < 0.001$)；排卵障碍和性功能障碍组的活产率 (13.24%、17.66%) 显著高于男方轻度少弱精子症 (7.04%)、输卵管因素 (6.62%)、子宫内膜异位症 (7.13%) 和不明原因不孕 (7.75%) (P 均 < 0.001)；克罗米芬 (CC)/ 来曲唑 (LE) 联合促性腺激素 (Gn) 方案的活产率 (12.20%、12.52%) 显著高于自然周期 (7.58%)、单独 CC 组 (8.14%)、单独 LE 组 (6.82%)、尿促性腺激素 (hMG) 组 (7.82%) (P 均 < 0.001)；刺激周期排卵前授精的活产率 (10.29%) 显著高于排卵后授精 (8.13%, $P = 0.034$)。② AID 中，不孕类型、治疗方案和授精时机均对妊娠结局没有显著影响 ($P > 0.05$)；女方年龄 ≥ 37 岁者流产率 (37.5%) 显著高于 < 37 岁者 (11.44%, $P < 0.001$)；4 个 AID 周期后累积妊娠率和活产率不再显著增加；CC+Gn 方案的活产率与 LE+Gn 方案类似 (21.04%、20.12%)，但 LE+Gn 方案患者的多胎活产率 (4.80%) 显著低于 CC+Gn 方案者 (12.03%, $P = 0.012$)。结论 不论 AIH 还是 AID，女方年龄均是妊娠结局的最主要影响因素，在 AIH 中，还必须考虑不孕年限、男方年龄和不孕原因对妊娠结局的影响。与 CC+Gn 相比，LE+Gn 可在显著提高活产率的同时降低多胎妊娠的风险。

【关键词】 人工授精；年龄；累积活产率；不孕年限；来曲唑

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Related influencing factors of intrauterine insemination pregnancy outcomes: a retrospective cohort study of 26 473 cycles in single center for 10 years

Sun Yu, Wang Lin, Wu Chunxiang, Liu Jinyong, Meng Yan, Ma Xiang, Huang Jie, Ding Wei, Liu Jiayin, Diao Feiyang

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【Abstract】 Objective To investigate the influencing factors the pregnancy outcomes of intrauterine insemination (IUI). **Methods** From January 2007 to June 2017, a total of 26 473 artificial insemination by husband (AIH) and artificial insemination by donor (AID) cycles of 12 165 couples in the Department of Reproductive Medicine, the First Affiliated Hospital of Nanjing Medical University/Jiangsu Province Hospital were retrospectively analyzed, and the data came from the Center's Clinical Assisted Reproductive Technology Management (CCRM) system database version 15.2. The relationship of pregnancy outcomes to the female age, the male age, the number of cycles, the duration of infertility, infertility types, the cause of infertility, treatment regimens, the timing of insemination was studied. **Results** 1) In AIH, the live birth rate (LBR) (4.16%) of women aged ≥ 37 years was significantly lower than those of <37 years old (9.58%, $P<0.001$), and there was no pregnancy when their husbands aged 45 years or older. After 3 AIH cycles, the cumulative live birth rate (CLBR) and clinical pregnancy rate (CCPR) were no longer significantly increased. If the woman was younger than 37 years old, no matter the primary or secondary infertility patients, the LBR was significantly lower in patients with more than 5 years of infertility (8.03%, 5.75%) than those less than 5 years (9.96%, $P<0.001$; 10.91%, $P<0.001$). The LBR of ovulatory disorder and sexual dysfunction group (13.24%, 17.66%) was significantly higher than that of mild oligospermia and asthenospermia (7.04%), tubal factor (6.62%), endometriosis (7.13%) and unexplained infertility (7.75%) (all $P<0.001$). Clomiphene (CC) or letrozole (LE) combined with gonadotropin (Gn) could achieve higher LBR (12.20%, 12.52%) than natural cycle (7.58%) or CC/LE/hMG used alone (8.14%, 6.82%, 7.82%, $P<0.001$). The LBR of pre-ovulation insemination in the stimulation cycle (10.29%) was higher than that of post-ovulation insemination (8.13%, $P=0.034$). 2) In AID, infertility type, treatment regimen and the timing of insemination had no significantly effect on pregnancy outcome. The abortion rate of women aged ≥ 37 years (37.5%) was significantly higher than that of <37 years old (11.44%, $P<0.001$). After 4 AID cycles, the CLBR was no longer significantly increased. The LBR of CC+Gn regimen was similar to that of LE+Gn regimen (21.04%, 20.12%), but multiple LBR of LE+Gn regimen (4.80%) significantly reduced (12.03%, $P=0.012$). **Conclusion** No matter AIH or AID, the female age is the most important factor influencing the pregnancy outcome. Furthermore, the influence of infertility duration, the male age and the cause of infertility on the pregnancy outcome must be considered simultaneously in AIH. LE+Gn regimen can significantly increase the LBR and diminish the risk of multiple pregnancy compared with CC+Gn.

【Key words】 Insemination; Age factor; Cumulative live birth rate; Infertility duration; Letrozole

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【摘要】目的 探索体外受精 / 卵胞质内单精子显微注射 - 胚胎移植 (IVF/ICSI-ET) 早卵泡期长效方案助孕达满意活产率及安全性的获卵数。**方法** 回顾性分析 2014 年 1 月至 2017 年 10 月期间在江西省妇幼保健院生殖中心行 IVF/ICSI-ET 早卵泡期长效方案助孕的 12 815 个周期的临床资料, 根据获卵数分为 3 组: A 组 (获卵数 ≤ 8) ($n=3279$), B 组 (获卵数 9~17) ($n=7031$), C 组 (获卵数 ≥ 18) ($n=2505$), 分析各组间患者的一般情况、促排卵情况及妊娠结局。再应用 logistic 多元回归模型对潜在混杂因素进行调整, 做出预测概率图, 校正最佳获卵数。**结果** 根据获卵数与实际活产率、高危卵巢过度刺激综合征 (OHSS) 风险取消周期率及中重度 OHSS 发生率的折线图结果显示, 当获卵数在 9~17 个时, 取卵周期活产率 (范围 48.7%~55.2%) 达最高并趋于稳定; 而当获卵数 ≥ 18 个时, 因高危 OHSS 风险取消周期率显著增高。3 组间一般资料, 如年龄、不孕年限、体质量指数 (BMI)、基础卵泡刺激素 (bFSH)、窦卵泡数 (AFC) 差异均有统计学意义 (P 均 $<0.000 1$)。A 组、B 组和 C 组间促性腺激素 (Gn) 使用时间 [(11.39 \pm 2.28) d、(11.78 \pm 2.17) d、(12.28 \pm 2.49) d]、人绒毛膜促性腺激素 (hCG) 注射日雌二醇水平 [(1 365.43 \pm 682.11) ng/L、(2 438.94 \pm 1 112.83) ng/L、(3 918.29 \pm 1 698.42) ng/L]、hCG 注射日孕酮值 [(0.82 \pm 0.44) μ g/L、(0.95 \pm 0.38) μ g/L、(1.14 \pm 0.44) μ g/L]、可利用胚胎数 (1.97 \pm 1.25、3.37 \pm 1.95、5.06 \pm 2.98)、因高危 OHSS 风险取消周期率 (0.12%、2.13%、18.84%)、中重度 OHSS 发生率 (0.06%、1.87%、3.27%)、移植囊胚率 (4.20%、6.70%、35.64%)、种植率 (44.47%、52.62%、58.04%) 均随获卵数增加而显著升高, 差异有统计学意义 (P 均 $<0.000 1$), 而 Gn 使用总量 [(2 946.75 \pm 1 173.42) IU、(2 305.27 \pm 945.69) IU、(1 986.19 \pm 890.02) IU]、hCG 注射日促黄体生成素 (LH) [(0.95 (0.61, 1.43) IU/L、0.91 (0.58, 1.39) IU/L、0.80 (0.49, 1.26) IU/L]、无可利用胚胎取消周期率 (10.77%、3.36%、1.48%)、流产率 (15.25%、12.08%、11.07%) 显著降低 ($P < 0.000 1$)。B 组取卵周期临床妊娠率 (60.60%) 及活产率 (52.33%) 均显著高于 A 组、C 组 (48.10%, 40.60%; 39.64%, 35.45%) ($P < 0.000 1$)。应用 logistic 多元回归模型对潜在混杂因素进行调整, 如年龄、bFSH、AFC、hCG 注射日雌二醇等, 做出预测概率图, 得出当校正获卵数 ≥ 10 个时, 活产率达最高并趋于稳定; 当校正获卵数 ≥ 18 个时, 因高危 OHSS 风险取消周期率显著增高。**结论** 在早卵泡期长效方案中, 获卵数在 10~17 个时, 可在新鲜胚胎移植周期中获得满意的活产率、较低的高危 OHSS 风险取消周期率和中重度 OHSS 发生率, 缩短患者达活产时间。

【关键词】 活产率; 卵巢过度刺激综合征; 受精, 体外; 胚胎移植; 早卵泡期长效方案; 获卵数

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Exploration of optimum number of oocytes retrieved in *in vitro* fertilization/intracytoplasmic sperm injection and embryo transfer with an early follicular phase prolonged protocol

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【Abstract】 Objective To explore an optimal number of oocytes with an early follicular phase prolonged protocol in *in vitro* fertilization/intracytoplasmic sperm injection and embryo transfer (IVF/ICSI-ET) treatment. **Methods** A retrospective analysis of the clinical data of 12 815 cycles with an early follicular phase prolonged protocol in the reproductive center of Jiangxi Provincial Maternal and Child Health Hospital from January 2014 to October 2017, to explore the cut-off value of the number of oocytes retrieved, which associated with observed live birth rate and the cycle cancellation rate for high ovarian hyperstimulation syndrome (OHSS) risk. According to the cut-off value, patients were divided into three groups: group A (oocytes yields were ≤ 8) ($n=3279$), group B (oocytes yields were 9–17) ($n=7031$), group C (oocytes yields were ≥ 18) ($n=2505$), the baseline characteristics and clinical outcomes were analyzed among the three groups. Then applied the logistic multiple regression model to adjust the potential confounders, we constructed a prediction probability nomogram, and adjusted the optimal number of oocytes. **Results** According to the results of the line chart, we found that when the number of oocytes retrieved were 9–17, the live birth rate per oocyte pick up (OPU) cycle yield (range 48.7%–55.2%) was the highest and tended to be stable; when the number of oocytes retrieved were ≥ 18 , the cycle cancellation rate for high OHSS risk was significantly increased. The baseline characteristics among the three groups, such as age, infertility years, body mass index (BMI), basal follicle stimulating hormone (bFSH), antral follicle count (AFC) were statistically significant ($P<0.000 1$). In group A, group B and group C, duration of gonadotropin (Gn) stimulation [(11.39 \pm 2.28) d, (11.78 \pm 2.17) d, (12.28 \pm 2.49) d], estrogen [(1 365.43 \pm 682.11) ng/L, (2 438.94 \pm 1 112.83) ng/L, (3 918.29 \pm 1 698.42) ng/L] and progesterone levels [(0.82 \pm 0.44) μ g/L, (0.95 \pm 0.38) μ g/L, (1.14 \pm 0.44) μ g/L] on human chorionic gonadotropin (hCG) injection day, number of available embryos (1.97 \pm 1.25, 3.37 \pm 1.95, 5.06 \pm 2.98), cycle cancellation rate for high OHSS risk (0.12%, 2.13%, 18.84%), moderate to severe OHSS incidence rate (0.06%, 1.87%, 3.27%), blastocyst transplantation rate (4.20%, 6.70%, 35.64%) and implantation rate (44.47%, 52.62%, 58.04%) were significantly increased with the number of oocytes retrieved among the three groups ($P<0.01$, $P<0.000 1$); meanwhile Gn used dosage [(2 946.75 \pm 1 173.42) IU vs (2 305.27 \pm 945.69) IU vs (1 986.19 \pm 890.02) IU], luteinizing hormone (LH) levels on hCG injection day [0.95(0.61,1.43) IU/L, 0.91(0.58,1.39) IU/L, 0.80(0.49,1.26) IU/L], cycle cancellation rate for unusable embryos (10.77%, 3.36%, 1.48%), and abortion rate (15.25%, 12.08%, 11.07%) were significantly reduced ($P<0.000 1$). The clinical pregnancy rate (60.60%, 48.10%, 40.60%) and the live birth rate per OPU cycle (52.33%, 39.64%, 35.45%) in group B were significantly higher than those in group A and group C ($P<0.01$, $P<0.000 1$). Using the logistic multiple regression model to adjust the potential confounders, such as age, bFSH, AFC, estrogen levels on hCG injection day, to construct a prediction probability nomogram, it was concluded that when the number of oocytes were ≥ 10 , the live birth rate was the highest and tended to stable; when the number of oocytes were ≥ 18 , the cycle cancellation rate for high OHSS risk was significantly increased. **Conclusion** In the early follicular phase prolonged protocol, when the number of oocytes yields was 10 to 17, the satisfactory outcome can be obtained in the fresh embryo transfer cycle, and the duration of patient obtained the live birth can be shortened.

【Key words】 Live birth rate; Ovarian hyperstimulation syndrome; Fertilization *in vitro*; Embryo transfer; Early follicular phase prolonged protocol; Number of oocytes retrieved

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体外受精长方案晚卵泡期不同浓度孕酮干预对妊娠结局的影响

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【摘要】 目的 探讨体外受精 (IVF) 长方案在晚卵泡期不同浓度血清孕酮干预后对新鲜胚胎移植妊娠结局的影响。方法 回顾性分析 2015 年 6 月至 2017 年 12 月期间在厦门大学附属第一医院生殖中心就诊行体外受精 - 胚胎移植 (IVF-ET) 治疗中, 分别行长方案 [促性腺激素释放激素激动剂 (GnRH-a) 组, 352 例] 和拮抗剂方案 [促性腺激素释放激素拮抗剂 (GnRH-A) 组, 277 例] 患者的临床资料, 根据人绒毛膜促性腺激素 (hCG) 注射日血清孕酮水平将患者分为 4 个亚组, A 组: 孕酮水平 $<1.2 \mu\text{g/L}$; B 组: $1.2 \mu\text{g/L} \leq$ 孕酮水平 $<1.5 \mu\text{g/L}$; C 组: $1.5 \mu\text{g/L} \leq$ 孕酮水平 $<1.75 \mu\text{g/L}$; D 组: 孕酮水平 $\geq 1.75 \mu\text{g/L}$, 对比各亚组患者分别行新鲜周期卵裂胚 (第 3 日) 移植和囊胚 (第 5 日) 移植后临床妊娠率、流产率等各项指标。结果 在长方案中, A、B、C、D 组患者的临床妊娠率分别为 55.00%(110/200)、54.17%(39/72)、52.00%(26/50) 和 30.00%(9/30), 而拮抗剂组则分别为 50.71%(71/140)、48.61%(35/72)、35.00%(14/40) 和 20.00%(5/25), 无论哪种促排卵方案中, D 组患者临床妊娠率均低于其他各亚组, 且差异具有统计学意义 ($P < 0.05$)。而拮抗剂方案中, C 组患者临床妊娠率也已经明显下降 ($P < 0.05$)。对比各亚组分别实行卵裂胚和囊胚移植, 拮抗剂方案中处于 D 组行卵裂胚移植者, 临床妊娠率仅为 16.67%, 明显低于其他各亚组。而长方案中 C 组行卵裂胚移植者临床妊娠率 (44.00%) 低于 A 和 B 组患者 (50.00%, 50.00%), 且差异具有统计学意义 ($P < 0.05$)。结论 长方案中晚卵泡期孕酮水平在 $>1.75 \mu\text{g/L}$ 时明显降低妊娠结局, 其中行卵裂胚移植组在孕酮水平上升至 $1.5 \mu\text{g/L}$ 时明显降低临床妊娠率。拮抗剂方案中晚卵泡期孕酮水平高于 $1.5 \mu\text{g/L}$, 明显对临床结局有不利影响。

【关键词】 受精, 体外; 胚胎移植; 孕酮早升; 控制性促排卵; 干预

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Influence of the different concentration of progesterone intervention on pregnancy outcomes in late follicular phase of gonadotropin-releasing hormone agonist cycles of *in vitro* fertilization

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【Abstract】 Objective To evaluate the clinical pregnancy outcomes of *in vitro* fertilization (IVF) cycles undergoing gonadotropin-releasing hormone agonist (GnRH-a) or gonadotropin-releasing hormone antagonist (GnRH-A) protocols in different progesterone concentration intervention in late follicular phase. **Methods** In this retrospective study, the data of 352 IVF GnRH-a and 277 IVF GnRH-A cycles were performed in Reproductive Medical Center of the First Affiliated Hospital of Xiamen University from June 2015 to December 2017. According to the different concentration of progesterone intervention on human chorionic gonadotropin (hCG) injection day, patients were divided into four subgroups (group A, progesterone < 1.2 μg/L; group B: 1.2 μg/L ≤ progesterone < 1.5 μg/L; group C: 1.5 μg/L ≤ progesterone < 1.75 μg/L; group D: progesterone ≥ 1.75 μg/L. The clinical pregnancy rate and the abortion rate were compared among the above groups in which patients received day 3 or day 5 embryos transplanted.

Results The clinical pregnancy rates of the four groups (A-D) undergoing GnRH-a protocol were 55.00% (110/200), 54.17% (39/72), 52.00% (26/50), and 30.00% (9/30), and those undergoing GnRH-A protocol were 50.71% (71/140), 48.61% (35/72), 35.00% (14/40), and 20.00% (5/25), respectively. The clinical pregnancy rates of both group D undergoing different protocols were significantly lower than other progesterone intervention groups ($P < 0.05$). The clinical pregnancy rates undergoing GnRH-A protocol were significantly decreased in group C ($P < 0.05$). The lowest clinical pregnancy rate was 16.67% in group D undergoing GnRH-A protocol with day 3 embryo transplanted, significantly lower than other subgroups. The clinical pregnancy rates undergoing GnRH-a protocol with day 3 embryo transplanted were significantly decreased when progesterone concentration elevated to the level of group C (group C vs. groups A, B: 44.00% vs. 50.00%, 50.00%). **Conclusion** The clinical pregnancy outcomes were significantly decreased when the late follicular progesterone intervention elevated to 1.75 μg/L in those patients undergoing GnRH-a protocol, but in this group with day 3 embryo transplanted, the clinical pregnancy rate was already significantly decreased when progesterone levels elevated to 1.5 μg/L. The clinical pregnancy rates in patients undergoing GnRH-A protocol were also significantly decreased when progesterone intervention elevated to 1.5 μg/L. In this same group with day 3 embryo transplanted, the clinical pregnancy rate was decreased when progesterone levels elevated to 1.2 μg/L although without significant differences.

【Key words】 Fertilization *in vitro*; Embryo transfer; Premature progesterone rise; Controlled ovarian stimulation; Intervention

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高雄激素诱导人卵巢颗粒细胞凋亡和程序性细胞凋亡因子 4 表达上调

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【摘要】目的 探讨高雄激素和程序性细胞凋亡因子 4(PDCD4) 在人颗粒细胞凋亡中的作用。**方法** 在人卵巢颗粒细胞系 KGN 中转染 PDCD4 表达载体, 荧光定量 PCR 的方法检测过表达前后 PDCD4 的表达情况, 应用流式细胞仪技术和 Annexin V 染色检测 PDCD4 过表达对 KGN 细胞凋亡的影响; 应用不同浓度梯度的睾酮 (0、 10^{-7} mol/L、 10^{-6} mol/L、 10^{-5} mol/L) 处理 KGN 细胞, 分别于 24 h 和 48 h 后应用实时定量 PCR 和 Western blotting 的方法检测不同浓度睾酮处理后颗粒细胞中 PDCD4 的表达水平, 通过流式细胞仪技术检测 48 h 后不同浓度梯度的睾酮对颗粒细胞凋亡的影响。应用 PDCD4 小干扰 RNA 在高浓度睾酮 (10^{-5} mol/L) 处理的 KGN 细胞中敲低 PDCD4 的表达, 应用流式细胞仪技术检测 PDCD4 的表达敲低对高雄激素诱导的细胞凋亡的影响。**结果** PDCD4 在人卵巢颗粒细胞系 KGN 细胞中过表达后, Annexin V-PE 染色和流式细胞仪检测结果显示 KGN 细胞凋亡数显著增加 ($P=0.014$)。不同睾酮浓度处理 KGN 细胞, 与 NC 组比, 10^{-5} mol/L 组和 10^{-6} mol/L 组 PDCD4 基因表达水平均上调 (24 h: $P=0.035$, $P=0.038$; 48 h: $P=0.029$, $P=0.009$); PDCD4 蛋白水平表达升高。高浓度的睾酮 (10^{-6} mol/L 和 10^{-5} mol/L) 处理 KGN 细胞 48 h 后, 颗粒细胞凋亡显著增加 (10^{-6} mol/L 组与 NC 组比较 $P=0.036$; 10^{-5} mol/L 组与 NC 组比较 $P=0.028$), 差异具有统计学意义。在 10^{-5} mol/L 浓度睾酮处理的 KGN 细胞中敲低 PDCD4 的表达后, 与未敲低组比, 细胞凋亡率显著降低 ($P=0.038$)。**结论** PDCD4 能促进人卵巢颗粒细胞凋亡, 高浓度睾酮能诱导颗粒细胞凋亡和上调颗粒细胞中 PDCD4 的表达水平, 其诱导颗粒细胞凋亡的机制可能与 PDCD4 介导的凋亡通路有关。

【关键词】 雄激素; 卵巢颗粒细胞; 凋亡; PDCD4; 多囊卵巢综合征

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Hyperandrogen induces apoptosis of human ovarian granulosa cells and up-regulation of PDCD4

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【Abstract】 Objective To investigate the role of PDCD4 in apoptosis of human granulosa cells and to investigate whether hyperandrogen can promote the up-regulation of PDCD4 and participate in the apoptosis of human ovarian granulosa cells. **Methods** The PDCD4 was overexpressed by transfection of PDCD4 expression construct in human ovarian granulosa cell line KGN cells and the transfection efficiency was detected by fluorescence quantitative PCR. The effect of overexpression of PDCD4 on apoptosis of KGN cells was detected by flow cytometry and Annexin V staining. The KGN cells were treated with testosterone of different concentration gradients (0, 10^{-7} mol/L, 10^{-6} mol/L, 10^{-5} mol/L). The expression of PDCD4 was detected by real-time quantitative PCR and Western blotting after 24 h and 48 h of testosterone treatment. The apoptotic effect of testosterone on granulosa cells was detected by flow cytometry after 48 h. PDCD4 small interfering RNA was used to knock down the expression of PDCD4 in KGN cells treated with high concentration of testosterone (10^{-5} mol/L). Flow cytometry was used to detect the effect of PDCD4 knockdown on apoptosis induced by high androgen. **Results** After overexpression of PDCD4 in KGN cells, results of Annexin V-PE staining and flow cytometry showed a significant increase in apoptosis of KGN cells ($P=0.014$). KGN cells were treated with different concentrations of testosterone. Compared with NC group, the expression level of PDCD4 mRNA in 10^{-5} mol/L group and 10^{-6} mol/L group was up-regulated (24 h: $P=0.035$, $P=0.038$; 48 h: $P=0.029$, $P=0.009$); the expression level of PDCD4 protein was also up-regulated. After treatment of KGN cells with high concentration of testosterone (10^{-6} mol/L and 10^{-5} mol/L) for 48 h, apoptosis of granulosa cells increased significantly ($P=0.036$ in 10^{-6} mol/L group compared with NC group; $P=0.028$ in 10^{-5} mol/L group compared with NC group). After knockdown of PDCD4 expression in KGN cells treated with 10^{-5} mol/L testosterone, the apoptosis rate was significantly lower than that in the non knockdown group ($P=0.038$). **Conclusion** PDCD4 can promote the apoptosis of human ovarian granulosa cells. High concentration of testosterone can induce the apoptosis and up-regulate the expression of PDCD4 in granulosa cells. The mechanism of apoptosis of granulosa cells induced by high concentration of testosterone may be related to apoptotic pathway mediated by PDCD4.

【Key words】 Androgen; Ovarian granulosa cells; Apoptosis; PDCD4; Polycystic ovary syndrome

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重组促黄体生成素与重组卵泡刺激素用于体外受精 / 卵胞质内单精子显微注射的 Meta 分析

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【摘要】目的 评价体外受精(IVF)/卵胞质内单精子显微注射(ICSI)治疗周期重组促黄体生成素(rLH)与重组卵泡刺激素(rFSH)在控制性卵巢刺激(COS)中的有效性。**方法** 计算机检索 PubMed、EMbase、The Cochrane Library、ClinicalTrials.gov、CNKI、VIP 和万方数据库, 搜集 rLH 联合 rFSH 与单独应用 rFSH 在 IVF 或 ICSI 治疗周期 COS 的随机对照试验(RCT), 检索时限均为从建库至 2018 年 6 月。由 2 位评价者按照纳入与排除标准独立筛选文献、提取资料并评价纳入研究的偏倚风险后, 采用 RevMan5.3 软件进行 Meta 分析。**结果** 共纳入 24 项研究, 5356 例患者。Meta 分析结果显示: 与单独应用 rFSH 组比较, rLH 联合 rFSH 组能有效提高临床妊娠率($RR=1.10$, $95\% CI=1.00\sim 1.21$, $P=0.04$), 并能降低卵巢过度刺激综合征(OHSS)发生率($RR=0.16$, $95\% CI=0.03\sim 0.89$, $P=0.04$)。在活产率($RR=1.22$, $95\% CI=0.65\sim 2.30$, $P=0.53$)、持续妊娠率($RR=1.13$, $95\% CI=0.97\sim 1.31$, $P=0.11$)及流产率($RR=0.76$, $95\% CI=0.50\sim 1.17$, $P=0.21$)方面, 两组间差异均无统计学意义。**结论** 现有证据表明, rLH 联合 rFSH 组能有效提高临床妊娠率, 并能降低 OHSS 发生率。但受纳入研究的质量限制, 上述结论尚需开展更多高质量研究予以验证。

【关键词】 重组促黄体生成素; 重组卵泡刺激素; 受精, 体外; 卵胞质内单精子显微注射; 系统评价; Meta 分析

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Application of recombinant luteinizing hormone and recombinant follicle stimulating hormone for *in-vitro* fertilization/intracytoplasmic sperm injection: a Meta analysis

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【Abstract】 Objective To compare the effectiveness of recombinant luteinizing hormone (rLH) combined with recombinant follicle-stimulating hormone (rFSH) compared with rFSH alone in women undergoing *in-vitro* fertilization/intracytoplasmic sperm injection (IVF/ICSI). **Methods** The databases including PubMed, EMBase, The Cochrane Library, ClinicalTrials.gov, CNKI, VIP and Wanfang were electronically searched to collect randomized controlled trials (RCTs) comparing rLH combined with rFSH versus rFSH alone in IVF/ICSI cycles from inception to June 2018. Two reviewers independently screened literature, extracted data and assessed the risk of bias of included studies. Then Meta-analysis was conducted by RevMan5.3 software. **Results** A total of 24 studies involving 5356 patients were included. The results of Meta-analysis showed that, compared with the rFSH alone group, the rLH combined with rFSH group could significantly improve the clinical pregnancy rate ($RR=1.10$, 95% $CI=1.00-1.21$, $P=0.04$), significantly reduce the ovarian hyperstimulation syndrome (OHSS) rate ($RR=0.16$, 95% $CI=0.03-0.89$, $P=0.04$). While there were no significant differences in live birth rate ($RR=1.22$, 95% $CI=0.65-2.30$, $P=0.53$), ongoing pregnancy rate ($RR=1.13$, 95% $CI=0.97-1.31$, $P=0.11$) and miscarriage rate ($RR=0.76$, 95% $CI=0.50-1.17$, $P=0.21$) between the two groups. **Conclusion** Current evidence shows that rLH combined with rFSH can improve the clinical pregnancy and reduce the incidence of OHSS. Due to the limited quality and quantity of included studies, more high quality studies are needed to verify the above conclusion.

【Key words】 Recombinant luteinizing hormone; Recombinant follicle-stimulating hormone; Fertilization *in-vitro*; Intracytoplasmic sperm injection; Systematic review; Meta analysis

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反复移植失败相关因素回顾性分析

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【摘要】目的 探讨反复移植失败的影响因素。方法 回顾性研究 2018 年 3 月至 2018 年 12 月期间在山西省妇幼保健医院行常规体外受精 / 卵胞质内单精子显微注射 (IVF/ICSI) 治疗并进行营养咨询的女性患者 3263 例, 按照移植后结局分为移植成功组 (对照组, $n=620$) 和反复移植失败组 ($n=368$)。通过观察比较寻找反复移植失败的相关因素。**结果** ①基本指标: 对照组年龄、不孕年限、继发不孕的比例、膳食结构不均衡的比例、选择 ICSI 助孕的比例均比反复移植失败组小, 差异有统计学意义 ($P=0.000 1$, $P=0.021$, $P=0.000 1$, $P=0.000 1$, $P=0.000 1$)。②实验室指标: 对照组获卵数、M_{II} 卵数、双原核 (2PN) 数、卵裂数、可移植胚胎数、剩余冷冻胚胎数比反复移植失败组多, 差异有统计学意义 (P 均 $=0.0001$)。③代谢指标: 对照组胆固醇 ≥ 5.2 mmol/L 的比例、甘油三酯 ≥ 1.7 mmol/L 的比例、高密度脂蛋白 (HDL) <1.29 mmol/L 的比例、白蛋白 <40 g/L 的比例较反复移植失败组低, 差异有统计学意义 ($P=0.044$, $P=0.027$, $P<0.001$, $P<0.001$)。④ logistic 回归分析: 不孕年限、2PN 数、可移植胚胎数、HDL <1.29 mmol/L、白蛋白 <40 g/L 等与反复移植失败密切相关。**结论** 膳食失衡导致白蛋白、HDL 降低, 增加代谢综合征的发生, 影响 2PN 数、可移植胚胎数, 最终影响血液循环, 导致反复移植失败。

【关键词】蛋白质; 血脂; 代谢综合征; 膳食均衡; 反复移植失败

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Retrospective analysis of factors related to repeated transplantation failure

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【Abstract】 Objective To investigate the factors of repeated transplant failure, and the correlation between repeated transplantation failure with general characteristics, embryonic laboratory conditions and metabolic indicators etc. **Methods** From March 2018 to December 2018, 3263 female patients who received routine *in vitro* fertilization/intracytoplasmic sperm injection (IVF/ICSI) treatment and nutrition consultation in Shanxi Maternal and Child Health Care Hospital were selected to analyze the related factors which affected the failure of repeated transplantation. The patients were divided into successful transplantation group (control group, 620 cases) and repeated transplantation failure group (failure group, 368 cases) depend on the result of transplantation. Those patients were observed and compared between the two groups about those factors. **Results** 1) Basic indicators: the age of control group was younger than that of the failure group ($P=0.000$). The duration of infertility in control group was shorter than that in the failure group ($P=0.021$). The rate of secondary infertility, the rate of unbalanced dietary, the rate of ICSI pregnancy in control group were lower than those in the failure group (all $P=0.000$). 2) Laboratory indicators: the number of eggs obtained, the number of M_{II} eggs, the number of two pronuclear (2PN), the number of cleavage eggs, the number of embryos, the number of remaining frozen embryos in control group were more than those in the failure group (all $P=0.000$). 3) Metabolic index: the ratio of cholesterol (TC) ≥ 5.2 mmol/L, the ratio of triglycerides (TG) ≥ 1.7 mmol/L, the ratio of high density lipoprotein (HDL) <1.29 mmol/L, the ratio of albumin (<40 g/L) in control group were lower than those in the failure group ($P=0.044$, $P=0.027$, $P<0.001$, $P<0.001$). 4) Logistic regression analysis: infertility duration, 2PN number, number of embryos prepared, HDL <1.29 mmol/L and albumin <40 g/L were closely related to repeated transplantation failure. **Conclusion** Dietary imbalance leads lower albumin and HDL, which increases the occurrence of metabolic syndrome, impairs the number of 2PN and the number of embryos, and finally affects the blood circulation, leading to the failure of repeated transplantation.

【Key words】 Albumin; Lipid; Metabolic syndrome; Dietary balance; Repeated transplantation failure

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卵泡敏感指数预测体外受精 / 卵胞质内单精子显微注射患者妊娠结局的价值

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【摘要】 目的 探讨卵泡敏感指数 (follicular sensitivity index, FSI) 预测接受体外受精 (IVF)/ 卵胞质内单精子显微注射 (ICSI)- 胚胎移植 (ET) 患者临床结局的价值。方法 选择 2009 年 4 月至 2015 年 12 月苏北人民医院生殖中心行 IVF/ICSI-ET 的不孕症妇女, 选择长方案促排卵治疗, 最终纳入 1218 个取卵周期, 1946 个移植周期, 共分为 3 组: 低 FSI 组 (397 个周期)、中 FSI 组 (415 个周期)、高 FSI 组 (406 个周期)。比较 3 组患者数据, 评价 FSI 与治疗结局的相关性。结果 FSI 的受试者工作特征 (ROC) 曲线下面积为 0.644。高 FSI 组女性排卵前卵泡数 (PFC)、卵泡输出率 (FORT)、获卵数、优质胚胎数、可移植胚胎数、种植率、活产率、累计妊娠率较高, 3 组间这些指标的差异具有统计学意义 (P 均 <0.05)。多因素分析显示促性腺激素 (Gn) 使用总量、PFC 及年龄是对 FSI 具有统计学意义的指标 ($P < 0.05$)。结论 FSI 是 IVF/ICSI-ET 治疗中预测妊娠结局的有效指标, FSI 高的患者具有较理想的妊娠结局。

【关键词】 卵泡敏感指数; 受精, 体外; 卵胞质内单精子显微注射; 胚胎移植; 妊娠结局

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Value of follicle sensitivity index in predicting the pregnancy outcomes in patients with *in vitro* fertilization/intracytoplasmic sperm injection

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【Abstract】 Objective To investigate the value of follicular sensitivity index (FSI) in predicting the pregnancy outcomes in patients undergoing *in vitro* fertilization (IVF)/intracytoplasmic sperm injection (ICSI)-embryo transfer (ET). **Methods** The data of infertility women undergoing the IVF/ICSI-ET in the Reproductive Center of the North Jiangsu People's Hospital from April 2009 to December 2015 were collected. Only long-term ovulation treatment was adopted, and finally 1218 egg-taking cycles and 1946 transplantation cycles were included. Those women were grouped into three groups: the low FSI group (397 cycles), the medium FSI group (415 cycles) and the high FSI group (406 cycles). Patients' data of three groups were compared to evaluate the association between FSI and treatment outcome. **Results** The area under the receiver operating characteristic (ROC) curve of FSI was 0.644. In the high FSI group, preovulatory follicle count (PFC), follicle output rate (FORT), number of retrieved oocytes, number of high-quality embryos, number of transplantable embryos, planting rate, live birth rate, and cumulative pregnancy rate were higher than those in the low FSI group and the medium FSI group. The difference among the three groups was statistically significant ($P < 0.05$). Multivariate analysis showed that total gonadotropin (Gn), PFC and age were statistically significant for FSI ($P < 0.05$). **Conclusion** FSI is an effective predictor of pregnancy outcome in IVF/ICSI-ET treatment, and patients with high FSI have an ideal pregnancy outcome.

【Key words】 Follicular sensitivity index; Fertilization *in vitro*; Intracytoplasmic sperm injection; Embryo transfer; Pregnancy outcome

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特殊部位异位妊娠 3 例临床分析

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【摘要】目的 探讨特殊部位异位妊娠的临床诊断和治疗方法。**方法** 对上海市闵行区中心医院收治的 3 例特殊部位妊娠的患者的临床资料进行回顾性分析并复习相关文献。**结果** 对 3 例患者行腹腔镜下探查术, 术后病理均为绒毛组织, 分别诊断为腹膜后妊娠、输卵管间质部妊娠和阔韧带妊娠。**结论** 特殊部位的异位妊娠患者临床症状无特异性, 术前诊断较困难。治疗目前仍以手术为主。腹腔镜具有创伤小, 视野广, 恢复快等优势, 是首选的手术方式, 但需加强腹腔镜的手术技能, 减少输卵管残端妊娠等并发症的发生。术中 B 超引导下寻找特殊部位病灶值得临床应用。

【关键词】 异位妊娠; 特殊部位; 腹腔镜; 诊断; 治疗

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Clinical analysis of 3 cases with special site ectopic pregnancy

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【Abstract】 Objective To investigate the clinical diagnosis and treatment of the special site ectopic pregnancy. **Methods** Relevant literatures were reviewed and the clinical information from the three patients with special site ectopic pregnancy in Minhang Central Hospital was analyzed. **Results** After laparoscopic surgeries for the three patients, the postoperative pathology of them was chorion. They were separately diagnosed with a retroperitoneal ectopic pregnancy, an interstitial tubal pregnancy and a broad ligament pregnancy. **Conclusion** The ectopic pregnancy in specific body areas has no same typical symptom. It is hard to be diagnosed before surgery. The main current treatment is laparoscopic surgery, which has some benefits, such as with small open wounds, broaden horizon, quick recovery. It is the preferred surgical method. But we need improve the laparoscopic surgery skills to reduce the risk of complication, such as the tubal stump fistula. Ultrasound during surgery to find the lesions can be widely used.

【Key words】 Ectopic pregnancy; Special site; Laparoscope; Diagnosis; Treatment

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构建人类辅助生殖技术医联体助力分级诊疗实施

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【摘要】目前我国人类辅助生殖技术医疗资源分布呈“倒金字塔”配置,导致“看病难、看病贵”,为此,本文通过云南省第一人民医院人类辅助生殖技术医联体模式的实践,探讨基于医联体助力分级诊疗服务体系实施的对策与建议。首先,成立专家团队工作站医联体联盟;其次,建立区域医疗卫生信息共享网络;最后,以“基层首诊,双向转诊,急慢分治,上下联动”为核心构建分级诊疗服务体系。本研究通过实证分析,证明该模式能有效促进医疗资源下沉,优化医疗资源的合理配置,能大大减轻患者的经济负担(误工费、差旅费等),大大减少患者就诊的时间成本(路途来回奔波、预处理和前期治疗时间等),使患者享受转诊前后医疗服务的连续性和便捷性,有效缓解了“看病难、看病贵”的问题,同时也增加了当地医疗机构的收入,取得了良好的社会效益。

【关键词】 医联体; 分级诊疗; 辅助生殖技术

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Building medical treatment alliance of human assisted reproductive technology support the accomplishment of hierarchical diagnosis and treatment system

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【Abstract】 The present resource distribution of human assisted reproductive technology (ART) is “inverted pyramid”, so that it leads to the difficulty and expense of medical service. Therefore, through the practice of building medical treatment alliance of human ART in the First People's Hospital of Yunnan Province, we discuss the strategy and proposal of how to support the accomplishment of hierarchical diagnosis and treatment system based on the medical treatment alliance of human ART. Firstly, medical treatment alliance of the expert team workstation should be established. Secondly, the regional health information sharing network is built. Lastly, the hierarchical diagnosis and treatment system will be built with the perception of “first diagnosis in substratum, dual referral, treat based on urgency or less urgency, upper and lower linkage”. Through empirical analysis, medical treatment alliance can promote the sink of medical resources, optimize the rational allocation of medical resources, greatly reduce the economic burden of patients (charge for loss of working time, travel expense), greatly reduces patients' time costs (go back and forth, pretreatment, prophase treatment), so that patients enjoy the continuity and convenience of medical services before and after referral, effectively relieve the difficulty and expense of medical service. It also increases the income of local medical institutions and achieves good social benefits.

【Key words】 Medical treatment alliance; Hierarchical diagnosis and treatment; Assisted reproductive technology

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辅助生殖技术子代安全性及对策思考

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【摘要】 随着不孕症发病率的增加和辅助生殖技术 (assisted reproductive technology, ART) 的发展, 通过 ART 出生的人群在社会总人口中占比不断增大, ART 所涉及的非生理性干预是否会对子代的安全造成隐患, 这一问题逐渐引起生殖领域研究者们的关注。虽然多数研究报道对 ART 安全性持乐观态度, 但也不乏一些令人担忧的研究结果。本文从围产儿结局、出生缺陷、内分泌代谢疾病、体格认知发育异常和儿童期肿瘤方面, 综述近几年的研究结果, 思考如何提高 ART 母体及子代的安全性。

【关键词】 生殖技术, 辅助; 先天畸形; 内分泌系统疾病; 认知障碍

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Research advance in the risk of offspring with assisted reproductive technology and strategies to improve the safety of maternity and progeny

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【Abstract】 With the increase in the incidence of infertility and the development of assisted reproductive technology (ART), the proportion of people born through ART in the total population of the society is increasing. It causes wide attention whether or not the non-physiological interventions involved in ART would threaten the safety of the offspring. Although most studies suggest that ART is safety, there are some worrying findings. This article reviews the results of perinatal outcomes, birth defects, endocrine and metabolic diseases, physical and cognitive abnormalities and childhood tumors, and considers how to improve the safety of maternity and progeny.

【Key words】 Reproductive techniques, assisted; Congenital abnormalities; Endocrine system diseases; Cognition disorders

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封闭抗体阴性复发性流产患者主动免疫治疗的研究进展

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【摘要】 不明原因复发性流产是一种严重的妊娠期并发症, 严重影响患者身体和心理健康, 目前观点认为同种免疫异常是其发生的主要原因。主动免疫已应用于封闭抗体阴性复发性流产患者的治疗, 但其安全性和有效性目前尚未达到共识, 其作用机制尚未完全阐明。本文就主动免疫用于封闭抗体阴性不明原因复发性流产治疗的研究现状和进展加以综述。

【关键词】 封闭抗体; 主动免疫; 不明原因性复发性流产; 淋巴细胞免疫治疗

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Research advances in active immunotherapy for unexplained recurrent spontaneous abortion with negative blocking antibodies

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【Abstract】 Unexplained recurrent spontaneous abortion is a serious pregnancy complications that badly affects the physical and mental health of patients. The use of active immunization in the treatment of recurrent pregnancy loss with negative blocking antibodies has a long history, but its safety and efficacy have not reached consensus and its mechanism of action has not been fully elucidated. This paper reviews the current status and progress of studies on the active immunotherapy of unexplained recurrent spontaneous abortion with negative blocking antibodies.

【Key words】 Antibodies, blocking; Immunity, active; Unexplained recurrent spontaneous abortion; Lymphocyte immunotherapy

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多囊卵巢综合征的体脂分布特征

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李东和赵越对本文有同等贡献

【摘要】 肥胖和体脂代谢是困扰多囊卵巢综合征 (PCOS) 患者的主要问题之一, 是引起 PCOS 远期并发症的重要因素。PCOS 女性的肥胖比例普遍高于正常女性, 且多表现为特征性的腹型肥胖。腹部脂肪量独立于全身脂肪量, 与糖、脂代谢紊乱、胰岛素抵抗、高雄激素血症呈正相关。了解体脂分布在 PCOS 发病中的作用对其治疗具有重要意义。

【关键词】 多囊卵巢综合征; 体脂分布; 胰岛素抵抗; 腹型肥胖

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Fat distribution features in women with polycystic ovary syndrome

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【Abstract】 Obesity and dysfunctional lipid metabolism are core problems of polycystic ovary syndrome (PCOS) patients and key risk factors for complications of PCOS. PCOS women have a higher incidence of obesity than healthy women and usually exhibit as abdominal obesity. Abdominal fat is independent from body fat, but correlates with impairment in glucose and lipid metabolism, insulin resistance and hyperandrogenemia. Understanding how body fat distributes to the pathogenesis of PCOS is crucial for developing therapeutic interventions.

【Key words】 Polycystic ovary syndrome; Body fat distribution; Insulin resistance; Abdominal obesity

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年轻妇科恶性肿瘤患者保留生育力及再生育治疗的研究进展

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【摘要】随着首次妊娠的高龄化趋势以及妇科恶性肿瘤(宫颈癌、卵巢癌、子宫内膜癌)患病的年轻化,越来越多的年轻妇科肿瘤患者未完成生育使命。另一方面,随着妇科恶性肿瘤的早期诊断及治疗方案的日益成熟,肿瘤患者生存率大大提高。如何在不影响肿瘤治疗的情况下,选择适合年轻妇科肿瘤患者保留生育力的方案,让其后续生育愿望得以实现,是临床医师在治疗肿瘤时需要考虑的问题,也是生殖医学面临的挑战。本文结合妇科恶性肿瘤的分期,对保留生育力治疗的指征、手术方式、治疗后的妊娠时机及随访情况、助孕方式、保留生育力治疗后肿瘤复发如何处理等问题,结合国内外相关指南和专家共识进行综述,旨在为临床治疗提供指导。

【关键词】 妇科恶性肿瘤; 肿瘤手术治疗; 生育力保存

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Research progress on fertility preservation and reproduction therapy for young gynecological malignant tumor patients

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【Abstract】 With the aging trend of the first pregnancy and the younger onset of gynecological malignancies (cervical cancer, ovarian cancer, endometrial cancer), more and more young gynecological cancer patients have not completed their reproductive mission. On the other hand, with the maturation of early diagnosis and treatment of gynecological malignant tumors, the tumor survival rate has been greatly improved. How to choose a plan suitable for young gynecologic cancer patients to retain fertility without affecting the treatment of malignant tumors, so that their subsequent fertility aspirations can be realized, is a problem that clinicians need to consider when treating tumors, and is also a challenge for reproductive medicine. Combined with the stage of gynecologic malignant tumor, this article reviews the indications, surgical methods, the timing and follow-up of pregnancy after treatment, the methods of helping pregnancy, and how to deal with the recurrence of tumor after fertility preservation treatment, to provide guidance for clinical treatment.

【Key words】 Gynecological malignant tumor; Tumor surgical treatment; Fertility preservation

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卵丘细胞与卵母细胞间的双向通信

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【摘要】 卵丘细胞 (cumulus cell, CCs) 与卵母细胞之间的双向通信机制是近年来人们研究的热点。CCs 与卵母细胞间的小分子物质运输、信号转导通过缝隙连接调控卵母细胞的发育与排卵。卵母细胞通过自身分泌卵母细胞分泌因子 (oocyte secreted factors, OSFs) 决定 CCs 的增殖和分化, 进而调节卵母细胞的发育与预防卵泡黄素化, OSFs 与糖酵解途径也密切相关。此外, 非编码 RNA (non-coding RNA, ncRNAs) 在雌性生殖细胞中的作用研究, 为进一步完善二者间的双向通信机制提供了新的思路。CCs 与卵母细胞间的双向通信机制非常复杂, 阐明该作用机制仍面临巨大挑战, 本文旨在对 CCs 与卵母细胞间的双向通信机制的研究现状作一综述。

【关键词】 卵丘细胞; 卵母细胞; 双向通信; 非编码 RNA

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Bidirectional communication between cumulus cells and oocytes

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【Abstract】 The bidirectional communication mechanism between cumulus cells (CCs) and oocytes are currently being investigated. Small molecule transport and signal transduction between CCs and oocytes regulate oocyte development and ovulation through gap junction. Oocytes determine the proliferation and differentiation of CCs by secretion of oocyte-secreted factors (OSFs), thereby regulating the development of oocytes and preventing follicular luteinization. In addition, OSFs are also closely related to the glycolytic pathway. In recent years, by studying the role of non-coding RNAs (ncRNAs) in female germ cells, new ideas have been provided to further improve the bidirectional communication mechanism. Because the bidirectional communication mechanism between CCs and oocytes is very complicated, it is still a huge challenge to clarify the mechanism of action. This article aims to review bidirectional communication mechanism between CCs and oocytes.

【Key words】 Cumulus cells; Oocytes; Bidirectional communication; Non-coding RNAs

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唾液酸对哺乳动物生殖功能影响的研究进展

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【摘要】 唾液酸广泛分布于各种生物体内, 是糖蛋白和糖脂糖链末端的一种九碳单糖, 在调控生物体内生物学功能中扮演了重要角色, 并且与人类的健康和疾病密切关联。在哺乳动物生殖系统中, 唾液酸在精子和卵细胞生理功能成熟、精卵结合和胚胎着床等过程中十分关键, 还在生殖异常的发生和男女性不明原因性不孕不育中起重要作用。本文将对上述过程的研究进展作一综述。

【关键词】 唾液酸; 生殖; 不孕不育

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Progress in research on the effects of sialic acid in mammalian reproductive function

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【Abstract】 Sialic acid is widely distributed in various organisms. It is a nine-carbon monosaccharide binding to the terminal of glycan chain on glycoprotein and glycolipid. It plays an important role in regulating the biological functions in organisms, and is closely related to the health and disease of human. In the mammalian reproductive system, sialic acid is not only critical in the maturation of physiological function of sperm and egg, the process of sperm-egg binding and embryo implantation, but also participates in many regulations of reproduction functions and the occurrence of reproduction abnormality, especially in unexplained infertility. In this review, we briefly report the recent research progress of sialic acid function in mammalian reproductive system.

【Key words】 Sialic acid; Reproduction; Infertility

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