

中药改善早发性卵巢功能不全的作用机制研究进展^Δ

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摘要 早发性卵巢功能不全(POI)是严重影响女性生殖健康的生殖内分泌疾病,但临床仍缺乏能够有效恢复卵巢功能且安全性理想的治疗手段。中药凭借多成分、多靶点的整体调节优势,在防治POI方面展现出独特潜力。中药单体中,姜黄素、白藜芦醇、淫羊藿苷可通过调控核转录因子红系2相关因子2/血红素加氧酶1、磷脂酰肌醇3激酶/蛋白激酶B、促分裂原活化的蛋白激酶等信号通路,发挥抗氧化、抗炎及抑制卵巢颗粒细胞凋亡等作用;单味中药如西洋参、菟丝子、肉苁蓉等能调节性激素水平,改善卵巢氧化应激与免疫损伤;中药复方如益经汤、四物汤、左归丸、坤泰胶囊等则可通过调控血管内皮生长因子/血管内皮细胞生长因子受体2、磷脂酰肌醇3激酶/蛋白激酶B/哺乳动物雷帕霉素靶蛋白、沉默信息调节因子1/p53等多条信号通路,促进血管生成、抑制线粒体凋亡、调节细胞自噬与铁死亡,从而延缓卵泡闭锁,改善卵巢储备功能。建议后续学者可利用人工智能技术,深入探索相关作用机制,并开展高质量的临床试验,推动中医药在POI防治中的规范化应用。

关键词 早发性卵巢功能不全;卵巢早衰;中药;单体;复方;作用机制

Research progress on the mechanisms of traditional Chinese medicine in improving premature ovarian insufficiency

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ABSTRACT Premature ovarian insufficiency (POI) is a reproductive endocrine disorder that severely affects female reproductive health. However, there remains a lack of clinically effective and safe therapeutic options to restore ovarian function. Traditional Chinese medicine (TCM), with its advantages of multi-component and multi-target holistic regulation, has shown unique potential in the prevention and treatment of POI. Among TCM monomers, curcumin, resveratrol, and icariin exert antioxidant, anti-inflammatory, and anti-ovarian granulosa cell apoptosis effects by regulating signaling pathways such as nuclear factor-erythroid 2-related factor 2/heme oxygenase-1, phosphoinositide 3-kinase/protein kinase B, and mitogen-activated protein kinase. Single TCM herbs, including American ginseng, Cuscutae Semen, and Cistanches Herba, can regulate sex hormone levels, and alleviate ovarian oxidative stress and immune damage. TCM compound formulas such as Yijing decoction, Siwu decoction, Zuogui pill, and Kuntai capsule modulate multiple signaling pathways, including vascular endothelial growth factor/vascular endothelial growth factor receptor-2, phosphoinositide 3-kinase/protein kinase B/mammalian target of rapamycin, and silence information regulator 1/p53, thereby promoting angiogenesis, inhibiting mitochondrial apoptosis, and regulating autophagy and ferroptosis, which ultimately delay follicular atresia and improve ovarian reserve function. Further studies are suggested to apply artificial intelligence

to deeply explore the underlying mechanisms and carry out high-quality clinical trials, so as to promote the standardized application of TCM in the prevention and treatment of POI.

KEYWORDS premature ovarian insufficiency; premature ovarian failure; traditional Chinese medicine; monomer; compound formulas; mechanism

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