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论著

硫酸铝在体外对大鼠胚胎组织谷胱甘肽含量和卵黄囊细胞膜流动性的影响

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摘要 目的 为探讨铝的发育毒性及机理。方法 孕9.5 d大鼠胚胎于体外培养系统中给予不同剂量的硫酸铝，培养48 h后，观察胚胎生长发育和器官形态分化状况；应用二硫代双硝基苯甲酸(DTNB)直接法测定胚胎组织谷胱甘肽（GSH）含量；以1，6-二苯己三烯为荧光探剂，用荧光偏振技术测定卵黄囊细胞膜脂质流动性。结果 当培养液中铝浓度为1.2 mg·L^{-1}时，胚胎生长发育和分化明显被抑制；3.0 mg·L^{-1}时，畸形胚胎发生率明显升高，主要有神经管闭合不全，脑发育不良和体翻转不全；6.0 mg·L^{-1}时，胚胎组织GSH含量和卵黄囊细胞膜脂质流动性显著降低。上述效应均呈现出一定的剂量-效应(反应)关系。结论 铝有潜在的致畸性和胚胎毒性，胚胎组织GSH含量和卵黄囊细胞膜流动性降低可能在铝致胚胎发育毒性中起重要作用。

关键词 铝 胚胎 培养 谷胱甘肽 卵黄囊 膜流动性 膜脂质类

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Effects of aluminum sulfate on glutathione content and membrane lipid fluidity of visceral yolk sac cell of rat embryo *in vitro*

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Abstract

AIM To investigate the developmental toxicity of aluminum sulfate and its mechanism. **METHODS** Sprague-Dawley rat′s 9.5 day-old embryos were explanted and cultured in a whole embryo culture system with aluminum concentrations from 0.6 to 9.0 mg·L^{-1} for 48 h. Each viable embryo was evaluated using brown scoring system, and visceral yolk sac diameter, crown-rump and head length, and embryo dry weight were measured, as well as GSH content in embryonic tissue by using 5,5-dithio-*bis*-2-nitrobenzoic acid(DTNB), and membrane lipid fluidity of visceral yolk sac cell by 1,6-diphenyl-1,3,5-hexatriene(DPH) fluorescence polarization technique. **RESULTS** Some reverse concentration-dependent decreases in above mentioned parameters were observed. When aluminum doses at ≥1.2 mg·L^{-1}, the embryonic growth and morphogenesis were inhibited significantly. GSH content in embryonic tissue and membrane lipid fluidity of visceral yolk sac cell reduced obviously at ≥6.0 mg·L^{-1}. Otherwise, $Al_2(SO_4)_3$ at Al concentration of 3 mg·L^{-1} resulted in significant elevation in number of teratism including open neural tube, small head abnormality and deficient in flexion. **CONCLUSION** $Al_2(SO_4)_3$ Could result in embryonic growth retardation and potential teratogenic toxicity. These effects might be due in part to decrease in GSH activity and membrane lipid fluidity.

Key words aluminum embryo culture glutathione yolk sac membrane fluidity membrane lipids

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