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孕晚期鼠感染弓形虫Prugniaud株对子一代学习记忆能力的影响

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Effect of Toxoplasma gondii Prugniaud Strain Infection in Pregnant Mice on the Learning Ability of the F1 Generation

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摘要

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摘要 目的 研究孕晚期鼠感染弓形虫prugniaud (PRU) 株对其生殖毒性及子一代学习记忆能力的影响。方法 受孕15 d (孕晚期) 的25只ICR鼠随机分为两组。实验组 (13只) 灌胃含弓形虫包裹的小鼠脑组织匀浆液 (10个包裹/鼠), 对照组 (12只) 灌胃等量生理盐水, 记录孕鼠产子时间和数量。实验组和对照组于受孕20 d后分别处死3只, 取胎盘组织和产出死胎的胎盘组织制作切片, 进行苏木素-伊红(HE)染色和免疫组织化学检测, 同时提取胎盘组织DNA, 进行PCR扩增弓形虫B1基因。实验组和对照组子代进行水迷宫实验, 观测两组子鼠学习记忆能力的差异。结果 实验组和对照组小鼠分别于受孕后 (19.2±1.751) d和 (21.0±1.732) d产子 (P<0.05), 产子数分别为70只和85只 (P>0.05)。实验组胎盘组织, HE染色后镜下见, 绒毛间呈现多灶弓形虫, 绒毛周围霍夫包尔细胞增多, 血窦扩张充血, 可见有核红细胞; 免疫组织化学检测结果显示, 胎盘组织中有弓形虫抗原颗粒; PCR可在胎盘组织中扩增出弓形虫特异性DNA片段 (194 bp)。水迷宫测试结果显示, 学习第3天和第4天, 实验组子鼠的逃避潜伏期时间分别为 (29.92±4.28) s和 (27.69±6.23) s, 对照组的分别为 (24.07±5.32) s和 (22.25±7.94) s, 前者长于后者 (均P<0.05); 实验组和对照组子鼠的目标象限寻找路程分别为 (384.66±41.33) cm和 (426.12±46.48) cm, 差异有统计学意义 (P<0.05)。结论 孕晚期鼠感染弓形虫PRU株后, 可导致生殖毒性, 并影响子一代的学习记忆能力。

关键词: 刚地弓形虫 Prugniaud株 生殖毒性 学习记忆

Abstract: Objective To study the effect of Toxoplasma gondii prugniaud strain infection on female reproductive toxicity in mice and learning ability of their F1 generation. Methods Thirteen ICR mice were each infected intragastrically with 10 T. gondii cysts on the 15th day of pregnancy (late stage pregnancy). 12 mice were treated with physiological saline as control. The time from conception to birth and the number of offspring were recorded. Three mice from each group were sacrificed when pregnant 20 d, placentas from the sacrificed and output stillbirth mice were examined by using histopathology and immunohistochemistry. DNA extraction was performed from placenta tissue, and then T. gondii B1 gene was amplified by PCR. The F1 generation mice from experiment group and control group were tested by Morris water maze test. Statistical analysis on learning and memory ability was made by SPSS 13.0 software. Results The time from conception to birth in experiment group [(19.2±1.751) d] was shorter than that in control group [(21.0±1.732) d] (P<0.05). No significant difference was found in the number of offspring between experiment group (70) and control group (85) (P>0.05). Microscopic examination with HE staining showed multiple T. gondii among placental villi, the increase of the number of Hofbauer cells, blood sinus expansion and hyperemia, and visible nucleated erythrocytes. Immunohistochemically, T. gondii antigen was detected in placenta tissue. T. gondii B1 gene was detected in placenta tissue (194 bp). On the third and fourth day of the Morris water maze test, the latency of experiment group [(29.92±4.28) s, (27.69±6.23) s] was longer than that of the control [(24.07±5.32) s, (22.25±7.94) s] (P<0.05). In the spatial probe test, the distance across the platform quadrant of experiment group [(384.66±41.33) cm] was shorter than that of the control [(426.12±46.48) cm] (P<0.05). Conclusion T. gondii Prugniaud strain infection in late stage pregnancy of mice may induce reproductive toxicity and affect the learning and memory capability of the F1 generation.

Keywords: Toxoplasma gondii Prugniaud strain Reproductive toxicity Learning and memory

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