



### 吡喹酮治疗血吸虫感染小鼠后IFN- $\gamma$ 和IL-4及T细胞的变化

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### Changes of IFN- $\gamma$ , IL-4 and T Cells in Schistosoma japonicum- infected Mice after Praziquantel Treatment

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摘要

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**摘要** 目的 观察血吸虫感染小鼠经吡喹酮治疗后血清中细胞因子IFN- $\gamma$ 和IL-4的水平, 及脾细胞中特异性T细胞数量的变化。方法 将90只6~8周龄BALB/c小鼠随机分成3组, 分别为感染组、治疗组和对照组, 每组30只。感染组和小鼠经腹部感染血吸虫尾蚴(约25条/鼠)。治疗组小鼠于感染后6周经口给予吡喹酮治疗, 300 mg/(kg·d)×3 d。分别在治疗后4、6、8和12周, 对各组小鼠进行称重, 采血并分离血清, ELISA检测血清细胞因子IFN- $\gamma$ 和IL-4水平。无菌取小鼠脾脏, 制备脾细胞悬液, 经日本血吸虫可溶性虫卵抗原(SEA)刺激后, 用酶联免疫斑点法(ELISPOT)分别检测分泌IFN- $\gamma$ 和IL-4的特异性T淋巴细胞的增殖水平。结果 治疗组小鼠体重在治疗后4~12周均显著大于感染组(P<0.05), 与对照组间差异无统计学意义(P>0.05)。ELISA结果表明, 治疗后4周, 治疗组血清中IFN- $\gamma$ 和IL-4水平与感染组间差异无统计学意义(P>0.05), 而治疗后6、8和12周, 治疗组的IFN- $\gamma$ (0.038±0.013、0.028±0.001和0.027±0.007)和IL-4(0.051±0.020、0.045±0.019和0.043±0.016)水平均显著低于感染组(IFN- $\gamma$ : 0.057±0.004、0.060±0.023和0.052±0.017, IL-4: 0.150±0.014、0.148±0.014和0.123±0.017)(P<0.05), 而治疗组和感染组的IFN- $\gamma$ 和IL-4水平均显著高于对照组(P<0.05)。ELISPOT结果显示, 在治疗后4周和6周, 治疗组脾细胞中IFN- $\gamma$ 特异性淋巴细胞数量与感染组间差异无统计学意义(P>0.05), 而治疗后8周和12周治疗组细胞数量(39.9±22.8和38.5±6.2)显著低于感染组(141.9±39.3和106.8±28.6)(P<0.05); 治疗组脾细胞中IL-4特异性淋巴细胞数量在治疗后4周显著高于感染组(P<0.05), 而后开始减少, 治疗后8周和12周(111.3±14.3和113.0±44.2)显著低于感染组(220.3±107.1和208.1±17.2)(P<0.05); 治疗组和感染组脾细胞中IFN- $\gamma$ 和IL-4特异性淋巴细胞数量均显著高于对照组(P<0.05)。结论 吡喹酮治疗血吸虫感染小鼠后血清中细胞因子IFN- $\gamma$ 和IL-4水平降低, 脾细胞中IFN- $\gamma$ 和IL-4特异性淋巴细胞数量减少。

**关键词:** 日本血吸虫 吡喹酮  $\gamma$  干扰素 白细胞介素4 酶联免疫斑点试验

**Abstract:** Objective To investigate the serum levels of IFN- $\gamma$  and IL-4, and the dynamic changes of IFN- $\gamma$ -specific and IL-4-specific lymphocytes in mice with Schistosoma japonicum infection after treatment by praziquantel. Methods Ninety BALB/c mice were randomly divided into three groups (n=30) named as infection group, treatment group and control group. The mice in treatment group and infection group were infected with (25±2) S. japonicum cercariae through the abdominal skin. At 6 weeks post-infection, the mice in treatment group were administered orally with praziquantel [300 mg/(kg·d)] for 3 d. At 4, 6, 8 and 12 weeks post-treatment, the mice were weighed, and serum samples were collected. Serum levels of IFN- $\gamma$  and IL-4 were measured by ELISA. At the same time, the spleens were aseptically removed to prepare cell suspension, and the counts of IFN- $\gamma$  and IL-4 specific lymphocytes were examined by ELISPOT after stimulation of Schistosoma japonicum soluble egg antigen (SEA). Results From 4 to 12 weeks after praziquantel treatment, the body weight of mice in treatment group were significantly heavier than that of infection group (P<0.05), but no significant difference was found between treatment group and control group (P<0.05). At 4 weeks post-treatment, there was no significant difference in serum levels of IFN- $\gamma$  and IL-4 between treatment group and infection group (P>0.05). At 6, 8, and 12 weeks after treatment, the serum levels of IFN- $\gamma$  (0.038±0.013, 0.028±0.001, and 0.027±0.007) and IL-4 (0.051±0.020, 0.045±0.019, and 0.043±0.016) in treatment group were significantly lower than that of infection group (IFN- $\gamma$ : 0.057±0.004, 0.060±0.023, and 0.052±0.017; IL-4: 0.150±0.014, 0.148±0.014, and 0.123±0.017) (P<0.05). Serum IFN- $\gamma$  and IL-4 levels in treatment group and infection group were significantly higher than that of control group (P<0.05). ELISPOT results showed that at 4, 6 weeks post-treatment, there was no significant difference in the number of IFN- $\gamma$ -specific lymphocytes between treatment group and infection group (P>0.05). While at 8 and 12 weeks after treatment, the IFN- $\gamma$ -specific lymphocytes in treatment group (39.9±22.8 and 38.5±6.2) were significantly less than that of infection group (141.9±39.3 and 106.8±28.6) (P<0.05). At 4-week post-treatment, the IL-4-specific lymphocytes in treatment group were much more than that of infection group (175.6±62.3) (P<0.05), and then began to decline. At 8 and 12 weeks after treatment, the IL-4-specific lymphocytes (111.3±14.3 and 113.0±44.2) in treatment group were significantly less than that of infection group (220.3±107.1 and 208.1±17.2) (P<0.05). The IFN- $\gamma$ -specific and IL-4-specific lymphocytes in treatment group

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and infection group were significantly more than that of control group ( $P < 0.05$ ). Conclusion After praziquantel