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钙和铅相互作用对鲫鱼毒性效应的影响

Effect of interaction between calcium and lead on the toxicity of crucian

关键词: [鲫鱼](#) [铅](#) [钙](#) [抗氧化系统](#)

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作者 单位

卓丽玲 枣庄学院生命科学学院, 枣庄 277160

张春岭 枣庄学院生命科学学院, 枣庄 277160

张少东 无棣县畜牧局, 滨州 251900

刘福航 枣庄学院生命科学学院, 枣庄 277160

张广明 枣庄学院生命科学学院, 枣庄 277160

楚文超 枣庄学院生命科学学院, 枣庄 277160

摘要: 以鲫鱼为材料, 研究了钙和铅相互作用对鲫鱼毒性效应的影响. 试验分为5组, 分别为空白对照 I 组、单独染铅 II 组 ($0.1 \text{ mg} \cdot \text{L}^{-1}$) 及铅钙联合组 (III 组: $0.1 \text{ mg} \cdot \text{L}^{-1}$ 铅+ $2 \text{ mmol} \cdot \text{L}^{-1}$ 钙, IV 组: $0.1 \text{ mg} \cdot \text{L}^{-1}$ 铅+ $4 \text{ mmol} \cdot \text{L}^{-1}$ 钙, V 组: $0.1 \text{ mg} \cdot \text{L}^{-1}$ 铅+ $6 \text{ mmol} \cdot \text{L}^{-1}$ 钙), 处理 35 d 后, 检测鲫鱼肌肉、鳃中铅含量, 以及肝胰脏中总抗氧化能力 (T-AOC)、过氧化氢酶 (CAT) 活性和丙二醛 (MDA) 含量. 结果表明, 与 I 组比较, II、III 组鲫鱼肌肉、鳃中铅含量增高 ($p < 0.05$), V 组鲫鱼肌肉中铅含量降低 ($p < 0.05$), 与 II 组比较, IV、V 组鲫鱼肌肉、鳃中铅含量降低 ($p < 0.05$); 与 I 组比较, II 组 CAT 活性降低 ($p < 0.05$), III、IV 和 V 组 CAT 活性升高 ($p < 0.05$), 与 II 组比较, IV、V 组 CAT 活性升高 ($p < 0.05$); 与 I 组比较, II、III 和 V 组 T-AOC 活性降低 ($p < 0.05$), 与 II 组比较, III、IV 和 V 组 T-AOC 活性增高 ($p < 0.05$); 与 I 组比较, II、III、IV 和 V 组 MDA 含量升高 ($p < 0.05$), 与 II 组比较, III、IV 和 V 组 MDA 含量降低 ($p < 0.05$). 由此可见, 钙可竞争鲫鱼对铅的吸收, 降低铅在其肌肉、鳃中的蓄积, 提高鲫鱼肝胰脏的抗氧化能力, 表明钙能降低铅的毒性效应.

Abstract. This study was to investigate the toxic effects of interaction between calcium (Ca) and lead (Pb) on crucian. It was divided into five groups, i.e., control group (Group I), Pb^{2+} alone exposed group ($0.1 \text{ mg} \cdot \text{L}^{-1}$, Group II), and Pb^{2+} combined with Ca^{2+} groups ($0.1 \text{ mg} \cdot \text{L}^{-1} \text{ Pb}^{2+} + 2 \text{ mmol} \cdot \text{L}^{-1} \text{ Ca}^{2+}$ (Group III), $0.1 \text{ mg} \cdot \text{L}^{-1} \text{ Pb}^{2+} + 4 \text{ mmol} \cdot \text{L}^{-1} \text{ Ca}^{2+}$ (Group IV), $0.1 \text{ mg} \cdot \text{L}^{-1} \text{ Pb}^{2+} + 6 \text{ mmol} \cdot \text{L}^{-1} \text{ Ca}^{2+}$ (Group V)). After exposed for 35 days, concentrations of Pb^{2+} in the muscle and gill and the total anti-Oxidative capacity (T-AOC) as well as levels of catalase (CAT) and malondialdehyde (MDA) in the hepatopancreas were assessed. The results showed that Pb^{2+} levels in the muscle and gill of Group II and Group III increased ($p < 0.05$) and its level in the muscle of Group V decreased ($p < 0.05$) compared to Group I. Compared with Group II, Pb^{2+} levels in the muscle and gill of Group IV and Group V decreased significantly ($p < 0.05$). As far as the CAT activity was concerned, its activity in Group II was lower than that in Group I ($p < 0.05$), while its level in other three groups (Group III, Group IV and Group V) was higher than that in Group I ($p < 0.05$), respectively. Compared with Group II, the CAT activity in Group IV and Group V increased significantly ($p < 0.05$). Regarding the T-AOC, its level in three groups (II, III and V) was significantly lower ($p < 0.05$) than that in Group I, but T-AOC level in three groups (III, IV and V) was significantly higher ($p < 0.05$) than that in Group II, respectively. As for MDA, its content in other four groups (II, III, IV and V) was higher ($p < 0.05$) than that in Group I, respectively, while its level in three groups (III, IV and V) was lower ($p < 0.05$) than that in Group II, respectively. In summary, Ca^{2+} can lower the accumulation of Pb^{2+} in the muscle and gill of crucian and increase the anti-Oxidative ability in the hepatopancreas by the interaction between Ca^{2+} and Pb^{2+} , which demonstrated that Ca^{2+} can alleviate the toxic effect of Pb^{2+} .

Key words: [crucian](#) [lead](#) [calcium](#) [antioxidant system](#)

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服务热线：010-62941073 传真：010-62941073 Email: hjkxxb@rcees.ac.cn

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