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投喂高脂饲料后草鱼主要生化指标和乙酰辅酶A 羧化酶1 mRNA表达的变化

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Changes in Main Biochemical Indices and Acetyl-CoA Carboxylase 1 mRNA Expression of Grass Carp Fed a High-Fat Diet

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摘要 为了研究草鱼肝脏对高脂饲料的代谢调控机理, 试验研究了连续12周投喂含8.1%脂肪的饲料对草鱼血清生化指标、肝胰脏生化指标及乙酰辅酶A羧化酶1(ACC1)mRNA表达的影响。将120尾平均体重为(15.0±2.4) g的健康草鱼随机分为高脂组和基础组, 分别投喂含8.1%脂肪的高脂饲料和4.6%脂肪的基础饲料, 并在试验的第4、8、12周检测草鱼血清中甘油三酯(TG)、总胆固醇(CHO)含量及谷丙转氨酶(ALT)、谷草转氨酶(AST)活性以及肝胰脏中丙二醛(MDA)含量和超氧化物歧化酶(SOD)、过氧化氢酶(CAT)活性。在试验第12周, 制作病理切片观察肝胰脏组织形态, 并应用半定量反转录聚合酶链式反应(RT-PCR)检测肝胰脏ACC1 mRNA的相对表达量。结果表明: 试验期间, 高脂组草鱼肝细胞出现损伤, 并随投喂时间的延长而加重; 高脂组草鱼血清中AST、ALT活性及TG、CHO含量以及肝胰脏中MDA含量均随投喂时间的延长而显著或极显著上升($P<0.05$ 或 $P<0.01$), 而肝胰脏中SOD和CAT活性则随投喂时间的延长而显著或极显著下降($P<0.05$ 或 $P<0.01$)。在试验第12周, 高脂组草鱼血清中AST、ALT活性及TG、CHO含量以及肝胰脏中MDA含量均显著或极显著高于基础组($P<0.05$ 或 $P<0.01$), 而肝胰脏中SOD和CAT活性则显著或极显著低于基础组($P<0.05$ 或 $P<0.01$); 与基础组相比, 高脂组草鱼肝胰脏ACC1 mRNA相对表达量极显著升高($P<0.01$)。由此得出, 高脂饲料的连续投喂升高了草鱼的血脂水平, 并使草鱼肝胰脏出现损伤, 其作用机制可能与高脂饲料降低草鱼抗氧化能力以及促进肝胰脏脂肪合成有关。

关键词: 草鱼 高脂饲料 生化指标 ACC1 mRNA 半定量RT-PCR

Abstract: The effects of consecutive feeding 8.1% fat diet for 12 weeks on serum biochemical indices, hepatopancreas biochemical indices and acetyl-CoA carboxylase 1 (ACC1) mRNA expression of grass carp were investigated to study the metabolic regulation mechanism of grass carp liver on high-fat diet. A total of 120 grass carp with an average body weight of (15.0±2.4) g were randomly divided into high-fat group and basal group, and the fish in those 2 groups were fed the diets containing 8.1% (high-fat diet) and 4.6% fat (basal diet), respectively. The contents of triglyceride (TG) and total cholesterol (CHO) and the activities of alanine aminotransferase (AST) and aspartate aminotransferase (ALT) in serum, and the content of malondialdehyde (MDA) and the activities of superoxide dismutase (SOD) and catalase (CAT) in hepatopancreas were determined on the 4th, 8th and 12th weeks, respectively. On the 12th week, the tissue morphology of hepatopancreas was observed by making pathological sections, and the relative expression of ACC1 mRNA in hepatopancreas was analyzed by semi-quantitative RT-PCR. The results showed as follows: in the experimental period, the hepatocytes of grass carp of high-fat group appeared injuries, and the injuries were more and more serious with increasing the feeding time; the contents of TG and CHO and the activities of AST and ALT in serum and the content of MDA in hepatopancreas of high-fat group were significantly increased ($P<0.05$ or $P<0.01$), while the activities of SOD and CAT in hepatopancreas of high-fat group were significantly decreased with increasing the feeding time ($P<0.05$ or $P<0.01$). On the 12th week, the contents of TG and CHO and the activities of AST and ALT in serum and the content of MDA in hepatopancreas of high-fat group were significantly higher than those of basal group ($P<0.05$ or $P<0.01$), whereas the activities of SOD and CAT in hepatopancreas of high-fat group were significantly lower than those of basal group ($P<0.05$ or $P<0.01$). Compared with the basal group, the relative expression of ACC1 mRNA of high-fat group was significantly increased on the 12th week ($P<0.01$). The results indicate that consecutive feeding high-fat diet can increase the blood fat level and damage the hepatopancreas of grass carp, and its mechanism may be

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related to the high-fat diet decreasing antioxidant ability and increasing liver fat synthesis of grass carp.

Keywords: grass carp, high-fat diet, biochemical indices, ACC1 mRNA, semi-quantitative RT-PCR

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