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丝裂原活化蛋白激酶信号通路抑制剂对断奶仔猪小肠形态和肠通透性的影响

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Inhibitors of Mitogen Activated Protein Kinase Pathways: Effects on Intestinal Morphology and Permeability of Weaner Piglets

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摘要 本试验旨在研究丝裂原活化蛋白激酶(MAPK)信号通路抑制剂对断奶仔猪小肠形态和肠通透性的影响。选用体重约为5.8 kg的24头21日龄杜×长×大断奶仔猪,随机分成4组,每组6头。试验组断奶前30 min分别腹腔注射p38 MAPK抑制剂(SB203580,Ⅰ组)、c-Jun N末端激酶(JNK)抑制剂(SP600125,Ⅱ组)和胞外信号调节激酶1/2(ERK1/2)抑制剂(PD98059,Ⅲ组),对照组注射等量的生理盐水。于断奶后36 h屠宰仔猪取样待测。结果表明:Ⅰ组空肠绒毛高度和绒毛高度/隐窝深度均显著高于对照组($P<0.05$),隐窝深度显著低于对照组($P<0.05$),Ⅱ组空肠绒毛高度/隐窝深度显著高于对照组($P<0.05$);与对照组相比,Ⅰ组和Ⅱ组仔猪血浆*D*-乳酸、二胺氧化酶含量显著降低($P<0.05$),而Ⅲ组仔猪血浆*D*-乳酸含量显著高于对照组($P<0.05$);Ⅰ组空肠黏膜促炎细胞因子肿瘤坏死因子α(TNF-α)、白细胞介素1β(IL-1β)、白细胞介素6(IL-6)和干扰素γ(IFN-γ)水平显著低于对照组($P<0.05$),与对照组相比,Ⅱ组TNF-α和IL-1β水平显著降低($P<0.05$),而Ⅲ组TNF-α水平显著高于对照组($P<0.05$),IL-6和IFN-γ水平有上升的趋势,但差异不显著($P>0.05$)。结果提示,在断奶应激致仔猪小肠黏膜屏障受损过程中,抑制p38 MAPK和JNK通路后,肠屏障得到改善,而抑制ERK1/2通路后肠屏障损伤有加重的趋势。

关键词: 断奶仔猪 小肠形态 肠通透性 丝裂原活化蛋白激酶信号通路

Abstract: This experiment was conducted to investigate the effects of inhibitors of mitogen activated protein kinase pathways on intestinal morphology and permeability of weaner piglets. Twenty-four weaner piglets (Duroc×Landrace×Yorkshire) with a similar body weight of 5.8 kg were randomly allocated to 4 groups with 6 piglets in each group. Thirty minutes before weaning, piglets in experimental groups received intraperitoneal injection of inhibitors of p38 MAPK (SB203580, group Ⅰ), JNK (SP600125, group Ⅱ) and ERK1/2 (PD98059, group Ⅲ), respectively. Piglets in control group were given the same volume of saline. Piglets were slaughtered at 36 h after weaning. The results showed as follows: compared with control group, group Ⅰ had significantly higher jejunum villus height and villus height/crypt depth ($P<0.05$), and group Ⅱ had significantly higher villus height/crypt depth ($P<0.05$); compared with control group, contents of plasma *D*-lactate and DAO in groups Ⅰ and Ⅱ were significantly decreased ($P<0.05$), while plasma *D*-lactate content in group Ⅲ was significantly increased ($P<0.05$); compared with the control group, levels of proinflammatory cytokines (TNF-α, IL-1β, IL-6 and IFN-γ) in group Ⅰ were significantly decreased ($P<0.05$), TNF-α and IL-1β levels in group Ⅱ were significantly decreased ($P<0.05$), however, TNF-α level in group Ⅲ was significantly increased ($P<0.05$), IL-6 and IFN-γ levels tended to be increased ($P>0.05$). In conclusion, inhibition of p38 MAPK and JNK pathways protects intestinal mucosal barrier from the damage induced by early weaning. However, there are worse damage in intestinal mucosal barriers when ERK1/2 signaling pathway is inhibited.

Keywords: weaner piglets, intestinal morphology, intestinal permeability, MAPK signaling pathways

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