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枯草芽孢杆菌对Caco-2细胞抗氧化功能的影响研究

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Eff... s subtilis on Antioxidative Function of Caco-2 Cells

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摘要 本试验旨在研究枯草芽孢杆菌对氧化应激状态下Caco-2细胞抗氧化功能的影响。将Caco-2细胞分为4组，对照Ⅰ（空白对照组，0 μmol/L H_2O_2）和对照Ⅱ（氧化应激组，100 μmol/L H_2O_2），处理Ⅰ和处理Ⅱ分别在对照Ⅱ条件下添加枯草芽孢杆菌B1和B10（终浓度为0.3×108 CFU/mL），分别于12、48 h测定氧化应激状态下Caco-2细胞上清液和裂解液的抗氧化活性。结果表明：与空白对照组和氧化应激组相比，添加2株枯草芽孢杆菌均极显著提高了Caco-2细胞培养上清液12、48 h时的总抗氧化能力（$P<0.01$）。其中，菌株B1可显著提高上清液中抗超氧阴离子（O_2^-）（$P<0.01$）、超氧化物歧化酶（SOD）（$P<0.01$）和过氧化氢酶（CAT）（$P<0.01$）以及48 h的过氧化物酶（POD）活性（$P<0.01$），而菌株B10除提高了Caco-2细胞上清液中抗O_2^-、SOD和CAT活性（$P<0.01$）外，还提高了细胞抑制羟自由基（·OH）能力（$P<0.01$）和POD活性（$P<0.01$或$P<0.05$）；添加枯草芽孢杆菌组细胞上清液中12 h时的乳酸脱氢酶（LDH）活性和丙二醛（MDA）含量与氧化应激组相比差异不显著（$P>0.05$），48 h时则均极显著降低（$P<0.01$）。细胞培养12 h时，氧化应激组细胞裂解液中SOD活性和GSH含量比空白对照组低（$P<0.05$）而POD活性高（$P<0.01$），48 h时结果与之相反，此时添加枯草芽孢杆菌组均极显著提高了细胞裂解液中POD的活性（$P<0.01$）。结果提示，2株枯草芽孢杆菌均提高了氧化应激状态下细胞的抗氧化功能。

关键词： **Caco-2细胞;枯草芽孢杆菌;抗氧化活性;氧化应激;作用机制**

Abstract： This experiment was conducted to study the effects of Bacillus subtilis on antioxidative function of Caco-2 cells under oxidative stress. Caco-2 cells were randomly divided into 4 groups, control Ⅰ (0 μmol/L H_2O_2) and group Ⅱ (oxidative stress group, 100 μmol/L H_2O_2), treatment Ⅰ and treatment Ⅱ added with B. subtilis B1 and B10 (at final concentration of 0.3×108 CFU/mL) in the condition of oxidative stress group, respectively, whose antioxidative activities at 12 and 48 h were measured in culture supernatant and lysate. The results showed as follows: compared with the control Ⅰ and the oxidative stress group, the two groups added with B. subtilis increased significantly the total antioxidative capacity (T-AOC) in cultured supernatant of Caco-2 cells at 12 and 48 h ($P<0.01$); B1 increased the anti-superoxide anion (O_2^-)（$P<0.01$）, superoxide dismutase (SOD)（$P<0.01$）, catalase (CAT) activities（$P<0.01$）, and the peroxidase (POD) activity at 48 h （$P<0.01$）, while B10 not only increased the activities of anti O_2^-, SOD, and CAT （$P<0.01$）, but also increased the inhibition capacity of hydroxyl radical (·OH) （$P<0.01$） and the POD activity （$P<0.05$ or $P<0.01$）; compared with the oxidative stress group, there were no significant differences in the lactate dehydrogenase (LDH) activity and malondialdehyde (MDA) content of the cells culture supernatant in the groups added with B. subtilis at 12 h ($P>0.05$), but they were significantly lower at 48 h ($P<0.01$). Compared with the control Ⅰ, there were lower SOD activity ($P<0.05$), less GSH content ($P<0.05$) and higher POD activity ($P<0.01$) of the cells lysate in the oxidative stress group at 12 h, while the results were the contrary at 48 h, but adding B. subtilis increased POD activity significantly ($P<0.01$). These results indicate that the two strains of B. subtilis can increase the antioxidative function of Caco-2 cells under oxidative stress. [Chinese Journal of Animal Nutrition，2011，23（2）：293-298]

Keywords： **Caco-2 cell; B. subtilis; antioxidative activities; oxidative stress; mechanism**

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