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论著

过氧基异丙苯和H2O2及抗氧化剂对不同时相肝癌细胞的NO、羰基和丙二醛的影响

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摘要 背景与目的： 研究有机氧化剂过氧基异丙苯(CHP)和无机氧化剂过氧化氢(H2O2)及抗氧化剂单独和联合作用对不同细胞周期时相肝癌细胞的一氧化氮(NO)、羰基和丙二醛(MDA)的影响。 材料与方法： 同步化原发性肝癌细胞系H299细胞(1×106/ml)，分别设对照组(DMSO)、CHP组(50 μmol/ml)、H2O2组(50 μmol/ml)、CHP＋H2O2组(H2O2和CHP各50 μmol/ml)、Vit A组(10 μmol/ml)、Vit E组(10 μmol/ml)、Na2SeO3组(50 nmol/ml Na2SeO3)、AO组(Vit A＋Vit E＋Na2SeO3，其中Vit A、Vit E各5 μmol/ml，Na2SeO3 25 nmol/ml)。分别于细胞周期G1、S、G2和M期加入上述试剂，观察NO、总羰基和MDA含量。 结果： 细胞同步于G1期者为86％，S期为78％、G2/M期为61％。与对照组相比，复合氧化剂(CHP＋H2O2组)对G1期肝癌细胞的NO含量有刺激作用(P<0.05)，单独Vit A组有显著的抑制作用(P<0.05)。复合氧化剂(CHP＋H2O2组)对G1～M期肝癌细胞的总羰基含量均有显著的刺激作用(P<0.05)，而单独应用Vit A、Vit E、Na2SeO3时对整个细胞周期的总羰基含量也有显著的抑制作用(P<0.05)。H2O2使G2/M期细胞的MDA含量增加(P<0.05)，而AO组MDA含量减少 (P<0.05)。 结论：细胞经同步化处理后，CHP和H2O2以及Vit A、Vit E、Na2SeO3对肿瘤细胞的影响存在一定的敏感点和敏感时相，复合氧化剂(CHP＋H2O2)和Vit A对DNA合成前期(G1期)肿瘤细胞内的氧化损伤信号分子NO作用显著；H2O2与复合抗氧化剂(Vit A＋Vit E＋Na2SeO3)作用于DNA合成后期(G2期)的肿瘤细胞后，细胞氧化损伤的终产物MDA明显改变。

关键词 自由基； 抗氧化剂； 细胞周期； 调控

Effects of CHP,H2O2 and Antioxidants on Contents of NO,Carbonyl and malondialdehyde of Cultured Hepatoma Cells in Different Phases of Cell Cycle

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Abstract BACKGROUND & AIM： To study isolatel and combined effects of the organic oxidant cumene hydroperoxide (CHP), the inorganic oxidant H2O2 and several antioxidants, on nitric oxide (NO) contents, total carbonyl and malondialdehyde (MDA) of hepatoma cells in different phases of cell cycle. MATERIALS AND METHODS：Hepatoma cells H299 (1×106/ml) were synchronized,and then divided into eight groups:the control group (DMSO),CHP (50 μmol/ml), H2O2(50 μmol/ml), CHP＋H2O2 (oxidant componds: H2O2 of 50 μmol/ml plus CHP of 50 μmol/ml), Vit A(10 μmol/ml), Vit E (10 μmol/ml),Na2SeO3 (50 nmol/ml),AO(antioxidant compounds of Vit A＋Vit E＋Na2SeO3 , among them: Vit A and Vit E were 5 μmol/ml each, Na2SeO3 was 25 nmol/ml). They were separately added to cultured cells at G1, S, G2 and M phase of the cell cycle. The cell contents of NO, total carbonyl (T_carbonyl) and MDA were determined. RESULTS： The cell cycle showed better synchronization. The synchronized cells in G1 phase was 86％, in S phase was 78％,and in G2/M phase was 61％. We found that NO of cells stimulated by oxidant componds (CHP and H2O2) at G1 phase were significantly increased (P<0.05) while they were inhibited by Vit A (P<0.05). The oxidant componds (CHP and H2O2) had stimulatory function, and Vit A、Vit E、Na2SeO3 had obvious inhibitory effects on T_carbony contents throughout the whole cell cycle (P<0.05). The levels of MDA in synchronized cultured cells were elevated by H2O2 at

G2/M phase, and were decreased by antioxidant compounds Vit A＋Vit E＋Na2SeO3 at G2 phase (P<0.05). CONCLUSION： After synchronization, the actions of organic oxidant, inorganic oxidant, and the tested antioxidants varied according to the different phases in the tumor cell cycles. Hepatoma cells in G1 phase were sensitive to oxidant compounds (CHP and H2O2) and Vit A on the oxidative injury NO level. The cellular oxidative injury marker MDA contents in hepatoma cells in G2 phase were significantly altered by H2O2 and antioxidant compounds (Vit A＋Vit E＋Na2SeO3).

Keywords free radicals antioxidants cell circle modulation

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