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论文

线粒体DNA缺失和功能缺失对核基因影响

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摘要:

目的 探讨线粒体DNA(mtDNA)缺失和线粒体功能缺失对核基因表达的影响。**方法** 应用人全基因组芯片分别对mtDNA缺失、线粒体功能缺失及正常HepG2细胞的核基因表达谱进行生物信息学分析。结果 与正常HepG2细胞比较,核基因表达差异倍数>2倍的mtDNA缺失细胞共有5 489个,其中3 350个上调,2 139个下调;而线粒体功能缺失细胞共有3 334个,其中1 457个上调,1 877个下调;mtDNA缺失和线粒体功能缺失对细胞信号途径均有明显影响,与正常HepG2细胞比较,线粒体功能缺失时信号途径差异明显的有334个,mtDNA缺失时信号途径差异明显的有188个。**结论** mtDNA缺失和线粒体功能缺失对核基因表达均有明显影响,mtDNA缺失对核基因表达的影响比功能缺失的影响更大,其可能机制在于对不同信号途径的影响。

关键词: 线粒体DNA缺失 线粒体功能缺失 核基因表达 人全基因组芯片

Effects of mitochondrial DNA-depletion and functional deficiency on expression of nuclear DNA

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Abstract:

Objective To study the effects of mitochondrial DNA(mtDNA)-depletion and mitochondrial functional deficiency on the expression of nuclear DNA.**Methods** Using human whole-genome chip, the expression profiles of nuclear DNA in mtDNA-depleted HepG2 cells and mitochondrial function deficient HepG2 cells were analyzed. **Results** Among 41 000 genes, there were 5 489 genes differentially expressed in mtDNA-depleted HepG2 cells compared with normal HepG2 cells (the fold change ≥ 2.0), with 3 350 up-regulated and 2 139 down-regulated. In mitochondrial function deficient HepG2 cells, there were 3334 genes differentially expressed, with 1457 up regulated and 1877 down regulated. The effects of mtDNA depletion and mitochondrial function deficiency on cell signaling pathways were significantly different and imposed different effects on different signaling pathways. **Conclusion** Both mtDNA depletion and mitochondrial function deficiency induce significant different expression of nuclear DNA. The effect of mtDNA depletion is more serious as compared with that of mitochondrial function deficiency. The mechanism may underlie the different effects on different signaling pathways.

Keywords: mitochondrial DNA depletion mitochondrial function deficiency nuclear DNA expression whole human genome oligo microarray

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