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药理学专栏

烟酰胺单核苷酸对RIN-m5f细胞中胰岛素分泌及*PDX-1*和*FoxO1*基因表达的影响

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摘要:

目的: 在细胞水平研究烟酰胺单核苷酸(nicotinamide mononucleotide, NMN)对胰岛素分泌的调节作用及其对与胰岛素分泌相关的重要转录因子胰十二指肠同源盒基因(pancreatic and duodenal homeobox-1, *PDX-1*)和分叉头框家族转录因子1(forkhead box-containing protein O-1, *FoxO 1*)基因表达的影响。方法: 采用大鼠胰岛素ELISA试剂盒检测RIN-m5f细胞胰岛素分泌水平。用Real-time PCR检测RIN-m5f细胞*PDX-1* 和*FoxO 1* 的mRNA表达水平。用Western印迹检测RIN-m5f细胞PDX-1蛋白表达水平。结果: 用瑞格列奈10 nmol/L+NMN 100 μmol/L处理RIN-m5f细胞48 h,与空白对照及DMSO对照组相比,胰岛素分泌量均显著增高($P<0.05$);与NMN 50 μmol/L组比较,胰岛素分泌量的增高也有统计学意义($P<0.05$)。10,50和100 μmol/L的NMN作用RIN-m5f细胞36 h,*PDX-1* 的mRNA表达量均上调(依次为$P<0.05$,$P<0.01$, $P<0.001$)。100 μmol/L剂量组与10 μmol/L和50 μmol/L剂量组比较差异也有统计学意义($P<0.001$)。 50,100和200 μmol/L的NMN作用RIN-m5f细胞36或48 h,PDX-1的蛋白表达量与对照组比较差异无统计学意义($P>0.05$)。结论: NMN可以调控RIN-m5f细胞中胰岛素的分泌及*PDX-1* 的mRNA表达水平。

关键词: 烟酰胺单核苷酸 胰十二指肠同源盒基因 分叉头框家族转录因子1 RIN-m5f

Effect of nicotinamide mononucleotide on insulin secretion and gene expressions of *PDX-1* and *FoxO1* in RIN-m5f cells

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Abstract:

Objective To investigate the effect of nicotinamide mononucleotide (NMN) on insulin secretion and gene expressions of pancreatic and duodenal homeobox 1(*PDX-1*) and forkhead box-containing protein O-1 (*FoxO1*), which were important transcription factors for insulin secretion. Methods Insulin secretion level in RIN-m5f cells was detected by rat insulin ELISA detection kit. The mRNA expression levels of PDX-1 and FoxO1 in RIN-m5f cells were analyzed by real-time PCR. The protein expression of PDX-1 was measured by Western blot. Results Insulin secretion levels in RIN-m5f cells treated with repaglinide (10 nmol/L) plus NMN (100 μmol/L) was significantly higher than those in the blank control, the DMSO control group, and the NMN (50 μmol/L) treated group ($P<0.05$). The mRNA expression levels of *PDX-1* in RIN-m5f cells treated with NMN (10, 50 and 100 μmol/L) for 36 h were significantly higher than those in the control group ($P<0.05$, $P<0.01$, and $P<0.001$, respectively). There was marked differences in the mRNA expression levels of *PDX-1* among different concentrations of NMN ($P<0.001$), but no significant differences in the mRNA expression level of *FoxO1* ($P>0.05$). No significant difference was found in the protein expression levels of PDX-1 in RIN-m5f cells treated by NMN (50, 100, and 200 μmol/L) for 36 or 48 h compared with the control group ($P>0.05$). Conclusion NMN can stimulate insulin secretion and upregulate the mRNA expression of *PDX-1* in RIN-m5f cells.

Keywords: nicotinamide mononucleotide pancreatic and duodenal homeobox 1 forkhead box-containing protein O-1 RIN-m5f cell

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