

## 论著 不同低氧模式对大鼠交感神经活性的影响机制及其与血压变化的关系

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摘要:

目的: 观察2种不同低氧模式对血压的影响并探讨其作用机制。方法: 18只雄性SD大鼠随机分为间断低氧组(intermittent hypoxia group, IH组)、持续低氧组(continuous hypoxia group, CH组)及正常对照组(normal control group, NC组), 分别给予7 h/d间断低氧、7 h/d持续低氧干预及常规饲养, 共实验42 d。实验前、实验3周、6周末检测3组大鼠尾动脉收缩压(arteria caudilis systolic pressure, ACSP)。6周末检测血清去甲肾上腺素(norepinephrine, NE)、丙二醛(malondialdehyde, MDA)、抑制羟自由基能力及血浆神经肽Y(neuropeptide Y, NPY)的变化。结果: 实验3周末, IH组大鼠ACSP高于实验前, 差异有统计学意义( $P < 0.05$ )。6周末IH组大鼠ACSP, NE, MDA, NPY浓度均明显高于CH组及对照组, 而抑制羟自由基能力明显降低(均 $P < 0.01$ )。CH组与实验前及对照组比较, 以上指标差异均无统计学意义(均 $P > 0.05$ )。NE, NPY, MDA均与ACSP呈正相关( $r = 0.873, P < 0.01; r = 0.671, P < 0.01; r = 0.582, P < 0.05$ ), 抑制羟自由基能力与ACSP呈负相关( $r = -0.790, P < 0.01$ )。MDA与NE和NPY呈正相关( $r = 0.843, 0.777, P < 0.01$ )。抑制羟自由基能力与NE及NPY呈负相关( $r = -0.864, -0.717, P < 0.01$ )。结论: 间断低氧可以诱发大鼠血压升高, 这可能与交感神经活性增强及氧化应激损伤有关。

关键词: 低氧 血压 交感神经活性 氧化应激

## Mechanisms of sympathetic activity in rats exposed to different patterns of hypoxia and the correlation with blood pressure

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Abstract:

Objective To observe the effects of two different hypoxia patterns on blood pressure and the underlying mechanisms. Methods Eighteen male SD rats were randomly divided into three groups: the intermittent hypoxia group (IH group), the continuous hypoxia group (CH group) and the normal control group (NC group). The rats of the IH and CH group were subjected to intermittent hypoxia (7 h/d) and continuous hypoxia (7 h/d) for 42 days respectively. The NC group rats were untreated. The levels of arteria caudilis systolic pressure (ACSP) were measured with noninvasive rats arteria caudilis gauge before the experiment, at the end of 3rd, 6th week of the experiment. The concentrations of norepinephrine (NE) in serum and neuropeptide Y (NPY) in plasma were respectively measured by enzyme-linked-immunosorbent assay (ELISA) and radioimmunoassay. The contents of malondialdehyde (MDA) and the ability of inhibiting hydroxyl free radical in serum were analyzed by thiobarbituric acid colorimetric analysis (TBAR) at the end of 6th week. Results At the end of 3rd week, the levels of ACSP were considerably higher than those before the treatment ( $P < 0.05$ ). The concentrations of ACSP, NE, MDA, NPY in the IH group were significantly higher than those in the other two groups at the end of 6th week (all  $P < 0.01$ ). The ability of inhibiting hydroxyl free radical were decreased by the intermittent hypoxia treatment (all  $P < 0.01$ ). However, there was no significant difference in ACSP, NE, MDA, NPY between CH and NC group (all  $P > 0.05$ ). The levels of NE, NPY and MDA were positively related with ACSP ( $r = 0.873, P < 0.01; r = 0.671, P < 0.01; r = 0.582, P < 0.05$ ). The correlation between the ability of inhibiting hydroxyl free radical and ACSP was negative ( $r = -0.790, P < 0.01$ ). the concentrations of MDA were positively related with NE and NPY respectively ( $r = 0.843, 0.777, P < 0.01$ ) and the ability of inhibiting hydroxyl free radical was negatively related with NE and NPY respectively ( $r = -0.864, -0.717, P < 0.01$ ). Conclusion Intermittent hypoxia can induce high blood pressure, which may be related to the sympathetic over-activity and the oxidative stress.

Keywords: hypoxia blood pressure sympathetic nervous system oxidative stress

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