

论著

低体温与心率变异性和血压变异性的关系

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摘要 目的: 研究低体温与自主神经功能变化的关系。方法: 采用体表物理降温法逐步降低直肠温度,直肠温度变化范围为19-37℃。分别记录不同直肠温度下大鼠动态心电和血压信号。应用心率变异性和血压变异性分析系统评价低体温对心率变异性和收缩压变异性的影响。结果: 心率变异分析表明, 直肠温度下降到29℃以下,R-R间期均延长(P<0.01),提示心率明显降低;当直肠温度下降到19-21℃时,心率变异归一化低功率率降低(P<0.05)和归一化高功率率增加(P<0.05),而且自主神经的平衡向心迷走神经张力增强的方向发生了转移(P<0.05)。血压变异性分析表明, 体温下降到31℃时与呼吸有关的归一化高功率率开始增加(P<0.01);直肠温度下降到29℃以下(除27℃外),与呼吸有关的归一化高功率率增加(P<0.05或P<0.01),同时自主神经的平衡也发生了改变(P<0.05)。结论: 随着体温的降低,心血管迷走神经活性增加,自主神经的平衡向迷走神经张力增强的方向转移。低体温对血压变异性的影响敏感于心率变异性。

关键词 [低温](#) [心率变异性](#) [血压变异性](#) [自主神经系统](#)

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Relationship between hypothermia and heart rate variability,blood pressure variability

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Abstract

AIM: To study the function of autonomic nervous system by the method of heart rate variability (HRV) and arterial blood pressure variability (BPV).METHODS: The rectal temperature of rats decreased gradually with their body surfaces contacted with ice,the range of the rectal temperature varied from 19℃ to 37℃.Both the dynamic electrocardiogram (ECG) signals and dynamic blood pressure signals were recorded,respectively.RESULTS: Using the method of HRV,there was an increase in RR interval (RRI),which implied a corresponding decrease in heart rate with the rectal temperature varying from 19℃ to 29℃ (P<0.01).There was a decrease in the value of normalized low frequency power (LFn) (P<0.05) and an increase in the value of normalized high frequency power (HFn) (P<0.01) with the rectal temperatures varying from 19℃ to 21℃.Therefore,the balance control of cardiac autonomic nervous was transferred to increase of vagal nerve drive (P<0.05).Using the method of BPV,there was an increase (P<0.01) in the value of HFn related to respiratory with the body temperatures falling to 31℃.While the body temperature varied from 19℃ to 29℃ (except 27℃),there was an increase in the value of HFn related to respiratory rates (P<0.05 or P<0.01) and the balance control of autonomic nervous was transferred to increase of vagal nerve drive (P<0.05).CONCLUSION: As the body temperature reduces,the vagal nerve activity in cardiovascular system increases,and the effect of hypothermia on HRV is sensitive to BPV.

Key words [Hypothermia](#) [Heart rate variability](#) [Blood pressure ariability](#) [Autonomic nervous system](#)

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