生物物理学报(2004) 20(5), 403-407

PDF文档

运动后心力及心率同时遥测的心力恢复趋势与心率恢复趋势的对比研究

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为了更加全面的研究和评估心肌的变时性和变力性，研制了能够在运动场地同时采集心力和心率信号的遥测系统。采集了50名体育系学生和30名普通系学生完成规定运动量的登梯运动后5分钟内连续变化的心音信号。对采集的数据经过三次样条插值、均匀采样和小波变换滤波后得到了平滑的心力恢复趋势曲线和心率恢复趋势曲线。统计分析表明，大负荷运动量下的心力储备主要来自于心肌收缩力的储备而不是心率储备（$p<0.001$），而且较之于普通系学生而言，体育系学生具有的高水平心功能不仅在于其具有更大的心肌收缩力储备上（$p<0.001$），而且还在于其具有更快的心肌收缩力的恢复速度上（$p<0.001$）。同时检测心力恢复趋势与心率恢复趋势会有益于全面评估心脏功能。

Comparative Study of Cardiac Contractility Recovery Trend And Heart Rate Recovery Trend Based On The Simultaneously Sampling Cardiac Contractility And Heart Rate Signals After Exercise

Objective: to study and evaluate myocardial inotropism and chronotropism more comprehensively, a heart sound telemetry system with simultaneously sampling signals of cardiac contractility and heart rate at the sports site was developed. Five-minute continuous heart sound signals were sampled respectively from 50 students in physical education department (PE) and 30 students in general departments (GD) after completing designed workload during step-climbing exercise. Smooth cardiac contractility recovery trend curves and heart rate recovery trend curves were obtained by processing the data through cubic spline interpolation, evenly sampling and wavelet transform filtering. Statistic analysis showed that the cardiac reserve under the heavy exercise workload mainly depends on the cardiac contractility reserve rather than the heart rate reserve($p<0.001$). Compared with the general department’s students, the high level cardiac contractility reserve of the physical department’s students may be reflected not only in cardiac contractility reserve, but also in faster cardiac contractility recovery rate ($p<0.001$) , but also by faster cardiac contractility recovery rate ($p<0.001$). Simultaneous measuring of both cardiac contractility recovery trend and heart rate recovery trend after exercise might be beneficial to comprehensive evaluation of cardiac function.

关键词