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用间接的心率监控测量仪对能量消耗的评价与比较

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Comparison of heart rate monitoring with indirect calorimetry for energy expenditure evaluation

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摘要 目的：采用新开发的总能量消耗的评价方法与传统方法进行比较。方法：对象共46人，其中16名中年男性（平均年龄51.4岁），14名中年女性（平均年龄49.9岁）和16名年轻女性（平均年龄19.1岁）。使用新开发的软件（2011年芬兰Oy公司出产MoveSense 心率监测分析仪），对24小时的心率能耗数据进行监控，并与用双标水法测得的数据进行对照比较。用Bland-Altman对两种测定方法之间的一致性程度进行分析。结果：发现两种测定方法在群体水平中得出的能量消耗值相似，平均为-8.6 kcal/天，而在个体水平中存在较大差异，46例研究对象中有44例（96%）能量消耗值在±2SD范围内，出现平均下降趋势，并没有任何过高或过低倾向。结论：我们的研究结果表明，目前每日评价能耗的心率软件系统尚需进一步研发，以适用于独立个体。

关键词： 双标水 心率监控 男性和女性 总能量消耗

Abstract: Purpose: The purpose of this study was to compare established methods with newly-developed methods for estimating the total energy expenditure (TEE).
Methods: The study subjects comprised 46 individuals, including 16 middle-aged men (mean age 51.4 years), 14 middle-aged women (mean age 49.9 years) and 16 young women (mean age 19.1 years). The TEE was estimated from 24-h heart rate (HR) data using newly-developed software (MoveSense HRAnalyzer 2011a, RC1, Suunto Oy, Vantaa, Finland), and was compared against the TEE determined using doubly labeled water (DLW). Agreement between the two methods was analyzed using Bland and Altman plots.
Results: The HR method yielded similar TEE values as the DLW method at the group level, with an average of 8.6 kcal/day in the difference in the mean, but with large individual variations. Forty-four (96%) out of 46 subjects fell within 2SD of the mean difference in TEE comparisons, and there was no tendency towards under- or over-estimation.
Conclusion: Our results indicate that the current software using HR analysis for the estimation of daily TEE needs further development for use with free-living individuals.

Significant points: Heat rate analysis for estimation of daily total energy expenditure is good for group estimation but further development is needed for free-living individuals.

Key words: Doubly labeled water Heart rate monitoring Males and females Total energy expenditure

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