

便携式无创血糖检测仪的研制

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摘要：

以能量代谢守恒法为基础，研制出以DSP(数字信号处理器)为主控芯片的便携式无创血糖检测仪器。仪器采用传感器集成器采集的多路湿度、温度和双波长光量信号计算出血氧饱和度，血流量，脉率等，综合得出血糖浓度。介绍了仪器检测原理，硬软件结构和算法实现过程。采用仪器样机进行临床实验，测量所得值与AUTOLAB18全自动生化分析仪检测结果相关系数达到0.87，绝对误差控制在 $\pm 0.5\text{mmol/L}$ 范围内。实验表明：采用能量代谢守恒法进行无创血糖检测是可行的；利用能量代谢守恒法研制的便携式无创血糖检测仪检测速度快，结果精确度较高，对人体血糖值检测有一定的临床价值。

关键词：传感器应用；无创血糖检测；能量代谢守恒；DSP；

The development of a portable noninvasive blood glucose measuring instrument

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Abstract:

A portable instrument of noninvasive blood glucose measurement based on DSP(Digital Signal Processor) is developed, with the method of COEM(conservation of energy metabolism). It calculates the blood glucose concentration using the oxyhemoglobin saturation, blood flow volume and pulse frequency and etc as parameters. These parameters are worked out by the humidity, temperature and decrement of double-wavelength ray, which are detected by an integrated sensor. The principle of system, hardware and software composition, algorithm implementation are introduced. In the clinical trials, comparing with the measuring results of AUTOLAB18 biochemical analyzer, the correlation coefficient of the instrument is 0.87. The absolute error is in the range of $\pm 0.5\text{mmol/L}$. Experimental results show that the method of COEM is feasible. The instrument using the proposed method has character of rapid detection, high-precision results, reliable performance and be of some significance in diabetes testing.

Keywords: sensors application; non-invasive glucose measurement; conservation of energy metabolism; DSP;

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