

光ファイバを用いた赤外線鼓膜体温計の有用性

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The Practicality of Tympanic Thermometry Using an Optical Fiber

by

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ABSTRACT

To test the practicality of tympanic thermometry using an optical fiber, we conducted three tests. The first test compared measured temperature with reference temperature. The second test compared tympanic temperature as measured by this new system (infrared-Tty) with tympanic temperature as measured by thermistor (thermistor-Tty) and esophageal temperature measured by thermocouple (Tes), both during lower leg immersion at 42 °C and constant load exercise. The third test compared the sensitivity and internal temperature threshold parameters for the onset of sweating calculated by infrared Tty with those calculated by thermistor-Tty and Tes. The results of the first test confirmed that the new system has good

linearity, dynamic response and stability. The system showed temperature variation of ± 0.2 during the stability test. The infrared-Tty values were similar to those by thermistor-Tty and Tes both during lower leg immersion and exercise. The new infrared system was able to measure tympanic temperature continuously throughout the experiments. The sweating sensitivity and the threshold for the onset of sweating parameters calculated by infrared-Tty were similar to those calculated by thermistor-Tty and Tes. These results indicate that this new method makes it possible to measure tympanic temperature continuously, and more safely.

要 旨

光ファイバを用いた赤外線鼓膜体温計の有用性を、1) 基準温度と比較、2) 下肢温浴と運動負荷時の深部体温変化をこれまでの方法と比較、3) 発汗反応（発汗量と深部体温関係における勾配：発汗の感受性、発汗開始深部体温閾値：発汗開始閾値）での比較から検討した。簡易黒体炉を用いて基準温度を36～40の間で変化させた場合、赤外線鼓膜体温計は直線性、追従性および安定性の基本性能を有し、測定誤差は ± 0.2 であった。2) の条件において赤外線鼓膜体温計で測定した鼓膜温（赤外線 Tty）はサーミスタで測定した鼓膜温（サーミスタ Tty）ならびに食道温と同様な値を示した。また、両負荷中、本システムで連続的に鼓膜温を測定することができた。さらに3) より、発汗反応の指標である発汗の感受性と発汗開始閾値は、赤外線 Tty で算出した場合と、他の深部体温で算出した場合とでほぼ同様であった。以上のことより、光ファイバを用いた赤外線鼓膜体温計は鼓膜温を連続的に、また、安全に測定できる新しい方法であることが示唆された。