

Development of a Wearable Sensor for Monitoring Temperature of Uterus Based on Zero Heat Flux Principle

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Monitoring temperature of uterus over a menstrual cycle provides information on ovulation which is useful in diagnosing complexities of female reproductive system. The continuous temperature monitoring over menstrual cycle is important to identify deviations of the temperature variation patterns. On the other hand, accurate temperature capturing is difficult with fat layer and irregular body shapes. A wearable device with a sensor array was tested for continuous temperature monitoring. The sensors were developed based on Zero Heat Flux (ZHF) thermometry principle. The calibrated five sensors were fixed to an undergarment. The sensor placement was done as one sensor directly in line with navel and two sensors at a distance of 4 cm from navel, another two, 5cm below the navel and 10 cm apart from each. Three healthy subjects were used and the temperature of the uterus was measured continuously for 15 minutes per day at one minute intervals between 6 am to 8 am, during their one complete menstrual cycle. The core body temperature also collected as reference temperature measurement. The collected data was analyzed using simple statistics. Though the identification of ovulation was difficult due to less number of subjects and shorter data collection duration, the temperature variation pattern has identified in certain regions of uterus during the menstrual cycle.

Keywords: Continuous monitoring, uterus temperature, zero heat flux principle