



**Ministry of Higher Education and
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Heat and Cold In Medicine

By

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Objectives: after the end of this lecture, the student must know:

1. Different methods available to measure body temperature
2. How heat and cold can be used in medicine

1. The most common way to measure temperature is with glass thermometer, containing mercury or alcohol. For the thermometer to measure fractions of temperature degree, it requires capillary diameter to be so small (<0.1 mm). It has restriction just above the bulb.

2. Thermistor : special resistor changes its resistance rapidly with temperature ($\%5$) \sim $^{\circ}\text{C}$ Resistance are equal the bridge is balance.

This used in medicine because of its sensitivity (0.01 $^{\circ}\text{C}$). Thermistor is placed in the nose to monitor breathing rate by showing temperature change between inspired and expired air and this type called pneumograph.

3. Thermocouple : consist of two junction different metals, if the two junctions are different temperature, voltage is produced. This can be made small enough to measure the temperature of individual cells.

4. Thermograph – mapping the body temperature.

Measurements of body surface temperature indicate that it varies from point to point depending upon metabolic and circulatory processes near the skin. In 1950 it's found that most of breast cancers characterized by an elevated skin temperature in the region of the cancer. The surface temperature above tumor ~ 1 $^{\circ}\text{C}$ higher than normal surrounding tissue.

If the temperature is sufficiently high (red hot), the radiation is visible.
At body temperature the emitted radiation is in the infrared (IR) region.