1-Body temperature

Introduction:-

Body temperature is tightly controlled to maintain normal metabolic processes. This control is achieved by the hypothalamus.

Body temperature depends upon the balance between heat generation and loss, and the ambient environment.

Temperature measurement is an important part of the general examination of the patient. It is measured by centigrade (Celsius) scale but many countries (USA) are using Fahranheit scale. The normal range of the body temperature is 36.6-37.2 C˚.

Heat is produced by:-

1- Metabolic process.
2- Food intake (dynamic action).
3- Exercise (contraction of skeletal muscles).
4- Hot environment such as sun, heater.

Heat is lost through:

1- Skin 97 % (radiation, conduction, convection and evaporation)
2- Expired air 2%.
3- Urine and feces 1%.

The body temperature is regulated by temperature center in hypothalamus. When body **temperature raises too high**, temperature center in anterior hypothalamus is activated and following mechanisms take place:

I- The mechanisms activated by heat are:-

A- Increase heat loss:-

1- Skin blood vessels dilate to transfer internal heat to skin.
2- Sweating through sympathetic nervous system (SNS).
3- Increases respiratory rate.

B- Decrease heat production:-

1- Anorexia.
2- Apathy and inertia.

II- The mechanisms activated by cold are:-

A- Decrease heat loss:-

1- Skin blood vessels constrict.

2- Curling up.

B- Increase heat production:-

1- Shivering.

2- Hunger.

3- Increase secretion of norepinephrine and epinephrine through (SNS). **See figure (1-1).**

Physiological variation:-

1- In women, the temperature may be one Celsius degree higher during ovulation.

2- The temperature of people who live in hot area 0.5 C˚ more than those live in cold area.

3- The temperature at evening 0.5 C˚ more than morning due to increase metabolism.

4- The temperature in groin and axilla is low 0.5 C˚ than that in the mouth while in the rectum its 0.5 C˚ higher.

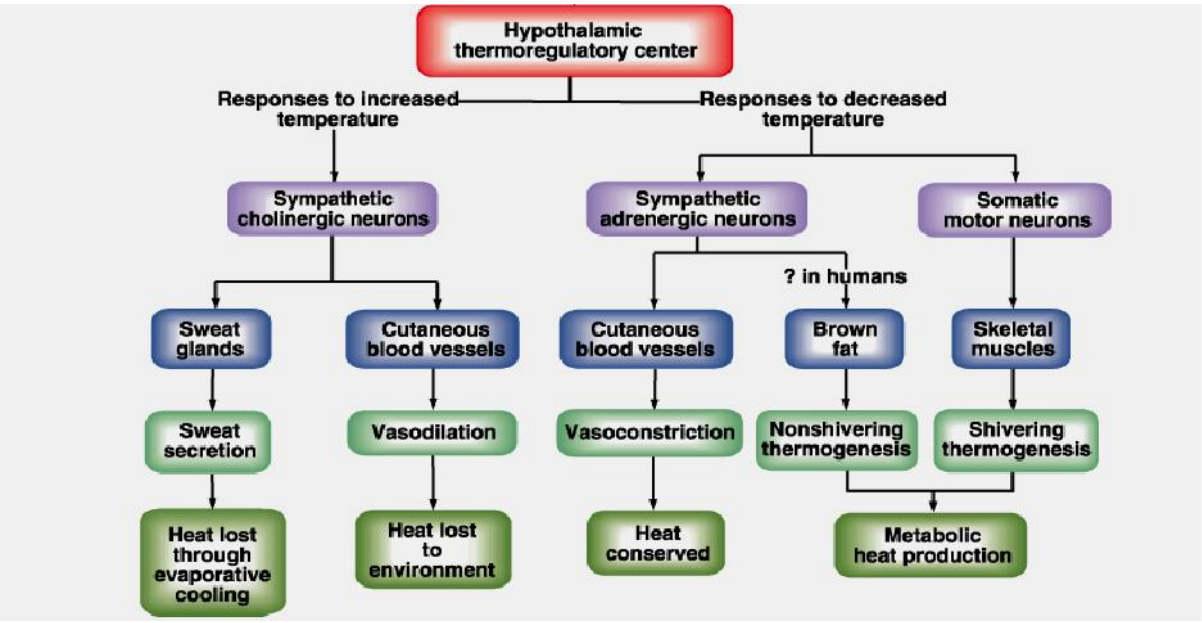


Figure (1-1): Hypothalamic thermoregulatory center.

Routs of temperature measurement:-

1- Mouth route, the most commonly used route and used in a conscious adult and in children older than 5 years.

2- Axilla route is used in unconscious adult and children.

3- Groin route is used in infant and smaller children.

4- Rectal route is now rarely taken.

Objective:

To measurement the body temperature.

Materials and instruments:

1- Subject.

2- Medical or clinical thermometer (figure 1-2).

3- Antiseptic substance.

4- Cotton.

5- Container.

Procedure:

1- Before inserting thermometer in the mouth, wash it by antiseptic solution.

2- Hold the thermometer by fingers and watch the level of mercury, if it is higher than 35C˚, shake it down to bring mercury below this level.

3- Put it in the mouth under the tongue for 2 minutes.

4- Mouth should be firmly closed, breathing is taken through nose.

5- Prior to reading, no hot or cold substance is placed in mouth and no gum chewing.

Clinical correlation

Fever (pyrexia) is a temporary increase in body temperature. Fever is present if the oral temperature is >37.7°C, or tympanic temperature >37.5°C.

Infection is the most common cause of fever but in very young or elderly patients and those with impaired immune function (due to primary disease, e.g. human immunodeficiency virus (HIV), or following treatment, e.g. oral steroids, immunosuppressants), infection may not produce fever.

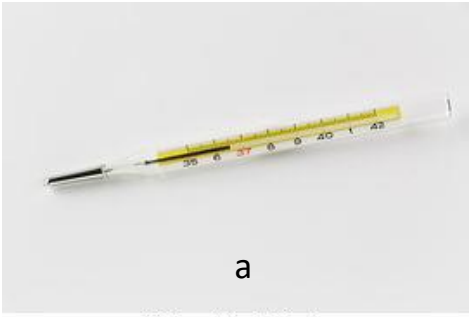
Other causes of fever are immunological diseases, hyperthyroidism, malignancies…etc.

Hypothermia is a core temperature <35°C and is easily missed unless rectal temperature is measured. As body temperature falls, conscious level is progressively impaired. Altered consciousness is common with core temperatures <28°C, and may mimic death. If you suspect hypothermia, measure temperature at more than one site, e.g. external auditory meatus and rectum.

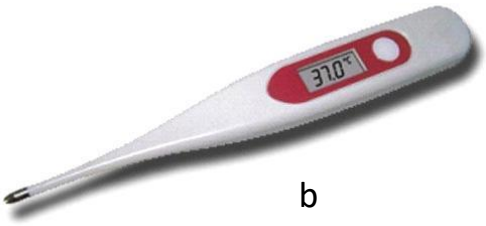
Hypothermia occurs in:

- elderly immobile patients living alone, particularly during the winter

- Water immersion and near drowning.
- Prolonged unconsciousness in low ambient temperatures, especially combined with alcohol intoxication (which causes peripheral vasodilatation), drug over dosage, stroke or head injury.
- Severe hypothyroidism.
- Infant in cold weather



a



b

Figure 1-2 shows different types of thermometers (a- mercurial, b- electronic & c- tympanic)

c

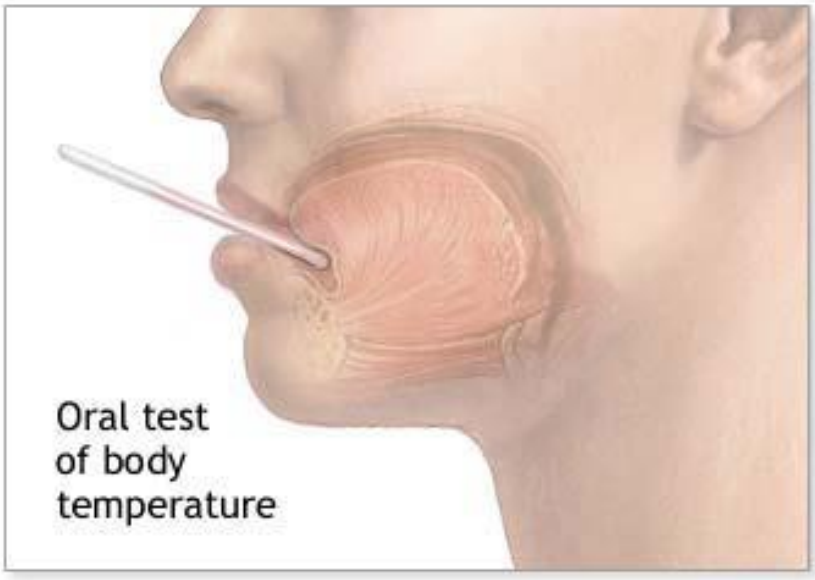


Figure 1-3: demonstrate oral temperature measurement