M.Sc. Sem. 1 CC-1 Univ. Q.1

प्राणि उष्मा (भाग-1)

THERMOREGULATION

INTRODUCTION :-

With the purpose of energy production, metabolic reactions go on continuously and consistently in the body. In addition to energy some heat is produced and the heat is responsible for the temperature of the body. In another way it can be said that body temperature is the index of internal reactions of the body. Normal body temperature of human being is ± 98.4°F.

The temperature recorded on the skin of the body is called surface temperature and recorded orally under the tongue is called inner temperature.

Animals capable of maintaining constant of body temperature are known as Homeothermic (warm blooded) and those showing variations in the body temp. are termed as Poikilothermic (cold blooded)

Variation in body temperature :-

There are certain factors responsible for variation in body temperature. These are :-

(i) Diurnal activities :- The body temperature recorded under complete rest is called basal body temperature. which is recorded in the morning time with the activity of the day time the body temperature fluctuate.

(ii) Age :-

In infant there is fluctuation in temperature in adult, it is approximately fixed in old age slightly lower.

(iii) Sex :-

Temperature is slightly higher in the male than the female.

iv) Quality of food :-

Ingestion of good protein rich diet is generally responsible for relatively higher body temperature.

(v) Environment :-

The environmental conditions including temperature are also one of the factors of temperature variation.

Basic Factors of Temperature maintainance :-

The temperature of the organs and tissues and equally, the temperature of the organism as a whole depends upon the rate of heat production and heat loss.

a) Heat Production in the body :-

The daily heat production of the body is approximately 2 thousand 5 hundred calories. Half of the energy liberated in the body and half is found in the form of heat. The muscles, liver, kidney take part heat production activity. Hormones like thyroxine and Adrenaline also have calorigenic action and take part in heat production. The distribution of heat produced in the body occurs through blood flows.

b) Heat loss from the body :-

Heat is lost from the body generally by four physical process :- Radiation, evaporation, conduction and convection.

In addition to these process occuring through the skin, the heat loss from the body are by diffusion of water through the lungs, by warming inspired air or expelled blood and by urine and faeces. The heat loss

can
from the body be explained by the following chart :-

"DAILY HEAT LOSS BY THE BODY THROUGH VARIOUS SOURCES"

Source	Daily Heat Loss (in cal.)	% age of Heat loss
(i) Through skin	2200	88%
(ii) Through lung	150	6%
(iii) Warming of air and food	100	4%
(iv) Through urine and faeces	50	2%
Total	2500	100%

Regulation of Body Temperature :-

Even after continuous loss of the temperature, the body temperature is maintained but the (body) body temperature regulated is the question mentioned.

The body temperature can be regulated by the following factors :-

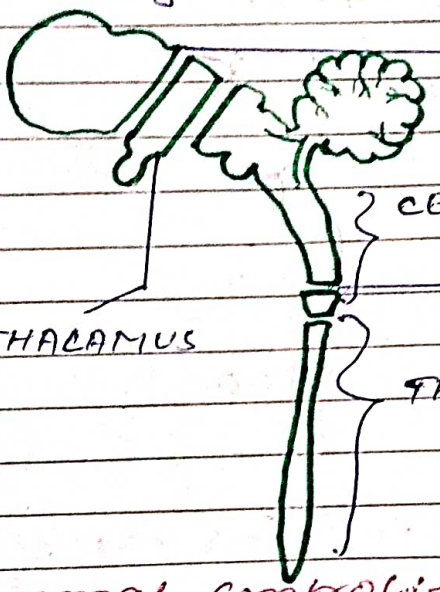
a) Nervous Control :-

The centre for temperature regulation are situated hypothalamus and are known as heat production centre, lies in posterior part of hypothalamus and serves to conserve body heat by sympathetic nerves fibers, which through the skin cause cutaneous vaso construction and inhibition of sweat gland activity.

Heat loss centre lies in anterior part of the hypothalamus and serves to check

over heating of the body this is brought about by parasympathetic fibres stimulation which causes cutaneous vaso dilation and stimulation of sweat gland activity.

Diagram illustrating the nervous mechanism of thermoregulation →



b) Hormonal control:-

The endocrine glands also participate in the regulation of body temperature especially the thyroid and adrenal. Both hormone forming activity is controlled by the nervous system.

The participation of the thyroid gland is shown for instance by an experiment in which the metabolic rate in an animal is increased by injecting blood serum from another animal which has been cold for the long time. Release of one tabolism activating thyroid into blood is apparently accelerated by cooling.

The adrenal also play a role in thermoregulation through adrenaline that they secrete into the blood which increases heat production by activating oxidation processes in the tissues particularly

on the muscles and reduce heat loss through the vaso constrictive effect. Adrenaline hormone is capable of raising body temperature.

c) Environmental control :-

The variation in atmospheric temperature is directly related with the variation in body temperature. Excessive process like sweating are stimulating and attempts to regulate the body temperature by increased heat loss during cold, heat production is stimulated by muscular activity of thyroxine and adrenaline activity of the heat loss is prevented by cutaneous, vaso constriction and inhibition of sweat reaction.

Conclusion :-

On the basis of above points it can be concluded that heat production and maintainance is purely interaction of metabolism hormonal and nervous mechanism