Heat loss from the body

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Radiation

- The intense thermal radiation of sun can be perceived
- The normal radiation loss from the body to the surroundngs is not felt directly, but it is still important
- In normal indoor conditions a person loses roughly equal quantities of heat by convection to the air and by radiation to the surrounding surfaces
- The loss of heat by radiation becomes noticeable when sitting near a cold window, and is felt as a radiation draught.

- All bodies above a temperature of absolute zero emit thermal radiation.
- Thermal radiation is produced by the vibration of the molecules of the emitting substance.
- Bodies which emit radiation also absorb it.
- This results in a net flow of energy from the hotter to the cooler bodies.
- The interventing medium, normally air, is assumed to play no part in the radiation exchange.
- Mean radiant temperature gives a single figure to measure the strenght of the radiation field at a point and allows an estimate of the radiation exchange with the surroundings of a real body at a point.

Convection

- Heat transfer by convection implies the physical movement of a fluid past the body, which serves to carry away the heat.
- Normally the surface temperature of a person will be warmer than the surrounding air.
- The layer of air in contact with his skin and clothing is warmed.
- This warm air may the be blown away by a draught; in the absence of a draught, the natural boyance of the warmed air will cause to rise and it will the be replaced by cooler air.
- In both cases air which has been warmed by the body is removed and the heat with it.

Evaporative Heat Loss

- The production and evaporation of sweat is the body´s most powerful temperature control mechanism.
- When a substance changes from liquid to vapor, a quantity of heat, known as latent heat, has to be supplied from somewhere.
- When liquid sweat evaporates on the skin surface, the necessary latent heat is extracted from the body, so that a cooling effect is produced.
- It is the evaporation of sweat, not its production, that cools the body.
- Any sweat that drips off the skin has produced no cooling at all; sweat that soaks into the clothing and then evaporates extracts heat from the clothing and the cooling effect is produced.

Respiration Loss

- Inspired air is both warmed and humidified on its passage to the lungs, where it reaches almost a complete saturation and a temperature equal to the deep body temperature.
- This heat is not all lost on expiration.
- However, there is a net loss of heat on respiration.

Heat Storage

- If the rate of heat production in the body is not equal to the rate of loss, the difference is stored in the body, resulting in a change in the mean body temperature.
- Over long periods of time, the net heat storage must be zero, but for short periods the thermal capacity of the body is great enough to absorb temporary imbalances of heat production and loss with only a small change in body temperature.