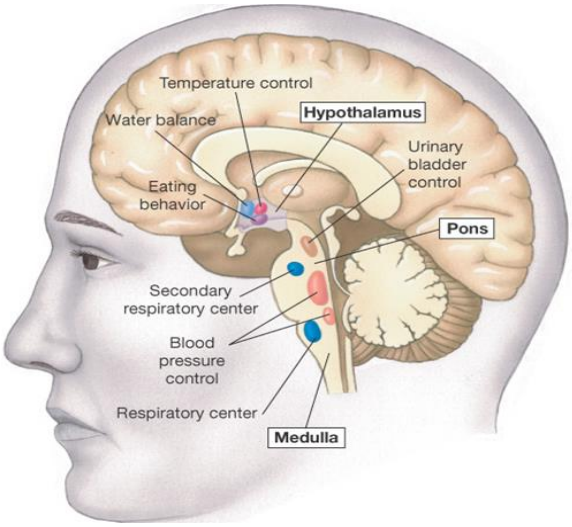
Lecture.7 Fever

Thermoregulatory Center (Thermostat)

Located in brain at hypothalamic region responsible for keeping the internal temp. at a normal level (approximately 36.8°C)

(set-point at 36.8 °C)

During fever there is changing in position of set-point to higher level



DEFINITION OF TERMS:

Fever: also known as **pyrexia**, or a **febrile response**, is a medical term which describes an increase in internal (core) body temperature to levels which are above normal (36.8°C ± o.5). 37°C = 98.6°F

Classification of pyrexia:

Pyrexia can be classed as:

- **low grade**: (38 to 39 °C, 100 to 102.2 °F),
- **moderate**: (39 to 40 °C, 102.2 to 104 °F),
- **high grade**: (more than 40 °C or 104 °F) depending on how much the body temperature has deviated from normal.
- if the fever goes above 42 °C (107.6 °F) then it may cause significant tissue damage and would most certainly be harmful. This is termed hyperpyrexia.
- Temperature normally fluctuates over the day, and the same applies to fever. If this characteristic pattern is lost, the raised body temperature may be due to hyperthermia, a more dangerous disorder. Hyperthermia is commonly caused by overheating or sunstroke, which elevates the body's temperature above the thermoregulatory set-point.

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Duration of fever:

1. Short duration: Remaining for few days usually less than 1 weeks. It subsides spontaneously without specific treatment or investigations. Mostly due to viral infections.
2. Moderate duration (1W – 3W): Usually the cause is known after some simple investigations, mostly due to bacterial infections like typhoid fever, brucellosis, malaria …etc but may be due to other causes.
3. Long duration fever: (more than 3ws): Any fever that prolonged for more than 3 Ws and the cause is not discovered after 10 days of investigations. It is called P. U. O (pyrexia of unknown origin)

Case scenario:

A 45 year old woman is seen for follow up evaluation of daily fever & fatigue for 1 month. She reports a temp. of as high as 38.4, but has no weight loss. No previous medical or surgical or travel history and takes no medication.

On physical exam, pulse 90, Bp 130/80, temp. 38.2. The patient looks well. The remainder physical exam. all are normal

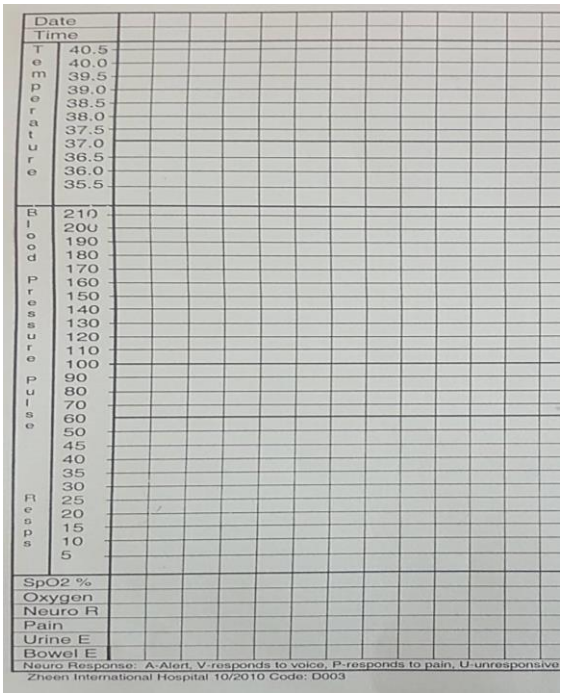
Investigations:

- CBC : Hb 13.7, WBC= 6.8, platelrt= 179
- Urine exam. is normal
- Renal, liver function tests are normal
- Virology screen normal
- Blood culture show no bacterial growth
- ECG, chest x-ray, and CT scan of abdomen and pelvis are normal

Temperature charts:

Are special sheets arranged in such a way in which you can put in it the patient recording temperature at specified time

e. g. at morning and evening although it may be every hour or every few hours. This sheet is usually connected to the patient case sheet file in the different medical wards and the recording of temperature is performed routinely by nurses.



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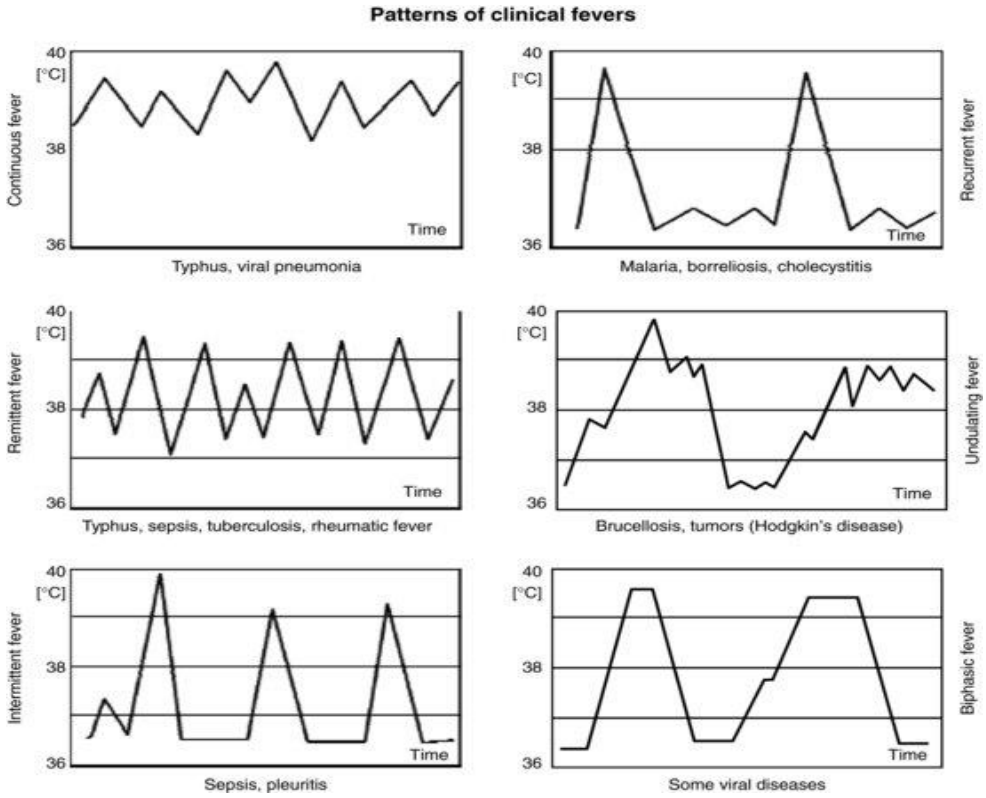
Fever pattern:

The following are the main patterns of the fever:

- **Continous fever:** e. g. in typhoid fever
- **Remittent fever:** e. g. in pus collection (abscesse) or using antipyretic drugs.
- **Intermittent fever:** e. g. in malaria (Tertiary and Quatrain), Brucellosis (undulant fever) and Hodgkin Lymphoma



In the past these patterns were considered very important for diagnosis of many infectious diseases but at present its importance was declined very much because of the availability of many investigatory tools and new techniques for diagnosis. Adding to this, these patterns are affected and changed by antipyretic drugs which are commonly prescribed to such patients.

Fever mechanism:

- Substances which induce fever are called *pyrogens*. Although external pathogens may be the ultimate reason for a fever, it is the internal or endogenous pyrogens that ultimately cause the increase in the thermoregulatory set-point.
- Fever mechanism:
- Pyrogens like e. g. lipopolysaccharide (LPS), which is a cell wall component of gram negative bacteria → which act on Macrophages leading to release of endogenous pyrogens or mediators like IL 1 and 6, TNF →These substances go to the brain through the circulation and prostaglandins E 2 is released which act on Thermoregulation center in hypothalamus (Re-setting the point up)

Notes...

- Pyrogens may come from MO, tumors, CT diseases and other inflammatory processes.

CAUSES OF FEVER:

Fever is a rise in our body's normal temperature,
Fever is part of our body's defense mechanism.
When our bodies are fighting infections, our body temperature rises. But why? Fever is a symptom of an infection. Fever is a symptom of almost every disease known to man. but generally can be arranged in following groups:

1. Infections: The largest and the most important group causing fever. (Viruses, bacteria, protozoal, helmintics,…etc)
2. 2. Tumors: benign and malignant, lymphoma, leukemia, solid tumors like hepatoma , hypernephroma,…etc.
3. 3. Connective tissue disaeses (Rheumatological diseases): Like SLE, Rheumatoid arthritis, Rheumatic fever, still disease ...etc.
4. 4. Drug reactions: e. g. due to penicillin, sulfa drugs…etc.
5. 5. Miscellaneous and factitious: like FMF, Bahcet disease, thyrotoxicosis, Self induced.

CAUSES OF VERY HIGH FEVER

(> 41.5)

1. Pontine hemorrage (intracranial): Hyperpyrexia
2. Falciparum malaria: Hyperpyrexia.
3. Drug reaction like phenothiazine drugs and some sort of general anasthesia
4. Heat stroke: Hyperthermia.

HEAT STROKE

This is due to overexposure to the sun. The body cannot bring down the temperature nor sweat. This is a potentially life threatening situation that requires emergency first aid and immediate means of bringing down the temp such as, dousing the person in cool water, giving cool liquids to drink, applying ice packs in axillary and groin areas, and moving the person out of heat and sun to a cool place.

NO PLACE FOR ANTIPYRETIC

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HYPOTHERMIA

Is lowering of body temperature below the normal, usually below 35C. In severe cases it may drops below 28 C which is fatal and affect the heart and other important organs and accompanied with bradycardia. ***Caused by:***

1. Hypopitutarism
2. hypothyroidism
3. exposure to extreme cold.

Measurement of body temperature:

person's body temperature is measured using a thermometer. Through:

1. Mouth: The commonest and easiest method for Temp. measurement.(cold and hot drinks affect the measuring)
2. Axilla or groin: In small children
3. Anal (Rectally): By using special thermometer. Approximate to core body temperature.
4. Ear: using a special temperature taking device in the ear.

Note:

The temperature through the axilla is 0.5 C less than the Oral Temp.

The rectal temperature is 0.5 C higher than the oral temperature.

FEVER MANIFESTATIONS:

Accompanying high fever the following manifestations may occur:

- Head ache, muscle pain (myalgia), joint pain, back ache and feeling hot.
- Nausea and vomiting.
- Epistaxis may occur.
- Tachycardia
- Redness of checks (flushing of face)
- Chills (fealing of coldness).
- Rigor (shivering): Real shaking of the body and teeth chattering (to raise Temp by muscle activity).
- and sweating (to reduce Temp) when fever drops.

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- Seizures (fit or convulsion): This is the most important and serious manifestation of high fever and especially occur in children. Repeated febrile convulsion may lead to serious brain damage.
- Another manifestation of the fever is confusion: which also commonly occur in children and elderly people.

Note: Fever also cause changes in endogenous proteins like globulin level, haptoglobin, ferritin, proteinuria, concentrated urine, high ESR, changes in WBCs count (leukocytosis), changes in coagulation factors and other acute phase reactant substances.

FEVER TREATMENT

1. Specific treatment for the cause of fever
2. Non specific measures to reduce the fever

Some comfort measures for someone with a fever include:

- **fever-reducing medications**,
- **cool wet rag** on the head,
- cover in **light blanket** (heavy blankets actually trap the heat),
- **avoid taking hot baths**,
- **drinking plenty of fluids**, especially clear cool liquids such as water and fruit juice to prevent dehydration,
- if the fever is high, you may give a **light sponge bath** using tepid water only, not cold water, and no alcohol!,
- Keep the person covered with a towel as not to get a chill.
- An infant or small child with a high fever can dehydrate very quickly, especially if they are losing fluids some other way, as well, such as diarrhea or vomiting. If they are not vomiting, **give them as much liquid as they can tolerate** to prevent dehydration. There are specially formulated liquids on the market for replenishing the body and maintaining electrolyte balance. If the child is vomiting

Antipyretic and anti-inflammatory drugs:

1. Paracetamol: Analgesic and anti-pyretic
2. Aspirin, Ibuprofen, Diclofenic acid and other NSAID.
3. Steroid drugs like hydrocortisone and prednisolone.

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