

## Systemic effects of inflammation

Dear All

Please use this as a complementary material for inflammation lecture 6; it gives information about systematic effects of inflammation which are of clinical relevance.

### INTRO

- Inflammatory response to any type of cell injury can cause systemic effects on the body.
- These are caused by inflammatory mediators which act beyond their local site of production.
- The main systemic manifestations are:
  1. Fever.
  2. Increased production of certain proteins = acute phase proteins.
  3. increased production of leukocytes.

### FEVER

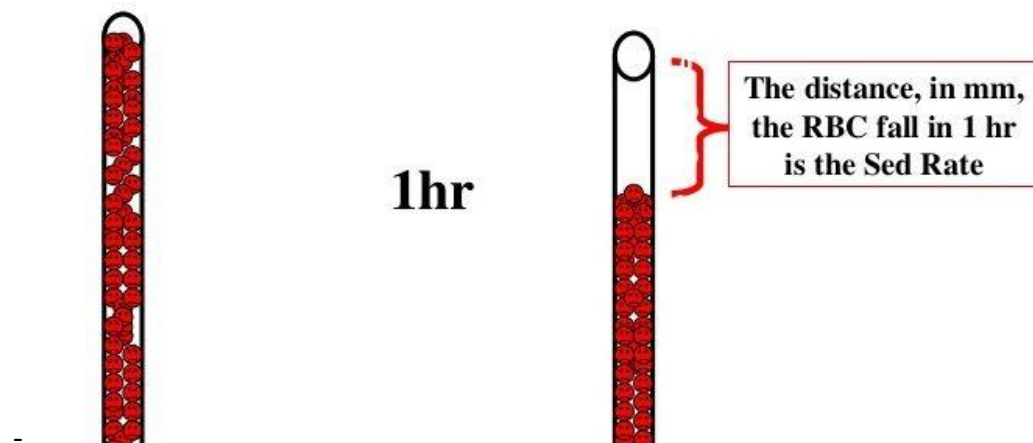
- Fever or pyrexia means increased body temperature. Note that this is different from “hotness” which occurs locally and is one of the cardinal signs of inflammation.
- Normal body temperature is regulated by the hypothalamus via certain neurotransmitters.
- During inflammation, certain endogenous and exogenous molecules can cause increase in body temperature.
- These molecules are called pyrogens (because they cause pyrexia = fever)
- Endogenous pyrogens include IL1 and TNF. Exogenous pyrogens are bacterial products, mainly lipopolysaccharides.
- These pyrogens act by increasing prostaglandin (PG) production in the vicinity of the hypothalamus... this occurs via stimulating cyclooxygenases.
- Once PG are increased, they increase neurotransmitters which affect the hypothalamic thermoregulatory centres causing fever.

### ACUTE PHASE PROTEINS

- These are proteins secreted from the liver under the influence of IL 6.
- They circulate in the blood, so we can measure them within patients' plasma... they are good indicators of inflammation and widely used clinically for this purpose.

- These include: serum amyloid A protein (SAA), fibrinogen and C reactive protein (CRP)
- CRP and SAA act as opsonins during inflammation.
- **CRP is** a very important indicator of inflammation.
- Fibrinogen increases aggregation of red blood cells. So clinically we measure it indirectly by measuring the rate of the RBC aggregation. This is called erythrocyte sedimentation rate (ESR)
- ESR is a good clinical indicator of inflammation and is measured by putting blood in a tube and leave the RBC to sediment at the bottom of the tube. After one hour, we measure the length of the clear plasma above the RBCs in the tube (see pic below). This length in mm is the ESR.

## Rate (ESR)



- Note: serial measurement of CRP and ESR can be used to assess response to treatment in inflammatory diseases like inflammatory bowel disease or rheumatoid arthritis.

### Leucocytosis

- This refers to increased WBC production with increased numbers of WBC within the blood.
- This is caused by increased release of WBCs from the bone marrow, under the influence of cytokines. But also, some infections can cause increased production of WBCs via increasing molecules that stimulate bone marrow.

Thanks