

Inflammation/Non-steroidal anti-inflammatory drugs (NSAIDS)

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Inflammation

- ▶ Inflammation is a localized protective/physiological immune/ biological response to tissue damage or microbial invasion.
- ▶ It occur due to tissue injury caused by physical trauma, noxious chemicals or microbial agents.
- ▶ Inflammation is characterized by redness, swelling, heat, pain, and loss of tissue function, which result from local immune, vascular and inflammatory cell responses to infection or injury.
- ▶ It is triggered by release of chemical mediators from injured tissues and migrating cells.

Chemical mediators

- ▶ such as histamine (from basophils/mast cells),
- ▶ Serotonin (from decarboxylation of tryptophan),
- ▶ Bradykinin (from plasma kinin or kallikrein system),
- ▶ Prostaglandins from activation of Cyclooxygenase-I (COX-I) and Cyclooxygenase-2 (COX-2)
- ▶ Leukotrienes from activation of lipoxygenase enzyme
- ▶ Platelet activation factors (PAF) from tumor cells (in case of malignancy)

Responses of chemical mediators

- ▶ Histamine cause /induce allergic responses
- ▶ Serotonin enhance secretion, vasodilation
- ▶ Bradykinin are pain producing substances, vasodilation
- ▶ Prostaglandins (PGE2 and PGF2 α increase uterine contraction), PGE1 increases body temperature, PGI2 and PGE1 inhibit gastric acid secretion and PGE2 & PGI2 suppress the immune responses
- ▶ Leukotrienes cause bronchoconstriction
- ▶ PAF promote platelet aggregation

Process of inflammation

- Result in release or entry of inflammatory mediators.
- Infiltration of white blood cells (Neutrophils) from circulatory system
- Intracellular adhesion molecules (ICAM) do adhesion of WBC in the endothelium
- Monocyte, lymphocyte, collagen fibers, proliferation, infiltration result in the formation of granuloma/pus formation
- These factors may induce acute and/or chronic inflammatory responses in the heart, pancreas, liver, kidney, lung, brain, intestinal tract and reproductive system, potentially leading to tissue damage or disease.

Non steroidal anti-inflammatory drugs (NSAIDS)

- ▶ They are known to possess anti-inflammatory effect but they are not steroids.
- ▶ They also induce analgesia and antipyretic effect.
- ▶ As NSAIDS provide relief from pain by reducing the level of pain producing substances and by elevating the **pain thresh hold***, so they are also known as analgesics.
- ▶ * means the point at which the sensory stimuli perceives the presence of unpleasant/noxious chemicals.
- ▶ Skin temperature, fear, emotions, anxiety, CO₂ tension or sweating are the factors which can alter pain thresh hold.

Classification

▶ **A. Salicylates**

- Acetyl salicylic acid (Aspirin)
- Salicylic acid
- Diflunisal
- Methyl Salicylate
- Sodium salicylate

Classification.....

- ▶ **B. Propionic acid derivatives and phenyl alcanoic acid**
- Ibuprofen
- Flurbiprofen
- Fenbufen
- Ketoprofen
- Naproxen
- Fenoprofen
- Oxaprozin

Classification.....

▶ **C. Fenamates**

- Mefenamic acid
- Flufenamic acid
- Tolfenamic acid
- Meclofenamate

▶ **D. Pyrrole alkanolic acid**

- Tolmetin

▶ **E. Acetic acid derivatives**

- ▶ Diclofenac sodium
- ▶ Diclofenac potassium
- ▶ Etodalac
- ▶ Aceclofenac
- ▶ Ketorolac
- ▶ Indomethacin
- ▶ Sulindac

Classification.....

▶ **F. Aniline derivatives**

- Acetaminophen
- Phenacetin

▶ **G. Pyrazolone derivatives**

- Phenylbutazone
- Oxyphenbutazone
- Metamizole

Classification.....

- ▶ **H. Oxicams/Enolic acid derivatives**
 - Piroxicam
 - Meloxicam
 - Tenoxicam
- ▶ **I. Naphthyl acetic acid/alkanones**
 - Nabumetone

Classification.....

▶ **J. Miscellaneous agents**

➤ Nimesulide

➤ Celecoxib

➤ Rofecoxib

➤ Parecoxib

▶ **K. Plant derived bioactives**

➤ Triptolide

➤ Andrographolide

➤ Curcumin