

Anti-inflammatory drugs; classes, uses and side effects

Instructor / **Mustafa Ahmed Jasim**
BVMS. M.Sc. (Pharmacology).

Dept. of physiology & Pharmacology
College of Veterinary Medicine
Diyala university (2016)

Inflammation

-It is a part of the complex biological response of body tissues to harmful stimuli, such as pathogen, damaged cells, or irritants.

- Classical signs of Inflammation include :

1- Redness (rubor).

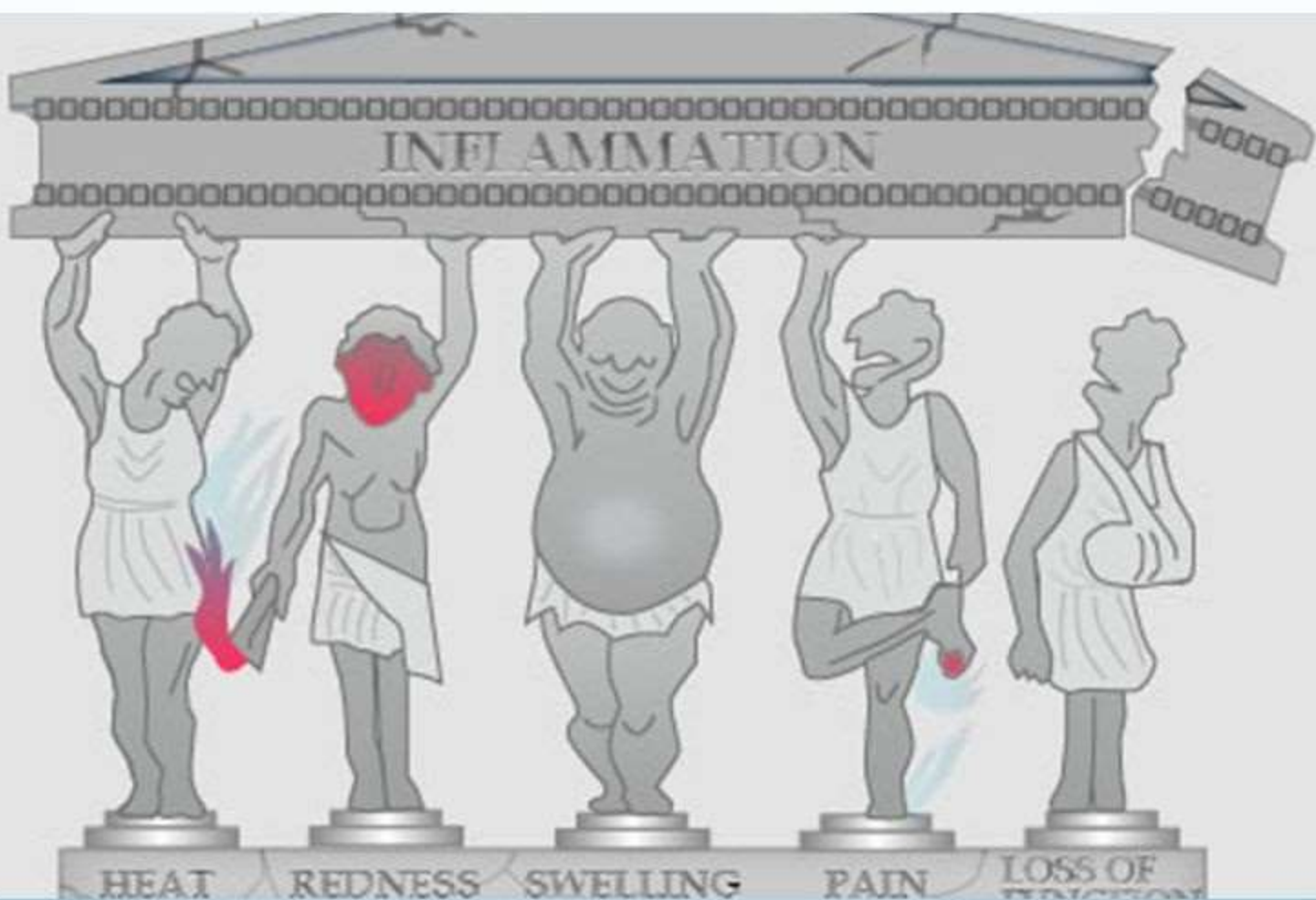
2- Swelling (tumor).

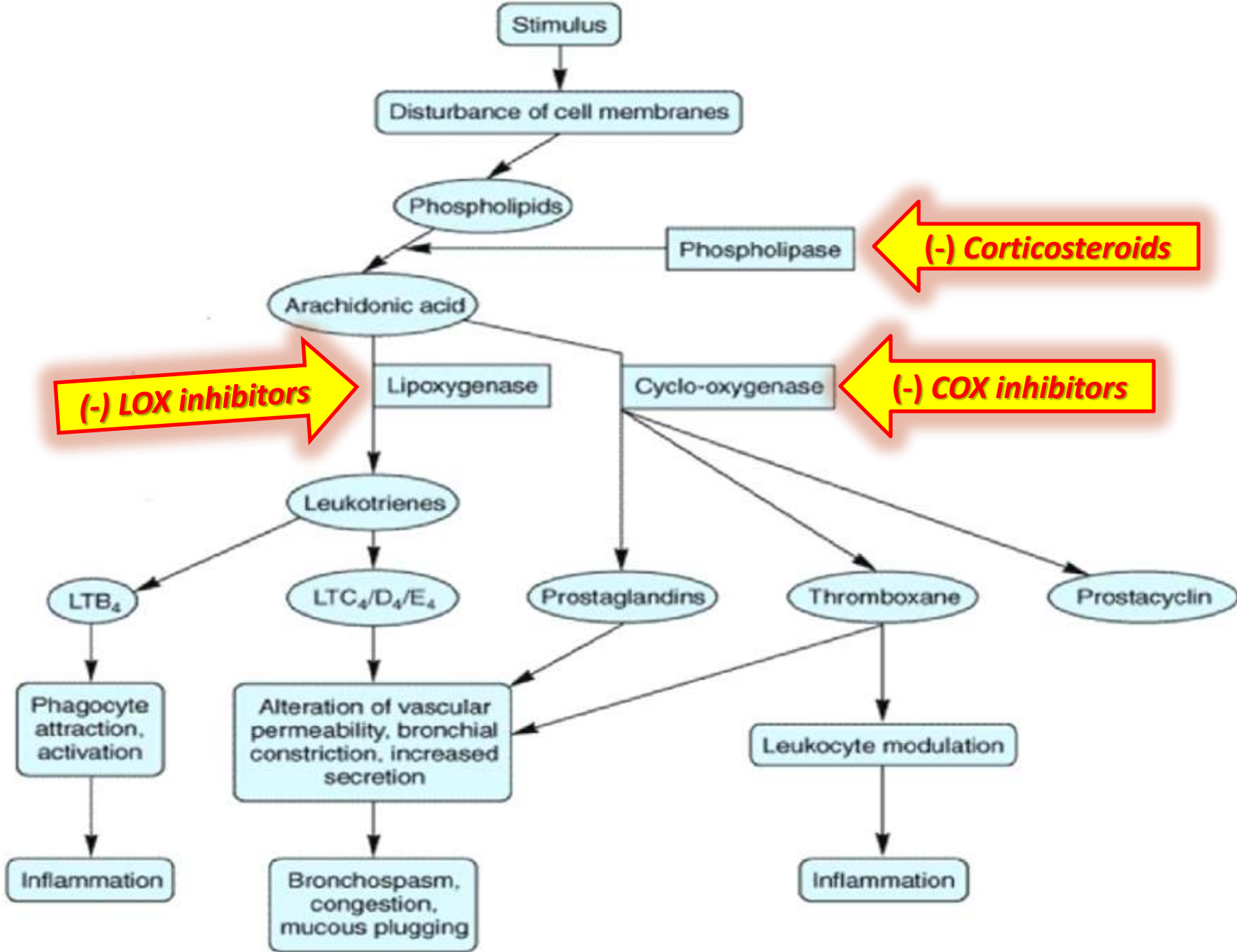
3- Heat (calor).

4- Pain (dolor) .

5- Loss of function (functio laesa).

Signs of Inflammation





- Two main groups of anti-inflammatory drugs:
 - 1- Steroidal anti-inflammatory drugs block the action of phospholipase .
 - 2- Nonsteroidal anti-inflammatory drugs block the action of cyclooxygenase and lipoxygenase

- There are two major isoforms of cyclooxygenase: cyclooxygenase-1 (COX-1) *conservative* and cyclooxygenase-2 (COX-2). *Inducible*.

- Although cyclooxygenase is widely distributed, lipoxygenases have so far been found mainly in lung, platelets, and white blood cells.

Steroidal Anti-inflammatory agents (Glucocorticoids)

- Glucocorticoids (GCs) are among the most widely used (and misused) class of drugs in veterinary medicine.
- Therapeutic protocols are often the product of clinical experience, common sense, and information from human medicine.
- Have anti-inflammatory effects due to their inhibition of phospholipase .
- Raise the concentration of liver glycogen and increase blood glucose levels.
- Affect carbohydrate, protein, and fat metabolism and they regulated by negative feedback mechanism.

Classification of corticosteroids

Corticosteroid	Anti-Inflammatory Potency	Sodium-Retaining Potency
Short-acting (≤ 12 hours)*		
Hydrocortisone	1	1
Cortisone	0.8	0.8
Fludrocortisone	10	125
Intermediate-acting (12–36 hours)*		
Prednisone	4	0.8
Prednisolone	5	0.8
Methylprednisolone	5	0.5
Triamcinolone	5	0
Long-acting (36–72 hours)*		
Paramethasone	10	0
Betamethasone	25	0
Dexamethasone	25	0
Flumethasone	30	0

Side effects of Glucocorticoids

- 1- Suppression of endogenous glucocorticoid synthesis.
- 2- Suppression of the response to infection or injury.
- 3- GIT disturbances- perforations.
- 4- Cataract, glaucoma.
- 5- Fluid and electrolyte disturbances.

Non Steroidal Anti-inflammatory Drugs (NSAIDs)

Dual COX, 5-LOX inhibitors

Inhibition of both COX and 5-LOX, thus reducing or abolishing at therapeutic dose rates synthesis of two groups of inflammatory mediators derived from arachidonic acid, PGs, and LTs
Improved g.i.t. and possibly renal safety profiles.

Selective COX-2 inhibitors

Inhibition of COX-2 with absence or only partial inhibition of COX-1 at recommended dose rates
Improved g.i.t. safety profiles.

COX inhibiting nitric oxide donors (CINODs)

Nitrosoesters of NSAIDs (e.g., aspirin, indomethacin, phenylbutazone), inhibit releasing nitric oxide and parent drug in vivo Improved g.i.t. safety profile and possibly greater efficacy and/or potency.

Group	Examples	Therapeutic uses
<i>Salicylate Derivatives</i>	Acetyl Salicylic Acid (Aspirin [®]) and related salicylate products.	Mild to moderate pain, anti-clot, antipyretic and for rheumatoid arthritis.
<i>Fenamates Derivatives</i>	Meclofenamate (Meclomen [®]) and mefenamic acid (Ponstel [®]). And Diclofenac (Voltaren [®])	Mild to moderate pain, rheumatoid arthritis and osteoarthritis, ankylosing spondylitis.
<i>Acetic Acid Derivatives</i>	Indomethacin (Indocin [®])	Rheumatoid arthritis, moderate to severe osteoarthritis, ankylosing spondylitis, gouty arthritis.
<i>Enolic acid Derivatives</i>	Piroxicam (Feledin [®]) and Meloxicam (Mobic [®]) Phenylbutazone Diperone (Metalgene)	Mild to moderate pain, Rheumatoid arthritis and osteoarthritis Antipyretic.
<i>Propionic Acid Derivatives</i>	Ibuprofen (Advil [®]), fenoprofen (Nalfon [®]), ketoprofen (Orudis [®]), and naproxen (Naprosyn [®]).	Long term management of mild to moderate pain, rheumatoid arthritis and osteoarthritis
<i>Paraaminophenol Derivatives</i>	Para-acetoaminophin (Paracetmol [®])	Antipyretic.
<i>Selective COX-2 inhibitors</i>	Celecoxib (Celebrex [®]) and rofecoxib (Vioxx [®])	Acute\long term treatment of rheumatic arthritis, osteoarthritis and

NSAIDs Adverse Effects

- Nausea
- Gastrointestinal distress, ulceration, bleeding
- Vomiting
- CNS stimulation
- Headache
- Vertigo
- Mental confusion
- Hypersensitivity reactions (rash, fever)
- Hepatic damage (elevated serum enzymes)

Thanks