College of Pharmacy

Department of Pharmacology

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Anti-inflammatory Drugs

Objectives

- Describe inflammation and its stages.
- Understand the difference between the steroidal and non-steroidal anti-inflammatory drugs.
- Explain the method used to screen the drug anti-inflammatory properties.

Inflammation

Definition:

It is a protective response against injury which can be chemicals, mechanical, infectious, or immunological.

Signs of inflammation:

- Heat.
- Erythema.
- edema.
- Tenderness & pain..
- Loss of function.

Chemical mediators of inflammation:

- Bradykinin.
- Leukotriene.
- Prostaglandin.

Cellular events during inflammation:

Acute stage:

Vasodilatation and increase muscular permeability due to the release of histamine & 5-HT leading to edema.

Exudative stage:

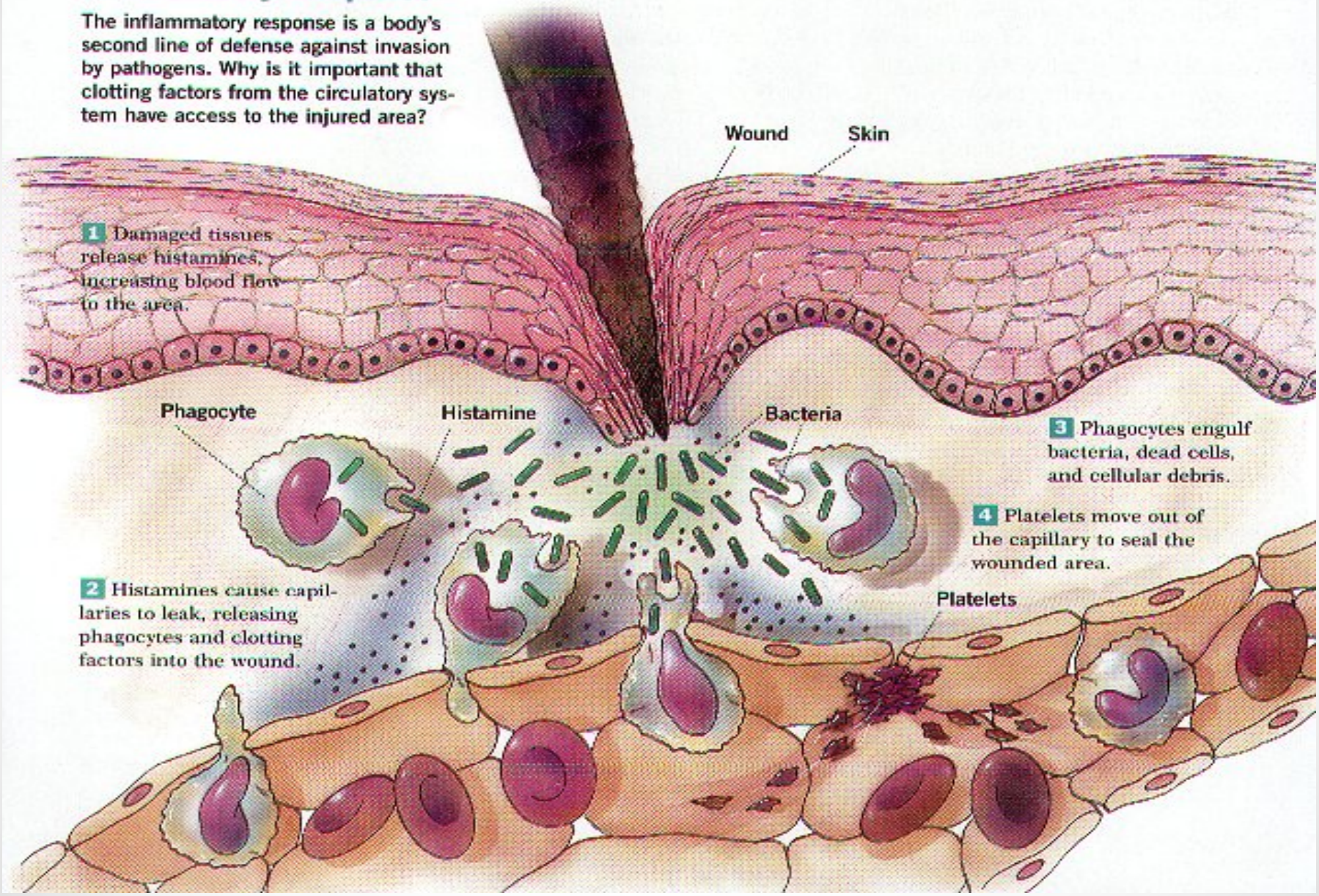
Migration of the leukocytes to the site of inflammation.

Repair stage:

Proliferation of fibroblast and formation of new connective tissue.

Steps of the Inflammatory Response

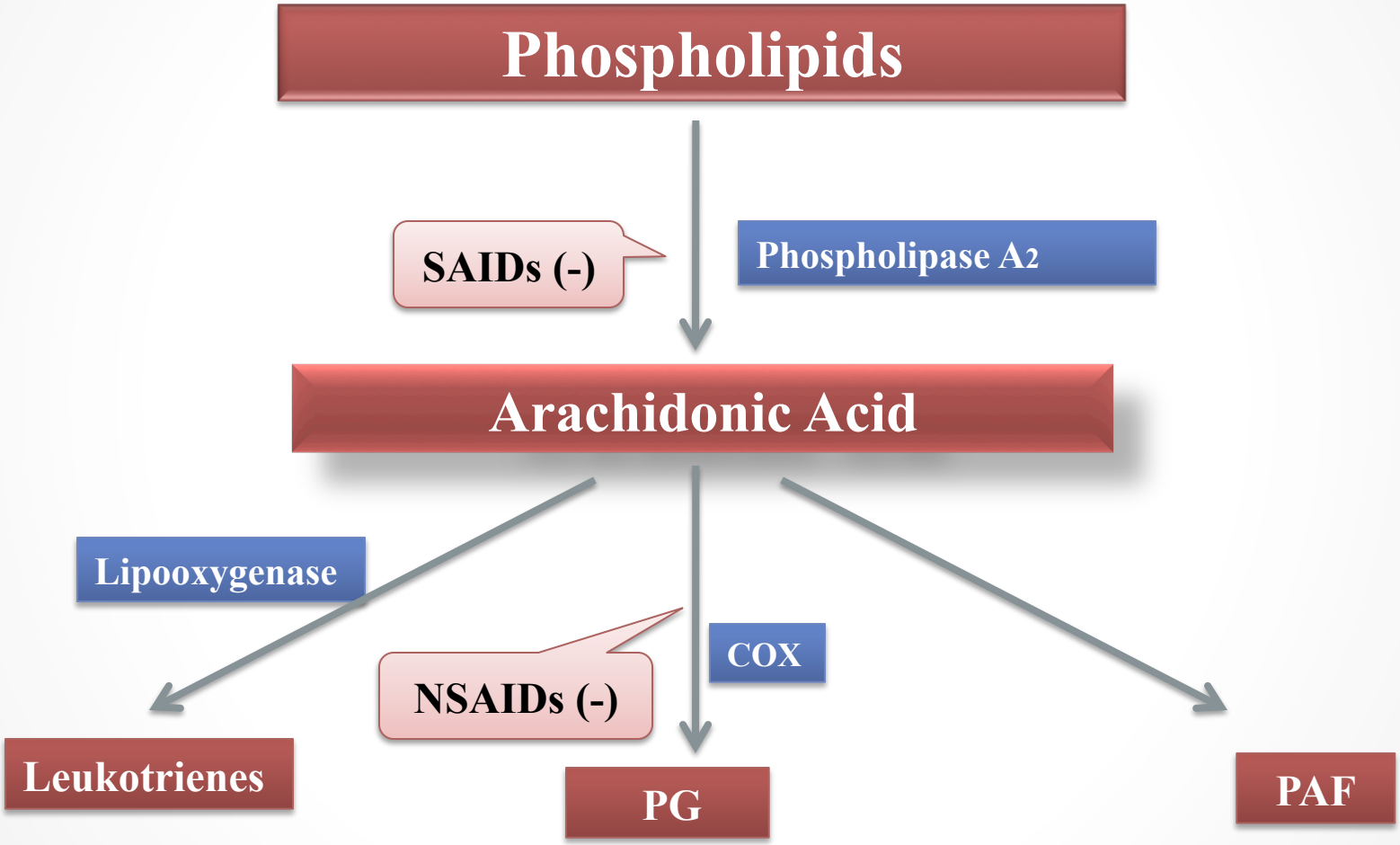
The inflammatory response is a body's second line of defense against invasion by pathogens. Why is it important that clotting factors from the circulatory system have access to the injured area?



Classification of anti-inflammatory drug

Type	Examples	MOA
SAIDs	Hydrocortisone, dexamethasone	Induce protein called lipocortin which cause inhibition of phospholipase A_2.
NSAIDs	Aspirin, Paracetamol, & Indomethacin	Inhibit cyclooxygenase enzyme leading to decrease prostaglandin biosynthesis (PGE_1 & PGI_2).

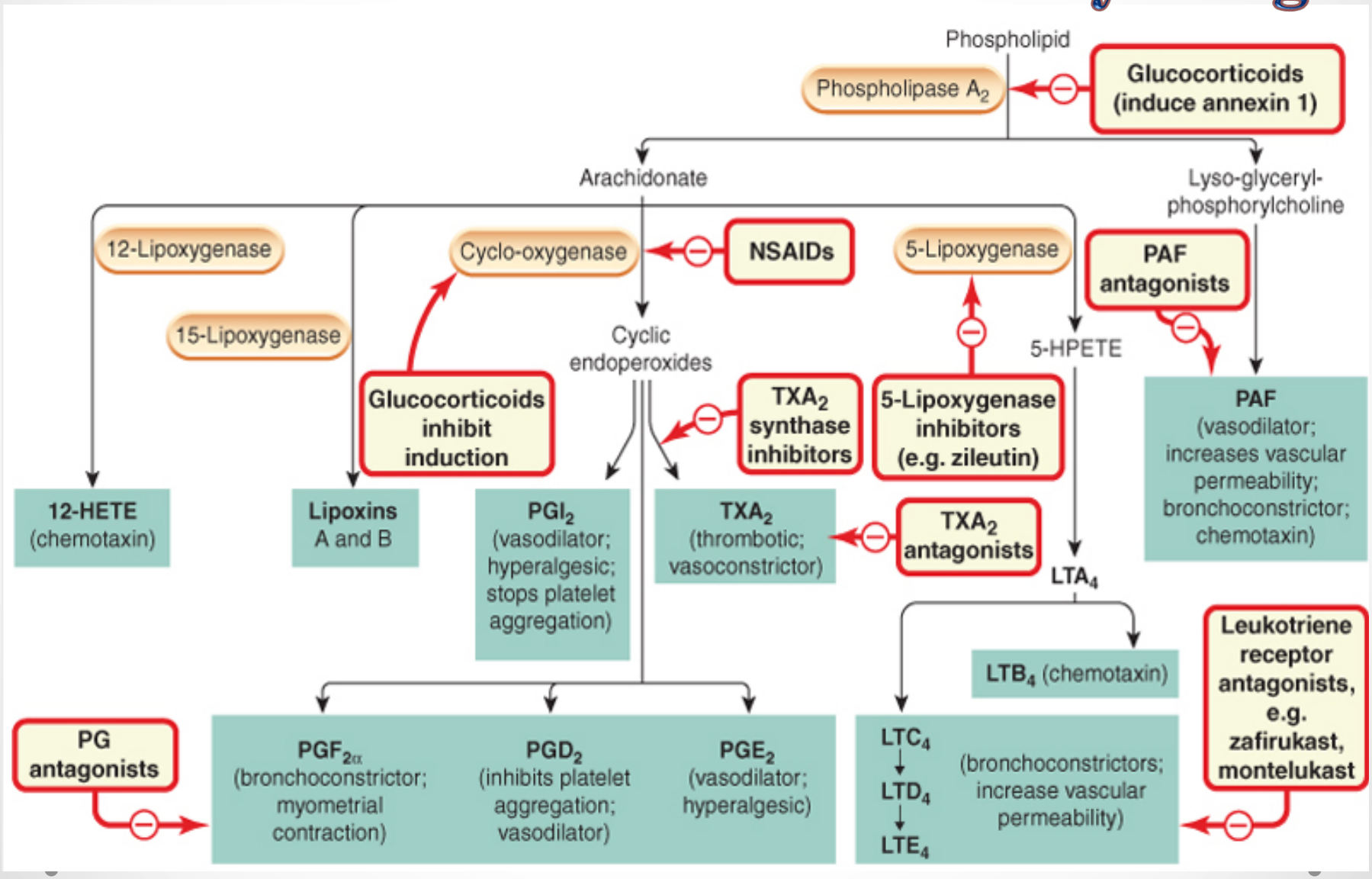
Site of action of anti-inflammatory drugs



Aspirin is contraindicated for asthmatic patients why?

Because it inhibits the COX enzyme shifting the reaction to the lipooxygenase pathway thus, increasing the leukotrienes production which cause bronchoconstrictions.

Site of Action of Anti-inflammatory Drugs



Screening methods for anti-inflammatory drugs:

1. Rat - Paw edema Method (Acute stage) .
2. Granulation Pouch Method (Exudative stage) .
3. Adjuvant induced arthritis.

Rat - Paw edema Method

Materials:

Animal: Rats.

Irritant substance: Carrageenin (2%) .

Drug used: Indomethacin (2 mg/kg) .

Rat - Paw edema Method

Methods:

1. The rats are weighed to the nearest gm and divided into two groups (each group include 3 rats), the groups are labeled I (control group) and II (treated group).

2. For control group, the rats are injected by of carrageenin in a dose of 0.1 ml (irritant substance) in subplanter area of the right hind paw of each rat and the left paw is used as control for the same animal.

Rat - Paw edema Method

Methods:

3. For treated group, the rats are injected by indomethacin intraperitoneal (IP) in a dose of 0.2 ml, 30 minute later the rats are injected by carrageenin in a dose of 0.1 ml in subplanter area of the right hind paw of each rat.

4. After two hours, the feet of each animal are cut at the ankles using bone scissor, then each foot are weighed and the right foot was compared to left one for each animal.

Rat - Paw edema Method

Results	Control Groups		Treated Groups	
Position	Right	Left	Right	Left
1	----	----	----	----
2	----	----	----	----
3	----	----	----	----
Mean	A	B	C	D

Rat - Paw edema Method

Calculations:

- % of edema produced by carrageenin alone =

$$\frac{A - B}{B} \times 100 = X\ \%$$

- % of edema produced by carrageenin after treatment =

$$\frac{C - D}{D} \times 100 = Y\ \%$$

- % Reduction of edema by indomethacin =

$$X - Y = \quad \%$$

References

- Goodman and Gilman's the pharmacological basis of therapeutics, E-book, 11th edition.
- H.P. Rang, M.M. Dale, M.J Ritter, R.J. Flower (2007). Anti-inflammatory and immunosuppressant drugs . Rang and Dale's Pharmacology, 6th edition, Elsevier health sciences, London.