

Evaluation of Nonsteroidal Anti-Inflammatory Drugs (NSAIDs) (Lab 5)



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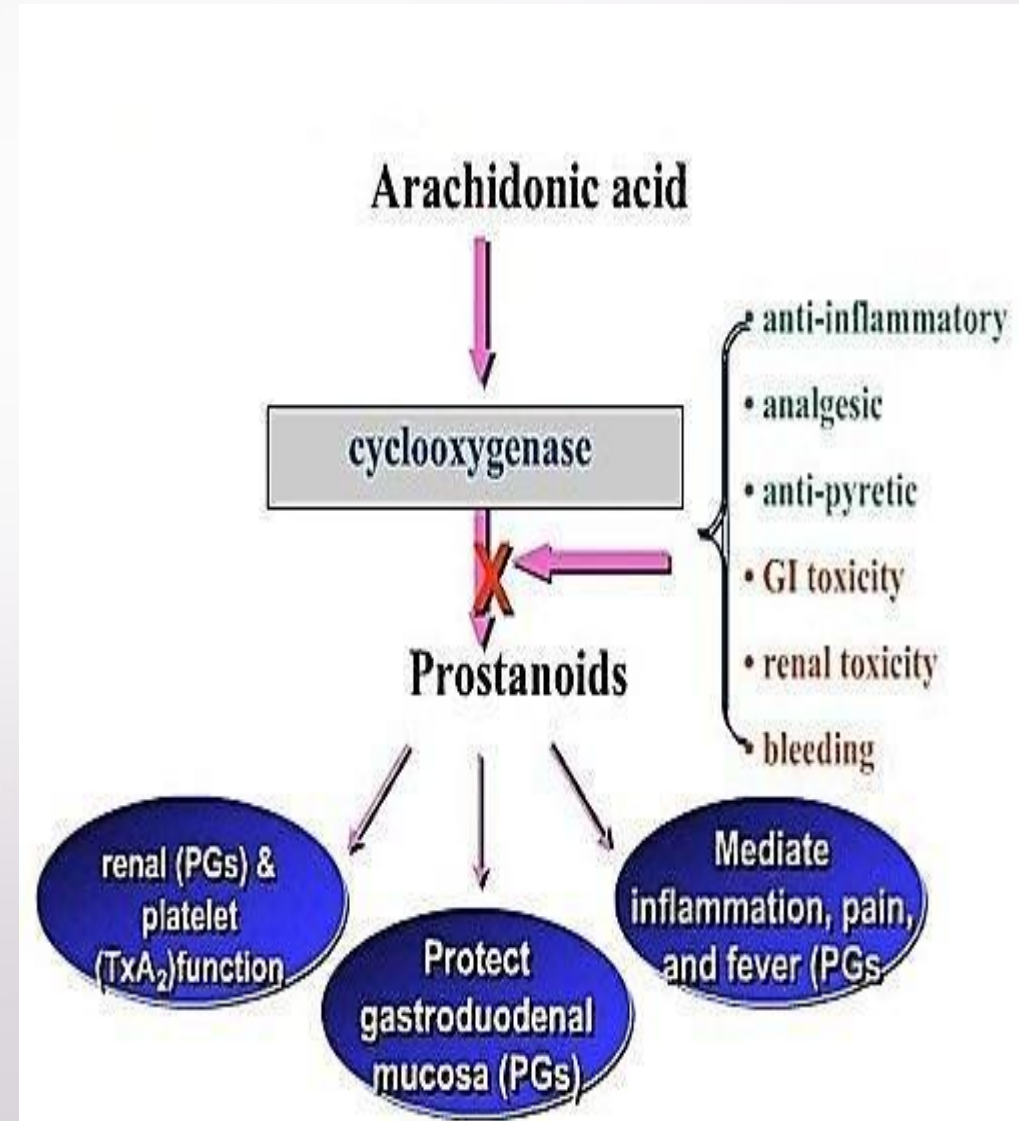
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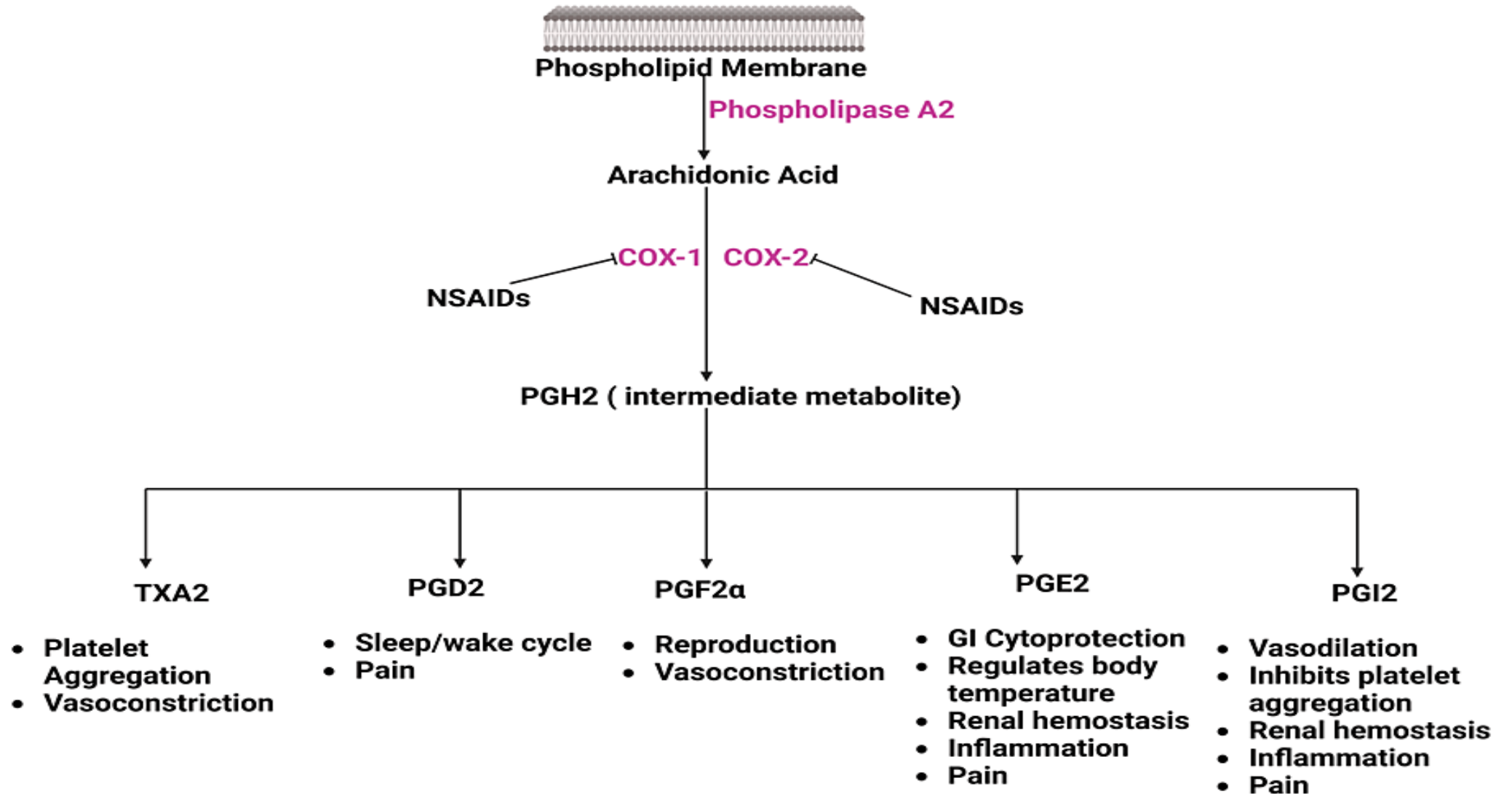
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Nonsteroidal Anti-Inflammatory Drugs (NSAIDs):

- The NSAIDs are a group of drugs that differ in their antipyretic, analgesic, & anti-inflammatory activities.
- They act primarily by inhibiting the COX enzymes that catalyze the first step in prostanoid biosynthesis. This leads to decreased **prostaglandin** synthesis with both beneficial & unwanted effects.



Synthesis of prostaglandins



Clinical uses of NSAIDs

NSAIDs are used to relieve pain & reduce signs of inflammation.

NSAIDs are a common treatment for chronic health problems such as rheumatoid arthritis & osteoarthritis.

General Adverse Effects of NSAIDs:

- Dyspepsia, nausea & vomiting. Gastric damage may occur in chronic users, with risk of hemorrhage.
- Skin reactions.
- Reversible renal insufficiency seen mainly in individuals with compromised renal function.
- All NSAIDs (except COX-2 inhibitors) prevent platelet aggregation & therefore may prolong bleeding.

In vivo analgesic evaluation techniques:

❖ Principle:

Pain is induced in a suitable animal & the response of the animal to the painful stimuli is recorded with or without administration of the analgesic agent.

❖ Classification of methods:

1. Methods for central analgesic activity:

- Hot plate method
- Tail immersion method
- Tail clip method

2. Method for peripheral analgesic activity:

- Writhing method
- Formalin test in rats

Writhing method:

- The painful stimulus is induced by IP injection of an irritant substance (acetic acid)
- The animals create a characteristics stretching behavior, which is called writhing.
(writhing is constriction of abdomen, turning of trunk (twist) & extension of hind legs).
- The number of writhes for each animal is counted during certain time period (during 30 minutes), beginning 5 minutes after injection of acetic acid.

Experimental protocol:

Control group

- The control group is given acetic acid IP (10 ml/kg) & after 5 minutes the number of writhes is recorded for each animal during 20 minutes.
- The number of writhes is recorded

Treated group


- Treated animals are administered the drug (diclofenac sodium at dose 10 mg/kg) IP, 5 minutes prior to acetic acid administration. Then acetic acid is given IP.
- 5 minutes are allowed to elapse, the mice are then observed for a period of 20 minutes & the number of writhes is recorded.

- If the drug possesses analgesic activity, the animal that received the drug will give lower number of writhes than the control, i.e. the drug having analgesic activity that inhibits writhing.

- Calculate % inhibition:

$$\% \text{ inhibition} = [\text{No. of writhing in control group} - \text{No. of writhing in treated group}] / \text{No. of writhing in control group} \times 100$$

| Writhing test | | |
|-------------------------|------------------------|---------------------|
| Group | No. of writhing | % inhibition |
| Control | 40 | 0 |
| Group I: Drug A | 20 | 50% |
| Group II: Drug B | 30 | 25% |



**THANK YOU FOR YOUR
ATTENTION**