NSAIDS EPIDEMIOLOGY

NSAIDs amounts to 3.8 of all prescriptions

A significant quantity is sold over the counter(OTC)

Use increases with age

90% of all NSAIDs prescriptions are issued to patients at ages over 65 years

NSAIDs is the most prominent risk for gastric ulceration, hemorrhage and perforation

The prevalence of NSAID-induced ulcers is 10% to 30%

ILOS

To focus on the general mechanism of action of NSAIDs

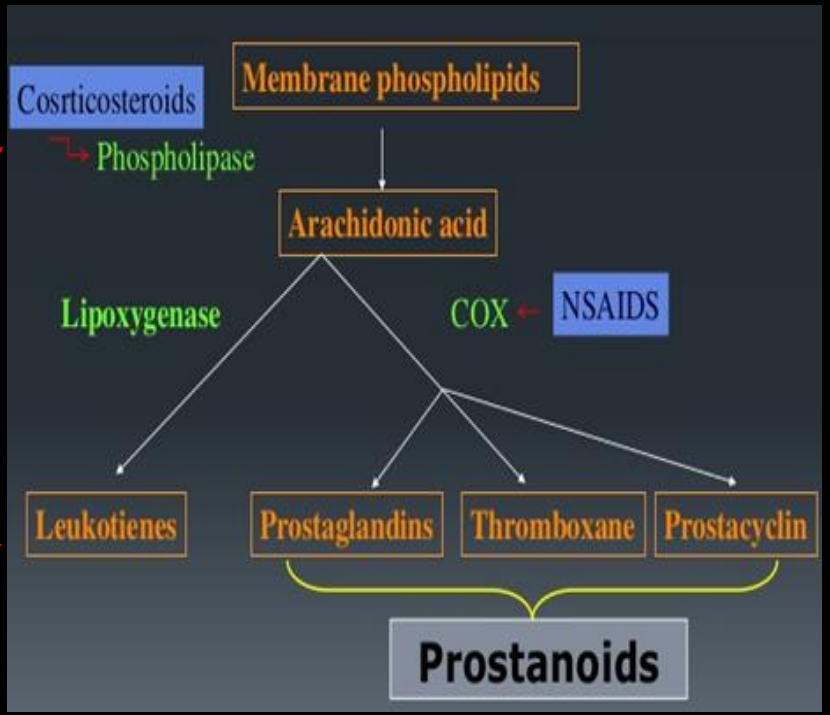
To classify NSAIDs on basis of their specifity to COX isoenzymes

To outline the common pharmacodynamic effects and ADRs of NSAIDs

To detail on the phramacokinetic properties and pharmacodynamic effects of **selected** NSAIDs

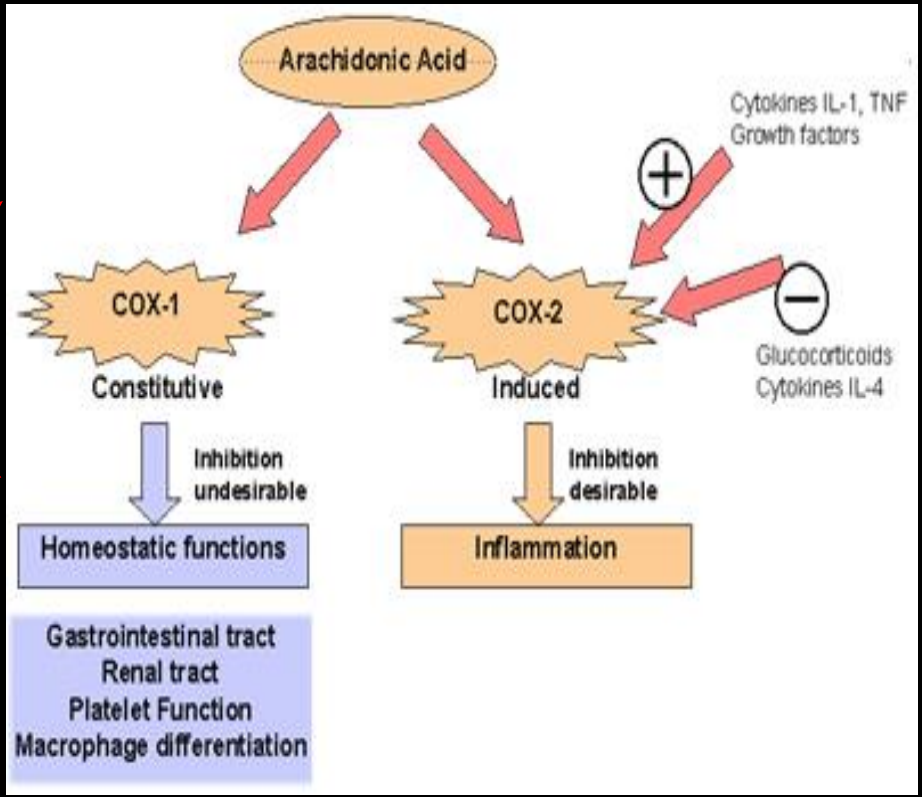
MECHANISM OF ACTION OF NSAIDS

NSAIDs inhibit cyclo oxygenase enzyme



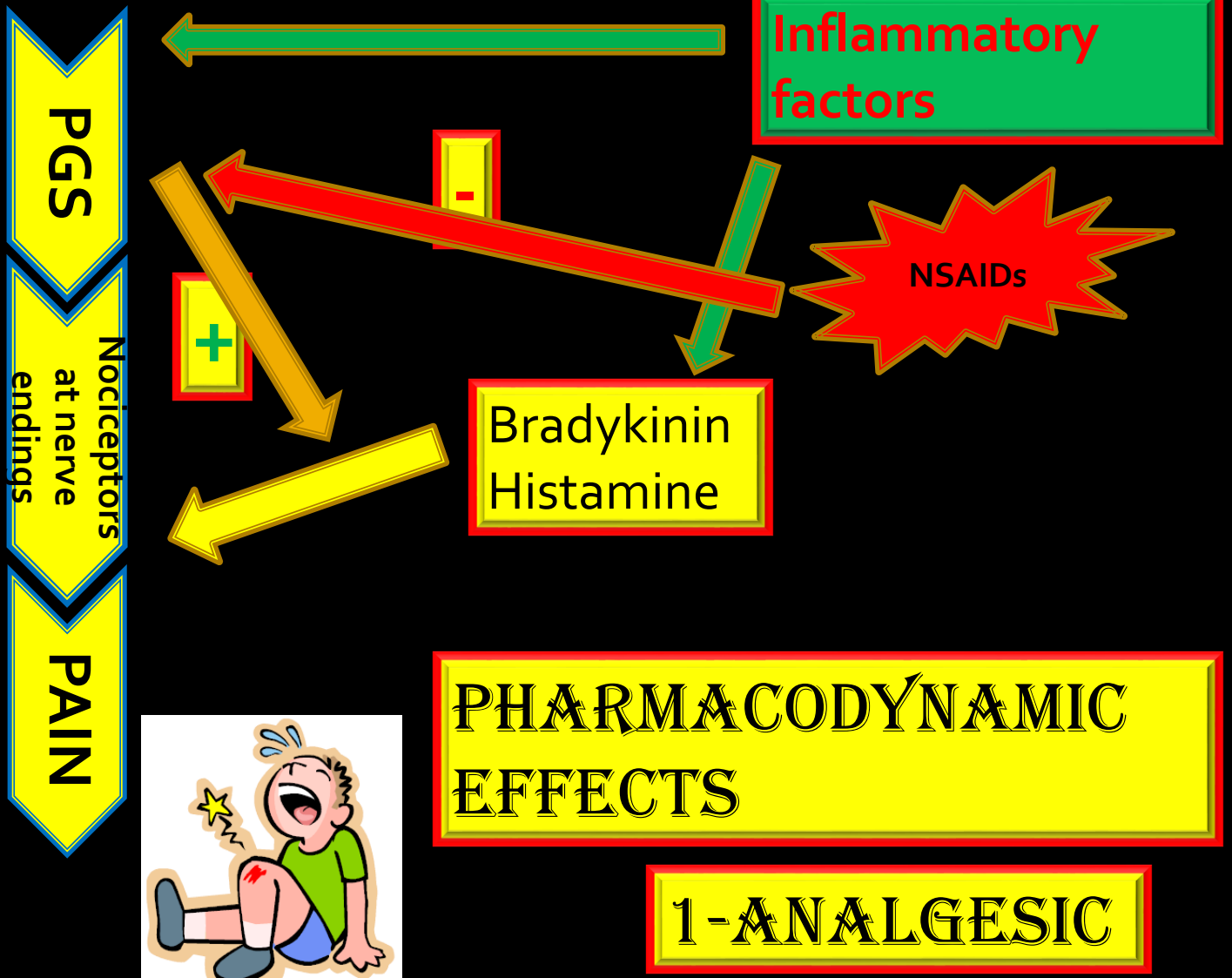
COX ISOFORMS

COX3 is found in the brain



CLASSIFICATION OF NSAIDS

Nonselective COX-1/COX-2 Inhibitors	Aspirin, Diclofenac
Selective COX-2 Inhibitors	Coxibs
Preferential COX-2 inhibitors	Meloxicam
COX-3 inhibitors	Paracetamol


Inflammatory factors
-
+
NSAIDs
Bradykinin
Histamine
PGS
Nociceptors at nerve endings
PAIN
PHARMACODYNAMIC EFFECTS
1-ANALGESIC

2-ANTIPYRETIC

Pyrogens

PGs

Thermoregulatory centre

-

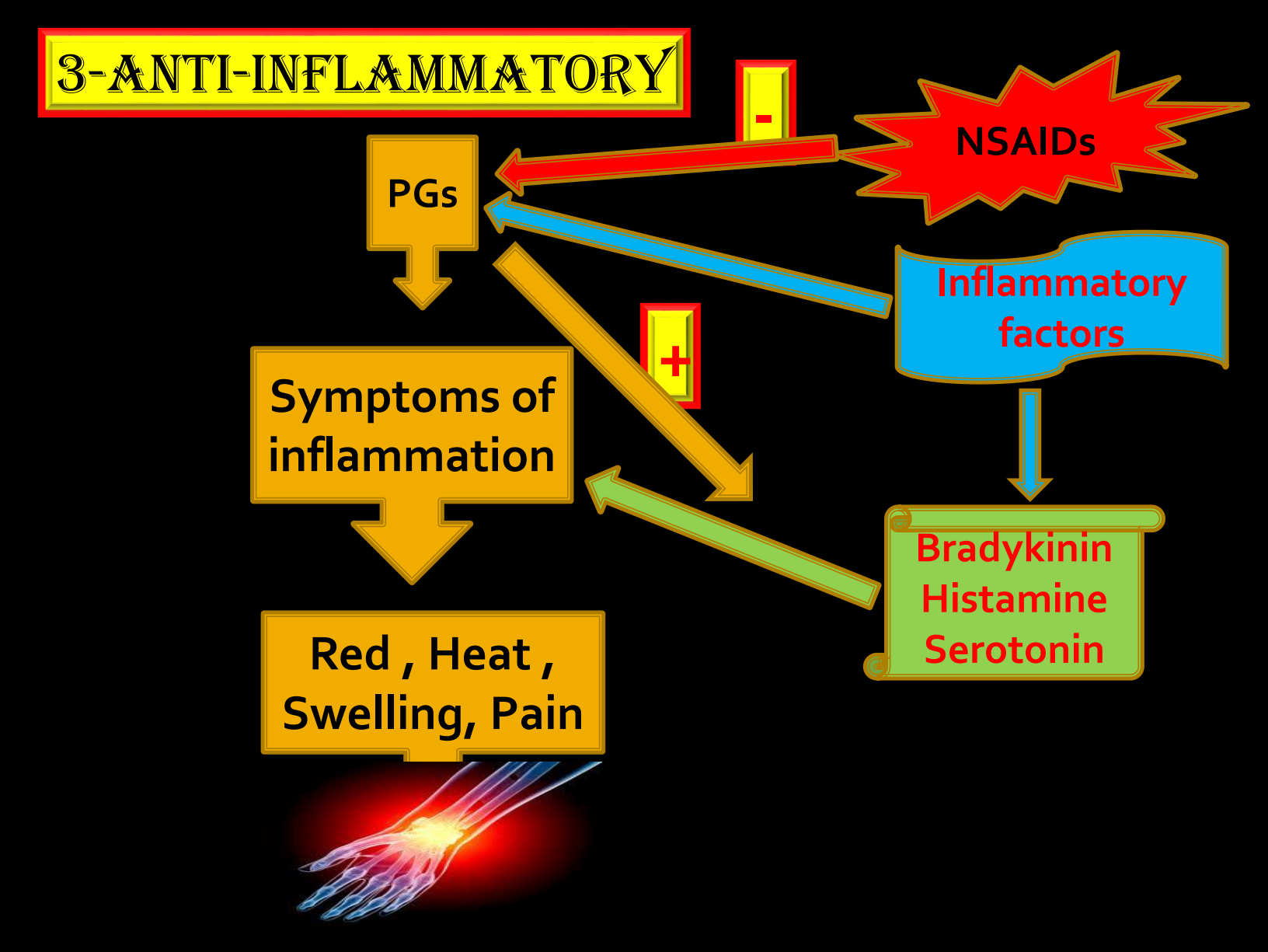
NSAIDs

Set point↑

Heat production↑
Heat dissipation↓

Fever

3-ANTI-INFLAMMATORY



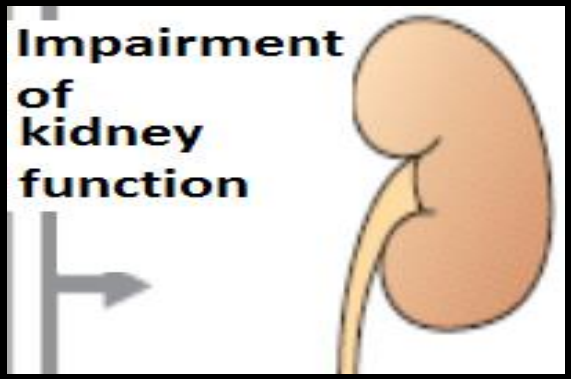
CLINICAL USES

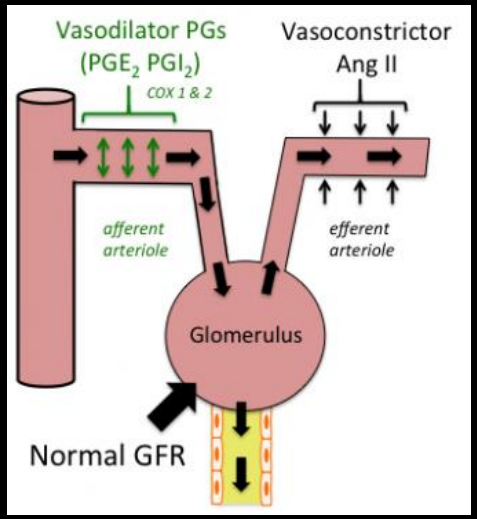
- Fever
- Headache, Migraine, Dental pain, Dysmenorrhea
- Common cold
- Rheumatoid arthritis / myositis

ADRS

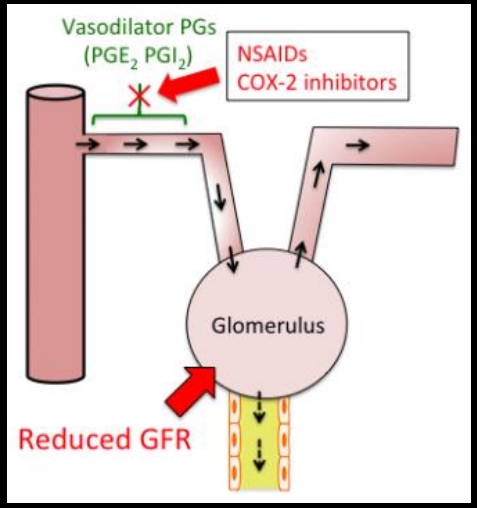
- GIT upsets (nausea, vomiting)
- GIT bleeding & ulceration
- Hypersensitivity reaction
- Inhibition of uterine contraction
- Salt & water retention

ADRS





NSAIDs cause hemodynamically-mediated acute renal failure



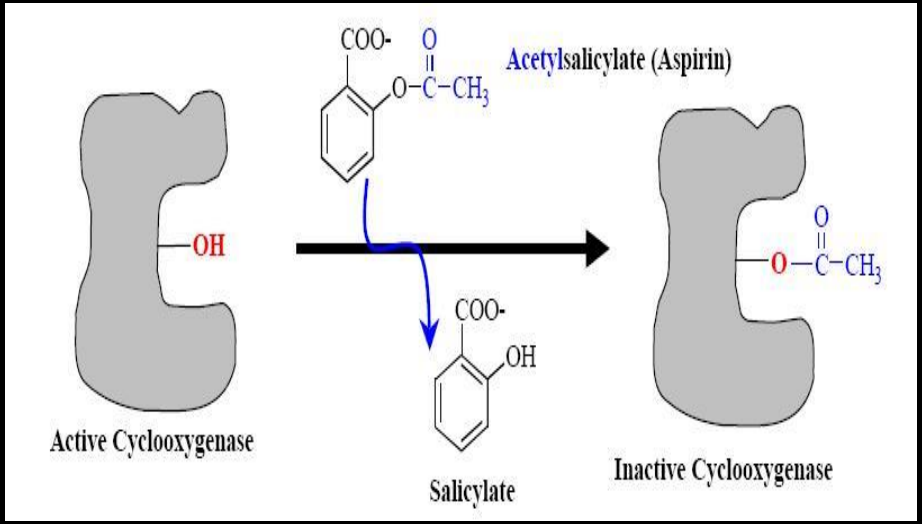
NON SELECTIVE COX INHIBITORS

- Aspirin
- Diclofenac
- Ibuprofen
- Ketoprofen
- Naproxen
- Piroxicam
- Indomethacin

NON SELECTIVE COX INHIBITORS

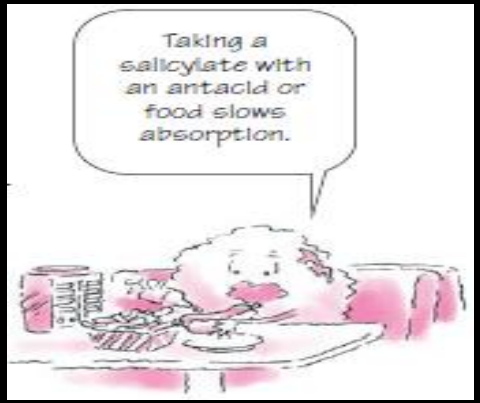
MECHANISM OF ACTION

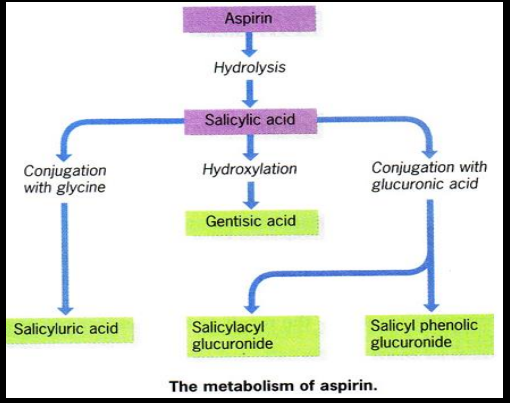
Aspirin inhibits COX irreversibly



PHARMACOKINETICS

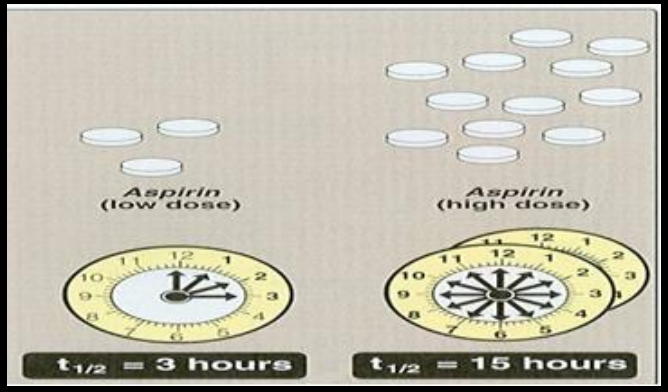
Metabolized by hydrolysis and then conjugation





The metabolism of aspirin.

Why a high dose has a long plasma half- life?



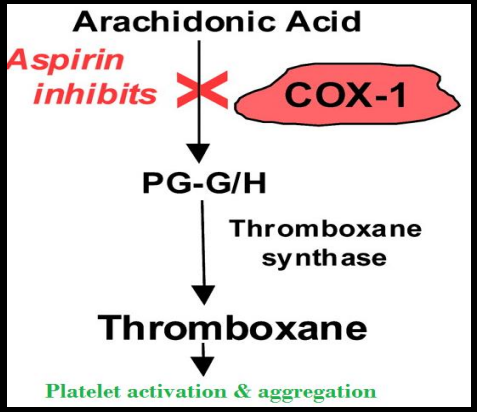
CLINICAL USES

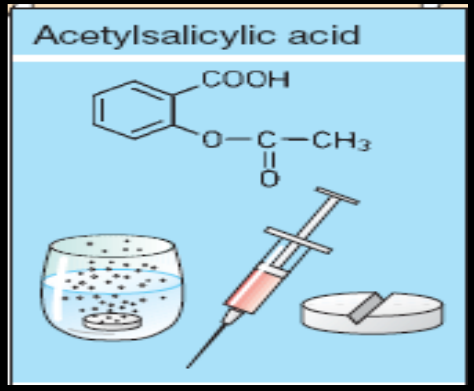
Acute rheumatic fever

Reducing the risk of myocardial infarction (cardioprotective)

Prevention of pre-eclampsia

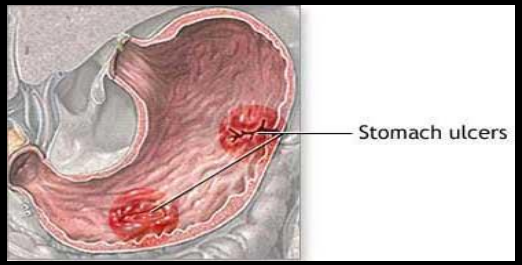
Chronic use of small doses , reduce the incidence of colon cancer

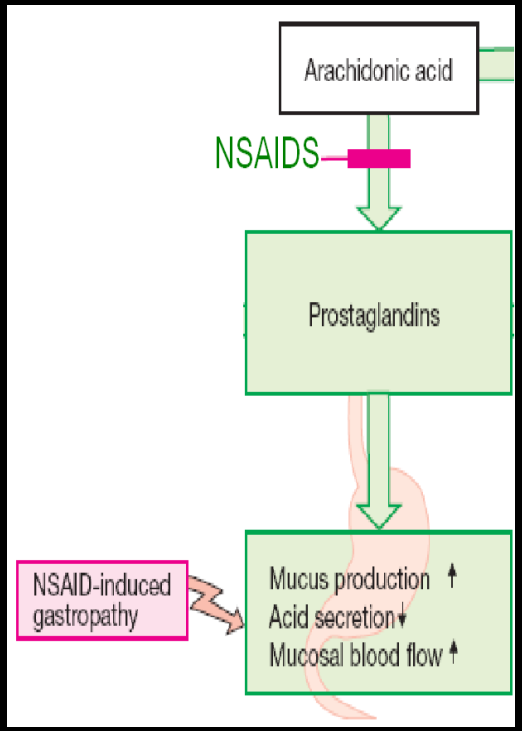




ADRS AT CLINICAL DOSES

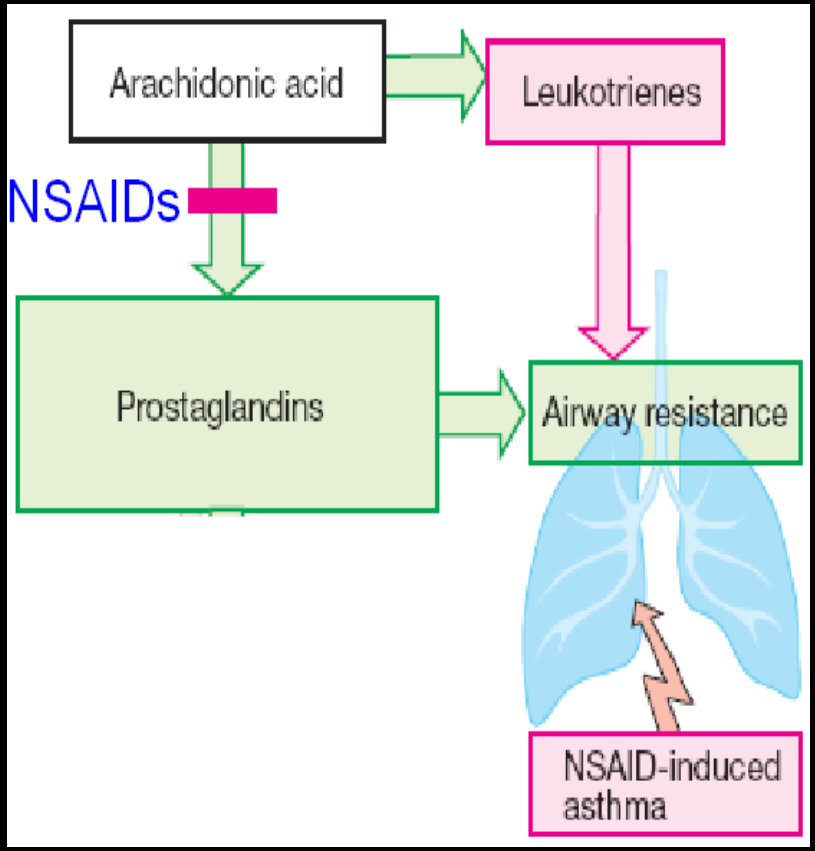
- Hypersensitivity
- Acute Gouty arthritis
- Reye's syndrome
- Impaired haemostasis
- GIT side effects, dyspepsia, nausea, vomiting
- Mucosal damage→ hemorrhage





ADRS AT CLINICAL DOSES

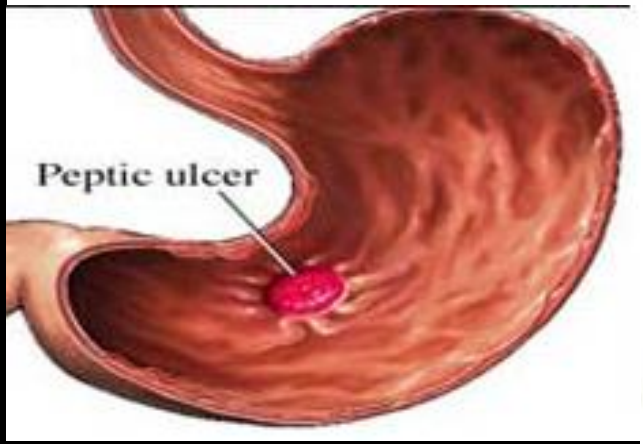
- Bronchospasm in aspirin- sensitive asthmatics

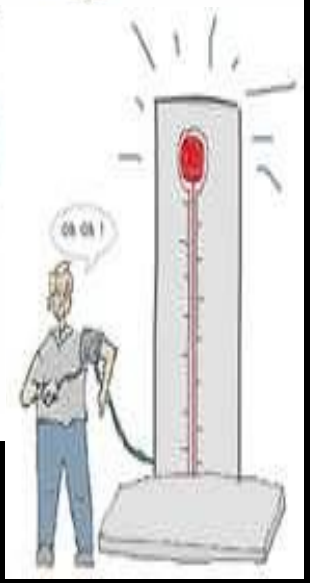


ADRS AT OVERDOSE

Salicylism (ringing of ear , vertigo)

Hyperthermia

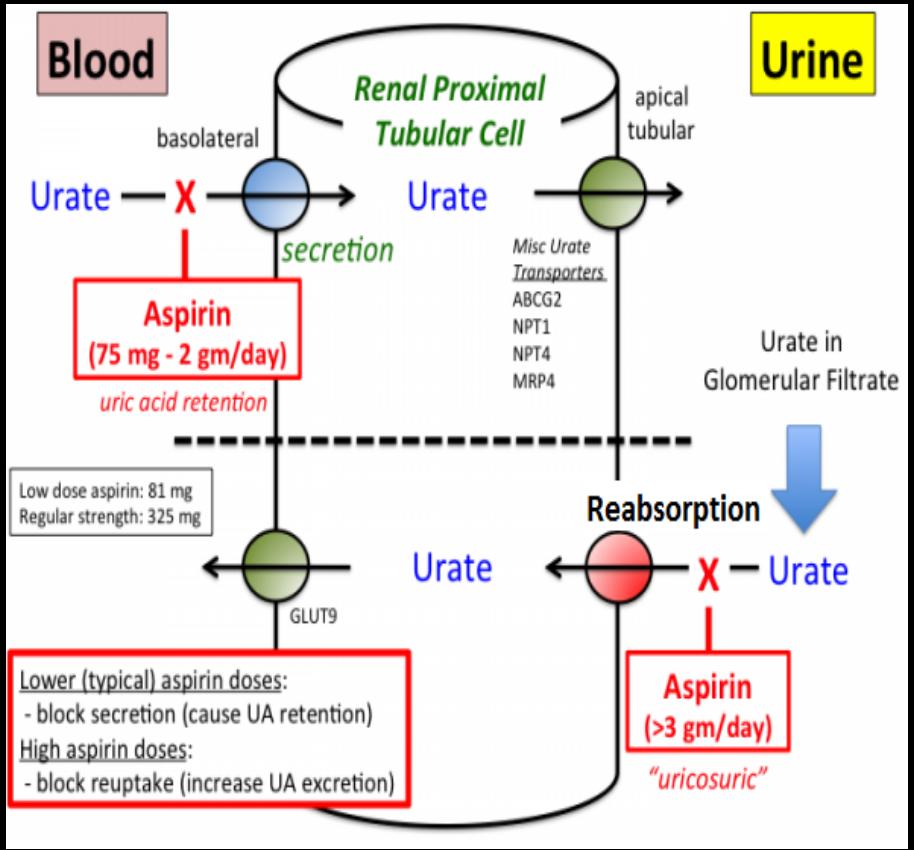




Gastric ulceration & bleeding

CONTRAINDICATIONS

- Peptic ulcer
- Pregnancy
- Hemophilic patients
- Patients taking anticoagulants
- Children with viral infections
- Gout (small doses)



NON SELECTIVE COX INHIBITORS

CLINICAL USES

- Analgesic
- Antipyretic
- Anti inflammatory
- Acute gouty arthritis
- Locally to prevent post- operative ophthalmic inflammation (solution)

PREPARATIONS

Diclofenac with misoprostol decreases upper gastrointestinal ulceration ,but result in diarrhea.

Diclofenac with omeprazole to prevent recurrent bleeding

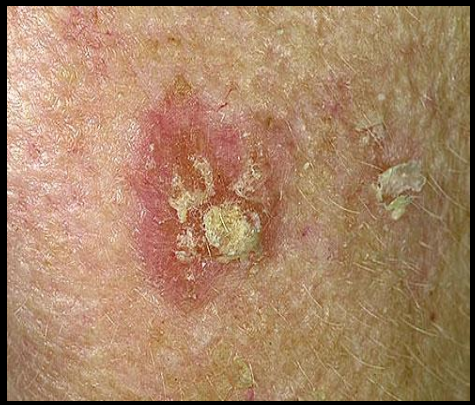
0.1% ophthalmic preparation for postoperative ophthalmic inflammation.

A topical gel 3% for solar keratoses.

Rectal suppository as analgesic

Oral mouth wash.

Intramuscular preparations



SELECTIVE COX-2 INHIBITORS

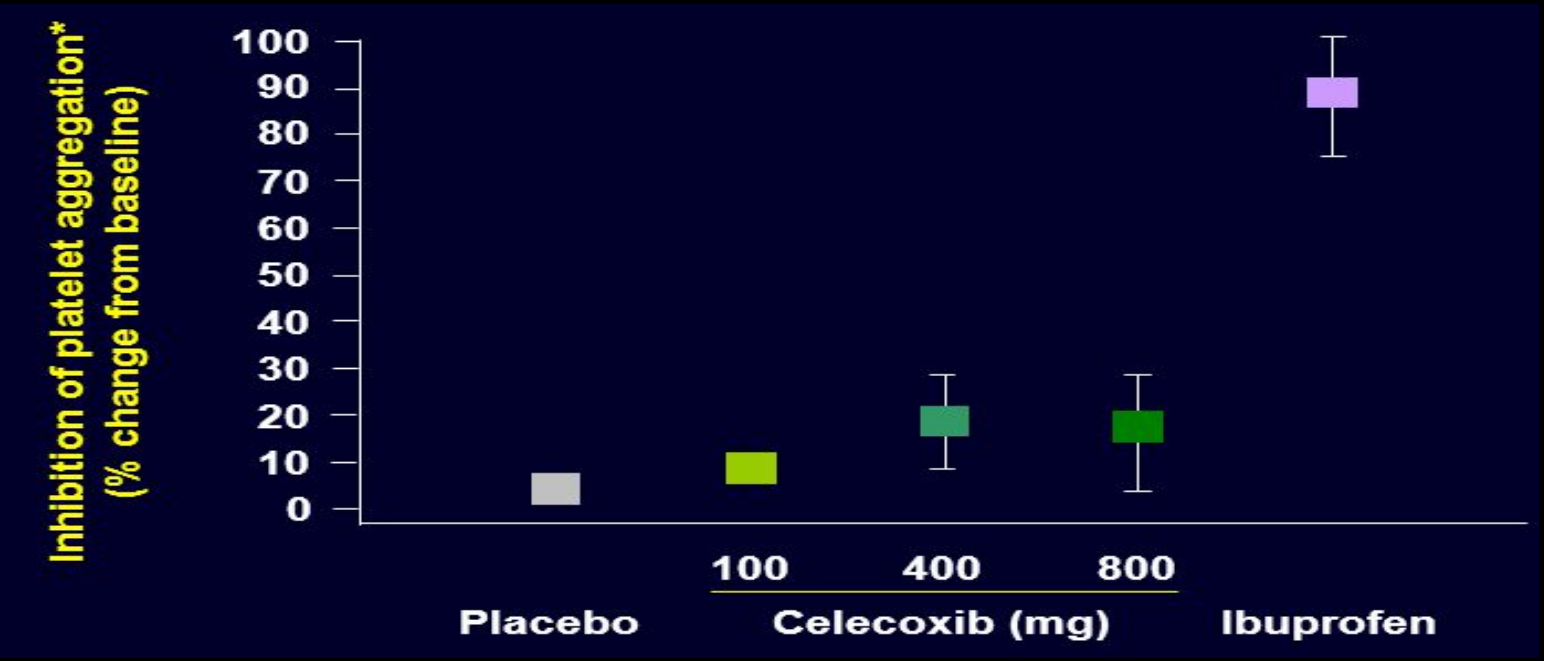
- Celecoxib
- Etoricoxib
- Paracoxib
- Lumiracoxib
- Rofecoxib
- Valdecoxib

Withdrawn because of risk of myocardial infarction & stroke

SELECTIVE COX-2 INHIBITORS

- Potent anti-inflammatory
- Antipyretic & analgesic
- Lower incidence of gastric upset

SELECTIVE COX-2 INHIBITORS



- No effect on platelet aggregation (COX-1)

GENERAL ADRS

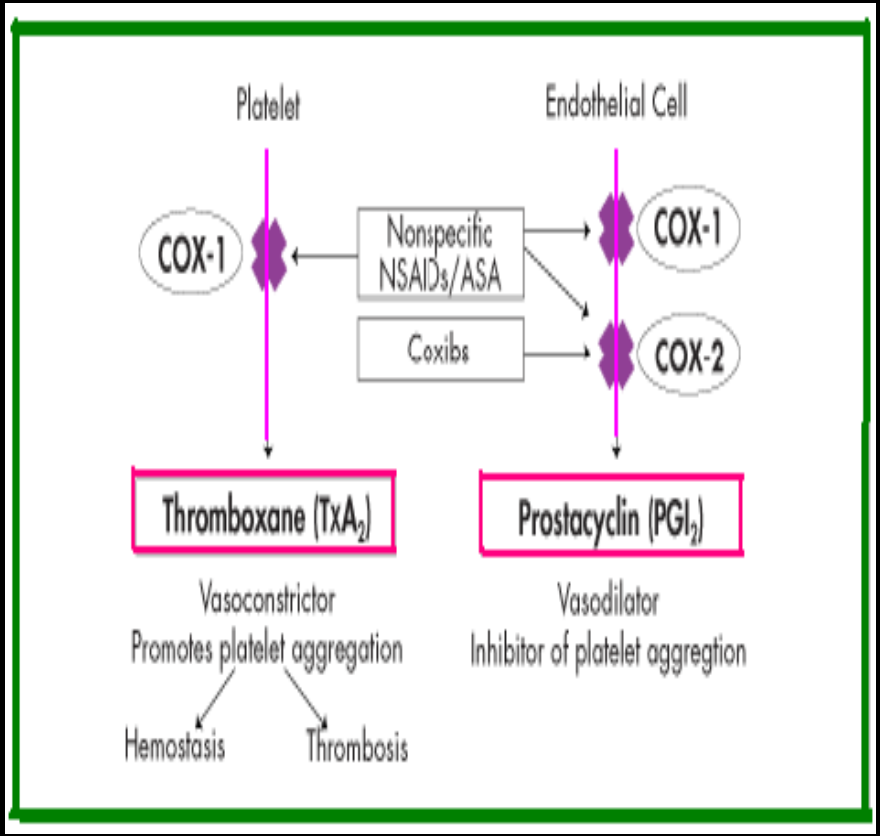
Renal toxicity

Dyspepsia & heartburn

Allergy

Cardiovascular (do not offer the cardioprotective effects of non-selective group).

Should not be given to a patient with CV disease



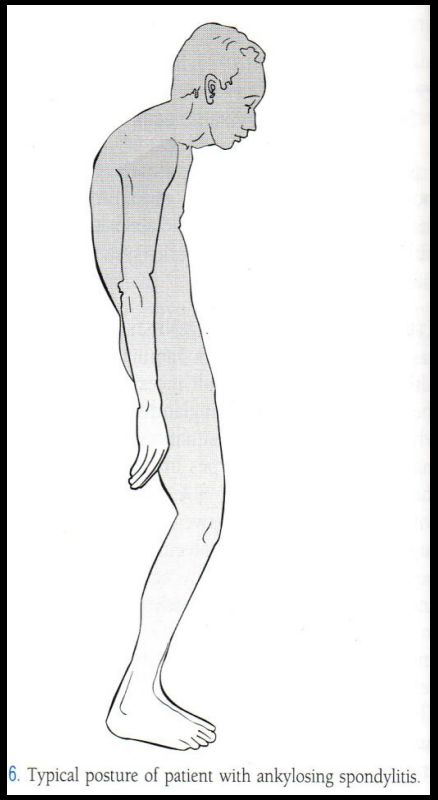
GENERAL CLINICAL USES

Short-term use in postoperative patients

Acute gouty arthritis

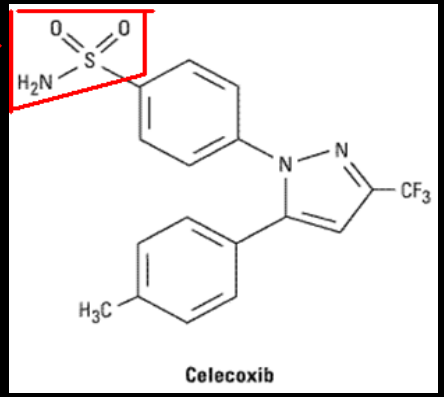
Acute musculoskeletal pain

Ankylosing spondylitis



6. Typical posture of patient with ankylosing spondylitis.

SELECTIVE COX-2 INHIBITORS



- Half-life 11 hours
- Food decrease its absorption
- Highly bound to plasma proteins
- Contra indicated in patients allergic to sulphonamides

PREFERENTIAL COX-2 INHIBITORS

- Meloxicam, nimesulide, nambumetone

- Preferentially inhibits COX-2 over COX-1 ,particularly at low dose
- Associated with lower GIT symptoms & complains, compared to non –selective COX inhibitors
- t½=20 hours
- Used for osteoarthritis & rheumatoid arthritis

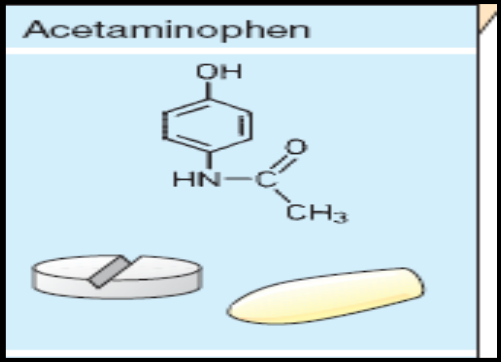
COX-3 INHIBITORS

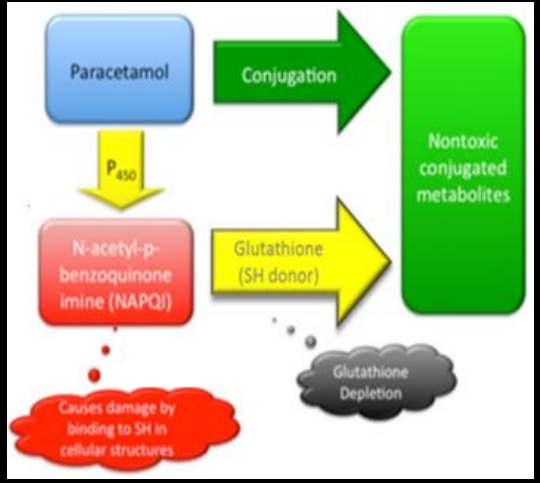
Weak anti inflammatory effect

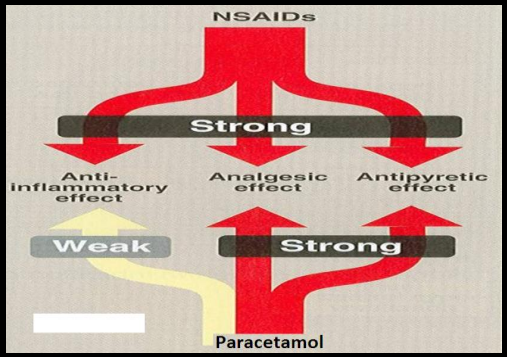
Given orally , well absorbed.

$t_{1/2}$=2-4h

Metabolized by conjugation at therapeutic doses



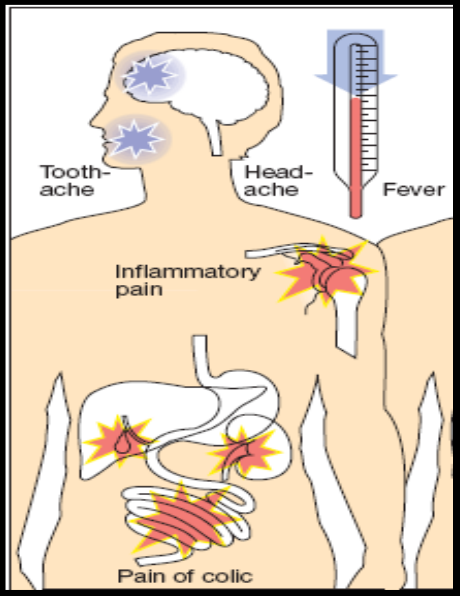




CLINICAL USES

Commonly used analgesic antipyretic instead of aspirin in cases of:-

- Peptic or gastric ulcers
- Bleeding tendency
- Allergy to aspirin
- Viral infections in children
- Pregnancy



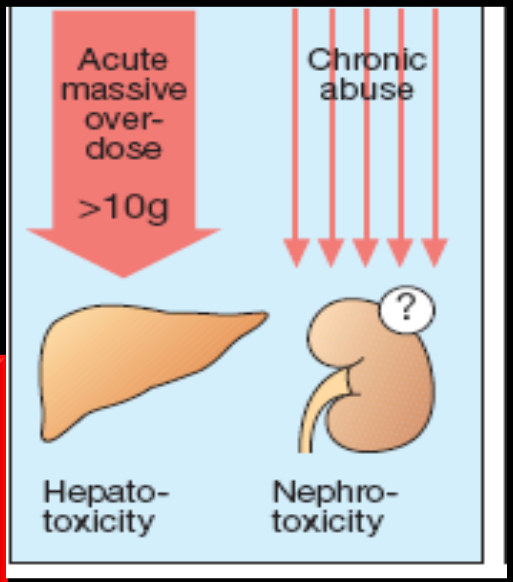
ADRS

Binding of paracetamol to COX is inhibited by peroxides produced in inflammatory sites. There is no evidence that COX3 exists in humans.

Mainly on liver due to its active metabolite

Therapeutic doses elevate liver enzymes

In large doses it is metabolized into N-acetyl-p-benzoquinone imine, which causes liver damage.



Treatment of toxicity of paracetamol is by **N-acetylcysteine** to neutralize the toxic metabolite