

Complementary and Alternative medicine

PHG 323 (*Phytotherapy*)

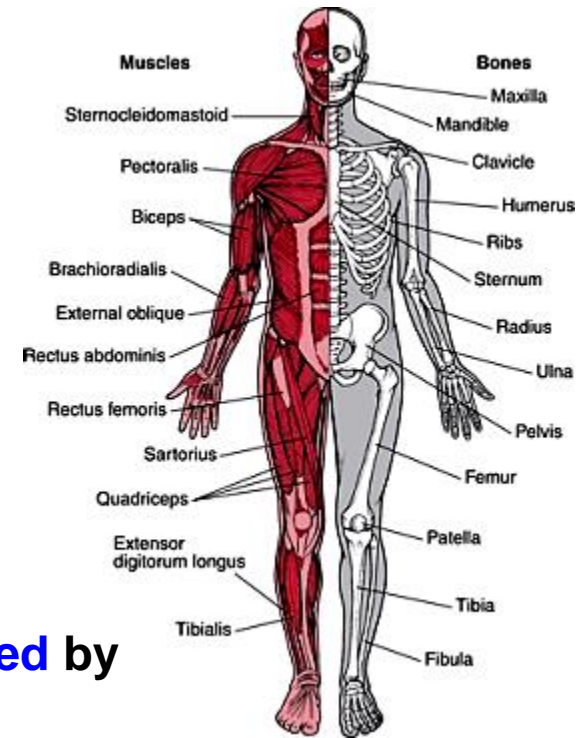
Part 7



Department of Pharmacognosy – College of Pharmacy - KSU

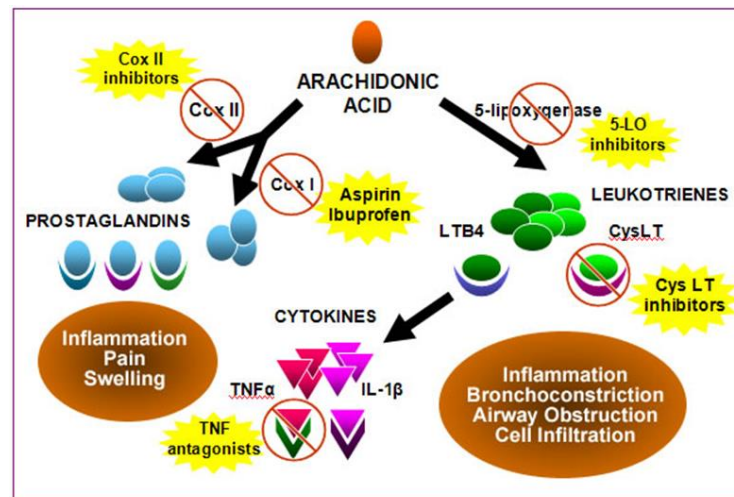
Musculoskeletal Disorders

- The musculoskeletal system is made up of the body's **bones**, **cartilage**, **joints**, and **muscles** which are **connected** to each other *via* **connective tissue** such as tendons.
- It **supports** the body, allows **motion**, and **protects** vital organs
- **These functions** may be **adversely affected** by certain **diseases** and **disorders**.
- The use of **analgesic** and **anti-inflammatory** drugs (such as **Aspirin** and Ibuprofen) is common for such conditions, but their **side effects** can **limit** their acceptability.



- **Non-steroidal anti-inflammatory drugs (NSAIDs)** act mainly *via* **inhibition** of **prostaglandin synthetases (cyclooxygenases, COXs)**.

- **Side Effects of NSAIDs:**
Inhibition of **COX-1** → **reduces** levels of the **gastroprotective** prostaglandins → **inflammation** of the gastro-intestinal lining → **ulceration** and **bleeding**



- **Phytotherapy** offers several approaches, which have been shown to be **clinically effective**.

Musculoskeletal disorders include:

- Muscle pain (الآم العضلات)
- Arthritis (التهاب المفاصل)

I. Muscle pain is caused mainly due to:

- **Overuse** of skeletal muscles (sports or work)
- **Rheumatic pain** of muscles due to prolonged **cold** exposure
- **Pressure** on the nerve roots e.g. pain in the **upper extremities**, due to **neck vertebrae** problems

Treatment of muscle pain:

- Most **topical anti-rheumatics** are **rubefacient**, which act by **counter irritation** followed by dilation of the capillaries and an increase in blood circulation.
- They are used for **localized** pain and when systemic drugs are **not appropriate**.

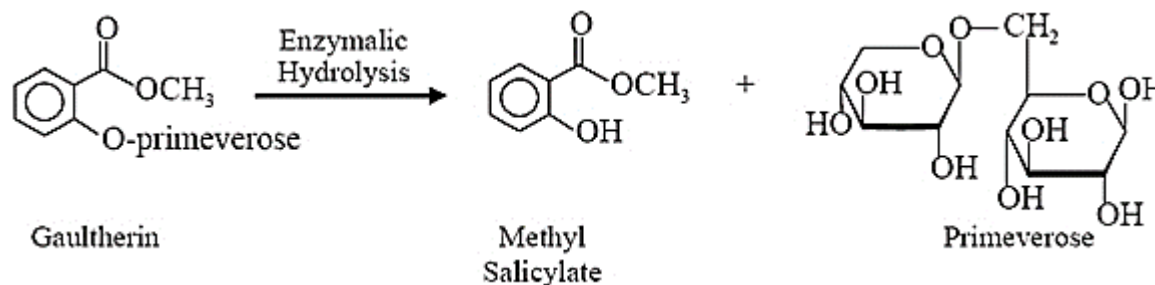


Phytotherapy of muscle pain

1) Rubefacient herbs:

a) Oil of wintergreen:

- Wintergreen oil is the **volatile oil** obtained by steam distillation of *Gaultheria procumbens* **AFTER enzymatic hydrolysis** (by maceration in warm water).
- The **oil** contains up to **98% methyl salicylate**



- It is **anti-inflammatory** and **anti-rheumatic** .
- It is mainly used in the **form** of **Ointment** and **Liniment** مروخ

- Wintergreen oil (methyl salicylate) is used in the following cases:

- Rheumatism
- Sprains الالتواء
- Neuralgia الألم العصبي
- All kinds of muscular pain



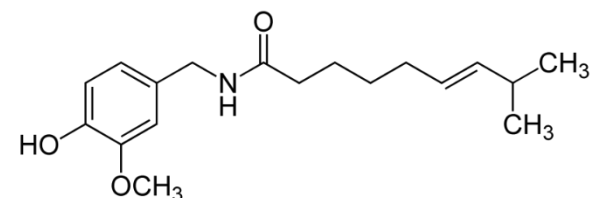
b) Turpentine oil:

- Volatile oil obtained by distillation of oleoresin obtained from *Pinus palustris*.
- It contains monoterpenes, mainly:
 - α -pinene (~ 65%)
 - β -pinene (~30%)
- It is used as ointments or liniments in concentration: 3 - 30%, to be applied up to 3-4 times/day



c) Capsaicine:

- **Capsaicine** is the active component of pungent *Capsicum spp.* (chillies).
- It is an **irritant** and produces a sensation of **burning** in any tissue with which it comes into contact.
- It is applied to the affected area, as a **cream** (0.025 - 0.075%) or **plaster** (0.075%) **not more** than 3 - 4 times/day.



N.B. Since capsaicine is highly irritant:

- It should **not** be applied:
 - Near the **eyes**, **mucous membrane**
 - For children

2) Refrigerants:

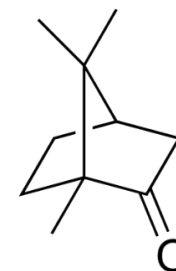
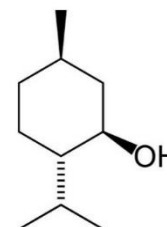
- Refrigerants are compounds that produce a **strong cooling** sensation when applied to the **skin**.
- They act topically as **refrigerant** and **counter irritant**.

a) Menthol:

- A **monoterpene alcohol** obtained from various **mint volatile oils** or prepared **synthetically**.
- It is applied as 1 - 2% to the painful area **3 - 4 times** daily.

b) Camphor:

- A **monoterpene ketone** obtained from *Cinnamomum camphora* or produced **synthetically**.



- Camphor is used as in topical preparations (3.0 - 11.0%) to be applied 3 - 4 times daily **to** and **around** affected area.
- It **depresses** cutaneous **pain receptors** providing: topical **analgesic** and local **anesthetic** effects



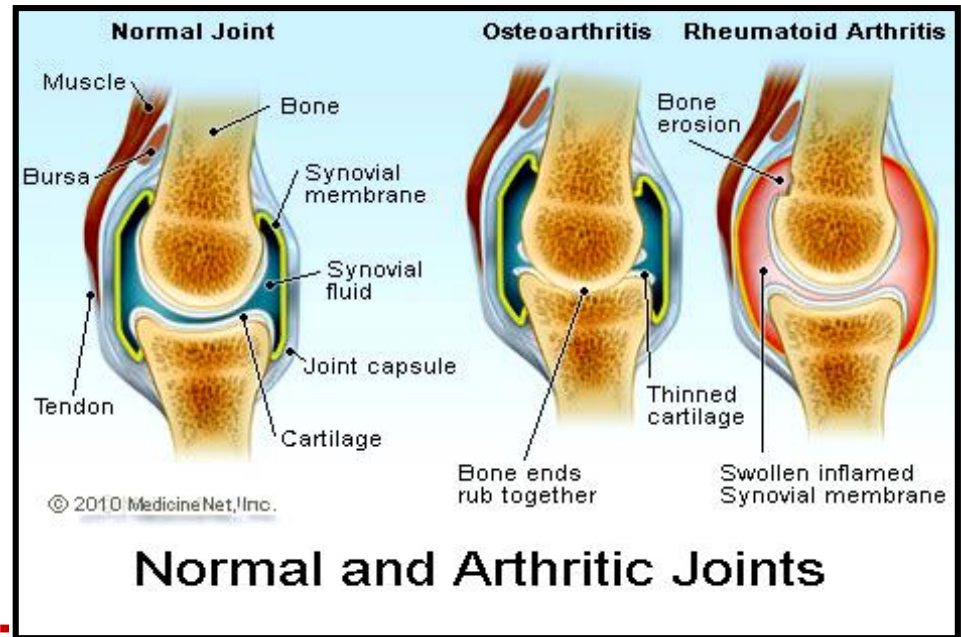
II. Arthritis:

- Arthritis refers to a number of disorders characterized by **inflammation** and **tissue damage** of joints.
- An **immune response** plays a significant role in producing both **local inflammation** and **tissue damage**.

- Several types of arthritis are known, among them are:

- 1) Rheumatoid arthritis
- 2) Osteoarthritis

Study this illustration →



Rheumatoid arthritis (RA):

- RA is an autoimmune disease that cause chronic inflammation of the joints (any joint lined by a membrane).
- RA affects 1 - 2% of adult population, more common in females.
- If the inflammation can not be controlled by medication, the joints may become deformed.

Symptoms of rheumatoid arthritis:

- **Joint swelling**, especially in the **small joints** of the **hands** and **feet**.
- Joint **stiffness**, and pain, especially in the **morning**.

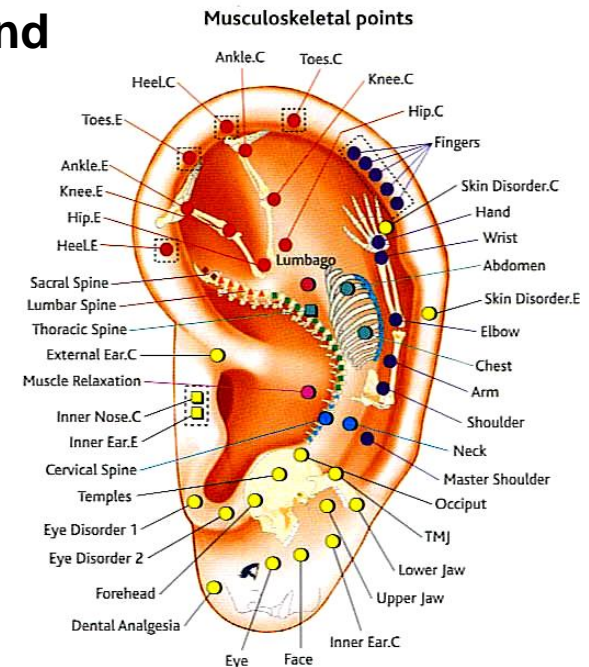
Diagnosis of rheumatoid arthritis:

- A **rheumatoid factor (RF) blood test** can measure the amount of the RF antibody present **in the blood**.
- However, high level of **RF** may **not** be a **definitive test** for **RA** as it is **also caused** by many **autoimmune** diseases and some infections.



Managing rheumatoid arthritis:

- For people suffering from arthritis, **pain relief** is a vital **concern**.
- The sensation of **not** being able to simply walk up the stairs is **discouraging** and can drive patients into **depression**.
- They are often **not eligible** for surgery and as a result, this will drive them to seek **alternatives** such as **acupuncture**.
- **Acupuncture** sessions can be **very beneficial** in controlling pain if **drugs** or **supplements** are:
 - **Insufficient**
 - **Have unacceptable side effects**



Phytotherapy of Rheumatoid Arthritis (herbal examples)

Common (Latin) names	Part used	Key comp.	Dose/d
Willow (<i>Salix alba</i>)	Bark	<ul style="list-style-type: none"> Glycosides yielding salicylic acid deriv. e.g Salicin (~15%) Tannins Flavonoids 	5-10 g
Devil's claw (<i>Harpogophytum procumbens</i>)	Tubular secondary roots	<ul style="list-style-type: none"> Iridoids (e.g. Harpagoside) Triterpene and phyosterols Phenols 	~7 g
Feverfew (<i>Tanacetum parthenium</i>)	Arial part	<ul style="list-style-type: none"> Volatile oil Sesquiterpene lactones (parthenolide) Flavonoids 	0.25 g
Stinging nettle (<i>Urtica dioica</i>)	Flowering part	<ul style="list-style-type: none"> Flavonoids Lignans Salicylic and phenolic acids 	~10 g
Ginger	See under Phytotherapy of dyspepsia		
Turmeric	See under Choleretics and Cholagogues		

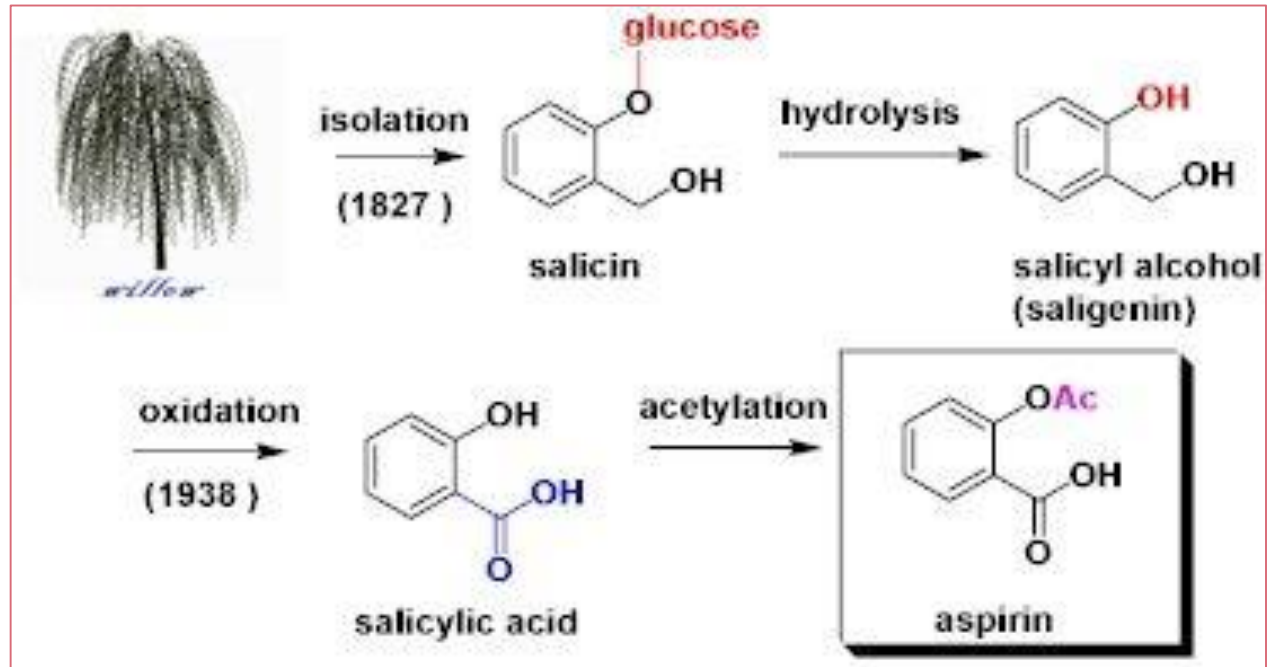
- Many **plants** possess significant **anti-inflammatory** action and are appropriate in the treatment of rheumatoid arthritis:

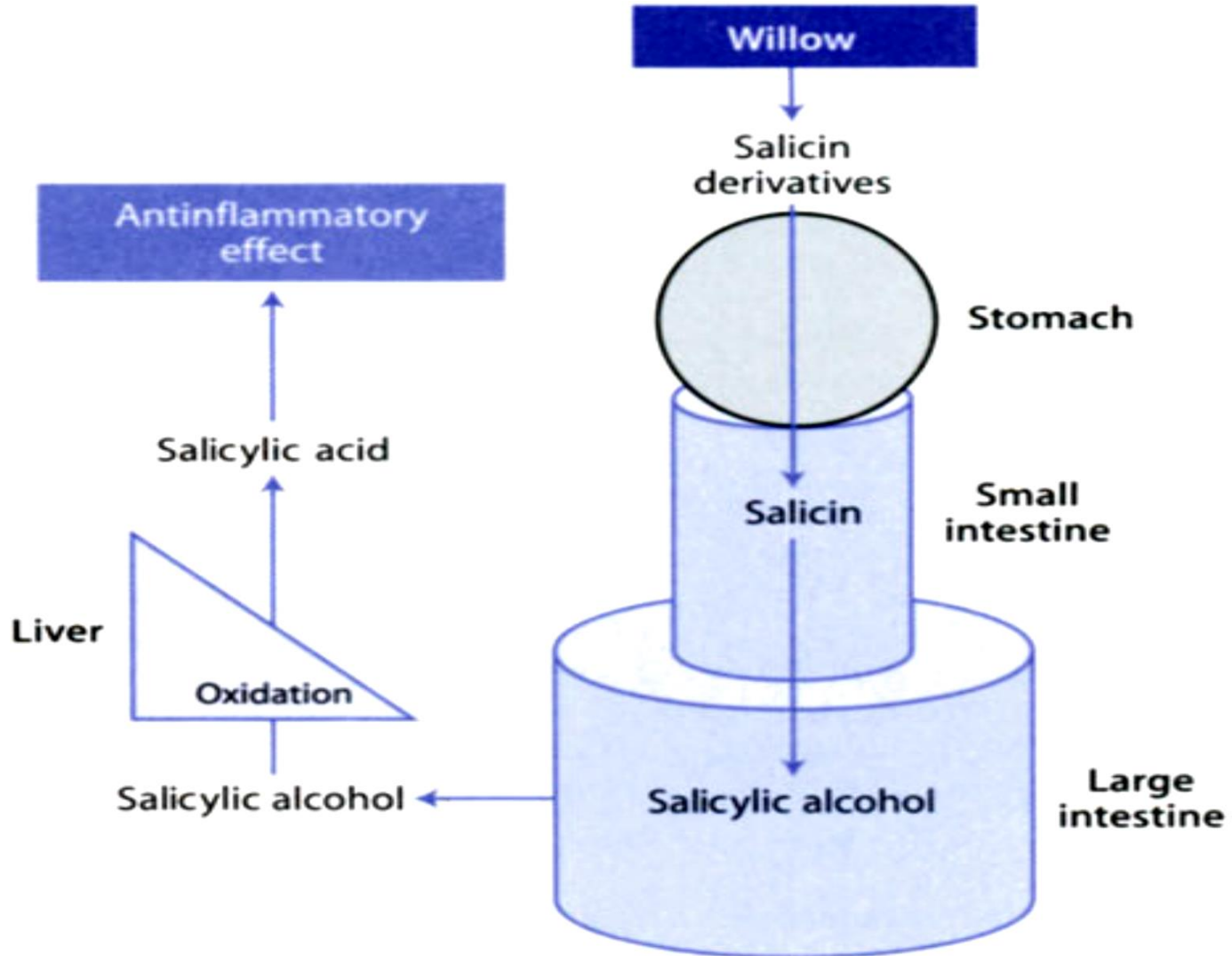
a) **Willow bark** قشر الصفصاف:



- The main **pharmacological action**:
 - **Anti-inflammatory**
 - **Analgesic**
 - **Antipyretic**

Relationship between **salicin** and **acetyl salicylic acid (aspirin)**





Pharmacokinetics of salicin and its derivatives

b) Devil's Claw

- Its anti-inflammatory effect is related to:
 - Inhibition of **lipxygenase enzyme** (LOX, responsible for leukotriene biosynthesis) **c.f. aspirin** which inhibit cyclooxygenase enzyme (COX).
 - Reduction of release of **tumor necrosis factor** (TNF) from inflammatory cells.
- Devil's claw was proved to be comparable in efficacy and **superior in safety** to a reference drug **Diacerein** in treatment of **osteoarthritis**.



Dosage

- Dose must **not exceed 9 g** dried root per day.
- Extract form (400-1200 mg per day, equivalent to **30-100 mg harpagoside**) is an alternative.

c) Feverfew

- Its anti-inflammatory effect is related to:
 - Inhibiting eicosanoid synthesis by interfering with **phospholipase A2**.
 - Inhibiting the **release of enzymes** involved in inflammatory processes

- Its has also **anti-migraine** effect which is partly is due inhibition of release of **5-HT** from blood platelets.



d) Stinging Nettle

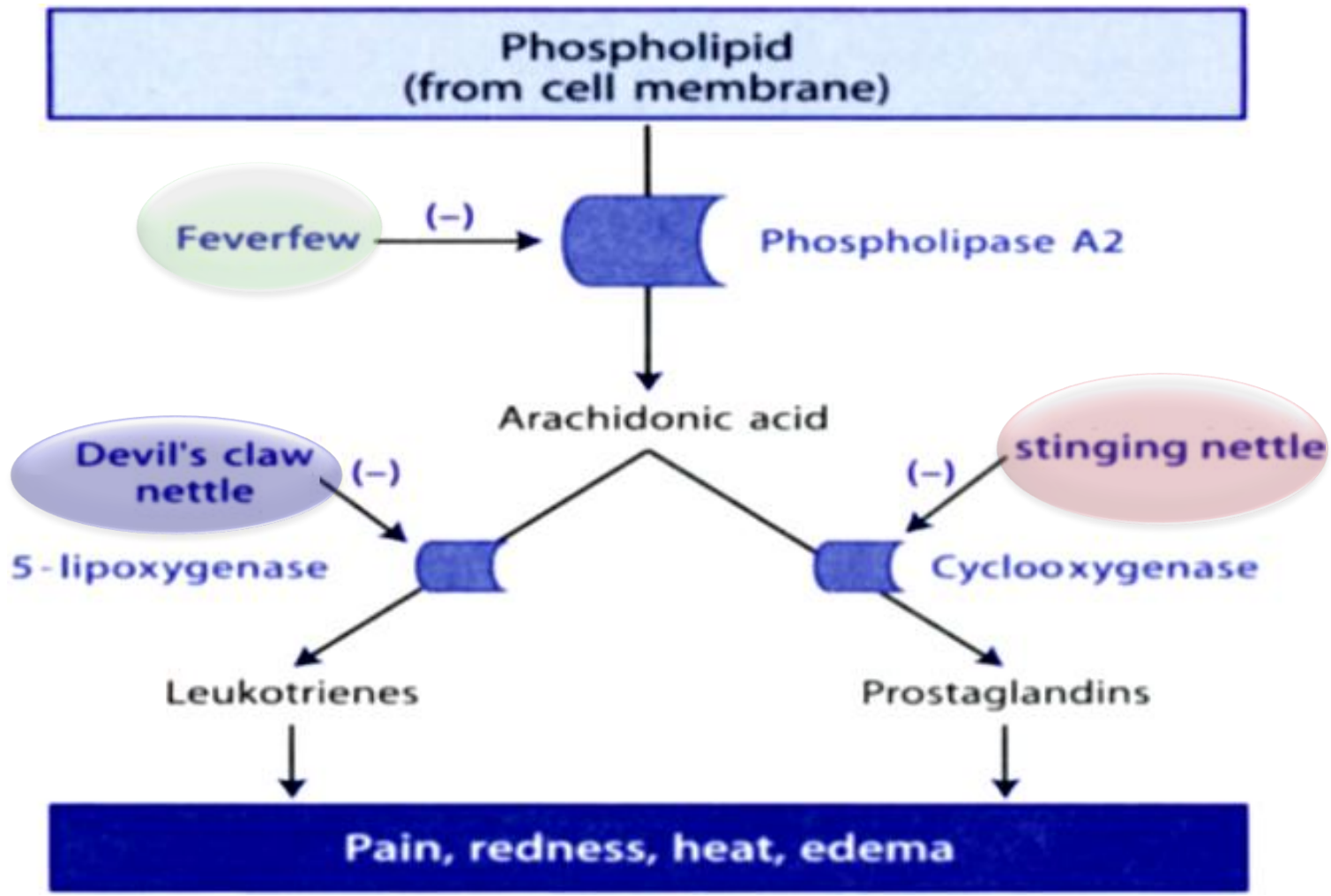
- Its anti-inflammatory effect is related to:
 - inhibits **cyclooxygenase enzymes** (COXs) responsible of production of prostaglandin
 - inhibits **lipxygenase enzyme** (LOX) responsible of production of leukotrienes.
 - inhibits **cytokines** production.



Dosage

- The recommended daily dose is 8-12 g crude drug or equivalent from the extract.
- It can be administered by the infusion method

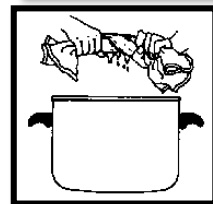




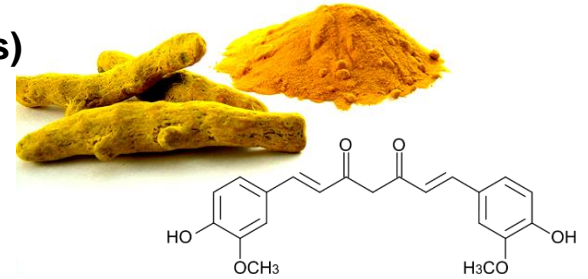
Mode of action of Feverfew, Devil's claw, and Stinging nettle

e) Ginger (See also under Phytotherapy of dyspepsia):

- A clinical study showed an evidence of **pain** and **swelling relief** when a dose of **3 – 7 g/day** of Ginger was given to patients with **rheumatoid arthritis**. **Moreover**, no side effect was reported even after **two years** of treatment with these high doses.
- Many people drink **Ginger tea** for **arthritis**.
- **Fresh** or **powdered** (**6-50 g**) of Ginger per day is prescribed.
- **Ginger compress** is also beneficial for arthritis.



f) Turmeric (See also under Choloretics and Cholagogues)



- Its major constituent, **curcumin**, has significant **anti-inflammatory** action.
- **Curcumin** has been shown to be as effective as **cortisone** or **phenylbutazone** in certain models of inflammation.
- Dosage: 400 to 600 mg **three** times daily.
- **Curcumin** combination: **curcumin** + **Bromelain (1:1)**
 - **Bromelain** is an enzyme **extracted** from the **Pineapple** and appears to improve joint inflammation.

