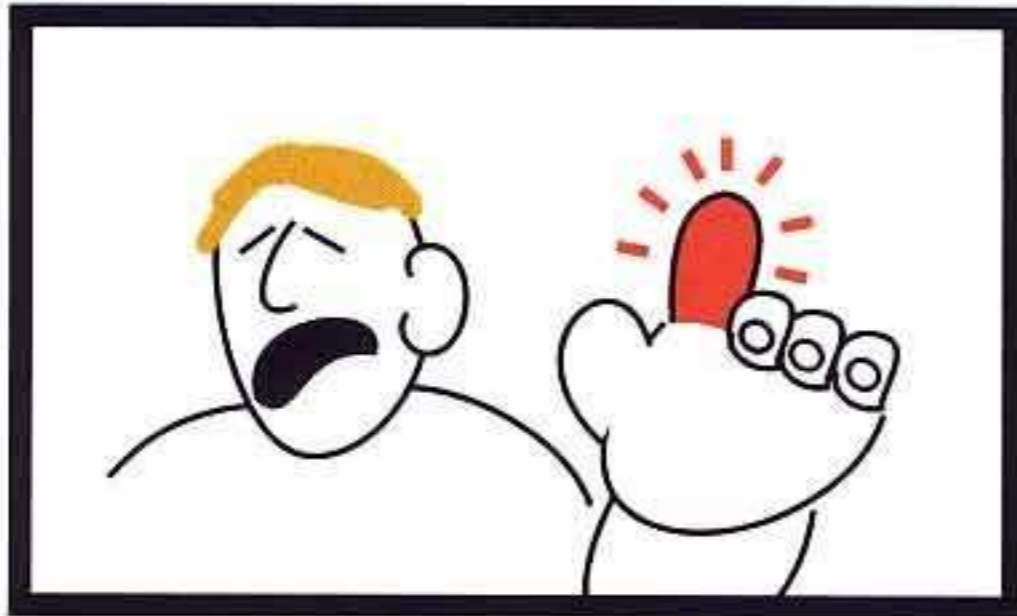


CHAPTER FIFTEEN

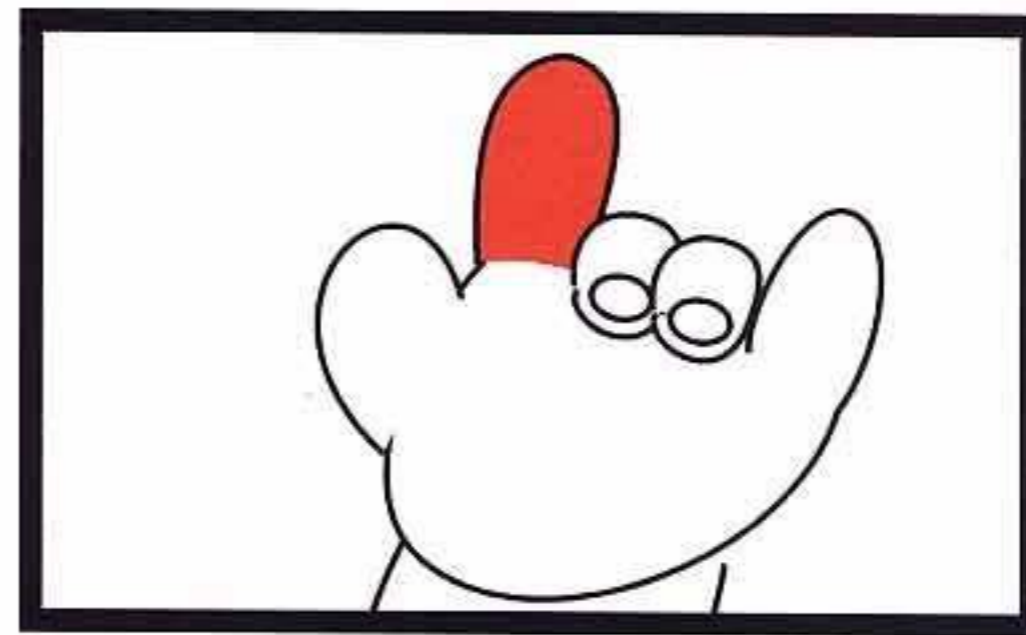
INFLAMMATION

IT'S A PAIN!!

But inflammation is one of the body's first lines of defence against infection.



The classic signs of an inflammatory response are:- heat, pain, redness, swelling and a loss of function.



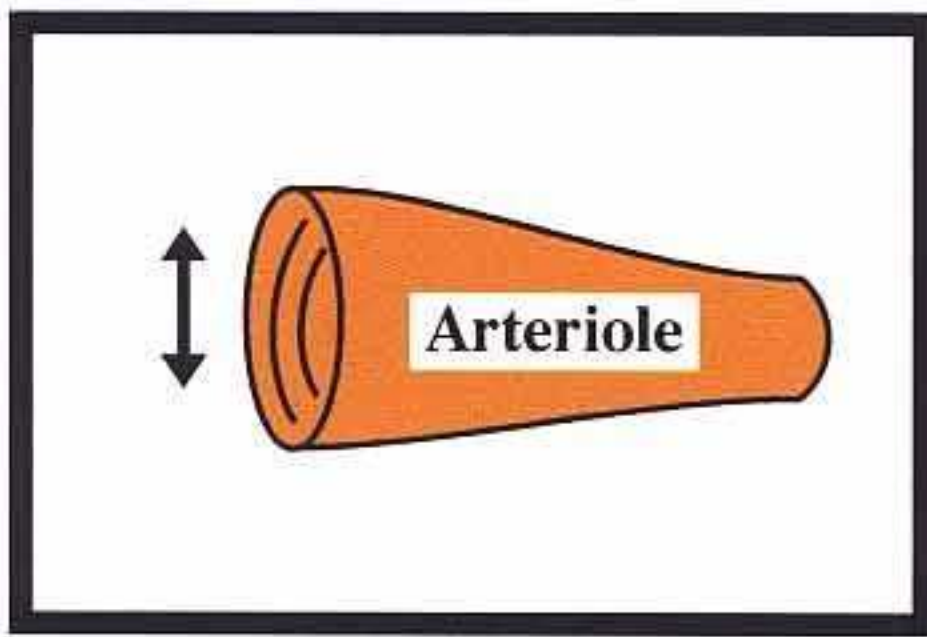
The redness, heat and swelling are due to an increased blood flow now entering the affected area.



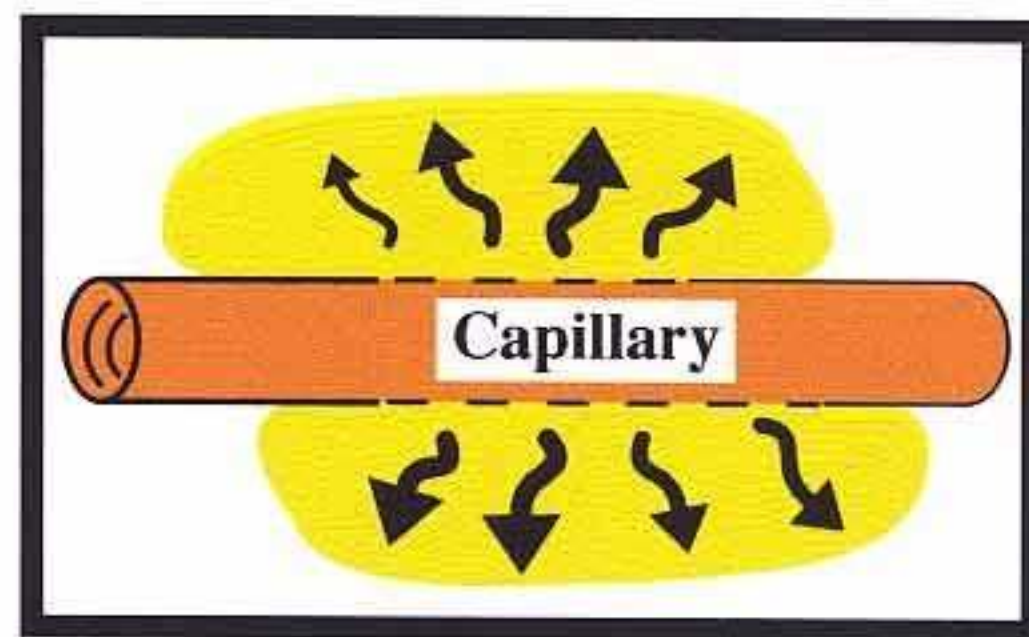
↕ Easy reading

Technical information

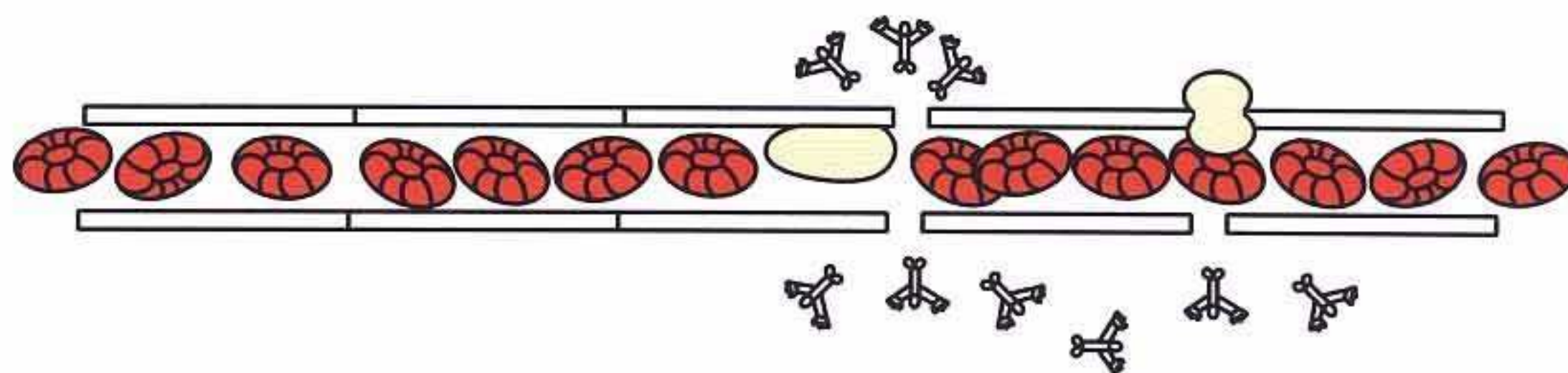
The increased blood supply diverts larger numbers of immune cells, antibodies etc., into the affected area.



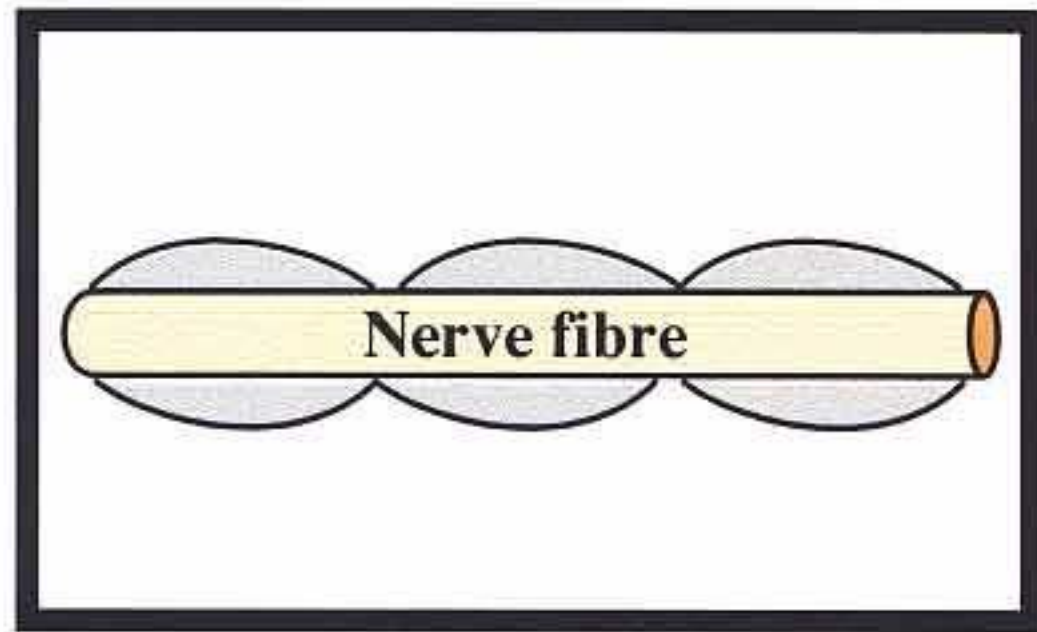
Arterioles supplying the affected part of the body dilate, allowing more blood to enter the area.



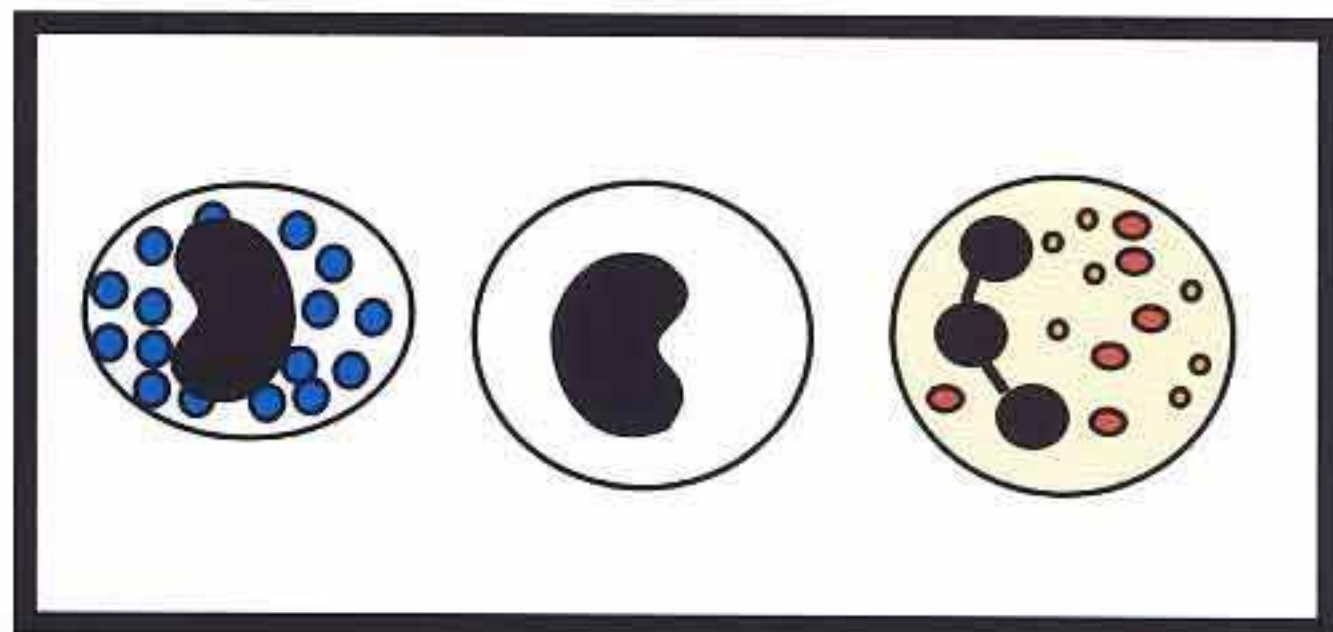
Gaps in the capillary walls in the affected area also widen, to allow more fluid to leak into the tissues.



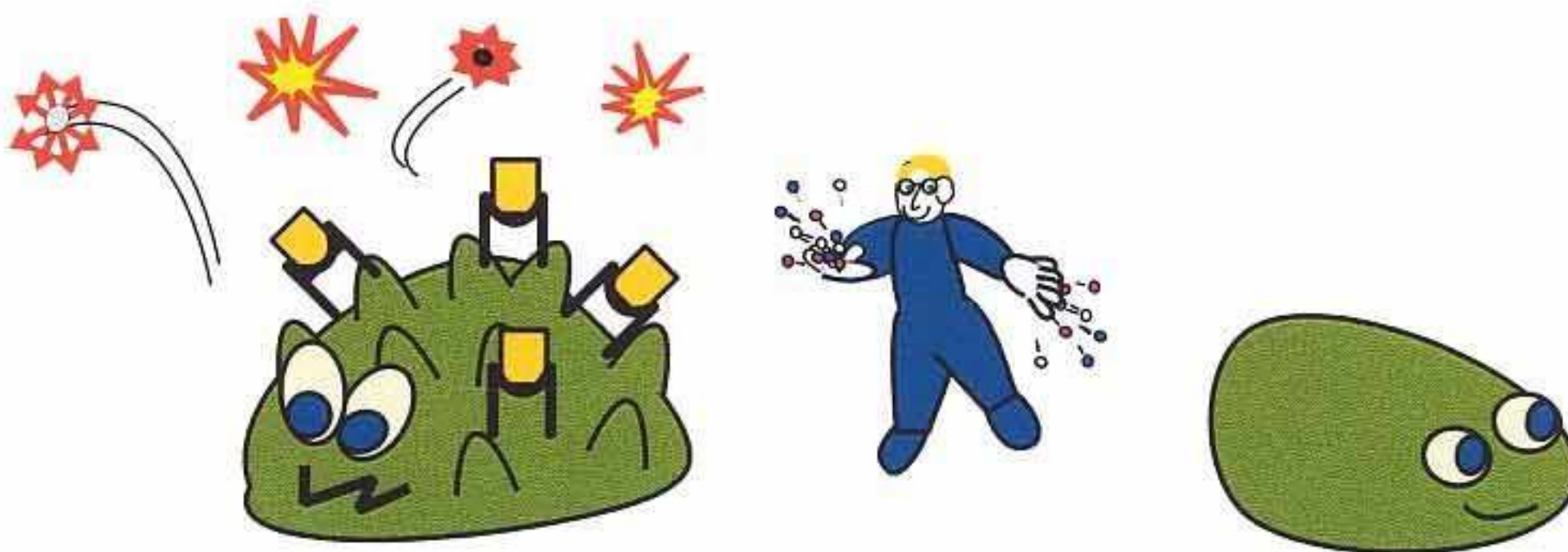
The wider gaps in the capillary walls also facilitates the passage of immune cells from the blood into the endangered area.



An inflammatory response will also illicit pain, as it irritates local nerve fibres.

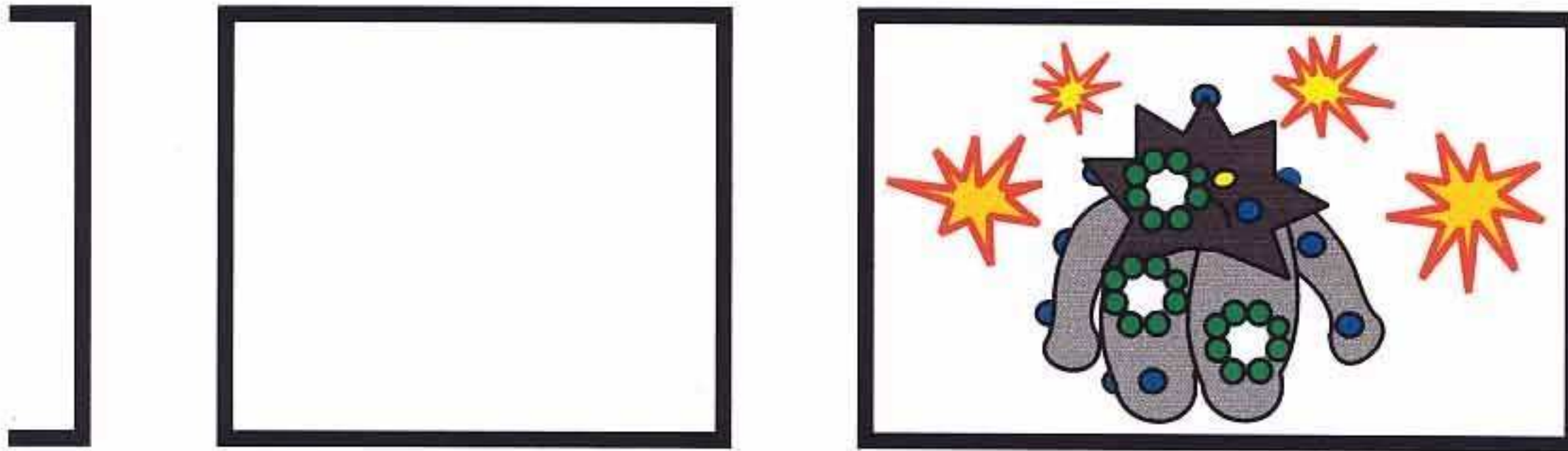


Mast cells, macrophages and neutrophils are the most important immune cells when it comes to releasing inflammatory factors.



The T helper's role in an inflammatory response, is to overtly stimulate the macrophages and neutrophils.

COMPLEMENT AND INFLAMMATION



Complement activation leads to a localised inflammatory response.


C3a

C3a activates any nearby mast cells and causes smooth muscle cells to contract.

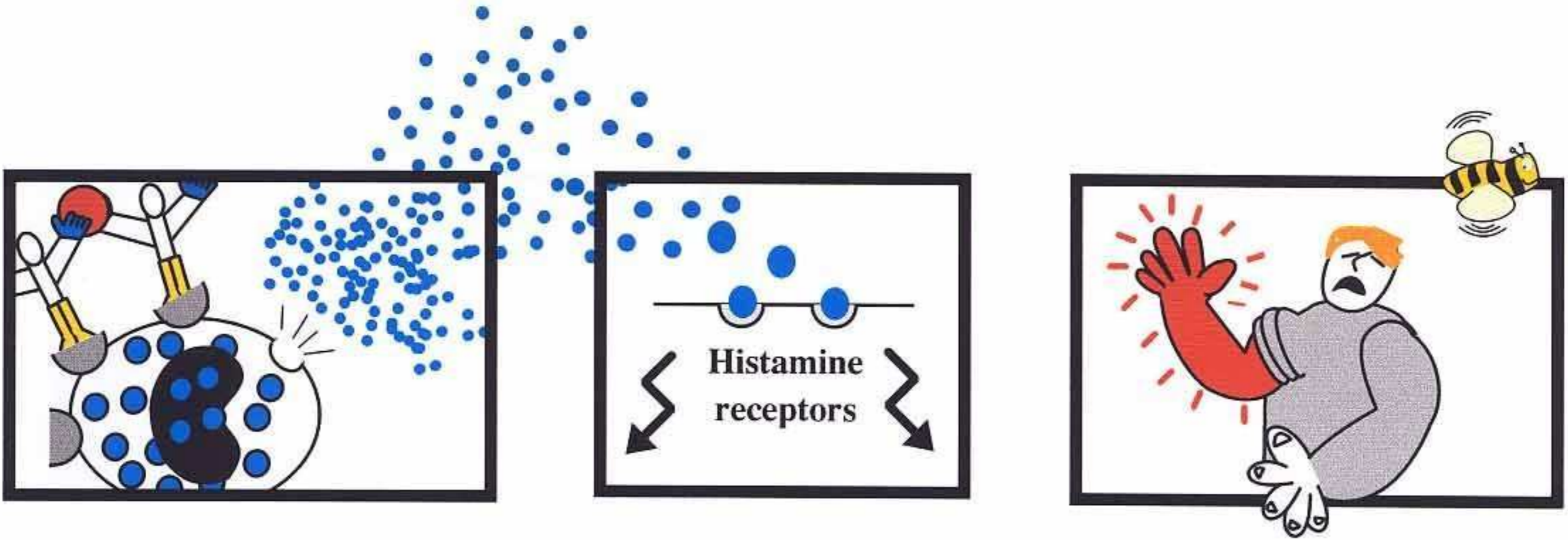

C4a

C4a has similar but a much less potent range of actions when compared to C3a.


C5a

C5a is the most potent of the 3. It activates mast cells, attracts and activates neutrophils and causes endothelial cells to become 'leakier'.

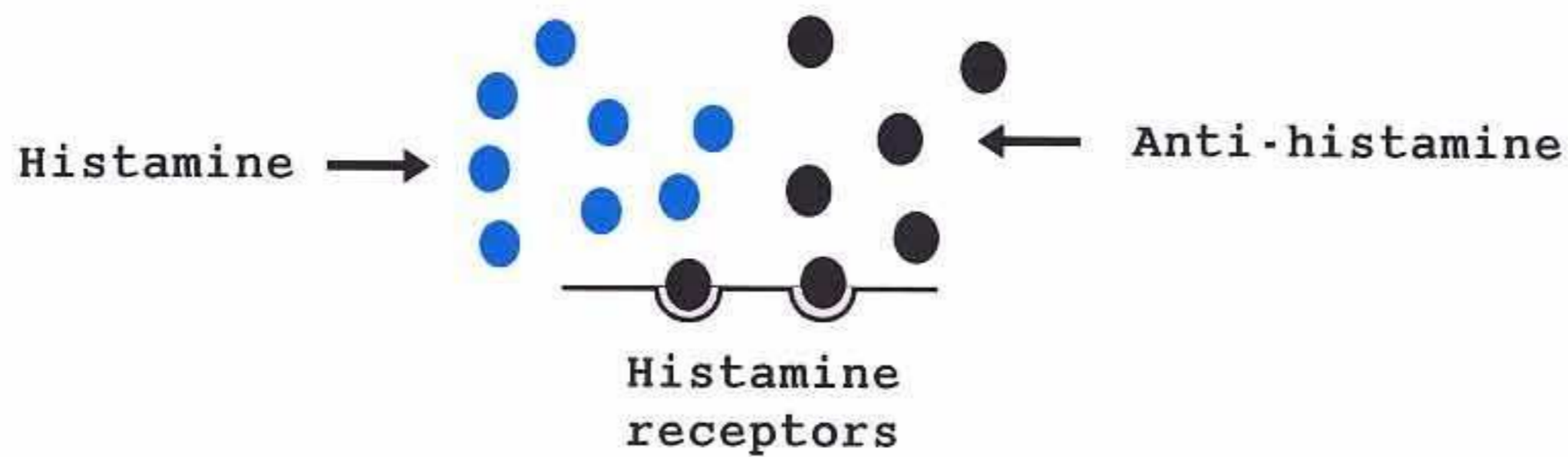
HISTAMINE



Histamine is stored in granules inside mast cells. It can then be released quickly to produce very rapid reactions.

To take effect, it must now bind onto nearby histamine receptors.

Histamine receptors are found all over the body, lining smooth muscle and endothelial cells.

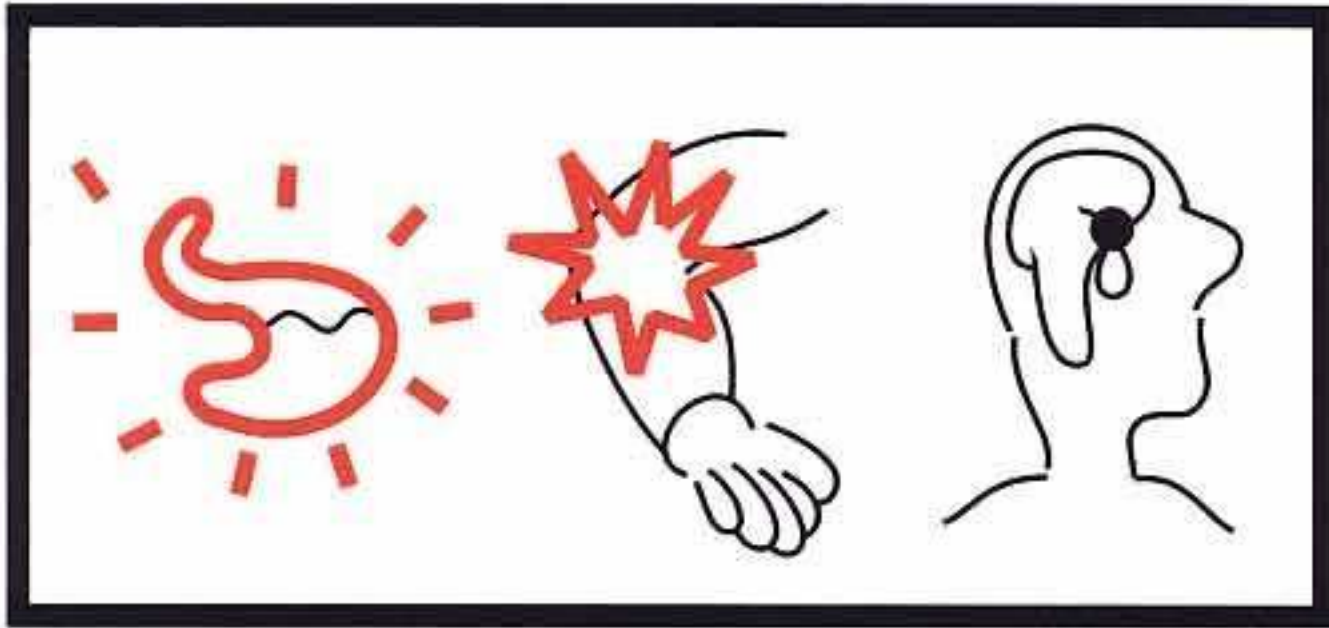


Anti-histamines fit into the histamine receptors, blocking the histamine.

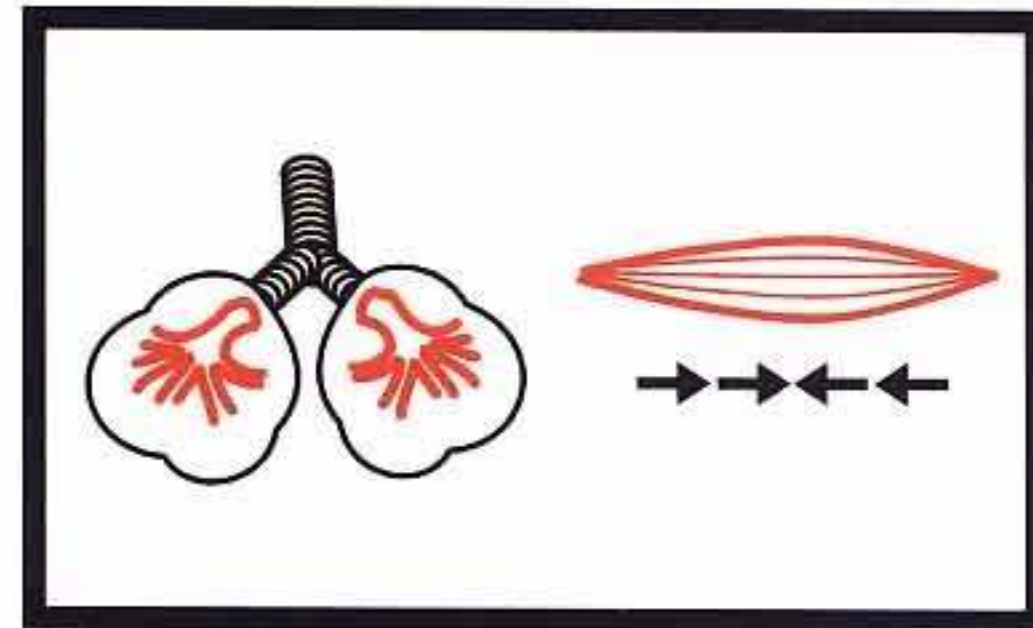
But because of an imprecise fit, the anti-histamines do not activate the receptors.

PROSTAGLANDINS AND LEUCOTRIENES

These 2 very important inflammatory mediators, can for some people, have very serious side effects.



Prostaglandins can trigger asthmatic attacks, joint inflammation, increase gastric acid secretion and cause the hypothalamus to raise the body's temperature.

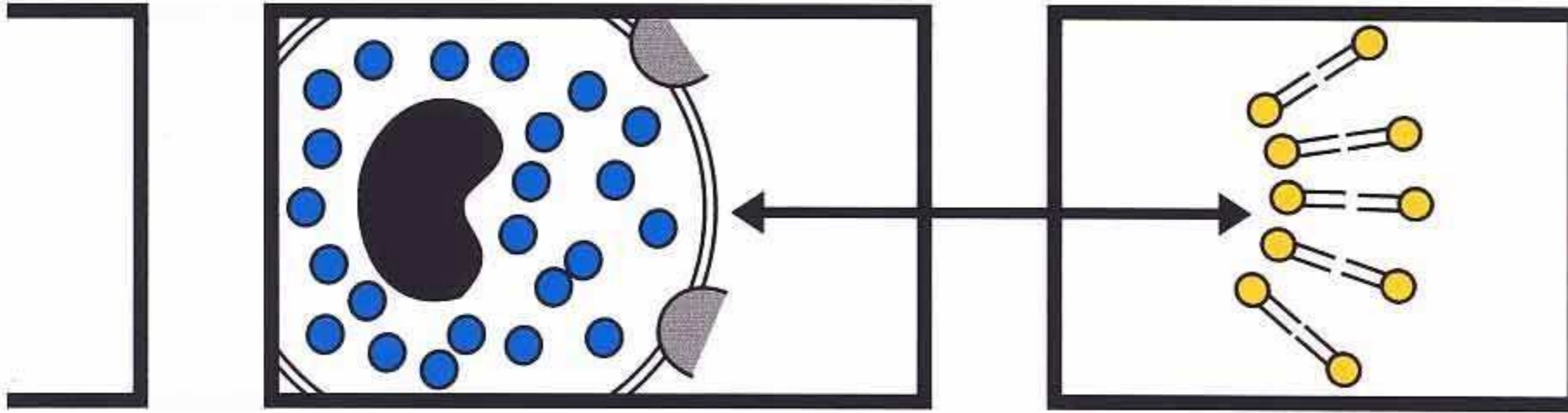


Leucotrienes can also cause severe asthmatic attacks and very strong smooth muscle contractions.



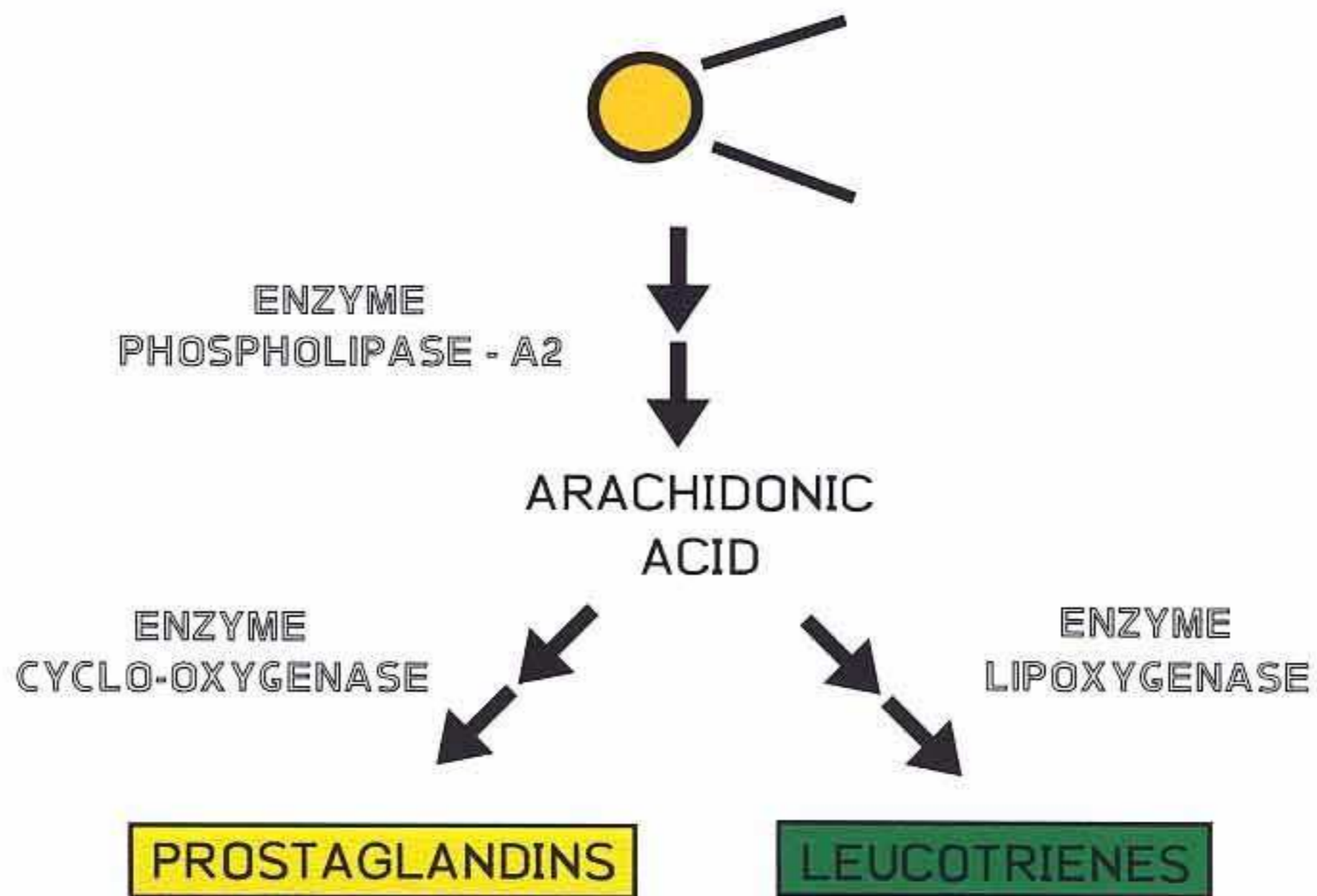
Histamine released from a mast cell, is relatively short acting. Prostaglandins and leucotrienes, which are also produced by activated mast cells, are longer acting inflammatory mediators.

HOW PROSTAGLANDINS AND LEUCOTRIENES ARE MADE



The mast cell's membrane, like all the cells in the body, is made up of a double layer of phospholipids.

Here we see a close up of the mast cell's membrane, showing the phospholipids.



Following mast cell activation, enzymes inside the mast cell, break down phospholipids into arachidonic acid and then into prostaglandins (PG's) and leucotrienes (LT's).

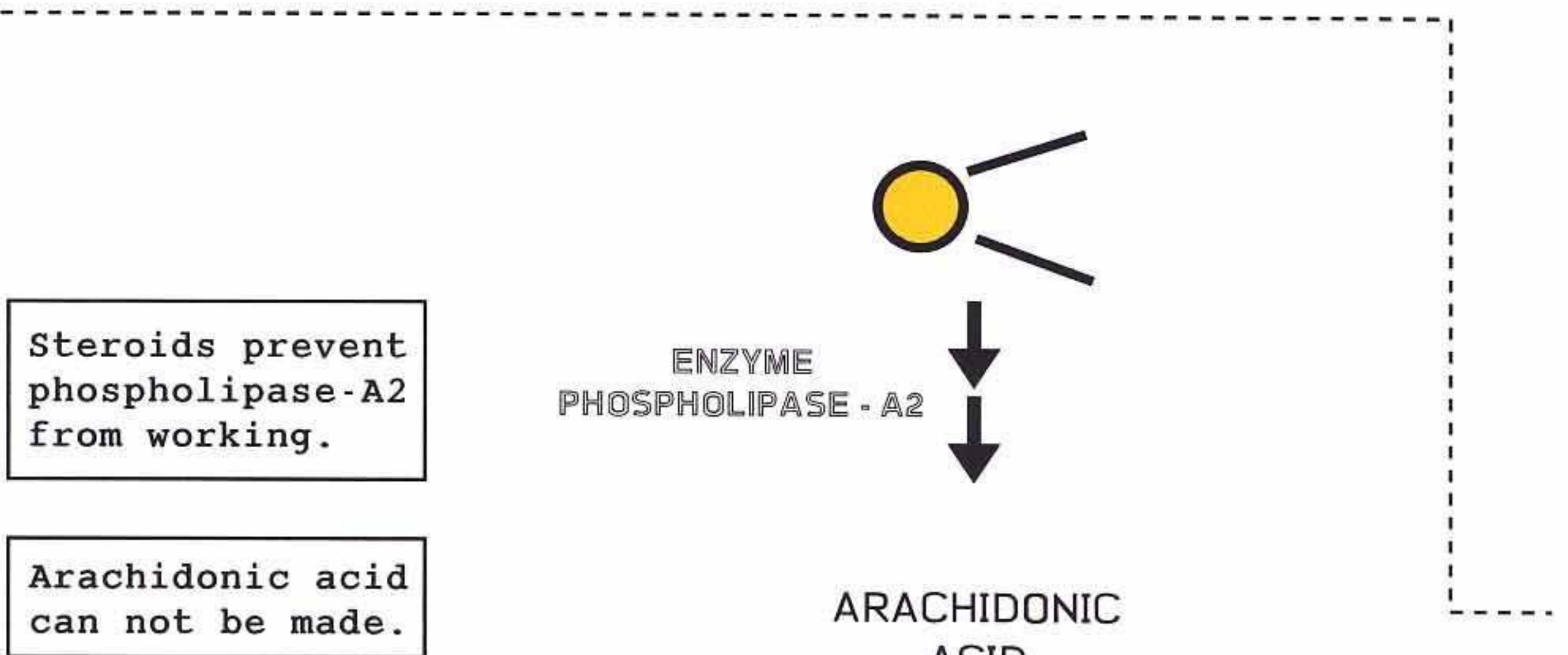
STEROIDS



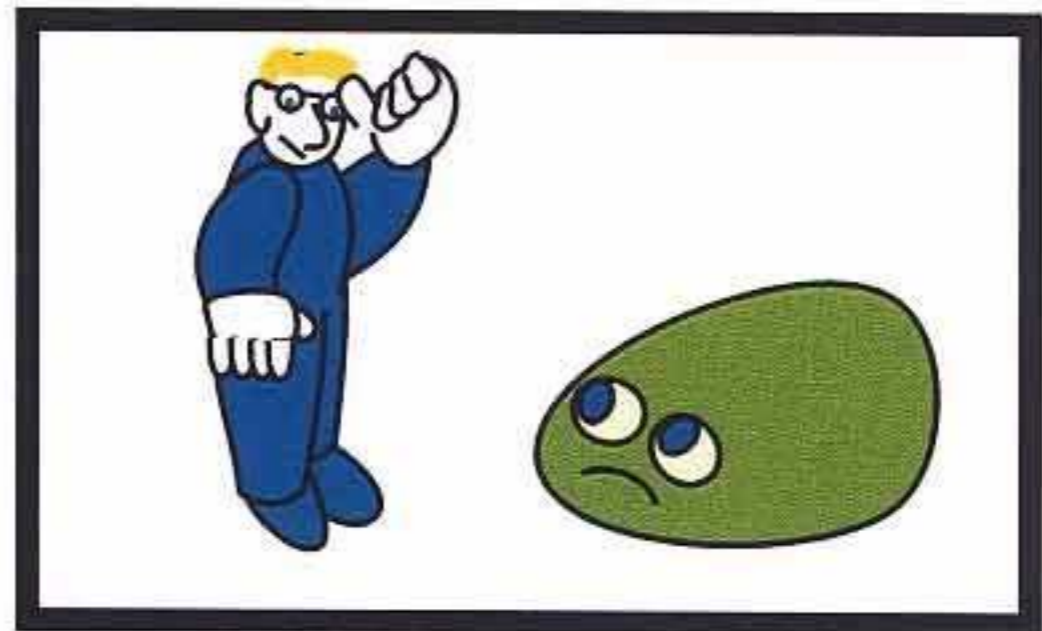
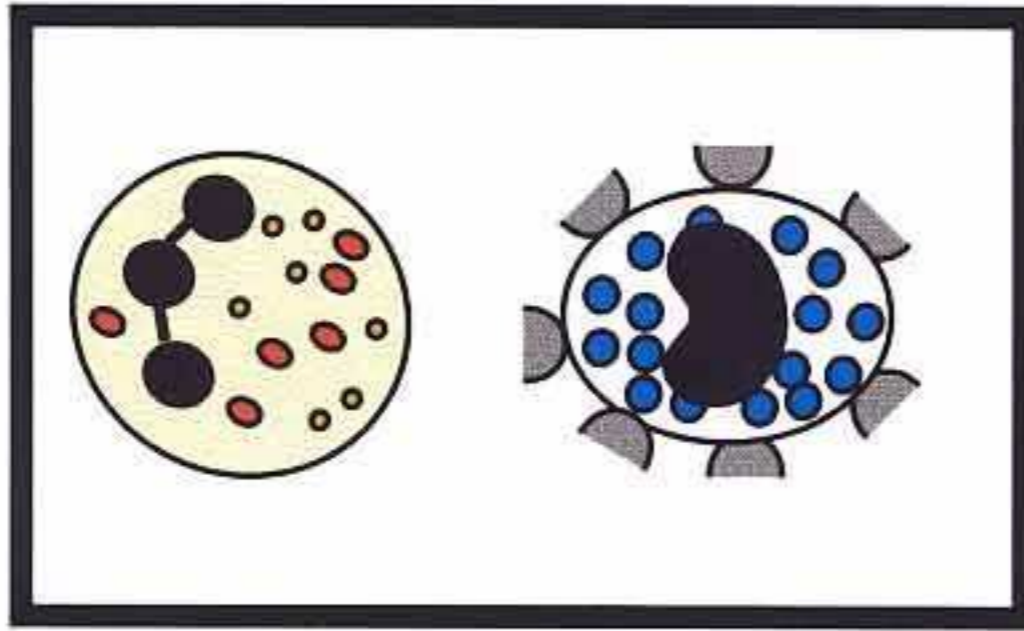
Steroids come in many forms and have some amazing anti-inflammatory properties.



Unfortunately, there are serious side effects when they are used over a prolonged period.



By stopping arachidonic acid being produced, mast cells are now unable to make prostaglandins and leucotrienes.



Steroids also prevent the release of preformed inflammatory granules.

Steroids may even stop the 'attack' protein from being expressed.

Steroids work by stabilising the membranes of cells that produce inflammatory factors.



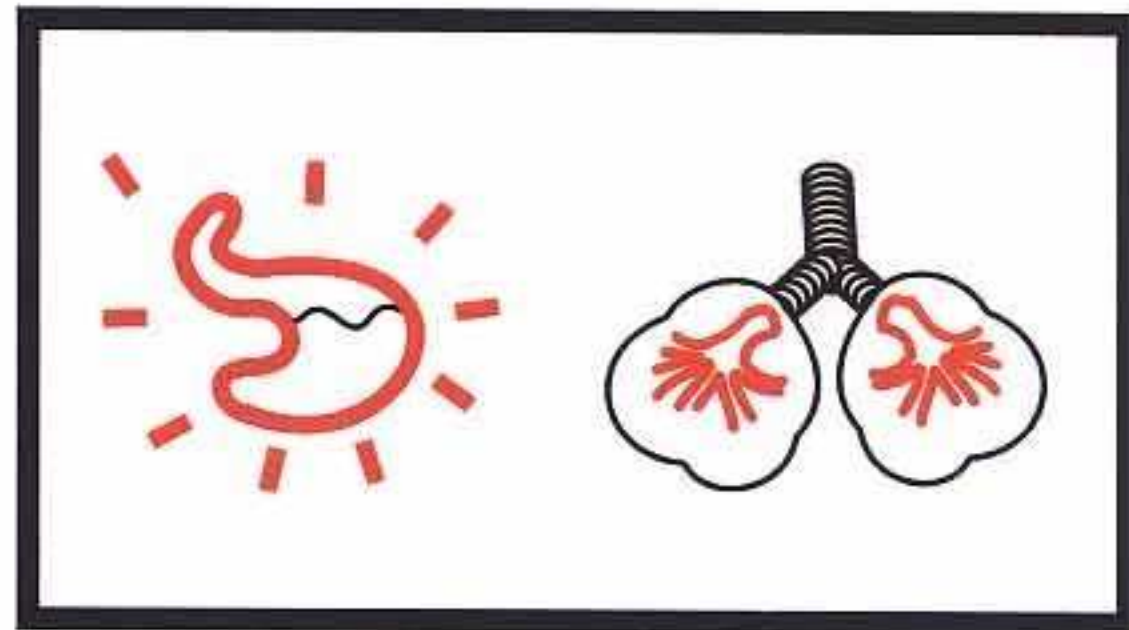
PG's and LT's can not now be produced.

Preformed granules can not be released.

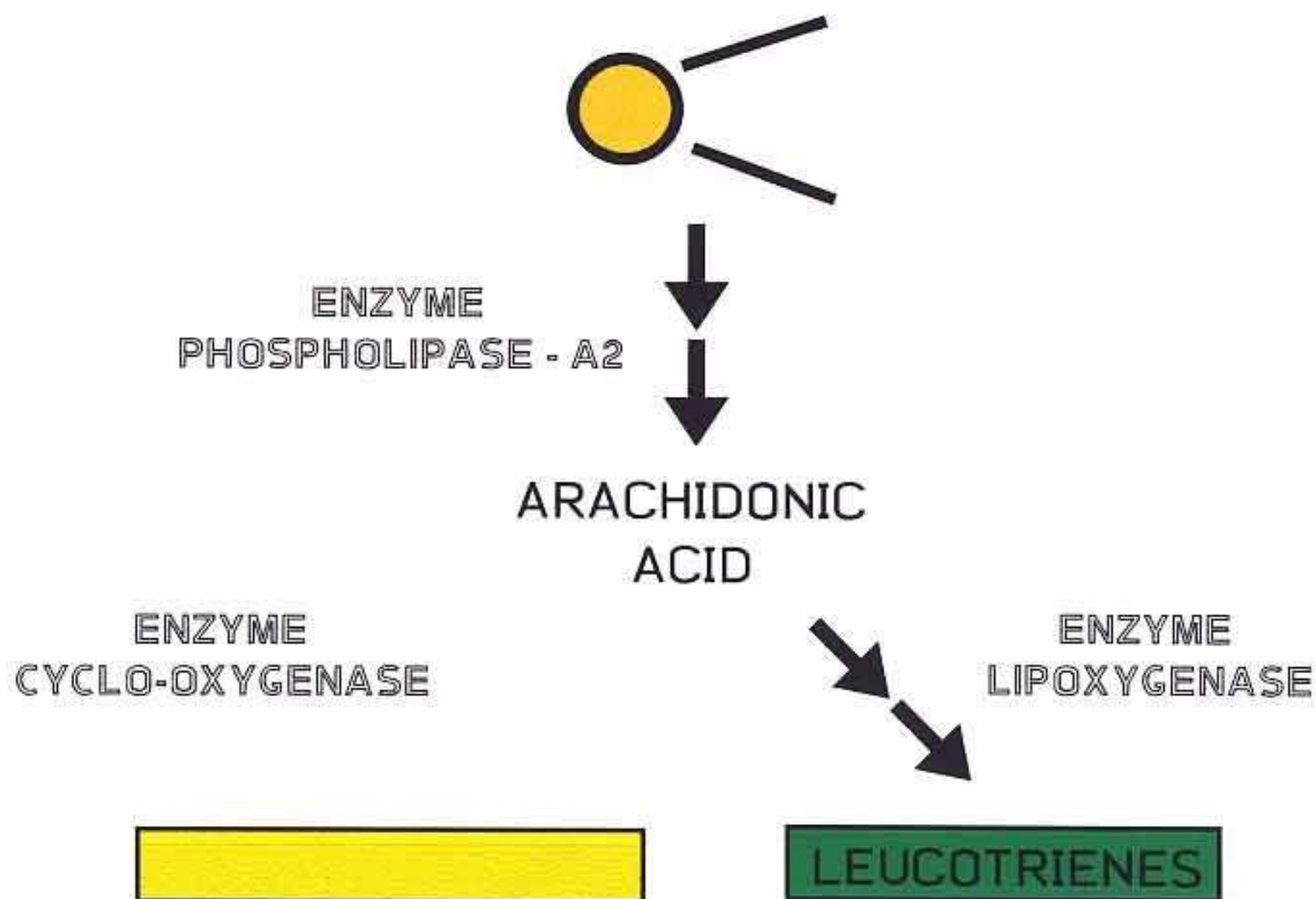
NON STEROIDAL ANTI - INFLAMMATORY DRUGS (NSAIDS)



These drugs can stop certain types of pain, because of their anti-inflammatory properties.



Unfortunately for some people, they cause problems such as gastric bleeds and severe asthmatic attacks.



These drugs work by stopping the enzyme cyclo - oxygenase from turning arachidonic acid into prostaglandins.

However, as NSAIDS do not affect the enzyme lipoxxygenase, all the arachidonic acid, is for some, now converted into leucotrienes.