Phospholipases

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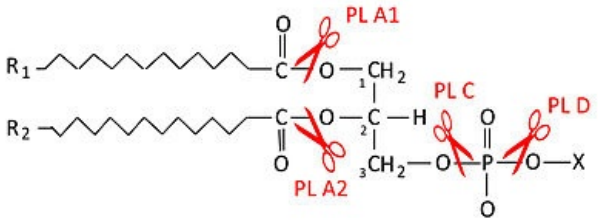
Phospholipases are hydrolytic enzymes cleaving ester bonds in phospholipids. Based on According to the position of the cleaved ester bond we can differentiate between five types of phospholipases: : phospholipase **A_1, A_2, B, C, D**. Thanks to phospholipases, second messengers or arachidonic acid and subsequently eicosanoids can be formed.

Phospholipase A

Phospholipase A is an enzyme that hydrolytically cleaves phospholipids. Phospholipase A is divided into phospholipase A1 and phospholipase A2, they cleave different bonds in the phosholipid. Both are contained in lysosomes and in the digestive tract, where they have a digestive function.



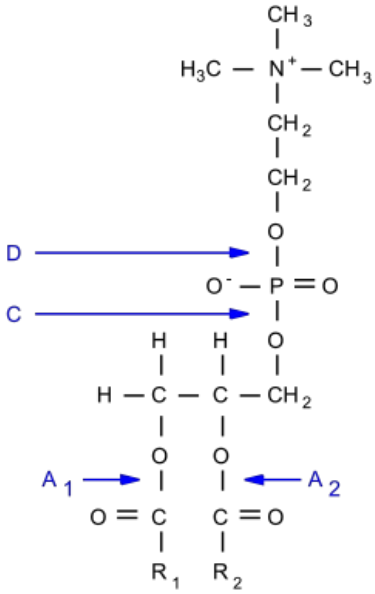
Sites of action of different phospholipases

Phospholipase A_1

An enzyme that cleaves the acyl at position 1 in a phospholipid.

Phospholipase A_2

It cleaves the acyl in position 2 from the phospholipid. Unsaturated fatty acids, such as arachidonic acid, are often found in this position. The release of arachidonate is an important step for some signaling pathways – both arachidonic acid itself and other substances derived from it (eicosanoids) have a signaling function. Enzymes with phospholipase 2 activity are also part of the venom of some snakes and spiders. The rest of the phospholipid that remains after sn-2 fatty acid cleavage (lysophospholipid) in the extracellular space has a haemolytic effect. After being bitten by some species of snakes and spiders, acute, even fatal, intravascular hemolysis can occur. In humans, extracellular phospholipase 2 is produced in pancreas as a proenzyme, it requires trypsin and Ca2+ ions for its activation.



Sites of action of different phospholipases - example: fosfatidylcholine

Phospholipase B

It acts at the sites of action of phospholipase A1 and phospholipase A2. It hydrolyzes both ester bonds in position 1 and 2 of the respective phospholipid.

Phospholipase C

It hydrolyzes the ester bond in position 3 and releases diacylglycerol (DAG) and a phosphorylated base (e.g. phosphocholine). It is used in the signaling pathways of many cells of the human body, it hydrolyzes the phospholipid phosphatidylinositol-4,5-bisphosphate into two second messengers – diacylglycerol and inositol-1,4,5-trisphosphate.

🔎 *For more information see wikiskripta:Buněčná signalizace(czech wikiskripta).*

Phospholipase D

It catalyzes the hydrolysis of phospholipids to release phosphatidic acid and compounds that were bound to phosphate (choline, serine, ethanolamine...). Phosphatidylcholine forms phosphatidic acid and choline is released.

Links

Related articles

- Buněčná signalizace (czech wikiskripta)
- Phospholipids
- Second messengers

Sources

- MATOUŠ, Bohuslav. *Základy lékařské chemie a biochemie.* 1. edition. Galén, 2010. ISBN 978-80-7262-702-8.
- BAYNES, John W – DOMINICZAK, Marek H. *Medical biochemistry.* 3. edition. Elsevier Mosby, 2009. ISBN 978-0-

323-05371-6.