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*Lipoxygenases*

Lipoxygenases (EC 1.13.11.12) catalyse the dioxygenation of polyunsaturated fatty acids containing one or more 1,4-*cis,cis*-pentadiene systems e.g. linoleic acid or arachidonic acid. The enzyme is widespread in the plant kingdom. The plant enzymes produce *cis,trans*-conjugated monohydroperoxides as primary products. The regio- and stereospecificities vary, depending on the origin of the enzyme and on the reaction conditions used. Lipoxygenase-1 from soybeans has been most extensively studied because of its excellent stability and easy accessibility. The enzyme contains 1 mol of Fe per mol of protein. The functional role of the iron in this enzyme has been demonstrated by various spectroscopic techniques in particular electron paramagnetic resonance spectroscopy. The iron appears to be directly bound to the polypeptide chain, though little is known about the actual coordination sphere of the metal. Besides the dioxygenase activity, soybean lipoxygenase-1 also shows a hydroperoxidase activity i.e. it is capable of metabolizing the hydroperoxides initially formed from an unsaturated fatty acid and oxygen. With soybean lipoxygenase-1 the hydroperoxidase activity is relatively high in the complete absence of molecular oxygen and in the presence of the non-oxygenated substrate fatty acid. This interesting secondary activity has also been found in a lipoxygenase from animal origin. This newly discovered enzyme from rabbit reticulocytes resembles soybean lipoxygenase-1 in an additional number of respects e.g. primary products formed under normal aerobic conditions and iron content. Other lipoxygenases from animal origin (leukocytes, thrombocytes and lymphocytes), when incubated with arachidonic acid (eicosatetraenoic acid), often show a different and much more diversified pattern of products, including mono- and dihydroxyeicosatetraenoic acids and representatives of a new class of physiologically active compounds namely the leukotrienes. The so-called cyclooxygenase, part of the prostaglandin synthase (EC 1.14.99.1), also initially forms dioxygenated products from fatty acids which eventually leads to prostaglandins and thromboxanes.

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