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Perspective

Eicosanoids and Plant Hormones

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DESCRIPTION

Different forms of lipids function as signaling molecules that attach to cell surface receptors, unlike steroid hormones. The most important of these molecules are prostaglandins, prostacyclin, thromboxanes, and leukotrienes, which belong to the eicosanoids family of lipids. Because eicosanoids are quickly degraded, they function locally in anticrime and paracrine signaling pathways. They cause blood platelet aggregation, inflammation, and smooth-muscle contraction in their target cells. Prostaglandins, prostacyclin, thromboxanes, and leukotriene's are all eicosanoids. They're made from Arachidonic acid, which is generated when phospholipase A_2 catalyses the breakdown of phospholipids (PLA_2). Arachidonic acid is subsequently metabolized in one of two ways: one leads to the production of prostaglandins, prostacyclin, and thromboxane's, while the other leads to the production of leukotriene's.

Arachidonic acid, which is made up of phospholipids, is used to make all eicosanoids. The conversion of Arachidonic acid to

prostaglandin H2 is the initial step in the route leading to the creation of prostaglandins or thromboxanes. Interestingly, aspirin and other no steroidal anti-inflammatory medicines target the enzyme that catalyses this reaction (cyclooxygenase). Aspirin decreases inflammation and discomfort by reducing prostaglandin production. Aspirin decreases platelet aggregation and blood clotting via reducing thromboxane production. Small daily dosages of aspirin are routinely advised to prevent strokes as a result of this exercise. Furthermore, aspirin and no steroidal anti-inflammatory medicines have been shown to reduce the incidence of colon cancer in both animal models and humans, presumably by decreasing the production of prostaglandins, which drive cell proliferation and promote cancer development.

Plant hormones are a collection of tiny chemicals that control plant growth and development. Environmental influences, likeas light or infection, alter the amounts of these molecules inside the plant, allowing them to coordinate the responses of tissues in different areas of the plant to environmental cues.

Auxins, gibberellins, cytokinins, abscisic acid, and ethylene are the five major groups of plant hormones, while several new plant hormones have lately been found. Auxin was the first plant hormone to be discovered, with Charles Darwin conducting the early research that led to its discovery in the 1880s. Auxins cause plant cell elongation by weakening the cell wall, which is one of its actions. Auxins also control a variety of other elements of plant development, such as cell division and differentiation. Plant hormones that affect stem elongation (gibberellins), fruit ripening (ethylene), cell division (cytokinins), and the development of dormancy (cytokinins) all have various impacts in their target tissues (abscisic acid).

CONCLUSION

The molecular processes of plant hormone action is less advanced than that of animal cells, and plant hormone receptors are just now being found and defined. Understanding the process by which plant cells respond to ethylene is one area where significant progress has been made. Several genes necessary for ethylene responsiveness have been found using the tiny weed Arabidopsis as a model. Genes encoding the ethylene receptor, which is related to a family of receptors found in bacteria and yeast, are among them. A protein related to the Raf protein kinase, which plays a major role in animal cell signaling pathways (described later in this chapter), and transcription factors, which regulate the expression of ethylene-responsive genes, have also been found in the ethylene signaling pathway.

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