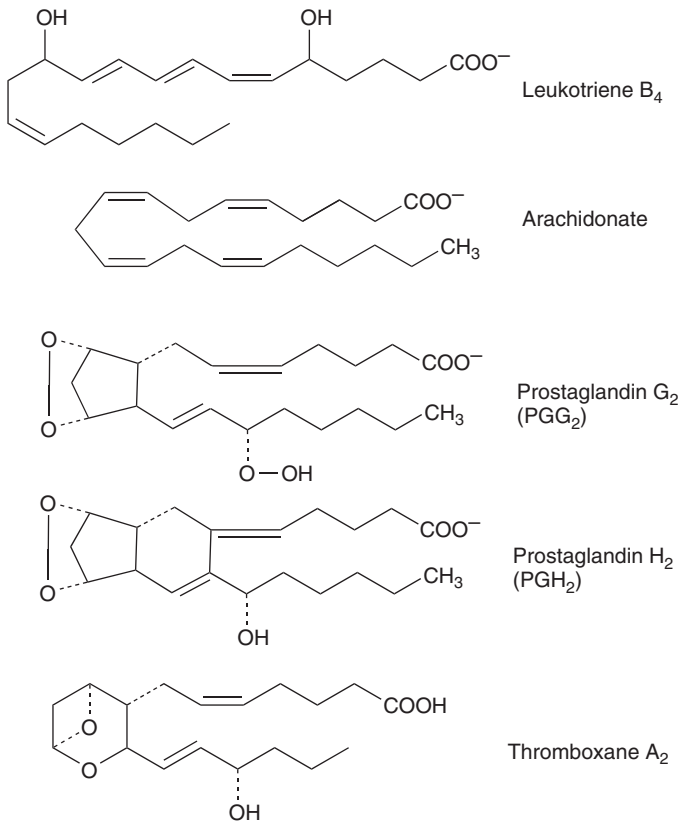

Figure 5-18 Eicosanoids are fatty acids with 20 carbons in the chain. Arachidonic acid is the precursor to the leukotrienes, the prostaglandins, and the thromboxanes.

Arachidonic Acid

An important precursor to the eicosanoids is *arachidonic acid*, a 20:4 FA. It is derived, as arachidonyl-CoA, from linoleoyl-CoA. The pathway involves chain lengthening (by two carbons, from 18 to 20) and the introduction of two additional C–C double bonds.

A dietary deficiency in linoleic acid would block biosynthesis of arachidonic acid. Because arachidonic acid is a precursor for prostaglandins, leukotrienes, thromboxanes, and prostacyclin, such a deficiency can have serious consequences for maintenance of blood pressure, the ability of platelets to aggregate, the inflammatory response, and many other physiological systems.

Derivatives of Arachidonic Acid

Arachidonic acid is incorporated into the phospholipids of the cell membranes. It is released by the action of phospholipase A_2, and then undergoes reactions that convert it to prostaglandins, prostacyclins, thromboxanes, and leukotrienes (**Figure 5-19**).

Prostaglandins have a five-membered ring generated through prostaglandin synthase action. They serve as local hormones and can affect a wide array of biological processes. Some mediate the process of inflammation; others can inhibit platelet aggregation in the blood-clotting cascade. Prostaglandins can also inhibit gastric acid secretion. Prostaglandins also play a role in reproduction; PGE_2 and PGF_2 can induce parturition.

Leukotrienes are produced through the action of lipoxygenase and other enzymes. They characteristically have (at least) three conjugated double bonds. They, and the related

© Jones and Bartlett Publishers. NOT FOR SALE OR DISTRIBUTION