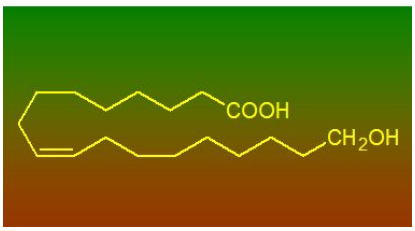
Lipid of the Month: September 2009

18-Hydroxy-9(*Z*)-octadecenoic acid



18-Hydroxy-9(*Z*)-octadecenoic acid is the ω-hydroxylation product of oleic acid and is formed in animal (1) and plant (2) tissues by cytochrome P-450 enzymes. In plants it can be converted into *cis*-9,10-epoxy-18-hydroxyoctadecanoic acid by either P-450- or peroxygenase-catalyzed oxygenations, and the epoxide can be further converted into 9,10,18-trihydroxyoctadecanoic acid by action of epoxide hydrolase activity (2). Additionally, 9,18- and 10,18-dihydroxyoctadecenoic acids can arise nonenzymatically in plants by photooxidation of 18-hydroxy-9(*Z*)-octadecenoic acid (3).

As shown by the pioneering work of Pappachan Kolattukudy, the plant extracellular polyesters cutin and suberin contain esterified 18-hydroxy-9(*Z*)-octadecenoic acid and other polyfunctional carboxylic acid derivatives (4). The polymers serve as lipophilic barriers controlling fluxes of water and solutes and also afford protection against microbes. Cutin typically serves as a barrier at the surface of leaves and fruits, whereas suberin functions in roots, internal organs and wound surfaces. Analysis of plant lines having modified cutin and/or suberin structures has begun to provide new information about structural-functional interelationships of these important biopolyesters (5).

18-Hydroxy-9(*Z*)-octadecenoic acid (O-1801-21) is prepared by Lipidox by total synthesis. Also available is the biogenetically related compound 9,10,16-trihydroxyhexadecanoic acid (aleuritic acid; O-1601-1).

1. Hoch, U. *et al.* (2000) Arch. Biochem. Biophys. 373, 63-71.
2. Kandel, S. *et al.* (2006) Phytochem. Rev. 5, 359-372.
3. Rontani, J.-F. *et al.* (2005) Phytochemistry 66, 313-321.
4. Kolattukudy, P.E. (1980), Science 208, 990-1000.
5. Pollard, M. *et al.* (2008), Trends Plant Sci. 13, 236-246.