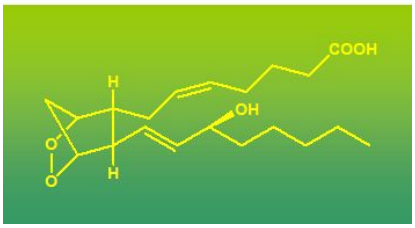
Lipid of the Month: November 2009

Prostaglandin H_2



Prostaglandin H_2 (PGH_2) is formed from arachidonic acid in the presence of prostaglandin endoperoxide synthases. The compound was originally detected as an intermediate in the biosynthesis of prostaglandin E_2 in a preparation of the sheep vesicular gland (1) and subsequently isolated in pure form and characterized (2). Not unexpectedly, the endoperoxide turned out to be chemically unstable with a half life time of about 5 min at 37^o in aqueous buffers. Spontaenous degradation of PGH_2 in buffer generates mainly a mixture of prostaglandins E_2 and D_2 (ratio about 4:1); interestingly, this ratio is reversed in the presence of serum albumin (3). Several enzymes including prostaglandin E and D synthases, thromboxane synthase and prostaglandin I synthase catalyze the conversion of PGH_2 into specific, biologically active eicosanoids. Aspirin and other non-steroidal antiinflammatory drugs block prostaglandin biosynthesis (4) by exerting an inhibitory effect on prostaglandin endoperoxide synthases. Intake of aspirin leads to reduced formation of thromboxane A_2 in circulating blood platelets and provides a certain protection against myocardial infarction and stroke, especially in patients with documented cardio- or cerebrovascular disease. Current interest in PGH_2 is focussed on its role as a substrate for prostaglandin E synthases (5), and on the design of specific inhibitors of this class of enzymes.

Prostaglandin H_2 (O-2004-1) was discovered at the Karolinska Institutet and accordingly Lipidox has a unique experience in the isolation, purification and handling of this unstable eicosanoid. Also available is the 8,11,14-eicosatrienoic acid-derived endoperoxide, prostaglandin H_1 (O-2004-2).

1. Hamberg, M. and Samuelsson, B. (1973) Proc. Natl. Acad. Sci. USA 70, 899-903
2. Hamberg, M. *et al.* (1974) Proc. Natl. Acad. Sci. USA 71, 345-349
3. Hamberg, M. and Fredholm, B.B. (1976) Biochim. Biophys. Acta 431, 189-193
4. Vane, J.R. (1971) Nature New Biol 231, 232-235
5. Jakobsson, P.J. *et al.* (1999) Proc. Natl. Acad. Sci. USA 96, 7220-7225