The metabolism of naphthalene and its toxic effect on the eye

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1. Naphthalene (1g./kg.) was fed daily by stomach tube to rabbits. 2. In more than half of the rabbits opacities in the lens and degeneration of the retina were visible in vivo. 3. Dissection of eye tissues revealed some or all of the following changes: a browning of the lens and eye humours, blue fluorescence of the eye humours and crystals in the retina and vitreous body. 4. The ascorbic acid concentration of the eye humours was decreased. 5. Some metabolites of naphthalene [1,2-dihydro-1,2-dihydroxynaphthalene, 2-hydroxy-1-naphthyl sulphate and (1,2-dihydro-2-hydroxy-1-naphthyl glucosid)uronic acid] are converted enzymically by the tissues of the eye into 1,2-dihydroxynaphthalene. 6. Changes in the eye are consistent with 1,2-dihydroxynaphthalene's being the primary toxic agent. The properties and reactions of this substance are described. 7. 1,2-Dihydroxynaphthalene is readily autoxidizable in neutral solution to form the yellow 1,2-naphthaquinone and hydrogen peroxide. This oxidation is reversed by ascorbate. 8. Ascorbate is oxidized catalytically by 1,2-naphthaquinone. This may account for the disappearance of ascorbate from the aqueous and vitreous humours of the eye after naphthalene feeding. It may also account for the appearance of crystals of calcium oxalate in the eye. 9. The brown colour of the lens of the naphthalene-fed rabbit is due to the presence of naphthaquinone-protein compounds.
Domain interactions reveal auto-inhibition of the deubiquitinating enzyme USP19 and its activation by HSP90 in the modulation of huntingtin aggregation.

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Structure, metabolism and biological functions of steryl glycosides in mammals.

Possible reactions of 1,2-naphthaquinone in the eye

*Biochem J* (March, 1967)

The chemical composition of bovine vitreous-humour collagen fibres

*Biochem J* (March, 1980)
A new look at vitreous-humour collagen

Biochem J (March, 1984)

In vitro fibrillogenesis of collagen II from pig vitreous humour

Biochem J (March, 1995)
Naphthalene is an organic compound with formula C10H8. It is the simplest polycyclic aromatic hydrocarbon, and is a white crystalline solid with a characteristic odor that is detectable at concentrations as low as 0.08 ppm by mass. As an aromatic hydrocarbon, naphthalene's structure consists of a fused pair of benzene rings. It is best known as the main ingredient of traditional mothballs. The reproductive and developmental toxicity of naphthalene has been evaluated in rats, mice and rabbits. The results of these studies suggest that naphthalene is a very weak reproductive and developmental toxicant, with detectable effects occurring only at doses associated with substantial maternal toxicity. The results of most studies were negative, suggesting that the mutagenic and genotoxic potential of naphthalene and its metabolites are weak. When naphthalene was evaluated for EPA's Integrated Risk Information System (IRIS), prior to completion of the NTP bioassay in rats, it was classified in Group C: possible human carcinogen. Alongside these mechanisms, the noxious health effects of these heavy metals are discussed. This chapter will highlight on the various sources of heavy metals and the processes that promote their exposure and bioaccumulation in the human body. More focus will be laid on the various mechanisms that lead to heavy metal toxicity with emphasis on macromolecule and cellular damages, carcinogenesis, neurotoxicity and the molecular basis for their noxious effects. The various toxic effects along with the signs and symptoms of some heavy metals in the human body will be discussed. 2. Sources of heavy metal exposure to humans. Heavy metals are naturally present in our environment. Naphthalene metabolism and toxicity have been extensively investigated and these data indicate that the lung and eye toxicity are mediated by reactive intermediates. The elegant studies conducted in Buckpitt’s laboratory implicate a 1,2-epoxide as one reactive intermediate which is extensively conjugated with glutathione (Buckpitt et al., 1987). Data from this laboratory also suggest that the liver may form a precursor metabolite or reactive metabolite which is transported to the lung (Buckpitt and Warren, 1983). The metabolism of naphthalene and its toxic effect on the eye. Biochem. J. 102, 842–852. Google Scholar. Warren, D.L., Brown, D.L. and Buckpitt, A.R. (1982). Evidence for cytochrome P-450 mediated metabolism in the bronchiolar damage by naphthalene.