

Salubrious effects of plumbagin on carbohydrate components of glycoproteins in mammary tumour

SHANMUGAM ILANCHEZHIAN AND PANCHANATHAM SACHANANDAM

Department of Medical Biochemistry, Dr.ALM Post-Graduate Institute of Basic Medical Sciences, University of Madras, Taramani Campus, Chennai 600 113, India

Glycoprotein components namely, hexose; hexosamine; and sialic acid are potential markers for diagnosis and treatment of various types of cancer. Glycoproteins are important constituents of cell surface and play a vital role in carcinogenesis. Glycoproteins play a prominent role in neoplastic behaviours such as increased growth rate, prolonged survival, invasiveness, expression of repressed antigen and escape from immune destruction (Yogeswaran 1983). The main objective of this study is to identify and establish the antitumour activity of Plumbagin mediated through its salubrious effect on carbohydrate components of glycoproteins in mammary tumour.

Mammary tumour was induced with 7,12-dimethyl benzanthracene (25 mg/ml) dissolved in sesame oil and the emulsion was administered to experimental animals 8 weeks of age, by gastric intubation. After confirmation of tumour, Plumbagin was administered at a dosage of 4 mg/kg body weight/day for 30 days to a set of control and DMBA induced tumour bearing animals.

In the present study, the concentration of all glycoproteins are increased significantly in tumour condition. The increased level of glycoprotein may be due to increased synthesis by sequential addition of monosaccharides to parent protein molecules catalysed by glycosyl transferase. It has been found that rats with metastasizing mammary tumour showed about 2-fold elevation in their sialyl transferase activity compared with normal rats (Bernacki 1977). Increased plasma glycoprotein may be due to abnormal levels of glycosyl transferase and glycosidases in the host with cancer has been attributed to leakage of the enzymes

from either intact or dying neoplastic cells and/or as a consequence of shedding of the tumour plasma membrane (Bosmann 1974). Dnistrain *et al* (1982) have also proposed increased serum sialic acid level as a marker of breast cancer. Winzler *et al* (1953) have observed an increase in serum hexosamine level due to damage of adjacent connective tissues in mammary tumour malignancy.

The normalised levels of glycoprotein are observed in Plumbagin treated group. This observations suggest that, during Plumbagin treatment cell destruction and the subsequent events are potentially prevented by Plumbagin and its reduced products like semiquinone or hydroquinone.

1. Bernacki, R.J., Kim, U. (1977). Concomitant elevation of serum sialyl transferase activity and sialic acid content in rats with metastasizing mammary tumour. *Science* 577-580.
2. Bosmann, H.B., Hill, R. (1974). Elevation in serum glycoprotein. N-Acetyl neuraminic acid transferase in rats bearing mammary tumours. *Fed. Eur. Biochem. Soc. Lett.*, 44 : 313-316.
3. Dnistrain, A.M., Schwartz, M.K., Katapodis, N. (1982). Serum lipid bound sialic acid as a marker in breast cancer. *Cancer* 50 : 1815-1819.
4. Winzler, R.J. (1953). Plasma proteins in Cancer. In : Greenstein JP, Haddow A. eds. *Advanced Cancer Res.* New York, Academic Press, 1 : 503-548.
5. Yogeswaran, G. (1983). Cell surface glycolipids in malignant transformation. *Adv Cancer Res.* 38 : 289-350.