Influence of estrogen on glutathione levels and glutathione-metabolizing enzymes in uteri and R3230AC mammary tumors of rats

James N. Suojanen, Roger J. Gay and Russell Hilf

Biochemistry Department and University of Rochester Cancer Center, University of Rochester School of Medicine and Dentistry, 601, Elmwood Avenue, Rochester, NY 14642, U.S.A.

Received 28 November 1979.
Available online 13 January 2003.

Abstract

The glutathione content and the activities of several enzymes in its metabolism, glutathione reductase, glutathione peroxidase and γ-glutamyl transpeptidase, were assayed in uteri obtained from estrogen-treated rats and in R3230AC mammary adenocarcinomas obtained from ovariectomized, intact and estrogen-treated hosts. Normal mammary glands, obtained 10–12 days post-partum, were also examined for these parameters.

A daily pharmacological dose of 0.4 μg of estradiol-17β induced a maximal increase in uterine weight and in reduced glutathione (GSH); higher doses of estrogen did not significantly increase either of these parameters. Levels of oxidized glutathione (GSSG) were comparable in both estrogen-treated and untreated rats. The time course of the estrogen-induced uterotrophic response was associated with increases in glutathione reductase, glutathione peroxidase and γ-glutamyl transpeptidase activities with the increased GSH level preceding the increase in uterine weight. Compared to neoplasms from intact or ovariectomized animals, tumors from estrogen-treated hosts exhibited significant decreases in levels of GSSG and GSH, as well as in
glutathione reductase and glutathione peroxidase activities, but demonstrated a significant
elevation of γ-glutamyl transpeptidase activity. Normal glands from lactating rats had decreased
GSH levels, lower activities of glutathione reductase and glutathione peroxidase, but elevated γ-
glutamyl transpeptidase activity versus tumors from intact rats. Tumors from estrogen-treated
rats more closely resembled mammary glands during lactation. The divergent growth responses
elicited by estrogen in the uterus and mammary tumor are correlated with the observed changes
in GSH levels and enzymes involved in glutathione metabolism.

**Keywords:** Estrogen effect; Glutathione metabolism; Glutathione; (Rat)

To whom reprint requests should be addressed.

**Biochimica et Biophysica Acta (BBA) - General Subjects**