Estradiol modulates membrane linked ATPases, antioxidant enzymes, membrane fluidity, lipid peroxidation and lipofuscin in aged rat liver

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Abstract

Free radical production and oxidative stress are known to increase in liver during aging, and may contribute to the oxidative damage, which plays an important role in the aging process. These changes increase during menopausal condition in females when the level of estradiol is decreased. The objective of this study was to observe the changes in activities of membrane linked ATPases (Na+K+ ATPase, Ca2+ATPase), antioxidant enzymes (superoxide dismutase, glutathione-S-transferase), lipid peroxidation levels, lipofuscin content and membrane fluidity occurring in livers of female rats of 3, 12 and 24 months age groups, and to see whether these changes are restored to 3 months control levels rats after exogenous administration of 17-β-estradiol (E2).

The aged rats (12 and 24 months) were given subcutaneous injection of E2 (0.1µg/g body weight) daily for one month. After 30 days of hormone treatment, experimental animals of all the groups were sacrificed and livers were isolated for further study. The results obtained in the present work revealed that normal aging was associated with significant decrease in the activities of membrane linked ATPases, antioxidant enzymes, membrane fluidity and an increase in lipid peroxidation and lipofuscin content in livers of aging female rats.

The present study showed that E2 treatment reversed the changes to normal levels. E2 treatment may be beneficial in preventing some of the age related changes in the liver by increasing antioxidant defenses.