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ESTROGEN MINIMIZES OXIDATIVE STRESS-INDUCED DAMAGE OF THE URINARY BLADDER

Hypothesis / aims of study
It has been shown that in rats bladder overactivity can be induced by intravesical H_2O_2. One possible mechanism might be oxidative stress-induced damage on cell junction of urothelial cells, resulting in disruption of barrier function of the urothelium. Several studies have demonstrated that estrogen has a protective effect from oxidative stress-related injuries in the kidneys, bones, brain and uterus. However, whether estrogen deficiency is associated with a lower ability of urinary bladder to protect itself from oxidative stress-induced damages has not been investigated before. The aim of this study is to investigate the role of estrogen in the oxidative-stress induced change of apoptosis and junctional protein of the urinary bladder.

Study design, materials and methods
Adult female Sprague-Dawley rats (230-280 g) were used in this experiment. Estrogen deficiency was induced by bilateral ovariectomy. Control group received sham operation. Estrogen replacement was given with intramuscular injection of solutions of estradiol benzoateare diluted in sesame oil every 2 days for 4 weeks. Control groups received injection of sesame oil only. Experiments were performed 4 weeks after surgery. Oxidative stress was induced with intravesical instillation of 1% H_2O_2. Expression of junctional protein E-cadherin was determined with western blotting. Cytotoxicity was determined by detecting the expression of caspase 3, a apoptosis-related protein.

Results
Totally 6 groups of animals with 6 in each group was used. Histological examination showed a remarkable detachment of urothelial cells with suburothelial edema following instillation of H_2O_2. Expression of caspase 3 was increased following ovariectomy and was recovered following estrogen replacement. Intravesical H_2O_2 increased caspase 3 expression, which was not further increased by ovariectomy. Estrogen supplement decreased the degree of the enhanced caspase 3 expression induced by ovariectomy or intravesical H_2O_2. In both sham and ovariectomy group intravesical H_2O_2 reduced E-cadherin expression, which was restored by estrogen replacement.

Interpretation of results
Estrogen deficiency and oxidative stress both increased apoptosis of urinary bladder. Oxidative stress reduced E-cadherin expression. Estrogen replacement decreased apoptosis expression and recovered E-cadherin expression.

Concluding message
These findings indicate that estrogen plays an important role in maintaining normal cellular activity and also help to minimize oxidative stress-induced damages.

Disclosures
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