

Changes in cardiovascular function based on adrenalin and norepinephrine metabolism in ovariectomized rats

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?Context? Menopause is a cardiovascular risk factor in women, and cardiovascular changes during perimenopause can increase the risk.

?Object? To observe the influence of plasma adrenalin and norepinephrine and their metabolites on the cardiovascular system and the rectification effect of estrogen in ovariectomized rats.

?Methods? Fifty-four adult female Sprague-Dawley rats were randomly divided into sham (Sham), ovariectomized (OVX), or ovariectomized+estrogen treatment groups (OVX+E), with 18 rats in each. The Sham and OVX groups were given normal saline and the OVX+E group was given estradiol valerate beginning 2 weeks after ovariectomy and continuing for 4 weeks. Radioimmunoassay, high-performance liquid chromatography, high-performance liquid chromatography-tandem mass spectrometry, and chromatography-spectrophotometry were used to detect estradiol, adrenalin, norepinephrine, metanephrine, and normetanephrine in plasma and vanillylmandelic acid in urine. Echocardiography, doppler blood flow detection technology and hamnatodynamometer were applied to assess cardiovascular function.

?Results? After ovariectomy, estrogen levels reduced and the metabolic processes of adrenalin and norepinephrine changed, which impacted cardiovascular functions. Changes of adrenalin and norepinephrine and its metabolites were correlated with the cardiovascular function.

?Main Outcome Measures? After ovariectomy, levels of estrogen reduced, adrenalin and metanephrine increased, and norepinephrine and normetanephrine in the plasma and vanillylmandelic acid in urine decreased. Symptoms indicative of cardiac diastolic dysfunction, including decreased diastolic left ventricular cavity capacity, increased wall thickness and decreased cardiac rate were observed. Different degrees of vasomotor dysfunction appeared in different peripheral positions, and the tail vessels were in relatively systolic conditions. However, the claw pad vessels were diastolic. Besides, blood pressure also increased.

?Conclusion? Cardiovascular disease occurred during the perimenopausal period. Estrogen replacement therapy can mitigate, rectify, and improve menopause-related conditions such as hot flash.

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