SEPTINTOJI TARPTAUTINĖ KONFERENCIJA

THE 7th INTERNATIONAL CONFERENCE

2026 m. liepos mėn. 7-10 d., Vilniaus universitetas, LIETUVA

7th-10th of July, 2026, Vilnius University, LITHUANIA

EVOLIUCINĖ MEDICINA: ŽMOGAUS RAIDOS PERSPEKTYVOS IR SVEIKATA BESIKEIČIANČIOJE APLINKOJE

EVOLUTIONARY MEDICINE: PERSPECTIVES ON HUMAN DEVELOPMENT AND HEALTH CONSEQUENCES IN A CHANGING ENVIRONMENT

Rengėjas:
Vilniaus universiteto Medicinos ir sveikatos mokslų
Doktorantūros mokykla, VU Medicinos fakultetas

Organized by
the Doctoral School of Medicine and Health sciences
at Vilnius University, VU Faculty of Medicine

THE HIDDEN COST OF STRESS: OVARIAN REMODELING UNDER CHRONIC PSYCHOLOGICAL STRESS

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Background and Aim: Chronic psychological stress contributes to female reproductive dysfunction through dysregulation of the hypothalamic–pituitary–gonadal axis. However, its direct impact on ovarian histomorphology remains poorly understood. This study investigated the impact of chronic psychological stress on ovarian morphology in female Wistar rats, focusing on follicular development, atresia, *corpus luteum*, and stromal–parenchymal composition.
Materials and Methods: Fourteen mature female Wistar rats (5–7 months; 253 ± 13.1 g) were assigned to Control (n = 9) and Stress (n = 5) groups. Chronic psychological stress was induced by a daily 2-hour restraint protocol for 28 days. Following carbon dioxide (CO_2) euthanasia, ovaries were fixed in 10% neutral buffered formalin, sectioned at 4 µm, and stained with hematoxylin and eosin (H&E). Digital morphometric analysis was performed using QuPath v0.5. Follicles (primordial, unilaminar, and multilaminar primary, secondary, tertiary, and atretic) and *corpora lutea* were quantified. Statistical comparison used the Mann–Whitney U test ($p < 0.05$).
Results: Unilaminar primary follicles were significantly increased in the Stress group compared with Control (1.366 ± 0.994 vs. 0.317 ± 0.196/mm²; p = 0.028). Primordial follicles showed a non-significant reduction under stress. Multilaminar primary and atretic follicles were rare in stressed animals, precluding meaningful comparison. No significant differences were observed in the number of secondary follicles, tertiary follicles, *corpus luteum*, or *corpus luteum* morphology. Stressed ovaries demonstrated a non-significant tendency toward reduced parenchymal and increased stromal fractions, suggesting mild stromal remodelling.
Conclusions: Chronic psychological stress primarily affected early folliculogenesis, with increased unilaminar primary follicles indicating altered follicular recruitment rather than follicular depletion. Effects on atresia and *corpus*

luteum were not demonstrable. Subtle stromal–parenchymal shifts suggest early ovarian structural remodelling under prolonged stress exposure.

Keywords: chronic psychological stress, follicular atresia, folliculogenesis, ovarian morphology, Wistar rats