

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
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**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

OPPOSING MORPHOLOGICAL EFFECTS OF CHRONIC STRESS AND DIABETES ON PERIVASCULAR WHITE ADIPOSE TISSUE

Pavni SINGH¹, Ruta VOSYLIUTE², Renata SIMKUNAITE-RIZGELIENE², Justinas BALEISIS³, Romualdas RUDYS³, Inga BIKULCIENE^{3,4}

¹Faculty of Medicine, Vilnius University, Vilnius, Lithuania

²Department of Anatomy, Histology and Anthropology, Institute of Biomedical Sciences, Faculty of Medicine, Vilnius University, Vilnius, Lithuania

³Department of Preclinical Research, Centre for Innovative Medicine, Vilnius, Lithuania

⁴Department of Physiology, Biochemistry, Microbiology and Laboratory Medicine, Institute of Biomedical Sciences, Faculty of Medicine, Vilnius University, Vilnius, Lithuania

Contact e-mail: pavni.singh@mf.stud.vu.lt

Background and Aim: Perivascular white adipose tissue (PWAT) is an active endocrine tissue involved in vascular homeostasis by regulating inflammation, vascular tone, and metabolic balance. Chronic psychological stress and type 1 diabetes mellitus (T1DM) are associated with metabolic and hormonal disturbances that may alter adipose tissue structure and function. While the effects of stress and diabetes on systemic adipose tissue are widely studied, their impact on perivascular adipose tissue remains poorly understood, particularly when they occur simultaneously. The aim of this study was to assess structural alterations in PWAT under chronic psychological stress, T1DM, and combination of both.

Materials and Methods: 35 Wistar rats were randomly divided into 4 groups: Control (n=8), Stress (n=10), T1DM (n=7), and T1DM + Stress (n=10). Chronic psychological stress was induced using the restraint stress protocol. T1DM was induced by streptozotocin injection (65 mg/kg). The aorta with surrounding adipose tissue was collected under anaesthesia for histological evaluation. Morphometric analysis was performed with QuPath (v0.4.4). The surface area of 550 adipocytes was measured. Analysis was done using MS Excel.

Results: In the Control group, average adipocyte surface area was 453.82 μm^2 , in Stress 506.52 μm^2 , and in T1DM 159.09 μm^2 . Adipose tissue was found to be absent in the T1DM+Stress group. Significant differences were found between all groups ($p < 0.001$).

Conclusions: Chronic psychological stress and T1DM have distinct but important effects on PWAT architecture. Stress leads to adipocyte hypertrophy, likely via glucocorticoids, whereas T1DM induces atrophy through unrestrained lipolysis. Combined, these conditions resulted in complete loss of detectable PWAT, suggesting a severe catabolic effect likely driven by enhanced lipolysis and impaired adipose tissue maintenance.

Keywords: adipose tissue, chronic psychological stress, histomorphometry, lipolysis, perivascular fat, type 1 diabetes mellitus