

<https://doi.org/10.7124/bc.000B6E>

**M.V. Chipura^{1,2}, R.R. Vasylyshyn^{1,2}, B.Ye. Haran^{1,2},
V.S. Nagibin², V.Ye. Dosenko^{1,2}**

¹ Kyiv Academic University

36, Akademika Vernadskoho Blvd., Kyiv, Ukraine, 03142

² O.O. Bogomoletz Institute of Physiology, NAS of Ukraine

4, Akademika Bohomoltsia Str., Kyiv, Ukraine, 01024

mariachipura2003@gmail.com

GLOBAL LEVELS OF 5-HYDROXYMETHYLCYTOSINE AND TET EXPRESSION IN THE MOUSE BRAIN IN THE PTSD MODEL AND ESCITALOPRAM TREATMENT

Background/Aim. Post-traumatic stress disorder (PTSD) involves persistent neuroplasticity alterations, likely mediated by epigenetic modifications [1]. Active DNA demethylation via TET-family enzymes produces 5-hydroxymethylcytosine (5-hmC), a stable mark crucial for neuronal function [2]. Aberrant 5-hmC patterns occur in various psychiatric conditions [3], 5-hmC dynamics in PTSD pathogenesis remain unclear. This study aimed to investigate global 5-hmC levels and Tet family mRNA expression in brain in the murine PTSD model and following escitalopram treatment. **Methods.** As the model of PTSD, single prolonged stress (SPS) paradigm was used. Male C57BL/6J mice ($n = 36$) were divided into 3 groups: Control ($n = 18$), SPS-exposed ($n = 10$) and SPS-exposed, treated with escitalopram ($n = 8$). To validate the PTSD-like phenotype and treatment efficacy, we used the Open Field (OF), Elevated Zero Maze (EZM), and Novel Object Recognition (NOR) tests. Global 5-hmC levels were quantified via dot blot assay and Tet-family mRNA expression was measured by qPCR. Data were analyzed using Welch ANOVA with Dunnett's T3 pos-hoc test with a set at 0.05. **Results.** SPS-exposed mice spent more time in the open areas of the EZM and OF, displaying a reckless phenotype, and showed decreased novelty interest in the NOR test. Escitalopram treatment reversed these changes. Hippocampal 5-hmC levels remained unchanged across all groups, while escitalopram treatment significantly reduced 5-hmC level in the mPFC, comparing to both Control and SPS-exposed groups. No Tet-family RNAs – expression changes were detected in the mPFC, whereas all Tet were downregulated in hippocampus in both SPS and escitalopram-treated groups. **Conclusions.** We found no direct correlation between Tet mRNA expression and global 5-hmC levels in the investigated brain regions. This discrepancy suggests that 5-hmC dynamics during PTSD and antidepressant therapy depend on post-translational regulation or cofactor availability rather than transcription.

Keywords: PTSD, 5-hmC, SPS, TET, escitalopram, epigenetics.

REFERENCES:

1. Kim GS et al. "Neuroepigenetics of Post-Traumatic Stress Disorder" in Progress in Molecular Biology and Translational Science, vol. 158 — Elsevier B.V., 2018; pp. 227—53.
2. Yin X, Xu Y. Structure and function of TET enzymes. *Adv Exp Med Biol.* 2016;**945**:275—302.
3. Fan BF et al. Deficiency of Tet3 in nucleus accumbens enhances fear generalization and anxiety-like behaviors in mice. *Brain Pathology.* 2022;**32**(6):e13080.

Received: 28.05.2026; Accepted: 08.09.2026; Published: 29.09.2026

Citation: Chipura M.V., Vasylyshyn R.R., Haran B.Ye., Nagibin V.S., Dosenko V.Ye. (2026) Global levels of 5-hydroxymethylcytosine and TET expression in the mouse brain in the PTSD model and escitalopram treatment. *Biopolymers & Cell*, Special issue(42), 51. <https://doi.org/10.7124/bc.000B6E>

© Publisher PH "Akademperiodyka" of the NAS of Ukraine, 2026. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted reuse, distribution, and reproduction in any medium, provided the original work is properly cited