

<https://doi.org/10.7124/bc.000B4B>

M.I. Lytvynova, N.V. Dvinskykh

National University of Pharmacy
53, Hryhorii Skovorody Str., Kharkiv, Ukraine, 61002
mashulalitvinova069@gmail.com

PROSPECTS FOR CREATING A BIOTECHNOLOGICAL DRUG FOR THE THERAPY OF PTSD AND CHRONIC STRESS

Background/Aim. Post-traumatic stress disorder (PTSD) and chronic stress are among the most pressing issues in modern psychiatry, causing cognitive and emotional impairments and reduced neuroplasticity. Existing pharmacotherapy is often insufficient and has side effects, creating a need for new pathogenetically grounded approaches. The aim of the study is to analyze the prospects for developing a biotechnological drug based on recombinant human brain-derived neurotrophic factor (rhBDNF), to determine its biological role, features of production, and current approaches to delivery to the central nervous system. **Methods.** This study is based on a systematic review of the scientific literature from the PubMed, Scopus, Web of Science, and Google Scholar databases for the period 2015–2025. **Results.** BDNF is a key neurotrophin that ensures neuronal survival, stimulates neurogenesis, and maintains synaptic plasticity. Its highest activity is observed in the hippocampus, prefrontal cortex, and limbic structures. In PTSD and chronic stress, BDNF levels decrease, leading to hippocampal atrophy, impaired neuroplasticity, and emotional-cognitive disorders. Recombinant BDNF (rhBDNF) is produced in *E. coli*, *Pichia pastoris*, and mammalian cell expression systems. The *P. pastoris* system is considered the most promising due to its high productivity, proper post-translational modifications, and cost-effectiveness. The production cycle includes the creation of an expression vector, transformation of producer cells, optimized fermentation, protein extraction, refolding, purification via affinity and ion-exchange chromatography, as well as stabilization through lyophilization and nanocapsulation. The main limitation of the therapy is overcoming the blood-brain barrier. Promising delivery methods include intranasal administration, nanoliposomal and nanoparticle systems, conjugates with carrier peptides, and sustained-release implants. Combining rhBDNF therapy with psychotherapy can significantly improve the effectiveness of PTSD treatment. Alternative approaches such as viral vector-based BDNF gene therapy, BDNF mimetics, and natural compounds are also being actively studied in models of depression and stress-related disorders, although rhBDNF-based therapy remains the most promising strategy for correcting BDNF and other neurotrophic factor deficiencies, owing to its established production platforms and targeted delivery options. **Conclusions.** The use of rhBDNF represents a promising area of biopharmaceuticals and neurobiotechnology. The combination of modern biotechnological platforms, innovative delivery systems, and personalized medicine opens up new possibilities for the treatment of stress-related and neurodegenerative disorders.

Keywords: PTSD, chronic stress, rhBDNF, neuroplasticity, biotechnological production, drug delivery systems, gene therapy.

Received: 05.06.2026; Accepted: 08.09.2026; Published: 29.09.2026

Citation: Lytvynova M.I., Dvinskykh N.V. (2026) Production of different forms of human recombinant valyl-tRNA synthetase using the HEK293 cell line. *Biopolymers & Cell*, Special issue(42), 18. <https://doi.org/10.7124/bc.000B4B>
© 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