

Molecular identification of the tick-borne encephalitis virus in ticks from the eastern region of kazakhstan

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Tick-borne encephalitis (TBE) is a viral infection caused by the tick-borne encephalitis virus (TBEV), a member of the Flaviviridae family. It poses a public health threat across Eurasia, including Kazakhstan. Despite its relevance, TBEV prevalence and genetic diversity data in Kazakhstan remain limited. Ongoing virus surveillance in tick populations is essential for assessing outbreak risks and guiding effective prevention strategies.

In 2022, 327 adult ticks (86 males, 114 females) were collected from vegetation in Eastern Kazakhstan oblast using the flagging method. The ticks represented five species: *Dermacentor marginatus* (161/327; 49.2%), *Ixodes persulcatus* (55/327; 16.8%), *Hyalomma anatolicum* (23/327; 7.0%), *Dermacentor reticulatus* (8/327; 2.4%) and *Hyalomma asiaticum* (7/327; 2.1%). RNA was extracted using the MAGNO-sorb kit on the Automag 96 platform, and TBEV RNA was detected via real-time RT-PCR with the TaqMan™ Fast Virus 1-Step Master Mix. Six samples tested positive for TBEV, including five from *D. marginatus* and one from *I. persulcatus*. The *D. marginatus*-positive ticks were collected in Shemonaykha, Zaisan, Glubokoye, and Ulan districts, while the *I. persulcatus*-positive tick was found in Ridder city. Among 216 ticks from these two species, the infection rate was 3.1% for *D. marginatus* (5/161) and 1.8% for *I. persulcatus* (1/55), with an odds ratio of 1.73 (95% CI: 0.19–15.48). These results confirm the active circulation of TBEV in Eastern Kazakhstan and provide evidence that these districts represent TBE-endemic areas. The detection of the virus in multiple tick species further underscores their epidemiological significance in maintaining and transmitting TBEV in the region.

These findings confirm the persistent risk of TBEV infection for humans and animals, emphasizing the need for ongoing surveillance, public education, vaccination, and tick control. Our study expands knowledge of TBEV circulation in Kazakhstan and highlights the importance of molecular monitoring for developing effective prevention and control strategies in the region.

Biography

Kuatbek Moldir specializes in laboratory diagnostics and expertise, with a passion for advancing immunology and biotechnology. Her research focuses on improving diagnostic accuracy and enhancing disease prevention strategies. With years of experience in laboratory research, and academic collaboration, she contributes to the development of innovative diagnostic techniques. Her work is rooted in evidence-based methodologies, integrating advanced molecular diagnostics and analytical techniques to improve healthcare outcomes. She actively engages in scientific research and laboratory expertise, ensuring precision and reliability in diagnostic procedures. Her contributions aim to enhance public health by refining disease detection and response strategies. Through her role at the AB National Center for Biotechnology, she is dedicated to expanding knowledge in immunology and infectious disease diagnostics. Her approach is interdisciplinary, combining research, technology, and education to create a lasting impact on healthcare and scientific advancements.

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