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Vector Behavior meets Transcriptomics: A Case Study of Ixodes ricinus and Harz Mountain Virus

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Ticks are important vectors of emerging viruses, including the Jingmenvirus Alongshan virus strain Harz Mountain (ALSV_HM), recently identified in Ixodes ricinus ticks collected from game animals in Lower Saxony, Germany. To investigate the transcriptomic impact of ALSV_HM, adult I. ricinus were experimentally infected via intrathoracic injection and incubated for seven days. Subsequently, RNA sequencing was performed, and reads were aligned to the Ixodes scapularis genome. Infected ticks showed significant upregulation of gene transcripts related to immune response, intracellular signaling, and RNA/DNA-binding functions, suggesting a broad activation of antiviral pathways and transcriptional regulation. Transcripts encoding transport- and membrane proteins were downregulated, implying potential disruption of cellular homeostasis and molecular transport. Interestingly, transcripts associated with aggressive behavior in other arthropods were also differentially expressed. To test behavioral changes, vertical and horizontal repellency assays using Icaridin were used. ALSV_HM-infected ticks displayed reduced sensitivity to Icaridin during vertical questing, whereas horizontal movement remained unaffected. These findings suggest that ALSV_HM alters both gene expression and host-seeking behavior in I. ricinus, potentially enhancing transmission dynamics and underscoring the need for surveillance of novel tick-borne viruses in a changing environment.

Keywords

Ixodes ricinus, Vector-borne diseases, Alongshan Virus

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Professional Status of the Speaker

PhD Student

Junior Scientist Status

Yes, I am a Junior Scientist.

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