Rewiring of host cell signaling in chikungunya virus infection: a mechanism for pathogenesis and therapeutic approaches

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- PMID: ٤١٤٩٣٥٤٣

- DOI: ١٠,١٠٠٧/s٠٠٢٠٣-٠٢٥-٠٤٦٤٢-٣

Abstract

Chikungunya virus (CHIKV) is one of the well-known arboviruses, transmitted via Aedes mosquitoes and infects humans through vector bites. The virus is endemic in certain countries; however, there is evidence suggesting that CHIKV may become widespread in non-endemic countries and may cause a significant burden on global health status in the future. In this context, exploring the characteristics of CHIKV enhances our understanding of it. This literature review examines alterations in host cell signaling induced by CHIKV, including those related to the phosphatidylinositol ٣'-kinase (PI٣'K)/Akt, mitogen-activated protein kinase (MAPK), janus kinase/signal transducers and activators of transcription (JAK/STAT), Wnt, transforming growth factor-β (TGF-β),

and P٥٣ pathways. We also review the effect of CHIKV on mitochondria and related processes, such as apoptosis, ferroptosis, and autophagy. The altered signals are involved in viral infection and manifestation. In that case, they may be suitable therapeutic targets for treating and preventing CHIKV. Multiple studies reveal that CHIKV infection alters the PI٣K/AKT and MAPK pathways, indicating their essential involvement in host signaling. Hence, these pathways (and also other mentioned ones) may be proper candidates for treatment or prevention of the virus. Further studies are required to explore more details about CHIKV-induced intracellular signaling alternation and its subsequent effects. These findings provide a deeper understanding of the fundamental molecular mechanisms underlying CHIKV infection, paving the way for the development of antiviral strategies.

Keywords: Aedes mosquitoes; CHIKV; JAK/STAT pathway; MAPK pathway; PAMPs.

Conflict of interest statement

Declarations. Conflict of interest: The authors declare no competing interests. Ethical approval: The ethical committee of Semnan University of Medical Sciences approved this study with the number: IR.SEMUMS.REC.١٤٠٤,١٧١. Consent to participate: Not applicable. Consent for publication: Not applicable.

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