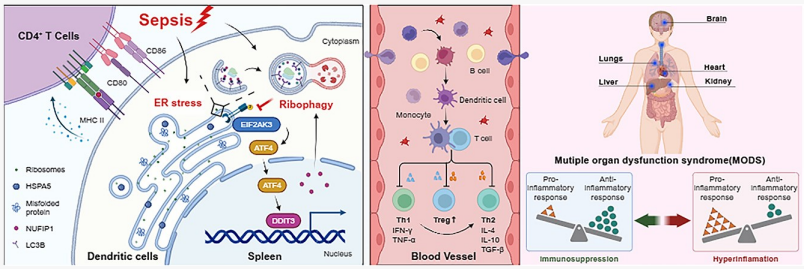
Targeting nufip1: a new strategy for sepsis treatment through ribophagy

GA, UNITED STATES, July 25, 2025 /EINPresswire.com/ -- Sepsis-induced immune dysfunction is a major contributor to high mortality rates in septic patients. Recent findings shed light on the role of nuclear fragile X mental retardation-interacting protein 1 (NUFIP1), a protein involved in ribophagy, in modulating immune responses during sepsis. This study demonstrates that NUFIP1-mediated ribophagy helps maintain dendritic cell function by mitigating excessive endoplasmic reticulum (ER) stress. The activation of dendritic cells through NUFIP1 facilitates T-cell priming and enhances immune responses, ultimately improving survival outcomes in septic models. These insights reveal that NUFIP1 may be a promising therapeutic target for addressing sepsis-induced immune suppression.



NUFIP1 in Sepsis: Regulating Immune Function and Organ Dysfunction. This illustration demonstrates the pivotal role of NUFIP1-mediated ribophagy in dendritic cell activation and sepsis-induced immune suppression. It shows how NUFIP1 mitigates ER stress, e

Sepsis is a life-threatening condition caused by infection-induced dysregulated immune responses, leading to multi-organ dysfunction. Dysfunction in dendritic cells, crucial for immune activation, plays a central role in the immune suppression observed in sepsis. Ribophagy, a selective autophagic process degrading ribosomes, has been implicated in maintaining cellular homeostasis during stress. However, the specific role of nuclear fragile X mental retardation-interacting protein 1 (NUFIP1), a ribophagy receptor, in dendritic cell function during sepsis remains poorly understood. Based on these challenges, further investigation into the regulatory mechanisms of NUFIP1-mediated ribophagy in dendritic cell activation and immune function in sepsis is essential.

A recent study published in Burns & Trauma (May 2025) by researchers from the Chinese PLA General Hospital and Nankai University explores the role of NUFIP1 in regulating immune responses during sepsis. The study focuses on how NUFIP1-mediated ribophagy protects dendritic cells from dysfunction caused by excessive endoplasmic reticulum (ER) stress, contributing to better immune function and survival outcomes in septic mice. The findings

provide a novel perspective on sepsis-induced immune suppression and suggest new therapeutic strategies targeting NUFIP1.

The study investigates the role of NUFIP1 in modulating dendritic cell activation during sepsis. Researchers used murine models to analyze the effects of NUFIP1-mediated ribophagy in response to lipopolysaccharide (LPS) stimulation and cecal ligation and puncture (CLP)-induced sepsis. The results revealed that NUFIP1 is crucial for maintaining dendritic cell activation by regulating ribophagy. Under septic conditions, NUFIP1 facilitated the activation of dendritic cells and enhanced T-cell proliferation by mitigating ER stress through the EIF2AK3–ATF4–DDIT3 pathway. In contrast, NUFIP1 deficiency led to diminished dendritic cell activation, reduced cytokine production, and impaired T-cell priming. This dysfunction aggravated peripheral immune suppression, worsened organ damage, and increased mortality in septic mice. Furthermore, salubrinal treatment, which inhibits ER stress, partially restored dendritic cell function, highlighting the therapeutic potential of targeting NUFIP1-mediated ribophagy to improve immune responses in sepsis.

Dr. Yong-ming Yao, the study's corresponding author, commented: "Our findings underscore the pivotal role of NUFIP1 in regulating immune function during sepsis. By controlling ribophagy and attenuating ER stress, NUFIP1 helps preserve dendritic cell activity, which is crucial for immune response. Targeting NUFIP1 could offer a promising therapeutic approach to mitigate the immune suppression observed in sepsis, potentially improving patient outcomes and survival rates."

The study highlights NUFIP1 as a potential therapeutic target for sepsis-induced immunosuppression. By modulating ribophagy and alleviating ER stress in dendritic cells, NUFIP1 ensures proper immune activation and reduces the risk of secondary infections and organ damage. Future therapeutic strategies could focus on enhancing NUFIP1 activity or mimicking its effects to improve immune function in septic patients. Moreover, the findings pave the way for developing targeted treatments that modulate ribophagy and ER stress, providing a novel approach to sepsis therapy and broader implications for inflammatory diseases.

References

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