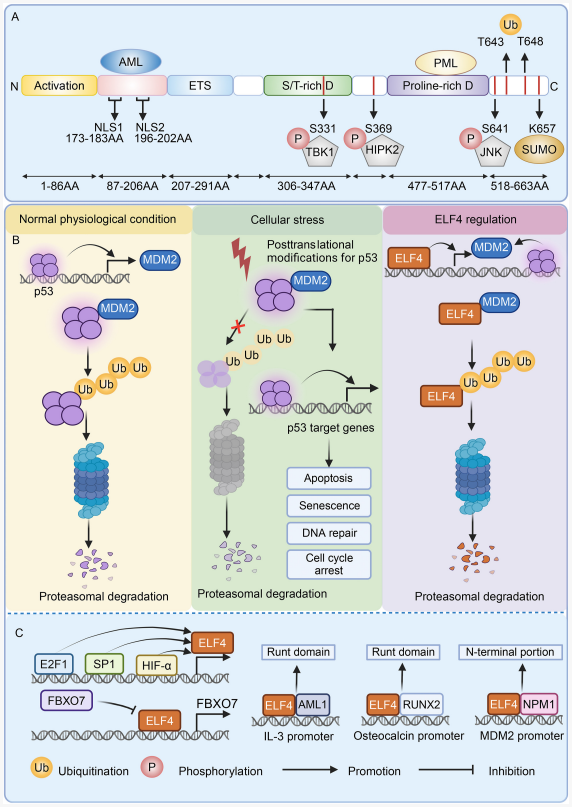
ELF4: A Key Transcription Factor Shaping Immunity and Cancer Progression

SHANNON, CLARE, IRELAND, March 10, 2025 /EINPresswire.com/ -- ELF4, a transcription factor belonging to the ETS family, has emerged as a pivotal regulator in cell differentiation, immune system function, and cancer progression. This newly published review underscores its molecular complexity and clinical significance, shedding light on its dual role in tumor suppression and oncogenesis.



Domain structure and transcriptional regulation of ELF4. (A) ELF4 includes six functional domains: an acidic domain, an AML1 interaction domain, a conserved ETS domain, a serine/threonine-rich domain, a proline-rich domain, and two nuclear location signal

ELF4 is highly expressed in various tissues, including hematopoietic cells, placenta, and the gastrointestinal tract. Its activity is tightly controlled through post-translational modifications and intricate signaling pathways, allowing it to modulate key physiological processes. Notably, ELF4 plays a critical role in osteogenic, adipogenic, and neuronal differentiation, positioning it as a central player in tissue development and regeneration.

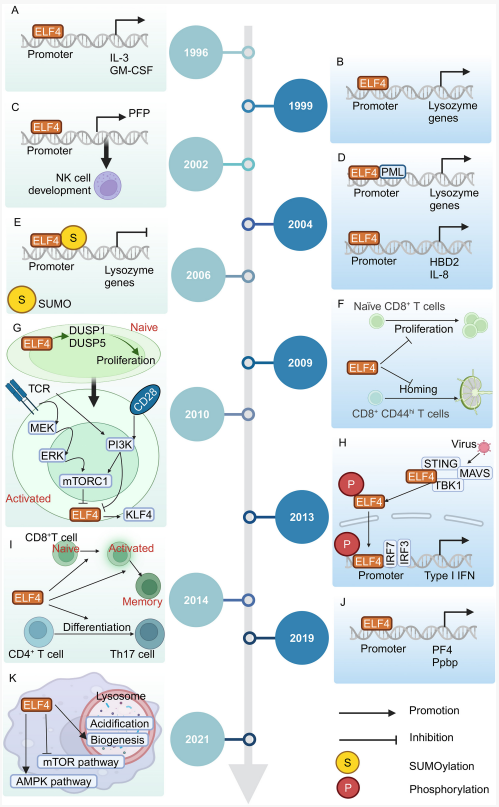
In the immune system, ELF4 is a crucial transcriptional regulator. It facilitates immune responses by activating cytokines such as IL-2 and GM-CSF, thereby enhancing T-cell function and innate immunity. However, ELF4 dysregulation has been implicated in immune-related disorders, including autoimmune diseases and inflammatory conditions. Its involvement in immune cell differentiation and tumor microenvironment interactions makes it a promising target for immunotherapy strategies.

In oncology, ELF4 displays a context-dependent role. It can act as a tumor suppressor by promoting DNA damage repair and regulating cell cycle checkpoints, thereby preventing uncontrolled proliferation. Conversely, in certain malignancies, such as leukemia, colorectal cancer, and glioblastoma, ELF4 is overexpressed, contributing to cancer stemness, metastasis,

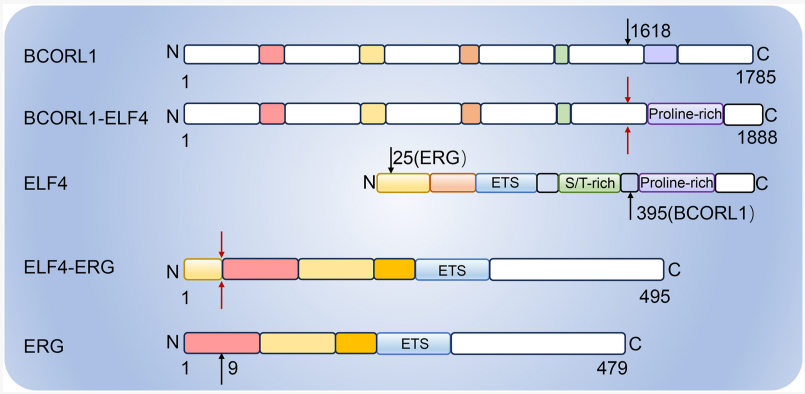
and therapy resistance. This paradoxical role highlights the need for a deeper understanding of tumor heterogeneity and ELF4-mediated gene regulation.

The review emphasizes ELF4's potential as a biomarker for cancer prognosis, with its expression levels correlating with tumor stage, immune infiltration, and patient survival rates. Additionally, its interaction with signaling pathways such as PI3K, MAPK, and p53 suggests that targeting ELF4 may open new avenues for precision medicine and targeted therapies.

Despite significant advancements, many aspects of ELF4 function remain unresolved. Further research is required to decode its regulatory mechanisms and develop therapeutic interventions that harness its unique properties.



The timeline delineates the principal findings and pivotal advancements in ELF4-related immune system research so far.



The protein fusion between BCORL1 and ELF4 or ERG and ELF.

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