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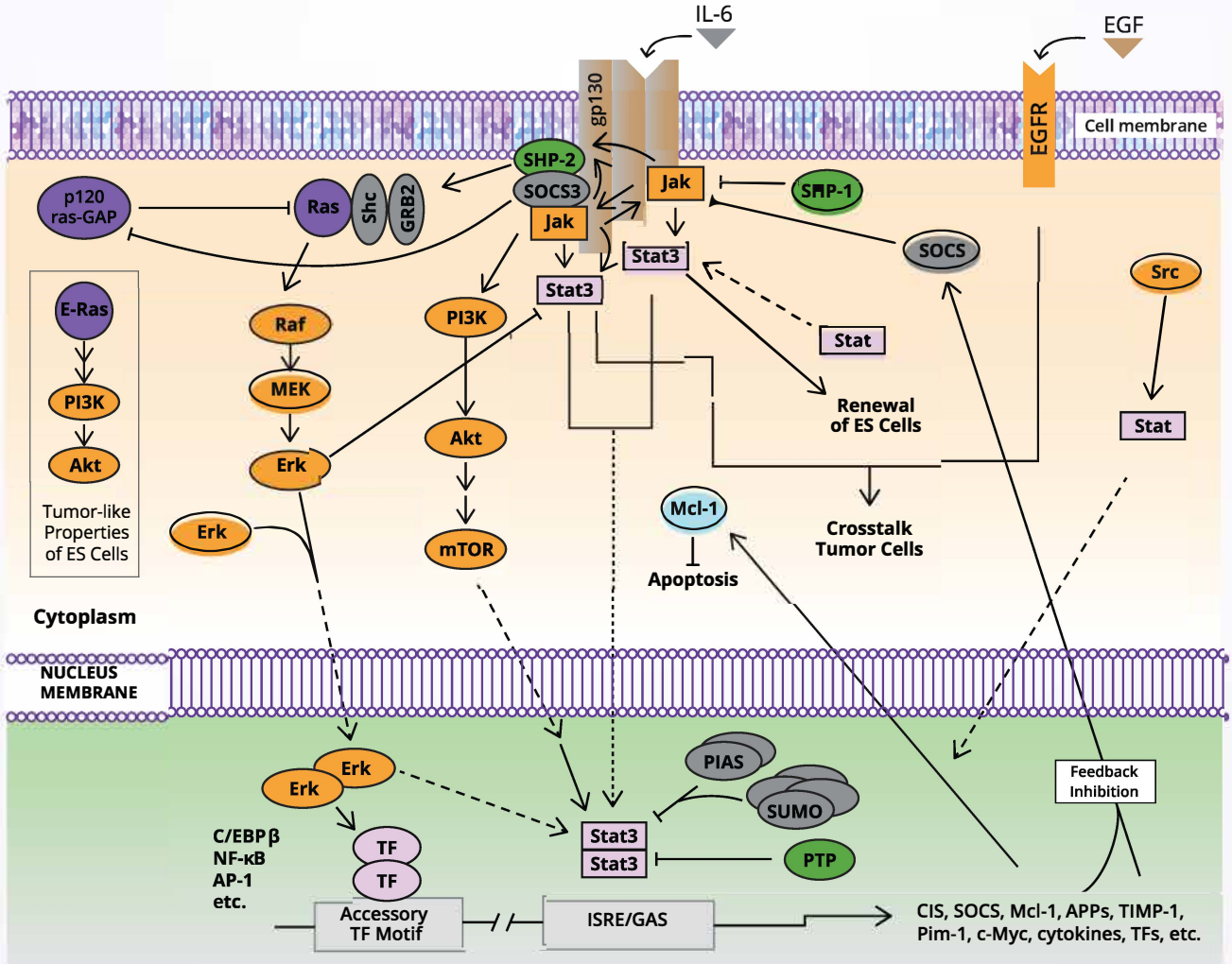
JAK/STAT Signaling Pathway

The Janus Kinase / Signal Transducers and Activators of Transcription (JAK/STAT) pathway is an evolutionary conserved signaling cascade which mediates the response to cytokines and growth factors. Cellular responses to the activation of this pathway include proliferation, differentiation, migration, apoptosis and cell survival. JAK/STAT signaling is integral to homeostatic and developmental processes such as hematopoiesis, immune development, stem cell maintenance, organismal growth and mammary gland development. The pathway is activated upon binding of an extracellular ligand, usually comprising interferons or growth factors. This results in multimerization of the receptor subunits bringing two JAKs into close proximity and thus activating them through transphosphorylation. Activated JAKs phosphorylate STATs, which are latent transcription factors residing in the cytoplasm. The activated STATs dimerize and enter the nucleus, binding to specific enhancer sequences resulting in gene transcription. In theory JAK/STAT signaling cascade is a simple mechanism linking extracellular signals into a direct transcriptional response, however is complicated by interactions with other signaling pathways. The best characterized are Ras/MAPK, PI3K and TGF- β.



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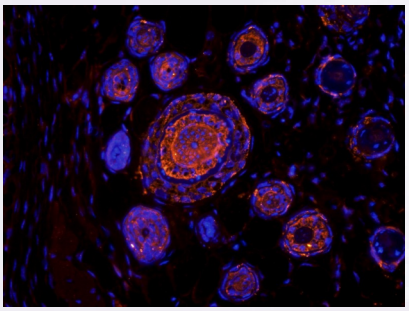

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JAK/STAT Pathway References

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- Villarino A.V., et al. Mechanisms of Jak/STAT signaling in immunity and disease. J Immunol. (2015) Jan 1;194(1):21-7. doi: 10.4049/jimmunol.1401867

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