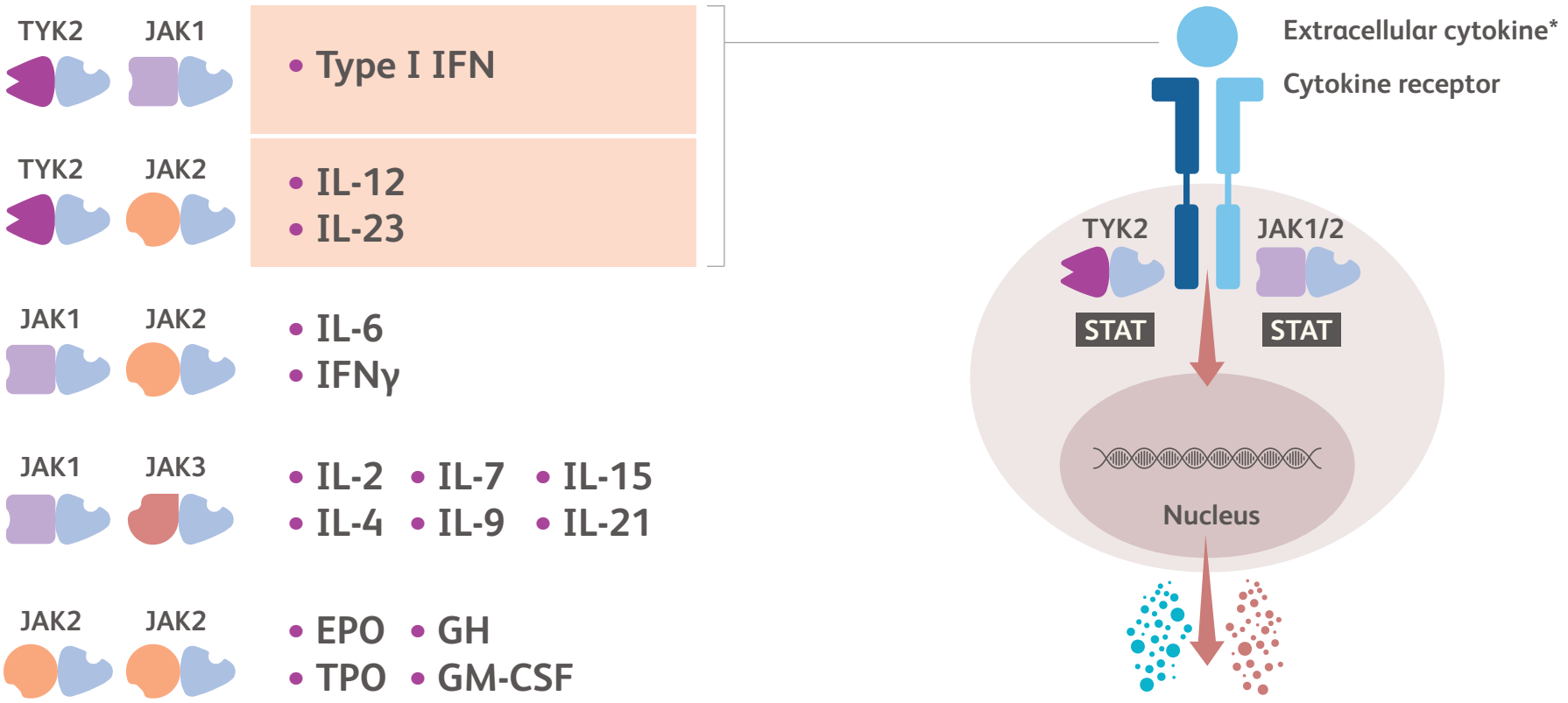
The TYK2 Pathway: An Overview

TYK2 is an enzyme that works inside the cell to mediate immune signals initiated by specific cytokines[1]

TYK2 and JAK1/2/3 typically work in pairs, or 'dimers' to relay signals from extracellular cytokines to the nucleus to regulate certain genes. TYK2 is selectively involved in the relay of signals from proinflammatory cytokines such as IL-23, IL-12, and Type I IFN.[1]

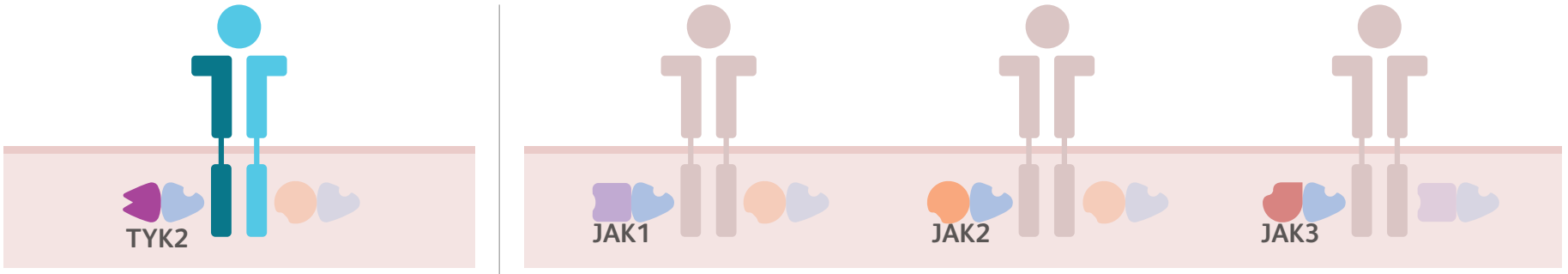
TYK2 and JAK1/2/3 signaling[1,2]



*Please note that this list of cytokines mediated by the different TYK2/JAK and JAK/JAK pairs is not exhaustive. Certain cytokines might also modulated by JAK and TYK2 trimers.[3]

TYK2 is involved in certain pathways of the immune system[3,4]

TYK2 is a member of the JAK family but has not been shown to be involved in metabolic and/or hematopoietic pathways.[3,4,7,10-12]



Involved in immune pathways[1,4-7]

Predominantly involved in immune pathways + lipid metabolism and/or blood cell development[1,4-6,10]

TYK2 and TYK2-dependent cytokines play a key role in various immune-mediated diseases, such as psoriasis, Sjögren's disease, psoriatic arthritis, lupus and its cutaneous manifestations[2,7-8,12-14]

Note: Cytokines are proteins released by specific cells of the immune system and can have effects on other cells.[5] Dimer is an oligomer containing 2 monomers.[1]

EPO=erythropoietin; GH=growth hormone; GM-CSF=granulocyte-macrophage colony-stimulating factor; IFN=interferon; IL=interleukin; JAK=Janus kinase; STAT=signal tranducer and activator of transcription; TPO=thyroid peroxidase; TYK=tyrosine kinase.

Resources: **1.** Hammarén HM et al. *Cytokine.* 2019;118:48-63. **2.** Burke JR et al. *Sci Transl Med.* 2019;11:eaaw1736. **3.** Baker KF, Isaacs JD. *Ann Rheum Dis.* 2018;77:175-187. **4.** Winthrop KL. *Nat Rev Rheumatol.* 2017;13:234-243. **5.** Gotthardt D et al. *Front Immunol.* 2019;10:2590. **6.** Choy EH. *Rheumatology (Oxford)*. 2019;58:953-962. **7.** Dendrou CA et al. *Sci Transl Med.* 2016;8:363ra149. **8.** Braunstein I et al. *Br J Dermatol.* 2012;166:971-975. **9.** Richard AJ et al. *Trends Endocrinol Metab.* 2011;22:325-332. **10.** Diogo D et al. *PLoS One.* 2015;10:e0122271. **11.** Shimoda K et al. *Immunity.* 2000;13:561-571. **12.** Khatri B et al. *Nat Commun.* 2022;13(1):4287. **13.** Jin JO, Yu Q. *J Clin Cell Immunol.* 2013;166:971-975. S!(9):11742. **14.** Howell MD et al. *Front Immunol.* 2019;10:2342.

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