

## LIFR gene

LIF receptor subunit alpha

### Normal Function

The *LIFR* gene provides instructions for making the leukemia inhibitory factor receptor (LIFR) protein. This receptor spans the cell membrane, which allows it to attach (bind) to other proteins, called ligands, outside the cell and send signals inside the cell that help the cell respond to its environment. Ligands and receptors fit together like keys into locks.

LIFR acts as a receptor for a molecule known as leukemia inhibitory factor (LIF) as well as other ligands. LIFR signaling can control several cellular processes, including growth and division (proliferation), maturation (differentiation), and survival. First found to be important in blocking (inhibiting) growth of blood cancer (leukemia) cells, this signaling is also involved in the formation of bone and the development of nerve cells. It appears to play an important role in normal development and functioning of the autonomic nervous system, which controls involuntary body processes such as the regulation of breathing rate and body temperature.

### Health Conditions Related to Genetic Changes

#### Stüve-Wiedemann syndrome

At least 27 mutations in the *LIFR* gene have been found to cause Stüve-Wiedemann syndrome. This severe condition, characterized by abnormally curved (bowed) legs, breathing problems, and episodes of dangerously high body temperature (hyperthermia), is often life-threatening in infancy. Most *LIFR* gene mutations involved in Stüve-Wiedemann syndrome prevent the production of any LIFR protein. Other mutations lead to production of an altered protein that likely cannot function. Without functional LIFR, signaling is impaired. The lack of LIFR signaling disrupts normal bone growth, leading to low bone mineral density (osteopenia), bowed legs, and other skeletal problems common in Stüve-Wiedemann syndrome. In addition, development of nerve cells, particularly those involved in the autonomic nervous system, is abnormal, leading to the problems with breathing, feeding, and regulating body temperature characteristic of this condition.

## Other Names for This Gene

- CD118
- CD118 antigen
- leukemia inhibitory factor receptor alpha
- leukemia inhibitory factor receptor precursor
- LIF receptor
- LIF-R
- SJS2
- STWS
- SWS

## Additional Information & Resources

### Tests Listed in the Genetic Testing Registry

- Tests of LIFR ([https://www.ncbi.nlm.nih.gov/gtr/all/tests/?term=3977\[geneid\]](https://www.ncbi.nlm.nih.gov/gtr/all/tests/?term=3977[geneid]))

### Scientific Articles on PubMed

- PubMed (<https://pubmed.ncbi.nlm.nih.gov/?term=%28%28LIFR%5BTIAB%5D%29+OR+%28leukemia+inhibitory+factor+receptor+alpha%5BTIAB%5D%29%29+AND+%28%28Genes%5BMH%5D%29+OR+%28Genetic+Phenomena%5BMH%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+1800+days%22%5Bdp%5D%29>)

### Catalog of Genes and Diseases from OMIM

- LEUKEMIA INHIBITORY FACTOR RECEPTOR; LIFR (<https://omim.org/entry/151443>)

### Gene and Variant Databases

- NCBI Gene (<https://www.ncbi.nlm.nih.gov/gene/3977>)
- ClinVar ([https://www.ncbi.nlm.nih.gov/clinvar?term=LIFR\[gene\]](https://www.ncbi.nlm.nih.gov/clinvar?term=LIFR[gene]))

## References

- Dagoneau N, Scheffer D, Huber C, Al-Gazali LI, Di Rocco M, Godard A, Martinovic J, Raas-Rothschild A, Sigaudy S, Unger S, Nicole S, Fontaine B, Taupin JL, Moreau JF, Superti-Furga A, Le Merrer M, Bonaventure J, Munnich A, Legeai-Mallet L,

Cormier-Daire V. Null leukemia inhibitory factor receptor (LIFR) mutations in Stuve-Wiedemann/Schwartz-Jampel type 2 syndrome. *Am J Hum Genet.* 2004 Feb;74(2): 298-305. doi: 10.1086/381715. Epub 2004 Jan 21. Citation on PubMed (<https://pubmed.ncbi.nlm.nih.gov/14740318>) or Free article on PubMed Central (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1181927/>)

- Mikelonis D, Jorcyk CL, Tawara K, Oxford JT. Stuve-Wiedemann syndrome: LIFR and associated cytokines in clinical course and etiology. *Orphanet J Rare Dis.* 2014 Mar 12;9:34. doi: 10.1186/1750-1172-9-34. Citation on PubMed (<https://pubmed.ncbi.nlm.nih.gov/24618404>) or Free article on PubMed Central (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3995696/>)
- Tomida M. Structural and functional studies on the leukemia inhibitory factor receptor (LIF-R): gene and soluble form of LIF-R, and cytoplasmic domain of LIF-R required for differentiation and growth arrest of myeloid leukemic cells. *Leuk Lymphoma.* 2000 May;37(5-6):517-25. doi: 10.3109/10428190009058503. Citation on PubMed (<https://pubmed.ncbi.nlm.nih.gov/11042511>)
- Voisin MB, Bitard J, Daburon S, Moreau JF, Taupin JL. Separate functions for the two modules of the membrane-proximal cytokine binding domain of glycoprotein 190, the leukemia inhibitory factor low affinity receptor, in ligand binding and receptor activation. *J Biol Chem.* 2002 Apr 19;277(16):13682-92. doi:10.1074/jbc.M111624200. Epub 2002 Feb 7. Citation on PubMed (<https://pubmed.ncbi.nlm.nih.gov/11834739>)

## Genomic Location

The *LIFR* gene is found on chromosome 5 (<https://medlineplus.gov/genetics/chromosome/5/>).

**Last updated April 1, 2016**