

LEP Gene

Subjects: Genetics & Heredity

Contributor: Peter Tang

leptin

Keywords: genes

1. Normal Function

The *LEP* gene provides instructions for making a hormone called leptin, which is involved in the regulation of body weight. Normally, the body's fat cells release leptin in proportion to their size. As fat accumulates in cells, more leptin is produced. This rise in leptin indicates that fat stores are increasing.

Leptin attaches (binds) to and activates a protein called the leptin receptor, fitting into the receptor like a key into a lock. The leptin receptor protein is found on the surface of cells in many organs and tissues of the body including a part of the brain called the hypothalamus. The hypothalamus controls hunger and thirst as well as other functions such as sleep, moods, and body temperature. It also regulates the release of many hormones that have functions throughout the body. In the hypothalamus, the binding of leptin to its receptor triggers a series of chemical signals that affect hunger and help produce a feeling of fullness (satiety).

2. Health Conditions Related to Genetic Changes

2.1. Congenital leptin deficiency

At least seven *LEP* gene mutations that cause congenital leptin deficiency have been identified. This disorder is associated with excessive hunger, massive weight gain, and reduced production of hormones that direct sexual development (hypogonadotropic hypogonadism). The *LEP* gene mutations that cause congenital leptin deficiency lead to an absence of leptin. As a result, the signaling that triggers feelings of satiety does not occur, leading to the excessive hunger and weight gain associated with this disorder. Because hypogonadotropic hypogonadism occurs in congenital leptin deficiency, researchers suggest that leptin signaling is also involved in regulating the hormones that control sexual development. However, the specifics of this involvement and how it may be altered in congenital leptin deficiency are unknown.

3. Other Names for This Gene

- LEP_HUMAN
- LEPD
- leptin (murine obesity homolog)
- leptin (obesity homolog, mouse)
- OB
- obese protein
- obese, mouse, homolog of
- obesity factor
- OBS

References

1. Dubern B, Clement K. Leptin and leptin receptor-related monogenic obesity. *Biochimie*. 2012 Oct;94(10):2111-5. doi: 10.1016/j.biochi.2012.05.010. Epub 2012 May 22. Review. Citation on PubMed

2. Farooqi IS, Jebb SA, Langmack G, Lawrence E, Cheetham CH, Prentice AM, Hughes IA, McCamish MA, O'Rahilly S. Effects of recombinant leptin therapy in a child with congenital leptin deficiency. *N Engl J Med*. 1999 Sep 16;341(12):879-84. Citation on PubMed
3. Farooqi IS, Matarese G, Lord GM, Keogh JM, Lawrence E, Agwu C, Sanna V, Jebb SA, Perna F, Fontana S, Lechler RI, DePaoli AM, O'Rahilly S. Beneficial effects of leptin on obesity, T cell hyporesponsiveness, and neuroendocrine/metabolic dysfunction of human congenital leptin deficiency. *J Clin Invest*. 2002 Oct;110(8):1093-103. Citation on PubMed or Free article on PubMed Central
4. Fatima W, Shahid A, Imran M, Manzoor J, Hasnain S, Rana S, Mahmood S. Leptin deficiency and leptin gene mutations in obese children from Pakistan. *Int J Pediatr Obes*. 2011 Oct;6(5-6):419-27. doi: 10.3109/17477166.2011.608431. Epub 2011 Aug 19. Citation on PubMed
5. Gibson WT, Farooqi IS, Moreau M, DePaoli AM, Lawrence E, O'Rahilly S, Trussell RA. Congenital leptin deficiency due to homozygosity for the Delta133G mutation: report of another case and evaluation of response to four years of leptin therapy. *J Clin Endocrinol Metab*. 2004 Oct;89(10):4821-6. Citation on PubMed
6. Mazen I, El-Gammal M, Abdel-Hamid M, Amr K. A novel homozygous missense mutation of the leptin gene (N103K) in an obese Egyptian patient. *Mol Genet Metab*. 2009 Aug;97(4):305-8. doi: 10.1016/j.ymgme.2009.04.002. Epub 2009 Apr 9. Citation on PubMed
7. Montague CT, Farooqi IS, Whitehead JP, Soos MA, Rau H, Wareham NJ, Sewter CP, Digby JE, Mohammed SN, Hurst JA, Cheetham CH, Earley AR, Barnett AH, Prins JB, O'Rahilly S. Congenital leptin deficiency is associated with severe early-onset obesity in humans. *Nature*. 1997 Jun 26;387(6636):903-8. Citation on PubMed
8. O'Rahilly S. Leptin: defining its role in humans by the clinical study of genetic disorders. *Nutr Rev*. 2002 Oct;60(10 Pt 2):S30-4; discussion S68-84, 85-7. Review. Citation on PubMed
9. Ozata M, Ozdemir IC, Licinio J. Human leptin deficiency caused by a missense mutation: multiple endocrine defects, decreased sympathetic tone, and immune system dysfunction indicate new targets for leptin action, greater central than peripheral resistance to the effects of leptin, and spontaneous correction of leptin-mediated defects. *J Clin Endocrinol Metab*. 1999 Oct;84(10):3686-95. Erratum in: *J Clin Endocrinol Metab* 2000 Jan;85(1):416. Citation on PubMed
10. Saeed S, Butt TA, Anwer M, Arslan M, Froguel P. High prevalence of leptin and melanocortin-4 receptor gene mutations in children with severe obesity from Pakistani consanguineous families. *Mol Genet Metab*. 2012 May;106(1):121-6. doi:10.1016/j.ymgme.2012.03.001. Epub 2012 Mar 10. Erratum in: *Mol Genet Metab*. 2013 Aug;109(4):404. Citation on PubMed

Retrieved from <https://encyclopedia.pub/entry/history/show/14185>