

MC2R gene

melanocortin 2 receptor

Normal Function

The *MC2R* gene provides instructions for making a protein called adrenocorticotrophic hormone (ACTH) receptor. This protein is found primarily in the adrenal glands, which are hormone-producing glands located on top of each kidney.

The ACTH receptor is embedded in the membrane of cells where it attaches (binds) to ACTH. ACTH is a hormone that is released by the pituitary gland, located at the base of the brain. The binding of ACTH to its receptor triggers the adrenal glands to produce a group of hormones called glucocorticoids. These hormones, which include cortisol and corticosterone, aid in immune system function, play a role in maintaining normal blood sugar (glucose) levels, help trigger nerve cell signaling in the brain, and serve many other purposes in the body.

The ACTH receptor also likely plays a role in the development of the adrenal glands before birth.

Health Conditions Related to Genetic Changes

Familial glucocorticoid deficiency

More than 40 mutations in the *MC2R* gene have been found to cause familial glucocorticoid deficiency. This condition is characterized by potentially life-threatening low blood glucose (hypoglycemia), recurrent infections, and skin coloring darker than that of other family members (hyperpigmentation). *MC2R* gene mutations account for approximately 25 percent of cases of this condition. Most of these mutations change single protein building blocks (amino acids) in the ACTH receptor. As a result, the receptor cannot be transported to the cell membrane or bind to ACTH. Without the binding of the ACTH receptor to its hormone, there is no signal to trigger the adrenal glands to produce glucocorticoids. A shortage of these hormones impairs blood glucose regulation, immune system function, and other cellular functions, leading to the signs and symptoms of familial glucocorticoid deficiency.

Primary macronodular adrenal hyperplasia

MedlinePlus Genetics provides information about Primary macronodular adrenal

hyperplasia

Other Names for This Gene

- ACTH receptor
- ACTHR
- ACTHR_HUMAN
- adrenocorticotrophic hormone receptor
- adrenocorticotropin receptor
- corticotropin receptor
- MC2 receptor
- melanocortin 2 receptor (adrenocorticotrophic hormone)

Additional Information & Resources

Tests Listed in the Genetic Testing Registry

- Tests of MC2R ([https://www.ncbi.nlm.nih.gov/gtr/all/tests/?term=4158\[geneid\]](https://www.ncbi.nlm.nih.gov/gtr/all/tests/?term=4158[geneid]))

Scientific Articles on PubMed

- PubMed (<https://pubmed.ncbi.nlm.nih.gov/?term=%28%28MC2R%5BTIAB%5D%29+OR+%28melanocortin+2+receptor%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%29%29>)

Catalog of Genes and Diseases from OMIM

- MELANOCORTIN 2 RECEPTOR; MC2R (<https://omim.org/entry/607397>)

Gene and Variant Databases

- NCBI Gene (<https://www.ncbi.nlm.nih.gov/gene/4158>)
- ClinVar ([https://www.ncbi.nlm.nih.gov/clinvar?term=MC2R\[gene\]](https://www.ncbi.nlm.nih.gov/clinvar?term=MC2R[gene]))

References

- Clark AJ, Chan LF, Chung TT, Metherell LA. The genetics of familial glucocorticoid deficiency. Best Pract Res Clin Endocrinol Metab. 2009 Apr;23(2):159-65. doi: 10.1016/j.beem.2008.09.006. Citation on PubMed (<https://pubmed.ncbi.nlm.nih.gov/195>)

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- Liang L, Angleson JK, Does RM. Using the human melanocortin-2 receptor as a model for analyzing hormone/receptor interactions between a mammalian MC2receptor and ACTH(1-24). *Gen Comp Endocrinol*. 2013 Jan 15;181:203-10. doi: 10.1016/j.ygcen.2012.11.011. Epub 2012 Nov 29. Citation on PubMed (<https://pubmed.ncbi.nlm.nih.gov/23201148>)
- Meimaridou E, Hughes CR, Kowalczyk J, Chan LF, Clark AJ, Metherell LA. ACTH resistance: genes and mechanisms. *Endocr Dev*. 2013;24:57-66. doi:10.1159/000342504. Epub 2013 Feb 1. Citation on PubMed (<https://pubmed.ncbi.nlm.nih.gov/23392095>)
- Meimaridou E, Hughes CR, Kowalczyk J, Guasti L, Chapple JP, King PJ, Chan LF, Clark AJ, Metherell LA. Familial glucocorticoid deficiency: New genes and mechanisms. *Mol Cell Endocrinol*. 2013 May 22;371(1-2):195-200. doi:10.1016/j.mce.2012.12.010. Epub 2012 Dec 29. Citation on PubMed (<https://pubmed.ncbi.nlm.nih.gov/23279877>)

Genomic Location

The *MC2R* gene is found on chromosome 18 (<https://medlineplus.gov/genetics/chromosome/18/>).

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