

## MRAP gene

melanocortin 2 receptor accessory protein

### Normal Function

The *MRAP* gene provides instructions for making a protein called melanocortin-2 receptor accessory protein (MRAP). This protein transports another protein, called the melanocortin-2 receptor (or more commonly the adrenocorticotrophic hormone [ACTH] receptor), from the interior of the cell to the cell surface. Specifically, the MRAP protein transports the ACTH receptor from a cell structure called the endoplasmic reticulum (ER), which is involved in protein processing and transport, to the cell membrane so that the receptor can function. The MRAP protein is also needed to turn on (activate) the ACTH receptor.

At the cell membrane, the activated ACTH receptor attaches (binds) to ACTH, which triggers the production of 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.

### Health Conditions Related to Genetic Changes

#### Familial glucocorticoid deficiency

At least 13 mutations in the *MRAP* 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). *MRAP* gene mutations account for approximately 20 percent of cases of this condition. Most of these mutations lead to the production of a protein that cannot interact with the ACTH receptor and so is unable to transport it out of the ER to the cell membrane. As a result, the ACTH receptor is not at the cell surface where it is needed to 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.

## Other Names for This Gene

- B27
- C21orf61
- FALP
- fat cell-specific low molecular weight protein
- fat tissue-specific low MW protein
- GCCD2
- melanocortin-2 receptor accessory protein
- MRAP\_HUMAN

## Additional Information & Resources

### Tests Listed in the Genetic Testing Registry

- Tests of MRAP ([https://www.ncbi.nlm.nih.gov/gtr/all/tests/?term=56246\[geneid\]](https://www.ncbi.nlm.nih.gov/gtr/all/tests/?term=56246[geneid]))

### Scientific Articles on PubMed

- PubMed (<https://pubmed.ncbi.nlm.nih.gov/?term=%28%28MRAP%5BTIAB%5D%29+OR+%28melanocortin+2+receptor+accessory+protein%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 ACCESSORY PROTEIN; MRAP (<https://omim.org/entry/609196>)

### Gene and Variant Databases

- NCBI Gene (<https://www.ncbi.nlm.nih.gov/gene/56246>)
- ClinVar ([https://www.ncbi.nlm.nih.gov/clinvar?term=MRAP\[gene\]](https://www.ncbi.nlm.nih.gov/clinvar?term=MRAP[gene]))

## References

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## Genomic Location

The *MRAP* gene is found on chromosome 21 (<https://medlineplus.gov/genetics/chromosome/21/>).

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