TTR gene

transthyretin

Normal Function

The *TTR* gene provides instructions for making a protein called transthyretin. This protein transports vitamin A (retinol) and a hormone called thyroxine throughout the body. To transport thyroxine, four transthyretin proteins must attach (bind) to each other to form a four-protein unit (tetramer). To transport retinol, transthyretin must form a tetramer and bind to another protein called retinol-binding protein. Transthyretin is produced primarily in the liver, and a small amount of this protein is produced in an area of the brain called the choroid plexus and in the light-sensitive tissue that lines the back of the eye (the retina).

Health Conditions Related to Genetic Changes

Transthyretin amyloidosis

Variants (also called mutations) in the *TTR* gene cause transthyretin amyloidosis. Nearly all of these variants change one protein building block (amino acid) in the transthyretin protein. The most common variant found in people with transthyretin amyloidosis replaces the amino acid valine with the amino acid methionine at position 50 in the transthyretin protein (written as Val50Met or V50M). This variant is seen most commonly in the Portuguese and Swedish populations, although it is found in affected people worldwide. Another common variant replaces the amino acid valine with the amino acid isoleucine at position 142 in the transthyretin protein (written as Val142Ile or V142I). It is estimated that 3 percent to 3.9 percent of African Americans and 5 percent of some West African populations have this variant.

Most of the *TTR* gene variants that cause transthyretin amyloidosis alter the structure of transthyretin, impairing its ability to form tetramers. As a result, the tetramers break down into individual transthyretin proteins, which attach to each other to form strands called fibrils. The fibrils clump together and form amyloid deposits in certain tissues, leading to the signs and symptoms of transthyretin amyloidosis.

Carpal tunnel syndrome

MedlinePlus Genetics provides information about Carpal tunnel syndrome

Other disorders

In some older adults, deposits of normal transthyretin proteins cause a condition called senile systemic amyloidosis. People with this condition do not have a variant in the *TTR* gene; for reasons that are unclear, the transthyretin protein begins to form protein deposits. The most common place for amyloidosis in people with this condition is in the heart; this causes progressive heart failure. Other sites of amyloidosis may include the lungs, blood vessels, and kidneys. It is estimated that 10 percent to 25 percent of people older than 80 have senile systemic amyloidosis.

Other Names for This Gene

- ATTR
- PALB
- prealbumin, amyloidosis type I
- TBPA
- TTHY_HUMAN

Additional Information & Resources

Tests Listed in the Genetic Testing Registry

- Tests of TTR (https://www.ncbi.nlm.nih.gov/gtr/all/tests/?term=7276[geneid])

Scientific Articles on PubMed

- PubMed (https://pubmed.ncbi.nlm.nih.gov/?term=%28%28TTR%5BTI%5D%29+OR+%28transthyretin%5BTI%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+720+days%22%5Bdp%5D)

Catalog of Genes and Diseases from OMIM

- TRANSTHYRETIN; TTR (https://omim.org/entry/176300)

Gene and Variant Databases

- NCBI Gene (https://www.ncbi.nlm.nih.gov/gene/7276)
- ClinVar (https://www.ncbi.nlm.nih.gov/clinvar?term=TTR[gene])

References

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Genomic Location

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

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