AGT gene

angiotensinogen

Normal Function

The *AGT* gene provides instructions for making a protein called angiotensinogen. This protein is part of the renin-angiotensin system, which regulates blood pressure and the balance of fluids and salts in the body. In the first step of this process, angiotensinogen is converted to angiotensin I. Through an additional step, angiotensin I is converted to angiotensin II. Angiotensin II causes blood vessels to narrow (constrict), which results in increased blood pressure. This molecule also stimulates production of the hormone aldosterone, which triggers the absorption of salt and water by the kidneys. The increased amount of fluid in the body also increases blood pressure. Proper blood pressure during fetal growth, which delivers oxygen to the developing tissues, is required for normal development of the kidneys, particularly of structures called the proximal tubules, and other tissues. In addition, angiotensin II may play a more direct role in kidney development, perhaps by affecting growth factors involved in the development of kidney structures.

Health Conditions Related to Genetic Changes

Renal tubular dysgenesis

At least six mutations in the *AGT* gene have been found to cause a severe kidney disorder called renal tubular dysgenesis. This condition is characterized by abnormal kidney development before birth, the inability to produce urine (anuria), and severe low blood pressure (hypotension). These problems result in a reduction of amniotic fluid (oligohydramnios), which leads to a set of birth defects known as the Potter sequence.

Renal tubular dysgenesis can be caused by mutations in both copies of any of the genes involved in the renin-angiotensin system. Most of the mutations in the *AGT* gene that cause this disorder change single protein building blocks (amino acids) in the angiotensinogen protein. These changes occur in a region of the protein that is necessary for its conversion to angiotensin I. It is thought that the altered angiotensinogen cannot be converted, leading to a nonfunctional renin-angiotensin system. Without this system, the kidneys cannot control blood pressure. Because of low blood pressure, the flow of blood is reduced (hypoperfusion), and the body does not get enough oxygen during fetal development. As a result, kidney development is impaired, leading to the features of renal tubular dysgenesis.

Hypertension

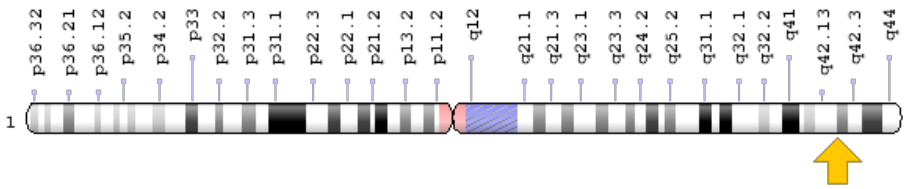
Other disorders

Variations in the *AGT* gene are associated with susceptibility to a form of high blood pressure (hypertension) called essential hypertension. Essential hypertension is a complex disorder associated with many genetic and environmental factors. The *AGT* gene variations associated with this condition affect single DNA building blocks (nucleotides) and likely lead to higher levels of the angiotensinogen protein.

Chromosomal Location

Cytogenetic Location: 1q42.2, which is the long (q) arm of chromosome 1 at position 42.2

Molecular Location: base pairs 230,702,523 to 230,714,122 on chromosome 1 (Homo sapiens Updated Annotation Release 109.20190905, GRCh38.p13) (NCBI)



Credit: Genome Decoration Page/NCBI

Other Names for This Gene

- angiotensinogen (serpin peptidase inhibitor, clade A, member 8)
- angiotensinogen preproprotein
- ANGT_HUMAN
- ANHU
- pre-angiotensinogen
- serpin A8
- SERPINA8

Additional Information & Resources

Educational Resources

- Merck Manual Consumer Version: The Body's Control of Blood Pressure https://www.merckmanuals.com/home/heart-and-blood-vessel-disorders/high-blood-pressure/high-blood-pressure

Scientific Articles on PubMed

- PubMed
  https://www.ncbi.nlm.nih.gov/pubmed?term=%28AGT%5BTI%5D%29+AND+%28%28Genes%5BMH%5D%29+OR+%28Genetic+Phenomena%5BMH%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+1440+days%22%5Bdp%5D

Catalog of Genes and Diseases from OMIM

- ANGIOTENSINOGEN
  http://omim.org/entry/106150
- HYPERTENSION, ESSENTIAL
  http://omim.org/entry/145500

Research Resources

- Atlas of Genetics and Cytogenetics in Oncology and Haematology
  http://atlasgeneticsoncology.org/Genes/GC_AGT.html
- ClinVar
  https://www.ncbi.nlm.nih.gov/clinvar?term=AGT%5Bgene%5D
- HGNC Gene Symbol Report
  https://www.genenames.org/data/gene-symbol-report/#!/hgnc_id/HGNC:333
- Monarch Initiative
  https://monarchinitiative.org/gene/NCBIGene:183
- NCBI Gene
  https://www.ncbi.nlm.nih.gov/gene/183
- UniProt
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