COL4A3 Gene

Subjects: Genetics & Heredity
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collagen type IV alpha 3 chain

genes

1. Normal Function

The *COL4A3* gene provides instructions for making one component of type IV collagen, which is a flexible protein. Specifically, this gene makes the alpha3(IV) chain of type IV collagen. This chain combines with two other types of alpha (IV) chains (the alpha4 and alpha5 chains) to make a complete type IV collagen molecule. Type IV collagen molecules attach to each other to form complex protein networks. These networks make up a large portion of basement membranes, which are thin sheet-like structures that separate and support cells in many tissues. Type IV collagen alpha3-4-5 networks play an especially important role in the basement membranes of the kidney, inner ear, and eye.

2. Health Conditions Related to Genetic Changes

2.1. Alport Syndrome

More than 40 mutations in the *COL4A3* gene have been found to cause Alport syndrome. Most of these mutations change single protein building blocks (amino acids) in a region where the alpha3(IV) collagen chain combines with other type IV collagen chains. Other mutations in the *COL4A3* gene severely decrease or prevent the production of alpha3(IV) chains. As a result, there is a serious deficiency of the type IV collagen alpha3-4-5 network in the basement membranes of the kidney, inner ear, and eye. In the kidney, other types of collagen accumulate in the basement membranes, eventually leading to scarring of the kidneys and kidney failure. Mutations in this gene can also lead to abnormal function in the inner ear, resulting in hearing loss.

2.2. Keratoconus

Keratoconus

2.3. Other disorders

Mutations in the *COL4A3* gene have been found to cause thin basement membrane nephropathy. This condition typically causes people to have blood in their urine (hematuria) but no other signs or symptoms of kidney disease.

In the past, this condition was often called benign familial hematuria. Thin basement membrane nephropathy rarely progresses to kidney failure.

Goodpasture syndrome is a severe disease of the lungs and the kidneys caused by antibodies to the alpha3(IV) collagen chains. Antibodies are immune system proteins that normally attack foreign substances such as bacteria or viruses, but in Goodpasture syndrome, they target alpha3(IV) collagen chains. It remains unclear why some people make antibodies to their own collagen chains. The antibodies cause inflammation when they attach (bind) to the basement membranes of blood vessels in the air sacs (alveoli) of the lungs and filtering units (glomeruli) of the kidneys. As a result, people with Goodpasture syndrome can develop kidney failure and bleeding in the lungs, which causes them to cough up blood. In some people, antibodies attack only the kidneys. These people are said to have anti-glomerular basement membrane nephritis.

3. Other Names for This Gene

- CO4A3_HUMAN
- collagen IV, alpha-3 polypeptide
- collagen type IV alpha 3
- collagen, type IV, alpha 3 (Goodpasture antigen)
- Goodpasture antigen
- TUMSTATIN

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