DKC1 Gene

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Dyskerin Pseudouridine Synthase 1: The DKC1 gene provides instructions for making a protein called dyskerin.

Keywords: genes

1. Normal Function

This protein is involved in maintaining structures called telomeres, which are found at the ends of chromosomes. Telomeres help protect chromosomes from abnormally sticking together or breaking down (degrading).

In most cells, telomeres become progressively shorter as the cell divides. After a certain number of cell divisions, the telomeres become so short that they trigger the cell to stop dividing or to self-destruct (undergo apoptosis).

Telomeres are maintained by two important protein complexes, telomerase and shelterin. Telomerase counteracts the shortening of telomeres by adding small repeated segments of DNA to the ends of chromosomes each time the cell divides. One component of telomerase, called hTR, provides a template for creating the repeated sequence of DNA that telomerase adds to the ends of chromosomes. The dyskerin protein attaches (binds) to hTR and helps stabilize the telomerase complex.

In most types of cells, telomerase is either undetectable or active at very low levels. However, telomerase is highly active in cells that divide rapidly, such as cells that line the lungs and gastrointestinal tract, cells in bone marrow, and cells of the developing fetus. Telomerase allows these cells to divide many times without becoming damaged or undergoing apoptosis. Telomerase is also abnormally active in most cancer cells, which grow and divide without control or order.

Dyskerin is also involved in the production of ribosomal RNA (rRNA), a chemical cousin of DNA. Ribosomal RNA is required for assembling protein building blocks (amino acids) into functioning proteins.

2. Health Conditions Related to Genetic Changes

2.1 Dyskeratosis Congenita

More than 40 mutations in the *DKC1* gene have been identified in people with dyskeratosis congenita. This disorder is characterized by changes in skin coloring (pigmentation), white patches inside the mouth (oral leukoplakia), and abnormally formed fingernails and toenails (nail dystrophy). People with dyskeratosis congenita have an increased risk of developing several life-threatening conditions, including cancer and a progressive lung disease called pulmonary fibrosis. Many affected individuals also develop a serious condition called aplastic anemia, also known as bone marrow failure, which occurs when the bone marrow does not produce enough new blood cells.

Most of the *DKC1* gene mutations that cause dyskeratosis congenita change single amino acids in the dyskerin protein. Researchers believe that these changes probably interfere with the dyskerin protein's ability to bind to hTR, resulting in dysfunction of the telomerase complex.

Impaired telomerase function prevents the normal maintenance of telomeres and leads to reduced telomere length. Cells that divide rapidly are especially vulnerable to the effects of shortened telomeres. As a result, people with dyskeratosis congenita may experience a variety of problems affecting quickly dividing cells in the body, such as cells of the nail beds, hair follicles, skin, lining of the mouth (oral mucosa), and bone marrow.

Breakage and instability of chromosomes resulting from inadequate telomere maintenance may lead to genetic changes that allow cells to divide in an uncontrolled way, resulting in the development of cancer in some people with dyskeratosis congenita.

2.2 Idiopathic pulmonary fibrosis

3. Other Names for This Gene

- CBF5
- CBF5 homolog
- cbf5p homolog
- DKC
- DKC1_HUMAN
- dyskeratosis congenita 1, dyskerin
- dyskerin
- FLJ97620
- H/ACA ribonucleoprotein complex subunit 4
- H/ACA ribonucleoprotein complex subunit 4 isoform 1
- H/ACA ribonucleoprotein complex subunit 4 isoform 2
- NAP57
- NOLA4
- nopp140-associated protein of 57 kDa
- nucleolar protein family A member 4
- nucleolar protein NAP57
- snoRNP protein DKC1
- XAP101

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