MKKS Gene

Subjects: Genetics
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Definition

McKusick-Kaufman syndrome is a condition that affects the development of the hands and feet, heart, and reproductive system. It is characterized by a combination of three features: extra fingers and/or toes (polydactyly), heart defects, and genital abnormalities.

1. Introduction

Most females with McKusick-Kaufman syndrome are born with a genital abnormality called hydrometrocolpos, which is a large accumulation of fluid in the pelvis. Hydrometrocolpos results from a blockage of the vagina before birth, which can occur if part of the vagina fails to develop (vaginal agenesis) or if a membrane blocks the opening of the vagina. This blockage allows fluid to build up in the vagina and uterus, stretching these organs and leading to a fluid-filled mass. Genital abnormalities in males with McKusick-Kaufman syndrome can include placement of the urethral opening on the underside of the penis (hypospadias), a downward-curving penis (chordee), and undescended testes (cryptorchidism).

The signs and symptoms of McKusick-Kaufman syndrome overlap significantly with those of another genetic disorder, Bardet-Biedl syndrome. Bardet-Biedl syndrome has several features that are not seen in McKusick-Kaufman syndrome, however. These include vision loss, delayed development, obesity, and kidney (renal) failure. Because some of these features are not apparent at birth, the two conditions can be difficult to tell apart in infancy and early childhood.

2. Normal Function

The *MKKS* gene provides instructions for making a protein that plays an important role in the formation of the limbs, heart, and reproductive system. The structure of this protein suggests that it may act as a chaperonin, which is a protein that helps fold other proteins. Proteins must be folded into the correct 3-dimensional shape to perform their usual functions in the body. Abnormally folded proteins can also interfere with the functions of normal proteins.

Although the structure of the MKKS protein is similar to that of a chaperonin, some studies have suggested that protein folding may not be this protein's primary function. Within cells, the MKKS protein is associated with structures called centrosomes. Centrosomes play a role in cell division and the assembly of microtubules, which are proteins that transport materials in cells and help the cell maintain its shape. Researchers speculate that the MKKS protein may be involved in transporting other proteins within the cell.

3. Health Conditions Related to Genetic Changes

3.1. McKusick-Kaufman Syndrome

Two mutations in the *MKKS* gene have been identified in people with McKusick-Kaufman syndrome in the Old Order Amish population. Each of these mutations changes a single protein building block (amino acid) in the MKKS protein. One mutation replaces the amino acid histidine with the amino acid tyrosine at protein position 84 (written as His84Tyr or H84Y). The other mutation replaces the amino acid alanine with the amino acid serine at protein position 242 (written as Ala242Ser or A242S). Affected Amish people have these two mutations in both copies of the *MKKS* gene.

The mutations that underlie McKusick-Kaufman syndrome alter the structure of the MKKS protein. Although the altered protein disrupts the development of several parts of the body before birth, it is unclear how *MKKS* mutations lead to the specific features of this disorder.

The signs and symptoms of McKusick-Kaufman syndrome overlap significantly with those of another condition called Bardet-Biedl syndrome, which can make the two conditions difficult to tell apart in infancy and early childhood. Although both syndromes can be caused by changes in the *MKKS* gene, it remains unclear why some mutations cause McKusick-Kaufman syndrome and others cause Bardet-Biedl syndrome.

3.2. Bardet-Biedl Syndrome

MedlinePlus Genetics provides information about Bardet-Biedl syndrome

4. Other Names for This Gene

- Bardet-Biedl syndrome 6 protein
- BBS6
- HMCS
- KMS
- MKKS_HUMAN
- MKS

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Keywords

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