3MC Syndrome

Subjects: Genetics & Heredity
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3MC syndrome is a disorder characterized by unusual facial features and problems affecting other tissues and organs.

Keywords: genetic conditions

1. Introduction

The distinctive facial features of people with 3MC syndrome include widely spaced eyes (hypertelorism), a narrowing of the eye opening (blepharophimosis), droopy eyelids (ptosis), highly arched eyebrows, and an opening in the upper lip (cleft lip) with an opening in the roof of the mouth (cleft palate).

Other common features of 3MC syndrome include developmental delay, intellectual disability, hearing loss, and slow growth after birth resulting in short stature. Less often, individuals with 3MC syndrome can have abnormal fusion of certain bones in the skull (craniosynostosis) or forearm (radioulnar synostosis); an outgrowth of the tailbone (caudal appendage); a soft out-pouching around the belly-button (an umbilical hernia); and abnormalities of the kidneys, bladder, or genitals.

3MC syndrome encompasses four disorders that were formerly considered to be separate: Mingarelli, Malpeuch, Michels, and Carnevale syndromes. Researchers now generally consider these disorders to be part of the same condition, which is called 3MC based on the initials of the older condition names.

2. Frequency

3MC syndrome is a rare disorder; its prevalence is unknown.

3. Causes

3MC syndrome is caused by mutations in the *COLEC10*, *COLEC11*, or *MASP1* gene. These genes provide instructions for making proteins that are involved in a series of steps called the lectin complement pathway. This pathway is thought to help direct the movement (migration) of cells during development before birth to form the organs and systems of the body. The lectin complement pathway appears to be particularly important in directing the migration of neural crest cells. These cells give rise to various tissues including many tissues in the face and skull, the glands that produce hormones (endocrine glands), and portions of the nervous system. After birth, the lectin complement pathway is involved in the immune system.

The *COLEC10*, *COLEC11*, and *MASP1* gene mutations that cause 3MC syndrome impair or eliminate the function of the corresponding proteins, resulting in faulty control of cell migration in early development. Impaired cell migration disrupts the normal growth and development of several tissues and organs, which leads to the various abnormalities that occur in this disorder. Researchers suggest that similar pathways in the immune system can compensate for problems in the lectin complement pathway, which explains why immune system abnormalities are not part of 3MC syndrome.

3.1. The genes associated with 3MC syndrome

- COLEC10
- COLEC11
- MASP1

4. Inheritance

This condition is inherited in an autosomal recessive pattern, which means both copies of the gene in each cell have mutations. The parents of an individual with an autosomal recessive condition each carry one copy of the mutated gene, but they typically do not show signs and symptoms of the condition.

5. Other Names for This Condition

- Carnevale syndrome
- Carnevale-Krajewska-Fischetto syndrome
- craniofacial-ulnar-renal syndrome
- craniosynostosis with lid anomalies
- Malpuech facial clefting syndrome
- Malpuech syndrome
- Michels syndrome
- Mingarelli syndrome
- oculo-skeletal-abdominal syndrome
- oculopalatoskeletal syndrome
- OSA syndrome
- ptosis of eyelids with diastasis recti and hip dysplasia
- ptosis-strabismus-rectus abdominis diastasis

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