# TPM3 Gene

Subjects: Genetics & Heredity
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Tropomyosin 3: The TPM3 gene provides instructions for making a protein called slow muscle alpha (α)-tropomyosin, which is part of the tropomyosin protein family.

genes

## 1. Normal Function

The *TPM3* gene provides instructions for making a protein called slow muscle alpha (α)-tropomyosin, which is part of the tropomyosin protein family. Tropomyosin proteins regulate the tensing of muscle fibers (muscle contraction) by controlling the binding of two muscle proteins, myosin and actin. In non-muscle cells, tropomyosin proteins play a role in controlling cell shape.

Slow muscle α-tropomyosin is found in skeletal muscles, which are the muscles used for movement. Skeletal muscle is made up of two types of muscle fibers: type I (slow twitch fibers) and type II (fast twitch fibers). Slow muscle α-tropomyosin is found only in type I fibers. Type I fibers are the primary component of skeletal muscles that are resistant to fatigue. For example, muscles involved in posture, such as the neck muscles that hold the head steady, are made predominantly of type I fibers. Slow muscle α-tropomyosin helps regulate muscle contraction in type I skeletal muscle fibers.

## 2. Health Conditions Related to Genetic Changes

### 2.1. Cap myopathy

At least two *TPM3* gene mutations have been identified in people with cap myopathy. These mutations replace the protein building block (amino acid) arginine with the amino acids cysteine or histidine at position 168 of the protein sequence, written as Arg168Cys or Arg168His (also written as R168C or R168H). The specific effects of these *TPM3* gene mutations are unclear, but researchers suggest they may interfere with normal actin-myosin binding, impairing muscle contraction and resulting in the muscle weakness that occurs in cap myopathy.

### 2.2. Congenital fiber-type disproportion

At least 10 mutations in the *TPM3* gene have been found to cause congenital fiber-type disproportion, a disorder that causes general muscle weakness that typically does not worsen over time. *TPM3* gene mutations appear to be the most common cause of this disorder. These mutations change single amino acids in slow muscle α-

tropomyosin and are thought to impair the protein's ability to interact with myosin and actin within type I skeletal muscle fibers, disrupting muscle contraction. Inefficient muscle contraction leads to muscle weakness in people with congenital fiber-type disproportion.

### 2.3. Other disorders

Mutations in the *TPM3* gene are also associated with a condition called nemaline myopathy. People with nemaline myopathy typically have muscle weakness throughout their body, including the muscles of the face, neck, and limbs. When nemaline myopathy is caused by mutations in the *TPM3* gene, affected individuals typically have muscle weakness at birth or beginning in early childhood. *TPM3* gene mutations account for a small percentage of all cases of nemaline myopathy.

#### Nemaline myopathy

## 3. Other Names for This Gene

- cytoskeletal tropomyosin TM30
- FLJ41118
- heat-stable cytoskeletal protein 30 kDa
- hscp30
- TM-5
- TM3
- TPM3_HUMAN
- TRK
- tropomyosin alpha-3 chain
- tropomyosin gamma

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