Duchenne muscular dystrophy patient information

It is important that you discuss the benefits and limitations of genetic testing with your physician, a medical geneticist or a genetic counsellor before you have genetic testing.

Why is my physician recommending genetic testing?

Your physician (or other healthcare provider) may be ordering genetic testing, as some of the symptoms of your child may be suggestive of Duchenne muscular dystrophy (DMD). Duchenne muscular dystrophy is genetic condition that is characterized progressive muscular degeneration and weakness. Onset of this condition is in early childhood and is usually first identified as delayed motor milestones such as walking independently, a waddling gait or difficulty climbing the stairs. Weakness of the proximal muscles (muscles of the hips, pelvic area, thighs and shoulders) is generally first observed and weakness of the proximal muscles is generally greater than the distal muscles. Genetic testing can provide an accurate diagnosis and confirm clinical findings. An accurate diagnosis can help determine prognosis, recurrence risks and identification of suitable treatments or clinical trials

Since DMD is a genetic condition, it is important to understand how the genetic changes can result in this condition.

What is DNA?

DNA is the basic unit of genetics. It is the genetic material that we inherit from our parents and pass to our children. DNA is comprised of four separate molecules (chemicals) that are called bases. Each base is assigned a different letter. These letters are A (adenine), T (thymine), G (guanine), and C (cytosine). These four bases are joined together in very long strings of DNA within our cells. These long strings of DNA are called DNA sequences (also called the DNA code or the genetic code). DNA is what genes are composed of.

What is a gene?

A gene is a specific pattern of DNA bases; this pattern is called a DNA sequence. We have approximately 20,000 genes and each gene has a specific function within our body. Each gene creates a different protein, which are the building blocks for our body. Our genes determine how our bodies develop and function from hair and eye colour to how our brain cells communicate and how we develop during pregnancy. Our genes are located within structures called chromosomes.

What is a chromosome?

Chromosomes are structures that contain all of the DNA in our cells. We have 23 pairs of chromosomes. One copy of each pair is inherited from our mother while the other copy is inherited from our father. As we have two copies of each chromosome, we therefore have two copies of every gene. Each pair of chromosome are unique. Chromosome 1 is the largest and the remaining chromosomes are named by descending size, chromosome 22 is the smallest. Chromosome pair 23 are called the sex chromosomes. In general, sex chromosomes determine the gender of the individual. A pair of XX typically result in a female while a pair of XY chromosome typically result in a male. All of the chromosomes are found in the nucleus of the cell.

What is the cause of DMD?

DMD is caused by changes (variants) in the gene called *DMD*. The *DMD* gene is found on the X chromosome. The X chromosome is one of the sex chromosomes, the other sex chromosome is the Y chromosome. A female is typically XX and a male is typically XY. Since males only have one X chromosome, they have only one copy of the *DMD* gene. Females have two X chromosomes, and therefore have two copies of the *DMD* gene. Females who are carriers for a DMD are generally unaffected as they have a second copy of the gene. However, it is possible for females to be affected. Generally affected females have a milder form of the condition called “Becker muscular dystrophy”.

Why pursue testing?

Your physician or genetics specialist may recommend genetic testing for DMD testing if your child’s clinical presentation is suggestive for this condition. Accurately identifying the cause of your child’s symptoms and finding a diagnosis can help determine the best course of treatment and what to expect in the future. An accurate diagnosis can help determine the risk of recurrence for future pregnancies.

There are a number of approved and investigational therapies available depending on the specific genetic changethat is identified in the DMD gene. These options can be discussed further with your healthcare team.

How is testing performed?

DMD testing requires a blood sample. DNA is extracted from the sample and is then analysed for pathogenic variants (changes) within the DMD gene.

How long before the results are ready?

The results of this analysis are generally ready in 2 - 3 weeks. Depending on what you have agreed with you healthcare provider, results may be delivered over the phone or in person.

Possible results –

Positive – Genetic changes are identified which confirms the diagnosis for DMD

Negative – No variants were identified which could explain the confirm a diagnosis of DMD. *A negative result does not always rule out the genetic basis for DMD.*

Uncertain – A variant is classified as uncertain when there is insufficient evidence to determine if the variant is either disease causing (pathogenic) or has no effect (benign). *As more research is conducted, it is possible that uncertain variants may be reclassified in the future.*

Unexpected results – In rare situations, it is possible that a genetic diagnosis, not directly related to your child's condition is identified. These findings could have implications for the healthcare of your child.

It is important to follow up with your physician, a medical geneticist or a genetic counsellor to discuss the results of your genetic testing.