

Genetic Testing to Detect Familial Dilated Cardiomyopathy

What is Dilated Cardiomyopathy?

Dilated Cardiomyopathy is an inherited heart disease that often leads to heart failure.

DCM is a cardiac disease affecting at least 1 person in 2500 and is inherited in 30-60% of those affected. DCM causes progressive heart failure leading to death within five years of diagnosis in up to 50% of patients. Advanced DCM is one of the most common indications for heart transplantation, and DCM can also cause stroke and sudden cardiac death. DCM symptoms typically first appear in patients 30-50 years old. After diagnosis, progression of symptoms is unpredictable and can be rapid.¹

What causes Familial Dilated Cardiomyopathy?

Familial Dilated Cardiomyopathy is caused by a gene defect.

DCM can be caused by such conditions as congenital heart disease or hypertension, or it can be familial. Patients with familial DCM have an inherited defect in the heart muscle. This defect causes the left ventricle – the chamber of the heart that pumps blood to the rest of the body – to become enlarged, or “dilated.” The muscle tissue surrounding a dilated left ventricle is thinner and weaker than the muscle tissue of a normal heart. As a result, each time a DCM heart beats, it pumps less blood than a normal heart would. This reduced ability to pump blood throughout the body causes the symptoms associated with DCM.²

How is Dilated Cardiomyopathy diagnosed?

Dilated Cardiomyopathy is usually diagnosed by an echocardiogram.

DCM symptoms most commonly first occur in adults 30-50 years old, but symptoms may appear at any age. At first, people with DCM may experience typical symptoms of heart trouble such as chest pain, fainting, shortness of breath during or after exercise, excessive tiredness, sensation of irregular and/or unusually forceful heart beats (called palpitations), or swelling in the lower legs and feet. Many patients have disturbances in the heart’s rhythm that can be detected with a test called an electrocardiogram (EKG). DCM is best diagnosed with an echocardiogram – a test that allows the doctor to observe the dilation of the left ventricle and the heart’s reduced ability to pump.³

What are the treatment options for Dilated Cardiomyopathy?

Dilated Cardiomyopathy is treated by lifestyle changes, medications, sometimes surgery, and, in extreme cases, heart transplantation.

Treatment for DCM depends on the nature and severity of the patient’s symptoms. Lifestyle changes including salt and fluid restriction, weight control, moderation of alcohol consumption, and moderate, controlled aerobic exercise can delay onset and progression of heart failure. Several classes of drugs, including beta blockers and ACE inhibitors, can also delay progression of heart failure and have been shown to reduce mortality and improve the quality of life for DCM patients. End-stage heart failure is treated by heart transplantation. Patients who experience arrhythmias (abnormalities in the heart’s rhythm) may be at risk of stroke and can be treated with medications that help to control the heart’s rhythm and medications that prevent the formation of blood clots that can cause strokes. Patients at high risk of sudden death can be treated by implantation of a cardioverter-defibrillator (ICD). An ICD will recognize abnormalities in the heart’s rhythm that lead to cardiac arrest and discharge an electrical pulse to restore the normal rhythm.^{1,2}



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Why is it important to determine if a person is likely to develop Dilated Cardiomyopathy?

Early diagnosis and treatment of Dilated Cardiomyopathy can help to delay the onset of heart failure.

DCM is a progressive disease. Young individuals affected by DCM often appear to be unaffected – with hearts that look normal and function properly. As these individuals get older, the left ventricle begins to enlarge, and the heart’s ability to pump is gradually reduced. However, obvious symptoms usually do not occur until the fourth or fifth decade of life, when the heart failure is already quite advanced. Diagnosis at an earlier, presymptomatic stage can allow early treatment, which may delay the disease progression. In the case of familial DCM, such early diagnosis can be achieved by screening at-risk family members of a patient with confirmed familial DCM. Screening involves extensive heart examinations at regular intervals, which can detect DCM before the patient experiences obvious symptoms. However, cardiac screening cannot detect a predisposition to DCM – in other words, while cardiac screening can detect early stages of ventricular enlargement, it cannot determine if an individual is likely to experience ventricular enlargement at some point in the future. Therefore, cardiac screening can never show that a family member of a patient with DCM is not at an increased risk of the disease.⁴

How can genetic testing help families with Dilated Cardiomyopathy?

Genetic testing can help to identify family members who are likely to develop Dilated Cardiomyopathy and should have regular heart exams, so that treatment can be started early. Genetic testing can also help to identify family members who are unlikely to develop Dilated Cardiomyopathy and do not need regular heart exams.

Familial DCM has been linked to defects (called mutations) in any one of several genes, including TNNT2, TNNI3, TPM1, MYBPC3, MYH7, ACTC, and LMNA. Detection of a disease-causing mutation in any of these genes therefore allows diagnosis of DCM. Such a diagnostic test is referred to as a “genetic test.” Importantly, genetic testing cannot only confirm a clinical diagnosis, but can also detect a predisposition for DCM in individuals who don’t yet have symptoms. In addition, genetic testing can show that DCM is familial, even if the patient doesn’t have or is not aware of a family history of the condition. Once the specific mutation causing DCM in one family is known (the “familial mutation”), genetic testing can easily identify both presymptomatic or affected family members (who have the familial mutation) and unaffected family members (who do not have the familial mutation). Unaffected family members no longer have to worry as much about developing the disease or passing it on to their children and do not need to undergo the rigorous and costly heart exams recommended for DCM patients. Presymptomatic or affected family members, on the other hand, know that they have to remain vigilant for symptoms of the disease.⁵

References:

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