Arrhythmogenic Right Ventricular Cardiomyopathy

Subjects: Genetics & Heredity
Contributor: Catherine Yang

Arrhythmogenic right ventricular cardiomyopathy (ARVC) is a form of heart disease that usually appears in adulthood. ARVC is a disorder of the myocardium, which is the muscular wall of the heart. This condition causes part of the myocardium to break down over time, increasing the risk of an abnormal heartbeat (arrhythmia) and sudden death.

Keywords: genetic conditions

1. Introduction

ARVC may not cause any symptoms in its early stages. However, affected individuals may still be at risk of sudden death, especially during strenuous exercise. When symptoms occur, they most commonly include a sensation of fluttering or pounding in the chest (palpitations), light-headedness, and fainting (syncope). Over time, ARVC can also cause shortness of breath and abnormal swelling in the legs or abdomen. If the myocardium becomes severely damaged in the later stages of the disease, it can lead to heart failure.

2. Frequency

ARVC occurs in an estimated 1 in 1,000 to 1 in 1,250 people. This disorder may be underdiagnosed because it can be difficult to detect in people with mild or no symptoms.

3. Causes

ARVC can result from mutations in at least 13 genes. Many of these genes are known as desmosomal genes because they provide instructions for making components of cell structures called desmosomes. Desmosomes attach heart muscle cells to one another, providing strength to the myocardium and playing a role in signaling between neighboring cells.

Mutations in desmosomal genes impair the function of desmosomes. Without normal desmosomes, cells of the myocardium detach from one another and die, particularly when the heart muscle is placed under stress (such as during vigorous exercise). These changes primarily affect the myocardium surrounding the right ventricle, one of the two lower chambers of the heart. The damaged myocardium is gradually replaced by fat and scar tissue. As this abnormal tissue builds up, the walls of the right ventricle become stretched out, preventing the heart from pumping blood effectively. These changes also disrupt the electrical signals that control the heartbeat, which can lead to arrhythmia.

Less commonly, mutations in non-desmosomal genes can cause ARVC. These genes have a variety of functions, including cell signaling, providing structure and stability to heart muscle cells, and helping to maintain a normal heart rhythm. Researchers are working to determine how mutations in non-desmosomal genes can lead to ARVC.

Gene mutations have been found in about 60 percent of people with ARVC. Mutations in a desmosomal gene called *PKP2* appear to be most common. In people without an identified mutation, the cause of the disorder is unknown. Researchers are looking for additional genetic factors that play a role in causing ARVC.

3.1. The genes associated with Arrhythmogenic right ventricular cardiomyopathy

- DES
- DSC2
- DSP
- JUP
- LMNA
- PKP2
- RYR2

- TGFB3
- TTN

3.2. Additional Information from NCBI Gene:

- CTNNA3
- DSG2
- PLN
- TMEM43

4. Inheritance

Up to half of all cases of ARVC appear to run in families. Most familial cases of the disease have an autosomal dominant pattern of inheritance, which means one copy of an altered gene in each cell is sufficient to cause the disorder.

Rarely, ARVC has an autosomal recessive pattern of inheritance, which means both copies of a 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

- arrhythmogenic right ventricular cardiomyopathy-dysplasia
- arrhythmogenic right ventricular dysplasia
- arrhythmogenic right ventricular dysplasia/cardiomyopathy
- ARVC
- ARVD
- ARVD/C
- right ventricular dysplasia, arrhythmogenic
- ventricular dysplasia, right, arrhythmogenic

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