ATRIAL SEPTAL DEFECTS

GENETIC TESTING

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What are atrial septal defects?

When a baby is growing in the womb, it is normal for several openings to be present in the muscular wall (septum) that separates the upper chambers (right and left atria) of the heart. Those openings usually close either shortly before or shortly after the baby is born. In some cases, however, one of the openings may not close completely. This is known as an atrial septal defect (ASD).

Most people with ASDs develop symptoms at some point in their lives.[1] The age at which symptoms appear varies from person to person.[1] Often, the first symptom of an ASD is extreme tiredness (fatigue) or shortness of breath that occurs during routine physical activity.[1] Some people suffer from strokes or die without warning before their atrial septal defects are diagnosed.

Surgical repair of the heart works well for young people with ASDs[1]; however, ASDs often are not found until adulthood, when the heart and lungs may have suffered damage that cannot be reversed with surgery.[1,2,4] Damage caused by an atrial septal defect can lead to:

- A buildup of pressure in the blood vessels inside the lungs (pulmonary hypotension), which can cause fatigue, shortness of breath, chest pain, and a racing heartbeat.
- Inability of the right side of the heart to pump blood (right-sided heart failure), which can cause fatigue, shortness of breath, and swelling (due to a buildup of fluid) in the legs, ankles, feet, and abdomen.
- Irregular heartbeats (atrial fibrillations) that could be life threatening.
- Blockage of the electrical signal that controls the heartbeat (AV block), which slows the heartbeat and can lead to sudden death.

What causes atrial septal defects?

Not all of the causes of ASDs are known, but some are caused by abnormal changes in certain genes. Genes are found in every cell in your body. They carry the instructions for making proteins that control how each of your cells work. Genes can undergo abnormal changes (called mutations) that may cause cells to stop working the way they should. Gene mutations may result in health conditions, and they may be passed from parent to child (inherited).

A number of genes play roles in the way your heart is formed and developed. When mutations occur in 1 or more of those genes, problems like atrial septal defects can occur. Within a single family, several members may have ASDs or other congenital (present at birth) heart defects. Genetic mutations are believed to be the underlying cause of such familial heart defects.[6]

How are atrial septal defects diagnosed?

ASDs have specific signs that can be observed by a doctor during a routine physical exam. These signs include altered heart sounds, a heart murmur, and small changes in the position and size of the heart and major blood vessels. Tests such as a chest X-ray or heart MRI may be used to confirm a diagnosis of an ASD.[1]

Information about your family's medical history will be an important part of the medical workup. If other members of your family have known heart problems, have been diagnosed with a congenital heart defect, or had a sudden cardiac death, your doctor may recommend a genetic test called gene sequencing to find out if you have a familial ASD.

What is gene sequencing for atrial septal defects?

Gene sequencing for ASDs is a procedure that reads the instructions (DNA) that make up certain genes known to play a role in the formation and development of your heart. This test, which is performed on a sample of blood, is a way to identify the presence of altered genes in your cells, which can help a doctor[5]:

- Confirm a diagnosis of a familial ASD.
- Manage your care if you have been diagnosed with an ASD.

- Identify members of your family who may have ASDs.

What possible results of gene sequencing can be reported, and what might they mean?

- **Negative:** No mutations were found in the genes tested. A negative result may reduce the chance that a person has a familial ASD but cannot completely rule it out.
- **Positive:** A mutation was found in 1 or more f the genes tested, confirming the diagnosis of a familial ASD.
- **Variant of unknown significance:** A mutation was found in the genes tested that either has not been reported before, or previous reports about the mutation have been conflicting. Therefore, it is unclear if the mutation is the cause of a person's signs and symptoms. Genetic testing of other family members may provide more information. If all affected family members have the same mutation, then it is likely to be linked to the inherited disorder. If some affected family members do not have the mutation, it is less likely to be linked to the disorder.

Gene sequencing test results should be combined with clinical findings and reviewed by a heath professional who specializes in medical genetics.

Where can I find more information?

If you have questions or want more information about genetic testing for atrial septal defects, ask your doctor or genetic counselor. You may search for a genetic counselor in your area using an online address book provided by the National Society of Genetic Counselors at **www.nsgc.org**.

Other information resources include:

- Genetics Home Reference
  Home page: **http://ghr.nlm.nih.gov**
- March of Dimes
  Telephone: 914-997-4488
  Home page: **www.marchofdimes.com**

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