



sema4

Expanded
Carrier Screen
(ECS)

What is the Expanded Carrier Screen (ECS) test?

Carrier screening determines if you and your partner are at increased risk to have a child with a genetic disorder. Our ECS is pan-ethnic and is designed to detect conditions that affect people of all ethnicities. Testing for these conditions is available by a simple blood or saliva test. This brochure provides information about the diseases screened for in our ECS at Sema4.

Which genetic disorders are included in this panel?

We test for 281 single gene diseases. Most diseases are inherited in the autosomal recessive manner (where both members of a couple need to be carriers for there to be an increased risk for having an affected child). There are 21 diseases on this panel that are inherited in an X-linked manner (where only the woman needs to be a carrier for there to be an increased risk to have an affected child). Each genetic disease has its own unique features. Some disorders impact intellectual ability, while others impact physical ability. Some disorders decrease one's lifespan, while others don't necessarily decrease lifespan, but impact one's daily life in significant ways. Some disorders have treatment options, such as lifelong medications or specific restrictive diets. Here are some of the more common diseases on this panel:

- **Cystic Fibrosis:** chronic disease of the lung and digestive systems that shortens lifespan (typically into the 20s-30s). May also impact male fertility and cause an increased risk for infectious diseases.
- **Fragile X syndrome:** moderate to severe intellectual disability along with behavioral problems in males, characteristic physical features.
- **Spinal Muscular Atrophy:** progressive weakness of the muscles affecting breathing, swallowing, head/neck control, and walking; varying degrees of severity exist (but the most severe and common form shortens lifespan to about 3-5 years).
- **Smith-Lemli-Opitz syndrome:** growth retardation, small head, moderate to severe intellectual disability, behavior problems, cleft palate and cardiac defects.

For a full description of these disorders as well as a complete list of all 281 diseases on this panel, please visit www.sema4genomics.com

How do I get tested?

Ask your doctor about the Expanded Carrier Screen (ECS) pan-ethnic panel. He or she will draw your blood for the test and send it to Sema4.

- If you are currently pregnant, your doctor may recommend that both you and your reproductive partner be tested at the same time. Since many disorders require that both the man and the woman be carriers for there to be an increased risk to have an affected child, completing testing at the same time will provide risk information in a time sensitive manner.
- If you conceived using a sperm or egg donor, your doctor may discuss with you the limitations of completing carrier screening. If you are found to be a carrier for an autosomal recessive condition, the egg or sperm donor may not be available for further testing to clarify risk.

Billing: Sema4 is contracted with most major health insurance carriers. For billing inquiries and pricing information, please contact our Billing Department at **800-298-6470** or email billing@sema4genomics.com

How do I get my results?

If you are found to be a carrier for one of the disorders on this panel, you may receive a telephone call from a Genetic Counselor at Sema4. During this conversation, your results will be discussed and, if necessary, recommendations will be made regarding yourself, your partner, your offspring and other family members. Your results will also be given to your doctor, so that he/she is aware of your carrier status. If your reproductive partner hasn't been screened yet and testing is indicated, the laboratory Genetic Counselor will help coordinate your partner's testing.

In most cases, your partner's testing can be performed on a saliva specimen. Your doctor may provide you with a Saliva Sample Collection Kit which includes instructions, necessary paperwork, as well as a pre-paid FedEx mailer. Your partner's saliva can be collected at home and shipped directly to Sema4.

(If you are not found to be a carrier, your results will be sent directly to your doctor for him/her to review them with you.)

What does it mean to be a carrier?

If both partners of a couple are identified as carriers of the same autosomal recessive condition, the couple has a 25% risk with each pregnancy to have a child affected with that disease. The couple also has a 50% chance with each pregnancy to have a child who is a carrier of the disease, and a 25% chance to have a child who does not inherit a pathogenic variant from either parent and is not a carrier.

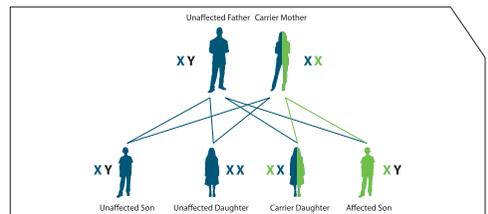
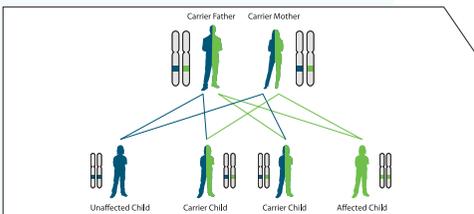
If a woman is identified as a carrier of an X-linked condition, she has a 50% chance with each pregnancy to pass on the X chromosome with the pathogenic variant and an increased risk to have an affected son or mildly affected daughter.

When an at-risk couple is identified, our Clinical Genetic Counselors can provide information and support which may be helpful in making important family planning decisions. Reproductive options that may be offered to you include: chorionic villus sampling (CVS), amniocentesis, in vitro fertilization (IVF) with preimplantation genetic diagnosis (PGD), sperm or egg donation and adoption.

For most diseases, being identified as a carrier has no implications on one's own health. However, for a small number of autosomal recessive conditions and X-linked conditions on this panel, a person identified as a carrier may actually manifest mild symptoms of the disease and/or a later stage in life than would be expected in a truly affected individual. In rare instances, a person who is undergoing carrier screening may discover that he/she is affected with one of the diseases. This is generally only relevant for diseases or variants that convey an adult-onset disease or can be associated with a milder clinical presentation.

How are genetic disorders inherited?

Genes are basic units of hereditary information that code for all of the body's traits and functions. A change, known as a pathogenic variant, in a gene can cause that gene not to function properly. This can lead to disease. Genes are carried on larger structures called chromosomes. Most individuals have 46 chromosomes or 23 pairs (one chromosome from each pair is inherited from a person's mother and the other from the person's father). These pairs are numbered 1 through 22 and the 23rd pair (called the sex chromosomes) determines whether a person is male or female. Typically, a male has one X and one Y chromosome, and a female has two X chromosomes. When a male child is conceived he received the Y chromosome from his father and one of his mother's X chromosomes (at random). When a female child is conceived she received the X chromosome from her father and one of her mother's X chromosomes (at random). There are multiple ways by which a genetic disease can be inherited.



Autosomal recessive conditions, like Cystic Fibrosis, occur when pathogenic variants are present in both the maternal and paternal copies of a gene. Each parent of an affected individual has one copy of a gene that works properly and one copy that does not. The parents are generally unaffected and are considered "carriers" of the disease.

X-linked conditions, like Fragile X syndrome, occur when there is a pathogenic variant in a gene on the X chromosome. "Carrier" females have a working copy of a gene on one X chromosome and a copy with a pathogenic variant on the other X chromosome. If the X chromosome with the pathogenic variant is passed on by the female, along with a Y chromosome from the male, the resulting son will have the X-linked condition. Males with an X-linked condition are generally affected and females are generally unaffected carriers (carrier females may be affected, to a variable degree, based on disease or pathogenic variant).



Opening the Data
Finally Completing the Picture
A Healthier Future
Everyone

Introducing Sema4, formerly the Mount Sinai
Genetic Testing Lab at the Icahn School of
Medicine at Mount Sinai. Learn more at
sema4genomics.com/ourstory

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