Navigenics®

Navigenics Health Compass Report

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to print a report for your physician.
It represents an abridged version of your
complete Navigenics results, which you
can view online.

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About Navigenics

Navigenics, a private company based in Foster City, Calif., offers personalized, preventive health and wellness services based on a member's genomic risk profile.

Our founders and advisors include leading genetic scientists, physicians, genetic counselors, bioethicists, patient advocates and health policy and technology experts.

We are committed to grounding our service in the latest scientific knowledge about genetics, health, disease prevention, and how genes can affect responses to certain medications. We are also committed to presenting information in a private, clear, transparent, and personalized way so that our members can act on it.

How we do it

Navigenics analyzes people's genetic makeup to give them a picture of their genetic predisposition for common, actionable health conditions. We look for one-letter variations in DNA (SNPs) that serve as markers of risk for health conditions or medication interactions.

Here is a summary of the steps we take. More detail can be found at www.navigenics.com, along with extensive information explaining genetic markers.

- We select genetic markers based on strong science associated with actionable health concerns. Our team of Ph.D. geneticists selects genetic risk markers that are significantly associated with clearly defined health concerns validated by multiple well-designed studies. The studies typically have been published in top-tier journals such as Science, Nature and the New England Journal of Medicine.
- We collect DNA via a saliva sample, and then the DNA is analyzed for appropriate markers in a CLIA-certified lab.
- We analyze these complex results with formulae developed by our Ph.D. mathematicians and prepare a report that is easily understood, but extensively documented.

Note for New York members: This genetic test will provide your physician and you with information that may be valuable in predicting your risk of developing specific diseases. However, it is likely that other factors including family history, age, behavior, and environment, as well as yet undefined genetic elements, will also will also influence disease risk and modify the predictive value you have been given. These results should therefore be interpreted with care by your physician and in the context of all other available information.

How we calculate risk

Here's how we calculate your risk for the conditions we cover.

- For most conditions, we start with the average lifetime risk for your gender, for people in the United States.
- Next we look at the actual risk markers we found in your genome. For most conditions, we check multiple markers.
- Then we calculate how much each marker on its own raises the risk of that condition. These "odds ratios" are based on the original scientific studies that associated these markers with disease risk.
- Finally, using a formula developed by our science team, we factor together the odds ratios for each marker, how common those markers are in the population and how common the condition is. We apply that to the average lifetime risk.
- The result is an estimate of your own lifetime risk, compared with the population average.
- For some conditions, such as hemochromatosis and lactose intolerance, as well as for medication outcomes, lifetime risk estimates are not available. In these cases. we state whether the genes analyzed indicate that you have increased risk.

Considerations and caveats

The Navigenics Health Compass is not a diagnostic test. Our service highlights genetic predisposition to common, important health concerns, so that prevention measures may be taken, early diagnosis may be made, or appropriate medication choices may be made.

The Navigenics Health Compass is a powerful tool. But it does have important limitations regarding certain conditions such as breast cancer, colon cancer and several others. For example, the Navigenics Health Compass addresses common genetic causes of breast cancer. It does not, however, specifically address more rare causes of familial breast cancer, such as BRCA mutations. So, individuals who have a strong family history of breast cancer, especially in relatives under age 50, may be at greater risk than the Navigenics Health Compass estimates and should consult a Navigenics Genetic Counselor.

For this reason, we strongly encourage you to review your results for **each** condition – even those conditions where you may not be identified as having risk - to see whether further discussion of your results is warranted.

About genetic markers

More than 99 percent of our genetic code is identical from person to person. The remainder is unique among individuals. DNA, the chemical instructions that determine our genetic code, is composed of four biochemical bases that are represented by the DNA alphabet: A, T, G and C.

SNPs, or single nucleotide polymorphisms, are one-letter variations in DNA. Each SNP ("snip") consists of two markers. Each marker has two possible versions: one risk, one non-risk. For example, at a given SNP, the base "A" may be the risk marker and the base "G" the non-risk marker.

The SNPs included in the Navigenics risk estimate have been reliably shown to be associated with health conditions or medication reactions. The degree of genetic risk you inherit is related, in part, to how many risk markers you have residing at each SNP — none, one, or two. Just because you may have one or two risk markers does not mean that you will definitely develop a given health condition or medication reaction, but it can raise your risk, especially if other lifestyle or environmental risk factors are present.

Understanding the Health Condition results table

For most conditions, each row gives your estimated lifetime risk of that condition, compared with the average risk for your gender. Note that for some conditions, such as hemochromatosis and lactose intolerance, lifetime risk estimates are not available. Highlighted rows indicate either:

- **Your overall risk is greater than 25 percent** or
- **Your risk is more than 20 percent above average** for that condition or
- **You have increased risk** for that condition.

Condition	Your percentile[1]	Your estimated lifetime risk[2]	Average lifetime risk[3]
Condition 1	37%-44%	2.3%	3.1%
Condition 2	86%-100%	80%[4]	25%
Condition 3	37%-44%	4.4%	9%
Condition 4	63%-80%	28%[5]	35%

[1]**Your percentile**: This information allows you to see how you compare to other people. When compared to a reference population, your SNP-based risk for the condition falls within the given range of percentiles. For Condition 1, for example, 36 percent of people have a lower genetic risk, while 45 percent have a higher genetic risk.

[2]**Your lifetime risk**: Your risk of this condition over the course of your lifetime. For some conditions, such as hemochromatosis and lactose intolerance, estimated lifetime risk numbers are not available. In these cases, we indicate whether you are at increased or no increased risk for the condition.

[3]**Average lifetime risk**: The average person's risk of this condition over the course of their lifetime, depending on gender. For some conditions, such as hemochromatosis and lactose intolerance, average lifetime risk estimates are not available. Your lifetime risk number shows how you compare to the average lifetime risk.

[4]This row is highlighted because your risk is **more than 20 percent above average**.

[5]This row is highlighted because your overall risk is **greater than 25 percent (though lower than the average)**.

Understanding the Health Condition genetic markers table(s)

Gene or location[1]	Risk marker[2]	Your markers[3]	Odds ratio[4]	Source[5]
AAA1	**C**	GG	1.0	Scientist Name, et al., Scientific Publication, p. 217, Feb. 2008.
BBB2	**T**	**TT**	6.2	Scientist Name, et al., Scientific Publication, p. 217, Feb. 2008.
CCC3	**A**	**A**G	1.23	Scientist Name, et al., Scientific Publication, p. 217, Feb. 2008.

[1]**Gene or location**: The place we looked in your genome.

[2]**Risk marker**: The variant in the human genetic code that marks higher odds for this condition.

[3]**Your markers**: The letters we found in your DNA. Any risk markers found are bold. Pending means we're continuing to analyze your DNA to provide results for this location. In most cases, we'll be able to provide results and will let you know when we get them. In a few cases, a person's DNA may not provide results at this location, even after repeat analysis. If you have questions, see our Help section or contact one of our Genetic Counselors.

[4]**Odds ratio**: How much your odds of developing this condition are increased by your genotype. The higher the number, the greater the increase. An odds ratio of 1.0 corresponds to having no risk markers. (Note that for some conditions, odds ratios are not available.)

[5]**Source**: A scientific journal article where the association between this location and the disease was reported.

Understanding the Medications results tables

For Medications, your results are presented in two tables — one related to side effects and one related to drug effectiveness. Each row gives your genetic results indicating how you are likely to respond to that particular drug. For some medications, your results indicate your likelihood of severe side effects. For others, your results indicate whether a particular medication is likely to be effective for you. Highlighted rows indicate that based on this genetic analysis, either:

- **Your risk of side effects is moderate or high** or
- **This medication may not have typical effectiveness for you** or
- **You should share your genetic results with your doctor to help find a dose of this drug that is more likely to be safe and effective for you.**

Medication Side Effects

Drug[1]	Side effect[2]	Your risk[3]
Medication 1	types of possible side effects (such as severe allergic reaction, nausea, etc.)	high risk[4]
Medication 2	types of possible side effects (such as bone marrow problems, fever, etc.)	moderate risk[5]
Medication 3	types of possible side effects (such as muscle pain, muscle damage, etc.)	low risk

[1]**Drug**: We analyzed this person's genetic code to determine the person's likely risk of side effects if taking this medication.

[2]**Side effect**: Severe side effects that are possible with this medication because of a person's genetic markers

[3]**Your risk**: This person's risk of severe side effects, based on the markers we found in their genetic code.

[4]This row is highlighted because this person's risk of side effects is **high**, meaning that this person meaning that this person's risk is greatly increased based on the markers in their genetic code.

[5]This row is highlighted because this person's risk is **moderate**, meaning that this person's risk is somewhat increased based on the markers in their genetic code.

Medication Effectiveness

Drug[1]	Information[2]	How effective for you[3]
Medication 1	reasons why this medication is used (such as to reduce risk of heart failure)	decreased effectiveness[4]
Medication 2	reasons why this medication is used (such as to prevent blood clots, etc.)	may require customized dose[5]
Medication 3	reasons why this medication is used (such as to lower cholesterol, etc.)	typical effectiveness

[1]**Drug**: We analyzed this person's genetic code to determine how effective this medication is likely to be for them.

[2]**Information**: Medical conditions for which this drug is commonly used

[3]**How effective for you**: How effective this medication is likely to be for this person, based on the markers we found in their genetic code.

[4]This row is highlighted because this drug's level of effectiveness for this person is **decreased**, meaning that this person carries risk markers we looked for that are linked to decreased levels of effectiveness.

[5]This row is highlighted because this drug is may be safe and effective after this person's **dose is customized**, meaning that these genetic markers can be used by a doctor to help find a dose tailored to the person's genetic makeup.

Understanding the Medications genetic markers tables

For your Medications results, the genetic markers tables differ from those that appear in your Health Conditions results. These differences reflect the distinct ways that your Medications results are discussed. Below, you'll find a detailed explanation of your Medications genetic markers tables.

What we looked for		Your results		
Gene or location[1]	Test SNP[2]	Your markers[3]	Scientific name[4]	What it means[5]
AAA1	**rs112233**	**GG**	*2/*3	high risk
BBB2	**rs445566**	**C**T	*1/*3C	moderate risk
CCC3	**rs778899**	AA	*1/*1	low risk

[1]**Gene or location**: The place we looked in your genetic code. Some markers are in or near a gene – a specific stretch of DNA that instructs the body to make a protein.

[2]**Test SNP**: Pronounced “snip,” this is the scientific name for the exact place in your DNA that was tested. “rs” stands for the scientific term "reference sequence. ”

[3]**Your markers**: You have two copies of each marker — one inherited from your mother and one from your father. Any letters in bold represent a marker you have that confers some risk.

[4]**Scientific name**: The name for the specific version of the gene you have. These are often expressed using a combination of asterisks and numbers, such as "*1/*1". The asterisk is pronounced “star”.

[5]**What it means**: What your specific genetic results mean for you in terms of how you react to this medication.

Cover Page for Personal Results - Navigenics Health Compass

Unique Barcode Identifier	037-10061375135
Laboratory Barcode	00014702
Sample Type	Saliva
Sample Collection Date	March 02, 2010
Date Received at Laboratory	March 31, 2010
Sample received to have met acceptable criteria for testing?	Yes
Sample forwarded to another laboratory for testing?	No
Date Report is Generated	July 14, 2010

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West Sacramento, CA 95605
Douglas S. Harrington, MD — Laboratory Director

Your Navigenics Health Condition results

Each row below gives your estimated lifetime risk of that condition (where available), compared with the average risk for your gender. Highlighted rows indicate either:

- **Your overall risk is greater than 25 percent** or
- **Your risk is more than 20 percent above average** for that condition or
- **You have increased risk** for that condition.

Please also note that unhighlighted rows may underestimate risk in certain cases, as noted in our results for certain conditions. For this reason, we strongly encourage you to review your results for and the discussion of each condition carefully.

For more information on how we calculate your lifetime risk, please see page 4.

Condition	Your percentile [1]	Your estimated lifetime risk [2]	Average lifetime risk [3]
Abdominal aneurysm	0% - 25%	1.1%	1.5%
Alzheimer's disease	74% - 98%	37%	17%
Atrial fibrillation	0% - 59%	19%	23%
Brain aneurysm	0% - 25%	0.66%	0.90%
Breast cancer	18% - 21%	10%	13%
Celiac disease	82% - 84%	0.20%	0.11%
Colon cancer	15% - 18%	4.1%	5%
Crohn's disease	64% - 66%	0.52%	0.54%
Deep vein thrombosis	82% - 87%	3.4%	3.6%
Diabetes, type 2	62% - 64%	31%	30%
Glaucoma	43% - 79%	1.7%	2.4%
Graves' disease	79% - 90%	3.1%	2.3%
Heart attack	0% - 11%	18%	25%
Hemochromatosis, HFE-related	0% - 57%	extremely low risk / no risk markers present (non-carrier)	N/A
Lactose intolerance	95% - 100%	high risk	N/A
Lung cancer	33% - 80%	6%	6%
Lupus	44% - 46%	0.15%	0.26%
Macular degeneration	98% - 100%	21%	3.1%
Melanoma	0% - 61%	1.6%	2.6%
Multiple sclerosis	37% - 57%	0.45%	0.77%
Obesity	20% - 56%	31%	32%
Osteoarthritis	44% - 61%	47%	47%
Psoriasis	64% - 100%	6%	4.0%
Restless legs syndrome	82% - 95%	8%	4.0%
Rheumatoid arthritis	26% - 31%	2.5%	3.3%
Sarcoidosis	21% - 69%	0.87%	1.0%
Stomach cancer, diffuse	56% - 100%	2.2%	1.7%

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[1]**Your percentile**: This information allows you to see how you compare to other people. Compared to a sample population, your SNP-based risk for the condition is within the given range of percentiles.

[2]**Your estimated lifetime risk**: Your risk of this condition over the course of your lifetime. For some conditions, estimated lifetime risk numbers are not available. In these cases, we indicate whether you are at increased risk for the condition.

[3]**Average lifetime risk**: The average person's risk of this condition over the course of their lifetime, depending on gender. For some conditions, such as hemochromatosis and lactose intolerance, average lifetime risk estimates are not available.

Your Navigenics Medications results

For Medications, your results are presented in two tables — one related to drug side effects and one related to drug effectiveness. Each table row gives your genetic result indicating how you are likely to respond to that particular drug. For some medications, your results indicate your likelihood of severe side effects. For others, your results indicate whether a particular medication is likely to be effective for you.

Highlighted rows indicate that based on this genetic analysis, either:

- **Your risk of side effects is likely to be moderate or high** or
- **This medication is not likely to have typical effectiveness for you** or
- **You should share your genetic results with your doctor to help find a dose of this drug that is more likely to be safe and effective for you.**

It is important to note that a result of special interest (orange or dark highlight) is assigned for one of these three reasons. **Also note that low risk or typical results (unhighlighted rows) also provide valuable information that can help guide you and your doctor to medications that are more likely to be safe and effective for you.** Should you ever need any of these medications, you and your doctor can use all of your results to make more personalized medication choices.

It's also important to note that these results may occasionally overestimate or underestimate risk in certain cases, as noted in our results for certain conditions. For this reason, we strongly encourage you to review your results for each condition carefully.

Medication Side Effects

Drug [1]	Side effect [2]	Your risk [3]
Abacavir (Ziagen®)	Severe allergic reaction, including fever, rash, and nausea	low risk
Carbamazepine (Carbatrol®)	Life-threatening dermatological syndromes that include fever, rash, and peeling skin.	low risk
Floxacillin (Floxapen®)	Severe liver toxicity, leading to liver damage	low risk
Fluorouracil (Efudex®)	Severe, potentially fatal toxicity	low risk
Irinotecan (Camptosar®)	Severe reactions, including suppression of the immune system	high risk
Simvastatin (Vytorin®, Zocor®)	Muscle pain and damage	low risk
Succinylcholine (Anectine®)	Prolonged, potentially dangerous paralysis of the breathing muscles	low risk
Thiopurines (Azasan®)	Severe bone marrow complications	low risk

[1]**Drug**: We analyzed your genetic code to determine how effective this medication is for you.

[2]**Side effect**: Severe side effects associated with this medication

[3]**Your risk**: Your risk of side effects, based on the markers we found in your genetic code.

Medication Effectiveness

Drug [1]	Information[2]	How effective for you [3]
Beta blockers (Coreg®, many others)	Used to treat and prevent cardiovascular disease	typical effectiveness
Clopidogrel (Plavix®)	Used to prevent blood clots and conditions linked to them, such as heart attack and stroke	typical effectiveness
Statins (Pravachol®, Zocor®, many others)	Used to treat high cholesterol and help prevent heart disease	decreased cholesterol lowering, but some cardiac effectiveness
Warfarin (Coumadin®)	Used to treat and prevent blood clots and heart-related conditions, such as atrial fibrillation and heart attack	likely to require customized dose

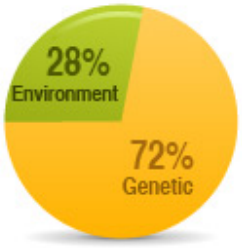
[1]**Drug**: We analyzed your genetic code to determine how effective this medication is for you.

[2]**Information**: Medical conditions for which this drug is commonly used.

[3]**How effective for you**: How effective this medication is for you, based on the markers we found in your genetic code.

Abdominal aneurysm

Your estimated lifetime risk: **1.1% (11 per 1,000)**
Average lifetime risk: **1.5% (15 per 1,000)**



You have **0** of the **2** risk markers we looked for.

Gene or location [1]	Risk marker [2]	Your markers [3]	Odds ratio [4]	Source [5]
9p21	**G**	A A	1.0	Nature Genetics, 2008

see page 6 for an explanation of this table format

What we found for abdominal aneurysm

We looked at one place on your genome where a one-letter difference in the genetic code affects your odds of abdominal aneurysm. At this location, there are two markers, for a total of two possible risk markers. The table above shows your markers. You have zero of the two risk markers we looked for.

What does it mean?

When an abdominal aneurysm ruptures, it usually happens with little warning and often is fatal. Abdominal aneurysms affect about 3 percent of the U.S. population. Over the course of the average U.S. woman's lifetime, the risk of developing an abdominal aneurysm about 1.5 percent. Your risk of developing this type of aneurysm is below average. If you want to reduce it even further, lifestyle changes can help — and will lower your risk of other conditions, as well.

What's next

- If you smoke, quit.
- Ask your doctor about screening, especially if you are over 65, have ever smoked or have a family history of aortic aneurysms, connective tissue disease or polycystic kidney disease.

What you can do

Clinically proven

- If you smoke, quit.
- Monitor your blood pressure and if it is high, keep it under control, whether with regular exercise, weight loss, dietary changes, medication or a combination of all four.
- Eat a low-fat diet to improve your cholesterol profile. High cholesterol contributes to the buildup of plaque and inflammation in your arteries, which make you more susceptible to an aneurysm.
- Eat lots of fruits, vegetables, and whole grains.
- Choose dairy products that are low in fat and try to get your protein from lower-fat sources such as beans, fish, chicken, and lean meats.
- If you have any risk factors plus a family history — particularly if you are a man over age 60 who has ever smoked — ask your doctor to consider screening you with an abdominal ultrasound test.

Early detection

Points to remember

- An abdominal aneurysm usually has no symptoms.
- If you have parents or siblings with this condition or connective tissue disorders such as Marfan syndrome, Ehlers-Danlos syndrome or polycystic kidney disease, your risk goes up.

- Smoking and elevated blood pressures are the greatest risk factors.

Symptoms

If you experience any of these symptoms, seek medical attention immediately:

- A pulsating bulge you notice when you press down on your abdomen around the navel area, or a pulsing feeling there, like a heartbeat
- Sudden or recurring pain radiating in your abdomen or back
- Sudden dizziness or clammy hands and feet, which may signal a sudden drop in blood pressure

Testing

- An ultrasound test can spot an abdominal aneurysm.
- A physical examination can detect it, but in some cases it may be missed even by a skilled physician.
- Results can be confirmed by CT scan, MRI or angiogram.

What should I tell my doctor?

- Do you smoke or have you ever smoked?
- Do you have a history of heart disease?
- Do you currently have hypertension?
- Do you have unexplained chronic or acute pain in your abdomen or back?
- Do you have a parent or sibling who has had an aneurysm?
- Do you have a family history of polycystic kidney disease or of connective tissue disorders such as Marfan or Ehlers-Danlos syndrome?
- Have you experienced blunt trauma to your abdomen, such as a fall or an injury due to a car accident?

What can my doctor do?

- Observe you. If your doctor detects an aneurysm, it will need to be monitored.
- Refer you to a vascular surgeon (a specialist in blood vessel surgery) for a consultation if an aneurysm is found.
- Work with you to monitor and control other risk factors (such as hypertension, high cholesterol or heart disease) and help you stop smoking.
- Give you medication. Beta blockers, for instance, can slow the growth of aneurysms.
- Recommend surgery. When an aneurysm is larger than 5.5 cm, there is a 30 to 50 percent risk of rupture. At this point, it's likely that you will need surgery, in which the aneurysm is replaced by a graft.
- Consider endovascular stenting. This is a newer technique in which doctors place a brace in the area of the aneurysm via a groin artery. It's most often used for people who are not a good surgical risk.

More information

You'll find even more information on this condition in the online version of your results. Log into your Member Account at www.navigenics.com to access:

- In-depth information on the general genetic understanding of this condition
- Details on the science behind your results
- Resources and groups that can provide even more information on this condition

(If you received your results through your doctor, ask your clinician to pass along this information.)

Alzheimer's disease

Your estimated lifetime risk: **37% (37 per 100)**
Average lifetime risk: **17% (17 per 100)**

Gene or location [1]	Risk marker [2]	Your markers [3]	Odds ratio [4]	Source [5]
APOE	**E4/E4**	E3/E4	5.02	Journal of Clinical Psychiatry, 2007

see page 6 for an explanation of this table format

Navigenics tests for markers associated with the common, or late-onset, form of Alzheimer's, which generally develops after age 65. There is also a very rare early onset form with a strong hereditary component, which Navigenics does not test for. If any of your relatives have been diagnosed with Alzheimer's before age 60, you should consult your physician, who may refer you to a genetic counselor.

What we found for Alzheimer's disease

On your genome, we looked at one place in your APOE gene where two one-letter differences in the genetic code can combine to raise your odds of Alzheimer's disease. At this location, three possible markers, called E2, E3, and E4, are determined by the two one-letter differences in the APOE gene. A person might have zero, one, or two copies of the risk marker, E4. The table above shows your markers.

What does it mean?

Being at above-average risk doesn't mean you have Alzheimer's or ever will. A wide range of prevention measures may lower your risk.

Additional genetic factors that contribute to Alzheimer's will undoubtedly be validated in the future, but APOE is currently, and is likely to continue to be, the single most important genetic factor related to late-onset Alzheimer's.

What's next

- Exercise your body (walk briskly, ride a bike) and challenge your brain (study a language, do crossword puzzles). Increasing evidence suggests these actions may help prevent Alzheimer's.

Early detection

Symptoms

The earliest signs of Alzheimer's are memory lapses, such as forgetting familiar words and names or the locations of everyday objects. It's normal to forget names or appointments occasionally, but forgetting recently learned information and forgetting more often may be early signs of the illness. Such problems may not be obvious or detectable during a medical exam.

At the earliest stage in which the illness may be diagnosable, friends and family may notice a person having difficulty:

- Remembering words and names.
- Remembering the names of recently introduced people.
- Performing well at work or in social settings.
- Recalling a recently read passage.

- Remembering the location of a valuable object.
- Planning or organizing.

A diminished sense of smell can also be an early warning sign, though it may be caused by other conditions such as allergies or sinus problems.

Testing

Early diagnosis seems to be important in managing the disease. Consult your doctor if you think you have early symptoms. Alzheimer's is usually screened for using a simple test or questionnaire that measures mental function. Brain imaging can reveal whether you are demonstrating signs of Alzheimer's, other age-related dementia or normal aging.

Drug treatment

There is no known cure for Alzheimer's, but certain drugs, such as donepezil (Aricept) and galantamine (Razadyne), may temporarily improve memory symptoms. In one study, donepezil slowed progression from mild cognitive impairment to Alzheimer's among patients who had one or more copies of the genetic marker Navigenics tests for.

What you can do

As yet there are no surefire strategies for preventing Alzheimer's disease. But good evidence is emerging that healthy lifestyle measures like exercising and eating healthy really can make a difference.

Promising

Exercise your brain. It's thought that maintaining an active mental life increases the connections between nerve cells and may compensate for the brain's degeneration over time. Engage in activities that involve a lot of information processing: doing puzzles, studying a language, learning to play a musical instrument. The more activities you do and the more often you do them, the more you'll benefit.

Exercise your body. Aerobic fitness — the kind you get from brisk walking, bike riding or running — improves mental function, perhaps by increasing blood flow to the brain. Exercise also lowers cholesterol, blood pressure and blood sugar levels — all of which are risk factors that have been associated with Alzheimer's. Engage in heart-pumping activity for at least 30 minutes three times a week.

Be social. People who have a strong network of friends and a lively social life are less likely to suffer cognitive decline. Social activities that are also mental and physical are the best. Take a learning vacation with friends, join a book group, form a walking club.

Trim your waistline. Fat around the belly is more dangerous than fat that accumulates elsewhere. It raises your risk for high blood pressure, heart disease and death, and one study found that being apple-shaped in midlife increased the risk of dementia 30 years later. Women should aim for a waist circumference of no more than 35 inches; men for no more than 40 inches. People of Asian origin may be at risk at even lower waist circumferences. Asian women should aim for a waist circumference of no more than 31 inches, men for no more than 35 inches.

Control cholesterol and blood pressure. Many scientists suspect that cardiovascular risk factors also put you at higher risk for Alzheimer's disease. If your HDL cholesterol (the "good" kind) is less than 35 milligrams/deciliter, your triglycerides are above 250 milligrams/deciliter, or your blood pressure is 140/90 or higher, talk with your doctor about how you can improve those numbers through diet, exercise or medication.

Preliminary

Go Mediterranean. Several studies have found that the more closely patients adhered to a Mediterranean diet, the less likely they were to develop Alzheimer's or to die if they did get the disease. A Mediterranean diet is defined as lots of fruits, vegetables, legumes and cereals; plenty of unsaturated fats, chiefly olive oil; few dairy products and little meat and poultry; a "moderately high" intake of fish; and wine with meals.

Consider statins. Statin drugs, commonly prescribed for high cholesterol, may also lower the risk of developing Alzheimer's or slow its progress. Some researchers suspect statins may block the formation of protein plaques in the brain, which are a hallmark of the illness. Talk to your doctor about deciding to take a statin, as the data are still preliminary. In addition, statins can cause side effects, such as muscle and liver damage.

Get your B vitamins. High blood levels of a substance called homocysteine, which also may be associated with heart disease, are thought by some to increase the risk of Alzheimer's. Getting the vitamins from your diet may be more effective than taking them from a pill. Taking a daily supplement of folic acid and vitamins B6 and B12 can reduce homocysteine. (A recent study suggests that at least some of the benefit attributed to higher folate levels and lower homocysteine levels is actually related to exercise, which may increase folate levels.) There is some controversy, however, about the safety of these supplements, and you should consult your physician before taking them.

Manage stress. One study found that "chronic psychological distress" is linked to the development of mild cognitive impairment, which can be a precursor to Alzheimer's disease.

Eat your omega-3's. Four studies have found that eating omega-3 fatty acids, found in certain fish such as salmon, trout, herring, sardines, tuna and mackerel, may decrease the risk of dementia. These fish are high in "good" fats, such as omega-3 fatty acids. (You will need to be aware of the mercury content of some of these fish, especially if you are pregnant or planning to get pregnant.) If you don't eat much fish, ask your doctor whether you should take a dietary dietary fish oil supplement of about 1,000 or 1,200 mg omega-3. These supplements may cause excessive bleeding, as well as belching,flatulence, and stomach upset.

If you drink, choose wine. Some studies suggest that wine, in moderation (one drink a day for women, two for men), may help protect against dementia, particularly for women.

Have some curry. There is some evidence that curcumin, also known as turmeric, the spice that gives curry its yellow color, may help prevent Alzheimer's disease. India, where people eat a lot of curry, has one of the lowest rates of the disease in the world. Curcumin seems to have antioxidant and anti-inflammatory properties and inhibits the formation of amyloids, which make up the brain plaques characteristic of Alzheimer's disease. Studies are under way to see whether curcumin has an effect.

What should I tell my doctor?

- Have you noticed any changes in how sharp your mind seems? Are you increasingly forgetful, especially of recent events, while your past memory seems fine? Do you lose things more often or get lost more often? Do you have trouble naming things?
- Ask those around you if they have noticed any changes in your memory, as they are often more objective.
- Try challenging your memory to see how you do compared to your expectations. Do a puzzle for several days in a row and see if you improve.
- Could anything else be causing memory problems? Some examples are stress, anxiety, depression, sleep deprivation, medications, alcohol or other medical problems.
- Do you have a family history of Alzheimer's?
- Have you noticed your sense of smell becoming less acute?

What can my doctor do?

- Order blood tests looking for other medical conditions that can cause or mimic dementia.
- Refer you to a neurologist or geriatric psychiatrist for consultation or testing.
- Order an MRI scan of your brain.

More information

You'll find even more information on this condition in the online version of your results. Log into your Member Account at www.navigenics.com to access:

- In-depth information on the general genetic understanding of this condition
- Details on the science behind your results
- Informational resources that can provide even more specifics on this condition, such as how to find support groups and clinical trials

(If you received your results through your doctor, ask your clinician to pass along this information.)

Atrial fibrillation

Your estimated lifetime risk: **19% (19 per 100)**
Average lifetime risk: **23% (23 per 100)**

You have **0** of the **4** risk markers we looked for.

Gene or location [1]	Risk marker [2]	Your markers [3]	Odds ratio [4]	Source [5]
4q25_1	**T**	C C	1.0	Nature, 2007
4q25_2	**T**	G G	1.0	Nature, 2007

see page 6 for an explanation of this table format

What we found for atrial fibrilation

We looked at two places on your genome where a one-letter difference in the genetic code affects your odds of atrial fibrillation. At each location, there are two markers, for a total of four possible risk markers. The table above shows your markers. You have zero of the four risk markers we looked for.

What does it mean?

Your risk of atrial fibrillation, a type of irregular heartbeat, is about average. A few basic lifestyle changes can reduce your risk for this condition and for other conditions as well. Atrial fibrillation can slow you down and in some cases lead to blood clots, stroke or congestive heart failure. It affects less than 1 percent of the U.S. population, and about 3 to 5 percent of people over the age of 65; your chances of having it increase with age. The average U.S. woman has a 23 percent chance of having atrial fibrillation over the course of her lifetime. Drugs, medical interventions and surgery often can control this condition, but taking preventive action now may help avert trouble.

Atrial fibrillation can slow you down and in some cases lead to blood clots, stroke or congestive heart failure. It affects more than 2 million Americans, including about 3 to 5 percent of people over the age of 65; your chances of having it increase with age. Drugs, medical interventions and surgery often can control this condition, but taking preventive action now may help avert trouble.

Ethnic variation

Most conditions have only been studied in people of European ancestry, but this one also has been studied in other groups.

What's next

- Keep an eye on your blood pressure, and treat it if it's high.
- Avoid stimulants, including herbal supplements and decongestants.
- Don't use tobacco.
- Limit the amount of alcohol you drink.
- Stay in good physical shape.

Early detection

Points to remember

- Atrial fibrillation is potentially serious and, if unchecked, can lead to heart failure, blood clots and stroke.
- Atrial fibrillation is more common with age and in men.
- Sometimes atrial fibrillation cannot be traced to a direct cause.

Symptoms

Many people with atrial fibrillation may feel nothing or have only mild symptoms.

Watch for:

- Unexplained fatigue
- Decreased exercise tolerance
- Chest pain or tightness
- Dizziness, especially with exertion, or fainting spells
- Shortness of breath
- Irregular pulse, racing heartbeat or a thumping feeling in your chest

Testing

Your doctor may want to:

- Check your heart, pulse and blood pressure
- Test your blood to assess your thyroid function, diabetic status and lipid levels
- Do a baseline electrocardiogram
- Have you wear a special portable monitor that records your heartbeats as you conduct your daily activities
- Refer you to a cardiologist

What you can do

With atrial fibrillation, you may or may not notice that your heart is beating irregularly. While the consequences can be serious, there's a lot you can do to lower your risk.

Clinically proven

Don't ignore hypertension. High blood pressure is a prime risk factor for atrial fibrillation, so get your blood pressure tested. If it's 140/90 or higher, talk with your doctor about how to reduce it.

If you are overweight, lose weight. Obesity strains your heart and contributes to high blood pressure. Being obese is also related to sleep apnea, which can raise the risk of atrial fibrillation.

Don't drink to excess. A high intake of alcohol — particularly if you drink several drinks a day — can interfere with the normal electrical impulses of your heart.

Avoid stimulant drugs and herbal supplements. These range from over-the-counter decongestants, to herbal supplements like ephedra and ma huang, to illegal substances like cocaine.

Quit smoking. Tobacco use is a risk factor for atrial fibrillation, stroke and heart disease.

Learn to manage stress. Stress can worsen cardiac health and trigger fibrillation episodes. Practicing yoga, meditation or deep breathing may help you relax.

Get your cholesterol numbers in order. Talk with your doctor if:

- You're a man and your total cholesterol is above 200 milligrams per deciliter, or your HDL ("good" cholesterol) is less than 40 milligrams/deciliter;
- You're a woman and your HDL is less than 50 milligrams/deciliter or your triglycerides are above 250 milligrams/deciliter.

Preliminary

Watch the caffeine. Studies disagree on how risky caffeine is for people with atrial fibrillation, but since it's a stimulant, it is best to keep your intake moderate.

Eat a healthy diet. Aim for a reduced-calorie, low-fat diet high in fiber, including fruits, vegetables, whole grains and lean protein, both for general heart health and to keep your weight down.

Eat fish or take fish oil supplements. Some studies suggest that the omega-3 fatty acids in fatty fish such as salmon and tuna can reduce the risk of atrial fibrillation. (Be sure to pay attention to the mercury content of the type of fish you're eating.)

What should I tell my doctor?

- What are the nature and duration of your symptoms?
- Do you have a family history of atrial fibrillation, heart disease or stroke?
- Do you have any compounding conditions, such as a history of heart disease, heart attack or stroke; high blood pressure; thyroid disease; or diabetes?
- Do you have a congenital heart defect?
- Do you smoke?
- How much caffeine do you drink?
- Are you taking any other medications, including decongestants (over-the-counter or prescription) or herbal supplements?
- How much alcohol do you drink?
- Do you take stimulant drugs, such as cocaine or amphetamines?
- Are you experiencing stress?
- Have you gained weight lately?

What can my doctor do?

- If you have atrial fibrillation, observe your heart rate over a period of time (this could be on an inpatient or outpatient basis) or treat you with medications to try to restore a normal rhythm, depending on your symptoms and other risks
- Possibly reset your heart rhythm by cardioversion, a process in which an electric shock is given to your heart when you are sedated
- In certain cases, if the fibrillation remains uncontrollable, perform (either surgically or with a catheter) a procedure called ablation, in which the malfunctioning area of heart tissue is destroyed
- Implant a device to control your rhythm, such as a pacemaker
- If you remain in atrial fibrillation or continue to lapse back into abnormal rhythm, put you on an anticoagulant such as warfarin to help prevent blood clot formation and stroke

More information

You'll find even more information on this condition in the online version of your results. Log into your Member Account at www.navigenics.com to access:

- In-depth information on the general genetic understanding of this condition
- Details on the science behind your results
- Resources that can provide even more information on this condition

(If you received your results through your doctor, ask your clinician to pass along this information.)

Brain aneurysm

Your estimated lifetime risk: **0.66% (66 per 10,000)**
Average lifetime risk: **0.90% (90 per 10,000)**

You have **0** of the **2** risk markers we looked for.

Gene or location [1]	Risk marker [2]	Your markers [3]	Odds ratio [4]	Source [5]
9p21	**G**	A A	1.0	Nature Genetics, 2008

see page 6 for an explanation of this table format

What we found for brain aneurysm

We looked at one place on your genome where a one-letter difference in the genetic code affects your odds of a brain aneurysm. At this location, there are two markers, for a total of two possible risk markers. The table above shows your markers. You have zero of the two risk markers we looked for.

What does it mean?

Your risk for a brain aneurysm is below average. If you want to reduce your risk even further, lifestyle changes can have a powerful effect. Brain aneurysms affect about 2 percent of Americans, and over the course of the average U.S. woman's lifetime, the risk of developing a brain aneurysm is about 9 per 1,000.

Early detection

Points to remember

While up to 12 million Americans may have a brain aneurysm, fewer than one percent of these aneurysms rupture each year.

Symptoms

A brain aneurysm can be relatively silent, unless it presses on a nerve or begins to leak small amounts of blood. A rupture usually brings more severe symptoms.

Watch for:

- Headaches
- Dizziness
- Facial or eye pain
- Double vision
- Loss of peripheral vision
- Stiff neck

People with the following symptoms, which can indicate a ruptured aneurysm, should seek emergency treatment immediately:

- Sudden onset of a severe headache, especially with neurological symptoms such as confusion, lethargy, seizure, trouble speaking or thinking, muscle weakness, numbness, loss of vision or double vision
- Nausea and vomiting together with the symptoms above

Testing

Talk with your doctor about whether you should be screened for brain aneurysms. Based on your own medical history, your family history and symptoms, your doctor may order various tests. Brain aneurysms are diagnosed with:

- Computed tomography (CT) angiography. A CT scan is a diagnostic imaging procedure that uses a series of computer-generated X-rays to provide a comprehensive view of your brain. Before the scan, you'll have a contrast dye injected into your bloodstream. This process produces images of blood flow in your brain.
- Magnetic resonance imaging (MRI) angiography. This test uses computer-generated radio waves and a powerful magnetic field to produce detailed images of the brain and blood vessels.
- X-ray angiography. This test provides the best image of blood vessels in the brain. The procedure involves inserting a catheter (a small, thin tube) into an artery in the leg and passing it up to the blood vessels in the brain. A contrast dye is injected through the catheter and X-ray images are taken of the blood vessels.

What you can do

Being at increased risk for a brain aneurysm is scary. But if an aneurysm does form, you and your doctor can reduce your risk of rupture with careful follow-up and attention to your health habits.

Promising

Avoid stimulant drugs. They can cause a sudden increase in blood pressure and damage arteries, increasing your risk of a ruptured aneurysm.

Stop smoking. Quitting will significantly reduce your risk of developing a brain aneurysm. Smokers are more likely to develop multiple aneurysms and suffer a rupture.

Lower blood pressure. High blood pressure stresses arteries in the brain, raising the risk than an aneurysm will develop or rupture. Talk with your doctor about how you can lower your blood pressure by changing your diet or taking medication.

Preliminary

Limit alcohol consumption. If you have an aneurysm, having more than two drinks per day raises your risk that it will rupture. Binge drinking (having more than five drinks at a time) also increases your risk.

Avoid straining. If you have an aneurysm, any sudden, forceful exertion, such as lifting heavy weights, may increase your risk of a rupture by raising your blood pressure.

Be cautious with aspirin. If you have an aneurysm, talk to your doctor before taking any blood-thinning drugs, as well as nonsteroidal anti-inflammatory drugs such as aspirin (which is also a blood thinner). They might increase blood loss if your aneurysm ruptures.

What should I tell my doctor?

- Do you have a family history of brain aneurysms?
- Do you have high blood pressure? Is your blood pressure being monitored?
- Do you have any symptoms of a possible brain aneurysm, such as persistent headache or vision changes?
- Do you have a disease or condition that increases the risk of brain aneurysms? These include:
  - Polycystic kidney disease, in which the kidneys develop multiple cysts.
  - Arteriovenous malformation (AVM), a condition in which an abnormal connection exists between arteries and veins in the brain. (AVMs can be a symptom of hereditary hemorrhagic telangiectasia, also known as Osler-Weber-Rendu.)
  - Connective tissue disorders such as Marfan syndrome, Ehlers–Danlos syndrome type IV and neurofibromatosis type 1.

What can my doctor do?

- Help you quit smoking.
- Monitor and, if appropriate, help you lower your blood pressure.
- Be attentive to even mild symptoms of a brain aneurysm.
- Advise you about follow-up and treatments for a brain aneurysm. Appropriate monitoring and, in some cases, timely surgery can prevent an aneurysm from rupturing.

More information

You'll find even more information on this condition in the online version of your results. Log into your Member Account at www.navigenics.com to access:

- In-depth information on the general genetic understanding of this condition
- Details on the science behind your results
- Resources and groups that can provide even more information on this condition

(If you received your results through your doctor, ask your clinician to pass along this information.)

Breast cancer

Your estimated lifetime risk: **10% (10 per 100)**
Average lifetime risk: **13% (13 per 100)**

You have **5** of the **14** risk markers we looked for.

Gene or location [1]	Risk marker [2]	Your markers [3]	Odds ratio [4]	Source [5]
TNRC9	**A**	**A** G	1.27	Nature Genetics, 2007
FGFR2	**A**	G G	1.0	Nature, 2007
chr2.217614077	**A**	**A** G	1.11	Nature Genetics, 2007
CASP8	**G**	**G G**	1.35	Nature Genetics, 2007
MAP3K1	**C**	A A	1.0	Nature, 2007
chr8.128424800	**G**	A **G**	1.06	Nature, 2007
LSP1	**C**	T T	1.0	Nature, 2007

see page 6 for an explanation of this table format

Navigenics tests for common markers associated with breast cancer. Much less common are single-gene mutations that can lead to breast cancer, which Navigenics does not test for. If you answer "yes" to any of these questions, you should consult your physician, who may refer you to a genetic counselor.

- Have you or anyone in your family had breast cancer before age 50, cancer in both breasts at any age or ovarian cancer at any age?
- Have two or more close relatives on the same side of your family (maternal or paternal) had breast or ovarian cancer, or has one relative had both?
- Do you have any male relatives with breast cancer?
- Do you have Ashkenazi (Eastern European) Jewish ancestry and at least one family member with breast or ovarian cancer at any age?
- Do you have any relatives with an identified genetic mutation that increases their risk for cancer?

What we found for breast cancer

We looked at seven places on your genome where a one-letter difference in the genetic code affects your odds of breast cancer. At each location, there are two markers, for a total of 14 possible risk markers. The table above shows your markers. You have five of the 14 risk markers we looked for.

What does it mean?

You are at below-average risk for breast cancer. Regular checkups, not smoking and maintaining a healthy weight can lower your risk even more. Breast cancer affects less than 1 percent of women at any given time, but over the course of her lifetime, the average woman has a 13 percent chance of developing breast cancer. Death rates from breast cancer have recently begun dropping in the United States, especially among women under 50. Scientists credit earlier detection through screening, improved treatment and less long-term use of hormones after menopause.

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Scientists credit earlier detection through screening, improved treatment and less long-term use of hormones after menopause.

What's next

- Get regular breast exams and mammograms.
- Maintain a healthy weight, eat a balanced diet low in animal fat and get regular exercise.
- If you smoke, stop.

Early detection

Symptoms

Breast cancer often has no symptoms in its early stages. If you notice any of the following signs, you should see your doctor.

- A lump or thickening in or near the breast or underarm. Nipple tenderness.
- A nipple turned inward (inverted) into the breast.
- A clear or bloody fluid discharge from your nipple.
- A change in breast size or contours.
- Any flattening or indentation of the skin over your breast.
- Red or irritated skin over the breast.
- Pitting of the skin over your breast, similar to an orange peel.

Testing

- A clinical breast exam by a doctor: You may need these exams yearly or more often, depending on your personal level of risk.
- Mammograms: All women should get a mammogram every year beginning at age 40. Mammograms are X-ray pictures of the breast. Yearly mammograms reduce the risk of death from breast cancer by 25 to 35 percent in women more than 50 years old. If you have a higher risk of developing breast cancer, your doctor may recommend that you start this and other breast cancer screening before age 40.
- Breast self-exam: Breast self-exams cannot replace regular screening mammograms or clinical breast exams by your doctor. Research has shown that statistically, breast self-exams alone don't reduce the number of deaths from breast cancer or increase the number of cancers detected. But in any one woman they can result in the detection of a problem.
- MRI: Magnetic resonance imaging uses a powerful magnet to make detailed pictures of breast tissue. Research has shown that MRI scans are better than mammograms at finding invasive cancers early in high-risk women, especially in younger women who have dense breast tissue. The American Cancer Society recommends yearly MRI screening for women with a lifetime breast cancer risk of 20 percent or higher, women who received chest radiation between ages 10 and 30 and women with a strong family history of breast and ovarian cancers. MRI is not recommended for routine screening because it has a high rate of false-positive results — finding problems where none exist. The quality of the MRI scan and interpretation can also be an issue.
- Ultrasound: An ultrasound device sends out waves that bounce off tissues, and a computer uses the echoes to create a picture. Ultrasound can be used in a woman of any age to evaluate a breast thickening or lump. This technique isn't used for routine screening because it has a high rate of false-positive results.

What you can do

With breast cancer, regular monitoring and examinations are important in that they promote early detection and improved results of treatment. There is emerging evidence that obesity, hormone replacement therapy and alcohol increase your risk of developing breast cancer.

Clinically proven

Anti-estrogen drug therapy. Medications for preventing breast cancer affect the hormone estrogen, which influences the growth and development of many breast tumors. (These tumors are called estrogen-receptor positive.) Because of

significant side effects, these drugs are used only after careful consideration in individuals at very high risk, usually because of a significant family history or because they carry one of the rare BRCA gene mutations, which Navigenics does not test for.

- Tamoxifen. Tamoxifen is approved by the Food and Drug Administration for breast cancer prevention. Tamoxifen blocks the receptor in estrogen-receptor-positive breast cancer cells, preventing them from growing. Research has shown that tamoxifen results in a relative risk reduction of about one-third for non-invasive breast cancer and about one-half for invasive breast cancer in women at high risk of developing breast cancer. It has short-term side effects, but also long-term risks: uterine cancer, blood clots in the legs or lungs and stroke. Because of these risks, women taking tamoxifen should be monitored by their doctors for any sign of serious side effects.
- Raloxifene. Raloxifene is approved for prevention and treatment of postmenopausal osteoporosis but is also used to prevent breast cancer. Like tamoxifen, raloxifene blocks the effect of estrogen on breast tissue. Research has shown that raloxifene is as effective as tamoxifen in preventing estrogen-receptor-positive breast cancer in postmenopausal women at high risk for developing breast cancer. Although raloxifene reduces the risk of invasive breast cancer, it does not have the same protective effect against non-invasive cancer. Raloxifene has a lower risk of certain side effects such as uterine cancer and blood clots in the legs or lungs, compared to tamoxifen.

Prophylactic oophorectomy. This measure is only considered for women at very high risk of breast cancer because of a significant family history or because they carry one of the rare BRCA gene mutations, which Navigenics does not test for. This surgical procedure removes the ovaries and fallopian tubes. It lowers the amount of estrogen available to stimulate estrogen-receptor-positive breast cancer. However, removing your ovaries means you will experience early menopause, exposing you to a different set of risks, including osteoporosis and menopausal symptoms.

Prophylactic mastectomy. This measure is only considered for women at very high risk of breast cancer because of a significant family history or because they carry one of the rare BRCA gene mutations, which Navigenics does not test for. This surgical procedure removes nearly all of the breast tissue, so there are very few breast cells left behind that could develop into a cancer. If you take this step, there is no guarantee that you will not develop breast cancer.

Promising

Early detection. Regardless of risk, every woman should practice early detection measures. Careful monitoring may not prevent breast cancer, but it increases the chance that cancer will be caught early, while it is non-invasive and most treatable. Talk to your doctor about developing a specialized program for early detection that meets your individual needs and gives you peace of mind.

Avoid long-term HRT. Using postmenopausal hormone replacement therapy for several years, particularly estrogen and progesterone combined, increases your breast cancer risk and the likelihood that cancer won't be caught until it's more advanced. Your risk climbs steadily each year you continue to use it. If you stop using HRT, it seems to take about five years for your risk to drop back to normal. Use of estrogen alone does not appear to increase risk of breast cancer, although study results have been mixed. If you're approaching menopause, talk to your doctor about options for managing your symptoms, including short-term hormone therapy.

Don't smoke. Smoking is linked to an increased risk of breast cancer. Smoking can also increase complications from breast cancer treatment.

Work out. Get 30 minutes of aerobic exercise three to five times a week. Some studies have shown that brisk walking, swimming, running or biking can help prevent cancer and its recurrence. (Check with your doctor before beginning a strenuous exercise program.) Other research suggests that exercise boosts the immune system, limits weight gain from chemotherapy and eases treatment side effects.

Maintain a healthy weight. Research has shown that significant weight gain between age 18 and menopause increases your risk of breast cancer. Overweight women also have an increased risk of developing breast cancer after menopause.

Preliminary

Eat a healthy diet. Researchers disagree on whether certain vegetables, fruits or supplements reduce risk for breast cancer. However, a healthy diet can help you lose weight or maintain normal weight, which can lower breast cancer risk. Here are the most important changes to make:

- Add more fruits, vegetables, beans and high-fiber grains. Substitute monounsaturated fats such as olive oil for saturated fats and animal fats. Avoid trans fats.
- Do not replace high-fat foods with simple carbohydrates such as white bread, rice and potatoes.
- Aim for a varied diet instead of eating the same foods every day.

Eat your omega-3's. Consider incorporating omega-3 fatty acids into your diet. Two servings a week of fatty fish, such as salmon, trout, herring, sardines, tuna and mackerel, are a good source of these fats, which may suppress the growth of tumor cells.. (You will need to be aware of the mercury content of some of these fish, especially if you are pregnant or might get pregnant.) If you don't eat much fish, ask your doctor whether you should take a dietary fish oil supplement of about 1,000 or 1,200 mg. The supplements may cause excessive bleeding in some people.

Ask about the risks of birth control pills. Overall, risk of breast cancer for users of birth control pills is small and appears to be confined to the short term. Risk levels return to normal within five to 10 years after discontinuing use. Because this is an area of ongoing study, talk with your doctor about the latest information on birth control pills and breast cancer.

Breast-feed your baby if possible. Some studies suggest that breast-feeding may slightly lower breast cancer risk, especially if it is continued for 18 to 24 months.

Avoid alcohol. Avoid alcohol if you are at heightened risk for breast cancer. One drink a day raises your risk by 10 percent, one recent study found. Three or more drinks a day raise it by 30 percent. It doesn't matter what kind of alcohol — wine, beer or hard liquor.

Consider aromatase inhibitors. If you are at high risk of breast cancer due to many factors, discuss aromatase inhibitors with your physician as an option. These drugs block an enzyme, aromatase, which is critical for estrogen production in women who have experienced menopause. They currently are used in women who have already had breast cancer, and clinical trials are under way to test whether aromatase inhibitors lower other women's risk of breast cancer. The approved drugs include Arimidex (anastrazole), Femara (letrozole), and Aromasin (exemestane). Aromatase inhibitors are not without side effects and may contribute to bone fractures and osteoporosis.

What should I tell my doctor?

- Has anyone in your family had breast cancer? How old were they when they were diagnosed?
- Have you found any unusual lumps during breast self-exams? Do you have nipple discharge, bleeding or breast pain?
- Are you are taking any hormones or medications that can cause breast tenderness or increase your risk of cancer? (Make a list of all the medications you are taking, as well as herbs or vitamins.)

What can my doctor do?

- Conduct a baseline breast examination.
- Depending on your age, risk and findings, send you for a mammogram or other screening test.
- Change or adjust medications if they may be contributing to symptoms or cancer risk.
- Refer you to a breast specialist if your history or findings are complex.
- Schedule you for regular mammograms.
- If your risk is extremely high, based on family history or other factors, refer you to specialists for further evaluation.

More information

You'll find even more information on this condition in the online version of your results. Log into your Member Account at www.navigenics.com to access:

- In-depth information on the general genetic understanding of this condition
- Details on the science behind your results
- Resources and groups that can provide even more information on this condition

(If you received your results through your doctor, ask your clinician to pass along this information.)

Celiac disease

Your estimated lifetime risk: **0.20% (20 per 10,000)**
Average lifetime risk: **0.11% (11 per 10,000)**

You have **7** of the **20** risk markers we looked for.

Gene or location [1]	Risk marker [2]	Your markers [3]	Odds ratio [4]	Source [5]
HLA-DQ2.5	**T**	C **T**	7.04	Nature Genetics, 2007
IL2-IL22 locus	**C**	**C** T	1.42	Nature Genetics, 2007
1q31	**A**	**A A**	1.99	Nature Genetics, 2008
3q25_3q26.2	**G**	A A	1.0	Nature Genetics, 2008
2q11_2q12	**T**	C **T**	1.27	Nature Genetics, 2008
CTLA4	**T**	C **T**	1.24	European Journal of Human Genetics, 2005
3q28	**A**	**A** C	1.21	Nature Genetics, 2008
6q25	**T**	C C	1.0	Nature Genetics, 2008
3q25_3q26.1	**C**	T T	1.0	Nature Genetics, 2008
SH2B3	**T**	C C	1.0	Nature Genetics, 2008

see page 6 for an explanation of this table format

What we found for celiac disease

We looked at 10 places on your genome where a one-letter difference in the genetic code affects your odds of celiac disease. At each location, there are two markers, for a total of 20 possible risk markers. The table above shows your markers. You have seven of the 20 risk markers we looked for.

What does it mean?

Your results don't mean you have celiac disease or ever will. But since you're at above average risk, you might want to watch for symptoms. Celiac disease affects less than 1 percent of the U.S. population. For the average U.S. woman, the chance of getting celiac disease over her lifetime is 11 per 10,000. Celiac disease is a chronic digestive problem caused by an inability to process gluten — a protein in wheat, rye and barley — so many common foods cause bloating, cramps or diarrhea. There's no cure, but it can be controlled with a gluten-free diet.

Celiac disease is a chronic digestive problem caused by an inability to process gluten — a protein in wheat, rye and barley — so many common foods cause bloating, cramps or diarrhea. There's no cure, but it can be controlled with a gluten-free diet.

What's next

- Do you have a family history, or frequent symptoms like gas, cramps or diarrhea?
- If you have concerns, see your doctor, but don't stop eating wheat right away — it could delay diagnosis.

Early detection

Symptoms

Think about whether you might have early symptoms or a family history of the disease. Celiac disease symptoms are non-specific, meaning that they are similar to those of many other disorders.

People with celiac disease may experience a wide variety of symptoms, or in some cases, none at all. Intestinal symptoms may include cramping, gas, bloating, pain, diarrhea, constipation and stools that are pale, fatty or foul-smelling. Other symptoms may include unexplained weight loss, anemia, cessation of menstrual periods, a smooth tongue, cracks in the corners of the mouth, leg swelling or fatigue.

Testing

If you are at increased risk for the disease (either because of genetic markers or a family history), monitor your health and symptoms and talk with your doctor about possible testing for the disease.

Many doctors agree that testing for the presence of active disease should occur only if symptoms have arisen, or if there are other seemingly unrelated conditions that might indicate disease, such as a rash called dermatitis herpetiformis (with red, blistering, itchy skin). But some people may want to be tested even if they have no signs of the disease.

The first step is a blood test that looks for high levels of certain antibodies — the proteins that the immune system produces in reaction to the presence of gluten — which act against the body's own tissues. The preferred test is the IgA TTG (immune globulin A tissue transglutaminase), but there are others that may be appropriate as well.

If that test is positive, the next step usually is to take a biopsy of the lining of the small intestine, to look for changes in the tissues. The biopsy sample is taken by passing a thin tube (an endoscope) through the mouth, esophagus and stomach and into the small intestine, using tiny instruments to take tissue samples. A biopsy is usually necessary to confirm the presence of celiac disease.

The disease can be further confirmed if a gluten-free diet eases the symptoms.

What you can do

There's no proven way to prevent celiac disease. But knowing what to look for can lead to earlier diagnosis, fewer symptoms and fewer complications.

Preliminary

Delay gluten in infants. Some studies suggest that parents with the disease should introduce gluten into their infants' diets between 4 and 6 months. Earlier or later introduction was associated with increased risk of developing the condition for infants who carried genetic markers for celiac disease.

What should I tell my doctor?

- Do you have any symptoms or family history?
- Have you ever been told you have iron deficiency anemia, Vitamin D deficiency or osteoporosis?
- Are you concerned enough to want testing?

What can my doctor do?

- Order blood tests looking for general medical problems such as anemia or protein deficiency, which can be signs of celiac disease.
- Order specific blood tests for celiac disease, such as IgA TTG (immune globulin A tissue transglutaminase).
- Refer you to a gastroenterologist for consultation. To diagnose you definitively, the gastroenterologist may have to do more invasive tests.
- Put you on a gluten-free diet, if you are diagnosed with celiac disease. You will need to become familiar with foods that contain hidden gluten and learn where to buy gluten-free foods.

More information

You'll find even more information on this condition in the online version of your results. Log into your Member Account at www.navigenics.com to access in-depth information on the general genetic understanding of this condition, details on the science behind your results, and resources and groups that can provide even more information on this condition. (If you received your results through your doctor, ask your clinician to pass along this information.)

Colon cancer

Your estimated lifetime risk: **4.1% (41 per 1,000)**
Average lifetime risk: **5% (50 per 1,000)**

You have **1** of the **10** risk markers we looked for.

Gene or location [1]	Risk marker [2]	Your markers [3]	Odds ratio [4]	Source [5]
CRAC1	**T**	C **T**	1.2	Nature Genetics, 2008
8q24	**G**	T T	1.0	Nature Genetics, 2007
EIF3H	**C**	A A	1.0	Nature Genetics, 2008
SMAD7	**T**	C C	1.0	Nature Genetics, 2007
11q23	**C**	A A	1.0	Nature Genetics, 2008

see page 6 for an explanation of this table format

Navigenics tests for common markers associated with colon cancer. Much less common are single-gene mutations that can lead to colon cancer, which Navigenics does not test for. If you answer "yes" to any of these questions, you should consult your physician, who may refer you to a genetic counselor.

- Have you or anyone in your family had colon cancer before the age of 50, or multiple colon polyps?
- Have two or more close relatives on the same side of your family (maternal or paternal) had colon, uterine or ovarian cancer, or has one relative had more than one of these cancers?
- Do you have Ashkenazi (Eastern European) Jewish ancestry and at least one family member with colon cancer at any age?
- Do you have any relatives with an identified genetic mutation that increases their risk for cancer?

What we found for colon cancer

We looked at five places on your genome where a one-letter difference in the genetic code affects your odds of colon cancer. At each location, there are two markers, for a total of 10 possible risk markers. The table above shows your markers. You have one of the 10 risk markers we looked for.

What does it mean?

You are at below-average risk for colon cancer, the second-leading cause of cancer-related death in the United States. Many deaths from this disease are preventable through regular screening, and lifestyle measures may prevent colon cancer from developing. Exercising and eating a healthy diet (lots of fruits and veggies, not so much red meat or alcohol) may also help lower your chances of getting colon cancer. About three in a thousand Americans suffer from colon cancer at any given time, and the average U.S. female has a 5 percent chance of developing colon cancer over her lifetime. Your risk increases with age — the vast majority of colon cancer diagnoses happen after age 50.

Exercising and eating a healthy diet (lots of fruits and veggies, not so much red meat or alcohol) may also help lower your chances of getting colon cancer. Your risk increases with age — the vast majority of colon cancer diagnoses happen after age 50.

Ethnic variation

Most conditions have only been studied in people of European ancestry, but this one also has been studied in other groups.

What's next

- Over 50? Make sure you're getting screened.
- Under 50? If you have family history or symptoms, your doctor might start screening early.
- Another good reason to improve your diet and exercise.

Early detection

Points to remember

- Your test does not mean you definitely will or will not get colon cancer — it's not a diagnosis, just an indicator of your risk.
- If you are under 50, your doctor is unlikely to order a colonoscopy unless you also have symptoms, a family history, or increased risk based on a genetic test. The colonoscopy is an invasive test that can cause complications.
- A more likely recommended course of action might be annual fecal occult blood tests, a healthy lifestyle and regular visits to your doctor.
- If you have Crohn's disease or your Navigenics test indicates that you are at increased risk for Crohn's disease as well as colon cancer, it's important to be alert to potential Crohn's symptoms and treat them promptly. Treating inflammation of the bowel can reduce colon cancer risk.

Symptoms

Colon cancer often causes no symptoms for years. But you should see your doctor if you have any of the following signs:

- A change in bowel habits that lasts for more than a few days. That can include diarrhea, constipation or stools that are narrower than usual.
- A feeling that you need to have a bowel movement that is not relieved by doing so.
- Blood (bright red or dark red) in the stool.
- Frequent gas pains, bloating, fullness or cramps.
- Jaundice (yellowing of skin and eyes).
- Weakness and fatigue.
- Vomiting.
- Unexplained weight loss.

Testing

Experts are not in total agreement over which screening tests should be done, at what age they should start or how often they should be performed. But all agree that the most thorough and accurate test is a colonoscopy.

- Colonoscopy: Although some doctors perform the procedure without anesthesia, it's most likely that you will be mildly sedated for it. The doctor inserts a slender, flexible tube equipped with a light and tiny camera into your rectum and threads it through the length of the colon to examine the inside walls of the intestine. If any polyps or other abnormalities are found, they can be removed and biopsied. Because colonoscopies are costly and can cause complications, some experts recommend them as a first-line screening test only for people who have an increased risk of colon cancer because of their medical or family history. How often the procedure should be done depends on a person's individual risk. The American Cancer Society recommends that people at average risk for colon cancer get a colonoscopy every 10 years. Those at higher risk probably will need more frequent screenings, on the order of every three to five years. (You might want to schedule your colonoscopy first thing in the morning: One study found that the first colonoscopies of the day tended to find more polyps.)

- Fecal occult blood test: You use a special kit provided by your physician or pharmacy to check your stool for hidden blood. If the test is positive, a follow-up colonoscopy is recommended. The test is easy and inexpensive, but also has a high rate of both false negatives and false positives.
- Immunochemical fecal occult blood test: A newer kind of stool blood test, this works like the fecal occult blood test but is not affected by foods or vitamins, and so is less apt to produce a false positive result. If the test does suggest there's blood in your stool, your doctor will probably follow up with a colonoscopy or other appropriate diagnostic test.
- Stool DNA test: Instead of looking for blood in the stool, this test looks for abnormal DNA from cancer or polyp cells. It may produce false negatives as well as false positives. It is more expensive than some of the other tests, and like other stool screening tests requires a colonoscopy to confirm positive results.
- Flexible sigmoidoscopy: Your doctor inserts a slender, flexible tube with a light and tiny camera into your rectum to examine the lower third of the colon. The test is not able to detect abnormalities in the upper colon, meaning it could miss as many as half of all colon cancers, and if polyps or other suspicious lesions are found on sigmoidoscopy, you'll need a full colonoscopy. Also, unlike a colonoscopy, a sigmoidoscopy is done without sedation. This may appeal to some people, but can be moderately uncomfortable. Because of the limitations of stool occult blood tests and of sigmoidoscopy compared to colonoscopy, the American Cancer Society recommends getting a stool test every year and a sigmoidoscopy every five years.
- Double contrast barium enema: You will be given an enema that contains a white dye called barium and then a radiologist will take X-rays of your colon after it has been filled with air, looking for suspicious growths. If any are found, your doctor will probably follow up with a colonoscopy. Though simpler and less expensive than a colonoscopy, double contrast barium enema is also less accurate.
- Virtual colonoscopy: This relatively new test works like a barium X-ray but uses an imaging technology similar to a CT scan. A federal study concluded that it is effective at detecting large cancers and precancerous growths in people who are at average risk for colon cancer. It can be uncomfortable, though, because unlike a colonoscopy, it is generally done without anesthesia. It is starting to gain acceptance, but does have some drawbacks.

What you can do

Good news: The Harvard Center for Cancer Prevention recently reported that regular screening combined with a healthy lifestyle can prevent more than half of all colon cancer deaths in the United States. This is one of the most preventable cancers.

Clinically proven

Get screened. It's a good idea to consider having regular screening tests starting at age 40 or earlier if you are at increased risk due to genetic markers, family history, symptoms, or certain other conditions that raise your risk, such as ulcerative colitis. Medical guidelines recommend that everyone else should start being screened at age 50. With a colonoscopy, polyps can be detected and removed before they have the chance to become cancerous. Screening can also pick up colon cancers early, when treatment is most effective. There are many different screening options; see the "Early detection" section for more details.

Promising

Consider taking baby aspirin. Ask your doctor whether you should take a baby aspirin (81 mg) every day. A study published in 2003 followed 1,100 patients who had had precancerous polyps or colon cancers removed. They found that those who took a baby aspirin daily were 20 percent less likely to develop additional polyps and 40 percent less likely to suffer a recurrence of their cancer. (Note, however, that even baby aspirin may cause gastrointestinal bleeding.)

Preliminary

Maintain a healthy weight. Studies suggest that obesity — particularly if the excess weight is centered on your belly — may increase your risk for polyps and colon cancer by 50 to 80 percent. Experts suspect that may be because obesity can lead to higher levels of insulin in your blood, which in turn may promote abnormal cell growth in the colon.

Eat a healthy diet. The typical Western diet — heavy on red meat and saturated fats, light on fruits, vegetables and fiber — has long been associated with a heightened risk of colon cancer. There's no lone culprit here, nor any single food that can prevent the illness. But an overall healthy diet may lower cancer risk.

- Limit your consumption of red meat to no more than twice a week. Studies have consistently found that people who eat a lot of beef, pork or lamb have higher rates of colon cancer.
- Get plenty of fiber. A number of studies have found that people with a fiber-heavy diet have lower rates of colon cancer and pre-cancerous polyps. Though it's not clear what the optimal dose might be, experts recommend a bowl of bran cereal for breakfast or a daily tablespoon of a psyllium supplement such as Metamucil.
- Limit your alcohol intake. Colon cancer has been linked with heavy drinking. The American Cancer Society recommends men have no more than an average of two drinks a day and women average no more than one a day. (A drink is defined as one beer, one glass of wine or one shot of alcohol.)
- Eat apples. Substances in apples called oligomeric procyanidins may help prevent colon cancer.

Eat your omega-3's. Consider incorporating omega-3 fatty acids into your diet. Two servings a week of fatty fish, such as salmon, trout, herring, sardines, tuna and mackerel, are a good source of these fats, which may suppress the growth of tumor cells. (You will need to be aware of the mercury content of some of these fish, especially if you are pregnant or might get pregnant.) If you don't eat much fish, ask your doctor whether you should take a dietary fish oil supplement of about 1,000 or 1,200 mg. The supplements may cause excessive bleeding in some people.

Get regular exercise. Studies from around the world have consistently shown that physical activity can decrease the risk of colon cancer by as much as 50 percent. Exercise may help the bowel work well and also reduces levels of blood sugars and insulin, both of which can promote tumor growth. The more exercise, the stronger the effect, but even a moderate level of activity — such as three hours of brisk walking a week — can substantially lower your risk.

Consume calcium. Make sure you get adequate amounts of calcium, either through diet or a supplement. (The recommended intake for people aged 19-50 is 1,000 mg per day; for those over 50, 1,200 mg.) Very low levels are associated with a greater risk of pre-cancerous polyps and colon cancer.

Don't smoke. Smoking increases your risk of developing colon cancer and cancer-causing polyps. Smokers are 30 to 40 percent more likely than non-smokers to die from colon cancer. Women, in particular, should take note: One study found that smoking raises a woman's chances of colon cancer even more than it does a man's.

Get enough vitamin D. There's emerging evidence that this vitamin may help protect against many forms of cancer, including colon cancer. In people who'd already had at least one colon polyp, taking 800 IU of vitamin D per day increased colon cells' production of a protein that helps kill damaged cells, one study found. Talk your physician about the right amount for you.

What should I tell my doctor?

- Has anyone in your family ever had colon cancer, and at what age?
- Have you noticed any changes in your bowel movements, especially constipation, narrowing of the stools or blood in the stool?
- Are you having regular abdominal pain or losing weight without trying?
- Could anything else be causing these symptoms, such as stress, anxiety or depression; dietary changes or excesses; medication or herbs; or unusual travel where you might have picked up a parasite?
- Are you taking aspirin or any other anti-inflammatory drugs?
- Are you worried enough to want testing?

What can my doctor do?

- Take a careful history and do a physical.
- Check several stool samples for blood.
- Order blood tests for anemia, among other things.
- Refer you to a specialist, if needed. The gastroenterologist may elect to do a colonoscopy or other tests.

More information

You'll find even more information on this condition in the online version of your results. Log into your Member Account at www.navigenics.com to access:

- In-depth information on the general genetic understanding of this condition
- Details on the science behind your results
- Resources and groups that can provide even more information on this condition

(If you received your results through your doctor, ask your clinician to pass along this information.)

Crohn's disease

Your estimated lifetime risk: **0.52% (52 per 10,000)**
Average lifetime risk: **0.54% (54 per 10,000)**

You have **20** of the **54** risk markers we looked for.

Gene or location [1]	Risk marker [2]	Your markers [3]	Odds ratio [4]	Source [5]
NOD2 (CARD15)-1007fs	**Extra C**	No Extra C's	1.0	European Journal of Human Genetics, 2007
NOD2 (CARD15)-G908R	**C**	**C** G	3.05	European Journal of Human Genetics, 2007
NOD2 (CARD15)-R702W	**T**	C C	1.0	European Journal of Human Genetics, 2007
LRRK2_MUC19	**T**	C C	1.0	Nature Genetics, 2008
PTGER4	**G**	T T	1.0	Nature, 2007
PTPN2	**G**	T T	1.0	Nature, 2007
IRGM	**T**	C C	1.0	Nature, 2007
IL23R	**T**	C C	1.0	Nature, 2007
ATG16L1	**T**	C **T**	1.19	Nature, 2007
BSN	**A**	G G	1.0	Nature, 2007
PTPN22	**G**	**G G**	1.72	Nature Genetics, 2008
chr10.101277754	**G**	A A	1.0	Nature, 2007
13q14	**G**	A A	1.0	Nature Genetics, 2008
ZNF365	**G**	A **G**	1.23	Nature, 2007
TNFSF15	**G**	**G G**	1.49	Nature Genetics, 2008
CCR6	**T**	C C	1.0	Nature Genetics, 2008
7p12	**A**	**A A**	1.44	Nature Genetics, 2008
1q24	**G**	A **G**	1.19	Nature Genetics, 2008
1q32	**T**	C **T**	1.18	Nature Genetics, 2008
21q21	**T**	**T T**	1.39	Nature Genetics, 2008
STAT3	**A**	**A** G	1.18	Nature Genetics, 2008
6q21	**C**	G G	1.0	Nature Genetics, 2008
10p11	**G**	**G G**	1.35	Nature Genetics, 2008
C11orf30	**T**	C **T**	1.16	Nature Genetics, 2008
ICOSLG	**G**	A **G**	1.13	Nature Genetics, 2008
ORMDL3	**A**	**A** G	1.12	Nature Genetics, 2008
8q24	**A**	**A** G	1.08	Nature Genetics, 2008

see page 6 for an explanation of this table format

What we found for Crohn's disease

We looked at 27 places on your genome where a one-letter difference in the genetic code affects your odds of Crohn's disease. At each location, there are two markers, for a total of 54 possible risk markers. The table above shows your markers. You have 20 of the 54 risk markers we looked for.

For most markers, we look to see if one of two specific letters is present at a specific place in the genetic code. For example, you may have an "A," which is associated with an increased odds of Crohn's, instead of a "T," which doesn't confer a risk.

However, one of the markers for Crohn's disease, the NOD2 (CARD15)-1007fs marker, works a little differently. For this marker we look to see if there is an extra letter in the genetic code, specifically a "C," also known as an insertion. Having this extra "C" increases the odds of having Crohn's, while having no extra "C" does not.

What does it mean?

You have an about average risk of developing Crohn's disease. Since this disease is hard to diagnose, knowing about your risk may help you and your doctor if you ever develop symptoms. Crohn's affects about two in a thousand Americans at any given time. Over the course of her lifetime, the average U.S. female has a 54 per 10,000 chance of developing Crohn's disease. Crohn's is a chronic condition that causes a wide range of digestive problems, because of inflammation in the gut and other organs. Most people with Crohn's are diagnosed between the ages of 20 and 30.

Crohn's is a chronic condition that causes a wide range of digestive problems, because of inflammation in the gut and other organs. Most people with Crohn's are typically diagnosed at one of two points in life — either in their teens and 20s, or between the ages of 50 and 70.

What's next

- Persistent intestinal problems? This might be why.
- If you smoke, it's another good reason to stop.

Early detection

Points to remember

- Early diagnosis and treatment can slow or halt the progression of the disease.
- Proper diagnosis can prevent unnecessary intestinal surgeries.

Symptoms

Crohn's disease can mimic symptoms of other condition. Symptoms include:

- Ongoing change in bowel habits
- Persistent abdominal pain
- Bloating and gas
- Diarrhea that does not respond to over-the-counter medications
- Constipation
- Fever, skin rash, joint pain, anemia, mouth ulcers
- Blood in your stool

Testing

There is no single test used to diagnose the condition. Your doctor probably will suggest a number of tests that may rule out other conditions and reveal more information about what is occurring in your body. These may include blood tests, colonoscopy, special X-rays of the GI tract, CT scan and tissue biopsy.

What you can do

Crohn's disease is the great masquerader. It can present with many different symptoms or no symptoms at all, and can take years to diagnose. Correct diagnosis is important for prompt treatment and to avoid unnecessary surgery and complications. Once diagnosed, there are treatment options that can help.

Promising

Don't smoke. Smokers have approximately twice the chances of developing Crohn's disease as non-smokers, and smoking also increases the severity of the disease.

Preliminary

Eat your omega-3's. Consider incorporating omega-3 fatty acids into your diet. Two servings a week of fatty fish, such as salmon, trout, herring, sardines, tuna and mackerel, are a good source of these fats, which can help reduce inflammation. (You will need to be aware of the mercury content of some of these fish, especially if you are pregnant or might get pregnant.) If you don't eat much fish, ask your doctor whether you should take a dietary fish oil supplement of about 1,000 or 1,200 mg. The supplements may cause excessive bleeding in some people.

What should I tell my doctor?

- Does anybody in your family have Crohn's disease or other inflammatory bowel diseases, such as ulcerative colitis?
- Do you have symptoms of the disease, such as abdominal pain and cramps, vomiting, bloating, gas, diarrhea, constipation, blood in your stool or weight loss?
- Do you have anal pain, infection or bleeding?
- Do you have fever, skin rash, joint pain, anemia or mouth ulcers?
- Do any foods give you discomfort? (Intolerance or allergies to milk or wheat products can mimic Crohn's disease.)

What can my doctor do?

- If you don't have any symptoms, monitor you over time for early signs of the disease.
- Refer you to a gastroenterologist, an intestinal disease specialist, for evaluation. Depending on your symptoms, you may get further testing, such as a colonoscopy or intestinal X-rays.
- If you are diagnosed with Crohn's disease, prescribe treatment that may include drugs or surgery.
- Recommend surgery to remove diseased sections of the GI tract or remove scar tissue. (Surgery does not cure the disease, however, as the inflammation often recurs in a new area.)

More information

You'll find even more information on this condition in the online version of your results. Log into your Member Account at www.navigenics.com to access:

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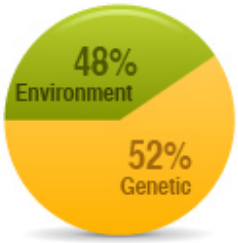
(If you received your results through your doctor, ask your clinician to pass along this information.)

Deep vein thrombosis

Your estimated lifetime risk: **3.4% (34 per 1,000)**
Average lifetime risk: **3.6% (36 per 1,000)**



You have **2** of the **8** risk markers we looked for.

Gene or location [1]	Risk marker [2]	Your markers [3]	Odds ratio [4]	Source [5]
F5-Leiden	**T**	C C	1.0	Journal of the American Medical Association, 2008
F2-G20210A	**A**	G G	1.0	Journal of the American Medical Association, 2008
SERPINC1	**T**	C **T**	1.29	Journal of the American Medical Association, 2008
CYP4V2	**A**	**A** C	1.18	Journal of the American Medical Association, 2008

see page 6 for an explanation of this table format

An increased likelihood of having a deep vein thrombosis (DVT) can be inherited or acquired. The most common inherited causes are factor V Leiden and the prothrombin G20210A mutation, which are included in the Navigenics test. (Additional confirmation of a positive test, however, is always appropriate.)

Another common risk factor for DVT is having elevated levels of homocysteine in the blood; this can be either inherited or acquired. Other genetic risk factors for DVT include Protein C, Protein S, and antithrombin deficiencies. Navigenics does not currently offer testing for these rare factors, which are measured by testing the levels of these substances in the body, rather than by a genetic test.

Regardless of your Navigenics test results, if you have a personal or family history of DVT, especially in someone under age 50; if the same relative had more than one clot; or if there is a family history of recurrent pregnancy loss (e.g. the same person has had more than three pregnancy losses), there may be an underlying genetic cause not covered by the Navigenics panel. If any of these circumstances apply in your family, it's a good idea to consult with your healthcare provider to determine whether additional testing may be appropriate.

What we found for deep vein thrombosis

We looked at four places places on your genome where a one-letter difference in the genetic code affects your odds of DVT. At each location, there are two markers, for a total of eight possible risk markers. The table above shows your markers. You have two of the eight risk markers we looked for.

What does it mean?

Based on the genetic markers we test for, your risk for deep vein thrombosis is about average. But remember that about half the risk for this condition comes from non-genetic factors. Taking certain basic precautions can help you lower your risk even further. Less than 1 percent of Americans suffer from deep vein thrombosis at any given time, and over the course of her lifetime, the average U.S. female has a 3.6 per 100 chance of developing deep vein thrombosis.

What's next

- If you are at increased risk for DVT, discuss the safety of estrogen-based oral contraceptives and hormone therapy with your doctor.
- Long trip planned? If you'll be in the car or on a plane for more than six hours, take periodic exercise breaks, flex your leg muscles, move your legs around and consider wearing compression stockings.

Early detection

Points to remember

One recent study showed that exposure to air pollution can raise the risk of DVT.

Symptoms

DVT itself can bring on leg redness, warmth, swelling, pain and difficulty walking. (Elderly people are less likely to show symptoms other than swelling.) Many people with deep vein thrombosis, however, have only mild symptoms or none at all.In such cases, the condition is discovered only after complications or a pulmonary embolus (a blood clot in the lungs) develops. Pulmonary embolus symptoms include:

- sharp chest pain that gets worse when you breathe deeply
- shortness of breath
- rapid breathing
- a fast pulse

Testing

To diagnose deep vein thrombosis or pulmonary embolism, your doctor may want to do the following tests:

- a blood test called D-dimer that checks for clotting particles
- an ultrasound scan for clots in the veins in your legs
- a CAT scan or MRI of your lungs if pulmonary emboli are suspected. A lung scan with radioactive isotope might be done for similar reasons.
- A venogram or angiogram, X-rays taken after injecting dye through a catheter to check for leg or lung clots

What you can do

If you have a blood clot in your leg, you may or may not have obvious symptoms. These clots can be particularly dangerous if they migrate to your lungs. By being aware of your risk, you can take steps to minimize the chances that a clot will form.

Clinically proven

- **Move about.** Break up extended inactivity — especially when traveling for longer than six hours — by moving your legs and walking around. The American Council on Exercise offers tips for leg exercises to do while flying (some of which can be done in a car, depending on whether you are driving). On long trips, drink plenty of fluids, but avoid coffee and alcohol, which can dehydrate you.
- **Consider short-term medications.** Before long plane or car trips, ask your doctor if you should take aspirin or other anticoagulants (medications that thin the blood to help prevent clots), depending on your degree of risk. Don't just take aspirin on your own, though. And since the available anticoagulants have different mechanisms of action and side effects, you need your doctor's input on which medication, if any, is right for you.
- **Get up and around.** During pregnancy and after childbirth, illness or surgery, get up and move about as soon as your doctor recommends. These are times when people are particularly prone to blood clots. Aside from lowering the chance of DVT, exercise can reduce discomfort and speed recovery.

Consider discontinuing hormone replacement therapy. HRT has been linked to increased risk of DVT, probably because it makes your blood clot more readily. Be sure to discuss the pros and cons with your doctor.

Lose weight. Being overweight raises the likelihood that you'll develop DVT.

Preliminary

Exercise regularly. For most people, regular exercise (with the consent of a physician) can keep blood circulating properly and reduce DVT risk. One caveat: If you already have DVT or are over 65, don't exercise without consulting your doctor first. One recent study found that for people over 65, strenuous exercise actually increased the risk of DVT, while moderate exercise did not.

Eat fruits and vegetables. Consuming four or more servings daily has been linked with a lower incidence of DVT.

Eat fish. Having at least one serving of fish a week has been associated with a lower incidence of DVT. The omega-3 fatty acids found in fish tend to thin the blood. (If you eat fish regularly, our chart can help you make healthy choices; particularly if you are or might become pregnant, it's important to pay attention to the mercury content.)

Stop smoking. Some studies have found that smoking increases the risk of DVT.

Consider special stockings. Your doctor may recommend thigh-high compression stockings (typically available at pharmacies) to reduce the risk of blood clots in the legs during pregnancy, after surgery or on long trips.

Sit comfortably. Avoid sitting with your legs crossed for long periods of time; this constricts your veins.

What should I tell my doctor?

- Have you experienced symptoms of blood clots or pulmonary emboli such as leg pain or swelling, or shortness of breath together with sharp chest pain?
- Do you have a family history of hypercoagulability (blood that clots too easily) or have any relatives ever had a blood clot?
- Have you suffered any trauma to your legs?
- Do you have a tendency to develop varicose veins?
- Have you had major surgery?
- Do you have diabetes?
- Have you been treated for cancer?
- Have you undergone or do you anticipate stretches of inactivity, such as recovering from surgery or going on extended car or plane trips?
- Are you pregnant or have you recently given birth?
- Have you or any close family members had a history of recurrent pregnancy loss (more than 3 pregnancies lost after 20 weeks gestation)?
- Do you take medications such as estrogen replacement therapy, oral contraceptives or erythropoietin (a hormone that promotes the production of red blood cells)?
- Do you smoke?

What can my doctor do?

- Test your blood for clotting factors and, depending on the results, perhaps test other members of your family to see if they carry an increased risk of clotting
- Refer you to a hematologist who specializes in clotting
- If your blood tests indicate a clotting problem, suggest aspirin or anticoagulant drugs
- In advanced cases, recommend surgery to install a mechanical filter, which prevents blood clots in the legs from traveling to the heart and lungs
- Have you wear graduated compression stockings
- If you're required to be inactive after surgery, put you on mechanical compression to keep blood circulating in your legs and have you consider anticoagulation drugs

More information

You'll find even more information on this condition in the online version of your results. Log into your Member Account at www.navigenics.com to access:

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- Resources and groups that can provide even more information on this condition

(If you received your results through your doctor, ask your clinician to pass along this information.)

Diabetes, type 2

Your estimated lifetime risk: **31% (31 per 100)**
Average lifetime risk: **30% (30 per 100)**

You have **20** of the **36** risk markers we looked for.

Gene or location [1]	Risk marker [2]	Your markers [3]	Odds ratio [4]	Source [5]
chr11.41871942	**C**	**C C**	2.61	Science, 2007
TCF7L2	**T**	A A	1.0	Nature, 2007
LOC441171	**A**	G G	1.0	American Journal of Human Genetics, 2007
KCNQ1	**A**	**A A**	1.54	Nature Genetics, 2008
PPARG	**C**	**C C**	1.53	Science, 2007
CDKAL1	**G**	A A	1.0	Nature Genetics, 2007
FTO	**A**	**A** C	1.16	Science, 2007
CDKN2A/B	**T**	**T T**	1.39	Science, 2007
SLC30A8	**C**	**C C**	1.39	Science, 2007
NOTCH2	**T**	G **T**	1.13	Nature Genetics, 2008
KCNJ11	**C**	**C** T	1.12	Science, 2007
IGF2BP2	**T**	G **T**	1.16	Science, 2007
JAZF1	**T**	C C	1.0	Nature Genetics, 2008
HHEX	**C**	**C C**	1.2	Science, 2007
WFS1	**G**	A **G**	1.03	Nature Genetics, 2007
17q12-TCF2	**G**	A **G**	1.08	Nature Genetics, 2007
ADAMTS9	**C**	**C C**	1.19	Nature Genetics, 2008
TSPAN8	**C**	T T	1.0	Nature Genetics, 2008

see page 6 for an explanation of this table format

What we found for diabetes, type 2

We looked at 18 places on your genome where a one-letter difference in the genetic code affects your odds of type 2 diabetes. At each location, there are two markers, for a total of 36 possible risk markers. The table above shows your markers. You have 20 of the 36 risk markers we looked for.

What does it mean?

Your risk for type 2 diabetes is about average. If you want to lessen your chances of getting diabetes, changing your diet and exercise habits can have a powerful preventive benefit. Type 2 diabetes affects about 7 percent of the U.S. population, and over the course of her lifetime, the average U.S. female has a 30 percent chance of developing the disease. As type 2 diabetes progresses, it damages internal organs such as your heart and kidneys. There is no cure, but you can control it with diet, exercise, weight control and, in some cases, oral medication or insulin injections.

As type 2 diabetes progresses, it damages internal organs such as your heart and kidneys. There is no cure, but you can control it with diet, exercise, weight control and, in some cases, oral medication or insulin injections.

Ethnic variation

Most conditions have only been studied in people of European ancestry, but this one also has been studied in other groups.

What's next

- If you're overweight, try to shed a few pounds. Losing just 5 to 7 percent of your body weight can protect you and, in some cases, actually reverse the disease.
- Get more movement into your life: Start incorporating aerobic exercise as well as resistance and flexibility training.
- Lighten your diet: Eat more fresh fruits and vegetables as well as whole grains and cereals. Trim your intake of high-fat and processed foods.
- Talk to your doctor about how often your blood sugar should be tested. Be ready to share any family history or symptoms you have.

What you can do

You can delay or prevent diabetes by paying careful attention to your health habits. And the changes you make probably will make you feel better in general.

Clinically proven

If you are overweight, drop a few pounds. You can lower your risk substantially by shaving off just 5 to 10 percent of your current weight. Aim for a BMI (body mass index) of less than 25. MayoClinic.com's BMI calculator or others like it can help you figure out your BMI, a measure based on your weight and height.

Trim your waistline. Fat around the belly is more dangerous than fat that accumulates elsewhere. It raises your risk for hypertension and heart disease. Happily, it's often one of the first places to get slimmer when you begin losing weight. Women should aim for a waist-to-hip ratio of no more than .7; men for no more than .9. That means your waist measurement is less than 70 percent (or 90 percent) of your hip measurement. A waist-hip ratio calculator can help you find your ratio.

Lighten your diet. Changing your eating habits can pay huge dividends. Aim for a reduced-calorie, low-fat diet, but also strive to make healthful eating an enjoyable part of your life by including foods you like.

- Eat 2 1/2 to 6 1/2 cups a day of colorful fruits and leafy greens, as well as non-starchy veggies like spinach, broccoli and green beans. These contain nutrients that are protective for many organs, such as your heart, brain, and blood vessels.
- Avoid refined carbohydrates and sugar. When you eat carbohydrates, make them complex carbs such as whole grains.
- Use herbs and spices for flavor, and also because they are packed with vitamins and chemicals that may be good for you. Cinnamon, for example, is cited by several small studies as helping blood sugar and cholesterol, though a recent meta-analysis of collected studies could not confirm this. You might sprinkle it on your oatmeal anyway, because it is tasty.
- Try lemon or balsamic vinegar and olive oil instead of bottled salad dressings.
- Certain vegetables actually release their nutrients better when cooked. Lycopene, for example, is a powerful antioxidant found in cooked tomatoes and other red vegetables. Carrots, zucchini and broccoli are better boiled than steamed, fried or raw.
- Try to get more protein from plants; incorporate dried beans, which contain calcium, and whole grains for their fiber and trace minerals into your cooking.
- Eat fish two to three times a week. Look for fish that are high in omega-3 fatty acids but low in mercury. Check out an online guide from the Washington state Health Department.
- Choose lean meats, tofu or chicken and turkey without the skin.
- Read labels; avoid processed foods containing saturated and trans fats as well as added salt and sugar.
- Stay away from sweetened sodas and juices.
- Choose low-fat or nonfat milk products.

Keep an eye on portion size. That bottle of juice may list calories for a single serving, but contain enough for two servings. Eating too much of even healthful foods can lead to weight gain. In restaurants, divide large portions of food. Guidance on portion size can be found on the diabetes food pyramid on the American Diabetes Association Web site.

Get moving. Thirty minutes of moderate-intensity exercise, five days a week — a total of 150 minutes — can do great things for your metabolism and mood. Brisk walking, swimming, dancing, biking, hiking and basketball all qualify. Walking is especially easy to fit into a busy schedule. Work in extra steps throughout your day: Get off the bus a few blocks from your stop, park at a distance from stores you visit, take the stairs instead of the escalator. Exercise can work better than medication in maintaining a healthy metabolism. Add in strength training to build muscle and stretches for overall flexibility. Research shows that willpower, like muscle, can be developed with practice. Concentrating on a few goals at a time can improve your likelihood of succeeding. Even modest amounts of exercise can help.

Control cholesterol and blood pressure. These are risk factors for heart disease, which is spurred by diabetes. If your HDL cholesterol (the "good" kind) is less than 35 milligrams/deciliter, your triglycerides are above 250 milligrams/deciliter, or your blood pressure is 140/90 or higher, talk with your doctor about how you can improve those numbers. (Following the suggestions for diet and exercise may help.)

Promising

Eat foods that are slowly digested. Whole grains, fruits and vegetables tend to keep your blood sugar levels steady after meals, which reduces wear and tear on your insulin-producing cells. Research suggests that eating more of these foods lowers blood lipid levels and inflammation, a cascading process that can lead to heart disease. One study notes that oatmeal for breakfast lowers blood sugar levels for a few hours.

Preliminary

Drink tea or coffee. Some studies have found that that drinking tea or coffee lowers the risk of diabetes. But coffee or caffeine may also have negative health effects, so check with your doctor before increasing your intake.

Look for colorful foods. Choose foods that contain natural dietary antioxidants, often deeply pigmented fruits and vegetables such as pomegranates, spinach, broccoli, cherries and grapefruit. Antioxidants in laboratory settings and animal research have been shown to protect cells against damage.

Eat nuts. Nuts such as almonds may have a stabilizing effect on post-meal blood sugar spikes and contain beneficial omega-3 fatty acids.

Early detection

Symptoms

Many people with diabetes have very mild symptoms, or none at all. Often, diabetes is diagnosed only after the onset of severe complications, such as stroke, heart disease, eye damage or nerve damage. Early diagnosis and treatment of diabetes can help you avoid these complications.

Watch for:

- Unexplained fatigue
- Frequent urination
- Unexplained weight loss
- Increased thirst and hunger
- Blurred vision
- Wounds that won't heal

Testing

Talk with your doctor about how often you should be tested for type 2 diabetes. The disease can be diagnosed with simple blood tests:

- The fasting plasma glucose test measures your blood glucose level after an eight-hour fast. A reading of 100 milligrams/deciliter or lower is considered normal, 100-125 mg/dl indicates pre-diabetes, and 126 or higher means diabetes.

- In an oral glucose tolerance test, blood samples are taken before and after ingesting a high-glucose drink. An A1C (also known as glycated hemoglobin or HbA1c) test gives a picture of your average blood glucose control for the past two to three months with one blood draw. This test measures the percentage of extra glucose that enters your red blood cells and links up (or glycates) with molecules of hemoglobin.

What should I tell my doctor?

- Do you have any symptoms of diabetes, such as increased thirst or appetite, weight loss despite increased appetite, increased urination, blurred vision or fatigue?
- Do you have a family history of diabetes?
- Has anyone ever mentioned that you had a high or borderline blood sugar?
- Are you taking any medication that can raise your blood sugar, such as corticosteroids like prednisone?
- Are you under extreme stress, which can elevate your blood sugar?
- Do you drink alcohol?
- What is your current weight in comparison to what it has been in the past?
- Have you had polycystic ovary syndrome?
- Have you experienced gestational diabetes or given birth to a child who weighed over 9 pounds?

What can my doctor do?

- Order blood tests to get a baseline reading of your blood sugar, probably including a fasting blood glucose test and possibly an oral glucose tolerance test.
- Measure your waist circumference and calculate your body mass index.
- Advise you about a weight loss and exercise program.
- Perform a baseline exam and lab tests to check organs that can be affected by diabetes such as the heart, eyes and kidneys.
- Be attentive to even modest elevations in blood pressure, triglycerides, and cholesterol, as these combine with diabetes to make complications more likely.
- Advise you to get a glucometer so you can periodically check your blood sugar on your own.

More information

You'll find even more information on this condition in the online version of your results. Log into your Member Account at www.navigenics.com to access:

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(If you received your results through your doctor, ask your clinician to pass along this information.)

Glaucoma

Your estimated lifetime risk: **1.7% (17 per 1,000)**
Average lifetime risk: **2.4% (24 per 1,000)**

You have **1** of the **2** risk markers we looked for.

Gene or location [1]	Risk marker [2]	Your markers [3]	Odds ratio [4]	Source [5]
LOXL1	**T**	C **T**	3.72	Science, 2007

see page 6 for an explanation of this table format

What we found for glaucoma

We looked at one place on your genome where a one-letter difference in the genetic code affects your odds of exfoliation glaucoma. At each location, there are two markers, for a total of two possible risk markers. the table above shows your markers. You have one of the two risk markers we looked for.

What does it mean?

You're at below-average risk for a type of glaucoma, a leading cause of blindness. Regular eye exams can lower your risk even more. Exfoliation glaucoma is one of the most common forms of glaucoma. Because it develops slowly and without symptoms, you can have the disease without knowing it. It's estimated to affect about 2 percent of the U.S. population, and 10 percent to 20 percent of people over 60. Over the course of her lifetime, the average U.S. female has an 24 per 1000 chance of developing exfoliation glaucoma.

Exfoliation glaucoma is one of the most common forms of glaucoma. Because it develops slowly and without symptoms, you can have the disease without knowing it. It's estimated to affect 10 percent to 20 percent of people over 60.

What's next

- See an eye doctor for a baseline exam.
- Work out a schedule for regular follow-ups. (It depends on your age and risk.)

Early detection

Points to remember

Your scan is not diagnostic; it just helps assess your risk. Being aware can lead to early diagnosis and help you avoid complications.

Symptoms

Initially, exfoliation glaucoma causes no symptoms. Your central vision remains normal and there is no pain.

The main sign of glaucoma is a gradual loss of peripheral vision in one or both eyes. Left untreated, your field of vision can gradually narrow until it seems that you are looking through a tunnel. Be sure to get an eye exam if you are not seeing objects that are off to the side of your field of vision. Other possible symptoms include:

- Trouble adjusting to seeing in a dark room
- Difficulty focusing
- Distorted lines, and edges that seem wavy

Testing

A complete eye exam may include the following screening tests for glaucoma:

- Applanation tonometry, which measures the pressure in your eyeball. Your doctor will administer anesthetic eye drops to numb your eye and then use a special instrument to apply slight pressure.
- Pachymetry, which uses ultrasound to measure the thickness of your cornea. Experts increasingly think this is important because the relative thickness of the cornea can affect the accuracy of the pressure reading.
- Ophthalmoscopy, which assesses the health of your optic nerve. In this painless procedure your doctor will use eye drops to dilate your pupils and then examine the optic nerve.
- Perimetry, a test to determine if you have suffered any visual loss. With one eye covered, you look straight ahead at a bowl-shaped white area while a computer flashes small lights in different locations around the bowl. You signal each time you see a light. The result is a map of your visual field. Since glaucoma typically starts by robbing you of peripheral vision, perimetry helps track the degree of that loss.

Specifically for exfoliation glaucoma, the doctor will look for tiny white flakes on the internal structures of the eye.

What you can do

The most important way to prevent glaucoma is with regular, thorough eye exams by an ophthalmologist or qualified optometrist.

Clinically proven

Get your eyes checked. Get a thorough eye exam at age 40 to establish a baseline of your eye health. Then follow that with regular screening tests, every one to two years if you have no risk factors or signs of glaucoma disease, and more frequently if you are at risk or already show signs of the disease. A complete exam should be performed by an ophthalmologist or qualified optometrist.

Promising

Cut back on caffeine. There is some evidence that too much caffeine can temporarily raise your eye pressure. Experts advise people at risk of glaucoma to limit themselves to no more than two cups a day.

Get regular exercise. Just as physical activity can improve your blood pressure, it may also help you reduce or maintain your eye pressure. It can also help mitigate other conditions that may be risk factors for glaucoma, such as diabetes and hypertension. In one small study, people who rode an exercise bike for 40 minutes four times a week were able to reduce their eye pressure by an average of 20 percent. The exercise can be running, walking, swimming — anything that elevates your heart rate for at least 20 minutes four times a week.

Stay right side up. If you do yoga, avoid positions that call for you to be upside down. Those inversions can increase the pressure in your eyes.

Avoid chugging water or other liquids. Studies have suggested that people with glaucoma are more likely to experience elevated eye pressure if they drink a quart of water quickly (within 20 minutes). Since many diet programs encourage participants to drink at least eight glasses of water a day, be sure to do it in small amounts throughout the day.

Preliminary

Ginkgo biloba. Though it has never been directly shown to help prevent or delay glaucoma, there is some evidence that the herbal extract ginkgo biloba may improve blood flow through the eye, which some experts believe may help preserve optic nerve cells. Ginkgo biloba can have side effects and, like other herbal remedies, should be taken only after consultation with a physician. It should not be used in conjunction with medicines that thin your blood, such as aspirin, Plavix or Coumadin.

What should I tell my doctor?

- Make sure your doctor knows if you are at above-average risk for exfoliation glaucoma so he or she can be sure to check for signs of the condition.
- Do you have any signs of glaucoma? Possible clues: a dark spot at the center of your vision or decreasing peripheral vision, including tunnel vision.
- Are you taking any medications that can cause or worsen eye pressure or glaucoma symptoms? Corticosteroids like prednisone are an example.

What can my doctor do?

- Perform a full eye exam, including measuring eye pressure and testing your field of vision to look for blind spots.
- Prescribe medicine to lower your eye pressure, if it is elevated.

More information

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Graves' disease

Your estimated lifetime risk: **3.1% (31 per 1,000)**
Average lifetime risk: **2.3% (23 per 1,000)**

You have **2** of the **6** risk markers we looked for.

Gene or location [1]	Risk marker [2]	Your markers [3]	Odds ratio [4]	Source [5]
DRB1*0301	**T**	C **T**	1.94	American Journal of Human Genetics, 2005
CTLA4	**G**	A **G**	1.59	Nature, 2003
PTPN22	**A**	G G	1.0	Rheumatology, 2007

see page 6 for an explanation of this table format

What we found for Grave's disease

We looked at three places on your genome where a one-letter difference in the genetic code affects your odds of Graves' disease. At each location, there are two markers, for a total of six possible risk markers. The table above shows your markers. You have two of the six risk markers we looked for.

What does it mean?

Knowing you're at above-average risk for Graves' disease may help you get diagnosed faster if you develop the condition. Be alert for a puzzling array of symptoms — swelling legs, bulging eyes, rapid pulse, weight loss. It's a highly treatable condition, once it's recognized. Graves' disease is an autoimmune disease in which the thyroid gland is overstimulated to produce excess hormones, a condition called hyperthyroidism. Graves' disease is more common in women and usually develops after age 20. Untreated, it can cause serious complications. However, once diagnosed, this condition can be well-managed with medication, radiation therapy or surgery. Graves' disease affects about 1 percent of people in the U.S., and over the course of her lifetime, the average U.S. female has a 2 per 100 risk of developing the condition.

Graves' disease is an autoimmune disease in which the thyroid gland is overstimulated to produce excess hormones, a condition called hyperthyroidism. Graves' disease is more common in women and usually develops after age 20. Untreated, it can cause serious complications. However, once diagnosed, this condition can be well-managed with medication, radiation therapy or surgery.

What's next

- Check the list of symptoms.
- Don't smoke.
- Get a handle on your stress levels.

Early detection

Points to remember

- Be aware of signs and symptoms and seek treatment to help keep the disease from progressing.
- Symptoms may develop slowly over time; onset can also be sudden.
- Only 3 percent to 4 percent of people with Graves' disease are asymptomatic.
- Graves' disease usually causes the thyroid to be overactive (hyperthyroidism), but occasionally the thyroid will function normally and symptoms will be found in other organs.

Symptoms

- Weight loss, even though appetite may increase
- Rapid heart rate
- Feeling fidgety, nervous or anxious; difficulty controlling emotions
- Feeling hot and sweating more than usual
- Noticeable swelling around the front of the neck (also known as a goiter or enlarged thyroid)
- Dry or irritated eyes, or the appearance of "bulging," where the white of the eye is visible above the iris, the colored part of the eye
- Diarrhea, rapid pulse and palpitations
- Irregular menses, thinning of hair, brittle nails
- Tremors, insomnia, weakness
- A thickening of the skin of the shins, which may also be darker and itch slightly
- Swelling of the legs

Testing

Graves' disease is diagnosed by one or more of the following tests:

- Blood work to determine thyroid and metabolic function
- A scan of your thyroid, using CT, MRI, ultrasound or radioactive iodine

What you can do

Graves' is an autoimmune disease that can be asymptomatic but may be doing slow damage to your body, so you will need to think about more than just your thyroid.

Promising

Don't smoke. Smoking increases the risk for several autoimmune diseases, including Graves' disease, and significantly increases the risk of eye problems related to Graves' hyperthyroidism. Particularly if you have a relative with Graves' disease, don't start smoking; if you smoke, try to quit.

Manage stress. Several studies have shown a link between increased stress or stressful life events and the development of Graves' disease. Although it's difficult to avoid stress entirely, finding ways to manage it may reduce your risk.

What should I tell my doctor?

- Do you have a family history of thyroid problems or Graves' disease?
- Have you had a recent infection or pregnancy?
- Have you had trauma to your thyroid or surgery in the area?
- Have you recently taken medications such as interferons, interleukins, or amiodarone used to treat cancer, chronic hepatitis or cardiac fibrillation?
- Have you been under a significant amount stress lately?
- What is your iodine intake? Note that iodine can be used in herbal preparations and appears in moderately high amounts in kelp.

What can my doctor do?

- Take a detailed health history.
- Conduct a physical exam to check your thyroid, heart, lungs, hair, skin, nails, eyes and legs.
- If you have any symptoms or findings, order blood tests including thyroid function tests and antibodies.
- If findings warrant it, order one of several types of thyroid scans.
- Your doctor may also evaluate medications you may be taking for other conditions such as HIV, hepatitis C, heart arrhythmias and multiple sclerosis that might cause an under- or overactive thyroid.

- Suggest you see an endocrinologist, a specialist in hormones and metabolism. If there is eye involvement, an ophthalmologist may be required as well.
- Administer beta blockers to control symptoms, as well as medications such as propylthouracil and Tapazole to quell an overactive thyroid.
- Recommend radioactive iodine treatment or surgery to remove the thyroid (you will then take synthetic hormones to replace your natural ones.)

More information

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Heart attack

Your estimated lifetime risk: **18% (18 per 100)**
Average lifetime risk: **25% (25 per 100)**

You have **0** of the **4** risk markers we looked for.

Gene or location [1]	Risk marker [2]	Your markers [3]	Odds ratio [4]	Source [5]
9p21	**G**	A A	1.0	Science, 2007
MTHFD1L	**A**	G G	1.0	New England Journal of Medicine, 2007

see page 6 for an explanation of this table format

What we found for heart attack

We looked at two places on your genome where a one-letter difference in the genetic code affects your odds of heart attack. At each location, there are two markers, for a total of four possible risk markers. The table above shows your markers. You have zero of the four risk markers we looked for.

What does it mean?

You're at below-average risk for heart attack. Heart disease is the No. 1 cause of death in the United States, and your risk increases with age. The average U.S. female has a 25 percent chance of developing a heart attack over the course of her lifetime. Yet it is one of the most preventable conditions. You may want to reduce your risk even more by changing your behavior.

Each year, about 865,000 American adults have heart attacks, and nearly 158,000 of them die. Heart disease is the No. 1 cause of death in the United States, and your risk increases with age. Yet it is one of the most preventable conditions.

Ethnic variation

Most conditions have only been studied in people of European ancestry, but this one also has been studied in other groups.

What's next

- Get yourself moving, but check with your doctor before beginning an aggressive exercise program.
- Talk to your doctor about checking your blood pressure and cholesterol — and lowering them if they're high.
- If you smoke, stop.

What you can do

If you make dietary and lifestyle changes before symptoms develop, you may be able to delay or reverse the progress of coronary artery disease and prevent a heart attack.

Clinically proven

Don't smoke. Smoking just one to five cigarettes per day increases the risk of heart attack by about 40 percent. Being a smoker is particularly dangerous for women. One study showed that women smokers had heart attacks an average of 14 years earlier than women nonsmokers, suggesting that smoking erodes the natural protection of female hormones. If you do not smoke, avoid prolonged exposure to secondhand smoke. Research has shown that non-smokers exposed to passive smoking for a number of years have a 25 percent greater risk of heart disease.

Work out. Get 30 minutes of aerobic exercise three to five times a week (after you have been cleared for this level of exercise by your physician). Physical activity such as brisk walking, swimming, running and biking lowers your risk of

coronary artery disease. People who don't exercise have twice the chance of dying from heart disease as those who exercise.

Eat a heart-healthy diet. The right foods can reduce your risk of coronary artery disease and heart attack by up to 30 percent. Here are the most important changes to make:

- Add more fruits, vegetables, beans, high-fiber grains to your diet and replace saturated fats such as butter with monounsaturated and polyunsaturated fats such as olive, canola, soybean and walnut oils. At least five servings per day of fruits and vegetables are recommended.
- Do not replace high-fat foods with simple carbohydrates such as white bread, rice and potatoes.
- Aim for a varied diet instead of eating the same foods every day.
- Avoid saturated fats and trans fats.

Eat your omega-3's. Try for two servings per week of fatty fish, such as salmon, trout, herring, sardines, tuna and mackerel. These fish are high in "good" fats, such as omega-3 fatty acids. Eating fatty fish at least once a week can double your chances of surviving a heart attack. (You will need to be aware of the mercury content of some of these fish, especially if you are pregnant or planning to get pregnant.) If you don't eat much fish, ask your doctor whether you should take a dietary fish oil supplement of 1,000 to 1,200 mg. The supplements may cause excessive bleeding.

Cut your cholesterol. Reduce your total cholesterol level below 200 milligrams per deciliter. A healthy diet and regular exercise can help lower your cholesterol. If diet and exercise aren't enough, consult your doctor about medications.

Pay attention to cholesterol type. Aim for less than 100 milligrams per deciliter of LDL, the "bad" cholesterol. Levels of HDL, the "good" cholesterol, should be 40 milligrams per deciliter or higher for men and 50 milligrams per deciliter or higher for women.

Lower your blood pressure. Try to get it below 120/80. Even a slightly elevated blood pressure, called prehypertension, is three times more likely to cause a heart attack. Prehypertension is defined as having systolic blood pressure (the top number) between 120 and 139 and/or diastolic pressure (the bottom number) between 80 and 89. Changing your diet is a good step toward improving blood pressure. Eat less salt and more fruit, vegetables, and whole grains. Regular exercise also helps. You may need to consult your physician about medication to lower your blood pressure.

Maintain a healthy weight. People who have excess body fat — especially around the waist — are more likely to develop heart disease. Your body mass index should be below 25. If you are moderately overweight or obese, losing even a few pounds can lower your risk.

Manage diabetes. People who have diabetes develop hardening and narrowing of the arteries more commonly and at a younger age. Keeping blood sugar at normal levels can slow this development.

Consider aspirin therapy. Take a low-dose (81 mg) aspirin daily, but only if your doctor advises it. Aspirin makes your blood less likely to clot. There are some risks associated with aspirin therapy that you should discuss with your doctor before you begin this type of treatment.

Consider medication. If you already have coronary artery disease, talk to your doctor about medications that may lower your risk of heart attack. (Women who might become pregnant should make sure their doctor knows that, because some of these drugs can cause serious birth defects.)

- Anti-platelet drugs, which prevent clotting. These drugs can cause side effects such as internal bleeding.
- Beta-blockers, which lower your heart rate and blood pressure, reducing demand on your heart. There is some risk of depression or sexual dysfunction associated with these drugs. They can worsen asthma in people predisposed to it.
- ACE inhibitors, which lower blood pressure and allow blood to flow from your heart more easily.
- Statins, which help lower cholesterol and stabilize arterial plaque. You may need to lower your cholesterol well below 200 milligrams per deciliter if you already have coronary artery disease. These drugs can cause side effects such as muscle and liver damage, but are usually well-tolerated and quite effective.

Promising

Drink lightly. There may be some benefit from consuming alcohol in moderation. Researchers believe that moderate drinking — that is, one drink for women or two drinks for men per day — may lower the risk of heart disease. They do not

recommend that non-drinkers start using alcohol or that drinkers increase the amount they already drink. Too much alcohol can raise blood pressure and damage the heart, liver and brain.

Weigh the pros and cons of birth control pills carefully. In some studies, birth control pills seem to be linked to an increased heart attack risk, especially for women older than 35 who smoke cigarettes.

Think twice about hormones. Most researchers now believe that hormone replacement therapy (estrogen and progestin) increases the risk of heart disease and may almost double the chance of a heart attack during the first year of therapy. However, a recent study found that women aged 50 to 59 who took estrogen had less plaque in their coronary arteries than those who took a placebo. Hormones may be a real benefit to some women in terms of quality of life and treatment of certain conditions. Whether to use hormones is a complex decision best made with your physician.

Manage stress. Stress raises your blood pressure and heart rate and causes your arteries to narrow, increasing your risk for heart attack. Regular exercise, social activities and talking about your concerns with family, friends, clergy or other confidantes can relieve stress. Take 15 to 20 minutes a day to sit quietly, breathe deeply and be peaceful. Consider enrolling in a mindfulness-based stress reduction program. Your employer or health insurance provider may offer free or low-cost stress reduction programs.

Preliminary

Cut back on NSAIDs. Some data indicates that most non-steroidal anti-inflammatory drugs (NSAIDs), which are used to relieve pain, fever and inflammation, may increase the risk of heart attack. So it is prudent to reduce your use of drugs such as ibuprofen (Advil, Motrin), naproxen (Aleve) and Cox-2 inhibitors such as Celebrex. The risk is greater if you take the drugs at higher doses or for long periods of time.

See your dentist regularly. Researchers believe inflammation caused by periodontal disease may be linked to coronary heart disease.

Get enough sleep. Sleeping five hours or less each night significantly raises the risk of developing high blood pressure, which can contribute to the risk of heart attack. if your schedule allows, consider making an afternoon nap part of your everyday routine: One study found that healthy people who take siestas are one-third less likely to die from coronary problems than those who don't.

Get an annual flu shot. The flu can worsen symptoms of coronary artery disease.

Treat sleep apnea. If you suspect that you have this condition, which causes breathing to stop periodically at night, ask your doctor whether you should sleep with a continuous positive airway pressure (CPAP) device. Sleep apnea may raise the risk of cardiovascular events, and CPAP reduces this risk.

Get your vitamin D. Low levels of vitamin D have been linked with higher risk of heart attack.

Early detection

Points to remember

- In many people, plaque gradually builds up in their arteries over a lifetime.
- Coronary artery disease — the precursor to most heart attacks — is a silent process that is detected either by screening laboratory tests or, less fortunately, after a heart attack, if blood vessels get narrow enough.
- Early treatment of a heart attack increases your chance of survival. So, if you have any symptoms or concerns that you may be having a heart attack, seek medical attention immediately. Seconds and minutes matter.

Symptoms

In its early stages, coronary artery disease often has no symptoms. Some people may experience some of the following:

- Chest pain during exertion, stress or sexual activity. The pain can feel like pressure; usually it is not sharp. You may feel it over the heart area or in the neck, back or arm.
- Decreased exercise capacity
- Shortness of breath on exertion
- Stomach discomfort or "indigestion" after meals

Most heart attacks start slowly. The pain involves discomfort in the center of the chest that lasts more than a few minutes, or that goes away and comes back. It can feel like uncomfortable pressure, squeezing, fullness or pain. Often people assume it is anything but a heart attack: muscle spasm, indigestion, a pulled muscle. Many times they wait too long before getting help.

Here are signs that can mean you are having a heart attack and should call 911 immediately:

- Chest pain
- Shortness of breath
- Nausea and vomiting without any obvious cause
- Palpitations
- Sweating
- Anxiety or a feeling of impending doom

Women often experience different symptoms than men during a heart attack. The most common symptoms of heart attack in women include shortness of breath, weakness and fatigue.

Testing

Blood tests and cardiac imaging tests can reveal whether you have early signs of disease or other risk factors for a heart attack.

- Blood tests look for the levels of sugar and fats in your blood, plus certain lipids felt to be associated with heart disease.
- A resting electrocardiogram (ECG) may be done as a baseline.
- A dynamic stress test may be a treadmill, a stress echo (during which an ultrasound image of the heart is taken during exercise), or a nuclear medicine scan in which a radioactive isotope is injected to scan the heart during exercise.
- A heart scan that checks for calcium in the coronary arteries may be considered as a baseline to help determine the risk of heart attack.
- An angiogram (in which dye is injected into the coronary arteries to look for blockage) may be suggested, depending on symptoms and results of the less invasive tests.
- The ankle brachial index, a comparison of your blood pressure taken at your arm and your ankle, can help predict cardiac events.

What should I tell my doctor?

- Has anyone in your family had a heart attack or heart disease? How old were they when it started?
- Do you have any chest pain? What does it feel like? What makes it better or worse? When does it occur? How long does it last? Can you provoke it by pressing on the area where it occurs?
- Do you exercise? How often and how strenuously? Are you overweight?
- Have you ever been told that you have diabetes, high blood pressure or high cholesterol?
- Do you have any other things which could be causing your problems? Stress, anxiety and depression can cause chest pain.
- Are your chest symptoms related to meals? Indigestion can both mimic heart pain and obscure its diagnosis.
- What medications and herbals are you taking, including over-the-counter medications? Stomach problems, possibly provoked by medications, can mimic cardiac pain.
- How is your diet? What kinds of foods do you eat? How much alcohol do you drink? Do you smoke?

What can my doctor do?

Your physician can monitor you closely for cardiac disease and — with your help in making lifestyle changes — have a good chance of avoiding a heart attack. You may not need any medications and only limited evaluations, but knowing your increased risk can lead to increased awareness and prevention. Here are some steps your doctor may take, depending on your symptoms and specific situation:

- Take a history and do an examination focused on the cardiovascular system.

- Order blood tests, an electrocardiogram or a stress test.
- Prescribe medication to lower your cholesterol and blood pressure, in addition to any changes you can make on your own with diet and exercise.
- Prescribe an 81 mg aspirin to prevent blood clots in the coronary arteries. Do not take this unless recommended by your physician, as even small amounts of aspirin can have serious side effects such as internal bleeding.
- Refer you to a cardiologist for further testing.

More information

You'll find even more information on this condition in the online version of your results. Log into your Member Account at www.navigenics.com to access:

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(If you received your results through your doctor, ask your clinician to pass along this information.)

Hemochromatosis, HFE-related

Your risk of iron overload: **extremely low risk**
Your HFE gene status: **no risk markers present (non-carrier)**

Gene or location [1]	Risk marker [2]	Your markers [3]	Odds ratio [4]	Source [5]
HFE-C282Y	**A**	G G	N/A	Genetics in Medicine, 2000
HFE-H63D	**G**	C C	N/A	Genetics in Medicine, 2000
HFE-S65C	**T**	A A	N/A	Blood, 1999

see page 6 for an explanation of this table format

What we found for HFE-related hemochromatosis

To estimate your risk, we looked at three places in your genome that are associated with hereditary hemochromatosis. These three SNPs are all in the same gene and act in combination to indicate your risk level. The table above shows your markers. Your markers indicate that you are at extremely low risk for hemochromatosis. Specifically, you have no risk markers present (non-carrier).

What does it mean?

We used your genetic markers to estimate your risk for HFE-related hereditary hemochromatosis and for a potentially dangerous consequence, iron overload. You have no known risk markers for HFE-related hemochromatosis. Based on these results, your chances of developing iron overload are extremely low (much less than 1 percent).

You carry no risk markers for HFE-related hereditary hemochromatosis. However, this result does not rule out the possibility that your biological relatives may still carry genetic risk markers for hemochromatosis. To understand more about what your results mean for your relatives, speak with your Navigenics Genetic Counselor.(If you live in the state of New York, your questions may need to be directed to your physician. For more details on genetic counseling access for New York members, please see the Help section of your online member account, or contact Member Service by email at memberservice@navigenics.com or by phone at (866) 522-1585 (US and Canada) or +1 (650) 585-7743 from 9am to 5pm PST.)

What's next?

If you carry two or more risk markers for hereditary hemochromatosis, consider the following, based on your health history:

- Get a blood test to check whether your body is storing excess iron . Ask your doctor about getting two specific screening tests — transferrin saturation and serum ferritin — to detect iron overload, since these are not included in standard blood tests.
- Examine your family history. Many families are not aware that HFE-related hemochromatosis runs in the family and may not have attributed certain conditions, including cirrhosis of the liver and liver cancer as well as other related health conditions, to this hereditary form of iron overload. Remember, identifying at-risk relatives early is important.
- If your iron levels are elevated, avoid alcohol, iron or vitamin C supplements, and iron-fortified foods.

Early detection

Symptoms

Iron accumulation can be present without obvious signs. Early symptoms may include fatigue, weakness, weight loss, abdominal pain and arthralgia. As accumulation progresses, additional symptoms can include arthritis, loss of libido, impotence, dyspnea, or amenorrhea or early menopause for women. Later signs might include abnormal liver function, diabetes, chronic abdominal pain, severe fatigue, hypopituitarism, hypogonadism, cardiomyopathy, arrhythmia, cirrhosis,

liver cancer, arthritis, heart failure, and bronze skin pigmentation. Be aware, though, that symptoms vary and don't always follow this order.

Further considerations for people with hemochromatosis

Avoid raw fish and shellfish. People with hemochromatosis are susceptible to infections caused by certain bacteria in raw fish and shellfish. The bacteria thrive on iron; cooking will destroy them. You should also avoid handling these fish, because the bacteria can enter your bloodstream through small breaks in your skin.

Consider vaccinations for hepatitis A and B. People with hemochromatosis are more susceptible to liver damage. Vaccinations against hepatitis can help protect your liver.

Testing

Your doctor can test your blood for:

- High amounts of iron stored in your body. (This is measured by checking serum ferritin and serum transferrin saturation levels, different measures than used for iron in standard blood panels.)
- High blood sugar
- Low thyroid function
- Abnormal liver function

What you can do

Identifying hemochromatosis and treating excess iron before organ damage occurs can help prevent serious complications such as liver disease, heart disease and diabetes. If you already have one or more of these conditions as a result of hemochromatosis, treatment may slow their progression or even reverse them.

Clinically proven

Avoid alcohol. If you choose to drink alcohol, drink very little. If you have liver damage, you should not drink at all; alcohol increases iron absorption and makes iron more toxic to your liver. Research shows that drinking too much alcohol raises the risk of liver damage tenfold in people who have been diagnosed with hemochromatosis. Permanent liver damage, in turn, raises your risk of developing liver cancer.

Avoid iron supplements. Be especially careful to check your multivitamin to make sure it doesn't contain iron. There are some exceptions regarding iron supplementation in people who may be significantly iron deficient for other reasons. So it's a good idea to discuss iron supplementation with your physician.

Avoid iron-fortified foods. If you are diagnosed with hemochromatosis, stay away from iron-fortified foods, such as breakfast cereals and certain pastas and breads; these may increase your iron levels. Limit red meat and read food labels to check for iron (watch for the word “ferrous”). It's OK to eat moderate amounts of iron-containing fruits or vegetables, such as spinach, because the iron they contain isn’t easily absorbed. Avoid cooking in iron skillets, which can leach additional iron into your food.

Promising

Avoid vitamin C supplements. Vitamin C increases the amount of iron your body absorbs and can also raise iron levels in your bloodstream. Avoid taking pills containing more than 500 milligrams of vitamin C per day. Eating fruits and vegetables rich in vitamin C is generally safe.

Drink black or green tea with meals. Research has shown that black and green teas (caffeinated or not) reduce iron absorption in the intestine.

What should I discuss with my doctor?

- Do you have a family history of hemochromatosis or liver disease?
- Do you have arthritis, especially in your hands?
- Are you often fatigued?
- Have you experienced impotence or loss of sex drive?
- Have you noticed your skin darkening?

- Do you have type 2 diabetes, which is sometimes related to iron overload?

What can my doctor do?

- Test your blood for clinical markers of hemochromatosis as well as blood sugar levels, thyroid function and liver function.
- If your blood iron is high, schedule regular blood drawing, via a procedure called phlebotomy, to reduce your blood iron and maintain it at normal levels.
- If phlebotomy doesn't reduce your blood iron enough, your doctor may advise you to consider chelation therapy, in which a drug that binds to excess free iron is circulated through your blood. Your body then excretes the bound iron and drug. Be aware, though, that this process may have serious side effects, such as kidney failure and cardiac arrhythmia.
- Advise you, in the context of your overall health history, how to adjust your diet to reduce your iron intake.

More information

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Lactose intolerance

Your estimated lifetime risk: **high risk**

Gene or location [1]	Risk marker [2]	Your markers [3]	Odds ratio [4]	Source [5]
LCT-13910	**G**	**G G**	N/A	Nature Genetics, 2002

see page 6 for an explanation of this table format

What we found for lactose intolerance

We looked at a place on your genome where a one-letter difference in the genetic code affects your chances of having lactose intolerance. At this location, there are two markers. Only individuals with two copies of the risk marker have increased risk of lactose intolerance. The table above shows your markers. You have two copies of the risk marker.

What does it mean?

Your results mean that your body probably can't digest milk products very well. People of European descent who have your genetic profile generally have trouble digesting dairy products. If you are of African or Asian ancestry, though, you may be able to consume dairy without problems even with these markers, because other markers can modify your risk.

Ethnic variation

Most conditions have only been studied in people of European ancestry, but this one also has been studied in other groups.

What's next?

- If you have symptoms, try changing your diet.
- Consider supplemental calcium, to be sure you're getting enough without dairy.
- Ask your doctor whether you should be tested for osteopenia, a loss of bone density (from insufficient calcium) that can lead to osteoporosis.

Early detection

Symptoms

Many people with lactose intolerance experience unpleasant digestive symptoms that can occur 30 minutes to two hours after they eat milk products. The severity of symptoms varies by person. Watch for:

- Abdominal pain or cramping
- Diarrhea
- Bloating
- Gas

Testing

Two medical tests used in adults can measure how lactose is absorbed in the digestive system.

The lactose tolerance test requires you to fast, then drink a liquid that contains lactose. Blood samples are taken over the next two hours to measure your blood sugar level, an indicator of how well your body digests lactose. If the sugar levels in your blood remain stable (rather than increase), it means you're not able to digest the lactose.

For a second test, you drink a lactose beverage. When the undigested lactose meets bacteria in your intestine, hydrogen is produced. An analysis of your breath measures the amount of hydrogen you exhale; higher levels indicate lactose intolerance.

A related test, the stool acidity test, is typically used only to diagnose infants and children.

What you can do

If you're lactose intolerant, there's a lot you can do to help yourself by modifying your diet. And you and your physician can minimize the chances of side effects (such as calcium deficiency and osteopenia) resulting from reduced dairy intake.

Clinically proven

Avoid dairy products. Everyone differs in the amount and type of dairy they can tolerate. While some people might not be able to consume even a little milk without symptoms, others can drink an entire glass. Some lactose-intolerant people find that they can eat yogurt; that's because the bacterial cultures used to make it also create lactase, which helps the body digest lactose.

Steer clear of lactose in processed foods and medicines. Salad dressing, energy bars, processed meats, breakfast cereals and even some medications contain lactose. Make it a habit to read labels.

Use lactase enzymes. These tablets or drops can help you digest foods that contain lactose; you take them just before or with the first bite of the trigger food. They convert the lactose into more digestible sugars.

Try lactose-reduced foods. You can find them at many supermarkets. Lactose-reduced milk contains the same nutrients found in regular milk and remains fresh for about as long.

What should I discuss with my doctor?

- Do you have symptoms of possible lactose intolerance, such as abdominal pain or bloating after consuming milk products?
- Do you have a family history of lactose intolerance?
- Are you concerned about your calcium intake because you avoid dairy products?
- Do you need a test for decreased bone density because of low dairy intake?

What can my doctor do?

- Order a lactose tolerance test or hydrogen breath test.
- Determine if you are getting enough calcium.
- Evaluate you for a loss of bone density, called osteopenia.
- Discuss dietary changes that can ease or eliminate your symptoms.

More information

You'll find even more information on this condition in the online version of your results. Log into your Member Account at www.navigenics.com to access:

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Lung cancer

Your estimated lifetime risk: **6% (6 per 100)**
Average lifetime risk: **6% (6 per 100)**

You have **1** of the **2** risk markers we looked for.

Gene or location [1]	Risk marker [2]	Your markers [3]	Odds ratio [4]	Source [5]
CHRNA3	**C**	**C** T	1.28	Nature Genetics, 2008

see page 6 for an explanation of this table format

What we found for lung cancer

We looked at one place on your genome where a one-letter difference in the genetic code affects your odds of lung cancer. At this location, there are two markers. The table above shows your markers. You have one of the two risk markers we looked for.

What does it mean?

Your risk of developing lung cancer is about average. About one in a thousand Americans suffer from lung cancer at any given time, and over the course of her lifetime, the average U.S. female has a 6 percent chance of developing lung cancer. Tip the odds in your favor by not smoking, avoiding secondhand smoke and protecting yourself from other cancer-causing substances such as radon and asbestos. Other genetic markers that have not yet been identified could also contribute to your overall risk.

What's next

- If you smoke, take this opportunity to ask your doctor to help you quit.
- Stay away from secondhand smoke, whether from cigarettes, cigars or pipes.
- Find out if there is radon — a cancer-causing radioactive gas — in your house.
- Set up an appointment to review your results with your doctor and discuss detection strategies if appropriate.
- If you're a current or former smoker, consider joining one of the many medical studies on preventing lung cancer and detecting it early.

Early detection

Points to remember

Although lung cancer usually doesn't cause symptoms until the disease is in an advanced stage, some people with early lung cancer do show signs of it. If you visit your doctor as soon as you notice any symptoms, there's a chance that cancer can be caught while it's still treatable.

Symptoms

These common signs of lung cancer can also be caused by other health problems, so having them doesn't mean you have cancer. What it does mean is that you should see your doctor right away to find out what's causing the symptoms. Watch for:

- A cough that won't go away
- Chest pain that hurts more when you take a deep breath, cough or laugh
- Shortness of breath or other breathing trouble
- A hoarse voice

- Weight loss with no known cause
- Coughing up bloody or rust-colored mucus
- Wheezing that you never had before
- Frequent lung infections, such as bronchitis and pneumonia
- Feeling very tired all the time

Testing

If you have symptoms typical of lung cancer, your doctor will probably examine you and ask you about your health history. Other tests your physicians might do include:

- Chest X-ray to look for masses or spots on the lungs. If anything suspicious shows up, your doctor may recommend further testing. (Chest X-rays can miss lung cancers, especially small ones.)
- Computed Tomography (CT) scan to get a more detailed look at the size, shape and position of any suspected tumors that show up on your chest X-ray. (This is sometimes used instead of an X-ray.). The test can also search for enlarged lymph nodes that may signal the spread of cancer.
- Sputum sample to see if cancer cells are present. In this test, a sample of mucus you cough up from your lungs is examined under a microscope.
- After initial screening tests, bronchoscopy may be used to look for tumors or take samples of tissue to be studied under a microscope for signs of cancer. For this exam, a lighted, flexible tube (bronchoscope) is threaded through your mouth, down your windpipe and into your lungs. Before this is done, your mouth and throat are sprayed with a numbing solution, and you may be given medicine to help you relax.

Should you have any of these tests even if you don't have symptoms, just to be on the safe side? That's something to discuss with your doctor. The tests themselves carry some risks and have not yet been found to lower the number of deaths from lung cancer, so most cancer experts currently don't advise using them for general screening. With your doctor, weigh the pros and cons of the tests and consider whether your various risk factors make regular screening worthwhile. Research is continuing in this area, so more reliable screening tests may be on the way. If you're so inclined, you can help researchers evaluate potential tests by volunteering for a clinical trial.

What you can do

Knowing about an increased risk for lung cancer is the first step toward lowering that risk — by measures well within your grasp. So what at first seems like bad news may not be.

Clinically proven

- **Don't smoke.** If you're a smoker, quitting is the most important step you can take. There's no denying that it's a challenge, but more than 46 million Americans have done it, and you can, too. Ask your doctor about medicine or nicotine replacement therapy and about local programs or professionals that can help you. You'll find useful resources here.
- **Avoid breathing other people's smoke.** Secondhand smoke can cause lung cancer in nonsmokers. The greater the exposure, the greater the risk.
- **Test for radon.** Have your home tested and, if necessary, treated for radon, a radioactive gas that forms in soil and rocks. You can't see or smell it, but if it builds up in your home — often in the basement, if you have one — it harms lung cells and increases lung cancer risk. You'll find radon testing kits in home improvement and hardware stores. The EPA's Web site can help you find a qualified testing or mitigation contractor.

Promising

- **Get vigorous exercise.** Regular aerobic workouts cut risk, even for smokers. A study of more than 36,000 women found that current and former smokers who participated in vigorous physical activity (jogging, swimming, aerobics) at least twice a week and moderate activity (walking, bowling, golfing, gardening) more than four times a week were less likely to develop lung cancer than those who rarely exercised.

- **Fill your plate with produce.** A diet rich in fruit and possibly vegetables may help prevent lung cancer, according to an extensive research review by the International Agency for Research on Cancer. The general recommendation for good health is to eat a variety of different fruits and vegetables, the more colorful the better.
- **Avoid beta-carotene supplements**. This is particularly important if you are or were a smoker, unless the supplements have been recommended to you by a physician. High doses of beta-carotene (in the range of 20 to 30 milligrams per day) have been found to raise lung cancer risk in smokers. Read the label on your multivitamin, too: certain multis marketed to reduce the risk of macular degeneration sometimes contain doses of beta-carotene in the risky range. If your physician has recommended these vitamins, be certain that he knows that you are or were a smoker and have an increased risk for lung cancer.

Preliminary

- **Drink tea.** Some research has found that consuming tea, as well as wine in moderation, seems to help prevent lung cancer in smokers. Scientists suspect that the protective power comes from plant chemicals called flavonoids, which have been shown in laboratory and animal studies to have anti-tumor properties.
- **Avoid vitamin E supplements.** There is some research evidence that these supplements may slightly raise lung cancer risk, particularly for smokers.
- **Consider chemoprevention.** Medical scientists are searching for ways to prevent or put the brakes on lung cancer with natural or lab-made drugs — an approach known as chemoprevention. In one such study, researchers found that current and former smokers who took the drug celecoxib (Celebrex) had lower levels of a protein linked to cell proliferation that can be a precursor to lung cancer. Other studies are still in the experimental stages. You can learn more from our clinical trials list below.

What should I tell my doctor?

- Are you a smoker now, or have you ever smoked cigarettes, cigars, a pipe or a hookah?
- Are you exposed to other people's tobacco smoke where you live, work or socialize?
- Have you ever had a job that exposed you to cancer-causing substances such as asbestos, arsenic, chromium, nickel, soot, tar or diesel exhaust?
- Have you ever had radiation treatments to your chest for some other type of cancer, such as Hodgkin's disease or breast cancer?
- Has anyone in your immediate family (mother, father, sister, brother) had lung cancer?
- Do you have any symptoms typical of lung cancer, such as a lingering cough, breathing problems or chest pain?
- Are you taking vitamin E supplements? (Some studies suggest these can increase lung cancer risk in smokers.)
- Are you concerned enough about your risk to undergo screening tests?

What can my doctor do?

Chances are you don't have any troubling symptoms or lung cancer at this time. Still, working with your doctor on a wellness plan is a good idea. Your doctor can:

- Help you quit smoking or put you in touch with other professionals who can
- Tell you how to avoid or limit exposure to cancer-causing substances on the job
- Talk with you about the risks and benefits of regular screening for lung cancer

More information

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Lupus

Your estimated lifetime risk: **0.15% (15 per 10,000)**
Average lifetime risk: **0.26% (26 per 10,000)**

You have **8** of the **26** risk markers we looked for.

Gene or location [1]	Risk marker [2]	Your markers [3]	Odds ratio [4]	Source [5]
TNFAIP3	**G**	C C	1.0	Nature Genetics, 2008
IRF5.1	**G**	A A	1.0	Proceedings of the National Academy of Sciences, 2007
DRB1*0301	**T**	C **T**	1.9	New England Journal of Medicine, 2008
PTPN22	**A**	G G	1.0	Rheumatology, 2007
ITGAM	**T**	C C	1.0	Nature Genetics, 2008
IRF5.3	**T**	G **T**	1.62	Proceedings of the National Academy of Sciences, 2007
STAT4	**T**	G G	1.0	New England Journal of Medicine, 2007
IRF5.2	**A**	**A** G	1.44	Proceedings of the National Academy of Sciences, 2007
DRB1*1501	**A**	C C	1.0	European Journal of Human Genetics, 2007
C8orf13-BLK	**A**	**A** G	1.39	New England Journal of Medicine, 2008
BANK1	**G**	A **G**	1.27	Nature Genetics, 2008
KIAA1542	**C**	**C C**	1.64	Nature Genetics, 2008
PXK	**G**	**G** T	1.27	Nature Genetics, 2008

see page 6 for an explanation of this table format

What we found for lupus

We looked at 13 places on your genome where a one-letter difference in the genetic code affects your odds of lupus. At each location, there are two markers, for a total of 26 possible risk markers. The table above shows your markers. You have eight of the 26 risk markers we looked for.

What does it mean?

You are at below-average risk of developing lupus. Lupus affects only about 5 in 10,000 individuals in the U.S. Over the course of her lifetime, the average U.S. female has a 3 per 1,000 chance of developing lupus. Lupus symptoms may be mild or severe, they may be temporary or permanent, and they often vary from person to person. It most commonly is diagnosed in women between the ages of 15 and 45.

Systemic lupus erythematosus is a chronic autoimmune disease in which the body's inflammatory response causes damage to a variety of tissues. Lupus symptoms may be mild or severe, they may be temporary or permanent, and they often vary from person to person. It most commonly is diagnosed in women between the ages of 15 and 45.

What's next

- Do your joints ache?
- Do you get a butterfly-shaped rash across your nose and cheeks?
- Does anyone in your family have lupus or another autoimmune disease?

Early detection

Points to remember

- Lupus is a chronic disease in which the body's inflammatory response causes damage to a variety of tissues. There is no cure for lupus, but medications may help control the disease, ease symptoms and prevent some serious complications.
- If you are at risk for the disease (either because of identified genetic markers or a family history), monitor your health and talk with your doctor about any symptoms you notice.

Symptoms

While joint problems and a skin rash are often the earliest signs of the disease, any of these symptoms may be the first to arise:

- Joint pain, stiffness, swelling or redness
- Skin rash that is worse in the sun, especially on the cheeks and nose
- Mouth sores
- Dry eyes
- Fingers and toes that turn white, then blue or purple, in the cold, at times associated with pain
- Persistent low-grade fevers
- Swollen glands
- Swelling of the legs
- Swelling around the eyes
- Hair loss
- Fatigue

Testing

If you have symptoms, talk with your doctor about additional testing for the disease. There is no single test for lupus, and diagnosis can be difficult. It is made based on a medical history, a physical exam and one or more tests. These may include:

- A complete blood count (to assess your levels of red blood cells, white blood cells, platelets and hemoglobin)
- The ANA or antinuclear antibody blood test
- An erythrocyte sedimentation rate (to measure inflammation)
- Urinalysis (to look for kidney problems)
- Chest X-ray (to check for fluid or inflammation in your lungs or an enlarged heart)
- Electrocardiogram (to look for heart damage)
- Blood tests for kidney and liver function

The ANA test looks for signs that the immune system is acting against the body and causing inflammation. A healthy immune system reacts to foreign substances by making proteins called antibodies, which help fight the invaders. In someone who has an autoimmune disease, the immune system makes autoantibodies, which try to fight off healthy tissues. ANA is one type of autoantibody, and a positive test result is one sign that a person may have lupus, but it is not definitive. Additional tests may be used to look for other autoantibodies.

Most people will be tested for lupus only after they have noticeable symptoms. There is some evidence, however, that the autoantibodies associated with the disease can be found in the body long before symptoms arise — months or even years earlier. If you are at high risk for lupus, you may want to talk with your doctor about being tested for these autoantibodies before you develop any symptoms. Note, however, that people can have autoantibodies and never develop any clinically significant disease.

What you can do

There are no proven strategies for preventing or delaying the onset of lupus, but early diagnosis and treatment can modify the severity of the disease and may prevent some complications.

Preliminary

Eat your omega-3's. Consider incorporating omega-3 fatty acids into your diet. Two servings a week of fatty fish, such as salmon, trout, herring, sardines, tuna and mackerel, are a good source of these fats, which can help reduce inflammation. (You will need to be aware of the mercury content of some of these fish, especially if you are pregnant or might get pregnant.) If you don't eat much fish, ask your doctor whether you should take a dietary fish oil supplement of about 1,000 or 1,200 mg. The supplements may cause excessive bleeding in some people.

Get enough vitamin D. Studies have shown that lupus patients tend to have low blood levels of this vitamin, which helps regulate key aspects of the immune system. One study suggests that people whose blood levels show autoantibodies (immune proteins that attack one's own body) but who don't yet have lupus symptoms may benefit from taking D as a preventive measure. If you're at increased risk for the disease, talk with your physician about whether you should take a supplement containing D, and if so, how much. Be aware that excess D can cause problems such as kidney stones.

What should I tell my doctor?

- Do you have a family history of lupus or other autoimmune disorders?
- Do you have any symptoms associated with the disease?
- Could other factors be triggering or mimicking the signs and symptoms of lupus, such as recent pregnancy or a reaction to certain medications?
- Are you concerned enough to want further evaluation and diagnostic tests?

What can my doctor do?

- Take a thorough medical history, asking you questions to determine whether your symptoms are consistent with a lupus diagnosis.
- Order blood tests, including tests of kidney function, liver function, blood count, urinalysis and immunologic tests such as an ANA (anti-nuclear antibody). Blood tests are often suggestive, rather than diagnostic, of the disease.
- Refer you to a rheumatologist for consultation.
- If you have joint symptoms, order X-rays of your joints.
- If you are diagnosed with symptomatic lupus, prescribe medications to help.

More information

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Macular degeneration

Your estimated lifetime risk: **21% (210 per 1,000)**
Average lifetime risk: **3.1% (31 per 1,000)**

You have **9** of the **12** risk markers we looked for.

Gene or location [1]	Risk marker [2]	Your markers [3]	Odds ratio [4]	Source [5]
LOC387715-S69A	**T**	G **T**	2.72	American Journal of Human Genetics, 2005
CFH-intron	**G**	**G G**	9.99	Nature Genetics, 2007
CFB	**T**	**T T**	9.8	Nature Genetics, 2006
C2-E318D	**G**	**G G**	7.73	Nature Genetics, 2006
CFH-Y402H	**C**	**C C**	6.3	New England Journal of Medicine, 2007
C3-R80G	**C**	G G	1.0	New England Journal of Medicine, 2007

see page 6 for an explanation of this table format

What we found for macular degeneration

We looked at six places on your genome where a one-letter difference in the genetic code affects your odds of macular degeneration. At each location, there are two markers, for a total of 12 possible risk markers. The table above shows your markers. You have nine of the 12 risk markers we looked for.

What does it mean?

Your results do not mean that you have macular degeneration or ever will. But since you are at above-average risk, have your eyes checked regularly, watch for symptoms and consider preventive measures. Age-related macular degeneration is the leading cause of severe vision loss in people 60 and older. About 1.5 percent of Americans suffer from macular degeneration, and over the course of her lifetime, the average U.S. female has a 3.1 percent chance of developing macular degeneration. There is no cure, but there are things you can do to help prevent it, and the damage can be slowed if it is caught early enough.

Age-related macular degeneration is the leading cause of severe vision loss in people 60 and older. There is no cure, but there are things you can do to help prevent it, and the damage can be slowed if it is caught early enough.

What's next

- How long since you've had your eyes checked?
- Is your central vision blurry? Do straight lines look crooked?
- Has anyone in your family had macular degeneration or gone blind?

Early detection

Points to remember

Your Navigenics report is not a diagnostic test and cannot tell you whether you have macular degeneration. Only your doctor can do that.

Be aware of any changes in your vision. Although the dry type of macular degeneration is slow to develop, the wet type progresses rapidly.

Symptoms

Macular degeneration is painless. The first noticeable symptom of the less serious dry form of macular degeneration is a slight blurriness in the central field of vision, which can occur in one or both eyes. You may have trouble recognizing faces or find that you need more light to read.

If you develop the more serious wet form of the eye disease, a common first symptom is that straight lines appear to be crooked. If you start seeing crooked lines, call your physician immediately, because treatment can sometimes slow the progression of this form of the disease.

The Macular Degeneration Foundation has a simple online test to check your central vision.

Testing

If you are at increased risk for macular degeneration because of symptoms, age, or a family history of the disease, monitor your vision and talk with your doctor about possible testing for the disease.

Have your eyes checked regularly. Because macular degeneration develops slowly, by the time you notice a change in vision, the macula may already be damaged. An eye-care professional can examine your retina for early signs of the disease. A common finding in dry macular degeneration is drusen, which are yellow deposits under the retina that can be seen during the eye exam. The more drusen you have, the greater the risk that the disease will progress to an advanced form.

Treatment

Treatments for wet macular degeneration include laser surgery, drug injections and photodynamic therapy, in which laser light is used to activate a light-sensitive drug to seal off and slow the growth of abnormal blood vessels in the retina.

What you can do

Early diagnosis is very important to prevent the effects of this disease, which affects central vision. But there are measures you can take that can slow its progression. Treatments exist and new ones are being developed.

Clinically proven

Don't smoke. Scientists agree this is the most important thing you can do to reduce your risk of age-related macular degeneration. Multiple studies have found that smokers are two to three times more likely than non-smokers to have macular degeneration, and are more likely to develop advanced forms of the disease. Researchers believe the nicotine in tobacco may trigger inflammation and the growth of blood vessels that damage the macula.

Promising

Take vitamins. The National Eye Institute's recent Age-Related Eye Disease Study showed that people with macular degeneration who took vitamins C and E, beta-carotene, zinc and copper reduced their risk of progression to advanced disease by about 25 percent. The study did not, however, indicate that the supplements could prevent the condition in the first place. The doses used in the study were five to 13 times higher than those in the usual multivitamin and can cause side effects. Do not take them without checking first with your doctor.

Lose weight. Although obesity is not a proven risk factor for developing the eye disease, clinical studies have shown that people who have the condition and who are overweight, defined as having a body mass index of at least 25, are more likely to develop advanced forms of the disease. (Body mass index is a common measure of weight and height.)

Eat more fruits and vegetables. Leafy greens, carrots, oranges and squash are good sources of vitamins C and E, beta carotene and zinc — all substances believed to lower the risk of macular degeneration.

Preliminary

Wear sunglasses. Ultraviolet rays in sunlight can damage your eyes, just as they damage your skin. Wear UV-blocking sunglasses whenever you are outside, even on overcast days.

Lower blood pressure and cholesterol. Because both macular degeneration and cardiovascular disease involve inflammatory changes to blood vessels, some scientists think there might be a connection between these diseases. Choose a low-fat diet and exercise regularly to lower blood pressure and cholesterol — the strategy could be as important to your eyes as it is to your heart.

Eat your omega-3's. Consider incorporating omega-3 fatty acids into your diet. Two servings a week of fatty fish, such as salmon, trout, herring, sardines, tuna and mackerel, are a good source of these fats, which have been associated in some studies with a lower risk of developing AMD. (You will need to be aware of the mercury content of some of these fish, especially if you are pregnant or might get pregnant.) If you don't eat much fish, ask your doctor whether you should take a dietary fish oil supplement of about 1,000 or 1,200 mg. The supplements may cause excessive bleeding in some people.

What should I tell my doctor?

- Do you have blurriness in your central field of view? Do straight lines look crooked?
- Is there a family history of AMD or vision loss? Find out before you go in for your visit.

What can my doctor do?

- Your doctor will probably send you to an ophthalmologist, a specialist in eye diseases, for baseline testing as well as encourage regular eye exams in the future.
- Your physician may prescribe a special blend of vitamins to help prevent the progression of macular degeneration. Some studies have shown that certain high doses of vitamins in combination can be helpful. Do not take extra vitamins without consulting with your doctor, as they can be toxic in high doses.
- If your doctor finds signs of AMD, he or she may examine you more frequently, to catch it as quickly as possible if it progresses.
- If your doctor finds that the less serious dry form of macular degeneration has converted to the wet type, he or she may treat it more aggressively with laser therapy or drugs.

More information

You'll find even more information on this condition in the online version of your results. Log into your Member Account at www.navigenics.com to access:

- In-depth information on the general genetic understanding of this condition
- Details on the science behind your results
- Resources and groups that can provide even more information on this condition

(If you received your results through your doctor, ask your clinician to pass along this information.)

Melanoma

Your estimated lifetime risk: **1.6% (16 per 1,000)**
Average lifetime risk: **2.6% (26 per 1,000)**

You have **0** of the **4** risk markers we looked for.

Gene or location [1]	Risk marker [2]	Your markers [3]	Odds ratio [4]	Source [5]
MC1R	**T**	C C	1.0	Nature Genetics, 2008
ASIP	**A**	G G	1.0	Nature Genetics, 2008

see page 6 for an explanation of this table format

Navigenics tests for common markers associated with melanoma. Much less common are single-gene mutations that can lead to the disease and are associated with rare forms of hereditary melanoma, which Navigenics does not test for. If you answer "yes" to any of the following questions, you should consult you should consult your physician or a dermatologist, who may refer you to a genetic counselor.

- Have you or anyone in your family had melanoma (especially two or more cases of melanoma in the same person)?
- Do you have a personal or family history of melanoma and pancreatic cancer – either both diagnoses occurring in the same family member or in two different relatives?
- Does anyone in your family have a known mutation in a gene associated with hereditary melanoma?
- Have you been diagnosed with multiple atypical or dysplastic nevi?

What we found for melanoma

We looked at two places on your genome where a one-letter difference in the genetic code affects your odds of melanoma. At this location, there are two markers. The table above shows your markers. You have zero of the four risk markers we looked for.

What does it mean?

Melanoma affects about two per thousand Americans, and the average U.S. female has a 2.6 per 100 chance of developing melanoma over her lifetime. Even though your genetic risk is below average, it's still smart to monitor your skin for changes and to avoid too much sun, especially at midday when the rays are strongest. Don't forget to wear protective clothing and use generous amounts of sunscreen with an SPF of at least 30.

What's next

- Get familiar with your skin. Watching for suspicious changes is the best defense against melanoma.
- Wear a broad-spectrum sunscreen with an SPF (sun protection factor) of at least 30 every day, as well as a wide-brimmed hat and protective clothing when you spend time in the sun.
- Set up an appointment to review your results with your doctor and discuss detection strategies, including regular skin screenings, if appropriate.

What you can do

Even if your risk for melanoma is average or below average, it's still smart to limit sun exposure, monitor your skin and have a dermatologist check out any unusual changes. With this particular cancer, the payoff for early detection is huge.

Early detection

Points to remember

If you visit your doctor as soon as you notice any unusual skin changes, there's a good chance that melanoma can be caught while it's still treatable. But if left alone, it is much more difficult to treat and is more likely to spread.

Symptoms

Where to look: Everywhere, because melanoma can develop even on parts of your body that aren't exposed to the sun. In Caucasians, it's most common in sun-exposed areas such as the back, legs, arms and face. In African Americans, Hispanics and Asians, the most common site is the bottom of the foot, followed by under fingernails and toenails and on the palms.

Dermatologists have developed the A-B-C-D-E guidelines to help you identify unusual moles that may indicate skin cancer. Some moles may show all of these changes, while others may only have one or two. Remember that not all melanomas arise from moles. Any changes that seem suspicious to you should be checked by a dermatologist. That said, here are the most common changes to watch for in your moles:

- **A is for asymmetrical shape**. Look for moles with irregular shapes, such as two very different-looking halves.
- **B is for irregular border.** Look for moles with irregular, notched or scalloped borders, typical of melanoma.
- **C is for changes in color.** Look for growths that have many colors or an uneven distribution of color. And don't forget that some melanomas (called amelanotic) are colorless.
- **D is for diameter**. Look for new growth in a mole larger than about 1/4 inch (six millimeters).
- **E is for evolving.** Look for changes over time, such as a mole that grows in size or that changes color or shape, or develops scaliness, itchiness or bleeding.

These changes can also be caused by other health problems, so having them doesn't mean you have cancer. But it's a good idea to see your doctor right away to find out what's going on.

Testing

Sometimes melanoma can be detected simply by looking at your skin, but the only way to accurately diagnose it is with a biopsy. Your doctor removes all or part of the suspicious mole or growth, and a pathologist analyzes the sample for signs of cancer.

Clinically proven

Wear a broad-spectrum sunscreen daily. These sunscreens block UVA and UVB rays, both of which cause changes in skin cells that can lead to melanoma. Tips:

- The SPF number should be at least 30.
- Look for the ingredients avobenzone (Parsol 1789) or mexoryl, which block UVA rays; and octocrylene, which blocks UVB; or zinc oxide or titanium dioxide, which physically block the sun's rays.
- For the best protection, put on sunscreen 20 to 30 minutes before you go out in the sun and reapply it every two hours if you're still outside or if you've been sweating a lot or swimming.
- Keep a bottle handy in your car and at work, as well as with outdoor gear such as gardening tools and sports equipment.
- Regarding safety, the research showing that sunscreens are safe and help prevent melanoma is much stronger than the evidence from a few small studies suggesting that some ingredients may be harmful.

Get regular skin screenings.

- Check your skin at least every month and report changes to your doctor. It's especially important to check your scalp and neck, as melanomas on the head tend to be more lethal. The Mayo Clinic offers a useful set of pictures that can help you spot questionable moles.
- The American Academy of Dermatology has more information about how to perform a self-exam.
- Visit your doctor for a skin exam every year if you're more than 40 years old, or more often if you're at high risk.

Don't get burned. More than five sunburns in a lifetime doubles your risk of melanoma, regardless of whether these sunburns occur in childhood or adulthood.

Stay out of intense sun. Minimize sun exposure at midday, even when the sky is cloudy.

Wear protective clothing. Tightly-woven clothes that cover your arms and legs and a broad-brimmed hat can strengthen the protection you get from sunscreen. (A white T-shirt is equivalent to an SPF of 6, while a heavy denim work shirt has an SPF of more than 1,000.) You can also buy specially designed clothes that block UVA and UVB. These clothes have a label listing the ultraviolet protection factor (UPF), the amount of UV radiation that penetrates the fabric. A UPF of 50 makes the best defense. A laundry additive called SunGuard can add UPF 30 protection to your clothes that lasts for 20 washings.

Promising

Wear sunglasses. It's rare, but melanoma can also occur inside your eye. Wrap-around sunglasses that block both UVA and UVB will protect your eyes and the skin around them.

Avoid tanning beds. They emit UVA rays, which scientists now believe damage skin and help cause melanoma.

Preliminary

Be careful with sun-sensitizing medications. Some common prescription and over-the-counter drugs – including antibiotics, diuretics, birth control pills and some antidepressants – may make your skin more sensitive to sunlight. Ask your doctor or pharmacist about the side effects of any medications you take. If they increase your sensitivity, take extra precautions to avoid getting burned.

Consider chemoprevention. Researchers are investigating ways to prevent skin cancer with oral drugs. One promising class of drugs is the cholesterol-lowering statins, which also seem to protect against certain cancers. Future preventive therapies may also include drugs that reduce the damage caused by UV radiation. In one small study, people who took an amino acid compound called N-acetylcysteine had less DNA damage after exposure to artificial UV light. More research will be needed to determine how useful these therapies might be, but they are worth keeping an eye on.

Check into topical treatments. Although isotretinoin (a vitamin A derivative) can help prevent non-melanoma skin cancer, the evidence is mixed as to its effectiveness against melanoma. Ask your doctor whether an isotretinoin cream might help you. Other potential skin treatments are still in clinical trials but may be worth considering as the research develops. For instance, researchers are developing lotion-based compounds that can repair cell damage after sun exposure.

What should I discuss with my doctor?

- Did you have one or more serious sunburns as a child?
- Do you have any symptoms typical of melanoma, such as an asymmetric mole with irregular borders and/or different colors?
- Do you have a mole that looks different from the rest?
- Have any of the moles on your body changed?
- Do you have more than 50 ordinary moles?
- Has anyone in your family had skin cancer?
- Are you taking immune-suppressing drugs? (These can increase skin cancer risk.)
- Should you consider a vitamin D supplement, to make up for the D blocked by sunscreen?

What can my doctor do?

Even if you don't have any symptoms of melanoma, talk with your doctor about monitoring your skin for suspicious changes. Dermatologists recommend regular skin screenings for everyone older than 40 and anyone with an increased risk of skin cancer. Your doctor can:

- Examine your skin for any suspect moles or skin spots.
- Schedule you for regular melanoma screenings.
- Keep you up to date on new strategies for preventing melanoma.

More information

You'll find even more information on this condition in the online version of your results. Log into your Member Account at www.navigenics.com to access:

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- Resources and groups that can provide even more information on this condition

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Multiple sclerosis

Your estimated lifetime risk: **0.45% (45 per 10,000)**
Average lifetime risk: **0.77% (77 per 10,000)**

You have **4** of the **6** risk markers we looked for.

Gene or location [1]	Risk marker [2]	Your markers [3]	Odds ratio [4]	Source [5]
DRB1*1501	**A**	C C	1.0	PLoS Genetics, 2007
IL7R	**C**	**C C**	1.8	Nature Genetics, 2007
IL2R	**C**	**C C**	1.37	New England Journal of Medicine, 2007

see page 6 for an explanation of this table format

What we found for multiple sclerosis

We looked at three places on your genome where a one-letter difference in the genetic code affects your odds of multiple sclerosis. At each location, there are two markers, for a total of six possible risk markers. The table above shows your markers. You have four of the six risk markers we looked for.

What does it mean?

You have a below-average risk of developing multiple sclerosis, which affects about six in 10,000 people in the United States. Over the course of the average U.S. woman's lifetime, the risk of developing multiple sclerosis is 77 per 10,000.

Multiple sclerosis is a chronic and progressive neurological disease. Knowing your risk can make you alert to symptoms if you do develop them. There is no cure for multiple sclerosis, but treatment can help lessen the severity and progression of symptoms. Most patients notice their first symptoms between the ages of 20 and 40.

What's next

- Watch for symptoms, including dizziness or trouble walking.
- Talk to your doctor if you have symptoms.

Early detection

- Symptoms of MS vary widely. Some people have only mild symptoms, while others can become disabled. People with the most common form of the disease have periodic flare-ups of symptoms, followed by periods of remission. Some with mild symptoms do not even need treatment.
- Even if you have several of the genes associated with an increased risk of multiple sclerosis, you may never get the disease, because part of a person's risk depends on environmental factors.
- The role of environmental factors in multiple sclerosis is still poorly understood, but research studies have found strong associations between MS and previous viral infections — especially the Epstein-Barr virus that causes infectious mononucleosis. Remember, however, that this is a very common infection and most people who have had it never develop multiple sclerosis.

Symptoms

Doctors believe that MS can show up in a wide variety of ways. If you have any of the early symptoms listed below, it is important to be evaluated as soon as possible by a neurologist who treats patients with MS.

- Inflammation of the optic nerves, resulting in eye pain, double vision, blurred vision and changes in color perception.
- Persistent numbness or tingling in the arms, legs or other parts of the body.

- Unexplained fatigue, muscle weakness or loss of balance.

Testing

There is no definitive test for multiple sclerosis, and it is often misdiagnosed.

- If you had infectious mononucleosis as a teen-ager or young adult and have concerns about multiple sclerosis, ask your physician to consider testing your blood for specific antibodies to the Epstein-Barr virus. A recent study found that unusually high levels of antibodies to certain EBV proteins were associated with an increased risk of multiple sclerosis. If you have these antibodies, you may want to be examined more frequently. However, mononucleosis is very common, and most people who have had it never develop multiple sclerosis.
- Human Leukocyte Antigen (HLA) genes are strong genetic drivers of autoimmune diseases. HLA genes contain the genetic code for proteins that your immune system uses to distinguish between what belongs in your body and what doesn't. People with a variant form of an HLA gene called HLA-DRB1*1501 have a higher risk of multiple sclerosis. Our test provides some information about your genetic risk at this location. If you are concerned about MS, ask your physician about higher-resolution HLA testing.

What you can do

There is no one classic symptom, but an awareness of the possibility of the disease can sensitize one to thinking of it when an unusual neurologic symptom does arise and persists.

Preliminary

Avoid excessive heat. Heat causes a worsening of symptoms in 75 percent of patients, a phenomenon known as "unmasking."

Eat your omega-3's. Consider incorporating omega-3 fatty acids into your diet. Two servings a week of fatty fish, such as salmon, trout, herring, sardines, tuna and mackerel, are a good source of these fats, which can help reduce inflammation. (You will need to be aware of the mercury content of some of these fish, especially if you are pregnant or might get pregnant.) If you don't eat much fish, ask your doctor whether you should take a dietary fish oil supplement of about 1,000 or 1,200 mg. The supplements may cause excessive bleeding in some people.

Don't smoke. Smoking can lead to vascular problems and interfere with the body's ability to heal.

Maintain a moderate exercise regime. Any form of exercise will work. An increase in core body temperature does not cause further problems, so exercise as tolerated by the patient is recommended.

What should I tell my doctor?

- Do you have a family history of multiple sclerosis?
- Have you experienced dizziness, visual problems, lack of coordination, limb weakness, difficulty walking, bladder or bowel dysfunction or fatigue?
- Do your symptoms worsen in heat, such as warm showers, hot tubs and warm weather?
- When do your symptoms appear? Do your symptoms periodically flare up and then go away?
- What have other doctors told you?
- Do you drink alcohol or smoke?
- Have you used drugs recreationally?
- Where you were born or raised — the farther from the equator, the greater the risk for MS.

What can my doctor do?

- Conduct a physical examination, including a neurological exam.
- Order blood tests to rule out other conditions that can mimic or contribute to neurological symptoms such as diabetes, vitamin B12 deficiency, thyroid disease, vasculitis, occult syphilis and Lyme disease
- Order an MRI or other special tests if appropriate, to look at the brain or spinal cord for changes associated with MS.

- Refer you to a neurologist if you have symptoms or concerns. The neurologist may administer electrophysiological tests, including visual, auditory and somatosensory evoked potentials, tests which show the electrical signals of sensation going from the body to the brain; perform an OCP or optical coherence tomography test; or perform a lumbar puncture (spinal tap) to check your cerebrospinal fluid.
- If you are diagnosed with MS, prescribe medication to treat the symptoms and decrease the number of episodes.

More information

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- Resources and groups that can provide even more information on this condition

(If you received your results through your doctor, ask your clinician to pass along this information.)

Obesity

Your estimated lifetime risk: **31% (31 per 100)**
Average lifetime risk: **32% (32 per 100)**

You have **1** of the **4** risk markers we looked for.

Gene or location [1]	Risk marker [2]	Your markers [3]	Odds ratio [4]	Source [5]
FTO	**A**	**A** T	1.31	Science, 2007
PCSK1_2	**G**	C C	1.0	Nature Genetics, 2008

see page 6 for an explanation of this table format

What we found for obesity

We looked at two places on your genome where a one-letter difference in the genetic code affects your odds of obesity. At each location, there are two markers, for a total of four possible risk markers. The table above shows your markers. You have one of the four risk markers we looked for.

What does it mean?

Your risk of becoming obese is about average, but let's face it, that's not entirely reassuring. If you're not already doing something about diet and exercise, now you know: The public health warnings really do apply to you. One in three Americans are obese, and over the course of the average U.S. woman's lifetime, the risk of becoming obese is also one in three (32 percent). By obesity we don't just mean being overweight, but a body mass index of 30 or more. It's a serious risk factor for heart disease, diabetes and joint problems. The risk of obesity increases with age.

By obesity we don't just mean being overweight, but a body mass index of 30 or more. It's a serious risk factor for heart disease, diabetes and joint problems. The risk of obesity increases with age.

What's next

- Painful question: How much did you weigh in high school?
- Develop better eating habits.
- Get more active.

What you can do

Genetics may predispose you to pack on the pounds. But genes are only part of the picture. Your lifestyle and habits can make a huge difference in getting the weight off and keeping it off.

Clinically proven

Be aware of what you eat. Learning to read nutrition labels and thinking about how you buy and cook your food will help you take in fewer calories and help prevent weight gain. A high-salt diet can cause you to retain fluids. Keep a food diary. People who keep a written record of their daily food consumption are less likely to overeat.

Get active. A daily exercise routine will burn off excess calories before they are turned into fat on your body. If you are not fit, begin slowly and gradually to increase the intensity and duration of your exercise. For healthy adults under 65, the American Heart Association and American College of Sports Medicine recommend moderate exercise for 30 minutes, five days a week or vigorous exercise for 20 minutes, three days a week. (To lose a significant amount of weight, you will probably have to move more: 60 to 90 minutes a day of exercise such as brisk walking.) A recent study suggests that varying the intensity level — alternating fast walking with moving at a moderate pace, for instance — may help you stick with a fitness regimen.

Keep an eye on portion size. A woman burns far fewer calories than a man of the same size – yet restaurants serve the same portions to everyone, and you may do the same at home. When eating out, consider splitting a dish or asking the waiter to box up half your meal before you start eating. At home, use measuring cups and a scale to be sure you know how much you're eating.

Focus on your waist. Fat around the belly is more dangerous than fat that accumulates elsewhere. It raises your risk for high blood pressure, heart disease and death. Even people with a normal BMI (body mass index, a measure of weight vs. height) may be at risk if they carry too much fat around their waists. Your waist circumference should be no more than 35 inches for women, 40 inches for men. People of Asian origin may be at risk at even lower circumferences. Asian women should aim for a waist of no more than 31 inches, men for no more than 35 inches.

Limit TV. Keep track of how many hours you spend watching television. Studies have shown that if you watch more than about an hour and a half of television daily, you are more likely to gain weight.

Check your medications. Certain medications used to treat depression, diabetes and allergies can cause people to gain weight. Consult your doctor if you are taking such medications or are gaining weight after beginning a new medication.

Create healthy environments. Talk to supervisors, co-workers and school principals about ways to introduce healthy and inexpensive food options into cafeterias and vending machines. Suggest promoting exercise through corporate gym memberships and after-school athletic programs.

Take control. Identify things that trigger overeating (such as stress or boredom) and find healthy alternatives (taking a walk or calling a friend). Keep your weight-loss goals realistic. And be sure to reward yourself (with something other than food) when you reach them.

Preliminary

Use a pedometer. Aim for at least 10,000 steps daily, a reasonable goal to promote weight loss. Counting your steps can motivate you to park a little farther away, take the stairs instead of the elevator and go for a walk around the block on your lunch break.

Get enough sleep. Depriving yourself of sleep seems to disrupt the hormones that regulate your appetite and contribute to weight gain.

Offer your kids healthy choices. If you're concerned about your children becoming obese, the answer is not to restrict their food – they'll only eat more outside the home. Instead, make sure your pantry is stocked with healthy, easy-to-eat choices, like cut-up fruits and vegetables. Keep sodas, candy, pizza and cakes out of the house and it'll be good for your weight control too.

Preliminary

Watch the fat and corn syrup. Foods containing high amounts of fat and high-fructose corn syrup may be correlated with obesity. Avoiding such foods could reduce your caloric intake and help prevent weight gain.

Get support. Evidence is mounting that a strong support structure helps people lose weight. Families need to decide to lose weight and get healthy together. Communities can pool resources and work toward becoming less obese.

Be wary of diet sodas. Animal studies suggest that artificially sweetened drinks may actually stimulate the appetite. Studies in humans have yet to confirm this, but drinking sodas, including diet sodas, is associated with weight gain. One trick that can help: Put ice in your cup before adding soda, so you drink less.

Drink before you eat. If you have a glass of water before meals, some studies show you may eat less.

Pick a diet, any diet. Low-fat, low-carb, and Mediterranean diets can all help, although recent research shows that low-carb and Mediterranean eating plans may be somewhat more effective for long-term weight loss. Ultimately, the diet is less important than whether you stick with it. Long-term weight maintenance requires a healthy lifestyle, with a balance of calories taken in and burned through exercise.

Eat breakfast. Skipping the morning meal may affect levels of a hormone called ghrelin, which regulates appetite levels.

Cook more to eat better. When you cook, double the recipe and freeze half of the dish. That way, when you're too busy to cook, you won't be tempted to resort to fast food.

Try a grocery delivery service. One study found that ordering groceries online instead of going to the supermarket reduced the number of high-fat foods in the house. Participants said using the online service helped them cut out impulse buys.

Weigh yourself regularly. Studies have found that people who weigh themselves every day are more likely to maintain weight loss, perhaps because they catch any weight gain early. But remember that weight can vary for many reasons, as water retention due to salt intake. A once-a-week weigh-in once a week may be better for some people.

Make small changes. Cutting just 100 calories a day from your diet should result in a loss of 25 pounds in two years.

Early detection

Points to remember

- Preventing obesity is safer, easier and more cost-effective than treating it.
- If you gain just one pound a year from the age of 18 on, you will be 40 pounds overweight by the time you turn 60.
- People who put on weight around their middles are at higher health risk than people who accumulate body fat on their hips.
- For several conditions, such as diabetes, losing even 10 percent of your body weight can significantly lower your risk of developing the disease.
- Slow and steady weight loss in conjunction with exercise and behavioral modification has a greater chance of keeping the pounds off long-term.
- Check with your doctor on the appropriate level and duration of exercise you need to incorporate into your daily schedule.

Symptoms

- Since obesity is usually a silent killer, measurements rather than symptoms are used to assess the degree of the problem. The Body Mass Index is a widely recognized calculation that uses your height and weight to determine if you are overweight. (BMI between 25 and 29.9) or obese (BMI over 30). Visit the Mayo Clinic's Web site's BMI calculator.
- BMI is a reliable measure of total body fat for both men and women, but it can overestimate body fat in people with a muscular build or underestimate body fat in older people and others who have lost muscle mass. To make this measurement a more accurate, your BMI is coupled with your waist circumference and overall risk factors for disease. The recommended waist circumference is less than 40 inches for men and less than 35 inches for women.

Testing

Your doctor may order the following tests at a consultation about being obese or overweight:

- Fasting blood sugar for incipient diabetes
- Cholesterol levels, including HDL (the "good" cholesterol); HDL goes down as you get heavier
- Triglyceride levels (fat in your blood)
- Thyroid activity
- Liver enzymes, for fatty liver disease that can lead to cirrhosis of the liver

What should I tell my doctor?

- Does obesity run in your family?
- Do you eat breakfast?
- What is the percentage of meals you eat at home and in restaurants?
- Do you have unusual eating behavior such as bulimia, binging or night eating?
- Do you have other health issues such as diabetes, high blood pressure or heart disease?
- What is your activity level?
- What did you weigh in high school? This can be used as a rough guide to what your individual mature weight should be.
- What nutritional pattern do you follow? High-protein, low-fat, low-carb, vegan, etc.

- Do you eat a lot? Any idea of how many calories per day? Do you snack frequently?
- How much alcohol do you drink?
- Do you smoke? Have you stopped smoking lately?
- What medications or herbals do you take?
- Do you eat a lot of salty or processed foods?
- Is your spouse or family supportive of your desire to lose weight?

What can my doctor do?

- Conduct a physical examination, calculate your BMI, check your waist circumference and your blood pressure.
- Check blood tests to evaluate your general health and metabolic status, checking for things such as an underactive thyroid or diabetic tendency.
- Enroll you in a behavior modification plan that includes meal substitutes, retraining your eating habits and increased exercise.
- Adjust any medications that might be contributing to your weight.
- Recommend appropriate diet and exercise plans or refer you to a dietitian.
- Prescribe medication or, for severely obese people, recommend consideration of bariatric surgery.

More information

You'll find even more information on this condition in the online version of your results. Log into your Member Account at www.navigenics.com to access:

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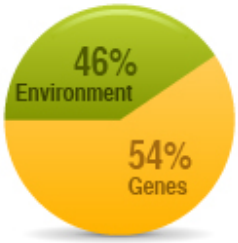
(If you received your results through your doctor, ask your clinician to pass along this information.)

Osteoarthritis

Your estimated lifetime risk: **47% (47 per 100)**
Average lifetime risk: **47% (47 per 100)**



You have **3** of the **4** risk markers we looked for.

Gene or location [1]	Risk marker [2]	Your markers [3]	Odds ratio [4]	Source [5]
GDF5	**A**	**A** G	1.27	Nature Genetics, 2007
DVWA	**C**	**C C**	1.85	Nature Genetics, 2008

see page 6 for an explanation of this table format

What we found for osteoarthritis

We looked at two places on your genome where a one-letter difference in the genetic code affects your odds of osteoarthritis. At each location, there are two markers, for a total of four possible risk markers. The table above shows your markers. You have three of the four risk markers we looked for.

What does it mean?

You are at about average risk for osteoarthritis, which affects an estimated 21 million Americans. Your risk for this condition associated with aging can be reduced with simple measures. Osteoarthritis is a leading cause of disability, leading to pain, inflammation and a loss of flexibility and mobility. Eighty-five percent of the U.S. population over age 70 shows signs of osteoarthritis on X-rays. But arthritis is not inevitable, and if you get it you can treat or lessen symptoms.

Osteoarthritis is a leading cause of disability, leading to pain, inflammation and a loss of flexibility and mobility. Eighty-five percent of the U.S. population over age 70 shows signs of osteoarthritis on X-rays. But arthritis is not inevitable, and if you get it you can treat or lessen symptoms.

Ethnic variation

Most conditions have only been studied in people of European ancestry, but this one has also been studied in Asians.

What's next

- Do you have symptoms? See your doctor.
- Be prepared to lose weight if necessary.
- Careful exercise can keep you going longer.

Early detection

Points to remember

- Osteoarthritis can lead to difficulty performing everyday activities and can impact quality of life. If you are aware of the symptoms, prompt treatment can help slow the progression of the disease and keep pain at bay.
- Early detection can rule out other forms of arthritis, such as rheumatoid arthritis, which can cause organ damage if left untreated.

Symptoms

- Achiness and stiffness of your joints, particularly the larger, weight bearing-joints such as hips, spine and knees. The distal finger joints (the ones farthest from the wrist) and the base of the thumb are common sites as well. This may asymmetrically affect only a few joints. Joints can appear red and swollen, but usually not to the degree that they do in rheumatoid or infectious arthritis.
- Morning stiffness that lasts less than 30 minutes, as well as joint achiness at the end of the day, or after vigorous exercise.

Testing

- X-rays or MRIs of your joints to rule out other diseases such as rheumatoid arthritis or lupus.
- Blood tests to check inflammatory markers, such as a sedimentation rate or C-reactive protein, and to be sure there are no other causes of your symptoms.
- Joint fluid sampling to rule out other diseases.

What you can do

The symptoms of osteoarthritis are not an inevitable part of aging. You can reduce the wear and tear on your joints through lifestyle changes.

Clinically proven

Manage your weight. Weight loss of 11 pounds was associated with a nearly 50 percent reduction in the risk of developing knee osteoarthritis in one study.

Protect yourself. Use appropriate protective gear during sporting activities. If you have problems with balance and are falling frequently, talk to your doctor about assistive devices that can help with balance and prevent joint injury. Wear rubber-soled shoes that provide good support.

Treat your injuries. If you suffer a joint injury, be sure to have it promptly treated.

Promising

Maintain physical fitness. Regular, low-impact exercise has been shown to decrease the risk of developing OA in those with normal joints. Talk to your doctor or physical therapist about the best exercise regimen given your specific risk factors and health history. They may recommend activities such as swimming, water aerobics and strength training. Regular exercise can also improve mood, pain management, mobility and flexibility in patients already diagnosed with OA. In addition, exercise helps keep weight down and contributes to overall health.

Preliminary

Don't smoke. One study showed that smoking is associated with a loss of knee cartilage in people with a family history of osteoarthritis.

Don't wear high heels. Research at Harvard University has shown that a heel of just 1.5 inches can put added strain on the knee that could hasten the development of OA or exacerbate it.

What should I tell my doctor?

- Are you experiencing any other conditions, such as recent viral or bacterial illness, thyroid disease or other types of arthritis?
- Are you taking medications that can cause joint achiness as side effects?
- At what age did you first experience symptoms?
- Have you experienced trauma to your joints or an occupational hazard that could lead to arthritis?
- Do you have a family history of osteoarthritis?
- Did your symptoms appear suddenly or are they more chronic in nature?
- Do you have morning stiffness, night pain or swelling of your joints?
- Where is your discomfort located: knees, hands, shoulders?

- How severe are your symptoms? Do over-the-counter painkillers or anti-inflammatories help? If so, what type is most effective?

What can my doctor do?

- Take a detailed health history, conduct a physical exam and order tests to check inflammatory markers and rule out other diseases such as rheumatoid arthritis or lupus.
- Refer you to an orthopedist to check if a biomechanical condition such as being knock-kneed, pigeon-toed or flat-footed is causing undue stress on joints.
- Refer you to a physical or occupational therapist to teach you how to use your muscles correctly and ease symptoms.
- Refer you to a rheumatologist to help with a preventive or therapeutic program.
- Treat symptoms with painkillers or anti-inflammatories.
- In severe cases, recommend consulting with an orthopedist about joint replacement surgery.
- Recommend self-care strategies, including exercise, weight management, the application of heat or cold and the use of assistive devices (e.g. a cane, splint or brace) as needed.

More information

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Psoriasis

Your estimated lifetime risk: **6% (60 per 1,000)**
Average lifetime risk: **4.0% (40 per 1,000)**

You have **6** of the **6** risk markers we looked for.

Gene or location [1]	Risk marker [2]	Your markers [3]	Odds ratio [4]	Source [5]
IL12B	**T**	**T T**	2.55	American Journal of Human Genetics, 2007
IL23R	**G**	**G G**	2.53	American Journal of Human Genetics, 2007
IL13	**C**	**C C**	1.78	Genes and Immunity, 2008

see page 6 for an explanation of this table format

What we found for psoriasis

We looked at three places on your genome where a one-letter difference in the genetic code raises your odds of psoriasis. At each location, there are two markers, for a total of six possible risk markers. The table above shows your markers. You have six of the six risk markers we looked for.

What does it mean?

Your chances of getting psoriasis are above average. If you develop this skin disease, you can take steps that may prevent flare-ups and ease symptoms. Psoriasis affects about 2 percent of Americans, and over the course of the average U.S. woman's lifetime, the risk of developing psoriasis is four per 100. Psoriasis is a chronic condition in which the skin renews itself too quickly, often causing itching and flaking. It comes in different variants and can affect other parts of the body beyond the skin. Symptoms vary, from minor redness to scaly, cracked skin that can be painful. It usually is diagnosed between the ages of 15 and 35.

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What's next

- Reduce alcohol intake if you drink.
- Don't smoke.
- Lose weight if you're overweight.

Early detection

Points to remember

- Psoriasis symptoms can vary. Skin symptoms can be mild at first and escalate over time, or they can remain stable. In some cases they can be severe from the onset. In mild cases, patients might notice increased burning or itching followed by redness and some flaking of the skin. In severe forms, the skin can become cracked and susceptible to infection. Psoriasis can be debilitating if it spreads over a patient's hands and feet.
- Psoriasis is believed to cause increased cardiovascular risk for patients who have more severe symptoms.
- The disease is also associated with insulin resistance. Diabetics are more prone to infection.
- Educate yourself about what psoriasis looks like. The earlier you identify symptoms and begin medical treatment, the better your chances of keeping the condition under control.

- Look for environmental triggers that correlate with flare-ups of psoriasis or worsening of symptoms. While psoriasis is mostly hereditary, triggers for outbreaks may include infections such as strep, certain medications, skin injuries and stress.

Symptoms

- Skin patches that are thickened, scaly, and reddish in color.
- Pitted nails
- Chronic raised red patches or teardrop-shaped pustules
- Skin pain and itchiness, redness and flaking or cracked skin
- Psoriatic skin patches can occur anywhere on the body, including genitals, armpits and nails, but most commonly are found on the scalp, elbows and knees, as well as the intergluteal area between the buttocks
- Arthritic symptoms affecting the back and other joints, including those of the hands and feet, often causing sausage-like swelling of digits
- Eye inflammation

Testing

- Psoriasis is usually diagnosed by simply examining the skin patches. Occasionally, a dermatologist may order a biopsy to confirm the diagnosis if it is in question.
- Before prescribing medications, your doctor might order a complete blood count or other blood tests.

What you can do

There is no proven way to prevent or cure psoriasis. However, there are actions you can take that may postpone symptoms or reduce their severity.

Preliminary

Good health and hygiene. Maintaining good hygiene can help your body minimize infections and stay healthy. Eat a healthy diet to keep your body from getting tired or sick. Drink a lot of water to stay well-hydrated. And get daily exercise to minimize stress.

Emollients and moisturizers. Emollients soften the skin, while moisturizers trap moisture in the skin to prevent dryness and cracking. After taking a shower, apply moisturizer to keep your skin from drying out. Dermatologists agree regularly moisturizing and softening your skin can help prevent drying, flaking and itching. Minimize friction and sweat in affected areas.

Avoid scratching. Scratching can allow infections to enter your body and can damage the skin. To soothe itching, seek medical help, apply a cold pack to the itch or take short, warm showers.

Winter-proof your skin. With heaters drying out the air and the cold wind drying your skin, it is especially important to keep hydrated during the winter. Drink water and use moisturizers regularly — try lotions during the day and heavier ointments or creams at night. Consider investing in an air humidifier.

Maintain a healthy weight. A recent study of more than 78,000 women found that those who were overweight or obese were more likely to be diagnosed with psoriasis during the 15 years of the study. In addition, there are some reports of psoriasis remission after substantial weight loss.

Reduce stress or learn to manage it better. Stress is one of the most common triggers for psoriasis, according to dermatologists. Reducing your stress can delay the onset of psoriasis and reduce the recurrence of symptoms.

Avoid alcohol and smoking. Some studies have correlated excessive alcohol intake and smoking with moderate to severe psoriasis. But there is still debate about how much effect they have.

What should I tell my doctor?

- Do you have a family history of psoriasis?
- Do you have any symptoms of psoriasis or arthritis?

- What medications do you take?
- Do you drink alcohol, and how much?
- Do you smoke?
- Do you have any other medical conditions or problems?
- What is your tolerance for risk of side effects of medication?

What can my doctor do?

- Examine your skin and joints, as well as check your eyes, heart and lungs.
- If you have skin lesions that look like psoriasis, refer you to dermatologist to confirm the diagnosis, as other skin conditions can mimic psoriasis.
- If you have any significant joint symptoms, refer you to a rheumatologist. Psoriasis can be associated with a type of arthritis called psoriatic arthritis.
- If you are diagnosed with psoriasis, recommend treatments including topical or oral medications or ultraviolet light therapy.
- Evaluate and monitor your risk for diabetes.

More information

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Restless legs syndrome

Your estimated lifetime risk: **8% (80 per 1,000)**
Average lifetime risk: **4.0% (40 per 1,000)**

You have **5** of the **6** risk markers we looked for.

Gene or location [1]	Risk marker [2]	Your markers [3]	Odds ratio [4]	Source [5]
MEIS1	**G**	**G** T	1.82	Nature Genetics, 2007
BTBD9	**T**	**T T**	2.85	Nature Genetics, 2007
MAP2k5_LBXCOR1	**G**	**G G**	1.94	Nature Genetics, 2007

see page 6 for an explanation of this table format

What we found for restless leg syndrome

We looked at three places on your genome where a one-letter difference in the genetic code affects your odds of restless legs syndrome. At each location, there are two markers, for a total of six possible risk markers. The table above shows your markers. You have five of the six risk markers we looked for.

What does it mean?

This is an uncomfortable condition that gives you an irresistible urge to move your legs, especially when you're resting or lying down. Your chances of getting it are above average. Restless legs syndrome affects about 3 percent of the U.S. population. Over the course of the average U.S. woman's lifetime, the risk of developing restless legs syndrome is four per 100. Restless legs syndrome is a nerve disorder that often makes it hard to fall asleep or stay asleep. There is no cure, and there are no proven ways to prevent it. However, changes in diet and exercise habits, as well as medications, can help you ease the symptoms.

Restless legs syndrome is a nerve disorder that often makes it hard to fall asleep or stay asleep. There is no cure, and there are no proven ways to prevent it. However, changes in diet and exercise habits, as well as medications, can help you ease the symptoms.

Ethnic variation

Most conditions on the Navigenics panel have only been studied in people of European ancestry. But this condition is a little different.

What's next

- Do you have symptoms? Talk to your doctor, because treatments are available.
- Cut out caffeine, alcohol and smoking.

Early detection

Points to remember

The risk of restless legs syndrome may be increased by:

- Low iron levels
- Poor sleep habits
- Smoking
- Alcohol or caffeine

Symptoms

Conditions linked to restless legs syndrome include iron-deficiency anemia, severe kidney disease and damage to the nerves of the hands and feet (peripheral neuropathy). Nearly a quarter (23 percent) of women develop symptoms of restless legs syndrome during pregnancy. Symptoms of restless legs syndrome include:

- You have a desire to move your legs that feels impossible to resist, and moving them makes you feel better.
- You feel sensations in your legs that are unpleasant, creepy-crawly, itching, pulling or tugging.
- You have a desire to move, particularly when you are resting or sitting still.
- Symptoms are more frequent at night.
- Your legs jerk while you are asleep.
- Your legs move involuntarily while you are awake.
- You feel tired or unable to concentrate during the day.

Testing

There are no lab tests that will tell for sure if you have restless legs syndrome. However, your doctor may test iron levels in your blood to see if they're low or order other tests to rule out conditions that could mimic restless legs syndrome.

What you can do

This is an annoying problem that can affect sleep and well-being but does not cause dire internal problems.

Preliminary

Iron supplements. Research shows that low iron levels can cause or worsen RLS symptoms. Iron supplements can cause constipation, stomach upset and other side effects, so before taking them, check with your doctor and have your blood iron level tested.

Practice good sleep habits.

- Maintain a cool, quiet and comfortable sleeping environment.
- Reserve the bedroom for sleeping. Don't eat, read or watch TV in bed.
- Go to bed at the same time every night.
- Get up at the same time every morning.
- Get enough sleep to feel well rested.

Don't smoke. Nicotine can interfere with sleep.

Try soothing activities. Examples include stretching, taking a hot or cold bath, massage and relaxation techniques, especially in the evening or at night.

Eliminate caffeine. Remember, caffeine can be in products that you might not suspect such as chocolate, certain medications and some non-cola sodas.

Decrease your alcohol intake.

Engage your mind in the evening. Find an activity you enjoy, such as crossword puzzles, needlepoint, lively conversation or even video games.

Get moderate, regular exercise. It is important to find an exercise time that works best for you. Intense exercise may be best performed in the morning or afternoon so that it doesn't disrupt your sleep. Research has shown that mild to moderate exercise tends to suppress RLS symptoms, while bursts of intense exercise can increase symptoms.

What should I tell my doctor?

- Do you have a family history of restless legs syndrome?
- What are your leg sensations during long periods of inactivity, such as driving and plane rides?
- Do you have irresistible urges to move your legs, especially at rest, but less so with movement or exercise? Do these symptoms get worse at night?

- Do you have factors that may cause or worsen RLS? These include iron or folic acid deficiency, pregnancy, chronic lung disease, varicose veins, venous insufficiency and thyroid disease.
- Do you have numbness, tingling and pain in your extremities?
- Do you drink coffee or alcohol?
- Do you take antidepressants, beta blockers, lithium, H2 blockers, antihistamines or antipsychotic medication? These drugs may exacerbate restless legs symptoms.
- Do you smoke?

What can my doctor do?

- Order blood tests looking for medical conditions that can contribute to or mimic RLS.
- Consider changing or eliminating medication that may be contributing to RLS.
- Refer you to a neurologist for consultation.
- If you have severe RLS, prescribe medications.
- Suggest leg-stretching exercises.

More information

You'll find even more information on this condition in the online version of your results. Log into your Member Account at www.navigenics.com to access:

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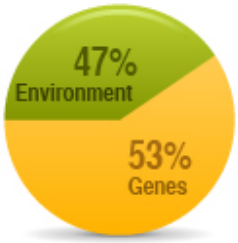
Rheumatoid arthritis

Your estimated lifetime risk: **2.5% (25 per 1,000)**
Average lifetime risk: **3.3% (33 per 1,000)**



You have **3** of the **10** risk markers we looked for.

Gene or location [1]	Risk marker [2]	Your markers [3]	Odds ratio [4]	Source [5]
PTPN22	**A**	G G	1.0	American Journal of Human Genetics, 2004
chr6.138007111	**C**	**C C**	1.77	Nature Genetics, 2007
TRAF1	**G**	A **G**	1.32	New England Journal of Medicine, 2007
chr6.138048197	**A**	G G	1.0	Nature, 2007
STAT4	**T**	G G	1.0	New England Journal of Medicine, 2007

see page 6 for an explanation of this table format

What we found for rheumatoid arthritis

We looked at five places on your genome where a one-letter difference in the genetic code affects your odds of rheumatoid arthritis. At each location, there are two markers, for a total of 10 possible risk markers. The table above shows your markers. You have three of the 10 risk markers we looked for.

What does it mean?

You are at below-average risk for rheumatoid arthritis, a joint disease that affects about one in a hundred Americans. Over the course of the average U.S. woman's lifetime, the risk of developing rheumatoid arthritis is 3.3 per 100. Not smoking can lower your risk even more. Rheumatoid arthritis is an autoimmune disease, meaning that your immune system attacks your own body, particularly the tissue surrounding the joints. The disease is chronic, though for many people symptoms may come and go. It generally is diagnosed between the ages of 40 and 60.

Rheumatoid arthritis is an autoimmune disease, meaning that your immune system attacks your own body, particularly the tissue surrounding the joints. The disease is chronic, though for many people symptoms may come and go. It generally is diagnosed between the ages of 40 and 60.

What's next

- Are your joints stiff, warm or swollen, especially in the mornings? See your doctor if so.
- If you smoke, stop. It increases your risk of RA.

Early detection

Points to remember

- Rheumatoid arthritis can lead to deformity and destruction of joints, as well as such complications as heart, eye and lung problems, so it is important to notice early warning signs and seek treatment to help prevent the disease from progressing.
- There are medications that your physician can prescribe that not only help with symptoms, should they develop, but also slow or stop disease progression.

Symptoms

- Achiness or stiffness in your muscles and joints for more than 30 minutes after you wake up in the morning or have been resting

- Relief from the ache and stiffness with activity or a hot shower
- Swelling and pain in your joints, often in the wrist and finger joints
- Tenderness, redness and heat in your joints
- Skin nodules near the affected joints
- Symmetric symptoms, meaning the same joint on each side of your body is affected at the same time
- Low-grade fever
- Fatigue, weight loss or generally not feeling well
- Decreased motion in affected joints
- Weakness in the muscles attached to affected joints
- Deformities in fingers (later-stage symptom)

What you can do

Testing

- X-rays of joints. With time the bone becomes whittled away as inflamed joint tissues secrete chemicals that eat away bone.
- Blood tests for Rheumatoid Factor, an antibody produced by the body's immune system. Autoantibodies usually attack the patient's own tissues, mistakenly identifying them as "foreign." RF is thought to promote the body's inflammation reaction, which in turn contributes to autoimmune tissue destruction.
- A new, more specific test that looks for antibodies to cyclic citrullinated peptides (CCPs).
- Other possibly useful lab tests include the erythrocyte sedimentation rate and C-reactive protein, which detects inflammation.

Rheumatoid arthritis is tricky to diagnose, as its symptoms vary widely or may not show up at all. Knowing your genetic risk level can give your doctor a clue to investigate, even if you develop vague or unusual symptoms.

Clinically proven

Don't smoke. To date, the only proven preventive strategy against RA is to stop or not start smoking. Smoking not only increases the risk of developing RA, it may affect the severity of the disease too. The effect of smoking varies, however, depending on the genes you inherit. Scientists are still trying to understand the precise mechanisms behind cause and effect.

Preliminary

Eat your peaches. Antioxidants are believed to protect tissue from damage by free radicals, and evidence of free-radical activity has been found in the joint fluid of people with RA. This and other factors have led researchers to look at the effects of antioxidants on the development and severity of RA. Although inconclusive, some research suggests that beta-cryptoxanthin may reduce risk. Beta-cryptoxanthin is a compound that our bodies use to make vitamin A. It is found in citrus fruits, peaches and apricots. A diet high in cruciferous vegetables, such as broccoli, cauliflower and cabbage, may help as well.

Eat your omega-3's. Consider incorporating omega-3 fatty acids into your diet. Two servings a week of fatty fish, such as salmon, trout, herring, sardines, tuna and mackerel, are a good source of these fats, which can help reduce inflammation. (You will need to be aware of the mercury content of some of these fish, especially if you are pregnant or might get pregnant.) If you don't eat much fish, ask your doctor whether you should take a dietary fish oil supplement of about 1,000 or 1,200 mg. The supplements may cause excessive bleeding in some people.

Consider green tea. Watch for further news about possible protective effects of green tea and preventing RA. Laboratory studies in animals indicate that EGCG, a substance found in this type of tea, may lessen or even prevent the inflammatory response that characterizes RA.

A Chinese herb could help. A small study done in mice found that a compound from the Chinese herb Tylophora atrofolliculata delayed the onset of RA and lessened its severity. Keep an eye out for further studies. Note that herbal supplements should be treated as medications and taken under supervision. Like medications, they have side effects as well as potential benefits.

What should I tell my doctor?

- Are your joints swollen, warm or tender? Are you stiff in the mornings? What makes the pain and stiffness go away? Activity? A hot shower?
- Is your range of motion more limited than it used to be?
- Are you tired? Have you lost weight? Do your muscles ache?
- Does anybody in your family have rheumatoid arthritis or another autoimmune disease, such as multiple sclerosis, Crohn's disease or type 1 diabetes?
- Have you had any recent infections or viruses that could create similar symptoms?
- What medicines, over-the-counter drugs or herbs have you taken recently? Some may cause side effects that could mimic RA symptoms.

What can my doctor do?

- Take a detailed health history.
- Do a physical exam that will include testing your range of motion and grip strength.
- Order X-rays and blood tests.
- Depending on your history, physical exam, and symptoms, your physician may suggest you see a rheumatologist, a specialist in inflammatory diseases; a lung specialist, as this disease can affect lung function; or an ophthalmologist if you have eye symptoms.
- Prescribe drugs to reduce pain and inflammation, if needed. These drugs are not cures — they simply quench the inflammatory process to slow ongoing damage to your body.
- Advise you about self-care strategies. These include exercise, weight management, quitting smoking, eating a healthy diet, applying hot or cold compresses, pain management techniques such as meditation or guided imagery and the use of assistive devices (e.g., a cane, splint or brace) as needed.

More information

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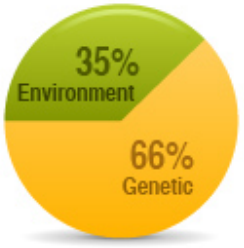
Sarcoidosis

Your estimated lifetime risk: **0.87% (87 per 10,000)**
Average lifetime risk: **1.0% (100 per 10,000)**



You have **1** of the **2** risk markers we looked for.

Gene or location [1]	Risk marker [2]	Your markers [3]	Odds ratio [4]	Source [5]
BTNL2	**T**	C **T**	1.6	Nature Genetics, 2005

see page 6 for an explanation of this table format

What we found for sarcoidosis

We looked at one place on your genome where a one-letter difference in the genetic code affects your odds of sarcoidosis. At this location, there are two markers. The table above shows your markers. You have one of the two risk markers we looked for.

What does it mean?

Your risk of developing sarcoidosis is about average. Sarcoidosis affects about 3.5 per 10,000 Americans. Over the course of the average U.S. woman's lifetime, the risk of developing sarcoidosis is one in a hundred. Many cases resolve on their own, and treatments can offer significant relief.

What's next?

- If you are at above-average risk, or have symptoms that suggest sarcoidosis (dry cough, shortness of breath, eye irritation), talk with your doctor about screening tests that can detect the disease. Early treatment is the best way to prevent permanent damage.
- If you develop the disease, anti-inflammatory medications like steroids can help control its symptoms and slow its progression.

Early detection

Points to remember

If you are at high risk, discuss with your doctor whether a baseline chest X-ray and annual follow-up breathing tests are right for you.If you have minor symptoms of sarcoidosis, you may only need to be monitored until the condition improves. But if symptoms bother you or put vital organs at risk, medications can help.

Your eyes may be affected even if your vision is normal, so it's important to have regular eye exams.

In two-thirds of cases, sarcoidosis disappears on its own without lasting symptoms.

Symptoms

Sarcoidosis may cause no symptoms or only general symptoms such as weight loss, fever or fatigue. These symptoms are common to many other diseases, so it's important to discuss them with your doctor in the context of any increased genetic risk. Some of the signs and symptoms associated with specific organs include:

- lungs: shortness of breath, wheezing or a dry cough
- lymph nodes: swelling, especially in the nodes in the chest
- eyes: watering, redness, dryness, sensitivity to light, blurred vision
- skin: raised pink or purplish areas and painful nodules under the surface

- joints and bones: arthritis in your ankles, elbows, wrists or hands, at times associated with bumps in the skin over your shins
- spleen and liver: enlargement of these organs
- heart: irregular heartbeats and chest pain
- brain and nervous system: loss of feeling, loss of muscle strength, headaches or dizziness

Testing

If you have symptoms, your doctor probably will suggest a number of tests that may rule out other conditions and reveal whether you have granulomas in your body. These tests may include a chest X-ray, a CT scan, blood tests and lung function studies. To confirm the diagnosis, a biopsy is usually performed on affected tissue. If you are at above-average risk of sarcoidosis, talk with your doctor about whether regular screening tests are right for you.

What you can do

No one can predict how sarcoidosis will affect each person, but early detection can help prevent possible serious complications. Most people with sarcoidosis live a normal life, and the disease often disappears on its own. If not, there are treatment options that can help.

Preliminary

Protect your lungs. In nearly all patients with the disease, sarcoidosis affects the lungs. To help keep yours healthy:

- don't smoke and avoid second-hand smoke
- get regular exercise
- avoid extended contact with chemicals such as pesticides, dust, and other irritants.

Get treated early. Early diagnosis and treatment (most often with corticosteroids) can slow progression of the disease and prevent damage to the lungs, eyes, heart, and other organs. Drugs that suppress your immune system, such as methotrexate, are also used to treat sarcoidosis. Look into the possibility of participating in clinical trials with new targeted therapies that can damp down the body's overactive immune response or treat symptoms like skin rashes.

What should I discuss with my doctor?

- Does anyone in your family have sarcoidosis or other inflammatory autoimmune diseases such as lupus?
- Have you been exposed to environmental toxins such as pesticides, especially via manufacturing or farming jobs?
- Do you have symptoms of sarcoidosis, such as unexplained fatigue, shortness of breath or persistent cough, or painful red nodules on your arms or legs?

What can my doctor do?

- If you don't have any symptoms, monitor you over time for early signs of the disease.
- Refer you to a lung disease specialist (pulmonologist), for evaluation and treatment of lung symptoms.
- Schedule you for regular eye exams. Sarcoidosis can affect your eyes without causing noticeable symptoms.

More information

You'll find even more information on this condition in the online version of your results. Log into your Member Account at www.navigenics.com to access:

- In-depth information on the general genetic understanding of this condition
- Details on the science behind your results
- Resources and groups that can provide even more information on this condition

(If you received your results through your doctor, ask your clinician to pass along this information.)

Stomach cancer, diffuse

Your estimated lifetime risk: **2.2% (22 per 1,000)**
Average lifetime risk: **1.7% (17 per 1,000)**

You have **2** of the **2** risk markers we looked for.

Gene or location [1]	Risk marker [2]	Your markers [3]	Odds ratio [4]	Source [5]
PSCA	**A**	**A A**	4.86	Nature Genetics, 2008

see page 6 for an explanation of this table format

Navigenics tests for a common marker associated with stomach cancer. Much less common is a single-gene mutation that can lead to hereditary diffuse stomach cancer, a rare form for which Navigenics does not test. If you answer “yes” to any of the questions below, you should consult your physician, who may refer you to a genetic counselor.

- Have two or more close relatives in your family had diffuse stomach cancer, with at least one person diagnosed before age 50?
- Have three or more close relatives been diagnosed with diffuse stomach cancer at any age?
- Has a close relative been diagnosed with diffuse stomach cancer before age 40?
- Has a close relative been diagnosed with both diffuse stomach cancer and lobular breast cancer?
- Has a close relative been diagnosed with diffuse stomach cancer and a different family member with either lobular breast cancer or signet ring colon cancer?

What we found for gastric cancer

We looked at one place on your genome where a one-letter difference in the genetic code raises your odds of diffuse stomach cancer. At this location, there are two markers. The table above shows your markers. You have two of the two risk markers we looked for.

What does it mean?

Your risk of developing diffuse stomach cancer is above average. If you are infected with H. pylori bacteria, as many people are, there's evidence that taking antibiotics to kill the bacteria could lower your risk. Dietary changes can also help. And if you smoke, now’s the time to get serious about quitting.

Ethnic variation

Most conditions have been studied only in people of European ancestry, but this one has been studied only in Asians.

What's next

- Set up an appointment to review your results with your doctor and get tested for infection with *H. pylori*, the bacteria that cause stomach ulcers, if appropriate.
- Steer clear of smoked, pickled, cured and highly salted foods.
- Add more colorful fruits and vegetables to your diet.

Early detection

Points to remember

Although diffuse stomach cancer usually doesn't cause symptoms until the disease is in an advanced stage, some people do show early signs of it. If you visit your doctor as soon as you notice any symptoms, there's a chance the cancer can be caught while it's still treatable. If you are at high risk, discuss with your doctor whether regular screening — which carries some risks — is right for you.

Symptoms

Having these symptoms doesn't mean you have cancer, nor does not having them mean you are disease free. What it does mean is that if you have any of them you should see your doctor right away to find out what's causing them. Watch for:

- Discomfort or pain in the upper or middle region of your abdomen that may not be relieved by food or antacids
- Abdominal discomfort or pain aggravated by eating
- Loss of appetite
- Black, tarry stools
- Vomiting blood
- Vomiting after meals
- Weakness and fatigue
- Unintended weight loss
- Full feeling after meals, even when eating less than normal
- Nausea
- Excessive belching
- Excessive gas

Testing

Even if you have no symptoms of diffuse stomach cancer, your doctor may want to test you for *H. pylori* infection, either with a blood test or by examining a stool sample.

If you do have symptoms, your doctor will probably examine you and ask you about your health history. Other tests your physician might do include:

- Upper endoscopy. This procedure allows your doctor to see abnormalities in your upper gastrointestinal tract that may not be visible on X-rays, and to test your stomach tissue for H. pylori infection. For the test, your doctor inserts a thin, flexible, lighted tube (endoscope) through your mouth and into your esophagus, stomach and the first part of your small intestine. Before this is done, your mouth and throat are sprayed with a numbing solution and you may be given medicine to help you relax. If any tissue in your upper intestinal tract looks suspicious, a small sample can be removed via biopsy instruments inserted through the endoscope.
- Endoscopy is the best available screening method for stomach cancer, but diagnosing diffuse cancer is difficult because the cells do not form a discrete tumor and so may be missed. Endoscopy does carry some risks, such as bleeding and complications from anesthesia. This method of screening so far has not been shown to lower the number of stomach cancer deaths, so most experts don't recommend it unless you are at high risk. New diagnostic techniques are under investigation, but none have yet proven effective in early detection.
- Stomach X-ray (upper GI series). The point of this test is to look for masses or spots (such as ulcers) in your esophagus, your stomach and the first part of your small intestine. Before the test, you'll drink a thick liquid that temporarily coats the lining of your stomach so that it shows up clearly on the X-rays. You may also be asked to swallow a gas-producing liquid or powder to stretch out your stomach to provide a better view of the inner lining. If anything suspicious shows up, your doctor may recommend further testing. This test is noninvasive but does expose you to a moderate amount of radiation and can result in short-term constipation.

- Stool sample. One sign of stomach cancer is microscopic internal bleeding, which is usually only detected by having your physician do a chemical analysis of your stool to check for blood. (Other diseases can also cause bleeding, so a positive test does not mean you have cancer.)

What you can do

With more cases of diffuse stomach cancer occurring every year, it's a good idea to be alert to symptoms. If you're at increased risk, healthy diet and lifestyle choices go a long way toward preventing this disease.

Promising

Get treated for *H. pylori*. Infection by *Helicobacter pylori* (*H. pylori*) bacteria causes changes in the stomach that, over many years, may develop into cancer. Research shows that taking antibiotics that kill *H. pylori* decreases the number of precancerous lesions in your stomach and could reduce your risk of stomach cancer. In the largest study, conducted in China, treating *H. pylori* was effective in preventing cancer in people who did not already have precancerous lesions. The link between *H. pylori* and the diffuse form of stomach cancer is less definitive than for other forms, but many doctors believe that treating the infection can help. Scientists are also developing and testing a vaccine against *H. pylori* in clinical trials.

Fill your plate with colorful fruits and vegetables. Consuming plenty of fruits and vegetables, especially those that are red or deep yellow, such as tomatoes, carrots and sweet potatoes, helps protect against stomach cancer. These fruits and vegetables contain antioxidant vitamins (such as vitamins A and C) that may lower the risk of gastric cancer by blocking substances that damage DNA.

Eat less salt. There is a strong association between high salt intake and risk of stomach cancer. Try to reduce the total amount of salt you eat and avoid eating heavily salted, preserved foods like ham and corned beef. The National Institutes of Health has information on how to reduce your salt intake.

Eat less smoked or pickled food. Stomach cancer is much more common in countries where people eat a diet high in smoked or pickled foods, such as preserved fish or kimchi (Korean pickled vegetables). Studies have shown that people at high risk for stomach cancer can improve their odds if they avoid eating these foods.

Avoid nitrites and nitrates. These compounds are known to increase your risk of stomach cancer. They're found primarily in processed and cured meats, such as salami, corned beef, ham and bacon. Researchers have found that certain bacteria, including *H. pylori,* can convert these chemicals into compounds that cause stomach cancer in animals.

Don't smoke. Tobacco irritates the stomach lining, which in some cases can lead to cancer. People who smoke have twice the stomach cancer risk of nonsmokers. Ask your doctor about medicine or nicotine replacement therapy and about local programs or professionals that can help you stop smoking.

Preliminary

Eat less red meat. Eating red meat an average of about twice a day seems to raise the risk of stomach cancer. The risk is even higher if the meat is barbecued or well done. This association is primarily found in people who are infected with *H. pylori*.

Lose weight. Being obese or overweight could increase your risk of stomach cancer, especially if you smoke. Eating a healthy diet that includes lots of fruits and vegetables will help your accomplish this goal while also lowering your cancer risk.

Limit alcohol. Alcohol seems to play a role in causing stomach cancer, although scientists do not yet understand how. Having more than three drinks a day appears to increase stomach cancer risk.

Consider chemoprevention. Taking aspirin and other nonsteroidal anti-inflammatory drugs (NSAIDs) can reduce the risk of stomach cancer. However, these drugs can cause serious internal bleeding and other health problems, including stomach ulcers, thus compounding the risk of an *H. pylori* infection. You should talk with your doctor about the possible risks and benefits of taking these drugs to prevent stomach cancer, as this is often a complex decision.

Talking with your doctor

What should I tell my doctor?

- Has anyone in your immediate family (mother, father, sister, brother) had stomach cancer?
- Do you have any symptoms typical of stomach cancer, such as stomach pain, feeling full all the time or fatigue?
- Do you eat a diet that's high in smoked, pickled, cured or heavily salted foods?
- Do you have any of the following medical conditions, which may raise your risk of stomach cancer?
  - *Helicobacter pylori* (*H. pylori*) infection
  - chronic gastritis (inflammation of the stomach)
  - pernicious anemia
  - intestinal metaplasia (a condition in which the normal stomach lining is replaced with the cells that line the intestines)
  - familial adenomatous polyposis (FAP) or gastric polyps
- Are you concerned enough about your risk to undergo invasive screening tests?

What can my doctor do?

- help you weigh the risks and benefits of screening tests for stomach cancer
- help treat *H. pylori* infection, if appropriate
- provide advice on eating a healthy diet
- help you quit smoking

More information

You'll find even more information on this condition in the online version of your results. Log into your Member Account at www.navigenics.com to access:

- In-depth information on the general genetic understanding of this condition
- Details on the science behind your results
- Resources and groups that can provide even more information on this condition

(If you received your results through your doctor, ask your clinician to pass along this information.)

Abacavir

Your risk of side effects: **low risk**

What we looked for		Your results		
Gene or location [1]	Test SNP [2]	Your markers [3]	Scientific name [4]	What it means [5]
HLA-B	rs2395029	TT	not HLA-B*5701	low risk

see page 8 for an explanation of this table format

Navigenics uses a single SNP (rs2395029) as a proxy for HLA-B*5701.

Medication overview

This drug is commonly used to treat HIV (human immunodeficiency virus) infection. Abacavir belongs to the group of drugs called NRTI's (Nucleoside Reverse Transcriptase Inhibitors). Its generic name is abacavir (a-BACK-a-veer) and its brand name is Ziagen®.

Your results

Based on your genetic markers, you are likely to have a low risk of serious side effects should you use abacavir. These include a life-threatening allergic reaction (hypersensitivity), with symptoms that can include fever, rash, nausea, vomiting, diarrhea, stomach pain, extreme fatigue or achiness, shortness of breath, cough or sore throat.

We determined your risk by analyzing your genetic code. Specifically, we looked at one place in your genetic code where a one-letter variation, called a SNP, affects your odds of having potentially life-threatening abacavir side effects (hypersensitivity reaction). This site is located in the HLA region.

The table above shows your results, and your genetic markers are TT. (See the “Genetics of abacavir sensitivity” section in the online version of your report for more details. If you received your results through your doctor, ask your clinician to pass along this information.)

Since it is difficult to directly test the HLA-B *5701 variation, your test looked at a well-established, reliable proxy for this variation. It is important to know that for some people of Asian ancestry (specifically identified in Han Chinese), this proxy may not be the most accurate way to assess for abacavir side effects. If you have questions, please contact your Navigenics Genetic Counselor or your physician.

What you can do

- Let your doctor(s) know about this genetic result.
- Carry this information with you should it be needed in a medical consultation or emergency. In the online version of your results, you'll find a Medications Wallet Card that you may want to print and carry with you. (If you received your results through your doctor, ask your clinician to pass along this information.)
- Consider sharing this information with your family.

If you are being treated for HIV, now or in the future, these results indicate that abacavir may be a good option for you.

Work with your doctor

You and your doctor need to work closely together to determine which medications are best for you. Should you need HIV treatment, abacavir may be a good choice for you.

The U.S. Food and Drug Administration recommends that physicians avoid prescribing abacavir to people who carry a genetic variant related to an elevated risk of side effects. While a negative genetic test does not rule out serious abacavir side effects, their likelihood is very low in people who do not carry this genetic variant. Your doctor and the rest of your medical team, however, need to evaluate your results in the context of your complete health picture to make medication choices tailored for you.

Actions your doctor may suggest

Every physician makes medical decisions on a case-by-case basis. But in general, here are some steps that doctors commonly take when considering abacavir.

Follow-up testing

Although you don't carry the genetic risk variant included in this test, you may want to consider follow-up testing to better understand how your genetic makeup affects your response to abacavir, especially if you are of Chinese ancestry. The type of genetic testing offered by Navigenics may be somewhat less conclusive for people of Chinese descent. There are many labs that offer follow-up testing, known as direct HLA typing. For more information, see details from the following clinical laboratories:

- LabCorp at www.labcorp.com/wps/portal/!ut/p/c0/04_SB8K8xLLM9MSSzPy8xBz9CP0os_hACzO_QCM_IwMLo1ALAyNj1yBnQxNfAwM_I_2CbEdFAAnCgmc!/?WCM_PORTLET=PC_7_UE4S1I93089S102JGM1M2N, and
- Quest Diagnostics at www.questdiagnostics.com/brand/business/hla_immu_gen/test_menu.html.

Or, for any questions about follow-up testing and your results, please contact your Navigenics Genetic Counselor. You can schedule a genetic counseling appointment in one of three ways:

- Call Member Service at (866) 522-1585 (US and Canada) or +1 (650) 585-7743 between the hours of 9am and 5pm Pacific Standard Time, Monday through Friday.
- Log in to your Navigenics report (www.navigenics.com/member/login) and click on the "Schedule Now" button on the right side of your screen under "Your Genetic Counselor." From there, you'll be able to select a date and time that works for you.
- You can also log in to your member account at www.navigenics.com/member/login, click on the "My Account" tab in the upper right-hand corner of any page, and then click on the "Talk to your expert" link on the left. From there, you'll be able to schedule your session online.

Personalized treatment

Possible treatment considerations include:

- **Watch for side effects.** Your genetic results indicate that if you need HIV treatment, abacavir may be a good choice for you. Life-threatening hypersensitivity reactions to abacavir usually occur within the first six weeks of starting therapy. If you have been on abacavir for a few months and have not experienced clinical signs of abacavir hypersensitivity, your risk for these side effects is very low.
- **Avoid lapses in abacavir therapy.** Abacavir hypersensitivity reactions are more common among abacavir-tolerant individuals who discontinue and then resume abacavir therapy. For this reason, it is recommended that those already taking abacavir continue until a hypersensitivity reaction is medically confirmed. Early discontinuation may eliminate the potential to use this drug in the future.

Share your results

Based on the genetic variant we tested, you have a low risk for abacavir hypersensitivity reaction. But your personal results don't rule out the possibility that your family members may carry the variant that is likely to increase their risk for abacavir hypersensitivity. While we do get all of our DNA from our parents, we only share about 50 percent of the *same* DNA with each of our parents, siblings, and children. Therefore your results cannot reveal complete personal genetic risk information about potential abacavir hypersensitivity reaction for your relatives. The only way your family members can learn their personal genetic risks is to undergo genetic testing.

For more information on family inheritance, or suggestions on ways to share this information with your family, please contact your Navigenics Genetic Counselor or your physician.

More information

You'll find even more information on abacavir side effects and your personal genetic risks in the online version of your results. Log into your Member Account at www.navigenics.com to access:

- A printable, personalized Medications Wallet Card
- Details on the science behind your results
- Specifics on each genetic marker analyzed in your results
- A look at how your genetic profile for this side effect compares to those of other people of the same ancestry
- An overview of all the possible genetic combinations related to this side effect
- Ways to minimize other risk factors that can cause or contribute to this side effect

(If you received your results through your doctor, ask your clinician to pass along this information.)

Beta blockers

How effective for you: **typical effectiveness**

What we looked for		Your results		
Gene or location [1]	Test SNP [2]	Your markers [3]	Scientific name[4]	What it means [5]
GRK5	rs17098707	AA	-	typical effectiveness

see page 8 for an explanation of this table format

Medication overview

This class of drugs is commonly used to treat and prevent various types of cardiovascular disease, such as high blood pressure or irregular heartbeat.

Its generic names include acebutolol, atenolol, carvedilol, esmolol, metoprolol succinate, metoprolol tartrate, pindolol, propranolol, sotalol, timolol, plus others less commonly prescribed. Brand names are Betapace®, Blocadren®, Brevibloc®, Coreg®, Coreg CR®, Inderal®, InnoPran XL®, Lopressor®, Sectral®, Tenormin®, Toprol XL®, Visken®, plus others less commonly prescribed.

Your results

Based on your genetic markers, you are most likely responsive to this medication. Beta blockers are likely to be effective drugs for you.

We determined your risk by analyzing your genetic code. Specifically, we looked at one place in your genetic code where a one-letter variation, called a SNP, in the gene GRK5 can affect your likelihood of responding to beta blockers. The table above shows your results, and that your genetic markers are AA. What this means for you is that, based on these markers, you are likely to be responsive to beta blockers, and these drugs are more likely to be effective for you. People who carry two copies of the “A” marker are more likely to respond to beta blockers.

(See the "Genetics of beta blocker effectiveness" in the online version of your results for more details. If you received your results through your doctor, ask your clinician to pass along this information.)

What you can do

This information is likely to be important for your health.

- Let your doctor know about this genetic result.
- Print the Medications Wallet Card in the online version of your results and carry it with you should these results be needed in a medical consultation or emergency.
- Consider sharing this information with your family.

Should you need beta blockers now or in the future, your physician may want to include this medication in your treatment plan.

Work with your doctor

This information may be important for your health. You and your doctor need to work closely together to determine which medications are best for you. If you are already taking beta blockers, don’t use this genetic result to make decisions about your medication on your own. Instead, share this result with your doctor.

Although no formal guidelines exist to maximize the benefits of beta blocker treatment according to a person’s genetic profile, you and your doctor need to work closely together to determine which medications are best for you, based on your genetics and other risk factors.

Actions your doctor may suggest

Every physician makes medical decisions on a case-by-case basis. But in general, here are some steps that doctors commonly take when considering beta blockers.

Personalized Treatment

Because your genetic results indicate that beta blockers are likely to be effective for you, your doctor may want to consider beta blockers if you need them. Possible treatment options include:

- **Evaluating this entire class of drugs:** These results apply to any beta blockers used to treat heart failure, including carvedilol and metoprolol.

Minimize other risk factors

Heart disease and high blood pressure have many risk factors beyond genetics. Regular exercise, keeping your weight down, not smoking, and eating a healthy diet can all help reduce your risks for cardiovascular disease and the likelihood that you might need to consider taking beta blockers.

Share your results

This information is likely to be important for your biological relatives. This is especially significant if you are of African-American ancestry, as studies of beta blockers in African Americans have shown the drugs to be less effective for this ancestral group. Consider talking to your family, or sending them a copy of this result. You may also want to consider contacting a Navigenics Genetic Counselor to discuss effective strategies for sharing your results with your family. (See below for details of how to set up an appointment with a Genetic Counselor.)

Also, because previous research has demonstrated that certain ancestral populations respond differently to beta blocker medications, it is important for your doctor to know that these medications are likely to be effective for you. If indicated, your doctor can decide whether or not to place you on a beta blocker based on your individual genetic profile, not only on your ancestry.

If you have any questions about what your results may mean for your family, please contact your Navigenics Genetic Counselor or your physician.

More information

You'll find even more information on beta blockers and your personal genetic risks in the online version of your results. Log into your Member Account at www.navigenics.com to access:

- A printable, personalized Medications Wallet Card
- Details on the science behind your results
- Specifics on each genetic marker analyzed in your results
- A look at how your genetic profile for this drug's effectiveness compares to those of other people of the same ancestry
- An overview of all the possible genetic combinations related to this side effect
- Ways to minimize other risk factors that can cause or contribute to this side effect

(If you received your results through your doctor, ask your clinician to pass along this information.)

Carbamazepine

Your risk of side effects: **low risk**

What we looked for		Your results		
Gene or location [1]	Test SNP [2]	Your markers [3]	Scientific name[4]	What it means [5]
HLA-B	rs2844682 rs3909184	GG GG	not HLA-B*1502	low risk

see page 8 for an explanation of this table format

Medication overview

This drug is commonly used to treat epilepsy, chronic pain and certain psychiatric disorders. Carbamazepine belongs to the group of drugs called anti-convulsants. Its generic name is carbamazepine (kar-ba-MAZ-e-peen); its brand names are Carbatrol®, Epitol®, Equetro®, Tegretol® and Tegretol XR®.

Your results

Based on your genetic markers, you have a low risk of potentially life-threatening dermatological side effects should you need to take this medication. These side effects include fever, body aches, a rash, blisters on mucous membranes, and small areas or large areas of peeling skin.

We determined your risk by analyzing your genetic code. Specifically, we looked at two places in your genetic code where one-letter variations, called SNPs, affect your odds of severe carbamazepine side effects. Both of these variations are in the HLA region.

The table above shows your results, and your genetic markers do not include HLA-B*1502. Specifically, you have no copies of the risk-related HLA-B*1502 variant. We estimated your risk of severe carbamazepine side effects based on your genetic risk markers at these two locations. (See the “Genetics of carbamazepine side effects” section of your online report for more details. If you received your results through your doctor, ask your clinician to pass along this information.)

IMPORTANT: *HLA-B*1502 is largely absent in individuals not of Asian origin (such as Caucasians, African-Americans, Hispanics, and Native Americans). While HLA-B*1502 is seen among a wide range of Asian populations and countries (China, Thailand, Malaysia, Indonesia, Philippines, Taiwan, South Asian India, and to a lesser degree Japan and Korea), the genetic analysis method used in this test is most relevant to people of Han Chinese ancestry. It does not accurately represent HLA-B*1502 in individuals with African ancestry, and research has not shown whether or not it is an accurate representation in other groups, including Caucasians and Japanese.*

What you can do

- Let your doctor(s) know about this genetic result.
- Carry this information with you should it be needed in a medical consultation or emergency. In the online version of your results, you'll find a Medications Wallet Card that you may want to print and carry with you. (If you received your results through your doctor, ask your clinician to pass along this information.)
- Consider sharing this information with your family.

If you require treatment for epilepsy, nerve pain, or certain psychiatric conditions, carbamazepine may be a good option for you.

Work with your doctor

This information may be important for your health. You and your doctor need to work closely together to determine which medications are best for you. If your doctor is considering prescribing carbamazepine, your genetic results indicate that your risk for experiencing severe side effects is likely to be low.

The U.S. Food and Drug Administration recommends www.fda.gov/Drugs/DrugSafety/PostmarketDrugSafetyInformationforPatientsandProviders/ucm124718.htm) that physicians avoid prescribing carbamazepine to people carrying the genetic risk variant covered by this test. Your doctor and the rest of your medical team, however, need to evaluate your genetic results within the context of your complete health picture to make medication choices tailored for you.

Actions that your doctor may suggest

Every physician makes medical decisions on a case-by-case basis. But in general, here are some steps that doctors commonly take when considering carbamazepine.

Personalized Treatment

If you are managing epilepsy, nerve pain or psychiatric conditions, carbamazepine may be a good choice for you. Over 90 percent of life-threatening side effects occur in the first few months of treatment with this drug. If you have been on carbamazepine for a few months and have not experienced side effects, your risk for these side effects is low.

Consider other risk factors

Factors other than your genetic markers can increase your risk of side effects and should be included in conversations with your doctor. These include certain illnesses, including diabetes and glaucoma, interactions with other medications, and gender (females are at greater risk).

Share your results

Even though your genetic results do not suggest an increased risk for severe side effects after carbamazepine use, your result does not rule out this risk in your family members. While we do indeed get all of our DNA from our family, we only share about 50 percent of the same DNA with our close relatives (parents, siblings, children). Therefore, your result does not reveal complete genetic risk information about carbamazepine side effects for your relatives.

If you have any questions about what your results may mean for your family, or want to learn more about the most effective ways to share your results with relatives, please contact your Navigenics Genetic Counselor or your physician.

More information

You'll find even more information on carbamazepine side effects and your personal genetic risks in the online version of your results. Log into your Member Account at www.navigenics.com to access:

- A printable, personalized Medications Wallet Card
- Details on the science behind your results
- Specifics on each genetic marker analyzed in your results
- A look at how your genetic profile for this side effect compares to those of other people of the same ancestry
- An overview of all the possible genetic combinations related to this side effect
- Ways to minimize other risk factors that can cause or contribute to this side effect

(If you received your results through your doctor, ask your clinician to pass along this information.)

Clopidogrel

How effective for you: **typical effectiveness**

What we looked for		Your results		
Gene or location [1]	Test SNP [2]	Your markers [3]	Scientific name[4]	What it means [5]
CYP2C19	rs4244285 rs4986893	GG GG	*1/*1	typical effectiveness

see page 8 for an explanation of this table format

Medication overview

This anti-clotting drug is commonly used to treat and prevent the recurrence of heart attack, stroke, or other health problems due to hardening and narrowing of the arteries. Its generic name is clopidogrel (kloe-PID-oh-grel), and is also known by the brand name Plavix®.

Your results

Based on your genetic markers, you are likely to be responsive to this medication. Clopidogrel is likely to be an effective drug for you.

We determined your risk by analyzing your genetic code. Specifically, we looked at two places in your genetic code where one-letter variations, called SNPs, can affect your response to clopidogrel. Both of these variations are in a gene called CYP2C19. The table above shows your results, and your genetic markers are *1/*1. What this means for you is that, based on these markers, clopidogrel is likely to be an effective medication for you. Specifically, you have no risk variants related to reduced clopidogrel effectiveness, and are therefore likely to have a typical response to clopidogrel. It is important to note, however, that there are other genetic factors that are not included in this test that can impact how effective clopidogrel may be for you.

See the “Genetics of clopidogrel effectiveness” section on your online results for more details. (If you received your results through your doctor, ask your clinician for access to this information.)

What you can do

This information may be important for your health.

- Let your doctor(s) know about this genetic result.
- Carry this information with you should it be needed in a medical consultation or emergency.
- Consider sharing this information with your family.

Based on your genetic markers, clopidogrel is likely to be an effective medication for you. Your physician may want to include clopidogrel in your treatment plans, if you ever need anti-clotting medication.

Work with your doctor

This information may be important for your health. You and your doctor need to work closely together to determine which medications are best for you. If you ever need an anti-clotting medication, clopidogrel may be a good option for you.

The U.S Food and Drug Administration advises that physicians consider modifying treatment plans for patients having genetic variants linked to a reduced ability to metabolize clopidigrel. Additionally, the FDA does provide guidelines for avoiding drug interactions when taking clopidogrel, based on an individual’s genetic profile. You and your doctor can work closely together to determine which medications are right for you, based on your genetic results and other health factors.

Actions your doctor may suggest

Every physician makes medical decisions on a case-by-case basis. But in general, here are some steps that doctors commonly take when considering clopidogrel.

Personalized treatment

- Because your genetic results indicate that you are responsive to clopidogrel, your doctor may want to consider it if you need anti-platelet or anti-clotting medication.
- Your doctor will also likely suggest that you avoid taking clopidogrel with other drugs that may reduce clopidogrel response, such as proton pump inhibitors (PPI's), medications commonly prescribed for acid reflux.
- If you take clopidogrel now or in the future, your doctor may prescribe a follow-up test called platelet reactivity testing to see how effective the drug is inside your body.

Minimize other risk factors

The health conditions that lead many people to use clopidogrel, such as heart disease and stroke, have many risk factors beyond genetics. Regular exercise, keeping your weight down, not smoking, and eating a healthy diet can all help reduce your risks for cardiovascular disease and the likelihood that you might need to consider taking clopidogrel.

Share your results

Even though your genetic results suggest that clopidogrel is likely to be an effective medication for you, your results do not rule out the potential for different levels of response to this drug among your other family members. While we do indeed get all of our DNA from our family, we only share about 50 percent of the same DNA with our close relatives (parents, siblings, children). Therefore, your results cannot reveal complete genetic risk information about clopidogrel effectiveness for your relatives.

If you have questions about what your results may mean for your family, or want to learn more about effective ways to share this information with your relatives, please contact your Navigenics Genetic Counselor or your physician.

More information

You'll find even more information on clopidogrel and your personal genetic risks in the online version of your results. Log into your Member Account at www.navigenics.com to access:

- A printable, personalized Medications Wallet Card
- Specifics on each genetic marker analyzed in your results
- A look at how your genetic profile for this drug's effectiveness compares to those of other people of the same ancestry

(If you received your results through your doctor, ask your clinician to pass along this information.)

Floxacillin

Your risk of side effects: **low risk**

What we looked for		Your results		
Gene or location [1]	Test SNP [2]	Your markers [3]	Scientific name[4]	What it means [5]
HLA-B	rs2395029	TT	not HLA-B*5701	low risk

see page 8 for an explanation of this table format

Navigenics uses a single SNP (rs2395029) as a proxy for HLA-B*5701.

Medication overview

This antibiotic is commonly used in Europe and Australia to treat staphylococcal (staph) infections. Floxacillin and a nearly identical drug called dicloxacillin belong to the group of antibiotics called penicillins. Generic names include floxacillin (floks-a-sill-in), flucloxacillin and flucloxacillin sodium; brand names includeFloxapen®, Fluclox® and Sesamol®.

Your results

Based on your genetic markers, you are likely to have a low risk of side effects. These include liver toxicity, which can result in irreversible liver damage.

We determined your risk by analyzing your genetic code. Specifically, we looked at one place in your genetic code where a one-letter variation, called a SNP, affects your odds of floxacillin side effects. This site is located in the HLA region.

The table above shows your results, and your genetic markers are TT. You have no copies of the risk-related HLA-B*5701 variant. (See the “Genetics of floxacillin side effects” section in the online version of your report for more details.)

Since it is difficult to directly test the HLA-B *5701 variation, your test looked at a well-established, reliable proxy for this variation. It is important to know that for some people of Asian ancestry (specifically identified in Han Chinese), this proxy may not be the most accurate way to assess the HLA-B*5701 variant. If you have questions, please contact your Navigenics Genetic Counselor or your physician.

What you can do

- Let your doctor(s) know about this genetic result.
- Carry this information with you should it be needed in a medical consultation or emergency. In the online version of your results, you'll find a Medications Wallet Card that you may want to print and carry with you. (If you received your results through your doctor, ask your clinician to pass along this information.)
- Consider sharing this information with your family.

Should you have an infection or need preventive antibiotic treatment, you and your doctor may want to consider floxacillin.

Work with your doctor

This information may be important for your health. You and your doctor need to work closely together to determine which medications are best for you. If you need an antibiotic, your doctor may decide that floxacillin is a good choice for you.

As yet, medical organizations have not issued guidelines about how doctors should incorporate genetic results into decision-making about this drug. That means your doctor and the rest of your medical team need to evaluate your results in the context of your complete health picture to make medication choices tailored for you.

Actions your doctor may suggest

Every physician makes medical decisions on a case-by-case basis. But since you do not carry any of the genetic risk variants included in this test, you and your doctor may want to consider using floxacillin if you need antibiotic treatment.

Consider other risk factors

Factors beyond your genetic markers can also contribute to risk of liver toxicity after the use of floxacillin and should be included in conversations with your doctor. These include age, with those over 60 at greater risk; gender, with females at greater risk; and duration of floxacillin treatment, with those on the drug longer at greater risk.

Share your results

Even though you appear to have a low risk for floxacillin-induced liver toxicity, based on the gene variant we tested, your personal result does not rule out a high risk in your other family members. Since each of us inherits half of our DNA from each of our parents – half from our mother and half from our father – learning your results can't tell the full story about everything that may be running in your family. There remains a chance that other relatives could still carry one or more of the gene variants associated with floxacillin side effects. If any of your relatives are taking, or consider taking, floxacillin, they may wish to undergo genetic testing to determine whether or not they have any risk for this side effect.

If you have questions about what your results may mean for your family, or want to learn more about the most effective ways to share this information with your family, please contact your Navigenics Genetic Counselor or your physician.

More information

You'll find even more information on floxacillin side effects and your personal genetic risks in the online version of your results. Log into your Member Account at www.navigenics.com to access:

- A printable, personalized Medications Wallet Card
- Details on the science behind your results
- Specifics on each genetic marker analyzed in your results
- A look at how your genetic profile for this side effect compares to those of other people of the same ancestry
- An overview of all the possible genetic combinations related to this side effect
- Ways to minimize other risk factors that can cause or contribute to this side effect

(If you received your results through your doctor, ask your clinician to pass along this information.)

Fluorouracil

Your risk of side effects: **low risk**

What we looked for		Your results		
Gene or location [1]	Test SNP [2]	Your markers [3]	Scientific name [4]	What it means [5]
DPYD	rs3918290	CC	*1/*1	low risk

see page 8 for an explanation of this table format

Medication overview

This broad spectrum chemotherapy medication is commonly used to treat a variety of cancers. Fluorouracil belongs to the group of drugs called anti-metabolites. It can be given as a cream applied to the skin, or as a liquid given by intravenous transfusion (IV).

Please note: Your genetic results also apply to the drug capecitabine (ka-pe-SITE-a-been), another chemotherapy drug which is converted to fluorouracil in the body.

Its generic names are fluorouracil (FLUR-oh-UE-ra-sil), 5-FU, and 5-fluorouracil. Its brand names are Adrucil®, Efudex®, and Fluorplex®. Capecitabine is sold under the brand name Xeloda®.

Your results

Based on your genetic markers, you are likely to have a low risk of side effects. These can include severe, potentially fatal, toxicity including diarrhea, other gastrointestinal disorders, and decreased white blood cell count.

We determined your risk by analyzing your genetic code. Specifically, we looked at one place in your genetic code where a one-letter variation, also known as a SNP, affects your odds of severe side effects after fluorouracil treatment. This site is located in the DPYD gene.

The table above shows your results, and your genetic markers are CC, also called *1/*1. What this means for you is that, based on these genetic markers, you have no copies of the genetic variant related to an increased risk for fluorouracil side effects.

To learn more, see the "genetics of fluorouracil side effects" in the online version of your results. If you received your results through your doctor, ask your clinician to pass along this information.

What you can do

- Let your doctor(s) know about this genetic result.
- Carry this information with you should it be needed in a medical consultation or emergency.
- Consider sharing this information with your family.

Based on your genetic results, if you are being treated for cancer, fluorouracil may be a good option for you. But since other genetic variants, not currently included in the Navigenics test, also affect your risk, your physician may also suggest further genetic testing.

Work with your doctor

This information may be important for your health. If you need a cancer medication, you and your doctor need to work closely together to determine which medications are best for you. Based on these genetic markers, fluorouracil and capecitabine may be good options for you. But since other genetic variants, not currently included in the Navigenics test, also affect your risk, your physician may suggest further genetic testing.

According to the U.S. Food and Drug Administration and the drug manufacturer, fluorouracil and capecitabine therapy are not recommended for patients known to have lower amounts of a particular enzyme related to fluorouracil, a condition called dihydropyrimidine dehydrogenase (DPD) deficiency. The Navigenics genetic test is able to identify the most

common cause of DPD deficiency. Your doctor and the rest of your medical team, however, need to evaluate your genetic results in the context of your complete health picture to make medication choices tailored for you.

Actions your doctor may suggest

Every physician makes medical decisions on a case-by-case basis. But in general, here are some steps that doctors commonly take when considering fluorouracil.

Follow-up testing

Although you do not carry the risk variant covered by this test, your doctor may want to order follow-up testing to better understand how other aspects of your genetic makeup affect your risk for severe toxicity with fluorouracil treatment. This additional testing may include a look at whether you carry a risk variant in the TYMS gene (which Navigenics currently does not test for). For an overview of options for follow-up testing, see information provided by the following clinical labs:

- Myriad Genetics at www.myriadtests.com/doc/Clinical-Update-5FU-v1n1.pdf, and
- ARUP Laboratories at www.aruplab.com/Testing-Information/resources/TechnicalBulletins/5-Fluorouracil%20Sensitivity%20%28DPYD,%20TYMS,%20and%20MTHFR%29,%208%20Mutations.pdf.

Consider other risk factors

Factors beyond your genetic markers can increase your risk of side effects and should be included in conversations with your doctor. These include ancestry, gender, and age. To learn more about minimizing these other risk factors, see the "What you can do" section of your online report. If you received your results through your doctor, ask your clinician to pass along this information.

Share your results

Even though you have a low risk for fluorouracil toxicity based on the DYPD gene variant tested here, your personal result does not rule out high risk in your family members. While we do get all of our DNA from our parents, we only share about 50 percent of the *same* DNA with each of our parents, siblings, and children. Therefore your results cannot reveal complete risk information about potential fluorouracil side effects for your relatives. Also note that additional gene variants (for which Navigenics does not currently test) can also increase a person's risk for fluorouracil toxicity. The only way for your relatives to learn of their personal risk is to undergo individual genetic testing.

If you have questions about what your results may mean for your family, or want to learn more about the most effective ways to share this information with relatives, please contact your Navigenics Genetic Counselor or your physician.

More information

You'll find even more information on fluorouracil side effects and your personal genetic risks in the online version of your results. Log into your Member Account at www.navigenics.com to access:

- A printable, personalized Medications Wallet Card
- Details on the science behind your results
- Specifics on each genetic marker analyzed in your results
- A look at how your genetic profile for this side effect compares to those of other people of the same ancestry
- An overview of all the possible genetic combinations related to this side effect
- Ways to minimize other risk factors that can cause or contribute to this side effect

(If you received your results through your doctor, ask your clinician to pass along this information.)

Irinotecan

Your risk of side effects: **high risk**

What we looked for		Your results		
Gene or location [1]	Test SNP [2]	Your markers [3]	Scientific name [4]	What it means [5]
UGT1A1	rs10929302	**AA**	-	high risk

see page 8 for an explanation of this table format

Medication overview

This drug is commonly used to treat colorectal and other cancers.

Your results

Based on your genetic markers, you are likely to have a high risk of side effects. These can include severe diarrhea and immune system suppression.

We determined your risk by analyzing your genetic code. Specifically, we looked at one place in your genetic code where a one-letter variation, called a SNP, affects your odds of severe irinotecan side effects. This site is located in the UGT1A1 gene. The table above shows your results, and your genetic markers are AA.

However, it's important to note that your genetic results also relate to the effectiveness of this drug. Given at standard doses, this drug may actually be more effective for people with your genetic profile. Should you ever need cancer treatment, you and your doctor may want to weigh your risk of side effects against the potential benefits of this medication. If you have questions,please contact your Navigenics Genetic Counselor. You can schedule a genetic counseling appointment in one of three ways:

- Call Member Service at (866) 522-1585 (US and Canada) or +1 (650) 585-7743 between the hours of 9am and 5pm Pacific Standard Time, Monday through Friday.
- Log in to your Navigenics report (www.navigenics.com/member/login) and click on the "Schedule Now" button on the right side of your screen under "Your Genetic Counselor." From there, you'll be able to select a date and time that works for you.
- You can also log in to your member account at www.navigenics.com/member/login, click on the "My Account" tab in the upper right-hand corner of any page, and then click on the "Talk to your expert" link on the left. From there, you'll be able to schedule your session online.

What you can do

- Let your doctor(s) know about this genetic result. If you are being treated for cancer, your medical team may want to reduce your risk of serious side effects by using lower doses of irinotecan or by using another drug entirely.
- Carry this information with you should it be needed in a medical consultation or emergency. In the online version of your results, you'll find a Medications Wallet Card that you may want to print and carry with you. (If you received your results through your doctor, ask your clinician to pass along this information.)
- Consider sharing this information with your family.

Work with your doctor

This information is likely to be important for your health.

You and your doctor need to work closely together to determine which medications are best for you. If you need anti-cancer therapy, your doctor may decide to prescribe lower doses of irinotecan, or a drug other than irinotecan. The U.S. Food and Drug Administration recommends that physicians consider a reduced initial irinotecan dose for patients with your genetic profile.

However, it's important to note that your genetic results also relate to the effectiveness of this drug. This drug, given at standard doses, may actually be more effective for people with your genetic profile. Should you ever need cancer treatment, you and your doctor may want to weigh your risk of side effects against the potential benefits of this medication.

If you are already receiving irinotecan, don't make changes to your medication on your own. Instead, share this result with your doctor right away.

Your doctor and the rest of your medical team need to evaluate your results in the context of your complete health picture to make medication choices tailored for you.

Actions that your doctor may suggest

Every physician makes medical decisions on a case-by-case basis. But in general, here are some steps that doctors commonly take when considering irinotecan.

Follow-up testing

It's likely that your doctor will want to order follow-up testing to better understand how your genetic makeup affects your response to irinotecan. Many different clinical laboratories offer follow-up testing, so talk with your doctor about the options that work best for you.

Personalized treatment

Your genetic results indicate that you may be at high risk for irinotecan side effects, and that you may respond to the drug at lower doses than people of other genetic profiles. Because of this, your doctor may want to tailor your therapy to reduce this risk. Treatment options include:

- Reducing your dose
- Using other cancer-fighting drugs such as cetuximab or bevacizumab, based on your preferences and medical factors
- Treating you with a type of protein-based treatment called "colony-stimulating factors" before your first cycle of chemotherapy. This can help prevent immune system suppression and fever. These treatments are currently recommended by the National Comprehensive Cancer Network for patients whose risk of immune system suppression with fever is 20 percent or higher.
- Weighing risks and benefits of this medication. It's important to note that your genetic results also relate to the effectiveness of this drug. This drug, given at standard doses, may be more effective for people with your genetic profile. Should you ever need cancer treatment, you and your doctor may want to weigh your risk of side effects against the potential benefits of this medication.

Minimize other risk factors

Factors beyond your genetic profile can increase your risk of severe sensitivity to irinotecan treatment and should be included in conversations with your doctor. These include age (older people are at greater risk); prior radiation therapy, with those who have received pelvic/abdominal radiation at greater risk; and a history of liver disease.

Share your results

Based on your results, other members of your family, especially your first degree relatives such as parents, siblings and children, may also be at genetic risk for irinotecan side effects. It's important to remember, though, that while your genetic results do have implications for your family, each person needs to be considered individually. The only way for family members to fully understand their genetic risk for irinotecan side effects is to have each person undergo genetic testing.

The genetics of family inheritance can be complex. Based on your genetic results, here is what we know:

- One or both of your biological parents is also at risk for irinotecan side effects.
- Each of your full siblings has at least a 50 percent chance (1 in 2) of being at risk for irinotecan side effects.
- Each of your biological children has at least a 50 percent chance (1 in 2) of being at risk for irinotecan side effects.
- Second-degree relatives, such as aunts, uncles, cousins, and grandparents may also have the gene variant which increases the risk of irinotecan side effects.

It's also important to note that additional gene variants, not currently covered by this test result, may also increase an individual's risk for irinotecan side effects.

If you have questions about sharing your results with your family, please contact your Navigenics Genetic Counselor or your physician.

More information

You'll find even more information on irinotecan side effects and your personal genetic risks in the online version of your results. Log into your Member Account at www.navigenics.com to access:

- A printable, personalized Medications Wallet Card
- Details on the science behind your results
- Specifics on each genetic marker analyzed in your results
- A look at how your genetic profile for this side effect compares to those of other people of the same ancestry
- An overview of all the possible genetic combinations related to this side effect
- Ways to minimize other risk factors that can cause or contribute to this side effect

(If you received your results through your doctor, ask your clinician to pass along this information.)

Simvastatin

Your risk of side effects: **low risk**

What we looked for		Your results		
Gene or location [1]	Test SNP [2]	Your markers [3]	Scientific name [4]	What it means [5]
SLCO1B1	rs4149056	TT	-	low risk

see page 8 for an explanation of this table format

Medication overview

This drug is commonly used to lower cholesterol and to prevent heart attack, stroke, and other cardiac problems. Simvastatin (SIM-va-stah-tin) belongs to the group of drugs called statins. Among statins, simvastatin has the highest risk for muscle-related side effects if taken at high doses. Its brand names include Lipex®, Simcard®, Simlup®, Simvacor® and Vytorin®.

Your results

Based on your genetic markers, you are likely to have a low risk of side effects. These include muscle pain or weakness (myopathy) and muscle breakdown (rhabdomyolysis) which can lead to kidney failure and, occasionally, death.

We determined your risk by analyzing your genetic code. Specifically, we looked at one place in your genetic code where a one-letter variation, or SNP, affects your odds of having simvastatin-induced myopathy. This site is located in the SLCO1B1 gene, and is known as the SLCO1B1*5 variant (pronounced “star 5”).

The table above shows your results, and your genetic markers are TT. Specifically, you have no copies of the risk variant “C,” where C confers risk. For more details see the “Genetics of simvastatin side effects” section of the online version of your report. (If you received your results through your doctor, ask your clinician to pass along this information.)

What you can do

- Let your doctor(s) know about this genetic result.
- Carry this information with you should it be needed in a medical consultation or emergency. In the online version of your results, you'll find a Medications Wallet Card that you may want to print and carry with you. (If you received your results through your doctor, ask your clinician to pass along this information.)
- Consider sharing this information with your family.

If you need drugs to treat high cholesterol or prevent heart disease, your medical team may want to use your genetic results to help choose a medication that works best for you. If you are already taking simvastatin, don’t decide to make changes to your medication on your own. Instead, talk to your doctor.

Work with your doctor

This information may be important for your health. Should you require treatment with a statin drug, simvastatin may be a good option for you.

Medical organizations have not yet issued guidelines about how doctors should incorporate genetic results into decision-making about this drug. That means your doctor and the rest of your medical team need to evaluate your genetic results in the context of your complete health picture to make medication choices tailored for you. You and your doctor need to work closely together to determine which medications are best for you.

Actions your doctor may suggest

Every physician makes medical decisions on a case-by-case basis. But in general, here are some steps that doctors commonly take when considering simvastatin.

Personalized treatment

Even though your genetic results indicate that you may be at low risk for side effects, some doctors may want to tailor your therapy to maximize the effectiveness of statins. Possible treatment options include:

- **Modifying your dose.** Since you are at low risk of side effects, your doctor may decide to prescribe a higher dose of simvastatin. Lower doses of statins may decrease your risk of statin-induced myopathy, but may not be as effective in reducing your cholesterol levels or risk of cardiovascular problems. Your doctor can use your genetic results to help strike a balance between effectiveness and safety.
- **Being careful about mixing medications.** Be aware of risks involved with use of certain other drugs, such as cyclosporine, amiodarone, or fibrates while taking simvastatin.

Consider other risk factors

Factors beyond your genetic profile can increase your risk of statin-induced myopathy and should be included in conversations with your doctor. These include:

- **Dose.** Your risk of side effects increases with simvastatin dose.
- **Age.** Your risk of side effects increases with age.
- **Other health factors.** Your risk of side effects is linked with the presence of other health conditions, such as diabetes, hypothyroidism, and kidney or liver diseases.
- **Other medications.** Your risk of side effects is affected by combining statin drugs with fibrate drugs such as fenofibrate (TriCor), bezafibrate (Bezalip), ciprofibrate (Modalim), gemfibrozil (Lopid), and others.

Share your results

Even though your results do not show an increased genetic risk for simvastatin-induced myopathy, your results do not rule out a genetic risk in your family members. Since each of us inherits half of our DNA from each of our parents – half from our mother and half from our father – learning your results can't reveal everything that may be running in your family. There remains a chance that other relatives could still carry one or more of the genetic risk variants that is associated with simvastatin myopathy. If any of your relatives is taking or considering simvastatin, they may wish to undergo genetic testing to determine whether or not they have any genetic risk for myopathy or other side effects.

If you have questions about what your genetic results may mean for your family, or want to learn more about effective ways to share this information with relatives, please contact your Navigenics Genetic Counselor or your physician.

More information

You'll find even more information on simvastatin side effects and your personal genetic risks in the online version of your results. Log into your Member Account at www.navigenics.com to access:

- A printable, personalized Medications Wallet Card
- Details on the science behind your results
- Specifics on each genetic marker analyzed in your results
- A look at how your genetic profile for this side effect compares to those of other people of the same ancestry
- An overview of all the possible genetic combinations related to this side effect
- Ways to minimize other risk factors that can cause or contribute to this side effect

(If you received your results through your doctor, ask your clinician to pass along this information.)

Statins

How effective for you: **decreased cholesterol lowering, but some cardiac effectiveness**

What we looked for		Your results		
Gene or location [1]	Test SNP [2]	Your markers [3]	Scientific name[4]	What it means [5]
APOE	rs429358 rs7412	**C**T **CC**	E3/E4	decreased cholesterol lowering, but some cardiac effectiveness

see page 8 for an explanation of this table format

Medication overview

Statins are commonly used for two related purposes: to lower cholesterol, and to help prevent heart attack, stroke, and other cardiovascular problems.

Statins are best known for their ability to lower cholesterol, which is linked to a reduced risk of heart attack and other cardiovascular conditions. But statins may also have other properties, such as the ability to reduce inflammation and other forms of internal damage. They may reduce the risk of cardiac problems through these other mechanisms, particularly for people with certain genetic profiles.

The results presented here refer to both cholesterol lowering and risk of cardiac conditions after statin usage. For some people, this relationship may appear contradictory at first – their genetic markers may not indicate that statins will help lower their cholesterol as much as expected, but may still indicate lower overall cardiovascular risk after a heart attack. This contradiction can be explained by the many capabilities of statins.

Statins are available under generic names such as simvastatin (SIM-va-stah-tin) and pravastatin (PRAH-va-stah-tin); brand names include Lipex®, Pravachol®, Vytorin®, and Zocor®.

Your results

This medication has varying levels of effectiveness for you:

- **Cholesterol reduction:** This medication is not likely to reduce your cholesterol levels as much as expected.
- **Risk of cardiac death:** If you ever suffer a heart attack, research shows that taking this medication regularly can actually improve long-term survival.

We determined your risk by analyzing your DNA. Specifically, we looked at two places in your genetic code where a one-letter variation, called a SNP, affects your response to simvastatin and pravastatin. The table above shows your results, and your genetic markers include one or more copies of the risk-related marker “E4”. What this means for you is that, based on these markers, simvastatin and pravastatin are likely to have a decreased overall effectiveness for you.

People who carry either one or two copies of the “E4” marker, like you, are more likely to find that use of these statins may not lower cholesterol levels as much as expected. But these drugs may still have some benefit. Should you ever have a heart attack and survive, scientific evidence shows that regular statin use is likely to improve your chances of living longer.

What you can do

This information is likely to be important for your health.

- Let your doctor(s) know about this genetic result.
- Carry this information with you should it be needed in a medical consultation or emergency.
- Consider sharing this information with your family.

If you are taking a statin now or in the future, your cholesterol levels may not drop as much as anticipated. But should you continue taking this medication regularly, there may still be some long-term benefits. Should you ever suffer a heart attack,

statins are likely to improve your chances of long-term survival, even though your cholesterol levels may not have dropped as much as anticipated. Scientists are still working to determine why, but theorize that this benefit may reflect the many different effects of statins.

Work with your doctor

This information is likely to be important for your health.

While you may not see your cholesterol levels drop as much as anticipated if you take statins, you may still benefit from this medication if you continue to take it regularly. You and your doctor should decide if the benefits of continued statin therapy outweigh the potential side effects and other concerns that come with long-term medication use. If you are already taking a statin, don't make changes to your medication on your own. Instead, share this result with your doctor right away.

Although no standard medical guidelines currently exist to maximize the benefits of statin treatment according to a person's genetic profile, you and your doctor need to work closely together to determine which medications are right for you, based on your genetic results and other factors.

Actions your doctor may suggest

Every physician makes medical decisions on a case-by-case basis. But in general, here are some steps that doctors commonly take when considering statin treatment.

Personalized treatment

People who share your genetic profile tend to have higher levels of LDL ("bad") cholesterol and higher risk of cardiovascular disease. Statins, such as simvastatin and pravastatin, are typically prescribed to lower cholesterol levels, including LDL levels. Several studies have shown that individuals who share your genetic profile don't see their LDL levels fall as much as expected after statin treatment. This has led some researchers to conclude that those with your genetic profile are less responsive to statin treatment.

But further scientific evidence shows that long-term use of statins may still have some benefit. Should people with your genetic profile experience a heart attack and survive, they are more likely to live longer if they have been taking simvastatin or pravastatin regularly.

Possible treatment options include:

- **Rethinking treatment goals.** Your doctor may use your genetic results to set a more realistic cholesterol target goal for you.
- **Evaluate this entire class of drugs.** Preliminary research indicates that these genetic results are also likely to apply to other types of statins, such as atorvastatin (Lipitor). But currently, proven findings are only available from two large studies – one focused on simvastatin and the other on pravastatin.

Minimize other risk factors

The genetic variant that affects how you respond to statins also relates to other important health concerns, including heart disease, stroke, and Alzheimer's disease. But while this genetic factor is connected to noteworthy health risks, the choices you make also play an important role. Heart disease, for example, has many risk factors beyond genetic ones. Exercise, maintaining a healthy weight, not smoking, reducing stress, and a healthy diet can all help reduce your risk for heart disease and stroke, and preliminary research shows that these habits can also reduce risk for another important health condition, Alzheimer's disease. While your genetic results are important, they are only part of the story.

Share your results

Based on your genetic results, other members of your family, especially your first degree relatives such as parents, siblings and children, may also be at genetic risk for having an atypical response to statins. It is important to remember, though, that while your genetic results do have implications for your family, each person needs to be considered

individually. The only way to fully understand your family members' genetic risk is to have each individual undergo genetic testing.

The genetics of statin effectiveness are complex. But since you carry at least one copy of a genetic variant known as APOE-4, which is related to this particular form of statin effectiveness and several other important health conditions, here's what we know:

- You inherited this genetic variant from at least one of your parents. If you have two copies of the variant, each of your parents carried at least one copy of the same variant. If you have one copy, at least one of your parents also carried one copy of this variant.
- Each of your full siblings has at least a 50 percent (1 in 2) chance for carrying at least one copy of this variant as well.
- If you have children, each of your children is also at risk for having inherited one or more copies of this variant. For example, if you have two copies of the APOE-4 variant, we know you passed along one of these two copies to each child. If you carry one copy, then there is a 50 percent (1 in 2) chance that each child inherited that variant and a 50 percent chance they did not.

Your relative's individual genetic risk depends on whether they inherited any other copies of this genetic variant. Knowing their specific genetic results is the best way to help them understand if they may also share this genetic profile. Consider sharing your results with your family, and encourage them to speak with their doctor. For suggestions on the most effective ways to share this information with your family, or if you have any other questions, please contact your Navigenics Genetic Counselor or your physician.

More information

You'll find even more information on statin effectiveness and your personal genetic risks in the online version of your results. Log into your Member Account at www.navigenics.com to access:

- A printable, personalized Medications Wallet Card
- Details on the science behind your results
- Specifics on each genetic marker analyzed in your results
- A look at how your genetic profile for statin effectiveness compares to those of other people of the same ancestry
- An overview of all the possible genetic combinations related to this side effect
- Ways to minimize other risk factors that can cause or contribute to this side effect

(If you received your results through your doctor, ask your clinician to pass along this information.)

Succinylcholine

Your risk of side effects: **low risk**

What we looked for		Your results		
Gene or location [1]	Test SNP [2]	Your markers [3]	Scientific name[4]	What it means [5]
BCHE	rs1799807 rs1803274	TT C**T**	-	low risk

see page 8 for an explanation of this table format

Medication overview

This powerful muscle relaxant is often used during anesthesia for major surgery or when a person is placed on a ventilator or breathing tube. Its generic name is succinylcholine (suk-sin-il-KOE-leen); brand names are Anectine® and Quelicin®.

Your results

Based on your genetic markers, you are likely to have a low risk of side effects. These side effects include a prolonged paralysis of breathing muscles during anesthesia, which can be life-threatening in some cases.

We determined your risk by analyzing your genetic code. Specifically, we looked at two places in your genetic code where one-letter variations, called SNPs, affect your odds of having succinylcholine side effects. Both of these variations are in the BCHE gene, and the two variants that can increase the risk of side effects are known as the BCHE A and BCHE K variants. The table above shows your results, and your genetic markers are TT/CT.

(To learn more, see the "Genetics of succinylcholine side effects" in the online version of your results. If you received your results through your doctor, ask your clinician to pass along this information.)

What you can do

- Let your doctor(s) know about this genetic result.
- Carry this information with you should it be needed in a medical consultation or emergency. In the online version of your results, you'll find a Medications Wallet Card that you may want to print and carry with you. (If you received your results through your doctor, ask your clinician to pass along this information.)
- Consider sharing this information with your family.

Actions your doctor may suggest

You and your doctor need to work together closely to determine which medications are best for you. While every physician makes medical decisions on a case-by-case basis, here are some steps that doctors commonly take when considering succinylcholine.

Follow-up testing

Since you do not carry any of the genetic risk variants included in this test, your doctor may decide that succinylcholine is a safe medication for you. Prior to prescribing any anesthetics, however, your doctor may also follow established medical guidelines and perform additional medical testing to more fully understand how your genetic makeup affects your response to succinylcholine. For an overview of how this additional analysis, called serum cholinesterase testing, works, visit the National Library of Medicine website (http://www.nlm.nih.gov/medlineplus/ency/article/003358.htm).

Minimize other risk factors

Factors beyond your genetic markers can also cause or contribute to prolonged muscle paralysis after the use of succinylcholine. These include concurrent use of specific drugs as well as certain personal health factors, which you should discuss with your doctor.

To learn more about minimizing these non-genetic risk factors, see the "What you can do" section of your online report. If you received your results through your doctor, ask your clinician to pass along this information.

Share your results

Even though your genetic results do not suggest an increased risk for succinylcholine side effects, your result does not rule out this condition in your family members. While we indeed get all of our DNA from our family, we only share about 50 percent of the same DNA with our parents, siblings, and children. Therefore, your result does not reveal personal genetic risk information about succinylcholine side effects for your relatives. If they wish to learn about their own genetic risks, they may want to consider genetic testing.

If you have any questions about what your results may mean for your family, or want to learn more about the most effective ways to share your results with relatives, please contact your Navigenics Genetic Counselor or your physician.

More information

You'll find even more information on succinylcholine side effects and your personal genetic risks in the online version of your results. Log into your Member Account at www.navigenics.com to access:

- A printable, personalized Medications Wallet Card
- Details on the science behind your results
- Specifics on each genetic marker analyzed in your results
- A look at how your genetic profile compares to those of other people of the same ancestry
- An overview of all the possible genetic combinations related to this side effect
- Ways to minimize other risk factors that can cause or contribute to this side effect

(If you received your results through your doctor, ask your clinician to pass along this information.)

Thiopurines

Your risk of side effects: **low risk**

What we looked for		Your results		
Gene or location [1]	Test SNP [2]	Your markers [3]	Scientific name [4]	What it means [5]
TPMT	rs1142345 rs1800460 rs1800462	TT CC CC	*1/*1	low risk

see page 8 for an explanation of this table format

Note for those at moderate risk of side effects: Because the TPMT*3A variant contains the variations found in the TPMT*3B and TPMT*3C variants, this assay cannot distinguish the TPMT*1/TPMT*3A genotype (moderate risk) from the TPMT*3B/TPMT*3C genotype (high risk). However, the TPMT*3B/TPMT*3C genotype is extremely rare in the United States. If these results show the TPMT*1/TPMT*3A genotype, you may want to consider follow-up testing using sequencing methods.

Medication overview

These anti-inflammatory, anti-cancer drugs are commonly used to treat people with autoimmune disorders or certain cancers, as well as people who have received an organ transplant. Azathioprine (AZA) and 6-Mercaptopurine (6-MP) are the generic names for two commonly prescribed thiopurines. Brand names include Azasan®, Imuran® and Purinethol®.

Your results

Based on your genetic markers, you are likely to have a low risk of life-threatening bone marrow complications following therapy with AZA or 6-MP. Symptoms of this disorder, called bone marrow suppression or myelotoxicity, include fatigue, easy bruising, and infections.

We determined your risk by analyzing your genetic code. Specifically, we looked at three places in your genetic code where one-letter variations, or SNPs, affect your odds of serious bone marrow suppression after treatment with either AZA or 6-MP. These SNPs are located in the TPMT (thiopurine S-methyltransferase) gene.

The table above shows your results, and your markers are *1/*1. Specifically, you have none of the genetic markers we tested for that cause reduced protein activity. However, other variants which may increase the risk of side effects do exist, and are not currently covered by this test result. Therefore, your doctor may still want to consider TPMT enzyme testing or additional genetic testing before placing you on AZA or 6-MP. (See the “Genetics of thiopurine side effects” section in the online version of your report for more information. If you received your results through your doctor, ask your clinician to pass along this information.)

What you can do

- Let your doctor(s) know about this genetic result.
- Carry this information with you should it be needed in a medical consultation or emergency. In the online version of your results, you'll find a Medications Wallet Card that you may want to print and carry with you. (If you received your results through your doctor, ask your clinician to pass along this information.)
- Consider sharing this information with your family.

Work with your doctor

This information may be important for your health.

You and your doctor need to work closely together to determine which medications are best for you. If you are being treated for a condition where AZA or 6-MP is used, these drugs may be an option for you. Your doctor and the rest of your medical team, however, need to evaluate your results in the context of your complete health picture to make medication choices tailored for you.

The FDA recommends that physicians offer a specific genetic test or blood enzyme test to patients before prescribing AZA or 6-MP, and adjust treatment plans based on the person's results. Your Navigenics genetic results provide some of the important information your doctors need before prescribing AZA or 6-MP.

Doctors may also prescribe one other type of thiopurine, thioguanine or 6-TG, which is not included in this result.

Actions your doctor may suggest

Every physician makes medical decisions on a case-by-case basis. But in general, here are some steps that doctors commonly take when considering thiopurines.

Follow-up testing

Although you do not carry any of the risk variants included in this test, your doctor may want to order follow-up testing should you require thiopurine treatment. Navigenics test for the four most common variants in a gene called TPMT that can lead to thiopurine side effects. But other variants do exist, so your doctor may opt to order additional genetic tests. Your doctor may also want to a type of follow-up testing that looks at a protein called TPMT enzyme. This protein is produced by the TPMT gene, and the test measures how much of this protein is functioning in your body. The results can help your doctor further determine whether drugs like AZA and 6-MP may cause serious side effects. Learn more about TPMT enzyme testing at www.labtestsonline.org/understanding/analytes/tpmt/test.html.

Personalized treatment

If you are managing a condition that calls for a thiopurine medication, AZA or 6-MP may be a good choice for you.

Please note, however, that though your genetic risk of serious side effects is most likely low, your doctor is still likely to monitor you for side effects should you ever use this medication. Since your bone marrow performs critical functions, such as supplying your body with new blood cells, this observation includes monitoring your complete blood count (CBC) closely. These genetic results cannot substitute for routine CBC monitoring in patients receiving AZA or 6-MP.

Minimize other risk factors

Factors other than your genetic markers can increase your risk of bone marrow suppression with AZA or 6-MP treatment and should be discussed with your doctor. These include certain interactions between these medications and other drugs. Bone marrow suppression due to thiopurine treatment may be worsened by drugs that work in similar ways in the body, such as the anti-inflammatory drugs olsalazine, mesalazine, or sulphasalazine.

Share your results

This genetic result is important for your biological family, especially if you carry any of the risk variants identified by this test. It is important to remember that we share 50 percent of our DNA with our close relatives such as parents, siblings, and children, and 25 percent with our aunts, uncles, and grandparents. If you are at increased risk for thiopurine side effects based on your genetic results, your other family members may be as well.

Even if you are not at elevated risk for side effects, family members may have a different risk profile. It is important that anyone considering treatment with a thiopurine drug undergo genetic or other types of medical testing, such as the TPMT enzyme testing described above, to help determine their risk. Consider talking to your family, or showing them this result.

The genetics of family inheritance can be complex. If you have questions, or want to learn more about the most effective ways to share this information, please contact your Navigenics Genetic Counselor or your physician.

More information

You'll find even more information on thiopurine side effects and your personal genetic risks in the online version of your results. Log into your Member Account at www.navigenics.com to access:

- A printable, personalized Medications Wallet Card
- Specifics on each genetic marker analyzed in your results
- A look at how your genetic profile for this side effect compares to those of other people of the same ancestry

(If you received your results through your doctor, ask your clinician to pass along this information.)

Warfarin

How effective for you: **likely to require customized dose**

What we looked for		Your results	
Gene or location [1]	Test SNP [2]	Your markers [3]	Scientific name[4]
CYP2C9	rs1057910 rs1799853	AC CT	*2/*3
VKORC1	rs9923231	CC	-
CYP4F2	rs2108622	TT	*3/*3

see page 8 for an explanation of this table format

WarfarinDosing.org input for your genotype:

VKORC1 - 1639/3673	Genotype = **GG**	CYP4F2 V433M	Genotype = **TT**
CYP2C9*2	Genotype = **CT**	CYP2C9*3	Genotype = **AC**

Please note: Other genetic variants included in the WarfarinDosing.org calculator are not included in these results, as their significance has not been sufficiently determined. These include GGCX rs11676382, CYP2C9*5, and CYP2C9*6. Calculator fields for these variants should be marked unavailable.

Medication overview

This blood-thinning drug is often used to treat and prevent blood clots. A very common medication, warfarin is prescribed millions of time each year. Yet its use often starts with trial and error. Warfarin doses need to be personalized. With too much of the drug, some people experience dangerous bouts of bleeding, while too little medication may lead to harmful blood clots in others. Should you need warfarin, your genetic results can help you and your doctor reduce your risk of such complications.

Your results

We looked at four places in your genetic code where a one-letter difference, also called a genetic marker or SNP, affects your optimum warfarin dosage. The table above shows your genetic markers. We then evaluated your warfarin dosing requirements based on your genetic makeup, or genotype. Your genetic results indicate that you carry at least one marker in the CYP2C9 or VKORC1 genes that makes you likely to require a customized warfarin dose.

Please note: Due to differences in genetic variant naming preferences, the Navigenics results above are labeled differently from the way the same genetic variants are labeled on WarfarinDosing.org, a warfarin dosage calculation tool for physicians. These differences do not make the results Navigenics provides any less accurate. Below the Navigenics results table, you'll find your results translated into a format appropriate for use with the WarfarinDosing.org calculation tool.

If you have any questions, please contact your Navigenics Genetic Counselor or your physician.

What you can do

This information is likely to be important for your health:

- Let your doctor(s) know about this genetic result.
- Carry this information with you in case it is needed in a medical consultation or emergency. In the online version of your results, you'll find a Medications Wallet Card that you may want to print and carry with you. (If you received your results through your doctor, ask your clinician to pass along this information.)
- Consider sharing this information with your family.
- If you are already taking warfarin, don’t try to use your genetic results to make changes to your medication on your own. Instead, talk to your doctor right away.

According to suggestions from the U.S. Food and Drug Administration (http://www.fda.gov/Drugs/ScienceResearch/ResearchAreas/Pharmacogenetics/ucm083378.htm), genetic variants are one of several factors that your doctor may want to take into account when prescribing warfarin.

If you need drugs to treat or prevent blood clots, your medical team can use your genetic information to help maximize warfarin benefits while minimizing side effects.

Work with your doctor

This information is likely to be important for your health. You and your doctor need to work closely together to determine how warfarin can be used most safely and effectively for you.

Warfarin requires personalized dosing. As part of the dosing process, the FDA recommends that a person's genetic results for variants in genes called VKORC1 and CYP2C9 be used to optimize warfarin dose. Your results for these genetic variants are shown in the table on the previous page and in the online version of your results. Your doctor and the rest of your medical team need to evaluate these genetic results in the context of your complete health picture to make dosing choices tailored for you.

If you are already taking warfarin, don't try to use your genetic results to make changes to your medication on your own. Instead, share your results with your doctor right away.

Actions your doctor may suggest

Every physician makes medical decisions on a case-by-case basis. But in general, here are some steps that doctors commonly take when considering warfarin.

Personalized treatment

If you require warfarin therapy, your doctor may want to tailor your medication to work best for you. Possible treatment options include:

- **Establishing the best dosing range for you.** The safe, effective range for warfarin is narrow. A dose that is too low may lead to blood clotting, while a dose that is too high may lead to bleeding. Either of these can be dangerous or even fatal. If you are taking warfarin, your doctor will conduct regular blood tests to ensure that the dose you are taking is high enough to prevent blood clots, while remaining safe. Your blood will be tested to determine its clotting ability, measured by a standard called the International Normalized Ratio (INR).
  If your INR is too high, that shows that there's too much medicine in your body, which can cause serious bleeding. If your INR is too low, you're not getting enough medicine, which means blood clots can still form. To strike a balance between efficacy and safety, your doctor will decide which INR range and warfarin dose is right for you, based on your genetic makeup, age, gender, weight, diet, and other factors.
- **Being careful about taking other drugs at the same time.** Other medications, as well as supplements, can affect warfarin sensitivity. These drugs include aspirin, ibuprofen, Tamoxifen, and diflucan as well as some antibiotics such as azithromycin, certain statin drugs (Zocor and Lipitor), and supplements such as cranberry extract, fish oils, and certain herbs (such as garlic, ginko biloba, and ginseng). Should you need an anti-clotting drug such as warfarin, let your doctor know about any medications you are taking, and talk with your doctor about the best way to reduce your risk of side effects.
- **Being aware of risks involved with what you eat and drink.** Foods and drinks of concern while you are taking warfarin include alcohol, licorice, cranberries, and foods high in vitamin K, such as leafy green vegetables. Talk with your doctor about the best way to reduce your risk of side effects.

Follow-up testing

It's possible that your doctor will want to order additional testing to better understand how your genetic makeup affects your response to warfarin, especially if you are not of Caucasian ancestry. Talk to your doctor about your possibilities for additional testing.

Dosing calculators

It's likely that your doctor will want to enter your genetic information into a dosing calculator, along with your other non-genetic risk factors, to determine the most accurate starting dose. You and your doctor can find your detailed genetic information in the table at the beginning of your warfarin report.

One such dosing calculator, designed for doctors, can be found at www.WarfarinDosing.org. **Should your doctor want to enter your genetic information into this calculator, it's important to note that Navigenics and the calculator refer to some of the same genetic markers differently.** These differences are only a reflection of how various scientific groups refer to the same markers, and don't make your Navigenics results any less accurate. Just below your genetic results, we've provided instructions that your doctor can use to make sure your genetic information is entered into the WarfarinDosing.org calculator correctly.

Consider other risk factors

Factors beyond your genetic markers can also affect your optimal dose of warfarin, and should be included in conversations with your doctor about this drug. These include:

- Your age
- Your gender
- Your weight
- Your diet
- Other medications you may be taking

Share your results

Based on your genetic results, other members of your family, especially your first degree relatives such as parents, siblings and children, may also have somewhat similar genetic responses to warfarin. It is important to remember, though, that each person needs to be considered individually. The only way to fully understand your family members' genetic responses to warfarin is to have each individual undergo genetic testing.

The genetics of warfarin response are complex. But based on your results, here is what we know:

To start, remember that we share approximately 50 percent, or half, of our DNA with our first-degree relatives, which include our parents, children, and siblings. We share about 25 percent, or a quarter, of our DNA with our second-degree relatives, which include our aunts, uncles, cousins, and grandparents. Thus, any particular warfarin-related genetic variants that you carry in the CYP2C9, CYP4F2, and VKORC1 genes, the genes covered by this test, are also carried by some of your relatives.

For example, if you carry a particular gene variant in CYP2C9, that variant was inherited from your parents. This also means that each of your children has a 50 percent (1 in 2) chance of inheriting that variant from you.

But when it comes to warfarin, many different genetic variants are important, and it is impossible to be certain exactly which variants any particular member of a family carries. While it is important to share your genetic results for warfarin response with your family, the best way to understand each family member's genetic response to warfarin is for each person to undergo genetic testing.

If you would like to discuss your genetic results in the context of your family or family history, or learn more about the most effective ways to share this information with your family, please contact your Navigenics Genetic Counselor or your physician.

More information

You'll find even more information on warfarin and your personal genetic risks in the online version of your results. Log into your Member Account at www.navigenics.com to access:

- A printable, personalized Medications Wallet Card
- Specifics on each genetic marker analyzed in your results
- An overview of all the possible genetic combinations related to this side effect

(If you received your results through your doctor, ask your clinician to pass along this information.)