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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 C C C	E4/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,

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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

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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, [contact a Navigenics Genetic Counselor](#). You can schedule an appointment by calling the phone number displayed at the top of this page.

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.)