



LIPID TESTS

# Decoding Your Lipid Panel Test Results

Not sure what your triglyceride, cholesterol, and other lipid test results mean? Learn about each test and what low, optimal, and high results signify so you can work with your doctor to choose appropriate treatment.

|   | Name of Test              | Optimal Range   |
|---|---------------------------|-----------------|
| 1 | Total Cholesterol         | 120 – 199 mg/dL |
| 2 | Triglycerides             | < 150 mg/dL     |
| 3 | LDL Cholesterol           | < 100 mg/dL     |
| 4 | HDL Cholesterol (Females) | ≥ 50 mg/dL      |
|   | HDL Cholesterol (Males)   | ≥ 40 mg/dL      |
| 5 | Cholesterol:HDL Ratio     | < 3.5:1         |
| 6 | Non-HDL Cholesterol       | < 130 mg/dL     |
| 7 | Apolipoprotein B          | < 90 mg/dL      |



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## Total Cholesterol

**Optimal : 120 – 199 mg/dL**  
**Borderline high: 200 – 239 mg/dL**  
**High: ≥ 240 mg/dL**

The blood lipids—cholesterol and [triglycerides](#)—are not soluble in blood. In order for them to be transported through the bloodstream to various tissues, they must be carried in lipoprotein “packages.” Lipoproteins are complex particles made up of phospholipids, protein, cholesterol, and triglycerides. There are five major kinds of lipoproteins—chylomicrons, very low-density lipoprotein (VLDL), intermediate density lipoprotein (IDL), low-density lipoprotein (LDL), and high-density lipoprotein (HDL). Most blood cholesterol is carried by the LDL and HDL lipoproteins.

The [total cholesterol blood test](#) measures the total amount of cholesterol being carried through the bloodstream by all five lipoproteins. Elevated levels of total cholesterol generally correlate with an increased risk of cardiovascular disease.

However, the magnitude of risk posed by high cholesterol levels depends on how it is distributed among the various kinds of lipoproteins. So the total cholesterol test has to be interpreted in light of results from the entire lipid panel.

### Low Results

There is no formal definition of low total cholesterol; generally speaking, the lower the better. However, extremely low total cholesterol levels, in the absence of lipid-lowering drug treatment, have been correlated in some studies with an increased risk of intracerebral hemorrhage, cancer, and problems during pregnancy.

It is unknown whether these very low cholesterol levels themselves may cause problems, or if they are the result of an underlying medical problem that already exists. If you have very low cholesterol levels you should consider discussing this finding with your doctor to see if he or she may want to recommend a more complete medical evaluation.

### Optimal Results

Total cholesterol in the optimal range generally indicates that blood cholesterol is not contributing substantially to your overall cardiovascular risk.

However, this result must be interpreted in light of LDL cholesterol and HDL cholesterol values. Even if your total cholesterol is in the optimal range, for instance, elevated LDL cholesterol or reduced HDL cholesterol levels would indicate increased risk; and any risk implied by a total cholesterol level in the borderline range can be mitigated by a high level of HDL cholesterol.

### Borderline High or High Results

Total cholesterol in the borderline high or high range is generally considered an important risk factor for cardiovascular disease. People with higher total cholesterol will usually be counseled on optimizing their diet and exercise, as well as on weight management and smoking cessation, in order to reduce their overall cardiac risk. Depending on the rest of your lipid profile (and on other risk factors you may have), your doctor might also recommend lipid-lowering drug therapy.

In rare cases, a person’s total cholesterol might be high because their HDL cholesterol level is high enough to push the total into the high range. The high total cholesterol in this case usually is not considered to be a risk factor.



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## Triglycerides

- Optimal : < 150 mg/dL
- Borderline high: 150 – 199 mg/dL
- High: 200 – 499 mg/dL
- Very high: ≥ 500 mg/dL

Triglycerides are the most common type of fat in the body. Any excess calories you consume (whether in the form of fat or carbohydrates) are converted to triglycerides and stored in your fatty tissues. Triglycerides in the blood are transported mainly by VLDL lipoproteins.

[Elevated triglyceride blood levels](#) are associated with an elevated risk of cardiovascular disease.

Triglyceride levels commonly increase following a meal. This is the main reason most laboratories require a 12-hour fast before a lipid panel is obtained.

| Optimal Results                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Borderline High, High, or Very High Results                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
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| <p>Triglyceride levels in the optimal or acceptable range do not increase your cardiovascular risk.</p> <p>There is no well-defined “low range” for triglyceride levels, and most doctors believe the lower the better. On occasion, extremely low triglyceride levels can be seen in people with severe <a href="#">hyperthyroidism</a> or malabsorption (the inability to absorb nutrients from the intestines), but these instances are rare, and the underlying illness is almost always dramatic enough to make the diagnosis fairly obvious.</p> | <p>Elevated triglyceride levels are associated with an increase in cardiovascular risk.</p> <p>Sometimes, high triglycerides are caused by specific medical conditions, including <a href="#">hypothyroidism</a>, kidney disease, pregnancy, and certain medications.</p> <p>Usually, however, elevated triglyceride levels are a part of an overall unhealthy metabolic pattern, typically seen in people who are overweight, sedentary, and who have unhealthy diets. This unhealthy metabolic pattern (commonly called either <a href="#">metabolic syndrome</a> or prediabetes) also includes (in addition to high triglycerides), reduced HDL cholesterol, elevated LDL cholesterol, and insulin resistance.</p> <p>People with this metabolic pattern are at high risk for premature cardiovascular disease. They need to work closely with their doctor to incorporate aggressive lifestyle changes, and very likely medication, to reduce their risk.</p> <p>People whose triglyceride levels are in the very high range often have familial or genetic conditions affecting their lipoproteins, causing high lipid levels. In addition to the elevated cardiovascular risk, very high triglyceride levels can also cause a dangerous form of <a href="#">pancreatitis</a>. Medications are almost always necessary to reduce triglyceride levels in these people.</p> |



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## LDL Cholesterol

**Optimal :** < 100 mg/dL  
**Above optimal:** 100 – 129 mg/dL  
**Borderline high:** 130 – 159 mg/dL  
**High:** 160 – 189 mg/dL  
**Very high:** ≥ 190 mg/dL

The LDL cholesterol test measures how much blood cholesterol is being carried by LDL lipoproteins. LDL lipoproteins transport cholesterol and triglycerides out to the various tissues of the body. Elevated levels of LDL cholesterol have been strongly associated with increased cardiovascular risk. For this reason, LDL cholesterol is commonly called “bad cholesterol.”

**Optimal Results**

LDL cholesterol levels in the optimal range often indicate a favorable cardiovascular risk profile. However, it is important to remember that your overall cardiovascular risk is determined by a composite of all your risk factors, and cannot be canceled out by a single favorable one.

Strictly speaking, there is no formal “low range” for LDL cholesterol. In some studies, LDL cholesterol levels below 40 mg/dL in people not taking lipid-lowering drugs have been associated with an increased risk of intracerebral hemorrhage, cancer, and problems during pregnancy. It is thought that when LDL cholesterol levels are spontaneously in this very low range, they are likely associated with underlying medical conditions that may be the cause of these risks.

Currently, however, there is no indication that very low LDL cholesterol levels produced by aggressive cholesterol-lowering drug treatment also increases such risks.

**Above Optimal and Higher Results**

LDL cholesterol levels that are above the optimal range generally indicate at least a potential risk factor for cardiovascular disease.

Typically, if your LDL cholesterol is in the “above optimal” range your doctor will review with you any other cardiac risk factors you may have, and give you advice about [lifestyle adjustments](#) you can make to reduce your overall risk.

If your LDL cholesterol is in the “borderline high” range, your doctor should also counsel you on reducing your controllable risk factors. If your overall cardiovascular risk remains elevated after you make your necessary lifestyle adjustments, lipid-lowering drug treatment might be recommended to help reduce your risk.

If your LDL cholesterol is in the “high” range, in addition to aggressive lifestyle measures to improve all your other risk factors, your doctor is very likely to prescribe a lipid-lowering drug treatment, in particular, a [statin drug](#).

If your LDL cholesterol is in the “very high” range, your doctor is likely to prescribe a statin drug even if you do not have other remarkable cardiac risk factors. And if the statin drug does not sufficiently reduce your LDL cholesterol level, additional cholesterol-lowering drugs may also be needed.



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## HDL Cholesterol

**Optimal for Men :  $\geq 40$  mg/dL**  
**Optimal for Women:  $\geq 50$  mg/dL**

The HDL cholesterol test is a measure of how much cholesterol is being carried by the HDL lipoprotein, whose main function is to remove excess cholesterol from the tissues and carry it back to the liver for reprocessing. The HDL lipoprotein can be visualized as a scavenger that removes cholesterol from places where it can do harm, such as the lining of blood vessels. The higher the HDL cholesterol, the more excess cholesterol is being removed.

This is why HDL cholesterol is commonly called “good cholesterol.” This is not strictly true, since cholesterol is just cholesterol. But, in general, it is a good thing to have lots of HDL lipoproteins around, scouring tissues of extra cholesterol that is not needed for healthy functioning.

### Optimal Results

HDL cholesterol levels in the optimal range often indicate a favorable cardiovascular risk profile. However, it is important to remember that your overall cardiovascular risk is determined by a composite of all your risk factors and cannot be canceled out by a single favorable one.

Strictly speaking, there is no high range for HDL cholesterol, and many experts believe the higher the better.

However, in recent years researchers have begun discovering rare genetic variants in HDL lipoproteins that can cause them to malfunction in a way that yields high HDL cholesterol levels, but without conferring a protective effect. In these cases, the HDL cholesterol levels are usually very high, often much higher than 100 mg/dL.

### Low Results

Low levels of HDL cholesterol are associated with increased cardiovascular risk.

Quite often, [low HDL cholesterol levels](#) are a part of an overall unhealthy metabolic pattern, typically seen in people who are overweight and sedentary, and who have unhealthy diets. This unhealthy metabolic pattern (commonly called either metabolic syndrome or prediabetes) also includes, in addition to low HDL cholesterol, elevated triglycerides, high LDL cholesterol, and insulin resistance.

People with this metabolic pattern have a high risk of premature cardiovascular disease. By working closely with their doctor to incorporate aggressive lifestyle changes, and possibly medication, they can reduce their risk.



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## Cholesterol: HDL Ratio

- Optimal : 3.5:1
- Acceptable: < 5:1
- High: ≥ 5:1

The cholesterol:HDL ratio is the ratio between the total cholesterol and the HDL cholesterol blood values. This ratio is not itself a blood test. It is simply a calculation made from values obtained with the standard lipid panel. Because it is so easily calculated, some laboratories routinely display the cholesterol:HDL ratio on their lipid panel report.

It is easy to calculate this ratio yourself. For instance, if your total cholesterol is 180 mg/dL and your HDL cholesterol is 50, your cholesterol:HDL ratio would be 180 divided by 50, or 3.6.

The cholesterol:HDL ratio is sometimes helpful in guiding your doctor’s recommendations when some your lipid panel implies borderline cardiovascular risk. The cholesterol:HDL ratio incorporates the fact that higher HDL cholesterol levels can mitigate at least some of the cardiovascular risk implied by elevated total cholesterol (or LDL cholesterol) levels.

Your doctor may find the cholesterol:HDL ratio useful if they are on the fence about prescribing [cholesterol-lowering treatment](#).

### Acceptable Results

A cholesterol:HDL ratio in the acceptable range is neither bad nor good. So if your total cholesterol is elevated (borderline high or high), an “acceptable” ratio should not sway your doctor’s recommendation on treating your cholesterol one way or the other.

### Optimal Results

If your [total cholesterol](#) is elevated (borderline high or high), but your cholesterol:HDL ratio is in the optimal range, this suggests that HDL cholesterol (“good cholesterol”) makes up a substantial proportion of your total blood cholesterol—and that your cardiovascular risk is probably lower than the total cholesterol value suggests. Your doctor should take this fact into account when recommending how to manage your elevated cholesterol level.

### High Results

A cholesterol:HDL ratio in the high range reinforces the excess risk implied by an elevated [total cholesterol](#) level. Furthermore, a high ratio often reflects a [low HDL cholesterol value](#), which itself is a risk factor for heart disease.



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## Non-HDL Cholesterol

**Optimal :** < 130 mg/dL  
**Suboptimal:** 130 – 159 mg/dL  
**Borderline high:** 160 – 189 mg/dL  
**High:** 190 – 219 mg/dL  
**Very high:** ≥ 220 mg/dL

Non-HDL cholesterol is simply the difference between total blood cholesterol and HDL cholesterol. It is meant to be a measure of all the “bad” cholesterol in the blood, and includes all the cholesterol being carried by LDL, IDL, VLDL lipoproteins and chylomicrons.

Because the large majority of cholesterol in the blood is usually carried by LDL lipoproteins, the non-HDL cholesterol test is very similar in its implications to the LDL cholesterol test. But because it includes all the cholesterol that is not “good” HDL cholesterol, some authorities believe it is a better measure than LDL cholesterol.

The major expert guidelines on blood lipids, however, still rely on LDL cholesterol levels. Your doctor will currently use non-HDL cholesterol levels mainly as a tie-breaker when they are on the fence about whether you should take cholesterol-lowering drugs.

### Optimal Results

Non-HDL cholesterol levels in the optimal range often indicate a favorable cardiovascular risk profile. However, it is important to remember that your overall cardiovascular risk is determined by a composite of all your risk factors, and cannot be canceled out by a single favorable one.

Strictly speaking, there is no formal “low range” for non-HDL cholesterol. However, non-HDL cholesterol levels usually parallel LDL cholesterol levels. In some studies, very low LDL cholesterol levels in people not taking lipid-lowering drugs have been associated with an increased risk of intracerebral hemorrhage, cancer, and problems during pregnancy.

It is thought that when LDL cholesterol levels are spontaneously in this very low range, they are likely associated with underlying medical conditions that may be the cause of these risks. These same risks have not been observed in people whose LDL cholesterol is very low as a result of drug treatment.

### Suboptimal and Higher Results

Non-HDL cholesterol levels above the optimal range are considered to indicate at least a potential risk factor for cardiovascular disease. In general, if your non-HDL cholesterol is in the “suboptimal” range your doctor will review with you any other cardiac risk factors you may have, and give you advice about lifestyle adjustments you can make to reduce your overall risk.

If your non-HDL cholesterol is in the “borderline high” range, your doctor should also counsel you on reducing your [controllable risk factors](#). If your overall cardiovascular risk remains elevated after you attempt these lifestyle adjustments, your doctor may prescribe a lipid-lowering drug, specifically, a statin drug, to help reduce your risk.

If your non-HDL cholesterol is in the “high” range, in addition to aggressive lifestyle measures to improve all your other risk factors, your doctor is very likely to prescribe a [statin drug](#) right away.

If your non-HDL cholesterol is in the “very high” range, your doctor is likely to prescribe a statin drug even if your other risk factors are not particularly elevated. And if the statin drug does not sufficiently reduce your non-HDL cholesterol level, additional cholesterol-lowering drugs may also be needed.



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# Apolipoprotein B

- Optimal : < 90 mg/dL
- Suboptimal: 90 – 99 mg/dL
- Borderline high: 100 – 119 mg/dL
- High: 120 – 139 mg/dL
- Very high: ≥ 140 mg/dL

Apolipoprotein B (or ApoB) is the primary protein that makes up the LDL lipoprotein particle. Each LDL particle contains exactly one ApoB, so measuring ApoB levels provides an estimate of the number of LDL particles circulating in the blood. It turns out the LDL particle number can be an important determinant of cardiovascular risk.

LDL particles can be divided into two general types. Some are large, “fluffy” particles that contain a lot of cholesterol, and others are small, dense particles that contain relatively little cholesterol. When a person’s LDL cholesterol is being transported mainly by the small, dense LDL particles, there has to be a lot of them of them to do the job. So a high ApoB value reflects a high LDL particle number, and an excess of the small, dense LDL particles.

This turns out to be important because the small, dense LDL particles do a lot more damage to blood vessels than the large, fluffy ones.

For any given LDL cholesterol level, if that cholesterol is being carried on a lot of small, dense LDL particles, a person’s cardiovascular risk is substantially higher than if that same amount of cholesterol is being carried on the larger, fluffier LDL particles. The ApoB test provides the additional information, not provided by a lipid panel, about LDL particle size and number.

In people whose standard lipid profiles place them in borderline risk status, measuring ApoB can be useful for your doctor in deciding whether lipid-lowering therapy might be a good idea.

| Optimal and Suboptimal Results                                                                                                                                                                                                                                                                                                                                                                                                                        | Higher Results                                                                                                                                                                                                                                                                                                                                             |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>An ApoB level in the optimal range suggests that, in a person with borderline abnormal LDL cholesterol level, the cardiac risk may be lower than it initially appeared.</p> <p>In the same person with abnormal LDL, an ApoB result in the “suboptimal range” does not move them out of the borderline category.</p> <p>No specific low range has been defined for ApoB. Current thinking is that when it comes to ApoB, the lower the better.</p> | <p>In a person with borderline abnormal LDL cholesterol levels, an ApoB level in the borderline high or high range would tend to tip the scales in the direction of elevated cardiovascular risk.</p> <p>If ApoB levels are very high, even in a person without elevated LDL cholesterol levels, that’s an indication of elevated cardiovascular risk.</p> |