**Statins (HMG-CoA Reductase Inhibitors)**

**What is a statin?**

Statin medications, also known as HMG-CoA Reductase Inhibitors, are medications used to lower bad cholesterol and decrease the risk of heart attacks, stroke, and death! Statins have been on the market since the late ‘70s and millions upon millions of people have taken statins. When they first came to market, they simply were used to lower high cholesterol. Quickly, studies started coming out that showed statins not only lower cholesterol, but decrease the risk of heart attacks, strokes, and death.

Most people think statins are used for cholesterol-lowering only and don’t realize that the benefit of heart protection is the main reason for using statins. This is mostly the healthcare industries fault. People are told over and over that statins are used to lower cholesterol. Though true, it is NOT the reason we use statins most of the time. As I always say, “who cares what your cholesterol is if you are still having heart attacks! We need a therapy that prevents heart attacks!” That is exactly what statins do. You could have fantastic cholesterol, but still have a heart attack or stroke. You could have horrible cholesterol and not have a heart attack or stroke. Determining the right candidate for statin therapy is key to making sure the right person is taking the right medication.

**How does a statin work?**

Statins work by blocking an enzyme that eventually leads to the production of cholesterol in the body. The body needs cholesterol to make hormones, cell walls, and fix any damaged blood vessels, but it only needs a small amount. Due to poor diets, genetics, and unhealthy lifestyles, most people generally make far more cholesterol than is necessary for normal body function. In fact, most people make “too much” cholesterol that can actually cause more damage than good.

When a blood vessel, let’s say in the heart, gets damaged, cholesterol gets pulled to the damaged site and seals the wound. If too much cholesterol goes, it not only fixes the site, but creates a plaque on top of the site which can obstruct or completely block the blood flowing through the blood vessel. When the blood vessel gets blocked or blood flow is reduced, the tissue on the other side of the blockage can either work harder to get more oxygen or simply die from lack of oxygen completely. This is BAD. Statins work to reduce the amount of cholesterol produced as well as the amount of cholesterol that makes its way to the blood vessel.

Not only do statins decrease cholesterol, they have other effects that are not fully understood. Studies have shown that people who take statins have lower markers of inflammation. Inflammation is a common cause of blood vessel damage to begin with. Reduced inflammation equals healthier vessels.

Statins also stabilize plaque that is already built up in the blood vessel. As we age, we all develop plaque in our arteries. That plaque could be thick and stable, meaning it won’t break apart with the slightest insult, or it could be thin and unstable. Thin and unstable is the scariest of all. If a piece of plaque breaks off, it could potentially flow downstream to another, smaller blood vessel where it completely blocks the blood flow to important heart tissue. That tissue will die within a matter of minutes. Once tissue is dead, it cannot come back. Statins make plaques thicker and more stable if there are already present, they do not cause the plaque to begin with.

Statins also make the blood vessel wall more resistant to damage. We are not sure exactly how, but imaging studies show that people taking statins have more pliable and resilient blood vessels that are less likely to be damaged in the first place.

The MOST IMPORTANT REASON statins are prescribed is, not only do they 1) lower cholesterol, 2) reduce inflammation, 3) stabilize plaque, or 4) strengthen blood vessels, but they LOWER THE RISK of heart attacks, strokes, heart procedures (such as coronary artery bypass grafts or revascularizations), and death! This is HUGE! If they didn’t decrease heart events or death, why would we care about the other stuff? We wouldn’t. The great news is that they do decrease heart events and death. We have seen if over and over and over again in so many studies!

**Summary of the benefits of taking statins:**

1. Reduces the risk of heart attacks, strokes, hospitalizations, heart procedures, and death. (see handout on statin studies)
2. Reduces cholesterol and inflammation.
3. Stabilizes plaque in blood vessels.
4. Strengthens blood vessel walls.
5. Very inexpensive therapy.
6. Very well tolerated.

**Who needs to take a statin?**

There are four main groups of people who should be taking statins, although risk/benefit discussions may happen between providers and patients if they fall in or out of these groups.

 Group 1: Patients with a history of atherosclerotic cardiovascular disease.

 Group 2: Patients over 40 years of age with diabetes.

 Group 3: Patients with LDL cholesterol (bad cholesterol) over 190mg/dL.

Group 4: Patients between 40-75 years of age with a 10-year risk of heart attack or stroke >7.5%. This is a calculation based on your risk factors.

Most people who fall into one of more of these groups should be taking a statin unless there is a safety or other reason for not taking one.

**What are the risks of taking statins?**

Statins have been prescribed for millions of people over the course of the last 50 years. This is a pretty good sample size to see what risks we are to expect of statins.

A word of caution: Please always discuss your statin concerns with a provider and don’t simply do an internet search or ask a neighbor because you will find that the people who have opinions about statins are those that do not like statins. People who have no issues with statins don’t tell their friends about it or blog about it online. That would be a pretty boring blog!

That being said, there are some risks of statins that everyone should be aware of.

**Risk 1: Muscle aches/pains**

Muscle side effects are the most common concern with statins. In studies, they found that about 15% of people experienced some sort of muscle side effect such as muscle fatigue, aches, pain, or soreness. In real-life, it seems closer to 30% of statin-users complain of some muscle side effect at some point in time. What is unknown is whether some of the muscle concerns are age-related, arthritis-related, or actually statin-related. An easy way to determine if it is statin related is 1) are the muscle aches/pains happening in large muscle groups such as the back, thighs, or calves, 2) are the muscle aches/pains happening on both sides of the body, 3) do the muscle aches/pains last all day, and 4) do the muscle aches/pains improve off of statin? If the answer to any one of these is no, then it is likely NOT statin-related.

If you do happen to have actual statin-related muscle side effects, do not be discouraged! There are seven statins on the market and one of them will likely work for you. The structure of some statins is such that they penetrate (or “get in to”) the muscle tissue more than other statins. If you didn’t tolerate one statin, you will likely tolerate a different statin.

 **Risk 2: Liver toxicity**

Statins RARELY cause liver toxicity. In fact, it is so rare that the FDA has decided that providers no longer need to routinely monitor liver function before and after statin therapy is initiated. Studies have shown that the risk of liver toxicity on a statin is the same risk as not being on a statin.

Many patients are extremely concerned about liver toxicity with statins, even without any risk of liver disease. I am often told my patients don’t want to take a statin due to the risk to the liver. Please remember, the risk of EXTREMELY low, the liver is resilient and can regrow if damaged…the heart cannot!

If you are concerned about your liver, your provider can certainly check a lab called and ALT (alanine aminotransferase). This shows your liver function.

Some studies actually show that statins reduce ALT levels in people with fatty liver disease! There could actually be some benefit for your liver!

 **Risk 3: Memory impairment**

Studies have not shown any memory impairment concerns; however, real patient cases have recently been reported of patients complaining of short-term memory loss while taking statins. There have only been a handful of cases in the millions upon millions of people taking statins, but it is a real concern.

One major thing to note is that no cases have shown long-term memory loss (i.e. dementia or alzheimer’s disease). All cases were short-term memory loss only and were fully reversible within a month or two of stopping the statin therapy. People were complaining of “foggy” thinking or forgetting small things like appointments or where they put the car keys. Again, all were fully reversible when the statin was stopped.

Statins DO NOT cause long-term memory impairment and DO NOT lead to dementia of alzheimer’s disease. In fact, some studies indicate a possible protective benefit of statins against alzheimer’s disease and we know that statins can decrease risk of dementia by decreasing the risk of strokes, the number one cause of dementia. The benefit of statin therapy for reducing strokes far outweighs the slight chance of short-term memory loss. Plus, you could always try the statin first and, if short-term memory loss is a concern, stop the statin after speaking with your provider.

Like with the muscle side effects, some statins are more likely to cause memory side effects than others. Again, due to the structure of statins, some penetrate through the blood brain barrier which may lead to more memory side effects, while others do not. This means that you could try different statins and have different effects.

 **Risk 4: Increased risk of diabetes or increased blood sugars**

Recently, studies have shown that people who take high dose statin therapy have a higher risk of being diagnosed with Type 2 Diabetes Mellitus (diabetes) or have higher levels of blood sugars overall. All statins can do this, but the higher doses are more likely. However, this increased risk is NOT seen in people who are not already at risk for diabetes.

People with prediabetes (higher blood sugar levels than normal, but lower than those of diabetes patients), people with poor diet, people who are overweight, and people with a family history of diabetes are at risk of diabetes diagnosis after starting a statin. Interestingly, the studies showed that most people who developed diabetes while on a statin would likely have been diagnosed within the year anyway, but the statin moved the time-to-diagnosis date up about 3 months.

For those who already have diabetes, the increase in blood sugars is insignificant and would not require therapy change in most people. It is certainly not a reason to avoid statin therapy.

To put this all into perspective, slightly higher blood sugars than “normal” is not a reason to avoid statin when statins reduce the risk of heart attacks, stroke, and death! The number one cause of death in patients with diabetes is not blood sugars but heart attacks.