Vitamin D and Multiple Sclerosis:
A patient friendly summary

What is multiple sclerosis?

Multiple sclerosis (MS) is a condition that affects your nerves. Your body's immune system, which usually fights infection, attacks the nerve cells in your brain and spinal cord. Nerve cells have a protective covering called the myelin sheath, which helps them to deliver messages to different parts of your body. As the myelin is destroyed, it becomes more and more difficult for nerve cells to work properly. When the nerve cells in your brain and spinal cord aren't able to do their job, many parts of your body can be affected. This can cause problems with your ability to walk, eat, see, and urinate. MS is not fatal or contagious and symptoms develop slowly in most people.

There are two main types of MS:

- **Relapsing-remitting.** This is the most common type of MS. Your symptoms come and go. When they appear this is called a relapse and when they fade away this is called a remission. When you go into remission you may recover completely and go back to how you were before the relapse, or you may recover to almost the same condition, but not completely. Relapses can last for days or weeks and can vary from mild to severe. On average, people with relapsing remitting MS have one or two attacks a year. Your symptoms can gradually get worse over time and your recovery from relapse can become less complete.
- **Progressive.** There are two kinds of progressive MS, primary and secondary. Primary progressive MS is when your symptoms get worse from the start and you don't go into remission. This means that you gradually become more disabled as time goes on. Secondary progressive MS is where you initially have relapsing remitting MS for quite a few years, but then you begin to have fewer periods of relapse and remission and gradually become more disabled. You may not recover completely after a relapse and eventually periods of relapse followed by remission can stop altogether. Instead your condition will get gradually worse. Only 15% of MS cases are initially diagnosed as progressive.

What causes multiple sclerosis?

Scientists and doctors don't know for sure what causes MS. However, it's thought that it may be a combination of your genes and your environment that cause it to develop. Some researchers believe that a virus may trigger MS in people that carry certain genes.

These are some of the other things that may influence whether you develop MS:

- **What sex you are.** More women than men have MS so it's possible that your hormones play a role in its development.
- **Your ethnic group.** More Caucasians develop MS than other ethnic groups, but the disease is usually more severe in African-Americans and Hispanics.
- **Your age.** MS can develop at any age, but it most commonly affects people between the ages of 20 and 40.
- **When and where you're born.** MS is more common all over the world in areas north of the equator and in people born in early spring. This suggests that there may be a link between the amount of sunshine you get and the likelihood of developing MS.

How common is multiple sclerosis?

Roughly 250,000 people in the United States have MS. Most people with MS are diagnosed between the age of 20 and 40. The chance of developing MS is about 1 in 750 in the United States, but your risk is greater if you:

- have a history of infection with the Epstein-Barr virus
- smoke
- have a first-degree relative (parent, brother or sister, non-identical twin) with the disease
- are female
- are white
- were raised in far North regions (MS is more common farther from the equator)

What is the link between multiple sclerosis and vitamin D?

Vitamin D plays an important role in developing healthy bones, but researchers are also starting to uncover the role of vitamin D in many other areas of your health. It's now known that vitamin D plays a role in your immune and nervous systems and how they work, although exactly how is still being studied.

Some cells in your immune and nervous systems have receptors for vitamin D. Receptors are found on the surface of a cell where they receive chemical signals. By attaching themselves to a receptor, these chemical signals direct a cell to do something, for example to act in a certain way, or to divide or die. The vitamin D receptors on nerve and immune system cells means that vitamin D is somehow affecting the cell. The cells also control how much vitamin D they have inside of them.

When immune system cells are exposed to vitamin D in laboratory experiments they become less inflamed. This could mean that vitamin D affects your immune system and makes it less likely to attack other cells in your body. Some researchers believe that this means vitamin D has the potential to prevent MS from developing. It could also affect relapsing remitting MS by reducing the number of relapses and how severe they are.

Most people get vitamin D from exposing their bare skin to sunlight. Some research has suggested that children who get lots of sun are less likely to develop MS as adults. So, if you grow up in a place that gets lots of sun, you're less likely to develop MS than someone who grows up in a place where there is little sun.

Exposing your skin to sunlight could affect your immune system in other ways apart from producing vitamin D. However, research does show that people with higher vitamin D levels in their blood are less likely to develop MS or have a relapse if they already have it.

What does the research say in general about vitamin D and multiple sclerosis?

Preventing MS

Most of the research which shows that vitamin D may help to prevent the development of MS is epidemiological. This means that researchers have studied groups of people for clues as to why they do or don't develop a certain disease.

Even though there is good evidence that vitamin D produced from exposing your skin to the sun plays a role in the development of MS, it's impossible to know if the beneficial effect of the sun is due to the vitamin D that is produced or some other unknown factor. Researchers also don't know if taking vitamin D supplements will have the same effect as exposing your skin to the sun.

Treating or managing MS

Whether or not taking vitamin D supplements can help people who already have MS is unclear. The studies that have been done have given conflicting results. Some research shows vitamin D can reduce the number of relapses in people with relapsing remitting MS where as other research shows vitamin D has no effect on the number of

relapses. This could be because there are differences in the way the research studies were designed and carried out. This makes them difficult to compare. These include differences in:

- the length of the study
- the form of vitamin D people take, for example tablets or injections
- the amount of vitamin D people take
- how often people take the vitamin D, for example every day or once a week
- the people taking part in the research, for example different ethnic groups
- the way the researchers measured the effects of the vitamin D

Until now, many of the research studies looking at vitamin D have involved small numbers of people, which makes it difficult to judge if vitamin D is really having an effect or not. Research studies that take place for a longer period of time and involve larger numbers of people and which compare vitamin D to a dummy pill are needed. This may help to show more clearly whether vitamin D really does prevent MS or treat symptoms once it has started. Two such studies are currently underway.

What does recent research say?

Treating MS

Only one high quality research study exists that shows vitamin D can help to treat the symptoms of MS.

A 2012 research study from Finland looked at whether or not giving vitamin D supplements to people with relapsing remitting MS improved their symptoms. The main results were:

- Taking vitamin D supplements significantly reduced the number of brain lesions found on a brain scan. A lesion on the brain means that nerve cells have been damaged or destroyed, which can lead to symptoms in the area of the body controlled by those nerves. New lesions show that there is nerve damage, which usually causes the development of more disabilities.
- The number of relapses that people had was the same whether they were taking vitamin D or not.

Most people started the study with very low amounts of vitamin D in their blood. The amount of vitamin D people took during the study was greater than the amount the US government recommends, but not as much as what the Vitamin D Council recommends. All of the people who took part were also being treated for their MS by taking other medicines, so it's difficult to know exactly what effect the vitamin D was having.

A 2012 research study from Norway looked at whether or not taking a vitamin D supplement reduced the number of relapses or prevented disability. The main results were:

- The number of relapses that people had was the same whether they were taking vitamin D or not.
- Taking vitamin D did not prevent further disabilities from developing in people with MS.

The amount of vitamin D people took during the study was greater than the amount the US government recommends, but not as much as what the Vitamin D Council recommends. The people taking this dose finished the study with the amount of vitamin D in their blood that the Vitamin D Council recommends for healthy people. The researchers suggested that people who already have MS may need to take even more vitamin D to reduce the number of relapses they have or to prevent new lesions from forming in their brains.

Preventing MS

A 2012 research study from Iran looked at whether or not taking a vitamin D supplement reduced the likelihood of developing MS in people who were at high risk of developing the condition. The main results were:

- Taking a vitamin D supplement reduced the likelihood of developing MS in people at high risk for developing the condition
- Taking a vitamin D supplement significantly reduced the number of brain lesions detected by an MRI scan.

The people taking part in this study were taking much more vitamin D than the US government recommends. They developed significantly fewer new brain lesions than the people not taking vitamin D and were much less likely to develop MS. None of the people taking the vitamin D experienced relapses, but the number of people in the study was so small it's difficult to say definitively if vitamin D plays a role in preventing MS.

Key points from research

- People diagnosed with MS tend to have lower blood levels of vitamin D than other healthy people of their age.
- Researchers don't know if it's vitamin D or some other beneficial effect of sunlight that leads to fewer people developing MS in sunny places.
- It's not clear if vitamin D is helpful in the prevention or treatment of MS, or both. Some researchers believe that the amount of vitamin D you get early on in your life is most important for your risk of developing MS as an adult. Once you have the disease some researchers believe that taking additional vitamin D may not help.
- Most of the studies testing vitamin D supplements for the treatment of MS looked at small numbers of people. This makes it difficult to know what the effect of vitamin D is.
- Research studies have used different amounts of vitamin D, so it's difficult to know how much vitamin D people would have to take to have an effect.
- How people respond to vitamin D may be affected by their genes.

What does this mean for me?

Research does seem to show a link between vitamin D and MS, but researchers don't know exactly how the two are related.

Research studies have shown that people with low levels of vitamin D in their blood may be more likely to develop MS than people with higher levels of vitamin D in their blood. People who expose their skin to the sun regularly are less likely to develop MS and some researchers suggest that taking vitamin D may lower your risk of developing it. However, it isn't clear whether getting good amounts of vitamin D, by taking supplements or by exposing your skin to the sun, could prevent you from developing MS.

Researchers don't know whether taking vitamin D can help to reduce the number of relapses if you have MS.

If you have MS and want to take vitamin D, it's unlikely to make your symptoms worse or cause you any harm if you take less than 10,000 IU/day.

Because vitamin D improves the health of your bones and people with MS are likely to have bone disease, it may be helpful to take vitamin D. Talk to your doctor for more information.

If you have MS it's important that you talk to your doctor about taking vitamin D or any other supplements. You should not take vitamin D in the place of other medications for your condition.

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