

MS CONNECTION

NATIONAL MULTIPLE SCLEROSIS SOCIETY - WISCONSIN CHAPTER

Fall 2009



Vitamin D

Wisconsin Researcher Colleen Hayes
Explores Benefits for Individuals with MS

Can Vitamin D Prevent MS?

**Wisconsin's World-Renown Vitamin D Researcher
Discusses Benefits for Individuals with MS**

By Amanda Gasper

“There is very good scientific evidence correlating low levels of vitamin D with a high risk of MS and with high disability in people with MS,” said Colleen Hayes, PhD, a professor and researcher at the University of Wisconsin-Madison.

Dr. Hayes has studied nutrition and the immune system for more than 25 years, and vitamin D and MS for almost 20 years. She has many friends, and one family member, with MS. Dr. Hayes is a recipient of numerous National Multiple Sclerosis Society grants, and was notified in October that she would receive another \$485,469 award to continue her vitamin D studies (see accompanying article).

According to Dr. Hayes, “It is not really possible to get the vitamin D one needs from food alone, without UVL exposure or vitamin D supplements.” In fact, only 10 percent of the vitamin D that people need comes from foods like fish, eggs and mushrooms.

A study just released by Harvard Medical School showed at least one in five U.S. children ages 1 to 11 doesn't get enough vitamin D and could be at risk for a variety of health problems including weak bones. The findings add to mounting evidence about vitamin D deficiency in children, teens and adults.

“Studies have suggested that vitamin D is beneficial

“*No one should be without these health benefits.*”
- Colleen Hayes



Colleen Hayes has studied vitamin D and MS for 20 years.

for preventing infections, autoimmune diseases, cancers and cardiovascular diseases,” Dr. Hayes said. “No one should be without these health benefits.”

According to Dr. Hayes, a study in Finland showed that after vitamin D levels decreased during winter, MS relapse rates increased.

In order to study the correlation between vitamin D and MS, Hayes uses the animal model: experimental autoimmune encephalomyelitis (EAE). The lesions that form and the types of cells that are present in the lesions in EAE are similar to those found in people with MS,

according to Dr. Hayes. She added that the clinical disease signs are similar, too. However, researchers know how the EAE disease process starts in mice but do not know how MS starts in humans.

“It is the best model we have to study the disease process,” she said. “The new knowledge we have gained through research in the model disease has provided a strong scientific rationale for testing vitamin D and calcitriol in MS patients.”

Dr. Hayes treated mice with calcitriol, the hormone form of vitamin D that is active in the human body. She found that it can prevent progression of EAE in both male and female mice.

MS patients were treated with calcitriol, as a prescription drug that must be taken under a physician's supervision, in a clinical trial. Dr. Hayes said, “It reduced the relapse rate and prevented disease progression. However, it did not become a standard MS therapy due to the risk of raising the serum calcium

levels. We have found a way to avoid this risk, and are working with neurologists to organize a follow-up clinical study.”

Dr. Hayes has also treated mice that have EAE with vitamin D and found gender differences in how well vitamin D protects mice from EAE.

“We found that vitamin D protected the females but

“**A simple rule is this, if there is not enough sunlight to get a tan, then vitamin D3 supplements are needed.**”
- Colleen Hayes

not the males from developing EAE. This is in contrast to calcitriol, which protects both females and males,” Dr. Hayes said. “Our follow-up study showed that females need a source of estrogen to obtain the benefits of vitamin D. In other words, estrogen and vitamin D work together in female rodents to protect them from developing EAE.”

According to Dr. Hayes, male mice broke down the vitamin D-derived calcitriol faster than females.

“In humans, we do not know if vitamin D provides a greater benefit to women than it does to men,” Dr. Hayes said. “If vitamin D proves to have stronger benefits in women than in men, then this new knowledge may help us understand and reverse the female gender bias in MS.”

If this is true, men may not be as dependent on vitamin D as women and women may have an increased need for vitamin D during puberty, according to Dr. Hayes.

“We will not know whether raising vitamin D levels can reduce MS relapse rates and prevent MS disease progression until an intervention study is performed. We need to raise the vitamin D levels in MS patients and determine if there are benefits as regards their disease,” Dr. Hayes said.

Currently, there are two clinical trials treating MS patients with vitamin D: One in Canada and another in Finland.

Although vitamin D is notoriously difficult to get in a diet, the following foods can help:

3.5 oz salmon, cooked
360 IU



1 tbsp cod liver oil
1,360 IU

1 cup fortified milk
98 IU



3 oz tuna fish, canned in oil
345 IU



3.5 oz mackerel, cooked
345 IU

1 whole egg (yolk contains vitamin D)
20 IU



3/4 to 1 cup fortified cereal
40 IU
Vitamin content varies by brand.



1 tbsp fortified margarine
60 IU



1.75 oz sardines, canned in oil
345 IU



1 oz Swiss cheese
12 IU



Vitamin D Studies to Continue

Hayes Receives Grant from National MS Society

The National Multiple Sclerosis Society announced in October that Colleen Hayes, PhD, and a professor at the University of Wisconsin-Madison, will receive a three-year \$485,469 grant to continue her study of vitamin D and how it may influence multiple sclerosis. This is Dr. Hayes' fifth award from the National Multiple Sclerosis Society in 10 years, during which time she has received \$1.8 million.

MS researchers have wondered why MS occurs less often in regions of the world where exposure to sunlight is high. There is evidence that vitamin D, which is made by cells in the skin in response to sunlight, and calcitriol – a hormone derived from vitamin D – may suppress the immune response involved in MS.



In her new research project, Dr. Hayes will study how vitamin D may influence MS-like disease to shed light on possible ways to prevent and treat human MS.

In previous research, Dr. Hayes found that a pulse dose of calcitriol combined with vitamin D supplements induced a long-lasting remission of experimental autoimmune encephalomyelitis (EAE), a disease similar to MS, in lab mice. For the new project, Dr. Hayes has assembled a group of collaborators from Wisconsin, Missouri, Oregon, Ohio and Canada to determine how calcitriol suppresses autoimmune activity in EAE. Their work will provide important information about the activity of vitamin D and calcitriol and its interactions with the immune system and inflammation. The new insights gleaned from this work will help to inform investigators who are planning future clinical trials to determine whether vitamin D and/or calcitriol can benefit people with MS or prevent new cases of the disease.

And what are Dr. Hayes recommendations for now? “In the complete absence of UVL exposure, an average adult will need 100 micrograms of vitamin D3 (about 4000 IU) each day,” Dr. Hayes said. “When UVL exposure is limited by low sunlight intensity in the winter months, or by indoor work, or by clothing, or by sunscreen, or by dark skin pigment, you will need to supplement.”

Dr. Hayes said she is an advocate of responsible sun exposure as long as the skin does not burn or if there is a history of skin or health problems caused by the sun.

“I expose my skin to moderate intensity sunlight without sun block for a period of time that does not cause my skin to burn (turn slightly pinkish), then I apply sunscreen or sit in the shade,” Dr. Hayes said.

Older adults need to supplement even if they have good UVL exposure because the ability for the skin to form vitamin D declines with age she said.

Dr. Hayes cautioned that there is not enough UVL intensity to form vitamin D from October to April in Wisconsin.

“A simple rule is this,” she said. “If there is not enough sunlight to get a tan, then vitamin D3 supplements are needed.”

Amanda Gasper is a Life Sciences Communication and Genetics student at the University of Wisconsin-Madison. She was a 2009 summer intern at the Wisconsin Chapter.

You can do your own vitamin D intervention study with your physician, according to Colleen Hayes.

Here's how.

1. Measure your MS symptoms by a timed walking test or a vision test or a cognition test
2. Take vitamin D supplements and measure the serum 25-D levels-the form of vitamin D in the blood
3. Measure your MS symptoms again to see if there is improvement

MS Connection is a publication of the National Multiple Sclerosis Society-Wisconsin Chapter. For information or to share story ideas, please call 262-369-4431. Editor: Cindy Yomantas, Art Director: Amy Malo