

# Nutrition Perspectives

University of California, Davis, Department of Nutrition and the Center for Nutrition in Schools

## Magnesium Helps Keep Vitamin D Levels From Being Too Low or Too High

If some is good, more is better, right? Not always, especially when it comes to vitamin D. Vitamin D plays an integral role in calcium absorption and in bone health. Vitamin D deficiency has been linked to variety of diseases, including certain types of cancer, multiple sclerosis cardiovascular disease, arthritis, osteoporosis, diabetes, and rickets. On the other hand, too much vitamin D can cause toxicity, with symptoms such as GI discomfort, diarrhea, irregular heartbeat, drowsiness, headaches, and muscle and joint pain. Past studies suggest that magnesium supplementation may help maintain levels of vitamin D in the blood in the sweet spot of not too high or too low.



In order to understand how magnesium affects vitamin D regulation, researchers at the Vanderbilt-Ingram Cancer Center conducted a study to determine how magnesium supplements



impact vitamin D levels in the blood. Participants (n=180) that were considered high risk of developing colon cancer were randomly assigned to receive either a magnesium supplement or a placebo. Over 12 weeks, participants visited the clinic three times to provide blood samples and have their height and weight

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## Letter from the Editors

*Welcome to a special UC Davis student edition of Nutrition Perspectives. Each year, Dr. Scherr teaches Nutrition 129: Journalistic Practicum in Nutrition. In this class nutrition undergraduates are educated about communicating nutrition information to the public through practical and hands-on experience in science writing for a non-scientific audience. In this special issue, we are pleased to share a selection of articles written by nutrition students on a variety of recent nutrition topics.*

*Thank you for your readership,*

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*Anna M. Jones, Ph.D., Rachel E. Scherr, Ph.D., and staff prepare NUTRITION PERSPECTIVES. This newsletter is designed to provide research-based information on ongoing nutrition and food-related programs. It is published quarterly (four times annually) as a service of the UC Davis Department of Nutrition and the Center for Nutrition in Schools. NUTRITION PERSPECTIVES is available online, free of charge, at <https://nutrition.ucdavis.edu/outreach/nutrition-perspectives>. Questions or comments on articles may be addressed to: NUTRITION PERSPECTIVES, Department of Nutrition, University of California, Davis, CA 95616-8669. Phone:(530) 752-3387; FAX: (530) 752-8905.*

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measured. The participants also completed dietary recalls before the study began and at regular intervals to determine how much calcium and magnesium they typically consumed.

The researchers found that magnesium supplementation affected blood levels of vitamin D differently depending on the level of vitamin D they started with. Those with vitamin D levels of 30 ng/ml experienced an increase in vitamin D in the blood, while those with higher levels of vitamin D (50 ng/ml) experienced a decrease. This may indicate that magnesium may play an integral role in regulating excess vitamin D. However, below 30 ng/ml, the effect of magnesium supplementation on vitamin D levels

Reference:

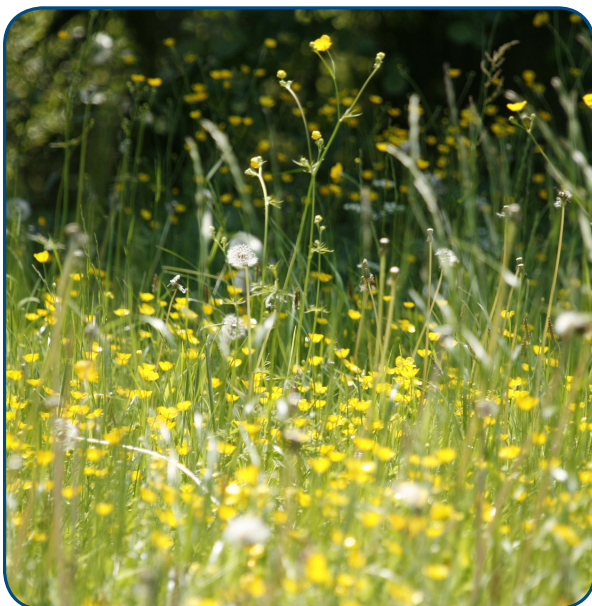
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was too inconsistent to be conclusive.

Researchers point to magnesium's crucial role in enzymes that inactivate and deactivate vitamin D to explain their findings. An example of this relationship is a certain type of rickets that is both magnesium-dependent and vitamin D resistant. Unlike classical cases of rickets, patients with this type of rickets don't improve when given vitamin D treatment unless magnesium is also supplemented. With the majority (79 percent) of adults in the United States not consuming enough magnesium in their diet, many may be at risk for unhealthy vitamin D status.

## What is Oral Allergy Syndrome?



*Those with oral allergy syndrome typically react to foods related to the type of pollen to which they are allergic.*

When is a food allergy not a food allergy? When it's oral allergy syndrome (OAS), a type of reaction usually found in those who have a pollen allergy. Unlike traditional food allergies, the reaction is generally fairly mild and limited to the mouth. Commonly, when a person with OAS has been exposed to the allergenic food, they will experience a few minutes of irritation or swelling of the mouth and throat. These symptoms are triggered when the food comes in contact with the mouth and throat. Those with OAS typically react to foods related to the type of pollen to which they are allergic. For example, those who are allergic to grass might also have a response to orange, tomato, peach, celery, and melon.

Oral allergy syndrome is mainly observed in adolescents and those with seasonal allergic rhinitis, otherwise known as seasonal allergies. It is estimated

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*Those with an allergy to birch pollen are more likely to react to peaches, plums, apricots, and other similar fruits.*

that as many as 47-70 percent of patients with a pollen allergy have OAS. Like a traditional food allergy, OAS is caused by the immune system reacting to a compound in the food, known as an antigen. This involves a specific part of the immune system, known as immunoglobulin E (IgE), a type of antibody in human body. When the food that causes a reaction comes in contact with the mouth, IgE detects pollen-food antigens and causes the body to respond with the symptoms of OAS. Although itching and swelling in the mouth and throat are the most common symptoms of OAS, there are still more unusual symptoms like redness of the hands, nausea, stomach irritation, vomiting, diarrhea, tightness in the chest, or loss of consciousness. A small number of individuals (1-2 percent) can have more severe reactions such as anaphylaxis.

Symptoms occur when the food allergens, especially raw fruits and vegetables come into contact with patients' throat, triggering OAS. Unlike with a traditional food allergy, cooking or warming the foods can often reduce the effect. For this reason, one of the ways it can be determined if a person has OAS rather than a food allergy is to see if they react to both the cooked version of the food and the raw (this should only be done under the supervision of a doctor in case of severe reactions).

Certain foods are more likely to trigger OAS depending on the seasonal allergy an individual has:

- Birch pollen allergy: consumption of apricot, peach, apple, carrot, almond, plum, hazelnut, pear, celery, fennel, parsley, aniseed, coriander, soybean, caraway, or peanut
- Ragweed pollen allergy: consumption of banana, melon, cucumber, or kiwi
- Grass pollen allergy: consumption of orange, tomato, melon, or peanut, or peeling raw potato

Like with a food allergy, when it's been determined that someone has OAS it's generally recommended they avoid the food that causes symptoms. Sometimes epinephrine auto-injectors (often referred to by the brand name "EpiPen") or antihistamines are prescribed. If you think you have OAS, check with your doctor to determine what is best for you and your symptoms.



*Cooked versions of the food that causes a reaction are often safe to eat for those with OAS.*

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## Spicy Food May Help in Preventing High Blood Pressure

High salt intake is related to an increased risk of developing heart disease, high blood pressure, and diabetes. According to the World Health Organization, people who eat more than the recommended 5 grams of salt per day have a greater risk of developing high blood pressure (1). In order to decrease the risk for high blood pressure and chronic medical conditions, it is important to reduce salt intake. It turns out that spicy food might help do just that (2)

Researchers from the Daping Hospital in Chongqing Shi, China conducted an observational study of 606 participants from four different cities to examine the relationship between salt preference and intake in relation to preference for spicy foods. To determine this, the researchers conducted several assessments. First, they had participants taste several solutions that contained increasing amounts of capsaicin, the compound that gives spicy food its characteristic burn. The next taste test was to establish the minimum amount of salt they could perceive. Each participant was asked to identify if a solution contained salt. The lower amount of salt a participant could taste indicated they were more sensitive to the taste of salt. Lastly, participants were asked to identify the salt water solution that was intolerably salty to them. Using these data, the participants' salt and spicy preferences were ranked from low, medium, or high preference. In addition, the researchers measured blood pressure and asked participants to complete a questionnaire about general food habits and preferences to determine how these might be related to salt and spicy preference.

Results showed that participants who had a higher preference for salt had higher blood pressure in comparison to those with lower salt preference. Moreover, participants with high salt preference were less sensitive to salt and had a lower spice preference compared to those with low salt preference. In contrast, participants with higher spice preference were more sensitive to salt, had a lower salt preference, and lower blood pressure. This suggests that the higher the spice preference, the more sensitive



*Participants with higher spice preference were more sensitive to salt, had a lower salt preference, and lower blood pressure.*



*Those who eat more than the recommended 5 grams of salt per day have a greater risk of developing high blood pressure.*

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## Spicy Food (Continued from page 5)

and less tolerant an individual is to salt. The researchers also found that the preference for higher salt is associated with being older in age, performing physical labor and having lower levels of education.

Researchers then posed a question of whether the administration of capsaicin, the main active ingredient in chili peppers, can alter the way the brain responds to salt. Using PET (positron emission topography) and CT (computed topography) scans, the researchers were able to determine that those with higher salt intake and salt preference also had higher brain activity in certain regions of the brain after consuming salt. To investigate how spice might change the brain's response to salt, participants were given a dose of 0.5- $\mu\text{mol/L}$  capsaicin, which has



*Habanero peppers are thirty times more spicy than jalapeno peppers, making the one of the spiciest peppers that are commonly available.*

been shown in other research to increase the perception of salt without being noticeably spicy (2). What they found was that adding capsaicin to salt increased brain activity in these regions more than salt alone. This suggests that the

brain activity may be changed by capsaicin, which could partly explain the relationship between higher spice preference and lower salt consumption. In other words, increased brain activity is connected to high salt intake and salt preference in humans.

It's long been recommended to lower salt intake as a way to reduce the risk of high blood pressure - which is a main factor related to heart disease. Since chili peppers are common flavor enhancements in China and the United States, they present avenue to lower salt consumption worldwide. So, if you like spicy foods, continue to eat capsaicin-filled dishes.

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## Compound in Pomegranates May Help Prevent Damage from IBD in Mice

Ten million people suffer from Inflammatory Bowel Disease (IBD) worldwide (1). This encompasses Crohn's disease and ulcerative colitis, and is characterized by inflammation in the digestive system, resulting in symptoms like chronic pain, bloating, and diarrhea (1). In patients with IBD, the immune system cells attack food, viruses, and 'good' bacteria in the digestive tract (1). The attacks by the immune system cells damage the walls of the intestines, causing inflammation. In addition, many patients with IBD have a decreased production of proteins that protect the intestinal barrier of the cell wall, called tight junction proteins.

Past studies have shown that diets with higher amounts of pomegranate can improve overall health. Pomegranates have ellagic acid, which has anti-inflammatory properties. In the body, ellagic acid is broken down into Urolithin A (UroA) by 'good' bacteria found in the gut. However, some people with IBD lack the 'good' bacteria to convert ellagic acid into UroA.



*Pomegranates contain ellagic acid, which has anti-inflammatory properties.*



*Millions worldwide suffer from Inflammatory Bowel Diseases, which causes damage to the intestines.*

Recently, a team of scientists headed by researchers at the University of Louisville found that UroA leads to an increase in tight junction proteins and a decrease in inflammatory proteins within the wall of the GI tract (2). These benefits have been linked to a potential decrease in symptoms caused by IBD.

Singh and team created a version of UroA, known as UAS03 that would be stable in the GI tract. Scientists then treated inflamed white blood cells from mice with UroA and UAS03, both of which caused a decrease in inflammation. The team then used RNA sequencing to determine if the cells treated with UAS03 had an increase in genes that created tight junction proteins, along with an increase in genes for an anti-inflammatory enzyme.

To show that UroA/UAS03 would work inside the body, scientists caused IBD-like symptoms in mice. The mice were then treated with UroA or UAS03. Both led to a decrease in inflammatory proteins and an increase in tight junction proteins. The mouse colons treated with the compounds experienced less weight loss, colon shortening, and disease activity. These results

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all suggest a decrease in IBD symptoms.

This study shows a potential new treatment to help with certain symptoms of IBD. Currently, IBD can be managed using anti-inflammatory steroids, antibiotics, immune system suppressors, or surgery for more serious cases. All available care is costly and may have chronic side effects, without treating the disease completely. The potential symptom relief by natural treatment using pomegranate metabolites gives hope for better management of IBD symptoms to the millions of people that suffer from it.



*Grapes and berries are also a source of ellagic acid.*

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## Fat Around the Middle May Be Influenced by the Types of Food We Eat



*The more fruits and vegetables consumed, the less visceral and hepatic fat a person was likely to have.*

The old adage of “eat your fruits and vegetables” never seems to go out of style in the world of nutrition, but perhaps it is for good reason. This time, research suggests regular intake of fruits and vegetables is associated with less visceral and hepatic fat. Visceral fat refers to fat around the internal organs, while hepatic fat is found in the liver. Both types of fat have been linked to many diseases, including heart disease and type 2 diabetes. Because these visceral and hepatic fat are associated with higher risk of disease, prevention has become a target for health promotion.

Findings from a study conducted by

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## Middle (Continued from page 8)



*Those who consumed more sweet snacks were more likely to have more visceral and hepatic fat.*

Esther van Eekelen et al. at Leiden University in the Netherlands, suggests that eating fruits and vegetables is associated with reduced hepatic and visceral fat compared to intake of sweet snacks. Previous research has shown an association between sugar-sweetened beverages and an increased risk of type 2 diabetes.

Men and women between the ages of 45 to 65 living in the Netherlands participated in the study (n=6671). Researchers collected data on typical dietary intake using a Food Frequency Questionnaire (FFQ). Magnetic resonance imaging (MRI) was used to assess liver and stomach fat in a subset of the participants (n=2580).

Researchers found that the more fruits and vegetables consumed, the less visceral and hepatic fat a person was likely to have. In addition, those who consumed more sweet snacks were more likely to have more visceral and hepatic fat. They found that there was a stronger association between fatty liver and sweet snacks in premenopausal women compared to postmenopausal women.

The type of food was also found to be important; vegetables had more of a protective effect when it came to developing fatty liver than fruits did. Other foods investigated, such as fish and meat were not found to be associated. The authors note that the FFQ did not distinguish between fresh or fried fish, or different types of meat which may have impacted results.

Overall, the group feels that their research aligns with other current research on healthy diets. "Our findings are in accordance with the current literature on food groups in relation to cardiometabolic disease ... they support the Dietary approaches to Stop Hypertension (DASH) diet and Alternative Healthy Eating Index" the authors said. When we're on the go looking for a quick snack, it might be worth grabbing some carrots and hummus over a slice of cake.

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*Vegetables had more of a protective effect when it came to developing fatty liver than fruits did.*

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