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## Our August 2020 Newsletter for Healthy Living

## Hydration and Your Health

Providing your body with optimal hydration in the form of pure water is one of the simplest steps you can take to improve your health. It's such a powerful tool that research published in the Journal of Clinical Investigation suggests 3 million fewer people in the U.S. would develop degenerative diseases if they improved hydration throughout life. It makes sense, since your body is made up mostly of water. At birth, body weight is 75% water, dropping to 55% in the elderly.

Keeping an optimal balance between water intake and output is essential for survival, which is why if you become dehydrated, your body will activate a number of hormonal and neuroregulatory mechanisms to save your life. Among them, you'll begin to feel thirsty, reminding you to drink some water,

while your kidneys hold onto water, so your urine output decreases. Researchers looked into the effects of long term subclinical hypohydration, or chronically losing more water than you take in, finding evidence that even subtle changes in hydration levels led to "profound" effects on long-term health, and stating, "[W]e provide evidence… that maintaining optimal hydration throughout a person's lifetime provides protection from the development of age-dependent chronic disorders."

In the study, researchers analyzed data from 15,792 adults, using serum sodium concentration as a measure of hydration status and lifelong hydration. Participants whose serum sodium concentration was close to the upper end of normal had increased levels of risk factors for age-related morbidity and mortality. Further, a strong association was found between serum sodium concentration in middle age and markers of coagulation and inflammation and the development of age-dependent degenerative diseases. Humans with less-than-optimal hydration status had increased inflammation and other factors associated with degenerative diseases, including cognitive impairment, dementia, heart failure and chronic lung disease.

***"...maintaining optimal hydration provides protection from the development of age-dependent chronic disorders."***

High blood pressure and diabetes were also associated with hydration status. According to the study: *"By analyzing disease prevalence, we showed that a serum sodium level below 142 mmol/L greatly reduced the risk for the development of many degenerative diseases including heart failure (HF), dementia, and chronic lung disease (CLD). These findings indicated that serum sodium levels in the upper half of the 'normal range' should be treated as a clinical risk factor that prompts recommendation for modification of water and salt intake."*

Maintaining optimal hydration status during your life could lead to significant health benefits, but it's difficult to define a set hydration level for everyone, since fluid needs vary according to activity levels, nutrition, health status and environment. However, the featured study suggested "a clear threshold of 141.5 mmol/L for serum sodium concentration," above which the risk of age-related diseases goes way up. If everyone in the U.S. with sodium concentrations above this level were to decrease them by drinking more water, reaching the 140 to 141.5 mmol/L range, 3 million cases of related diseases could be spared. The researchers noted impressive benefits from improved hydration on a population-wide scale. Specifically: *"These calculations predicted that the prevalence of dementia in people aged 70–85 years would decrease by 48%, heart failure by 24%, and chronic liver disease by 20%."*

Your body needs water for blood circulation, metabolism, regulation of body temperature and waste removal. If you're dehydrated, even mildly, your mood and cognitive function may suffer. In a study of 25 women, those who suffered from 1.36% dehydration experienced worsened mood, irritability, headaches and lower concentration and perceived tasks to be more difficult. A 2013 study in which 20 healthy women in their mid-20s were deprived of all beverages for 24 hours also showed the mental repercussions of too little water. While no clinical abnormalities were observed in the biological parameters (urine, blood and saliva), thirst and heart rate did increase and urine output was drastically reduced (and became darker).

As for mood effects, the authors noted, "The significant effects of [fluid deprivation] on mood included decreased alertness and increased sleepiness, fatigue and confusion." This may be one reason why, in another study, dehydrated drivers

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### What's Inside This Issue

There has been much written regarding the synergy between magnesium and vitamin D, and the importance of vitamin D for optimal immune function and overall health — especially as it pertains to lowering your risk of Covid-19. Many studies have also highlighted the role this duo plays in cognitive function among older adults, as well as overall mortality.

***"The associations between serum 25(OH)D and risk of mortality may be modified by the intake level of magnesium."***

One such study, "Association of Vitamin D and Magnesium Status with Cognitive Function in Older Adults: Results from the National Health and Nutrition Examination Survey (NHANES) 2011 to 2014," points out that vitamin D not only protects neuronal structures and plays a role in neuronal calcium regulation, but also appears to impact your risk for neurodegeneration as you grow older. Magnesium, meanwhile, aside from being required for converting vitamin D to its active form, also plays a role in cognitive health, and magnesium deficiency has been implicated in several neurological disorders.

Higher serum 25(OH)D levels were associated with reduced risk of low cognitive function in older adults, and this association appeared to be modified by the intake level of magnesium. Using NHANES data from 2,984 participants over the age of 60, the researchers compared serum vitamin D status and dietary magnesium intake against cognitive function scores. After adjusting for confounding factors, including total calorie consumption and magnesium intake, higher blood levels of vitamin D positively correlated with decreased odds of having a low cognitive function score on the Digit Symbol Substitution Test.

The same trend was found when they looked at vitamin D intake, rather than blood level. The correlation of higher vitamin D levels and better cognitive function was particularly strong among those whose magnesium intake was equal to or greater than 375 mg per day. According to the authors: *"We found that higher serum 25(OH)D levels were associated with reduced risk of low cognitive function in older adults, and this association appeared to be modified by the intake level of magnesium."*

While magnesium intake by itself did not appear to have an impact on cognitive function in the study above, other research has highlighted its role in healthy cognition. Memory impairment occurs when the connections (synapses) between brain cells diminish. While many factors can come into play, magnesium is an important one. As noted by Dr. David Perlmutter, a neurologist and fellow of the American College of Nutrition: *"It has now been discovered that magnesium is a critical player in the activation of nerve channels that are involved in synaptic plasticity. That means that magnesium is critical for the physiological events that are fundamental to the processes of learning and memory."*

A specific form of magnesium called magnesium threonate was in 2010 found to enhance "learning abilities, working memory, and short- and long-term memory in rats." According to the authors, "Our findings suggest that an increase in brain magnesium enhances both short-term synaptic facilitation and long-term potentiation and improves learning and memory functions." Getting back to magnesium and vitamin D, previous research using NHANES data from 2001 through 2006 found the duo has a positive impact on overall mortality rates.

The researchers hypothesized that magnesium supplementation increases your vitamin D level by activating more of it, and that your mortality risk might therefore be lowered by increasing magnesium intake. That is indeed what they found. According to the authors: *"High intake of total, dietary or supplemental magnesium was independently associated with significantly reduced risks of vitamin D deficiency and insufficiency respectively. Intake of magnesium significantly interacted with intake of vitamin D in relation to risk of both vitamin D deficiency and insufficiency. Additionally, the inverse association between total magnesium intake and vitamin D insufficiency primarily appeared among populations at high risk of vitamin insufficiency."*

*"Furthermore, the associations of serum 25(OH)D with mortality, particularly due to cardiovascular disease (CVD) and colorectal cancer, were modified by magnesium intake, and the inverse associations were primarily present among those with magnesium intake above the median. The associations between serum 25(OH)D and risk of mortality may be modified by the intake level of magnesium."*

According to a scientific review published in 2018, as many as 50% of Americans taking vitamin D supplements may not get significant benefit as the vitamin D simply gets stored in its inactive form, and the reason for this is because they have insufficient magnesium levels. Research published in 2013 also highlighted this issue, concluding that higher magnesium intake helps reduce your risk of vitamin D deficiency by activating more of it.

As noted by the authors: *"High intake of total, dietary or supplemental magnesium was independently associated with significantly reduced risks of vitamin D deficiency and insufficiency respectively. Intake of magnesium significantly interacted with intake of vitamin D in relation to risk of both vitamin D deficiency and insufficiency."* The reason for that is because magnesium is required in the conversion of vitamin D into its active form.

The recommended daily allowance for magnesium is around 310 mg to 420 mg per day depending on your age and sex, but many experts believe you may need anywhere from 600 mg to 900 mg per day. When it comes to oral supplementation, magnesium threonate appears to be the most efficient at penetrating cell membranes, including your mitochondria and blood-brain barrier. Other effective forms include magnesium malate, magnesium citrate, and ionic magnesium from molecular hydrogen.

While you may still need magnesium supplementation (due to denatured soils), it would certainly be wise to try to get as much magnesium from your diet as possible. Dark-green leafy vegetables lead the pack when it comes to magnesium content, and juicing your greens is an excellent way to boost your intake. Foods with high magnesium levels include: avocados, Swiss chard, beet greens, turnip greens, broccoli, Brussels sprouts, parsley, basil and grass-fed yogurt.

Reference: *Current Developments in Nutrition* June 2019; 3(Issue Supplement 1): nzz.052.FS05-03-19. *Medicalexpress.com* February 27, 2018. drperlmutter.com, *Magnesium and Your Brain*. *Neuron* January 27, 2010; 65(2):165-77. *Science Daily* February, 2018. *BMC Medicine* 2013; 11:187. National Institutes of Health, Magnesium.

# Resveratrol and Bone Loss

Osteoporosis — loss of the density and quality of bone — is a widespread and serious condition. As bones become more fragile and porous, they are at greater risk of fracturing, which is especially consequential for older people, particularly if they become bedridden. Of all individuals over the age of 50, about 50% of women and 25% of men will suffer a fracture in the years to come. Many factors can contribute to the development of osteoporosis from aging to smoking, to excessive alcohol consumption and a suboptimal diet, to the side effects of medications, a genetic predisposition or the loss of hormones after menopause.

**_"These findings suggest that resveratrol might be used as anti-aging therapy to resist age-induced bone loss."_**

Postmenopausal osteoporosis now affects as many as 46 million women in the U.S., according to the National Osteoporosis Foundation, because the menopausal years occupy one-third of a woman's life. Replacement hormones and bisphosphonates, drugs that inhibit the resorption and loss of bone by osteoclasts, have been used to treat osteoporosis but, as mentioned in a study in Nutrients, their side effects can be so dangerous that they may outweigh the benefits. That is why it is good news that resveratrol, a phytonutrient found in red grapes and berries, has been found to fight and prevent osteoporosis.

In a study published in the Journal of Bone and Mineral Research that was conducted at the University of Newcastle in New South Wales, researchers detected improvements in bone density in postmenopausal women who were given resveratrol. In the study, called "Resveratrol for Healthy Ageing in Women (RESHAW)," women took 75 milligrams (mg) of resveratrol twice daily or a placebo for 12 months, after which researchers measured their bone density by dual-energy X-ray absorptiometry scans, commonly called DXA scans. "The modest increase in bone mineral density at the femoral neck with resveratrol resulted in an improvement in the study population's T-score and a reduction in the 10-year probability of major fracture risk," said Peter Howe, an author of the study and professor emeritus at the university.

A T-score is used to measure your bone density. In a subanalysis of the study results, subjects who supplemented their resveratrol with vitamin D and calcium showed greater improvement, added Howe. According to the researchers, resveratrol improved bone density and lowered fracture risk even in women without clear signs of osteoporosis: *"Following 12 months of supplementation with resveratrol versus placebo, there were positive effects on bone density in the lumbar spine and neck of femur, which were accompanied by a 7.24% reduction in C-terminal telopeptide type-1 collagen levels, a bone resorption marker, compared to placebo daily has the potential to slow bone loss in the lumbar spine and femoral neck, common fracture sites in postmenopausal women without overt osteoporosis."*



The bone-strengthening benefits of resveratrol have been identified in other studies. In research published in the journal Nutrients, scientists found that dried plums (also known as prunes), which are rich in resveratrol, showed bone benefits in both animal and human studies. The researchers wrote: "*We found that individuals that received the dried plum intervention in our previous one-year clinical trial retained BMD of the ulna and lumbar spine to a greater extent than those who received the placebo. These findings suggest that resveratrol might be used as anti-aging therapy to resist age-induced bone loss."*

Reference: National Osteoporosis Foundation. *Nutrients*. 2017 May; 9(5):496. *Journal of Bone and Mineral Research*, June 21, 2020. *Endocrine Today* July 8, 2020. *Nutrients*. 2017 May; 9(5) 496: Bone-Preventive Effects of Dried Plum in Postmenopausal Women: Efficacy and Possible Mechanisms. *Journal of the Science of Food and Agriculture* July 4, 2012.

## Hydration…. continued from page 1

were found to make twice the amount of errors during a two-hour drive compared to hydrated drivers.

The No. 1 risk factor for kidney stones is also not drinking enough water, and there is research showing that high fluid intake is linked to a lower risk of certain types of cancer, such as bladder and colorectal. Even the risk of fatal coronary heart disease has been linked to water intake, with women who drank five or more glasses of water per day reducing their risk by 41% compared to women who drank less. Men, meanwhile, reduced their risk by 54%.

Both children and adults often fail to drink enough water, and it's estimated that 20% to 30% of older adults are dehydrated, often due to water deprivation and the fact that people naturally have a lower volume of water in their body as they get older. How much water is optimal varies depending on your age, health status, activity levels and more, but you might have heard the advice to drink eight 8-ounce glasses a day (known as the 8x8 rule). This is not necessarily the best amount for everyone, as there is no one-size-fits-all water quota for humans. Simply using thirst as a guide to how much water you need to drink is a way to help ensure your individual needs are met on a daily basis.

You can also use the color of your urine as a guide. If it is a deep, dark yellow then you are likely not drinking enough water. A pale straw color or light yellow is typically indicative of adequate hydration. If your urine is scant or if you haven't urinated in many hours, that too is an indication that you're not drinking enough. What is clear is that your body depends on a precise fluid balance to stay optimally healthy, and even slight changes in this balance can affect your physical and mental health.

Even if you are only skimping on water slightly, it could be leading to accelerated aging or increasing the risk of degenerative disease, if the featured study is confirmed. That doesn't mean you need to stress over the proper amounts of water or force yourself to drink large quantities. Just be conscious of replenishing your body with pure water regularly, and definitely take a large drink if you're feeling thirsty. If you can't remember the last time you've drank a glass of water, especially if you ordinarily reach for soda, energy drinks or fruit juice instead, make a point to switch your fluid of choice to pure water, and enjoy the health gains that follow.

Reference: *JCI Insight*. 2019 Sep 5; 4(17):e130949 Degenerative diseases. *Journal of Nutrition* 2012 Feb; 142(2):382-8. *British Journal of Nutrition* 2013 Jan 28; 109(2):313-21. *Physiology and Behavior* Aug. 1, 2015. *American Journal of Physiology* Nov. 1, 2002. *American Journal of Epidemiology* 2002 May 1; 155(9):827-33. Mayo Clinic, *Dehydration*.