

Hydrogenated Water Helps Reduce Oxidative Stress

Hydrogenated water helps reduce the oxidative stress that accelerates aging. If you are interested in slowing aging, reducing inflammation, and protecting yourself from many diseases and medical conditions, hydrogen water may be the key to your success.

Free radicals and other reactive oxygen species (ROS) are the result of normal enzymatic and nonenzymatic reactions in the human body. For example, stress, inflammation and exercise can create free radicals.

Free radicals can also be generated because of external influences such as

- Radiation
- X-rays
- Ozone
- tobacco smoke
- Exposure to ultraviolet rays
- Air pollutants
- Industrial chemicals

Oxidative stress due to excess free radicals progressively damage lipids, proteins, carbohydrates, RNA and DNA. This causes damage to cells and homeostatic disruption. The damage accumulates over time throughout the body.

Free radical damage is important because it manifests itself as disease and sickness. Free radical damage is associated with a number of conditions including premature aging, cancer, hypertension, heart diseases, stroke, arthritis, atherosclerosis, metabolic syndrome and diabetes.

Balance Between Reactive Oxygen Species and Antioxidants

The body experiences oxidative stress when the the production of reactive oxygen species exceeds the activity of the antioxidant defense system.

So, a lot of activity has been expended to find safe, effective, natural ways to increase antioxidants in the body.

Most people know that foods containing beta-carotene, vitamin C, and vitamin E have proven antioxidant properties. The trace mineral selenium is often included in this group. In addition, the body itself produces antioxidants such as glutathione, ubiquinol, and uric acid as part of its normal activities.

Hydrogen as an Antioxidant

But, hydrogen is even more basic than complex molecules such as vitamins and selenium in neutralizing a reactive oxygen species. Hydrogen can combine with reactive oxygen species to prevent DNA damage. But, how do we introduce hydrogen into the body? Hydrogen is present in the atmosphere in minute quantities, only about one part per million.

There are a number of ways to introduce hydrogen into the body. Some of these techniques include:

- Inhaling hydrogen gas
- Drinking hydrogen dissolved water (hydrogen water)
- Taking a bath in hydrogen water
- Injections of hydrogen-dissolved saline
- Dripping hydrogen saline into the eyes
- Modifying intestinal bacteria to produce more hydrogen

While introducing hydrogen into the body may seem new or trendy, it has been used for many years in gas mixtures used for deep diving and for prevention of decompression sickness.

Inhaling hydrogen gas has a rapid effect and is good for acute oxidative stress. But hydrogen in the air is flammable. This limits its use for therapeutic effects mainly to medical facilities. Outside of controlled environments in medical institutions, hydrogen is normally delivered by dissolving hydrogen in water, usually through bubbling or other direct contact with hydrogen.

Water with dissolved hydrogen (but low in dissolved oxygen) has a high pH. It has the ability to scavenge reactive oxygen species and protects the body from oxidative damage.

Mouse studies of dissolved hydrogen indicate, among other benefits, that it reduces atherosclerosis, improved kidney function, and improves brain injuries.

Antioxidants such as vitamins C and E help with glycemic control in both humans and animals. So, if dissolved hydrogen can act as an antioxidant, it may also help with glycemic control.

Clinical Studies of Hydrogenated Water

While many studies have been done on mice and rats, here are a couple of studies on humans.

In one study 30 patients (24 who had type 2 diabetes which was controlled with diet and exercise and 6 who were insulin resistant) were enrolled in a randomized, double-blind, placebo-controlled, crossover study to determine the effects of hydrogen-rich water. Half these patients consumed 900 mL of hydrogen-rich water and the other half were provided 900 mL of placebo water daily for 8 weeks. After a twelve week "wash-out" period the crossover period

began were the groups switched water types.

Various biomarkers of oxidative stress, insulin resistance, and glucose metabolism were measured before and after the 8 week trial.

Patients receiving hydrogenated water showed significantly lower levels overall of LDL cholesterol and specifically the dangerous small dense LDL as well as significantly lower urinary 8-isoprostanes (an indicator of oxidative stress).

Patients on hydrogenated water also showed increased plasma levels of adiponectin (indicating enhanced insulin sensitivity) and extracellular-superoxide dismutase (important for antioxidant defense). In addition, in 4 of the 6 patients with insulin resistance, the final glucose tolerance test showed normal.

In another study of 20 patients with potential metabolic syndrome (displaying one or more of the metabolic syndrome characteristics). Subject consumed 300-400 mL of hydrogenated water 5 times per day resulting in a total of 1.5 L to 2.0 L of hydrogenated water.

Various measures were made at the start, after 4 weeks and after the 8 week trial period.

After 4 and 8 weeks, the concentration of urinary TBARS (a measure of oxidative stress) decreased significantly from the start of the trial. There was an increase of SOD (superoxide dismutase) indicating increased antioxidant defense. There was a significant increase in good HDL cholesterol as well as a decrease in the ratio of total cholesterol to HDL cholesterol. This study showed no statistically significant difference in fasting glucose levels.

Considerations in Purchasing a Hydrogen Water Generator

You will find hydrogen water generators priced from about \$40 on up. Some expensive versions cost several thousand dollars.

They all work by electrolysis of water. When positive and negative electrodes are placed in water, the water molecule (H_2O) is broken up with hydrogen bubbling up from the negative electrode and oxygen bubbling up from the positive electrode.

Cheaper hydrogen water generators place both electrodes at the bottom of the water container so both hydrogen and oxygen bubble up into your water. Because water normally contains some salts, you will also get chlorine bubbling up into your water.

Models costing over \$100 often use Proton Exchange Membrane or PEM technology. Here the positive (oxygen) and negative (hydrogen) electrodes are separated by a membrane that allows hydrogen to bubble up into your water container, but oxygen and chlorine bubbles into another chamber where it is

discharged into the air.

This video explains this concept.

Hydrogen water may NOT be safe to drink! Find out WHY

Conclusions About Hydrogen Water You Can Use

Many studies have shown the potential for hydrogen to act as an antioxidant and defend against oxidative stress.

You probably already take vitamins C and E to help combat oxidative stress, slow aging, and help prevent many of the common diseases of aging. And now you can add hydrogen water to your tool box.

More oxygen generators are appearing on the market. Be sure to choose on with PEM technology to get the cleanest, purest hydrogen water for you and your loved ones.

Hydrogen Water References

[Free radicals, antioxidants and functional foods: Impact on human health](#) as published in *Pharmacognosy Review*

[Molecular hydrogen is a novel antioxidant to efficiently reduce oxidative stress with potential for the improvement of mitochondrial diseases](#) as published in *Biochimica et Biophysica Acta*

[Supplementation of hydrogen-rich water improves lipid and glucose metabolism in patients with type 2 diabetes or impaired glucose tolerance](#) as published in *Nutrition Research*

[Effectiveness of Hydrogen Rich Water on Antioxidant Status of Subjects with Potential Metabolic Syndrome—An Open Label Pilot Study](#) as published in *Journal of Clinical Biochemistry and Nutrition*

Age-Related Macular Degeneration and What You Can Do

Age-related macular degeneration affects nearly 2 million Americans. More than 7 million Americans are at substantial risk for developing age-related macular degeneration. Some estimate that nearly 3 million people will be affected by 2020. Macular degeneration is the leading cause of central visual impairment that affects reading, driving, recognizing faces and performing close-up work among people aged 65 and above.

What Causes Age-Related Macular Degeneration?

The exact way age related macular degeneration develops is unknown. But, oxidative stress of the retina is thought to be a major contributor. The high concentration of oxygen and exposure to intense light seem to make the retina susceptible to oxidative damage.

Smoking is a well known way to deplete antioxidants. Smoking also increases blood viscosity and constricts blood vessels thus reducing the blood flow to the eyes. Every cigarette you smoke does damage to your eyes.

As the name ("age-related" macular degeneration) implies, age also plays its part. The aging of the retinal pigment epithelial layer and Bruch's membrane (the layer below the epithelial layer) can allow the accumulation of debris and drusen. And, any existing abnormality typically worsens with age causing further damage and dysfunction of the retinal pigment epithelial layer.

Once the retinal pigment epithelial cells are damaged they secrete several growth factors including vascular endothelial growth factor (VEGF) which encourages the growth of new blood vessels (choroidal neovascularization) that cause problems in the "wet" form of age-related macular degeneration.

High BMI (body mass index) is also associated with increases in the late stage of the dry form of age related macular degeneration. Those in the obese category (BMI>30) compared to those with a "normal" BMI (ranging from 18.5 to 24.9) had nearly twice the incidence of this severe form of macular degeneration.

Exposure to bright, ultra-violet light increases (as does oxidative stress) after cataract surgery because the human lens helps reduce ultra-violet transmission to the retina.

Cardiovascular disease along with high cholesterol and hypertension (high blood pressure) are associated with the "wet" or neovascular age-related macular degeneration. Even subclinical cardiovascular disease with plaques in the artery walls increases the likelihood of late state age-related macular degeneration by 5 times.

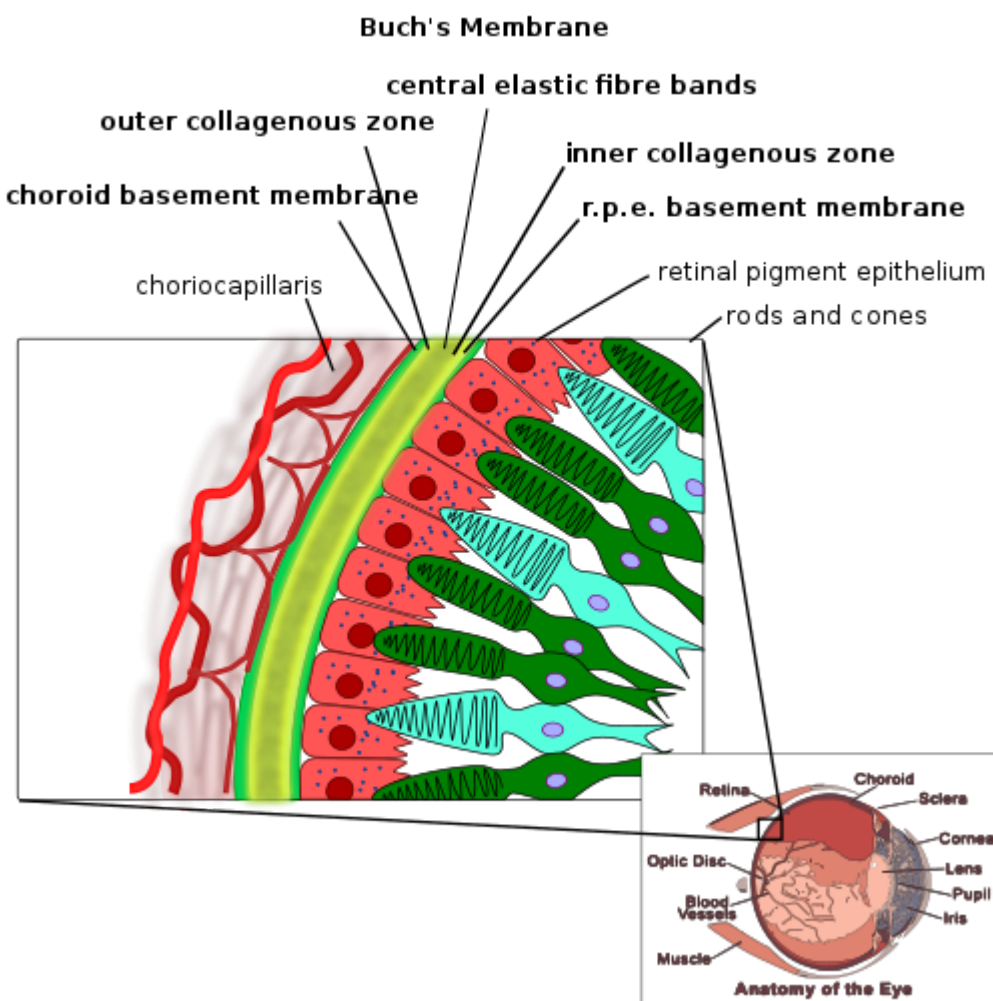
Genetics can predispose a person to get age-related macular degeneration. It is more prevalent in some families indicating a genetic factor. Genetics along with environmental stress make the disease more likely. Certain chromosomal regions seem to be associated with the disease, including 1q31-32, 6q21 and 10q26.

A poor diet low in antioxidants, low in omega-3 fatty acids, and low in leafy green vegetables does not provide protection. Unfortunately, the increasingly popular habit of eating manufactured foods and at fast food restaurants is leading, in many ways, to a sick population that is getting sicker as the years go by.

Difference Between Wet and Dry Macular Degeneration

While that main effect of age-related macular degeneration is the reduction in central vision, there are two causes for this impairment. They are designated “dry” and “wet” macular degeneration.

Dry age related macular degeneration is characterized by “drusen” which are yellow deposits forming under the macula. As these deposits build up they cause the retinal pigment epithelium and photoreceptors to atrophy. There are three stages of dry age related macular degeneration: early, intermediate and late. These stages are characterized by the size of the drusen deposits and the degree of atrophy in the retinal pigment epithelium and photoreceptors. The intermediate stage is when a person begins have trouble reading, recognizing faces, and having trouble adapting to changes in lighting.



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Wet age-related macular degeneration is caused by the abnormal growth of blood vessels under the retina. These blood vessels are delicate and often leak, producing a spontaneous hemorrhage. The scarring from the broken vessels causes irreversible damage to the macula. Such damage produces the

most drastic loss of central vision. This “wet” version can develop on its own or it can be the result of the “dry” version.

Around 90% of age related macular degeneration is of the “dry” variety while 10% is the “wet” variety.

What is Macular Degeneration?

Macular degeneration is a disease which affects the retina. In this video we will describe the symptoms of macular degeneration. The retina is the layer at the back of the eye which helps us to see the world around us.

First Signs of Macular Degeneration

Before any visual problems are noticed an ophthalmologist can detect drusen within the retina.

Drusen are small yellow or white deposits just under the retina. While the presence of drusen in people over aged 60 is normal, the risk of age-related macular degeneration increases significantly when the drusen are large or are numerous. The thickness of the drusen is related to the degree of degeneration of the retinal pigment epithelium and vision loss.

Can Macular Degeneration be Prevented?

Preventive measures usually fall under three categories:

A number of nutritional clinical trials have been conducted to determine what nutrients work to delay or prevent age-related macular degeneration.

AREDS Formulation of Nutritional Supplements

The “Age-Related Eye Disease Study” and the followup study “Age-Related Eye Disease Study 2” produced formulations of nutrients that reduced the risks of advancing to the advanced stage of age-related macular degeneration.

But, it was noticed that the vitamin A as beta carotene seemed to increase cancer risks in mostly former smokers. A second study (AREDS2) was performed to replace beta carotene. The final formulation consists of:

- Antioxidant vitamin C
- Antioxidant vitamin E
- Omega-3 long-chain polyunsaturated fatty acids
- Lutein + Zeaxanthin
- Copper
- Zinc

Does everyone need to take the AREDS2 vitamins for their eye health?

Lutein and zeaxanthin are carotenoids (plant pigments) that exist in high concentrations in the macula. They act as short-wavelength light filters that help reduce oxidation. Because the human body cannot make lutein, it must

come from the diet or supplements.

Neither lutein nor zeaxanthin were available during the first AREDS study because they could not be manufactured in a research formulation. But, they are now available from several reliable sources.

Omega-3 fatty acids have been known for some time to help reduce cardiovascular disease and strokes. Its qualities of helping to reduce inflammation and regulate the autoimmune response make it an ideal addition to the AREDS2 formulation to help prevent the advance of age-related macular degeneration.

Berry Extracts

Many people are interested in berries for their antioxidant properties. Though not extensively studied, the most important berries for their antioxidant properties are:

1. Blueberry
2. Goji berry (also called wolfberry)
3. Anthocyanin (found in blueberry, raspberry, black rice, and black soybean)

Lifestyle Changes

Lifestyle changes include:

- Smoking cessation
- Reducing BMI
- Reducing light exposure (sunglasses)

Can Drugs Reverse Macular Degeneration?

There are currently no drug treatments to regain lost vision.

FDA accepted treatments are available for the “wet” form of age-related macular degeneration only. These drugs are intended to prevent the further creation of additional blood vessels under the retina. As already mentioned, the deterioration of the retinal pigment epithelial cells produce vascular endothelial growth factor (VEGF) which encourages the growth of these new, weak blood vessels. The treatment involves injecting anti-VEGF drugs into the eye near the retina.

The costs for these drugs is high and multiple injections are required.

At the time this is written there are [322](#) clinical trial in progress dealing with macular degeneration. A few of these are:

- [Managing Neovascular \(Known as “Wet”\) Age-related Macular Degeneration Over 2 Years Using Different Treatment Schedules of 2 mg Intravitreal Aflibercept Injected in the Eye](#)
- [Evaluation of Visual Function and Driving Health Using Ocusweep in](#)

- [Patients Suffering From Wet Age-related Macular Degeneration](#)
- [Age-related Macular Degeneration \(AMD\) in the Vitamin D and Omega-3 Trial \(VITAL\)](#)
- [Clinical Study of Subretinal Transplantation of Human Embryo Stem Cell Derived Retinal Pigment Epitheliums in Treatment of Macular Degeneration Diseases](#)

Conclusions You Can Use

While you cannot do anything about your genetic makeup, you can take steps to reduce your likelihood of reaching a stage of age-related macular degeneration that interferes with your central vision. This involves simple habits that everyone should develop. These include:

- Eat healthy foods
- Lose excess weight
- Take supplements

References

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- [Double-masked, placebo-controlled, randomized trial of lutein and antioxidant supplementation in the intervention of atrophic age-related macular degeneration: the Veterans LAST study \(Lutein Antioxidant Supplementation Trial\)](#) from the journal *Optometry*
- [Prevention of age-related macular degeneration](#) from the journal *International Ophthalmology*
- [Lutein + zeaxanthin and omega-3 fatty acids for age-related macular degeneration: The Age-Related Eye Disease Study 2 \(AREDS2\) randomized clinical trial](#) from the journal *Ophthalmology*
- [Laser Treatment in Patients with Bilateral Large Drusen The Complications of Age-Related Macular Degeneration Prevention Trial](#) from the journal *Ophthalmology*
- [Dietary ω-3 Fatty Acid and Fish Intake in the Primary Prevention of Age-Related Macular Degeneration](#) from the journal *Archives of Ophthalmology*
- [Dietary antioxidants and primary prevention of age related macular degeneration: systematic review and meta-analysis](#) from the *British Medical Journal*
- [EVALUATION OF CURCUMIN-LOADED NANOLIPOSOMES FOR THE TREATMENT AND PREVENTION OF AGE-RELATED MACULAR DEGENERATION](#) a Thesis submitted in partial fulfillment of the requirements of the Gemstone Program University of Maryland, 2017