

H₂ Water –
the most powerful antioxidant



The greatest miracle of the 21st century?

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Enriched hydrogen – what is that?

Hydrogen is the basic building block of all life – a colourless, odourless, non-toxic gas that binds to other elements such as oxygen, nitrogen and carbon and thus forms the foundation for various basic substances such as sugar and water in our everyday lives.

In order to understand how hydrogen water, i. e. drinking water enriched with hydrogen, works, we need to take a look at the structure of water itself: Water molecules consist of two hydrogen atoms and one oxygen atom. This should mean that we take in a lot of hydrogen while drinking – right? No! It is assumed that our body cannot absorb the hydrogen from drinking water effectively enough because it is bound to the oxygen molecules in the water. In order to increase the absorption of hydrogen by the human body, drinking water can be enriched with additional hydrogen gas by various methods. Similar to the way gases are bound in the water of sparkling water, there is additional hydrogen in the water. When drinking, these molecules can penetrate our body cells and unfold their full effectiveness



there, which has already been proven in various studies and scientific research. To what extent does the body need additional hydrogen and how can it contribute to a healthier life?

Free radicals (and antioxidants)

One of the main reasons why hydrogen water is so good for us is its powerful effects against free radicals. Free radicals are substances that can cause serious damage to our organism and are proven to be responsible for a number of diseases and negative health effects – if you do not give your body enough opportunities to defend itself against the influence of these radicals. What exactly are free radicals and how can hydrogen protect you from their harmful effects?

Free radicals are single oxygen atoms that adhere to other molecules. When they do this, they damage body cells because they oxidize through the oxygen. As a result, these body cells can no longer function as usual, which can lead to significant health effects.



This condition is also called “oxidative stress”. Various studies have linked oxidative stress due to free radicals with these consequences:

- Diseases of the central nervous system such as Alzheimer’s and other dementias
- Cardiovascular diseases due to blocked arteries
- Autoimmune and inflammatory diseases such as rheumatoid arthritis and cancer
- Cataract and age-related vision loss

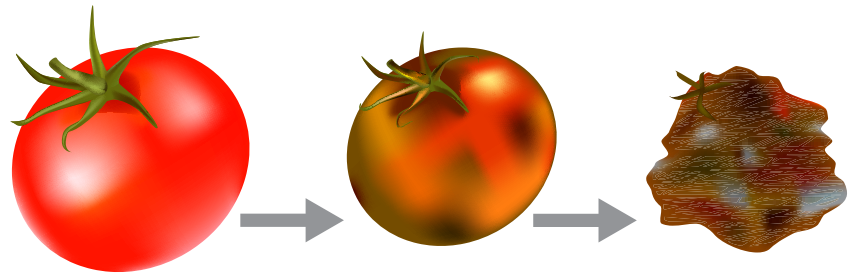
- Age-related changes in appearance, such as loss of skin elasticity, wrinkles, grey hair, hair loss and changes in hair texture

- Diabetes

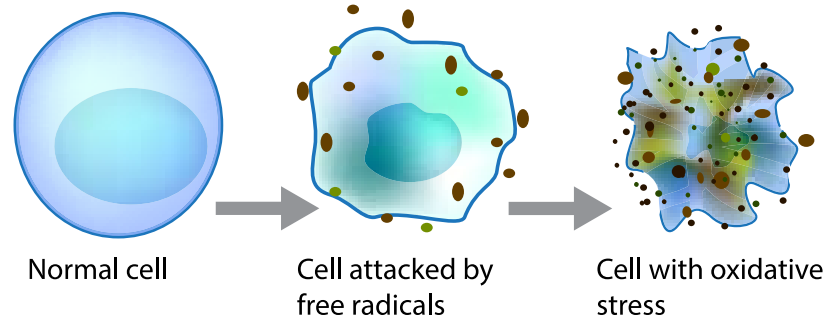
- Genetically determined degenerative diseases, such as Huntington's or Parkinson's disease

It is easy to see from this list that oxidative stress is a state of our body that should be reduced to a minimum in order

to ensure the long-term health of our cells and therefore of our entire organism. For this purpose, there is another type of molecules, the "antioxidants". Antioxidants counteract the adhesion of free radicals and therefore protect against health-threatening cell damage caused by oxidation. Antioxidants are substances



OXIDATIVE STRESS



that can prevent or slow down cell damage caused by unstable molecules produced by the body in response to environmental and other stresses. Since hydrogen and enriched hydrogen act as antioxidants, free radicals can effectively counteract these health damages.

How enriched hydrogen can fight free radicals

Where exactly does hydrogen come into play? Hydrogen is an antioxidant. And not just any antioxidant – hydrogen is probably the most efficient antioxidant ever.

Hydrogen is the world's smallest and purest antioxidant

Hydrogen molecules are much smaller than any other antioxidant, so it can easily penetrate our cells deeper than any other antioxidant. In fact, it is small enough to penetrate the mitochondria of the cells (the energy centre of the cell), which means it provides antioxidant protection right at the source of the harmful production of free radicals. Unlike other antioxidants, hydrogen is also small enough to cross the blood-brain barrier and provide direct protection against free radicals.

Molecular hydrogen is 100% natural and safe

Molecular hydrogen is absolutely safe because it is completely natural for the body – it does not consume

any energy to degrade, has no known toxic effect even in high doses and simply turns into water after its antioxidant effect. This is another great advantage of H₂ over other types of antioxidants.

We cannot take unlimited amounts of other antioxidants, such as vitamin C, because our body has to process them to break them down. Other antioxidants have a toxic effect in high concentrations, but not hydrogen. For this reason alone, it should be clear that molecular hydrogen is the best antioxidant nature has to offer – as long as it is used properly.



Hydro

Molecular hydrogen improves the body's own antioxidant systems

Hydrogen triggers activation of the cytoprotective proteins and antioxidant enzymes present in the body such as catalase, superoxide dismutase and glutathione. Each of these enzymes protects against various free radicals in the body. This way, our body can be induced to strengthen its own protective barrier against free radical damage and thus reduce oxidative stress in the long term.

Molecular hydrogen is the “smart” antioxidant

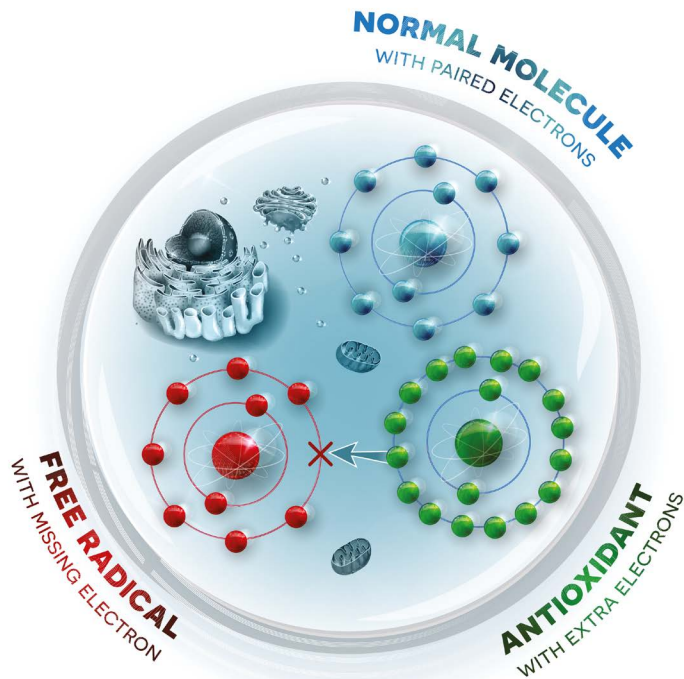
Most other antioxidants have a clear disadvantage over molecular hydrogen: they only have limited effects. There are two reasons for this:

First, they can only protect us against a few specific free radicals – but not against all, which means that many different types of antioxidants are needed for the wide variety of free radicals. As a result, we cannot “simply” ingest vitamin C to supply ourselves with antioxidants, because that would not be enough – after all, the body still remains unprotected from a whole host of other free radicals that can do as much damage as those that can be controlled by vitamin C.

On the other hand, most antioxidants cannot distinguish between necessary and harmful free radicals. Some free radicals, such as hydrogen peroxide, are beneficial to our cells. By taking some antioxidants, we therefore are not only doing something good for the, we are weakening it elsewhere.

Molecular hydrogen solves both of these basic problems of other antioxidants. It selectively targets only the toxic oxygen radicals and additionally neutral-





izes any kind of harmful free radical in our cells. As an example of its amazing efficiency, hydrogen selectively neutralizes the most harmful free radical, hydroxyl (OH), by converting it into water. H₂ also protects DNA, RNA, protein, lipids and many other cell components from oxidative stress better than any other antioxidant.

The health benefits of molecular hydrogen

Enriched hydrogen offers a wide range of health benefits - most of which are due to its properties as a highly effective antioxidant, but some others result from different modes of action of this elemental molecule.

Anti-inflammatory effect

Enriched hydrogen has been proven to counteract inflammation in our bodies. For example, it has been proven that the symptoms of rheumatic diseases can be noticeably alleviated – this is primarily about redu-

cing inflammation in the joints. This effect is closely related to the antioxidant effects of hydrogen.

Obesity, diabetes type II & metabolic syndrome

Metabolic syndrome is a disease characterized by high blood sugar, elevated triglyceride levels, high cholesterol and excess abdominal fat. In medicine, it is assumed that chronic inflammation is a fundamental cause of these symptoms. Since enriched hydrogen has anti-inflammatory properties, studies have also shown that subjects who have been drinking hydrogen enriched water have a lower “bad” LDL cholesterol level, a higher “good” HDL cholesterol level, fewer inflammations and higher antioxidant activity.

According to a study published in the prestigious “Nutrition Research” Journal, the use of enriched hydrogen can combat the symptoms of type 2 diabetes by improving the metabolism of fats and sugars. The study involved 30 participants with type 2 diabetes. One group drank enriched hydrogen for eight weeks, the other simply drank water. After the test phase, the researchers found that the hydrogen group

showed a significant improvement in fat and sugar metabolism. These are two important factors in the treatment of the disease.

In addition to a good diet and exercise, type 2 diabetics also benefit from drinking hydrogen-enriched water.

Athletic performance

Our health does not only benefit from the intake of molecular hydrogen, our athletic performance can also be increased this way. There are two (main) reasons for this: on the one hand, molecular hydrogen slows down the accumulation of lactate in the blood. Lactate is a central element of muscle fatigue – the more lactate there is, the more tired our muscles are. Molecular hydrogen can thus contribute to a noticeable increase in muscular endurance.

On the other hand, the anti-inflammatory effects of hydrogen also have a positive impact on the endurance of our muscles, which further promotes athletic performance.



However, research into molecular hydrogen in medicine is still in its infancy, and H₂ therapy is not a universal cure for all diseases. Nevertheless, preliminary data from animal and clinical studies continue to suggest that hydrogen can have significant effects in today's medicine because it is safe, easy to administer and immediately applicable clinically.

Anti-aging & skin

Ageing processes can also be promoted by the use of enriched hydrogen. Hydrogen works by positively influencing gene regulation, gene expression and the deactivation of negative genes. It attacks and neutralizes free radicals caused by stress, sleep deprivation, pollution, UVA and UVB rays.



Since hydrogen is the smallest molecule, it easily penetrates the cell membrane. It is thus able to penetrate the mitochondria (the energy centres of a skin cell) and the nucleus of a cell in which DNA is stored. Once there, it can neutralise and reduce the free radicals associated with ageing.

Which supplement method is the best?

There are several different products and methods that can be used to ingest hydrogen enriched water. These include already enriched bottled water, hydrogen tablets, inhalers, bulky hydrogen generators and even kitchen faucets with an integrated enrichment mechanism.

The problem with “finished” bottles is that hydrogen gas is quite volatile and therefore does not stay in the water for long. Methods in which hydrogen is added immediately before consumption are therefore preferable. In principle, all these methods work similarly – but most are extremely expensive to buy (many common generators and fittings cost around 2000 €!) and anything but mobile.

For this reason, mobile hydrogen generators are the best choice, especially for beginners and frequent travellers. With such generators, fresh hydrogen water can be prepared anytime and anywhere from any type of water. Since these mobile devices work with



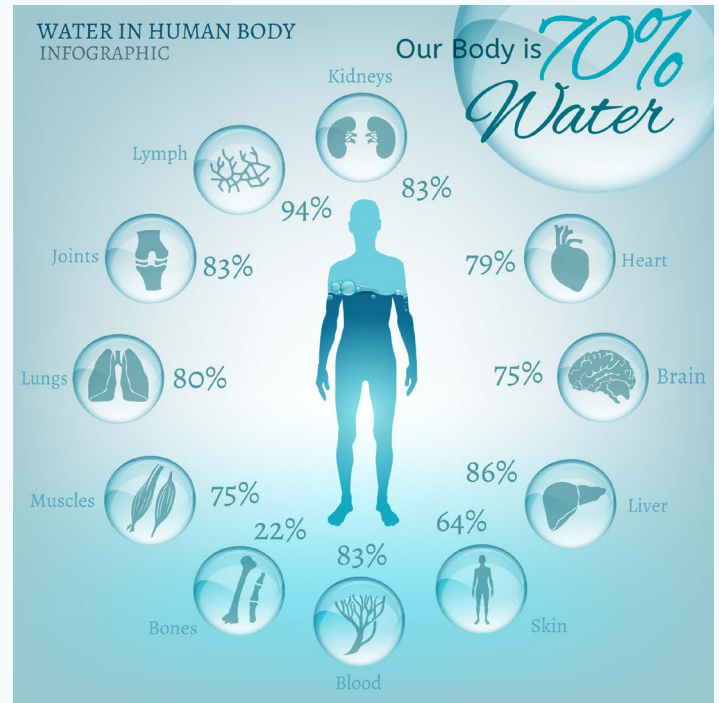
pressure, good products, in contrast to conventional generators, can reach a substantially higher hydrogen content in the water. With the help of pressure vessels, you can even achieve more than twice the saturation of conventional generators.

Frequently Asked Questions

A wide variety of questions with regard to drinking hydrogen-enriched water arise again and again. The most important and most frequently asked questions are listed here. These questions were answered by the Korean Ph. D. Walter Kirn of the COSAN Water Science Institute.

Which part of the body is affected by hydrogen-rich water?

If you drink water, it is already absorbed from the digestive tract after one minute, reaches the brain in three minutes, the skin tissue in ten minutes and the liver in twenty minutes. While there are many antioxidants that can remove free radicals, hydrogen molecules, due to their small size, are able to freely reach and penetrate every tissue and cell. Once in the cells, these hydrogen molecules react with reactive oxygen species and turn into water, which is then excreted from the body.



How does the healing spring water from Lourdes and Nordenau contain a high degree of hydrogen ions and reducing power?

Water from the springs of Lourdes and Nordenau is considered healing because of the hydrogen mol-

ecules dissolved in the mineral water. Hydrogen is produced by the weak current flow in the water as a result of the local magnetic field or the reducing power of the alkali rocks in the underground water layer.

Efforts to replicate the healing powers of these springs led to the creation of functional waters such as hydrogen-rich water and antioxidant water.

How long do you need to drink hydrogen-rich water to see its effects?

It depends on the daily dosage and physical condition. Since human cells have an average lifespan of about 4 weeks, it is recommended to drink it regularly for more than a month.

How much hydrogen-rich water should I drink per day?

The human body usually needs 2.6 litres of water per day, 1.6 litres of which have to be replenished by drinking. We therefore recommend drinking at least 1.6 litres of hydrogen-rich water a day.



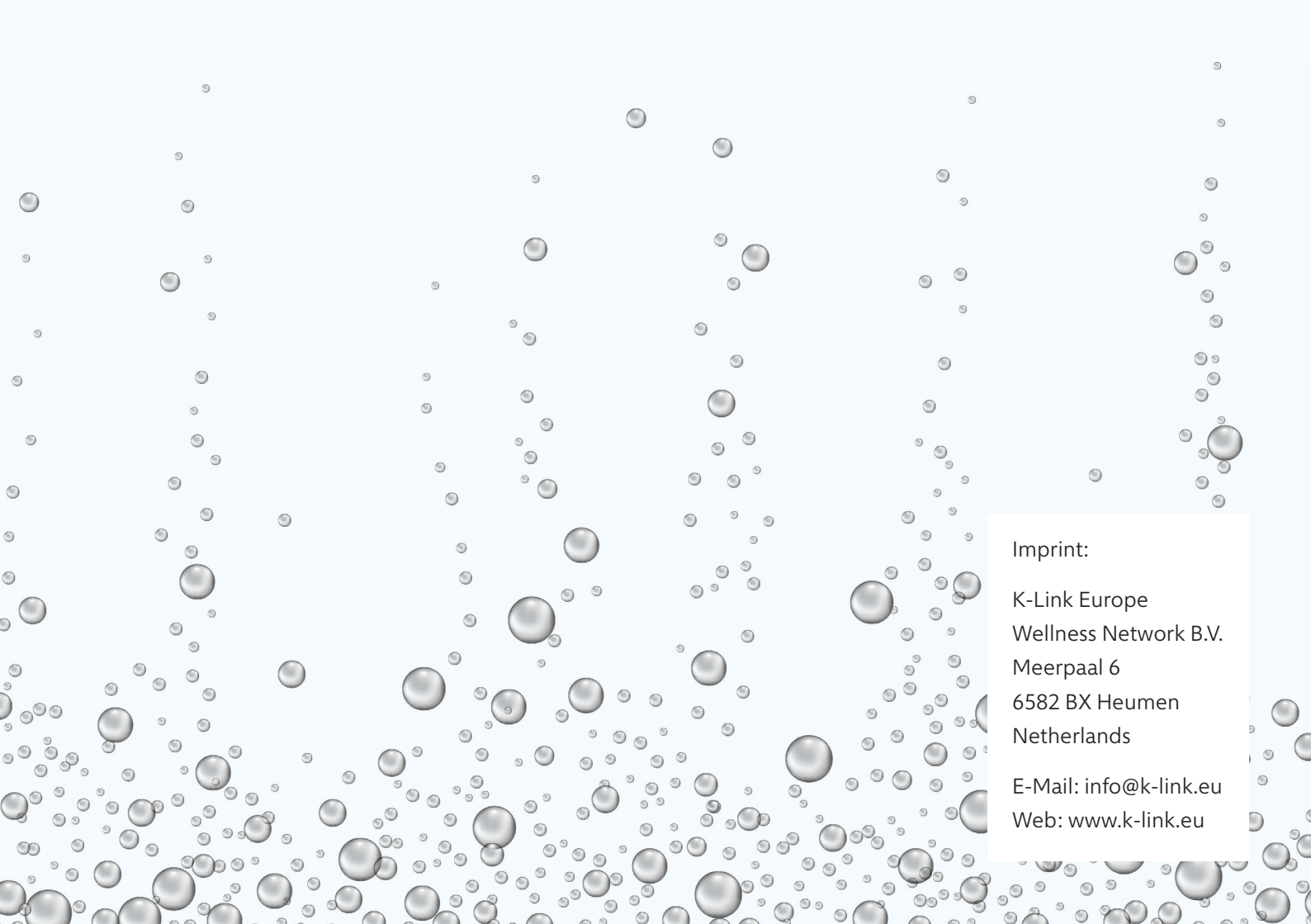
Can distilled water filtered by a reverse osmosis water purifier (RO) be used with the device?

Some of the hydrogen water generators on the market cannot produce hydrogen-rich water from distilled water due to the lack of electrolytes. In contrast, the Cosan Hydrogen Generator is capable of producing hydrogen-rich water from distilled water. Consumers should be aware that the water filtered by the RO water purifiers is naturally acidic and has a positive (+) redox value. It contains no hydrogen and no minerals, but this purified water can be processed to hydrogen-rich water with the Cosan Hydrogen Water Generator.



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