

# *What is Hydrogen Water ?*

Enjoy your life and health life with hydrogen water

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DAGAGA Co., Ltd.

# Contents

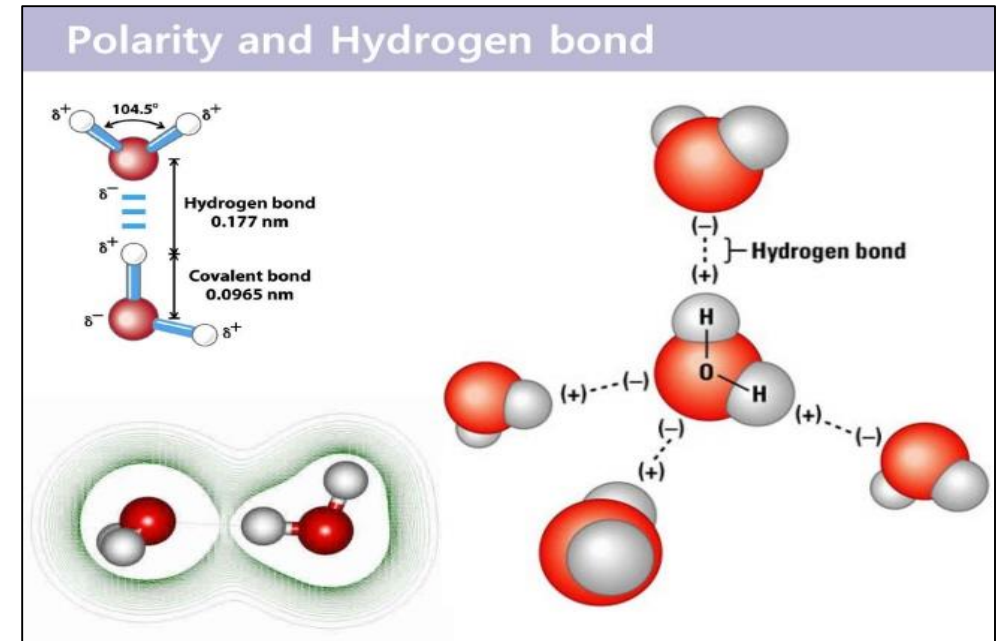
## T I T L E

CONTENTS 1	Characters of hydrogen
CONTENTS 2	Active oxygen in human body
CONTENTS 3	Active oxygen influence on human
CONTENTS 4	What are antioxidants?
CONTENTS 5	Why active hydrogen is needed?
CONTENTS 6	Importance of water to human body
CONTENTS 7	Interest in hydrogen water
CONTENTS 8	Studies on hydrogen water
CONTENTS 9	Study cases on hydrogen water
CONTENTS 10	Benefits of hydrogen water
CONTENTS 11	Evolution of Product Technology
CONTENTS 12	Features of our products
CONTENTS 13	Hydrogen water maker specification



# Characters of hydrogen

1. Hydrogen is the most abundant element which accounts for 75% of cosmic constituents.
2. It is an energy source for plants and as little as 0.5g hydrogen produces enough daily requirement of ATP, a bio energy material.
3. Human body store vast amount of hydrogen in the liver. The liver is a human chemical manufacturer and generates defense products.
4. Hydrogen is the lightest and smallest element.



# Atomic size : Periodic Trends

H ● 37								He ● 32
Li ● 152	Be ● 113	B ● 88	C ● 77	N ● 70	O ● 66	F ● 64	Ne ● 69	
Na ● 186	Mg ● 160	Al ● 143	Si ● 117	P ● 110	S ● 104	Cl ● 99	Ar ● 97	
K ● 227	Ca ● 197	Ga ● 122	Ge ● 122	As ● 121	Se ● 117	Br ● 114	Kr ● 110	
Rb ● 247	Sr ● 215	In ● 163	Sn ● 140	Sb ● 141	Te ● 143	I ● 133	Xe ● 130	

Atomic radius increases

출처 - <http://www.seehint.com/hint.asp?no=11348>

# Active oxygen in human body

We breath 24 hours a day 365 days to live.

Oxygen is supplied through the breathing which we cannot live without.

However, it is well known that 10L of oxygen or 2% of total oxygen we consume turns into active oxygen which attacks the body causing various diseases.

This active oxygen which is produced by breathing is a by-product produced in intracellular mitochondria in the process of energy production.

The active oxygen is essential in preventing bacteria and viruses from infiltrating the body, but the problem is that overproduced active oxygen attacks normal cells and tissues causing cancer, diabetes, eczema and other diseases.

Modern medicine has identified the acidified water and active oxygen oxidize our body and cause aging and various diseases.

Human body has over 60 trillion cells.

These cells make up organs, bones and flesh on human body.

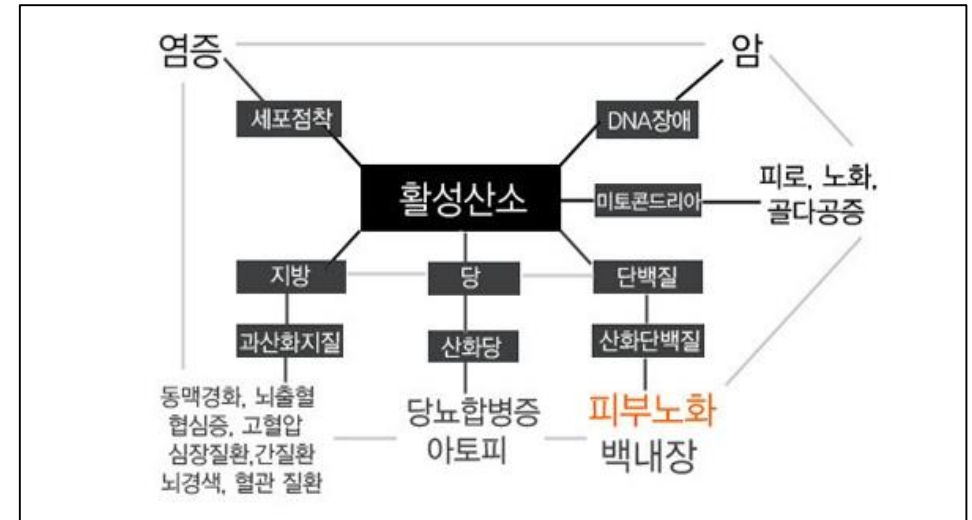
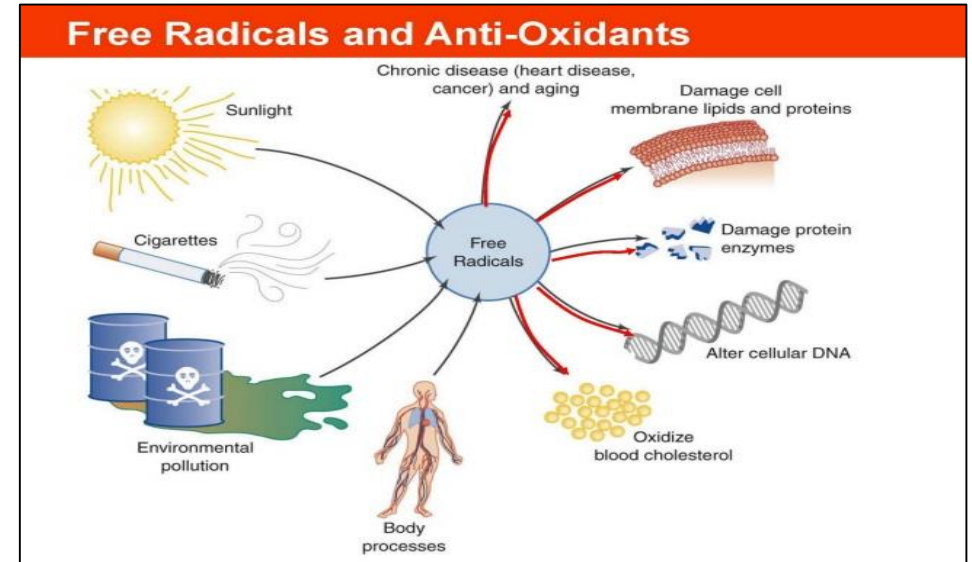
When these cells are healthy, the body is healthy.

However, active oxygen sickens, ages and causes various diseases.

There have been numerous studies that the active oxygen causes aging and diseases.

Many doctors and experts say many diseases are caused by active oxygen.

More than 200 major diseases such as cancer, stroke, cirrhosis, hypertension, myocardial infarction, nephritis, eczema, and dementia are known to be caused by active oxygen attacks.



# Active oxygen influence on human body

## Diabetes

Lipid peroxidation is the oxidation of cellular membrane that surrounds cells. The cellular membrane is mostly made of phosphorus and lipids, and phosphorus and lipids contain many unsaturated fatty acids. When this unsaturated fatty acid is attacked and oxidized by active oxygen, lipid peroxide is produced. The lipid peroxide is known to be grade 1 active oxygen and can be extremely toxic. Once the unsaturated fatty acids in the cell membrane are oxidized and become lipid peroxides, it attacks more unsaturated fatty nearby and produces more lipid peroxide. Such chain reaction causes the entire cellular membrane to be changes into lipid peroxide and kills the cell. Commonly used method of lipid peroxide Production is to measure its by-products by reacting the TBA with lipid peroxide among several ways to do it. A blood sample from diabetic patient is examined in this way to see the TBA reactants. It is much higher in diabetic patient. In diabetic patients, lipid peroxidation occurs more often and the damage caused by active oxygen increases. Diseases caused by lipid peroxidation are not limited to diabetes.





The lipid peroxide is deeply related to occurrences of cancer and arteriosclerosis. Cancer is a disease that occurs when the DNA of a cell is attacked by active oxygen. The relationship between cancer and active oxygen has already been verified by some research institutions.

**Arteriosclerosis is caused by the accumulation of lipid peroxide or oxidized cholesterol in the inner wall of blood vessels.**

With severe accumulation, blood flow worsens and even stops all together. Since it causes cerebral infarction, cerebral thrombosis, myocardial infarction, or angina, it is very important to change the lifestyle to inhibit the development of active oxygen in the body. To do so, we need to stay away from 7 ways of generating the active oxygen mentioned earlier.

It may not be easy to stay away from ultraviolet rays or exhaust gases, but smoking, excessive alcohol consumption, or excessive stress can be avoided with our own efforts.

**Diabetes is a disease in which glucose is excreted in urine due to incomplete reabsorption in the kidney when the blood glucose concentration (blood glucose level) rises and exceeds 160 mg per 100 ml of plasma (100 ml).**

Blood sugar is what the brain needs to live and several hormones are regulated so that it becomes 80mg per 1dl (100ml) of plasma even in the case of fasting.

Insulin secretion is the only hormone in the pancreas that has the ability to lower blood glucose levels. If not, the blood sugar will rise.

Hormone is secreted into the blood by the endocrine organs and presented in target organs to work by binding with receptive protein.

The insulin receptor is present in the cell membrane, and insulin is secreted from the beta cell. It is combined with the receptor to draw out glucose from the muscle into cells in a glucose metabolism which promotes fat synthesis.

In other words, insulin only changes the state of cells to use glucose. It does not directly digest glucose.

This is where most people misunderstand the process.

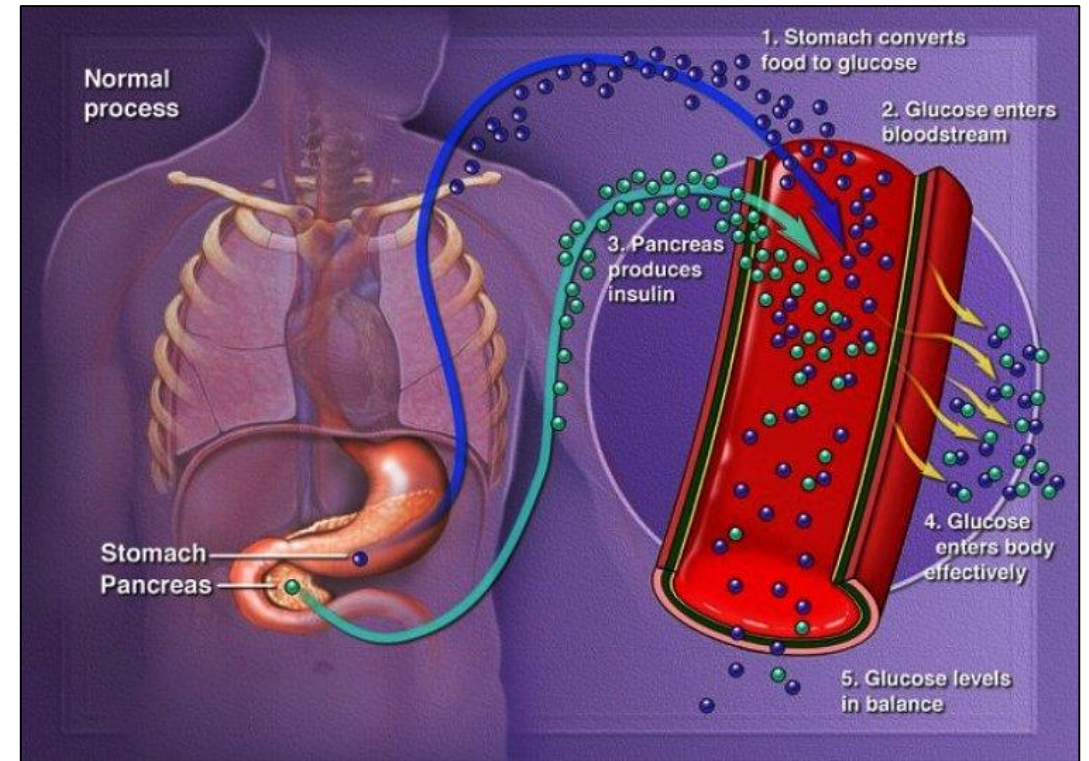
Degradation of glucose is "glucose metabolism". Glucose is metabolized before the blood sugar level falls. However, if an abnormality occurs in the insulin receptor in the cell membrane, insulin can not bind to the receptor. Then glucose can not enter the cell.

As a result, there is no raw material glucose to be used in glucose metabolism, and the blood glucose level increases due to no metabolism. If for some reason the blood sugar level is high, the amount of glucose that binds to the protein in the blood increases.

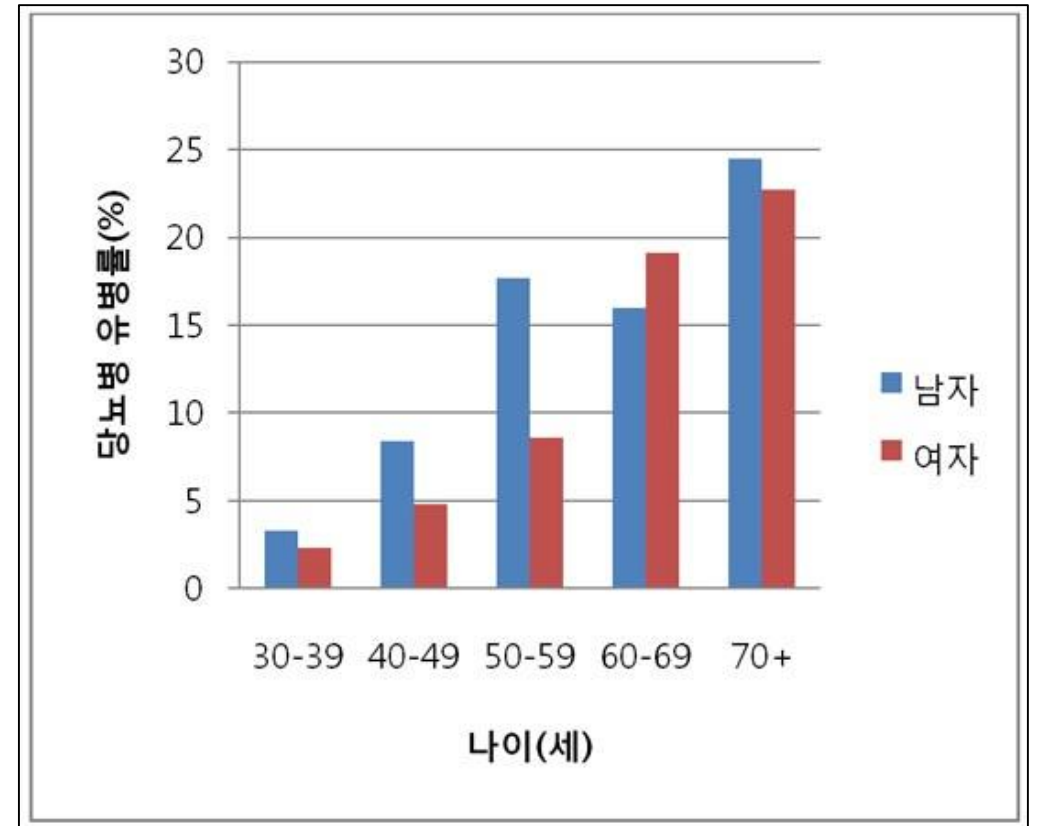
Since glucose has "aldehyde group" which will bind to the amino acid group of lysine .

In other words, active oxygen is generated from the protein bound to the sugar which causes arteriosclerosis, cataracts, diabetic cardiomyopathy or diabetic nephropathy.

There are many researches recently due to increased diabetic patients.



Streptozotocin is used in animal testing as the antibiotic to cause diabetes by destroying the Langerhans beta cells of the pancreas and stopping the insulin secretion. Mice under such experiments for 8 weeks will show increased 'lipid hydro peroxide' in hearts, kidneys and livers, which is an index of oxidative stress as well as decreased vitamin C concentration. Vitamin is decreased due to increased consumption caused by oxidative stress in mice. That experiments indicate the elevated oxidative stress due to active oxygen cause diabgetic complications.



# Cancer

**Single cancer can proliferate to cause the disease.**

Cancer is the No. 1 cause of death in advanced countries.

In Korea, 326 men and 290 women out of 100,000 die of cancer respectively which shows that more men die of cancer than women.

The mystery relationship between the active oxygen and cancer were clearly identified recently.

Cancer is amassed cancer cells. In its early stage when it is less than 1cm, it contains approximately 1 billion cancer cells which started with just one cancer cell.

Then where does that one cancer cell comes from? A normal healthy cell has transformed into a cancer cell in a process called the carcinogenesis.

And we now know that active oxygen and free radical are deeply engaged in this process.

**Carcinogens are the source of active oxygen or free radicals.**

Carcinogenesis includes the beginning, promotion and malignant stages caused by carcinogens.

Through studies, the carcinogens were identified as cell attackers to generate active oxygen and free radicals due to such stimulations.



## 세계보건기구(WHO)의 발암물질 분류

1군	발암물질	술, 담배, 햇빛(자외선), 벤젠, 매연, 톱밥의 분진, 석면, 니트로사민(젓갈), 전리방사선 등 111종
2군 (A)	발암추정물질	간디스토마, 아크릴아마이드 등 65종
2군 (B)	발암가능물질	DDT(농약), 니켈, 캐러멜색소, 납 등 274종
3군	발암성 미분류 물질	멜라민, 카페인 등 504종

자료: 국제암연구소(IARC)



Research has shown that carcinogens are more active in people with certain occupations.

For the first time in medical history, the man who wrote about occupational cancer is a British surgeon, who reported many scrotum cancers in 1775, from stubble cleaners working day after day.

Soot contains benzopyran, or a strong carcinogen. It is also contained in automobile exhaust gas and tobacco tar. It produces free radicals when inhaled.

#### **Free radical truncates genes in normal cells.**

The process how free radicals work in the carcinogenesis will be described in detail. Cancer cells have the autonomy multiplication in which they multiply with no limits. It grows larger and erodes human organs.

One cancer cell already has this ability from the beginning.

Normal cells have genes that accelerate or brake such multiplication.

For example, stomach epithelium is completely renewed in 3 days due to active and repeatable multiplication.

In a normal multiplication, the shape of stomach is maintained due to genes that follow the order of multiplication, check the commands, and turn the cell multiplication on or off.

In a cancer cell, such acceleration or braking process is absent.

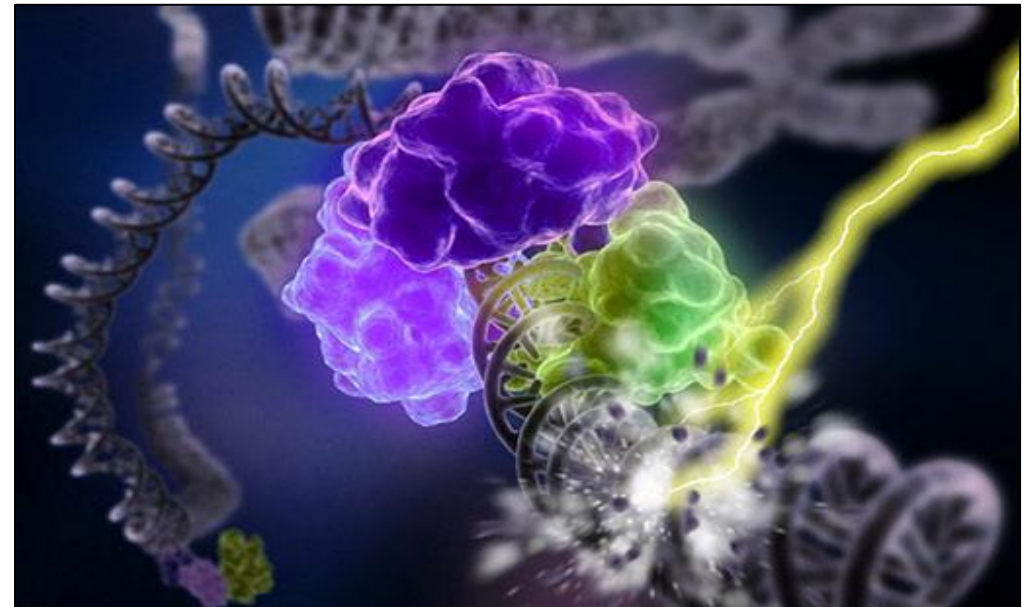
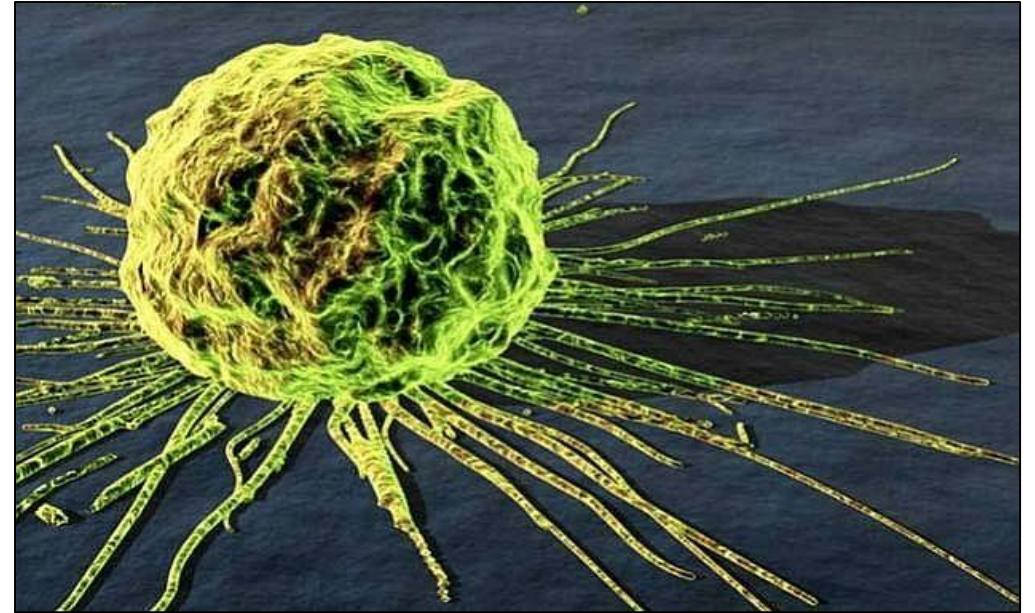
Acceleration promotes and braking stops the multiplication.

Initiation is when such gene abnormality is present in a cell.

Free radicals are known to truncate that DNA causing a gene mutation.

Free radicals mostly cause the DNA malfunction, not the carcinogens as we thought in the past.

Therefore, even those who clean soot in chimneys, smokers, or workers who are heavily exposed to carcinogens can reduce the risk of cancer by taking antioxidants that remove free radicals.

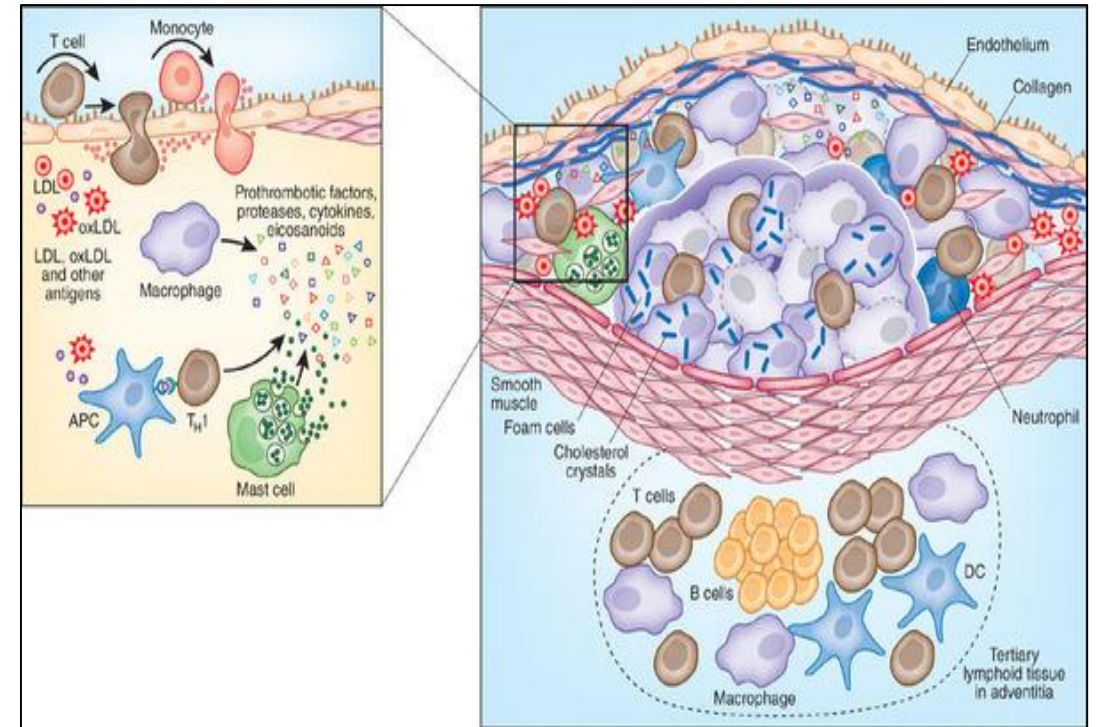


### Cancer is prone to develop where inflammation occurs.

Carcinogenesis is the abnormality that occurs in normal cells, extends the process to the cell membrane, and causes a cancer cell to be formed. Active oxygen generated in this process causes bigger problem. Unsaturated fatty acids contained in the cell membrane are automatically oxidized (autooxidized) to hydroxyl radicals. When the cell membrane is overloaded with lipid peroxidase, it causes normal cell membrane activity to be lost.

### Cancer often occurs where there is chronic inflammation.

Chronic infection caused by H. Pylori can develop into stomach cancer while viral chronic hepatitis can develop into liver cancer more easily. This is the promotion stage caused by active oxygen that damages the cell membrane. Those cancer cells become stronger and metastasis in the progression stage. The degree of malignancy is determined by amount of free radicals near cancer cells.





# Atherosclerosis

**It is caused by oxidized fat due to active oxygen.**

It is known that the aging comes from the blood vessel. Blood vessels harden, thicken and narrow as they age. This aging phenomenon is called atherosclerosis. The oxidized fat accumulates in artery walls to form protrusions. When cut, these protrusions look like scrambled egg yolk. It often occurs in coronary artery or cerebral artery. Completely blocked artery is called myocardial infarction or cerebral infarction.

Second and third causes of death in advanced nations are stroke and heart disease, respectively. Making the ischemic diseases such as myocardial infarction and cerebral infarction is the No. 1 cause of death and is even higher than the cancer. Therefore, such ischemic diseases can be more fatal than any other diseases.

Cholesterol is thought to be the first cause of atherosclerosis. Some even stay away from eating eggs thinking that it is the cause of high LDL. This is so because many doctors emphasize that fact.

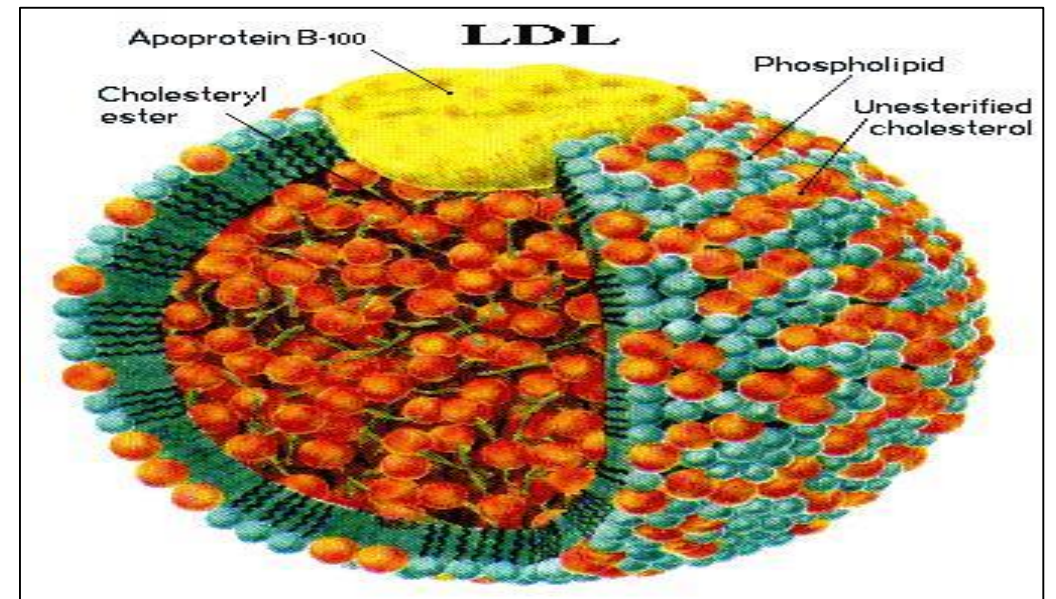
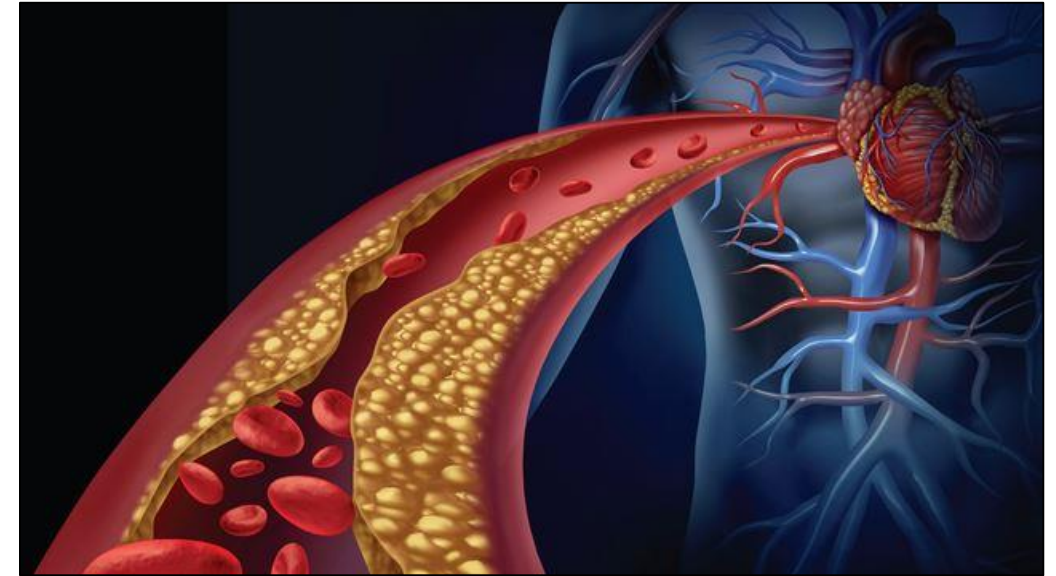
However, more doctors identify free radicals in blood is the cause, not the cholesterol.

**Cholesterol is a type of fat that does not dissolve in the blood.**

Cholesterol is transported by tanks called LDL or HDL. HDL transports cholesterol toward the liver while LDL transports it in reverse direction.

That is why HDL was thought to be good cholesterol that prevents atherosclerosis while the LDL was bad cholesterol.

However, LDL only transports cholesterol required in the rest of body and it is not bad at all.



### Oxidized LDL is consumed by white blood cells.

The problem is that the tank gets attacked by pirates call active oxygen while it sails.

The tank gets rusty and its contents turn into lipid peroxide in the attack.

There are receptors for LDL all over the body which cannot recognize oxidized LDL and not being transported. These floating oxidized LDL may accumulate on the artery wall to wreck the tank and white blood cells gather to clean the mass. And it become foamy cells by taking in too much oxidized LDL.

In the early stage of arteriosclerosis, lesions of fat clumps appear here and there on artery walls.

These are clearly identified as foamy white blood cells with oxidized LDL.

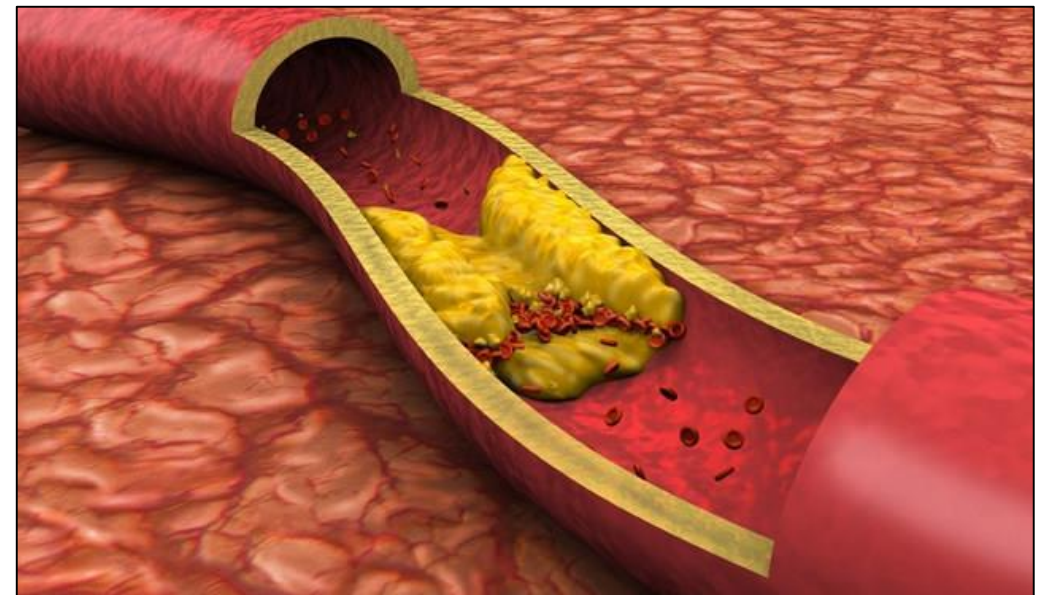
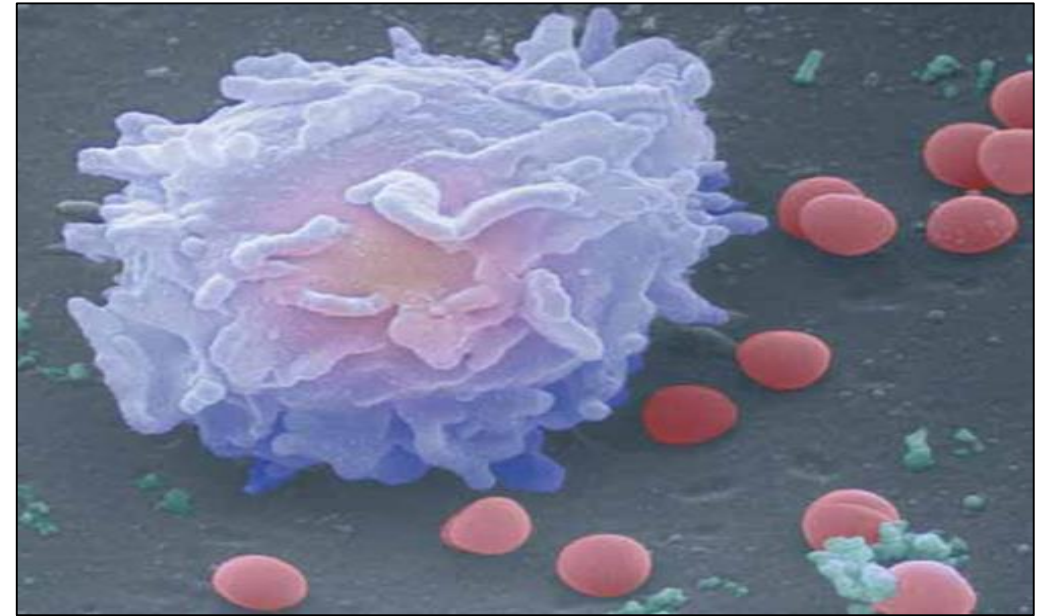
**As the arteriosclerosis progresses, increasingly more lipid peroxide accumulates on artery walls.**

According to data on arteriosclerosis progression and the amount of lipid peroxide among age group of 31 to 91 years of age, lipid peroxide is proportionally more as the arteriosclerosis progresses.

So we know now the arteriosclerosis is caused more by oxidized LDL cholesterol (a type of lipid peroxide), not the cholesterol itself.

Therefore, even with increased LDL cholesterol, foamy cells will not form if there is less active oxygen or free radical in the blood, and no arteriosclerosis. In other words, increased active oxygen in the blood stream may cause arteriosclerosis even with normal amount of LDL cholesterol.

To prevent ischemic diseases by preventing arteriosclerosis, it is very important to suppress active oxygen or to immediately take care of increased active oxygen as it occurs.





# Heart diseases

## Active oxygen causes heart diseases

Free radical is deeply involved in symptoms and progression of heart diseases.

Chest pain or heart attack may be what we are all reminded of but heart disease has begun before you feel any of these symptoms.

Heart diseases take long time to progress that we ever thought caused by oxidized LDL cholesterol.

This is the first domino in the formation of plaque taking a long time to progress.

But if the artery gets clogged by plaque, the result can be an instant loss of blood and oxygen to the heart, or heart attack.

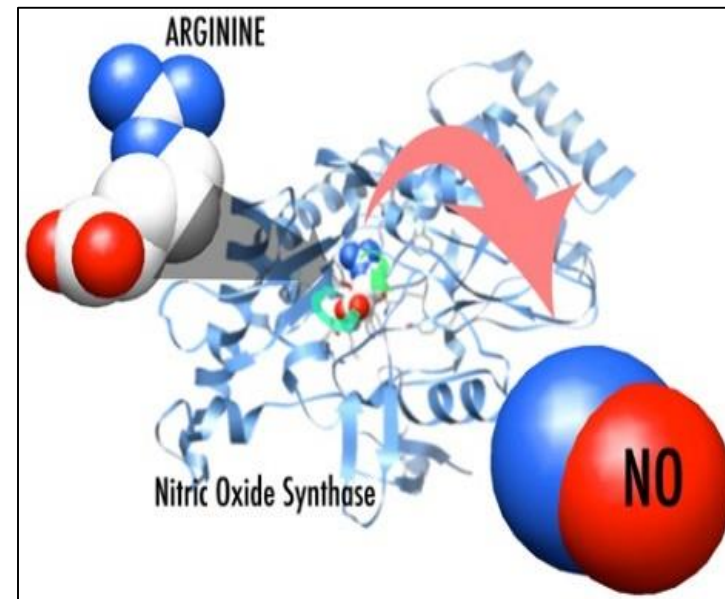
Much of the damage to the heart muscle due to a heart attack, as in stroke, is caused by sudden violent attack of free radicals after the blood flow is recovered.

Recently, researchers have found that free radicals promote myocardial infarction and the central role for nitric oxide, one of the free radicals.

Nitric oxide is essential for normal blood circulation, but excess is very dangerous and is known to be one of the risk factors for heart disease and stroke.

To maintain a healthy blood circulation, the human body needs to maintain a proper balance of nitric oxide.

is this network antioxidant and its ascending substances that do this job.



# Eczema

## Main cause of eczema is active oxygen.

Cause of eczema is not easy to be identified.

Over abundant active oxygen to fight off germs changes the skin cells by lipid peroxide and breaks down the protective skin barrier.

When germs and viruses enter our body, immune cells attack them and fat cells get attacked in the process. Damaged fat cells are recognized as germs and eosinophil (a kind of while blood cell) generates active oxygen to kill them, which in turn oxidizes normal skin cells to cause eczema.

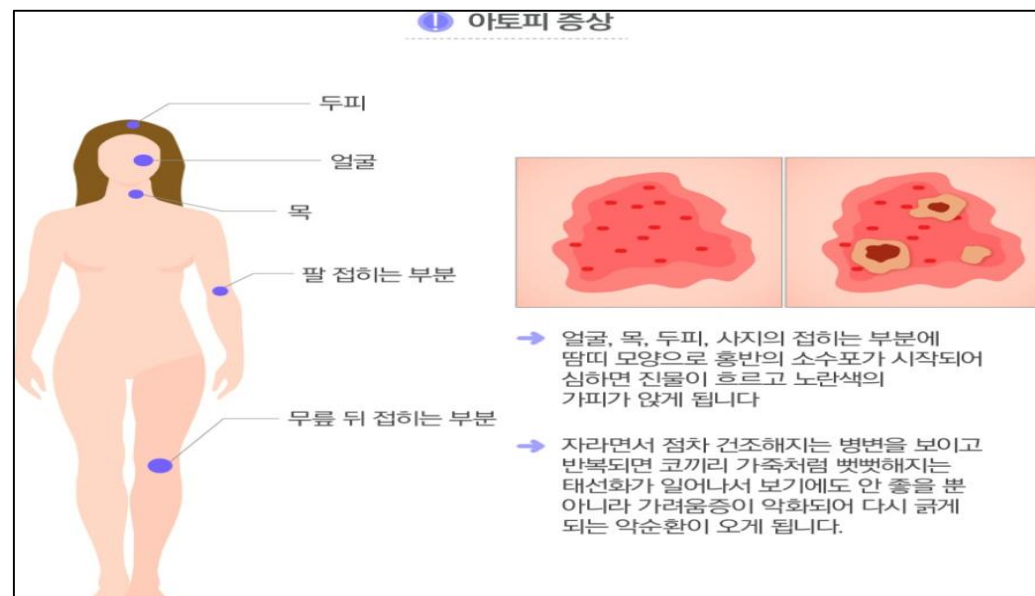
However, we still do not know why damaged fat cells are recognized as Germs or why eosinophil attack them.

There are many antibodies (allergens) such as house mites, pollen of food, but we do not know why each person is allergic to different allergens.

However, active oxygen is transformed into lipid peroxidation as a result of rioting in the process, and the intermediate process of inducing eczema is the same for everyone.

Eczema patients suffer from stresses due to allergies to cell and body tissues, resulting in over-production of active oxygen and further aggravation its symptoms.

In addition, since lipid peroxide is produced more by the combination of lipid and active oxygen of the cell membrane, it will lower the moisturizing effect.



# Cerebrovascular diseases

## Active oxygen damages blood vessel and causes stroke.

Block brain blood vessel causes brain damage.

Active oxygen is the mediator that causes damage to the blood vessels and causes stroke.

Patients who already suffered stroke may have additional blood vessel with progressing condition that there may be similar damage or risk of recurrence and may further cause angina pectoris or peripheral vascular ataxia. Strokes are a good example of how free radicals can affect your health.

And free radicals make the bad situation worse.

Strokes occur when blood flow is not allowed or restricted to specific areas of the brain.

This happens when oxidized plaque blocks blood circulation into the brain.

Regardless of its cause, the result can be detrimental.

If you think brain damage is caused by non-existence of blood and oxygen, the following facts may surprise you.

The reperfusion injury happens immediately with the stroke recovery.

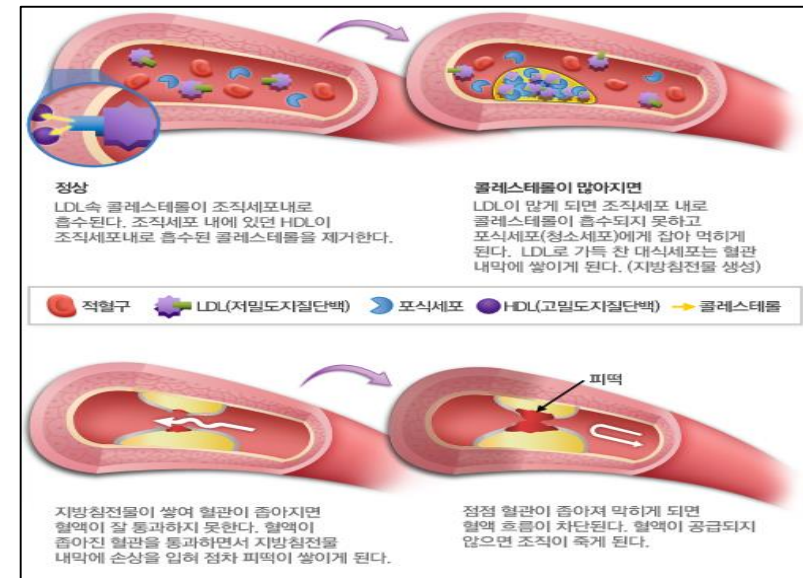
At this stage, brain damage is already done because of the rapid formation of superoxide radicals that can attack nearby tissues.

The situation can get worse when iron is released into a place where it is normally firmly fixed and controlled in the process of brain tissue damage. Iron is the most abundant mineral in the human body and essential to life. However, iron is not allowed to freely move since it is firmly attached to protein and sent to cell tissues which requires a lot of effort. Irons not attached to protein may be somewhat threatening since the iron can turn hydrogen peroxide into hydroxyl radical.

Even after stroke, more free radicals and brain tissue can not help fighting.

The accumulation of iron in the brain is also associated with degenerative diseases such as Alzheimer's and Parkinson's.

Several studies have shown that the free iron concentration in the blood increases the risk of developing heart disease and strokes.





# Dementia

## Dementia and active oxygen

Even dementia is related to active oxygen.

Dementia refers to the impairment of memory, language, and spatio-temporal abilities that cause a loss of mental function, resulting in impaired cognitive functioning and impaired social and daily life. Alzheimer's dementia is the most common dementia, and unlike vascular dementia, which progresses acutely and progressively, it is a degenerative brain disease that progressively progresses to various cognitive dysfunctions as a symptom of memory disorder at the beginning.

Although genetic factors play a major role in the etiology of this disease, environmental factors such as age, family history, education level, head injury, chronic exposure to toxicity, and continuous exposure to reactive oxygen species. In recent years, especially active oxygen has been gradually attracting attention as a causative factor.





# Parkinson's disease

## Active oxygen causes Parkinson's disease by injuring nerve cells

Parkinson's disease is a degenerative neurological disorder reported by Parkinson in 1817. Parkinson's disease, dementia, etc., are caused by the long-term runaway of active oxygen. When the production of reactive oxygen by stress, aging, neurotoxin, etc. exceeds the protection mechanism, the nerve cell is injured..

In the brain black matter, there are many factors promoting the generation of active oxygen and that it is easily damaged. Thus, inhibited production of active oxygen is and antioxidant enhancement will prevent and treat Parkinson's disease.

Degeneration of proteins, lipids, nucleic acids and enzymes in living bodies by free radicals leads to various conditions. The condition shown in the human body by the generation of free radicals can be improved by removing the free radicals. It has been reported that Parkinson's disease such as dementia is caused by long-term congestion of free radicals, not to mention ischemic damage of neuronal cells. Parkinson's disease is a degenerative neurological disorder reported by Parkinson in 1817.

In black matters of Parkinson's patients, there is a decrease in catalase and a slight decrease in glutathione peroxidase. In fact, patients have elevated lipid peroxidation and decreased glutathione concentrations.

This suggests that this condition is closely related to free radicals and lipid peroxidation. In addition, iron content is increased in black matters of patients.

And it is reported that the neuromelanin part is the most stable in the cell.

In the presence of this neuromelanin, iron is assumed to be reduced to bivalent iron, and bi- and tri-valent irons produce free radicals in a variety of reaction formats. As such, Parkinson's disease and free radicals are closely related.

When the production of free radicals by stress, aging, neurotoxins, etc. goes beyond its defenses, the nerve cells are injured.

It can be said that there is a number of factors promoting the generation of free radicals in the black body, which is easily injured.

Therefore, scientists believe that inhibiting the production of free radicals and enhancing antioxidant activity can help prevent and treat Parkinson's disease.



# Hepatitis and liver disease

## Liver disease and active oxygen

Hepatitis can include viral hepatitis, drugs, and alcohol-induced hepatitis. In hepatitis caused by drugs and alcohol except viral hepatitis, hepatic damage is caused by liver damage caused by lipid buildup. Liver Cooper cells will work hard to remove the virus.

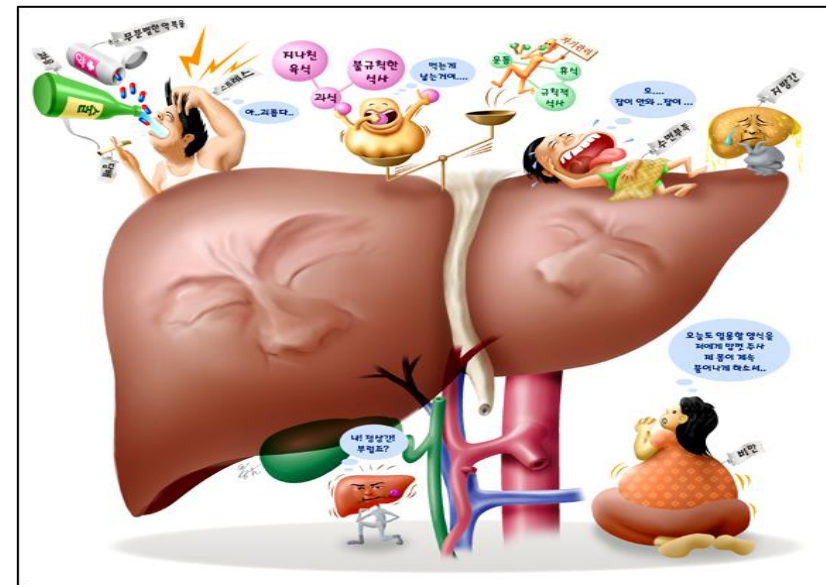
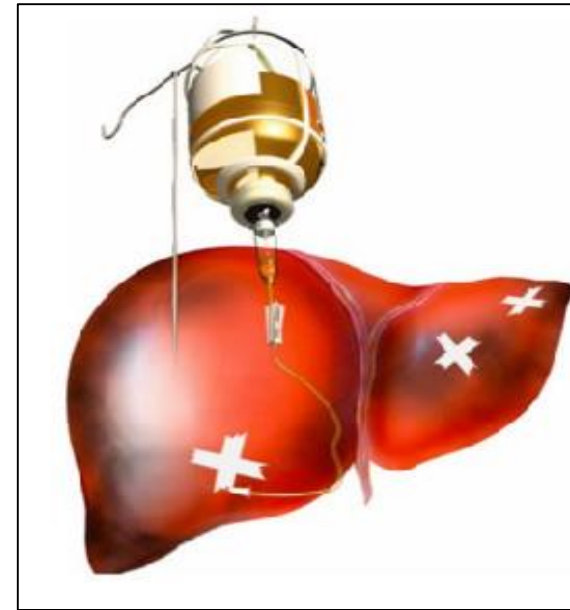
As any hepatitis progresses to chronic disease or cirrhosis, blood flow disorder occurs in the liver.

Secondarily, active oxygen and lipid peroxidation are involved, and hepatitis gradually progresses to chronic infection and cirrhosis Peroxide lipids are never produced outside the body when they are made in the body.

It is only degraded by glutathione peroxidase, which acts as a detoxifying agent in the liver.

Therefore, liver is a place where excess active oxygen and lipid peroxides are gathered, and it is also a place where antioxidants act actively to remove them.

According experts, effective removal of active oxygen and lipid peroxidase depending on the amount of glutathione peroxidase is deeply related to the progress of hepatitis and cirrhosis.



# Cataract

## Cataracts caused by oxidation of unsaturated fatty acids in the eye by active oxygen

Cataract is a disease caused by active oxygen (mainly oxy radical) which is overproduced by ultraviolet rays, as well as spots and freckles, also caused by lipid peroxide.

As the sun ray enters the eye, ultraviolet rays generate active oxygen and reacts with unsaturated fatty acids in the eye.

Lipid peroxide within the eye ball is prone to attach to the inside of lens.

Lipid peroxide is cloudy grease and the lens is blurred, making it difficult to see things.

This is what is causing cataract.

It has been found that vitamin E, vitamin C and carotenoid in the serum of cataract patients are lower than normal people.

If you do not wear sunglasses at the ski resort in winter, your eyes may become congested and itchy in a condition called ophthalmic nivalis caused by active oxygen generated in the lens due to UV-rays reflected on the snow.

This may be a temporary condition but if it is repeated, protein or hyaluronic acid in lens may be damaged.

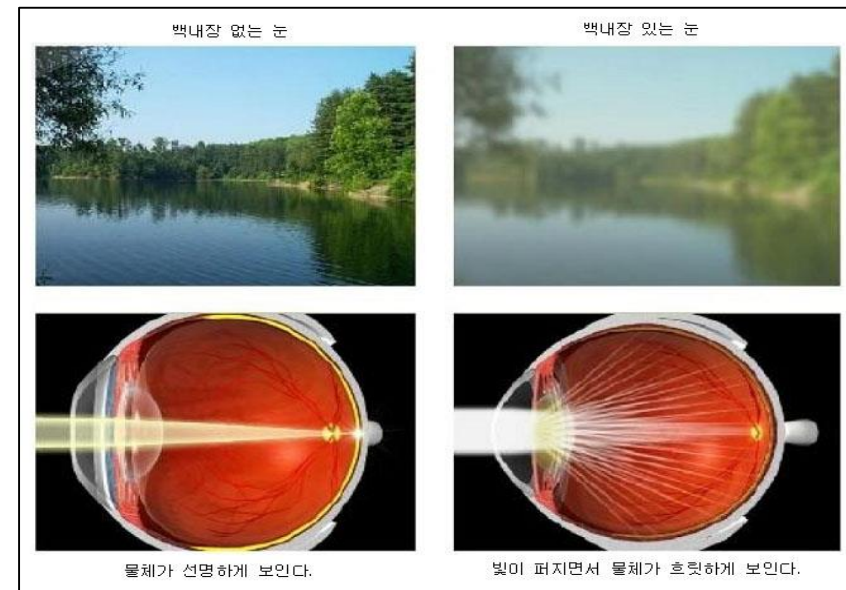
Same aging happens to eyes.

As the damage worsens, lens becomes cloudy in a condition call degenerative cataract.

Always wear sunglasses to protect your eyes from UV.

Eye drop containing antioxidant vitamins can be helpful in removing active oxygen.

When antioxidant supplements are taken, it may be helpful in removing active oxygen by antioxidants carried into eyes by blood circulation.





# Rheumatoid arthritis

## Autoimmune disease and active oxygen

One of the most common autoimmune diseases is rheumatoid arthritis where immune cells make antibodies at will and continuously attack normal cells. One of its symptoms is swollen hands and pain in finger joints which slightly improves in the afternoon.

It is because blood circulation becomes more active as one wakes up from deep Sleep which is call reperfusion.

Usually, when reperfusion occurs, a large amount of reactive oxygen is generated, which results in attacking normal cells.

Reperfusion happens in knees when standing up after long period of sitting down with knees bent which generates large amount of active oxygen.

At this time, active oxygen attacking normal cells are recognized as foreign substances by the immune system, which leads to confusion in the formation of new antibodies.

Neutrophils (a kind of white blood cell) migrate to the site of inflammation in the body and generate active oxygen, which worsens the inflammation of the joint.

Amount of active oxygen in rheumatoid patients is 5 times higher that that of normal people. This proves that large amount of oxidization stress causes more joint damage for rheumatoid patients.

Rheumatoid arthritis is a chronic inflammatory disease that causes inflammation of the synovial membrane in the joint as a primary Lesion, which slowly progresses and damages tissues and cartilage surrounding the joints and bones.

It further deforms and damages joints.





Although it is not clear, its major mechanism is the autoimmune disorder which is the protective system attacking the body by abnormal phenomenon. As a result, there are anemia, dryness syndrome, subcutaneous nodules, pulmonary fibrosis, vaculities, skin ulcers and other systemic symptoms through out the body other than symptoms in joints.

This is common phenomena in autoimmune disease.

The cause of autoimmune disease has not been identified. However, the metabolic breakdown between cells and excessive contaminants in the body seems to be most probable cause.

Cells as the basic unit of the body must communicate organically to facilitate the metabolism activities and to protect the body from external pathogens.

In addition, excessive pollutants cause white blood cells to overwork causing them to be less effective.

To help the autoimmune system, proper food intake is important for cell metabolism and body waste eliminations. Basically, essential nutrients should be properly taken. Various vitamins, mineral, essential fatty acids and high quality proteins can help normalize cell activity. Foods known to be antioxidant or detoxifying can also be very beneficial in autoimmune disease.

Strong antioxidant foods are known to slow down the progression of autoimmune phenomena while suppressing the inflammatory response.

It also inhibits excessive production of active oxygen that destroys cells and promotes aging, thus benefiting smooth metabolism among cells.

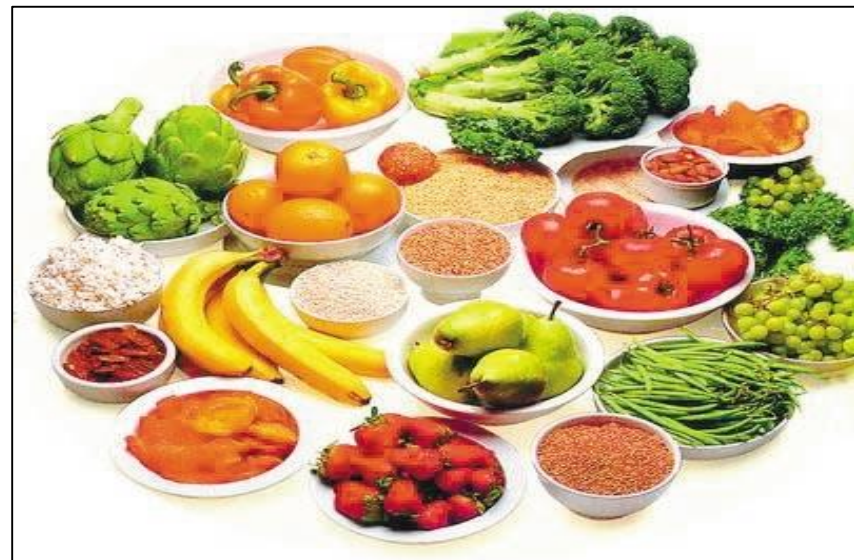
In addition, detoxification food reduces food and air pollutants as well as help releasing pollutants accumulated in the body. It helps the metabolism and immunity.

Nutrients that help in this action include vitamins A, C, and E and selenium, catechin, chlorophyll, lecithin, and dietary fiber. And they are rich in greenish-yellow vegetables, fruits, grains, green tea and rooibos.

Therefore, it is good to eat plenty of natural foods with a balanced diet so that you do not run out of essential nutrients.

Eating uncooked food can be good for the autoimmune disease.

## Common types of Arthritis



# Gastritis

## Why is stress bad for the stomach?

Let's imagine how neutrophil inflammation and ischemia-reperfusion can be damaging the body.

Active oxygen is deeply involved in the onset of gastric or duodenal ulcers. One might think of stress as the no. 1 cause of stomach and duodenal ulcers. The following experiment was done to study the relations between stress and ulcer. It was found that binding a mouse and submerging its head in water causes stomach ulcer. The conclusion of Such experiment is that ischemia – reperfusion is the main cause in various studies.

Ulceration refers to a condition in which a part of the tissue, such as the mucous membrane, is scratched or broken.

The blood vessel contracts sharply in the stressed gastric mucosa causing a temporary decrease in blood flow, resulting in a shortage of blood in the tissue .

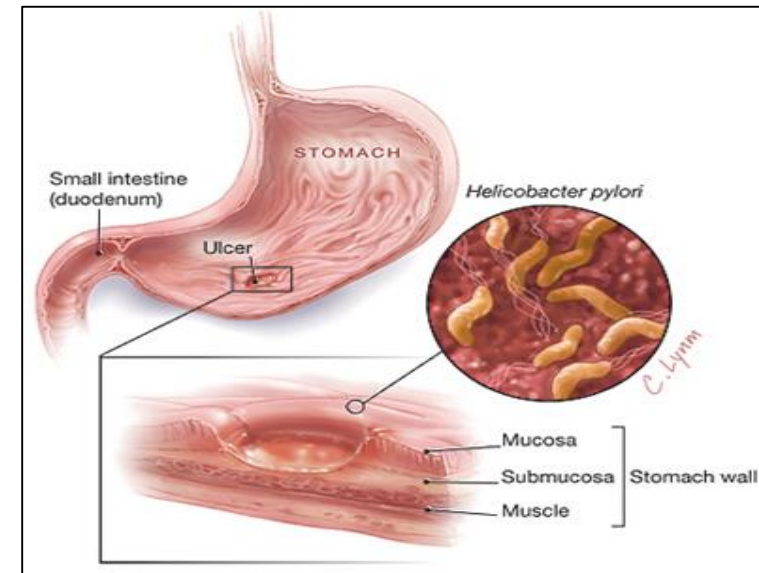
**Gastric mucosa contaminated by H. Pylori...** Neutrophils concentration is high

Helicobacter Pylori has been found to cause chronic stomach and duodenal ulcers. It is a spiral shaped bacillus (Helicon) with flagella, living near the exit of stomach (pylori). When gastric acid is secreted, almost all of the bacteria in the stomach are killed but H. Pylori is able to synthesize ammonia and changes its surrounding to alkaline so that it is able to live in the gastric mucosa. Once the stomach is contaminated with H. Pylori, a large number of neutrophils accumulate to release active oxygen to attack it.

Most chronic gastritis is a neutrophilic inflammation of the stomach mucosa caused by the constant release of free radicals. Chronic atrophic gastritis known as the aging of stomach mucosa; recurrent gastric duodenal ulcer that easily recurs even after treatment, and stomach cancer is closely related to H. Pylori. Because of this, antacids (acid secretion inhibitors) used for the treatment of gastric duodenal ulcers in the past and antibacterial therapy Pylori have been very successful. With successful antimicrobial treatment, the number of neutrophils infiltrating the gastric mucosa gradually decreases.

If a patient with a gastric mucosa infected with a filamentous fungus is severely stressed at work, the ischemia-reperfusion accompanied by the active oxygen flooding stomach attack the gastric mucosa. Stress and pylori cause active oxygen generation in the gastric mucosa.

Regardless of main causes or degree of damage from free radical damage, antioxidant vitamins and antioxidants are helpful in protecting the gastric mucosa.





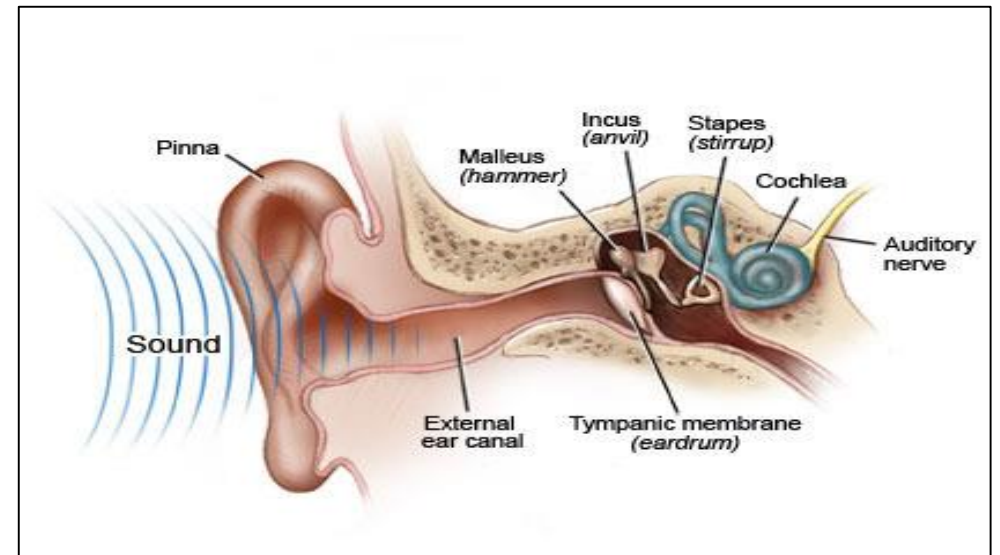
# Degenerative hearing loss

## Active oxygen weakens the hearing

Professor Moon, In-Seok, Department of Otolaryngology, Chungang University Hospital, said "accumulation of free radical due to aging can also weaken hearing" and "antioxidants help to neutralize free radicals or prevent the production of active oxygen to prevent degenerative hearing loss and noise-induced hearing loss". Antioxidant does not improve weakened hearing but rather prevent the symptom. Active oxygen refers to oxygen that enters the body during the breathing process, used for oxidation in many metabolic processes, transforming it into oxidizing oxygen and attacks the living tissue and damages the cells.

## Antioxidants help in maintaining hearing ability

At the International Society for the Study of Ear at the London University in 2006, Professor Johan Shaft of the University of Michigan Medical School has published a study that antioxidant polyphenols in red wine and green tea and salicylic acid, an aspirin ingredient, prevent ciliate damage in the inner ear. His team found that mice fed with antioxidant-containing foods had less aging-related hearing loss. He reported that "Red wines rich in antioxidants, green vegetables, and green tea help maintain hearing." Dr. Matianico, a team at the Uppsala University Hospital in Sweden, has also announced that three antioxidant cocktails, including vitamin C, have been effective in relieving the symptoms of Meniere's disease. Meniere's disease is a disease in which dizziness, hearing loss, earache, and feeling full of ears are present at the same time.



# Chronic fatigue

## Increased active oxygen in the body causes chronic fatigue

When the amount of active oxygen in the body increases, various symptoms such as fatigue, lethargy, arthralgia, memory loss, and low fever are induced and interfere with daily life. If these symptoms persist for more than 6 months, they are diagnosed as chronic fatigue syndrome.

Active oxygen is an important cause of chronic fatigue syndrome.

According to statistics from the Health Insurance Review and Assessment Service, the incidence of the recent "chronic fatigue syndrome" has increased by 60%.

People who are suffering from chronic fatigue are over-appetite-promoting, which increases the risk of adult obesity because free oxygen, which is not released properly, interferes with the breakdown of sugars and fats and promotes the accumulation of body fat.

Chronic Fatigue Syndrome also causes hormone imbalance and diminishes immune function in the body.

If these conditions persist, various diseases such as hypertension, hyperlipidemia, etabolic syndrome will be induced.





# Infertility and impotence

## Caused by active oxygen

Dr. Tory Hagen of the Linus Polling Institute, Oregon State University, USA, has shown and reported in Science Daily reported on August 28, 2011 that oxidative stress (reactive oxygen) can be a fundamental factor in infertility or erectile dysfunction, and that antioxidants can help treat it. He has shown that infertility and erectile dysfunction seem to be related to the inability of the blood vessels to relax and create nitric oxide. He pointed out that it is active oxygen that destroys nitric oxide and weakens its function, and that disabling this active oxygen is an antioxidant, and that actually increasing the production of nitric oxide is partly used for erectile dysfunction. The synthesis function of nitric oxide declines with age, and erectile dysfunction is also associated with aging, and it is likely that women are postponing pregnancy and increasing infertility, he said. Although it is not scientifically proven that antioxidants are effective in treating infertility, some doctors are already using antioxidants such as vitamins C and E to treat infertility, he said. The results of the study were published on 'Pharmacological Research' online edition.



# Obesity

## Caused by active oxygen

A lot of diet therapy became available with a recent diet craze.

The most talked about is toxin removal, or a detox diet.

It is said that the toxin removal is first rather than the exercise to lose weight in the diet.

What is a toxin?

It is easy to say that the toxin in the body is active oxygen which actually is lipid peroxide.

So why are these active oxygen and lipid peroxidation linked to diet? Let's look at the reasons.

The accumulation of fat in the body is the result of poor metabolism.

This can be seen from the order in which the fat is stored.

The order of fat accumulation begins from the blood vessels and passes through the liver and intestines, and subcutaneous fat which increases the body weight.

Therefore, it is not only the subcutaneous fat but also the blood vessels that have accumulated fat.

## Active oxygen cause fat to accumulate in blood vessel

Then why do fat accumulate in blood vessel? It is due to active oxygen.

Active oxygen combines with unsaturated fats in the blood and generate lipid peroxide which builds up in the blood vessel to interfere with blood circulation and create atherosclerosis.

Poor blood circulation means poor energy into cells which causes poor metabolism not being able to consume energy.

Unused energy becomes fat, accumulate and makes one obese.

In addition, active oxygen attack cells and cause DNA deformation and lipid peroxidation. For this reason, the cells do not function properly, and the production of ATP energy, which is the energy of the cell, is also reduced, so the nutrients consumed as food are not used as energy and remain in the body.

In the end, it is the cause of obesity that active oxygen and lipid peroxides interfere with blood flow and attack cells to prevent their functioning.

So to reduce this obesity is to remove the body's toxins, active oxygen and lipid peroxides.

To reduce these free radicals, it is important to consume enough antioxidants and reduce free radicals with proper exercise.



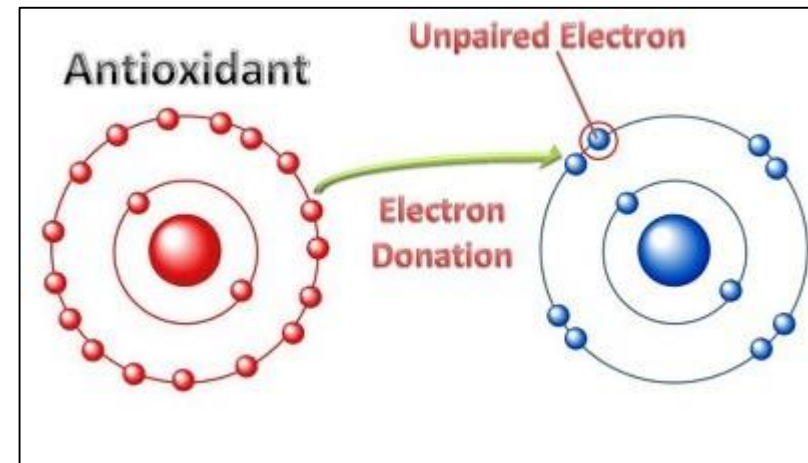
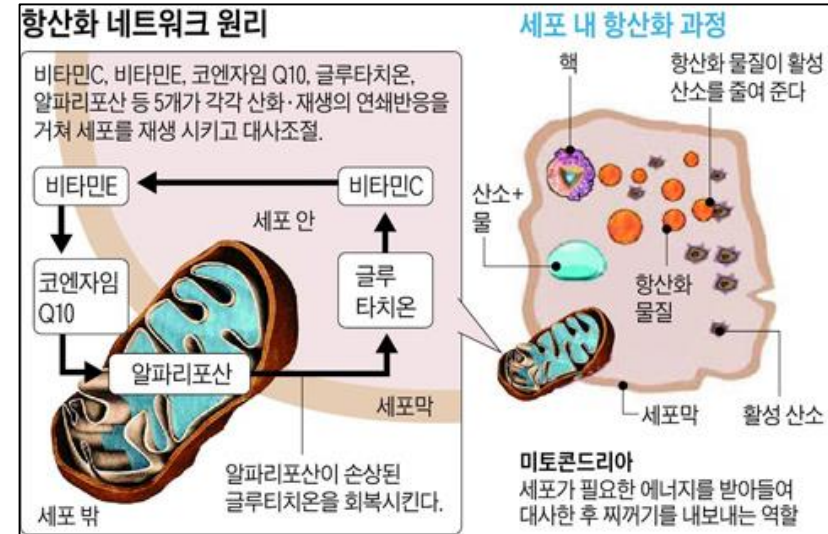
# What are antioxidants?

It reduces the destruction caused by active oxygen.

Various types of enzymes, vitamins C, E, and beta-carotene are well known antioxidants.

Antioxidants can reduce cancer and aging.

Active hydrogen, the oldest sulfurous substance on earth, is the most powerful and effective active oxygen scavenger.





# Why active hydrogen is needed?

Some limitations exist in antioxidants.

These particles are too large for antioxidants to be properly absorbed into the body, and this is what happens.

However, hydrogen, the proven antioxidant, has the smallest atom.

So hydrogen can reach the cell membrane faster and more effectively than other substances.

In general, the brain has an vascular membrane that blocks other substances to protect the brain, so other substances can not reach, but hydrogen can even reach the brain.

Hydrogen can selectively remove harmful free radicals.

Hydroxyl radical, a kind of active enzyme, is responsible for most diseases in our body.

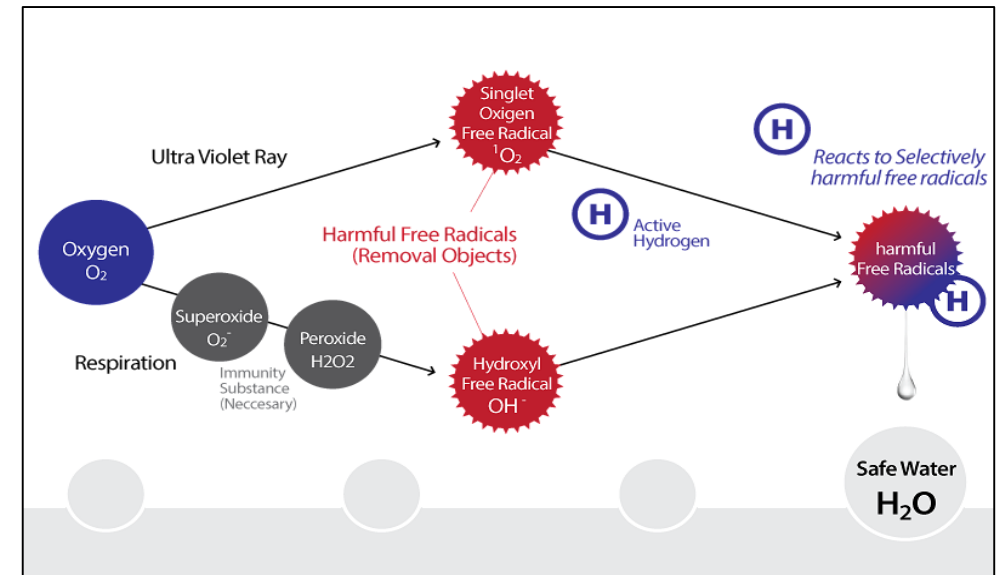
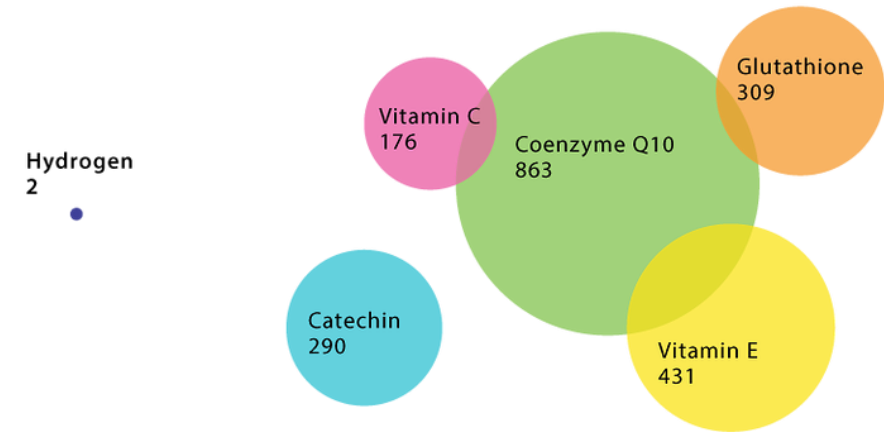
Uniform oxygen generated by ultraviolet rays damages the skin and eyes.

Hydrogen selectively removes only these two harmful active oxygen species.

In particular, OH<sup>-</sup> has a very fast chemical reaction and attacks cells that does not have time to neutralize.

However, active hydrogen also have a fast chemical reaction that can neutralize OH<sup>-</sup> before attacking cells.

Molecular Weights of Antioxidants



# Importance of water to human body

Water is important because it is directly or indirectly involved in all the metabolism of the human body.

Without water, our bodies can not sustain life.

What the water does in the human body is as follows:

- ① Drinking water moves in the order of mouth, stomach, intestine, liver, heart, blood vessel, cell, blood, kidney, excretion.
- ② It supplies oxygen and nutrients to each cell.
- ③ It is mixed with sweat and feces to release waste products.
- ④ The small intestine and large intestine dissolve, dilute, digest and absorb food.
- ⑤ It maintains normal pH in blood.
- ⑥ It promotes the circulation of blood and tissue fluids.
- ⑦ It regulates temperature by sweating.
- ⑧ It works as lubricant in joints.
- ⑨ It maintains bones and shapes of body.
- ⑩ It is essential in living.

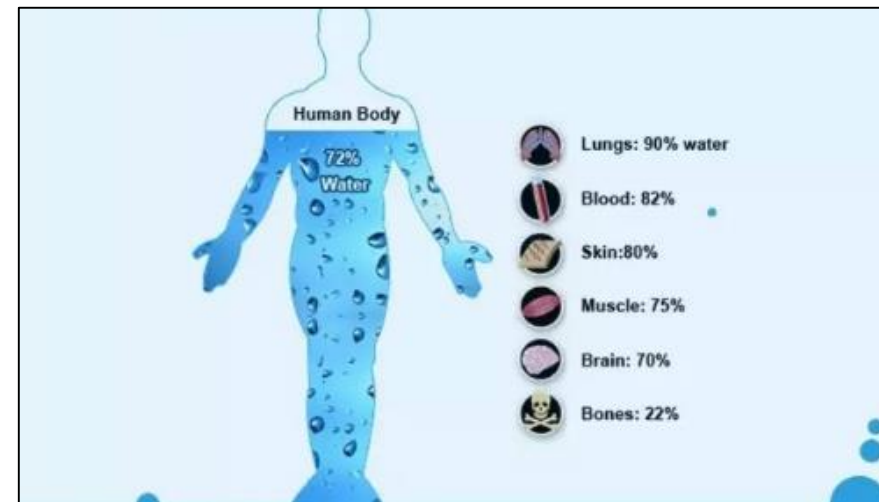
Because water is so important to the human body, it must be filled with good water to be healthy.

So what good water does it say? As I said before, good water is the water that has high reducing power and can remove active oxygen attacking our body.

It also refers to water with the following conditions necessary to maintain health:

- ① The pH should be slightly alkaline, 7.4 to 8.5, and the ORP should be low.(-250mV ~ -400mV)
- ② The water molecules should be small enough to be absorbed well in the cell.
- ③ There should be no chemicals or harmful substances such as chlorine, rust, heavy metals, or bacteria.
- ④ It should contain a balanced amount of minerals beneficial to the body, so it should have a good taste.
- ⑤ Oxygen and carbon dioxide should be properly dissolved (boiled water is free of oxygen and carbon dioxide)
- ⑥ Water hardness should not be too high or too low.(lowest hardness: distilled water, highest hardness: spring water)

And finally, there should be abundant hydrogen to reduce active oxygen.



# Interest in hydrogen water

There are four miracle of water in the world.

These have attracted worldly attention because they contain elements that are different from ordinary water.

Each TV station in Japan had previously covered and broadcasted about water called "miracle water." These programs investigated whether these miraculous waters contain special minerals or special microorganisms.

As a result, no special ingredients were found and there was no difference from ordinary well water, but there was one thing in common. All of them were high in "active hydrogen".

Professor Shirahata discovered that a large amount of hydrogen was contained in miracle water, and that hydrogen entered our body and acted as antioxidant.

So we started to study the antioxidants in the water (the active hydrogen removes active oxygen).

Four miracle water in the world –

1) France Lourdes Spring Water–

Discovered in 1858,

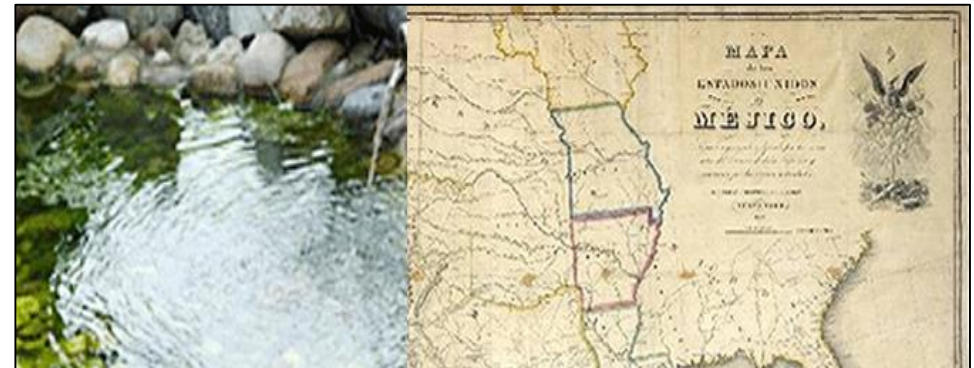
6 million patients with incurable diseases visit,

About 600Pbb active hydrogen found

2) Water in the village of Tracote, Mexico–

Discovered in 1991, 8 million have visited,

About 200Pbb active hydrogen found





3) Water in Nordenau, Germany–  
Discovered in 1991,  
Several million visitors everyday,  
About 100Pbb active hydrogen found



4) Nadana's Well in India– Discovered in 1992, 500,000 visitors annually,  
About 100Pbb active hydrogen



# Studies on hydrogen water

It is around 2005 that research on hydrogen began around the world.

Since then, the world's first research paper has been published in one of the world's most prominent journals, "NATUREMEDICINE" on May 8, 2007 by Professor Shita Ota of the University of Tokyo.

Hydrogen water research has been conducted worldwide since 2007, and a total of 1,200 research papers in English as of December 2016 are being published.

The following table shows that hydrogen-related research papers have been published in the global medical field and have increased rapidly over the years.

At present, more than 40 research institutes in Japan are conducting hydrogen researches. In researches including animal experiments, hydrogen intake methods are various such as inhalation of hydrogen gas, drinking of hydrogen water, and injection of hydrogen peroxide.

Researchers initially thought that hydrogen had the effect of inhibiting in vivo oxidation, but found that there were anti-inflammatory, anti allergic and energy metabolism-promoting effects through various clinical trials.

Feb. 11, 2013, on Japan's TBS TV Life Special program "3.8 billion years of life, What is a gene mystery human being?" broadcasted that hydrogen was closely related to the gene switch On-Off.

Hydrogen! Clinical trials are an important challenge at present.

It may not be beneficial to human though it is found to be beneficial to animal. But hydrogen experiments on human are found to be as effective as on animals. (Five studies are attached hereinafter)

At present, large companies in Japan are participating and are moving toward permitting hydrogen as a medicine. The big goal to do so is to allow hydrogen as medicine, so that health insurance can be applied as well. Most safe and convenient method of taking hydrogen is to inhale hydrogen gas in emergency situation and to drink hydrogen water for chronic diseases to promote the hydrogen generation within human body. It is also important to continue to support clinical researches using hydrogen so that there is no ethical problem in conducting research for many people.

It is our scientists as well as the related medical scientists to identify the mechanism for how hydrogen works in the human body.

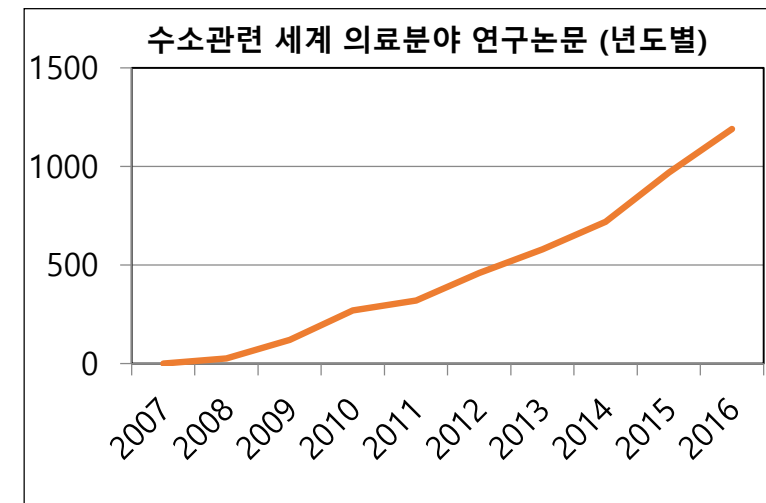
It is common sense to know that existing drugs are effective for certain symptoms of a specific disease, but it is surprising that hydrogen is effective for various diseases.

However, in order for hydrogen to be developed further, we should know exactly how it works and how to consume safely. If we manufacture hydrogen products without the scientific basis as a business ploy, it will not help the process. We need to look forward into the future to support further studies and developments.






Such studies will make us recognize and understand the importance of life.

Another thing we can do is to be more familiar with hydrogen in every day life.

This can not be done without the relevant industry providing scientific hydrogen-related products to the healthcare sector and delivering genuine publicity or professional knowledge to the general public. Although it can not exist without profits, if it does not have research, then it is interfering not only with social contribution but also with new growth engine that is attracting attention as a future growth business.



# Study cases on hydrogen water

NO	Research title	Attachment	Remarks
1	Effect of hydrogen on type 2 diabetes	 2형당뇨병의 수소수 효과	
2	Research on effects of molecular hydrogen on cancer	 분자수소의 암 효과 연구	
3	Effects of drinking hydrogen water on eczema	 수소수음용의 아토피	
4	Research of hydrogen water effect on liver cancer	 수소수의 간종양 효과 3	
5	Stomach ulcer and hydrogen water	 위궤양 과 수소	



# Benefits of hydrogen water

The leading hydrogen water market is Japan. Its government recommends the hydrogen water.  
It happened after the Fukushima nuclear power plant disaster.  
As the radioactive leaking disaster, the Japanese government issued hydrogen water to the its defense forces to get rid of radioactivity.  
Since then, many Japanese started drink hydrogen water.  
According to the Chinese Academy of Neuroscience, the Chinese Academy of Neurological Sciences, "the high concentration of hydrogen has been shown to improve the neurological function of experimental autoimmune encephalomyelitis mouse"  
There are active researches and clinical trials in China and the related hydrogen market is expanding.  
This results in expansion of Southeast Asia and Europe markets as well.

## Benefits of hydrogen water 1 Eczema



# Benefits of hydrogen water 2

## Radiation exposure



【測定結果】			
単位：mBq/L			
推定される核種	①原水	②水素水	③排水
Te-132 (テルル 132)	0.69	ND*	0.41
I-131 (ヨウ素 131)	52.13	ND*	31.92
Te-129 (テルル 129)	1.93	ND*	0.37
Cs-134 (セシウム 134)	1.46	0.01	0.34
Cs-137 (セシウム 137)	2.34	0.02	0.49
I-132 (ヨウ素 132)	0.12	ND*	0.02
Te-129m (テルル 129 メタ)	1.74	ND*	ND*
Cs-136 (セシウム 136)	0.04	ND*	0.01

ND\*：検出されなかった。 試験方法、条件などは別紙報告書をご確認下さい。

### 【結果】

測定した放射性物質の全てにおいて 99%を超える高い除去効果が確認されました。特に I-131 (ヨウ素 131) については顕著な効果が見られました。また、Cs-134 (セシウム 134)、Cs-137 (セシウム 137) については、測定困難なほどの微量との結果を得ることができました。なお、飲用の範囲を超える放射性物質を含む原水については製品の仕様上、本検証の対象・想定外といたしております。



# 水素含有水で口腔がん抑制

県立島大  
日常飲料で予防期待

県立島大の三羽根  
比古教授ら（島根県庁）  
の共同研究チームは、水素含有水を飲むことで、口腔がんの発生を抑制できる可能性を示した。

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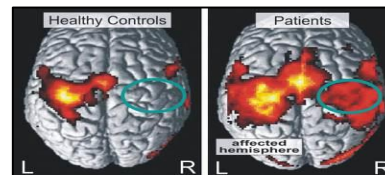
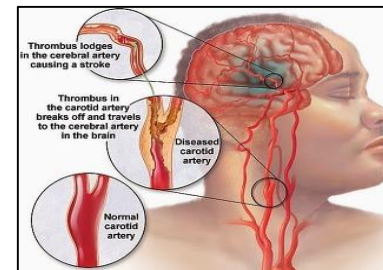
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※2007年7月23日付「日刊工業新聞（日刊工業新聞社）」より転載



# Benefits of hydrogen water 4 Stroke



THE YOMIURI SHIMBUN  
**読売新聞**

動脈硬化の予防となる活性酸素を、水素が取り除き、脳梗塞による脳の損傷を半分に減らす効果があることを、日本医科大学の山内成男教授が動物実験で確認した。体内の活性酸素だけを過剰に除去する効果も期待し、脳梗塞などの治療効果が期待されるのに有効な方法とされている。研究成果は8日付の科学誌「チャー・マンズ」(電子版)に掲載される。

日本医科大学チーム  
動物実験で確認

「老化の黒幕」活性酸素を除去

水素ガスを与えたラットの脳梗塞の損傷は、何も与えないラットの半分以下だった。

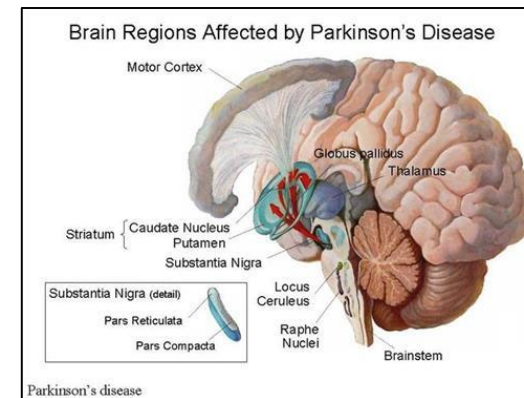
山内教授は「水素は生体の活性酸素には作用しない。既存の脳梗塞治療薬より効果は顕著で、有望だ」と語っている。

一方、体の「さび」と言われ、老化の黒幕と見られている「活性酸素」は、一時的に大量の活性酸素が発生する時に大量の活性酸素が発生し、脳を傷める。

山内教授らは、人工的に脳梗塞にしたラットを使い、一方に酸素不足の水素ガスを与え、もう一方は何も与えずに血液の流れを再開して、その結果

※2007年5月8日付「読売新聞(読売新聞社)」より転載  
この記事は、読売新聞社の許諾を得て転載しています。

# Benefits of hydrogen water 5 Parkinson's disease



OPEN ACCESS Freely available online

PLOS one

## Hydrogen in Drinking Water Reduces Dopaminergic Neuronal Loss in the 1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine Mouse Model of Parkinson's Disease

Kyoto Fujita<sup>1</sup>, Toshihiro Seike<sup>1</sup>, Noriko Yutsudo<sup>2</sup>, Mizuki Ohno<sup>2</sup>, Hidetaka Yamada<sup>2</sup>, Hiroo Yamaguchi<sup>2</sup>, Kunihiro Sakumi<sup>2</sup>, Yukiko Yamakawa<sup>3</sup>, Mizuho A. Kido<sup>3</sup>, Atsushi Takaki<sup>4</sup>, Toshihiko Katafuchi<sup>4</sup>, Yoshinori Tanaka<sup>5</sup>, Yusaku Nakabeppu<sup>2,3</sup>, Mami Noda<sup>1,3\*</sup>

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**Abstract**

It has been shown that molecular hydrogen (H<sub>2</sub>) acts as a therapeutic antioxidant and suppresses brain injury by buffering the effects of oxidative stress. Chronic oxidative stress causes neurodegenerative diseases such as Parkinson's disease (PD). Here, we show that drinking H<sub>2</sub>-containing water significantly reduced the loss of dopaminergic neurons in PD model mice using both acute and chronic administration of 1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine (MPTP). The concentration-dependency of H<sub>2</sub> showed that H<sub>2</sub> as low as 0.08 ppm had almost the same effect as saturated H<sub>2</sub> water (1.5 ppm). MPTP-induced accumulation of cellular 8-oxoguanine (8-oxoG), a marker of DNA damage, and 4-hydroxynonenal (4-HNE), a marker of lipid peroxidation were significantly decreased in the nigro-striatal dopaminergic pathway in mice drinking H<sub>2</sub>-containing water, whereas production of superoxide (O<sub>2</sub><sup>•-</sup>) detected by intravascular injection of dihydroethidium (DHE) was not reduced significantly. Our results indicated that low concentration of H<sub>2</sub> in drinking water can reduce oxidative stress in the brain. Thus, drinking H<sub>2</sub>-containing water may be useful in daily life to prevent or minimize the risk of life style-related oxidative stress and neurodegeneration.

**Citation:** Fujita K, Seike T, Yutsudo N, Ohno M, Yamada H, et al. (2009) Hydrogen in Drinking Water Reduces Dopaminergic Neuronal Loss in the 1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine Mouse Model of Parkinson's Disease. PLoS ONE 4(9): e7247. doi:10.1371/journal.pone.0007247

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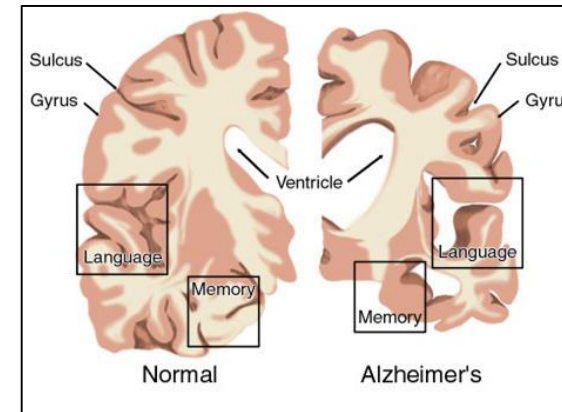
**Competing Interests:** The authors have declared that no competing interests exist.

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These authors contributed equally to this work.

# Benefits of hydrogen water 6

## Memory vitalization



### 読売新聞 THE YOMIURI SHIMBUN 記憶力低下 水素水で抑制

水素水を飲むことで、記憶力（認知機能）の低下を抑えられることを日本医大の太田成男教授らが動物実験で確認した。認知症の予防や治療にも道を開く成果で、科学誌ニューロサイコファーマコロジー電子版に発表した。

ストレスによって記憶力が低下することは知られている。研究チームは、マウスを狭い空間に閉じ込め、餌を与えないなどのストレスを加えたうえで、記憶力が、水素が大量に溶け込んだ水と通常の水を飲ませた場合でどのくらい違うか、10匹ずつ、三つの方法で6週間かけて比較した。その結果、いずれの場合も水素水を飲ませた方が記

■日本医大マウス実験で確認

憶力が顕著に高く、ストレスのないマウスとほぼ同等だった。記憶をつかさどる脳の領域（海馬）における神経幹細胞の増殖能力も同様の傾向だった。

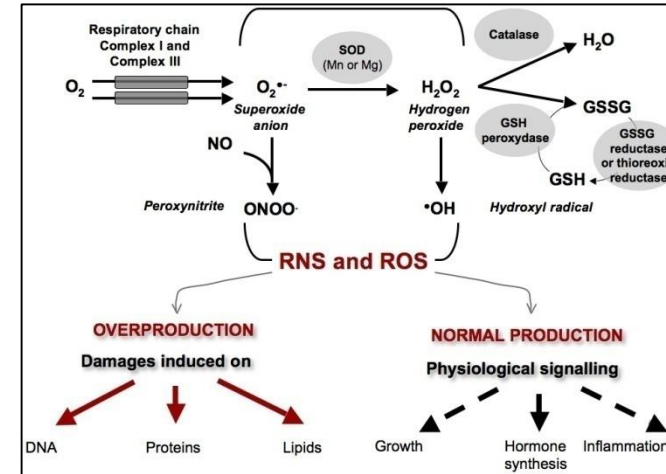
研究チームは昨年、水素が活性酸素を取り除き、脳梗塞による脳障害を半減させることを確認。認知症は活性酸素などによって神経細胞が変性する病気とされるが、太田教授は「水素水を飲まないマウスの海馬には活性酸素によって作られた物質が蓄積していた。水素水が活性酸素によって低下した神経細胞の増殖能力を回復させ、記憶力低下も抑制したと考えられる」と話している。

※2008年7月19日付「読売新聞（読売新聞社）」より転載  
この記事は、読売新聞社の許諾を得て転載しています。



# Benefits of hydrogen water 7

## Removal of toxic oxygen



Which energy developments do you think will be most effective in creating sustainable urban environments for the future?

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Article  
Nature Medicine 13, 688–694 (2007)  
Published online: 7 May 2007 | doi:10.1038/nm1577

Hydrogen acts as a therapeutic antioxidant by selectively reducing cytotoxic oxygen radicals

Burroh Ohsawa<sup>1</sup>, Masahiro Ishikawa<sup>2</sup>, Kunko Takahashi<sup>2</sup>, Megumi Watanabe<sup>2,3</sup>, Kiyomi Nishimaki<sup>2</sup>, Kumi Yamagata<sup>2</sup>, Ken-ichiro Katsura<sup>2</sup>, Yasuo Katayama<sup>2</sup>, Sadamitsu Aono<sup>2</sup> & Shigeo Ohta<sup>1</sup>

Acute oxidative stress induced by ischemia-reperfusion or inflammation causes serious damage to tissues, and persistent oxidative stress is accepted as one of the causes of many common diseases including cancer. We show here that hydrogen ( $H_2$ ) has potential as an antioxidant in preventive and therapeutic applications. We induced acute oxidative stress in cultured cells by three independent methods.  $H_2$  selectively reduced the hydroxyl radical, the most cytotoxic of reactive oxygen species (ROS), and effectively protected cells; however,  $H_2$  did not react with other ROS, which possess physiological roles. We used an acute rat model in which oxidative stress damage was induced in the brain by focal ischemia and reperfusion. The inhalation of  $H_2$  gas markedly suppressed brain injury by buffering the effects of oxidative stress. Thus  $H_2$  can be used as an effective antioxidant therapy; owing to its ability to rapidly diffuse across membranes, it can reach and react with cytotoxic ROS and thus protect against oxidative damage.

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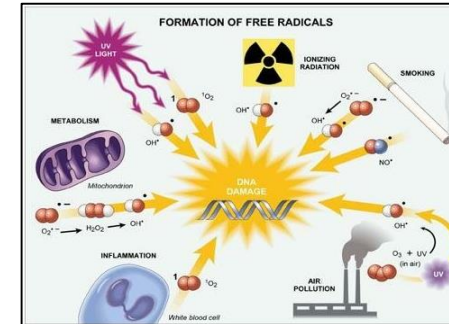
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# Benefits of hydrogen water 8 Anti- aging



**Mitochondria : 진화의 지배자, 노화의 주범**

Food Calories and Oxygen → Cellular Energy (ATP) and Water → Free Radicals

- 체내 : 60조 Cell → 10,000조 Mitochondria  
2중막, 복잡한 표면구조 → Huge surface → 3만개 호흡unit /개  
강력한 에너지 생성기관 → 진화를 지배
- 사람은 단위 면적당 태양의 1만 배 에너지 생산  
태양 =  $4 \times 10^{26} \text{ W} / 2 \times 10^{30} \text{ kg} \rightarrow 0.0002 \text{ mW/g}$   
사람 =  $1.3 \times 10^4 \text{ W} \times 30\% / 70 \text{ kg} \rightarrow 2 \text{ mW/g}$
- 산소 : 2 to 5% → Free Radicals : 노화의 주범  
73,000번 이상의 DNA손상 / cell, 1day  
but 대부분 복구(효소)

**朝日新聞**

## 水素で活性酸素撃退

日本医科大教授ら 細胞・動物で実験

水素が体に有害な活性酸素を取り除き、急病の治療などに使える可能性があることを、日本医科大学の太田成男教授(細胞生物学)らが細胞や動物の実験で見つけた。米科学誌ネイチャー・メディシン電子版で8日発表する。酸化を招きやすい活性酸素は病気や老化を引き起こすとされている。活性酸素にはいろいろな種類があるが、太田さんらが水素をとけこませた水の影響を培養細胞で調べたところ、酸化力が強くて体に有害な「ヒドロキシラジカル」という活性酸素を除去できることがわかった。

また、脳への血流を90分間止めて脳梗塞状態にしたネズミに濃度2%の水素ガスを吸わせて、活性酸素による障害を防げるかどうか調べた。その結果、水素を吸わせない場合に比べて、脳の細胞が死ぬ程度を半分ほどに抑えることができた。

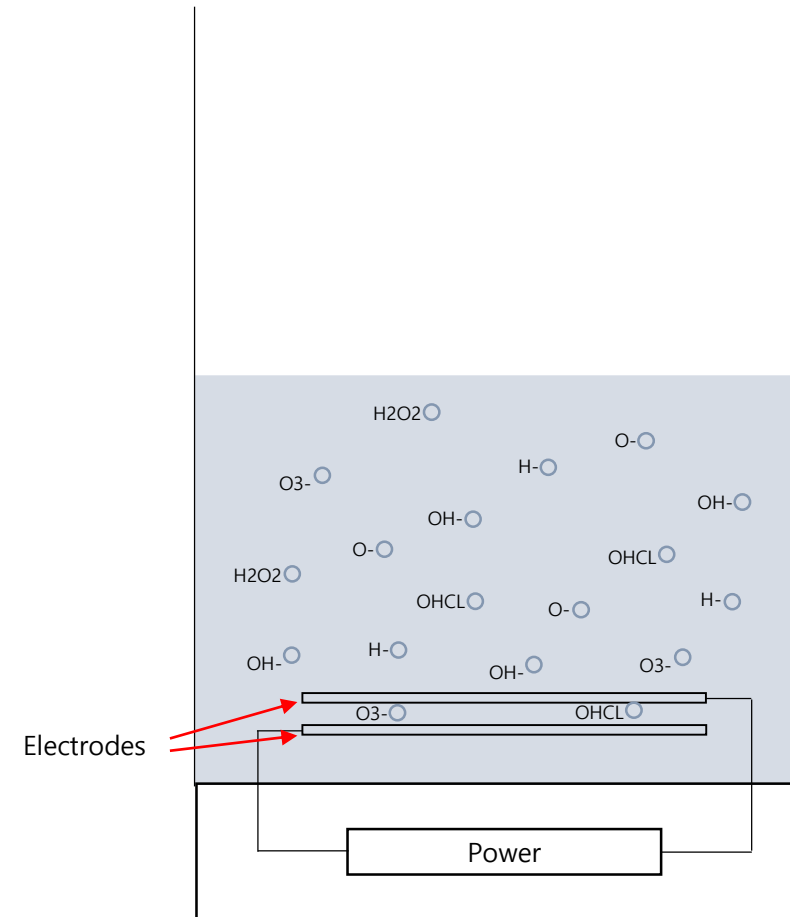
東京都老人総合研究所の田中雅嗣・健康長寿ゲノム探索研究部長は「水素で実際に人の病気や老化を防ぐことができると、どのくらい摂取すればいいのか、確かめるにはまだ多くの研究が必要だが、期待できる研究結果だ」としている。

※2007年5月8日付 「朝日新聞(朝日新聞社)」より転載

## Other hydrogen water generator and their methods

## Principles of first generation electrolysis

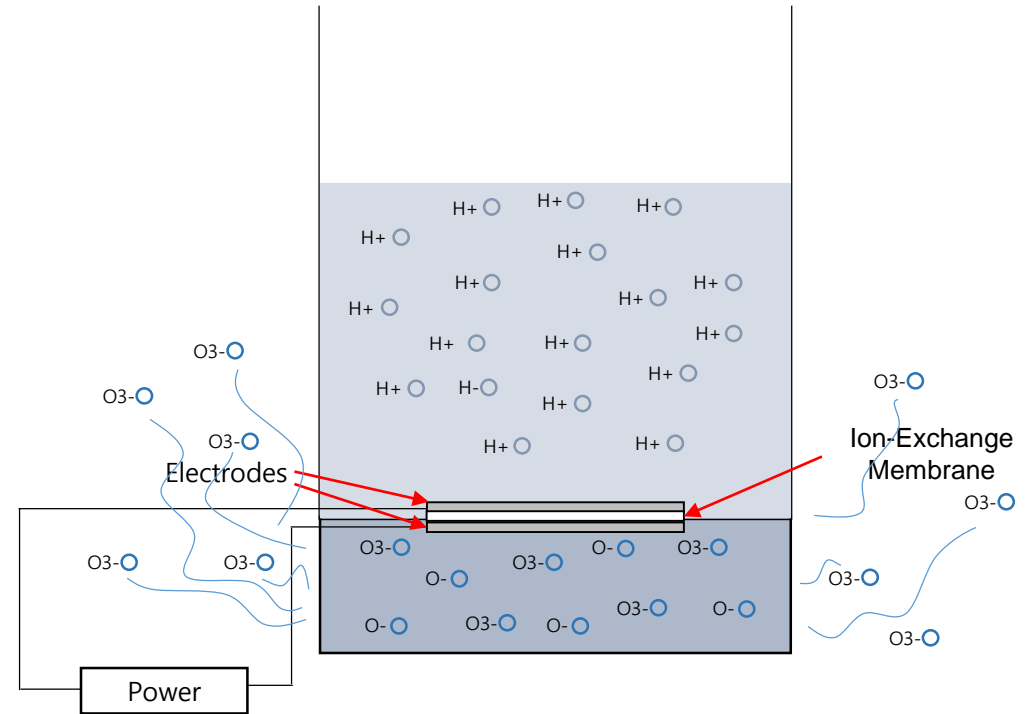
The structure of the electrolysis used by other manufacturers is shown in a diagram.  
It is more suitable to be used as sterilizing water than drinking water since various sterilizing elements are generated in the water to be consumed.



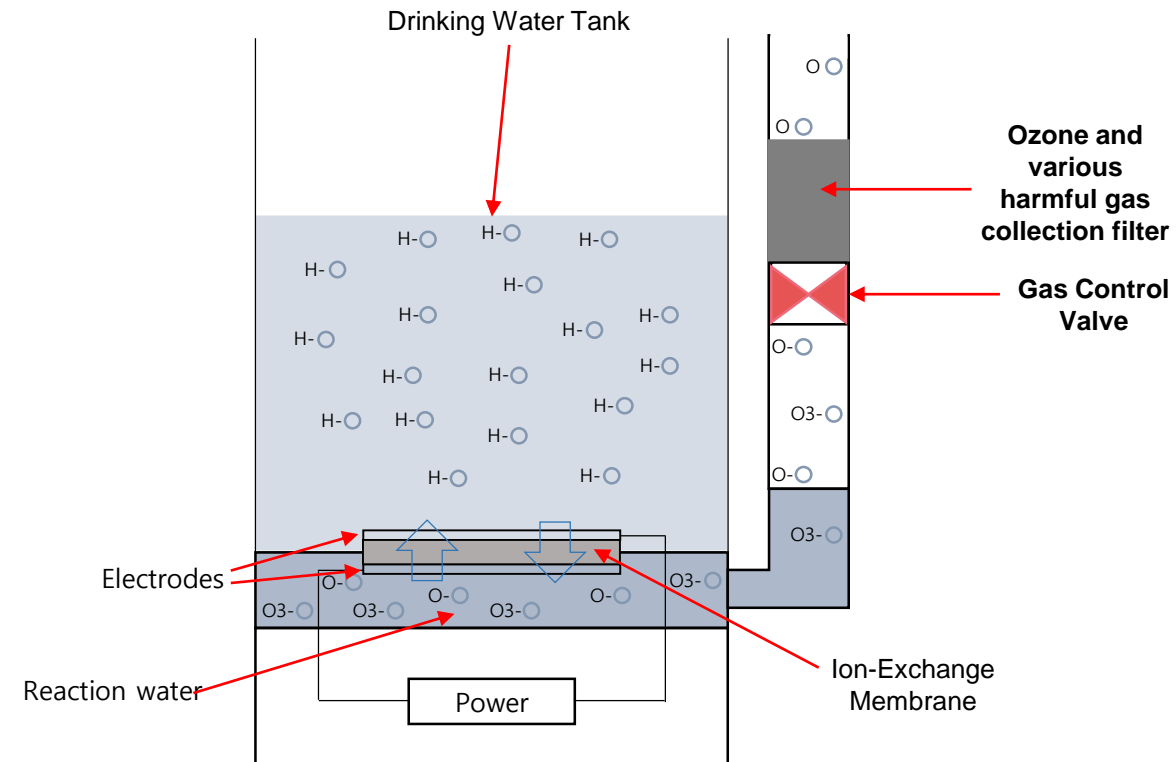


## Principles of second generation ion exchange method

Second generation ion exchange method is shown in a diagram. Various harmful gas escapes to outside which may be reintroduced into body through respiration and cause other diseases.



## Principles of third generation ion exchange method



# Characteristics

## Quality of hydrogen

Unlike other products, our products are applied with technology to dissolve pure hydrogen in the water. Other products generate oxygen and ozone as well as hydrogen which may be harmful rather than beneficial. Quality of such products depend on how pure the generated hydrogen is and how much can be dissolved in the water. Real hydrogen water contains nothing but pure hydrogen.





# Antioxidant effect



750 or greater

500 or greater

40 or greater

35 or greater

unit : each/Day



# Hydrogen Water Tumbler Mini (DHW-9100A) specification

NO	Description	Spec	Note
1	Voltage (V)	DC 3.7V/1A	DC Adaptor
2	Power consumption (W)	13.5	
3	weight (g)	400	Without Adaptor
4	Dimension	233×70 (Tumbler) 17×89 (Wireless Charger)	(L×Φ)
5	USB Cable(L)	1M	BTYPE
6	Dissolved hydrogen (ppb)	Over 1,000	
7	ORP	Over -200mV	
8	Maximum capacity (mℓ)	350	
9	Temperature (℃)	3℃ ~ 40℃	
10	Working time (minutes)	3	
11	Manufactured by	DAGAGA CO., LTD.	

## ■ Function and Performance

- The 9100A has a water capacity of 350ml.
- The 9100A provides enough hydrogen to the body with the amount of dissolved hydrogen in the water being more than 1,000ppb
- The functions are
  - Power on/off, (The power will automatically turn off after a certain time when it is on)
  - The operating time is 3minutes.
  - Hydrogen generation and cleaning Function can be selected.(It can be easily noticed with the color of the lamp changing to blue or red.)
- The built-in gas removal filter stops the harmful gas from generating outside the product.
- It can be used more than 10 times with 1 charge.
- Various safety features are applied for safe usage.
- The U.S. FDA, RoHS, and MSPs requirements are met as the materials used are harmless to the human body.
- The product includes sterilized water function.
- The product has both domestic and foreign patents



# Hydrogen Water Pot (DHW-8100A) specification

NO	Description	Spec	Note
1	Voltage (V)	DC 3.7V/1A	DC Adaptor
2	Power consumption (W)	13.5	
3	weight (kg)	1.7	Without Adaptor
4	Dimension	188×271×141 (POT) 210×22×150 (Controller)	(L×W×H)
5	Dissolved hydrogen (ppb)	Over 1,000	
6	ORP	Over-200mV	
7	Maximum capacity (L)	1.5	
8	Temperature (°C)	3°C ~ 40°C	
9	Working time (minutes)	5, 10, 20	
10	Manufactured by	DAGAGA CO., LTD.	

## ■ Function and Performance

- The 8100A has a water capacity of 1,500ml.
- The 8100A provides enough hydrogen to the body with the amount of dissolved hydrogen in the water being more than 1,000ppb
- The functions are
  - Power on/off
  - The operating time is 5, 10, 20minutes.
  - Hydrogen generation and cleaning Function can be selected.
 (It can be easily noticed with the color of the lamp changing to blue or red.)
  - The built-in gas removal filter stops the harmful gas from generating outside the product.
- Various safety features are applied for safe usage.
- The U.S. FDA, RoHS, and MSPs requirements are met as the materials used are harmless to the human body.
- The product includes sterilized water function.
- The product has both domestic and foreign patents





# Hydrogen Water Spa (DHW-5100A) specification

NO	Description	Spec	Note
1	Voltage (V)	DC 12V/1A	DC Adaptor
2	Power consumption (W)	144	
3	weight (kg)	1.7	Without Adaptor
4	Dimension	51×180 (Spa) 22×226 (Wireless Charger)	(L×W×H)
5	Dissolved hydrogen (ppb)	Over 1,500	
6	ORP	Over-200mV	
8	Temperature (°C)	3°C ~ 50°C	
9	Working time (minutes)	20	
10	Manufactured by	DAGAGA CO., LTD.	

## ■ Function and Performance

The 5100A provides enough hydrogen to the body with the amount of dissolved hydrogen in the water being more than 1,500ppb

- The functions are
  - Power on/off
  - The operating time is 20minutes.
  - Hydrogen generation and cleaning Function can be selected.

(It can be easily noticed with the color of the lamp changing to orange or red.)

- The built-in gas removal filter stops the harmful gas from generating outside the product.
- Various safety features are applied for safe usage.
- The U.S. FDA, RoHS, and MSPs requirements are met as the materials used are harmless to the human body.
- The product includes sterilized water function.
- The product has both domestic and foreign patents



# Hydrogen Water Purifier (DHW-7100A) specification

NO	Description	Spec	Note
1	Voltage (V)	AC 220V/1.5A	Cold Water
2	Power consumption (W)	330W / 2500W	Cold/Hot water
3	weight (kg)	12.5	
4	Dimension	524×496×289	
5	Dissolved hydrogen (ppb)	Over 3,000	
6	ORP	Over -400mV	
7	Maximum capacity (L)	1L / min	
8	Temperature (°C)	3°C ~ 40°C	
9	Available filtering capacity	1.5L	
10	Treatment type	Direct Water	
11	Manufactured by	DAGAGA CO., LTD.	

## ■ Function and Performance

- The 7100A has a water discharge capacity of 1,000ml and the available filtering capacity is 1,500ml.
- The 7100A provides enough hydrogen to the body with the amount of dissolved hydrogen in the water being more than 3,000ppb
- The functions are
  - Power on/off
  - Operating time is the time it takes to produce water.
  - Hydrogen generation and cleaning Function can be selected.(It can be easily noticed with the color of the lamp changing to blue or red.)
  - The built-in gas removal filter stops the harmful gas from generating outside the product.
- There are four types of filters, SEDI Filter, CARBON BLOCK Filter, UF Filter, and POST CABON Filter.
- The produced water can be set to water, hot water, and cold water.
- The Faucet on the side of the product makes it comfortable to use.
- Various safety features are applied for safe usage.
- The U.S. FDA, RoHS, and MSPs requirements are met as the materials used are harmless to the human body.
- The product has both domestic and foreign patents



*Thank you*

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DAGAGA Co., Ltd.