About Hydrogen water

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Ⅰ. Causes of Aging and Disease

▫ Causes of Aging and illness?

To review the recent research results, we can summarize the following 3 points.

1. The basis cause of Aging and illness is due to **cell damage**.
2. The cause of cell damage is **harmful oxygen free radicals**.
3. **90 % of all diseases** are caused by harmful oxygen free radicals as a major cause of Cell damage.

→ Cell damage due to harmful oxygen free radicals is the major cause of aging and disease

※ Representative diseases caused by harmful oxygen free radicals

Department	Representative diseases
Circulatory system/ Respiratory organ	myocardial infarction, artery hardening, pneumonia, angina
Brain-nervous system	cerebral infarction, epilepsy, cerebral hemorrhage, Parkinson disease, autonomic disturbance
The digestive system	gastritis, stomach ulcer, cancer of the stomach, cirrhosis, Crohn's disease, pancreatitis
Hematometer	leukemia, septicaemia, hyperlipidemia
Endocrine system	diabetes, adrenal, disturbances of metabolism
Integumentary System	atopic dermatitis, dermatitis solaris, photosensitivity disease
Dermatitis	cataract, Retinal degeneration
Tumor system	cancer caused by smoking, chemical carcinogenesis, radiation cancer
Connectivetissue system	articular rheumatism, autoimmune disease, collagen disease.

※ Appended as an appendix of about 400 related papers

*** All diseases (90%) are affected by harmful oxygen free radicals,** About 10% are caused by bacterial and viral diseases

* Germ diseases increases faster in the interior of the body when harmful oxygen free radicals increases

- Johns Hopkins University School of Medicine, 1991-

▫ What is harmful oxygen free radicals?

- The breathing oxygen around 2 ~ 3% turns into oxygen free radical, which produces good active oxygen and Harmful oxygen free radical.

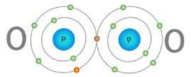
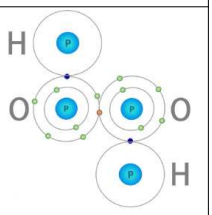
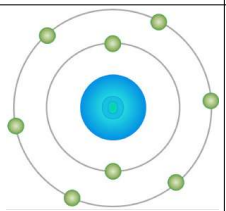
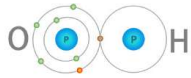
※ Breathe more than 20,000 times a day on average, more than 1 million liters of air is released through the respiration, and oxygen absorbed by double breathing is about 1500 liters, In other words Our body produces oxygen free radical of 30 liters every day.

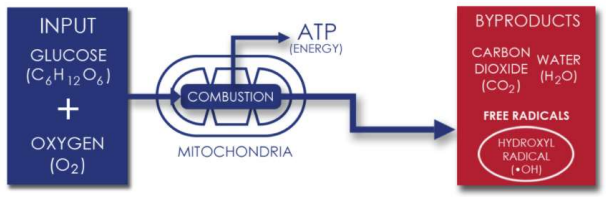
(Gale Encyclopedia of Medicine, 2008)

- There are 4 types of oxygen free radical(Superoxide radical, Hydrogen peroxide, Singlet oxygen, Hydroxy radical)

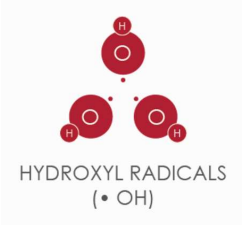
- The **hydroxyl radical** is the **most active one causing cell damages** of those oxygen free radicals.

※ Types and Functions of oxygen free radicals

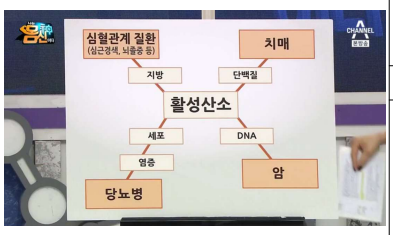
Oxygen free radicals				Function
1	superoxide anion		GOOD	* oxygen free radicals is required. because it activates antibacterial defense in human body → Contributing to immunity and physiological activation
2	hydrogen peroxide			
3	singlet oxygen		BAD	* Substances to cause skin damage (skin aging and skin cancer) induced by ultraviolet rays
4	**hydroxyl radical**			*** Necrotize the cell by destroying the chain of the cell membrane** *** Destroys the DNA and Complete suppression of protein synthesis** **→ Causing a variety of chronic diseases as well as the aging** *** Activity is attacking cells per microsecond.**



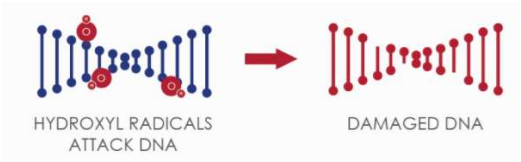
The generation Process of Oxygen free radical



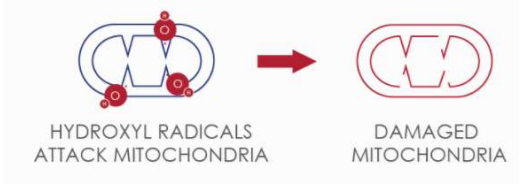
Hydroxyl Radical



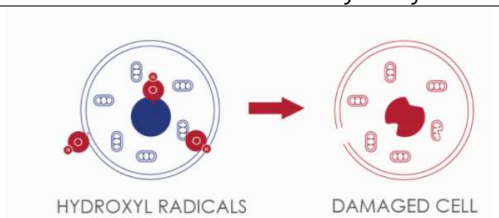
The relation between hydroxyl radical and diseases



The DNA attack of hydroxyl radical



The Mitochondria attack of hydroxyl radical



The cell attack of hydroxyl radical

Ⅱ. How to defend Harmful oxygen free radical

As described earlier, How to remove Harmful oxygen free radicals is the most important task to cope with aging and disease.

How to effectively remove Harmful oxygen free radicals?

◘ Oxygen free radical's defensive function

1. Superoxide dismutase (SOD)**:** The body's natural defense against Harmful **oxygen free radical**

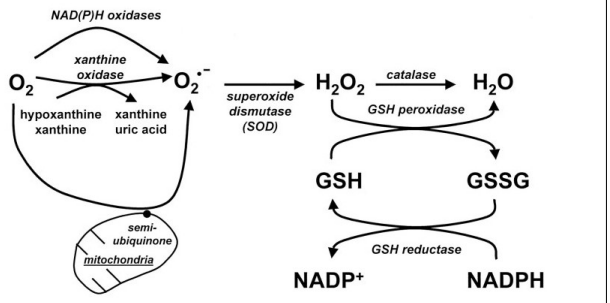
- SOD deactivate and detoxifies Oxygen free radical by decomposing into water and oxygen

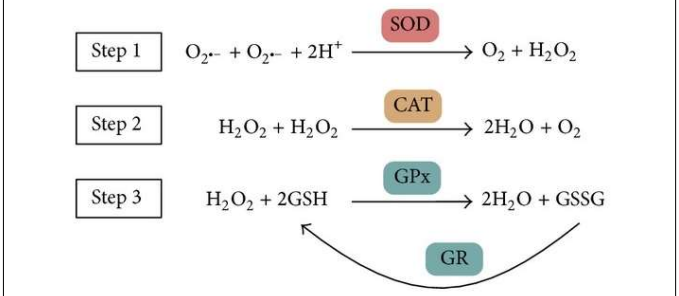
- The original lifespan of humans is about 120 years, which is equivalent to a cell's lifespan of 120 years.

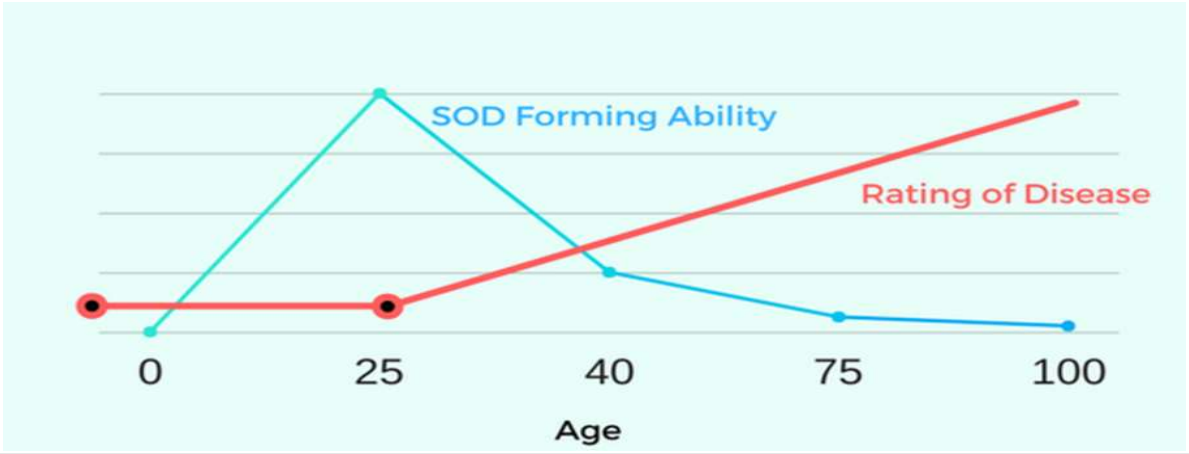
→ At present, Human life expectancy is about 80 years old due to Harmful oxygen free radical

※ SOD is the highest in the 20s, and gradually decreases after that, 50% in the forties and less than 10% if it exceeds 60 years old.

Limitation: SOD shows the highest value in 20s, and does not produce after 40s.





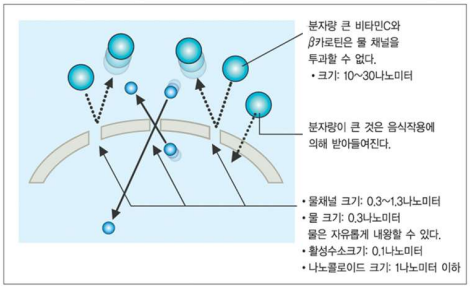


Variation in the SOD enzyme levels according to ages

-Keaney, M.; Matthijssens, F.; Sharpe, M.; Vanfleteren, J.; Gems, D. Superoxide dismutase mimetics elevate superoxide dismutase activity in vivo but do not retard aging in the nematode Caenorhabditis elegans. Free Radic. ; 2004-

2. Antioxidants through Food intake : vitamin C, vitamin E, beta-carotene, coenzyme

Limitation: There is a disadvantage in that it can not completely remove Harmful oxygen free radical due to limitations of molecular size, water solubility, and lipoid solubility.



The references for passing through water channel
- Dr. Shirahata, 2004-

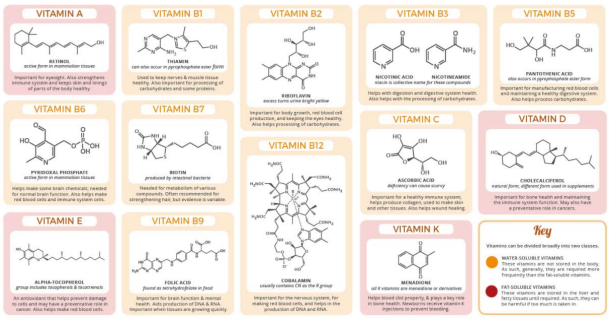
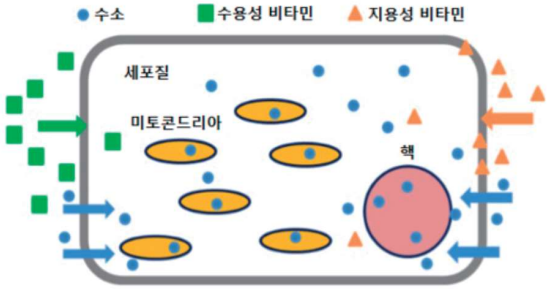
	soluble vitamin	fat soluble vitamins
Types	Vitamin B, C	Vitamin A, D, E, K
Structure		
limits	① Failure to pass through fat surrounded cell membrane → **No antioxidant activity into cells**	① Side effects In case of overdose ② Only stay outside of the cell membrane → **No antioxidant activity into cells**
		

그림 1-3. 수소분자와 비타민의 세포내 동태
(오타 시게오교수의 2012년 문헌에서 인용)

Types and Limits of Vitamins
- Dr. Shigeo Ota (2012) paper, etc. -

3. Hydrogen

- The contents related to hydrogen are described separately in Chapter 3

Ⅲ. An Effective methods for removal of Harmful oxygen free radical

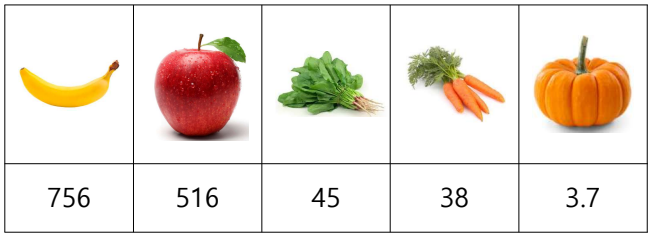
◘ Benefies of Hydrogen water

1. The most powerful antioxidative activity
(176 times of vitamin C, 431 times of vitamin E, 863 times of coenzyme)
2. High penetration
(it can pass through water soluble, lipoid solubility , cell membrane due to small molecular weight)
3. Harmless to the human body
4. The ability to eliminate selectively only harmful oxygen free radicals
5. No accumulation in the body

1. The most powerful antioxidative activity

- Hydrogen Water is more effective than 431 times more than vitamin E, 863 times more than coenzyme.

Comparison of Antioxidant power: 176 times of vitamin C, 863 times of coenzyme



756	516	45	38	3.7

If you drink hydrogen water of 1.5 liters

2. High penetration

- Hydrogen is the smallest material in the universe and can reach mitochondria in the cell.

※ Comparison of molecular weight of hydrogen and other antioxidants

※ Vitamin C acts only in the blood, Vitamin E acts only on the cell membrane.

- Human cells consist of water and oil. Hydrogen dissolves in both of water and oil, so it can reach the corners of the cell and remove oxygen radical.

- There is a water channel in the human body that allows water to flow freely.

- The size of the water channel is 0.3 to 1.3 nanometers

(1 nanometer is a meter of one-hundred-millionth.

- Vitamin C or beta 0 carotene can not pass through the water channel

- The size of the hydrogen molecule is 0.3 nanometers

→ The only substance that can remove harmful oxygen free radicals passing through the both of water and oil and penetrating water channels and cell membranes

3. Harmless to the human body

- In the case of hydrogen, It reacts only with oxygen radical.

It is naturally excreted through breathing and excretion due to its high diffusivity in case of the absence of Oxygen free radicals to react. so it has **no side effects on the body.**

4. the abilliminate harmful oxygen free radicals selectively

- About 90% of diseases are related to oxygen free radical**.**

- As mentioned earlier, **It reacts only with oxygen free radical as the most deadly component without reacting with active oxygen as the beneficial component**.

1. Hydrogen water containing abundant of hydrogen removes oxygen free radical effectively.
2. Suppress inflammation in the cells.
3. Cerebral infarction was dramatically improved.
4. Reduction Effect of Oxidized fat the interior of the body.

- In 2007, Summary of Paper by Professor Otashigeo -

5. No accumulation in the body after taking too much

- Hydrogen does not accumulate in the body. It is naturally excreted through breathing and excretion due to its high diffusivity in case of the absence of Oxygen free radicals to react.

→ Considering all advantages of hydrogen as above, Hydrogen(H2,H+) is the most ideal antioxidant and a new material of everyone's dreams in the 21stcentury.