2013 International Healthy Drinking Water Symposium

Title「Hydrogen water for health benefits and future perspective in Japan」

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Reduced water by electrolysis is beneficial for Health with hydrogen, and the research on functional hydrogen water, especially on reduced water is developing at a rapid pace in Japan. Reduced water such as electrolyzing hydrogen water can scavenge reactive oxygen species in human body. Reduced waters are expected to have preventive and positive effects on oxidative stress-related diseases such as diabetes, cancer, arteriosclerosis, high blood pressure, apoplexy and aging.

The human body is approximately 60~80% water. The water molecule itself, flowing water affects cellular function and functions of organs. Also the hydration and Brownian movement of water are fundamentally important for protein function.

Atoms and molecules derive from water molecules, such as protons (H^+), hydrogen atoms (active hydrogen [H]), hydrogen anions (H^-), hydrogen molecules (H_2), oxygen molecules (O_2), and reactive oxygen species (ROS). Also molecules dissolve in water, such as mineral ion, mineral nanoparticles, organic and inorganic compounds, and gases.

Intake of " Active hydrogen" and the opposite of "Active oxygen" scavenge excess "Active oxygen" species within the body. An effective way for this is to drink water in which "active hydrogen" is richly dissolved. Fortunately, Japan is well endowed with water and also tap water is drinkable everywhere.

For the methods of "Hydrogen Rich Water", the next methods are reported:
・Electrolysis (alternating current (AC) and direct current (DC)) ・Treatment with a magnetic field ・Light irradiation ・Ultrasonication ・Bubbling with hydrogen gases (H_2) ・Strong water flow and collision ・Treatment with some types of minerals or rocks.

I would like to report about "Hydrogen Water" by "Hayakawa Method : Patent Number : 5,435,894 (Fig.1)" of the alternating current (AC) electrolysis in this meeting. The process of Hayakawa method provides a grounding electrode and a pair of applying electrodes in water to be treated. First and second high frequency switches are connected respectively to a DC voltages source through a variable resistor. The process and apparatus are suitable for improving the taste of drinking water such as well water and city water. A level of the signal output from the high frequency oscillator to the high frequency switching commander circuit is preferable from the view point of safety within a range of 20-50KHZ and 10-50V, and a specified frequency and voltage shall be selected within the ranges, in response to the quality of water to be treated. The material of the applying electrodes is selected by taking the quality of water to be treated into consideration. As the material, zinc, lithium oxide, magnesium alloys (with zinc), copper, iron, stainless-steel, titanium can be listed, but zinc and magnesium alloys are preferable for obtaining drinking water, since the electrode made by such materials gradually dissolves to enrich the water in its mineral content (Fig. 2). It is preferable for the drinking water to have ORP value of about 100mV more or less, which riches in ability for dissolving minerals. The resulting quality improved water is also suitable for vegetables, for instance the same filling a flower vase, used for a garden plant.

These following are the characteristics of "Hydrogen Water by Hayakawa Method":

•Neuter, near on water of the living body (Fig. 3) •Low ORP (−270mV) (Fig.4), and the dissolved oxygen is about 15mg/L and dissolved hydrogen is about 1.5 mg/L (Fig. 5) •Water with low surface tension and high osmosis for easy absorbing to the cell •Hydrogen molecule with platinum nanocolloid and nano−level diameter, and dissociating in the atomic hydrogen •Scavenging function to active oxygen, particularly hydroxyl radical (•HO) •Good balance of the positive and negative ion of mineral.

In this meeting, I report the scavenging ability of hydrogen water by AC electrolysis (Hayakawa Method) for active oxygen with ESR (Electron Spin Resonance) to Fenton reaction (Fig. 6, Fig.7) and HPX−XOD reaction (Fig. 8), and also report the clinical evaluation of the blood glucose level by hydrogen water of AC electrolysis on the treatment of a diabetic patient with hydrogen water under drinking volume of 1500 cc per day during 8 weeks (Fig. 9, Fig. 10, Fig. 11).

The application and the direction by hydrogen water in future:

•Application to the treatment and the prevention of the disease as the antioxidant •Application to the acute oxidation stress (inflammation, the strong exercise, myocardial infarction, insufficiency of bloodstream) •Application in the fields of the emergency medical care •Application such as cancer, arteriosclerosis, brain disorder in lifestyle diseases and regenerated medicine •Application to beauty fields in the body •High maintenance of hydrogen−rich water dissolved in the saturation •Non−remove the active−oxygen to be required in the immune system •Application for the treatment of Alzheimer's disease and Parkinson's disease •Application for the defense on the radiation poisoning such as Se−137 with gamma ray •Improvement of the athletic capability of sports.

Figure :

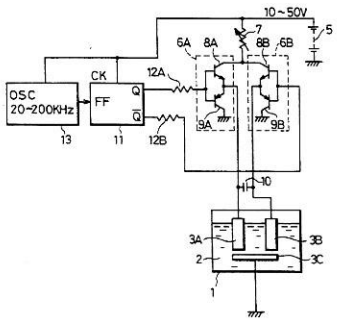

Figure 1. Alternating current electrolysis (Generator of Hayakawa Method:Patent Number : 5,435,894). The high frequency switching circuit is selected within a range of 20~50KHZ and 10~50V.

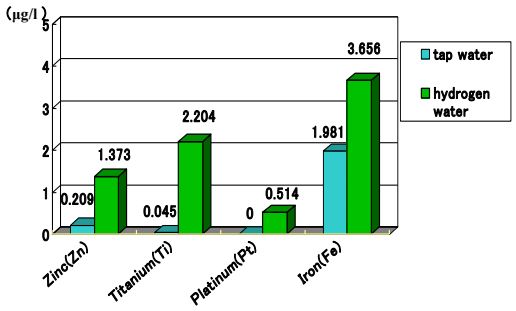

Figure 2. Fluctuation of trace metal-element in hydrogen water electrolyzed by alternating current for 30 minutes (ICP-MS mthod).

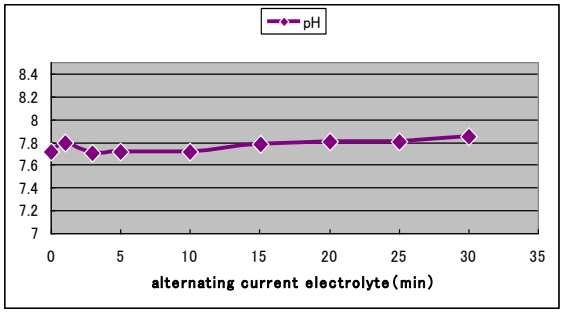

Figure 3. Change of the pH value in hydrogen water by alternating current electrolysis. pH value is stable under 8.

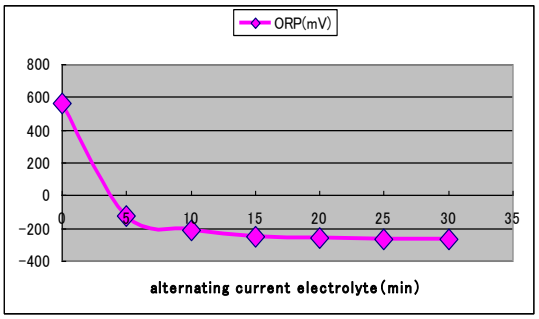

Figure 4. Change of ORP (Oxidation Reduction Potential) value in hydrogen water by alternating current electrolysis. ORP value is stable under -200mv 10 minutes later.

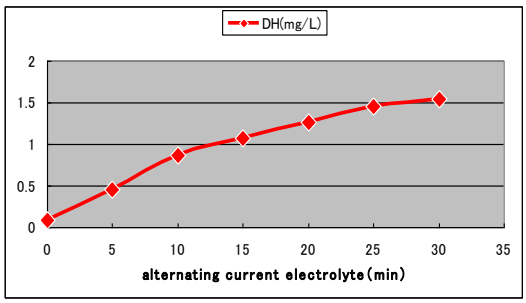

Figure 5. Change of DH (dissolved hydrogen) value in hydrogen water by alternating current electrolysis. DH value is stable over 1.5mg/L 30 minutes later.

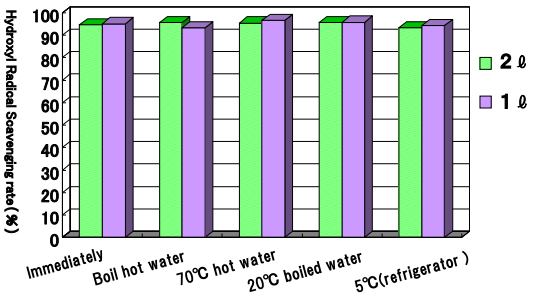

Figure 6. Scavenging rate on temperature to Hydroxyl radical of Fenton reaction on hydrogen water by alternating current electrolysis (20 minutes for reduction time).

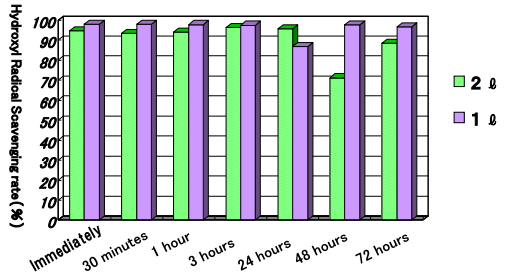

Figure 7. Scaveging rate on per hour later to Hydroxyl radical of Fenton reaction on hydrogen water by alternating current electrolysis (20 minutes for reduction time).

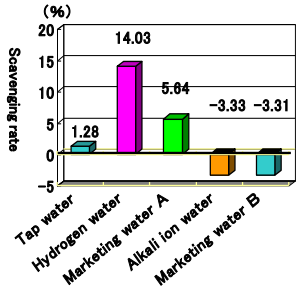

Figure 8. Scavenging rate of hydrogen water to superoxide anion radical of HPX-XOD reaction.

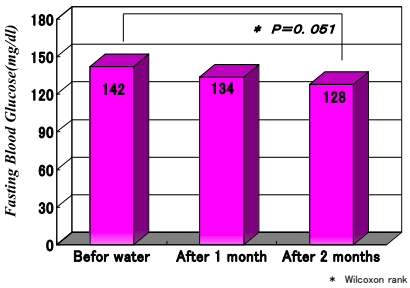

Figure 9. Treatment of diabetic patients with hydrogen water and levels of blood glucose value during 2 months (n=9). FBG (Fasting Blood Glucose: 116mg/dL> normal value)

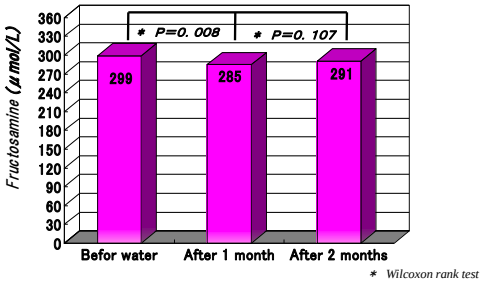

Figure 10. Treatment of diabetic patients with hydrogen water and levels of fructosamine value during 2 months (n=9). Fructosamine (205~285μ mol/ℓ : normal value).

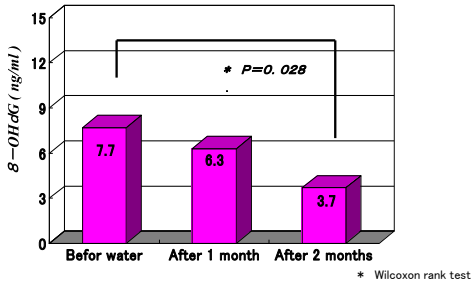

Figure 11. Treatment of diabetic patients with hydrogen water and average value of 8-OHdG in urine during 2 months (n=9). 8-OHdG (8-Hydroxy-2' -deoxyguanosine: ng/ml).