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Change of Hydrogen in Heavy Water and Activation of Unsaturated Fatty Acid by Specially Processed Water

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Abstract

We discuss an unsaturated fatty acid with the anticancer effect to start γ-linolenic acid, following a series of linoleic acids like arachidonic acid, an essential fatty acid to the body. On the other hand, heavy water, one of the hydrogen isotopes, relates to the Raman signal with biological materials added to suppress the metabolism of unsaturated fatty acids. Specially processed water comes into our theme in connection with heavy water possessing neutron-decay characteristics, and the water changes the hydrogen in heavy water.

Introduction

We write water in the chemical formula H_2O, but the detailed description is as follows, considering isotopes; normal water is described as ${}^{1}_{1}H_2{}^{16}_{8}O$. But heavy water involves deuterium, an isotope of hydrogen, ${}^{2}_{1}H$. So, heavy water depicts the molecule $HD^{16}_{8}O$. Normal water contains ${}^{1}_{1}H_2{}^{16}_{8}O$ (99.76%), ${}^{1}_{1}H_2{}^{18}_{8}O$ (0.17 %), ${}^{1}_{1}H_2{}^{17}_{8}O$ (0.037 %), and $HD^{16}_{8}O$ (0.032 %) [1].

Deuterium is not radioactive because of the stable isotope, but heavy water is highly toxic to health if consumed in large quantities. People employ heavy water in the nuclear industry as a neutron moderator in a nuclear reactor. Moreover, we use heavy water for H-NMR (Hydrogen Nuclear Magnetic Resonance) and organic EL (Electro Luminescence) for display and lighting technology.

In the medical field, researchers develop early prediction methods for cancer treatments and use heavy water as a contrast agent for H-MRI (Hydrogen-Magnetic Resonance Imaging). They also use deuterium as a tracer by using the mass difference. Moreover, deuterium indicates a Raman signal around the silent region by biological materials to suppress the metabolism of unsaturated fatty acids [2]. The essential constituents of biological materials are hydrogen, oxygen, and nitrogen. Phosphorus and sulfur are necessary for an organism, as are other metals for maintaining a body. We will discuss hydrogen later from deuterium.

Another heavy water application is a neutron moderator that reduces fast neutrons without nuclear reaction and leaves a thermal neutron of weak energy with lower kinetic energy. On the other hand, light water (${}^{1}_{1}H_2{}^{16}_{8}O$) is used as a moderator due to its high hydrogen content, but light water absorbs thermal neutrons more. A light water nuclear reactor is immensely more susceptible than a fast neutron to propagate a nuclear reaction of uranium-235 with the thermal neutrons.

However, Canada's nuclear reactor, namely, CANDU (Canadian deuterium uranium), uses ${}^{2}_{1}H$ for a neutron moderator and coolant of nuclear fuels in the reactor established in the 1960s [3]. We will discuss the isotopic analysis of heavy water later, although we do not elucidate the heavy water in the nuclear reactors described above.

Finally, we introduce specially processed water named SIGN water (Spin Information Gauge Network) containing an infoton, a presumed particle like an elementary particle [4]. The infoton is depicted <H^+∼e^->, neither hydrogen atom nor ion as characteristics.

Methods

Raman spectroscopy is used to determine vibrational modes of molecules, although rotational and other low-frequency modes of systems may also be observed. It is commonly used in chemistry to provide a structural fingerprint by which molecules can be identified. However, the Raman spectrum laser has higher energy than C-C bonding strength in an unsaturated fatty acid for visualization. An isotope analysis machine measures the isotopes in water to compare the sample with the standard.

Although we do not discuss and report here, we employ FT-IR (Fourier Transfer Infrared Spectroscopy) and H-NMR (Hydrogen-Nuclear Magnetic Resonance).

Results and discussion

Medical developments in fatty acids and deuterium

Heavy water possesses stronger chemical bonds than usual hydrogen compounds, meaning it takes time for a medicine to decompose. Therefore, the effect may continue more stable than in standard medicine.

Dodo et al. pay attention to an unsaturated fatty acid possessing the anticancer effect and employ a derivative introducing deuterium [2, 5]. They found that the derivative accumulates in lipid droplets, mainly in the adipose tissue, leading to anticancer function.

Before we discuss deuterium and fatty acids, we introduce the famous Horrobin's efforts focused on evening primrose oil, which contains γ-linolenic acid (GLA) [6].

An unsaturated fatty acid is converted by metabolism, resulting in a biologically active substance (e.g., prostaglandin) that develops various activities. For instance, γ-linoleic acid is synthesized from linoleic acid in a body. Suppose people consume a lot of linoleic acid (from mayonnaise and oil). In that case, if one experiences hormone imbalance or drinks too much alcohol, conversion to γ-linolenic acid may stop, leading to its lower density in the body [6].

Moreover, lipid droplets relate to an organelle [7]. Due to prostaglandin's function, the γlinolenic acid plays a role in low blood sugar levels, cholesterol, blood pressure and vasodilation. The prostaglandin is a bioregulatory hormone. Furthermore, γ-linolenic acid (GLA) was reported for anticancer activity that selectively shows cytotoxicity to cancer cells without affecting the normal cells [8]. However, the mechanisms have been unclear, and Dodo et al. researched visualization analysis using metabolic suppression function and Raman imaging for GLA anticancer activity [2, 9]. GLA is world-famous as an essential constituent to atopic dermatitis patients because there is only 50 % GLA in the blood of the patients compared with a healthy person, and GLA is used in medical treatment as a pharmaceutical for atopic dermatitis in England, Germany and France [10].

Arachidonic acid is an essential fatty acid in the liver, brain, glands, and skin cell membranes. It is abundant in the brain and is regarded as an effective form of brain cells, improving learning and cognitive response-ability. Moreover, arachidonic acid plays a role in intracellular signal transduction as a second messenger [11, 12].

As shown in Fig.1, arachidonic acid contains four double bonds in the C=C, compared to two in linolenic acid.

The bonding energy in the molecule indicates 3.6, 3.7, 4.3, 6.3 and 8.3 eV in C-C, C-O, C-H, C=C and C=O, respectively [13]. We convert the unit from kJ/mol to electron volt (eV). Therefore, we regard ARA as the most stable molecule. It is formed in the human body, but it is supposed to be taken from foods like meat, eggs, seafood, and mother's milk.

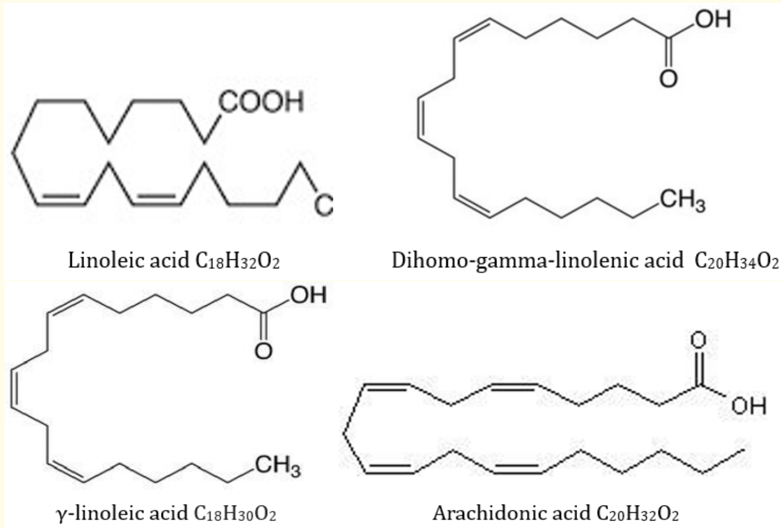

Figure 1: Unsaturated fatty acids and their bonding. Numbers show the places of the double bond.

Therefore, the higher energy, around 540 cm^{-1} (approximately 13 eV), may affect the molecule, like Raman spectrum visualization analysis research for GLA. However, we may judge the molecule's existence in the spectra. We will make a plan to attack the double bonds and activate the weakest C-C bonds in the GLA with SIGN water or heavy water.

Dodo said deuterium may protect cancer cells against oxidation by attacking two hydrogens in unsaturated fatty acids [2], but they do not discuss the reasons for attacking normal cells. Unsaturated fatty acids primarily transform to form physiologically active metabolites like prostaglandin, which change from a C-H bond to a C-O(H) bond. However, this function may stop by deuterium, which is their story.

If we try the heavy water processed by the SIGN water, the infoton, <H^+∼e^-> is supposed to reduce the C-O(H) to the average C-H bond in the unsaturated fatty acid.

Deuterium in nature and reaction with SIGN water

Ordinary water contains 0.015% of the heavy water in nature. Here, we discuss the ratio of deuterium and ordinary hydrogen. The hydrogen isotope ratio (as δD: the ratio of ^2H to ^1H in a sample versus in a standard) is another proxy used to assess paleoenvironmental conditions. Hydrogen isotopes are fractionated in natural waters by the exact mechanisms as oxygen isotopes, though to a lesser extent, due to the lower relative mass difference in isotope species.

δD deuterium/hydrogen ratio is referenced to Vienna Standard Mean Ocean Water (VSMOW) and $\delta^{18}O$ oxygen-18/oxygen-16 ratio [11].

The U.S. Geological Survey's National Water-Quality Assessment Program collected groundwater samples in the Cook Inlet Basin in southcentral Alaska in 1999. The NWQA program used water samples to determine the occurrence and distribution of selected significant ions, nutrients, trace elements, volatile organic compounds, radioisotopes, and environmental isotopes. We are interested in hydrogen rather than oxygen.

The δ notation expresses the parts-per-thousand difference in the ratio of the heavier abundant isotope to abundant isotope in a sample relative to the same ratio in a reference standard;

$$\Delta^2H=\{(^2H/^1H)\ \text{sample} / (^2H/^1H)\ \text{standard} - 1\}\text{x}1000 \quad (1).$$

Table 1 shows the amounts of $\delta^{18}D$ and δ^2H with average [14].

Water sample	$\delta^{18}O$	δ^2H
Specially processed water*	-10.79	-65.21
Tap water (Japan)	-8.58	-58.72
Nagara river (Japan)	-9.17	-51.60
Glacial Cap (Canada)	-19.85	-141.69
Crystal Geyser U.S.A.)	-15.32	-109.71

*The water is pressurized at 3 MPa.

Table 1: The amounts of $\delta^{18}D$ and δ^2H in Alaska Glacier Cap, Tokyo city water, and specially processed water (MICA water).

We notice the water contains deuterium in nature.

We will discuss the amount of ^2H as minor as possible using a medical treatment.

Deuterium decreases with SIGN water

Heavy water is not radioactive, but it has a density about 11% greater than water; otherwise, it is physically and chemically similar. The human body naturally contains deuterium, equivalent to about five grams of heavy, harmless water. When a significant fraction of water (> 50%) in higher organisms is replaced by heavy water, the result is cell dysfunction and death [15].

Deuterium contains a neutron and a proton but is non-radioactive. The proton has never been observed to decay, so ^1H is a stable isotope, and ^2H is not radioactive.

We develop activation of the deuterium with an infoton containing in the SIGN water; The neutron decays as follows:

$n \rightarrow p + e^- + \bar{\nu}$, n; neutron, p; proton, e^-; electron and $\bar{\nu}$; anti-neutrino (2).

The neutron's mass is nearly equal to the infoton, <H^+∼e^->, like 1.00898 u, and the infoton's mass is p + e =1.008138 u (atomic mass unit), and the difference is only 0.08%. The left-hand side of the equation is similar to the equation, $p + e^-$, on the right side, which is <H^+∼e^->.

Therefore, we can reduce the deuterium, resulting in lower Δ^2H, by decreasing ^2H (Table 1). We regard heavy water as not necessary for the human body.

By the way, we introduce the following equation: if a proton decays, although it is said that it has never been observed to decay. $p \rightarrow n + e^+ + \nu$ (neutrino) (3). As we discussed, the mass of the neutron in the right hand nearly equals the infoton's, and the electron, <H^+∼e^->, may react with e^+, resulting in zero.

Therefore, the electron beam from equation (2) will affect a body when heavy water is used for medical treatment.

Conclusion

We discussed unsaturated fatty acids and the substance's anticancer, namely, linoleic acid, γ-linolenic acid and arachidonic acid, essential fatty acids. Another theme was heavy water containing deuterium, a hydrogen isotope; we introduced the reduction of deuterium with the specially processed water containing pico-extended particle, infoton, <H^+∼e^->; we proposed the mechanism given neutron-decay characteristics, and the water changed the hydrogen in heavy water. Finally, ^1H is enough for a human body.

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