

Water, Water, Everywhere,
Caveat Emptor (Buyer Beware)!

By Dr. Paul Shin

The popular interest over one's physical health and well-being has spurred an onslaught of health care products. Recently, The Water Puzzle and the Hexagonal Key, Scientific evidence of Hexagonal Water and its positive influence on health!¹ a book by Dr. Mu Shik Jhon, was published and promoted in this publication and its web site^{2,3,4} and on the internet.⁵ The issue at hand is whether this concept (of "hexagonal" water) and therefore the industry surrounding it is as credible and actually beneficial as it is touted to be. In this article I present a scientific evaluation of the main piece of supporting evidence for Hexagonal Water, specifically as it is presented in Dr. Jhon's book.⁶ What is the science behind Hexagonal Water and how is it being used?

We all know of the biological importance of water and how we need to drink enough each day to keep our bodies operating optimally. There are many facets to the physical and chemical description of water that illustrate why it is the universal "molecule of life" without which our bodies couldn't exist. Water on Mars was sought as a necessary prerequisite for the past (or present) existence of life there. Dr. Jhon claims that water can be found in the liquid state in the form of hexagonal (six-sided) clusters. He envisions these clusters to be in the shape of rings that do not change shape or composition over a significant period of time. He claims that such forms of water are more beneficial to our bodies than other forms like the pentagonal (five-sided) or randomly associated larger clusters as is found under common conditions. To date, there are no reports in the scientific literature that verify the existence of such hexagonal structures for water. There are, however, several reports of their theoretical existence (Dr. Jhon being an author on several such reports).⁷ If these clusters could actually be directly detected and proven to exist as static (stable and non-changing) entities, then our understanding of chemistry and physics would be revolutionized!⁸

The fundamental basis for the existence of hexagonal clusters of water according to Dr. Jhon is presented in the data from NMR experiments. Nuclear magnetic resonance (NMR) technology is not as dangerous as it sounds! It is a non-invasive way to look at molecules- their composition, shape and motion. Its biomedical cousin (MRI- magnetic resonance imaging) is used to look at large groups of molecule types (*i.e.* different types of tissue in the body- bone versus muscle for example) as a medical diagnostic tool. I happen to be a chemist who specializes in the use of NMR technology.⁹ Dr. Jhon uses NMR applied to oxygen in water (¹⁷O-NMR linewidth).¹⁰ This linewidth value¹¹ reflects the potential interaction between water in its different physical states. The narrower (or smaller the value of) the linewidth, the less the water molecules are changing physical states or environments. Water samples with narrow (or small) linewidths (FWHH) therefore have a more static (non-changing) and stable physical environment of the liquid water molecules that comprise it. Dr. Jhon states that:

"The ¹⁷O-NMR linewidth for normal tap water usually measures between 100 and 150 Hertz, indicating an unorganized state of the water and a cluster size of (H₂O)₁₂₋₁₃.¹² Hexagonal Water usually measures between 60 and 70 Hz. (*sic*) – indicating a higher percentage of 6-ring structures (H₂O)₆."

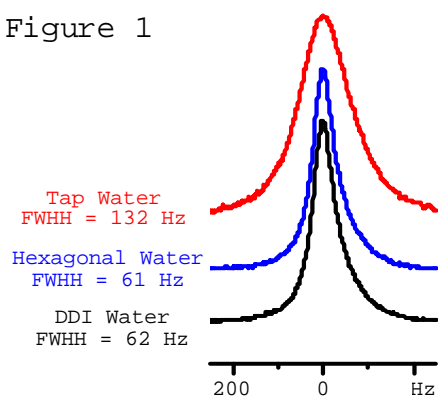
He reports ¹⁷O-NMR linewidth data for hexagonal water and there does appear to be a clear and well-defined difference between "Hexagonal Water" and tap water. I decided to replicate his experiment since scientific reproducibility lends credibility to reported results. Sure enough I was indeed able to replicate his data precisely! However, I also ran some control samples to ensure what was observed is indeed supportive to his claims about "Magnetically-structured water." My results are shown in Table 1.

Table 1. ^{17}O -NMR data for several water based sample. Both linewidth and pH values for these sample are listed.

Sample ¹³	FHWW (Hz) ¹⁴	pH ¹⁵
Human urine	60	4.8
Hexagonal Water	61	4.7
Ultrapure (DDI) water	62	4.8
M-Water	67	5.0
Strawberry juice	72	3.5
Home tap water	84	5.5
Arrowhead water	91	5.5
Home drinking water	109	5.0
Lab tap water	132	5.5
Kirkland water	135	7.0

As can be easily seen, the ultrapure (distilled & de-ionized or DDI) water has a ^{17}O -NMR linewidth nearly identical to that for Hexagonal Water and similar to that of M-Water (another “hexagonal water” product). Figure 1 shows an example of actual ^{17}O -NMR data. I conducted additional experiments comparing Hexagonal Water against ultrapure water and found no differences. Regardless of whether I added table salt or vitamin C or if I even diluted these samples of water with tap water, I saw no differences!¹⁶ I will leave it up to you to evaluate the data for yourself, but it is of interest to note that even a urine sample gives a ^{17}O -NMR linewidth that is virtually identical to that for Hexagonal Water.¹⁷

Figure 1



These results do not support Dr Jhon’s conclusions about the unique nature of his Hexagonal Water and this therefore casts a less than credible light on his claims of the therapeutic effects of Hexagonal Water.

In my recent conversation with MJ Pangman, the editor of this translated book, I had a chance to ask her several questions about the scientist and the science behind this presentation of “hexagonal water” theory. Dr. Jhon, a very prolific scientist with over 250 publications- most in American scientific journals,¹⁸ did not actually write this version of this book himself. Ms. Pangman personally met with him to ensure correct translation of his original writings that are in Korean. She wanted to accurately present his “wonderful findings” for our (*i.e.* the reader’s) benefit. The problem I have is that this book is fraught with errors that are both grammatical and, worse, scientific! How could such a prolific scientist who has published many of his own papers in English language journals approve of another publication with so many errors? Was too much “lost in translation”?

This book attempts to answer many questions about the unique properties of water. In his zeal to rationalize the extra-special properties of a particular form of water, Dr. Jhon has failed to provide sound scientific evidence to support his claims. He has even ignored some of the basic properties of water that students learn about in an advanced high school or college level chemistry course. Unfortunately, there are many questions created, not answered, by this book and none of his explanations¹⁹ lend credibility to the theories he presents.

In my opinion, the old paradigm, “*Knowledge is power!*” is not correct, but this truism should be, “*Knowledge is not power- It's what you do with knowledge- that's power!*” As with any form of power, it can be misused and abused. Insider information about a stock value for example is knowledge, but it is worthless unless acted upon. Remember Martha Stewart? Having the knowledge of what was going to happen with Imclone stock wasn't what disempowered her, it was her untimely selling of that stock- her action- that did. Scientific information is often misused and/or distorted and advantageously used to promote ideas or products. Is this what is being done with Hexagonal Water?

Often with dubious claims such as those made in this book (and by other proponents of “hexagonal” or “structured” water), there is some valid science presented, but then the rest of it is altered to serve the needs of the purveyor. The quoting of a Nobel laureate is also often used to make it sound like that this person supports the proponent's cause when this is not actually the case. In considering the veracity of such claims, the reader should always think for him or herself. Does the presented information really make sense at the fundamental level? Of course, having an appropriate educational background helps in evaluations of such data.

Yes, there are a dozen different physical forms of water, but they are found in water's solid form (ice) which can't exist in ambient nor physiological conditions! There is no “solid”²⁰ data to support the proposed hexagonal structure for water in the liquid state. In this book Dr. Jhon simply does not provide convincing evidence to support the miraculous properties of Hexagonal Water. Since all “hexagonal” or “clustered” water claims that can be found have the same dubious basis, the whole concept of hexagonal water is filled with too many holes to “hold water” for me.²¹

Caveat emptor!

¹ M. S. Jhon, in “The Water Puzzle and the Hexagonal Key, Scientific evidence of Hexagonal Water and its positive influence on health!”, (M.J. Pangman, ed.) Uplifting Press, Inc (no city is listed for publisher) (2004).
www.waterpuzzle.com

² www.thelatestmagazine.com/Articles/0604TheWater.htm

³ www.thelatestmagazine.com/Articles/0604structuredwater.htm

⁴ www.thelatestmagazine.com/Articles/0604WaterCrystals.htm

⁵ A Google search using the title nets 7 hits while using “hexagonal water” nets over 500 hits including products that produce hexagonal water.

⁶ There are other aspects of Hexagonal Water that are not addressed in this article. The use of electromagnetic fields in both the creation and analysis of Hexagonal Water and correlation of the pH of Hexagonal Water to the increasingly popular concept of the alkaline pH diet, for example, would each make additionally good topics for discussion but are not discussed here.

⁷ Refer to the references listed in his book.

⁸ All the scientific publications I have read clearly state that water is a constantly dynamic (changing) system that changes in the microscopic timeframe. Fluid dynamics at the molecular level occurs within the microsecond timescale or less. This concept is taught in advanced high school or introductory/general college level chemistry courses.

⁹ I have eighteen years of experience with NMR technology. This includes being a software and hardware engineer and sales representative for the leading manufacturer of NMR instrumentation in the world- not to mention the fact that I am currently the chemical instrumentation lab manager at a local university and am in charge of two high magnetic field NMR instruments.

¹⁰ See Appendix, page 115-116 in his book. Note that he is not a specialist in this technology though!

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- ¹¹ Also referred to as the full-width-at-half-height (FWHH) is reported in units of Hertz (Hz).
- ¹² The subscript outside the parentheses indicate the number of water molecules in the cluster whereas subscripts within indicate the number of each of the different types of atoms that comprise the molecule.
- ¹³ The urine sample is mine collected using aseptic (sterile) technique. The Hexagonal Water is Hexagonal Scalarwave Structured Water™. The ultrapure (DDI) water is produced from the Millipore Super-Q water filtration system (<http://www.millipore.com/catalogue.nsf/docs/C1760>). M-Water is Dr. David Wheeler's Primordial M-Water®. Strawberry juice is Trader Joe's Sir Strawberry juice drink. Home tap water is from my house collected using aseptic technique. Arrowhead water is commercially available. Home drinking water is purchased from Yellow Stone Drinking Water in San Fernando, California and was collected using aseptic (sterile) technique. Lab tap water is from the sink in the room that houses the NMR system. Kirkland water is from Costco. All samples were treated and prepared for NMR analysis identically. Please contact me if you would like details on the samples and/or the NMR experiment.
- ¹⁴ Error is conservatively within +/- 2 Hz.
- ¹⁵ Error is within +/- 0.2 pH units.
- ¹⁶ For the sake of presenting basic information, these data are not reported here, but please contact me for the detailed results of these additional experiments if you are interested.
- ¹⁷ I will also defer the correlation of the NMR linewidth data to the sample pH- to a separate article perhaps should the demand arise. These low pH values for the "hexagonal" waters are considered unfavorable by those who believe that poor health is caused by a low pH diet.
- ¹⁸ Most if not all are cited in his book, but many have nothing to actually do with the topic of this book!
- ¹⁹ Nor the explanations of any other resource support "hexagonal" or "structured" water or related products.
- ²⁰ Pun intended!
- ²¹ If you are interested I will be happy to test your water samples as I can. Please contact me via e-mail at nmrguy@mindspring.com for details.