Expanding a New Scientific View Of the Functional Properties of Water

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The following is a report from the Waterlife Conference, November 2, 2001, Columbia University, New York City.

The Functional Water Society of North America

> *"If we truly honor the sacredness in all life from the humble village to the largest city on Earth. Then we need to honor water for without it life would not exist. We need to fully understand the nature of water and how best to work with it in supporting all life. This will take the synergy of nature, technology, wisdom and ethics toward all mankind!"*
>
> *From the philosophy of Rudolph Steiner*

Future Vision

In a village in the future, a WaterLife project could be seen as providing a clean central water source, monitored for safety via satellite communications and laser spectral analysis. The pumps are powered utilizing solar arrays, methane gas, wind or pedals. They are equipped with easy to clean filters and the ability to apply magnetic fields and modulated UV light in the water treatment process. Water can be effectively used as a disinfectant for cleaning or as an environmentally safe pesticide when the appropriate electrolyzing tools are
applied. Where appropriate, natural methods of water restoration could also be used such as those proposed by John Todd at Wood's Hole, creating a synergy between nature and technology. All of this exists now; it just needs the bold step of "vision" to view water as a whole system to best serve the needs of mankind.

The Nature of Water

Water is a molecule of wonder and a resource that is taken for granted. The bonding and structure of water give it unique biological and ecological properties. We need a better understanding of water, its uses, and what we're doing to it. We need to merge advanced water research with current water polices and treatment, and use water as an ecological tool in renewing our environment. We need to provide water as the means to better the health of the villagers and their animals, and to enhance their crops. To do this, we need to step aside from our historical view of water

science and consider the possibilities presented by recent research, some of it “outside the box”. We need a wholistic vision and policy to ensure that we have clean air, water and proper soil conditions to maintain a healthy planet for its people and all life. We need to approach water from a whole systems perspective, using the new scientific advancements in our understanding of the nature of water and the water of nature!

Wholistic Approach to Water

The current focus on water treatment is on what shouldn’t be in the water. This assumes that the removal of “bad’ things in water will make the water good (i.e., have a positive health benefit). From an historical point of view, this may be true, except some of the techniques/chemicals used to remove the “bad” things may add new components that reduce the health benefits of the water. Thus, the current concern for the toxic byproducts of chlorine disinfection. The wholistic approach would be to consider what negative functions we are adding to water in our effort to remove or reduce existing components (microbes, toxins, chemicals, etc.) that produce negative functions. The next thing is to consider what we can do to water to produce positive functions. Another way to use the wholistic approach to water is to be concerned with what role the solvent (water) plays in the effectiveness of what’s in it (solutes).

Microbiologist has long recognized the import role that biological water plays in the formation of cell membranes, enzymes, and even DNA. Water restructures itself to accommodate biological processes [1]. Thus, nature shows us that altering the structure and properties of the water can have significant effects on what can be accomplished by what is in the water.

Functional Water

There is Functional Medicine and Functional Food, so why not Functional Water. Functional water can be defined as water that produces a positive health benefit. If we look at the basic functions of water in the body, such as solvent, lubricant, nutrient delivery, waste removal, and most of all, enabling almost all key biological processes (i.e., life), it is clear that water produces a positive health benefit. One example of an historical version of functional water is the mineral water used at spas for internal and external health benefits. Another example is the addition of fluorides to drinking water, which is supposed to produce a positive dental benefit (when calcium fluoride is used, not sodium fluoride, which is the chemical used mostly by local water companies). Not everyone agrees that fluoride in any form is beneficial.

If we want to see the health benefits of water, just look at what the lack of sufficient water in the body (dehydration) can cause [2]:

- Increased risk of kidney stones.
- Increased risk of urinary tract cancers.
- Increased risk of colon cancer.
- Increased risk of breast cancer

Some people feel that many of our health problems are due to chronic dehydration, and that proper hydration alone would cure many of our common diseases [3].

It is clear that water has medicinal and functional value. The key issue is what state should the water be in to provide the optimal medicinal and functional value. Unaltered source water from deep wells or protected springs would be a good start, but there are very few sources of water that are not treated by chemicals such as chlorine, ozone, and other chemicals. Thus, we should consider new treatment concepts that may restore or improve the medicinal/functional properties of conventionally treated water.

The historical way that functional water is produced is for nature or man to add minerals. Recently, man has decided to make aquaceuticals. That is, water with nutraceuticals (vitamins, herbs, minerals, etc.) that presumably produce a health benefit. Note that in all these cases, water is just the carrier (solvent) and the health benefits are assumed to come from the additives (solutes). Now what if the properties of the solvent (water) could be altered so that it contributed synergistically or catalytically to improve the health benefits of the solutes. This approach to making functional water has been actively pursued in recent years, particularly in Japan and Russia.

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Electrolyzed Alkaline Water

The Japanese and Russians have used electrolysis in combination with ion separation to produce functional waters with a wide range of beneficial properties for over 200 applications [4, 5]. For example, since 1966 the Japanese have been drinking **electrolyzed alkaline water** to increase and enhance calcium absorption. Approximately 15 million Japanese now drink this water. The Japanese Ministry of Health and Welfare has certified that alkaline electrolyzed water (a reducing water) assists in the alleviation of gastrointestinal disorders, acidosis, chronic diarrhea, and poor digestion. This same water is used in agriculture for enhancing plant growth. The acid electrolyzed water (an oxidizing water) that is produced by the same process [6] (and at the same time) is used as a disinfectant and pesticide.

Recent research in Japan has shown that electrolyzed alkaline drinking water has a synergistic effect on antioxidants. For example, the antioxidant strength of vitamin C in electrolyzed alkaline water is several times greater than vitamin C in tap water. The synergistic effect is due to the higher dissociation/ionization constant of the functional (electrolyzed) water [7]. Other studies have shown that electrolyzed water produces antioxidant behavior and protects DNA from free radical damage [8]. Clinical studies have shown that mice fed electrolyzed alkaline water lived 30% longer. This functional water enhanced the immune system and inhibited autoimmune disease [9].

Future Applications

There are many applications for functional water. Most of them have been subjected to limited testing and verification. A few of them have been extensively tested and are widely used outside the U.S. (human and animal drinking water, plant growth, food processing, disinfectant, pesticide). Based on this database, here are some possible future uses of functional water (used in the generic sense) in areas of interest to WaterLife.

- Use functional water for drinking to enhance the health benefits of nutrients in the water or taken with the water (humans and animals).
- Use functional water in cooking to improve the flavor and the nutritional value of foods.
- Use functional water for plant growth so that nutrients are more absorbable and less water is required.
- Use functional water for disinfection (water, food processing, medical, and mouth wash).
- Use functional water for skin problems (dermatitis, bruises, burns, bed sores).
- Use functional water to reduce gastrointestinal problems (diarrhea, constipation).

FWSNA

The Functional Water Society of North America (FWSNA) is a recently formed non-profit corporation that promotes the science and technology of functional water. It is associated with the Japanese Functional Water Foundation and participates in their annual Functional Water Symposium. The society maintains an extensive database of technical publications, articles and vendor information pertinent to the production and uses of functional water. This information, along with technical support, is provided to manufactures, users, and researchers of functional water.

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