

CLINICAL STUDIES OF IONIZED WATER

There have been many studies by Doctors in Japanese Hospitals on the Benefits of using Ionized Water.

Below are a few now translated into English and available to the public.

Fluid replacement promotes optimal physical performance.

Electrolyzed-reduced water scavenges active oxygen & protects DNA from oxidative damage.

The mechanism of the enhanced antioxidant effects of reduced water produced by electrolysis.

Antimicrobial interventions to reduce Salmonella species on poultry

Treatment of Escherichia coli inoculated alfalfa sprouts with electrolyzed oxidizing water

Inactivation of E. coli & Listeria on plastic kitchen cutting boards by electrolyzed oxidizing water.

Effect of electrolyzed water on wound healing.

Effect of electrolyzed oxidizing water on excised burn-wounds in rats

Decomposition of ethylene, a flower-senescence hormone, with electrolyzed anode water.

Use of Ionized water in hypochlorhydria, achlorhydria, reduction of high blood pressure

Use of Ionized water for gynecological conditions

Clinical Improvements obtained from the uptake of Ionized Water

Alkaline ionized water for abdominal complaints: Placebo controlled double blind tests

Physiological effects of alkaline ionized water: intestinal fermentation

Effects of calcium alkaline ionized water on formation and maintenance of osseous tissues

Reduced Water for Prevention of Disease

Use of Ionized water in heart disease and toxins.

Use of Ionized water in skin disease.

Use of Ionized water in allergies.

Use of Ionized water in diabetes treatment

Use of Ionized water in treating Acidosis

[Environmental electrochemistry of water](#)

The following information is sourced from various peer reviewed literature as well as various Internet sites. This information is for educational purposes only and is not meant to cure or treat any disease or illness. Consult your doctor for specialized medical advice.

Adequate fluid replacement helps maintain hydration and, promotes the health, safety, and optimal physical performance of individuals participating in regular physical activity.

American College of Sports Medicine position stand.

[Article on need for adequate water when exercising.](#)

Med Sci Sports Exercise

1996 Jan;28(1):i-vii.

Convertino VA, Armstrong LE, Coyle EF, Mack GW, Sawka MN, Senay LC Jr, Sherman WM.

It is the position of the American College of Sports Medicine that adequate fluid replacement helps maintain hydration and, therefore, promotes the health, safety, and optimal physical performance of individuals participating in regular physical activity. This position statement is based on a comprehensive review and interpretation of scientific literature concerning the influence of fluid replacement on exercise performance and the risk of thermal injury associated with dehydration and hyperthermia.

Based on available evidence, the American College of Sports Medicine makes the following general recommendations on the amount and composition of fluid that should be ingested in preparation for, during, and after exercise or athletic competition:

1) It is recommended that individuals consume a nutritionally balanced diet and drink adequate fluids during the 24-hr period before an event, especially during the period that includes the meal prior to exercise, to promote proper hydration before exercise or competition.

2) It is recommended that individuals drink about 500 ml (about 17 ounces) of fluid about 2 hours before exercise to promote adequate hydration and allow time for excretion of excess ingested water.

3) During exercise, athletes should start drinking early and at regular intervals in an attempt to

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consume fluids at a rate sufficient to replace all the water lost through sweating (i.e., body weight loss), or consume the maximal amount that can be tolerated.

4) It is recommended that ingested fluids be cooler than ambient temperature (between 15 degrees and 22 degrees C or 59 degrees and 72 degrees F) and flavored to enhance palatability and promote fluid replacement. Fluids should be readily available and served in containers that allow adequate volumes to be ingested with ease and with minimal interruption of exercise.

5) Addition of proper amounts of carbohydrates and/or electrolytes to a fluid replacement solution is recommended for exercise events of duration greater than 1 hour since it does not significantly impair water delivery to the body and may enhance performance. During exercise lasting less than 1 hour, there is little evidence of physiological or physical performance differences between consuming a carbohydrate-electrolyte drink and plain water.

6) During intense exercise lasting longer than 1 hr, it is recommended that carbohydrates be ingested at a rate of 30-60 g.h(-1) to maintain oxidation of carbohydrates and delay fatigue. This rate of carbohydrate intake can be achieved without compromising fluid delivery by drinking 600-1200 ml.hr(-1) of solutions containing 4%-8% carbohydrates (g.100 ml(-1)). The carbohydrates can be sugars (glucose or sucrose) or starch (e.g., maltodextrin).

7) Inclusion of sodium (0.5-0.7 g.l(-1) of water) in the rehydration solution ingested during exercise lasting longer than 1 hr is recommended since it may be advantageous in enhancing palatability, promoting fluid retention, and possibly preventing hyponatremia in certain individuals who drink excessive quantities of fluid. There is little physiological basis for the presence of sodium in an oral rehydration solution for enhancing intestinal water absorption as long as sodium is sufficiently available from the previous meal.

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Electrolyzed-reduced water scavenges active oxygen species and protects DNA from oxidative damage.

Use of Alkaline water with low ORP to reduce Radical Damage

Biochem Biophys Res Commun.

1997 May 8;234(1):269-74.

Shirahata S, Kabayama S, Nakano M, Miura T, Kusumoto K, Gotoh M, Hayashi H, Otsubo K, Morisawa S, Katakura Y.

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Active oxygen species or free radicals are considered to cause extensive oxidative damage to biological macromolecules.. The ideal scavenger for active oxygen should be 'active hydrogen'.

'Active hydrogen' can be produced in reduced water near the cathode during electrolysis of water. Reduced water exhibits high pH, low dissolved oxygen (DO), extremely high dissolved molecular hydrogen (DH), and extremely negative redox potential (RP) values. Strongly electrolyzed-reduced water, as well as ascorbic acid, (+)-catechin and tannic acid, completely scavenged O₂⁻² produced by the hypoxanthine-xanthine oxidase (HX-XOD) system in sodium phosphate buffer (pH 7.0). The superoxide dismutase (SOD)-like activity of reduced water is stable at 4 degrees C for over a month and was not lost even after neutralization, repeated freezing and melting, deflation with sonication, vigorous mixing, boiling, repeated filtration, or closed autoclaving, but was lost by opened autoclaving or by closed autoclaving in the presence of tungsten trioxide which efficiently adsorbs active atomic hydrogen. Water bubbled with hydrogen gas exhibited low DO, extremely high DH and extremely low RP values, as does reduced water, but it has no SOD-like activity. These results suggest that the SOD-like activity of reduced water is not due to the dissolved molecular hydrogen but due to the dissolved atomic hydrogen (active hydrogen). Although SOD accumulated H₂O₂ when added to the HX-XOD system, reduced water decreased the amount of H₂O₂ produced by XOD. Reduced water, as well as catalase and ascorbic acid, could directly scavenge H₂O₂.

Reduced water suppresses single-strand breakage of DNA by active oxygen species produced by the Cu(II)-catalyzed oxidation of ascorbic acid in a dose-dependent manner, suggesting that reduced water can scavenge not only O₂⁻ and H₂O₂, but also 1O₂ and .OH.

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PMID: 9169001 [PubMed - indexed for MEDLINE]

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The mechanism of the enhanced antioxidant effects against superoxide anion radicals of reduced water produced by electrolysis.

Effect of Alkaline Water on Free Radicals

Biophys Chem. 2004

Jan 1;107(1):71-82.

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We reported that reduced water produced by electrolysis enhanced the antioxidant effects of proton donors such as ascorbic acid (AsA) in a previous paper.

We also demonstrated that reduced water produced by electrolysis of 2 mM NaCl solutions did not show antioxidant effects by itself. We reasoned that the enhancement of antioxidant effects may be due to the increase of the ionic product of water as solvent. The ionic product of water (pK_w) was estimated by measurements of pH and by a neutralization titration method. As an indicator of oxidative damage, Reactive Oxygen Species- (ROS) mediated DNA strand breaks were measured by the conversion of supercoiled phiX-174 RF I double-strand DNA to open and linear forms. Reduced water had a tendency to suppress single-strand breakage of DNA induced by reactive oxygen species produced by H₂O₂/Cu (II) and HQ/Cu (II) systems. The enhancement of superoxide anion radical dismutation activity can be explained by changes in the ionic product of water in the reduced water.

PMID: 14871602 [PubMed - in process]

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Comparison of electrolyzed oxidizing water with various antimicrobial interventions to reduce Salmonella species on poultry.

Use of Acid Water to reduce Foodborne Pathogens

Poult Sci.

2002 Oct;81(10):1598-605.

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Food borne pathogens in cell suspensions or attached to surfaces can be reduced by electrolyzed oxidizing (EO) water; however, the use of EO water against pathogens associated with poultry has not been explored.

In this study, acidic EO water [EO-A; pH 2.6, chlorine (CL) 20 to 50 ppm, and oxidation-reduction potential (ORP) of 1,150 mV], basic EO water (EO-B; pH 11.6, ORP of -795 mV), CL, ozonated water (OZ), acetic acid (AA), or trisodium phosphate (TSP) was applied to broiler carcasses inoculated with Salmonella Typhimurium (ST) and submerged (4 C, 45 min), spray-washed (85 psi, 25 C, 15 s), or subjected to multiple interventions (EO-B spray, immersed in EO-A; AA or TSP spray, immersed in CL). Remaining bacterial populations were determined and compared at Day 0 and 7 of aerobic, refrigerated storage. At Day 0, submersion in TSP and AA reduced ST 1.41 log₁₀, whereas EO-A water reduced ST approximately 0.86 log₁₀. After 7 d of storage, EO-A water, OZ, TSP, and AA reduced ST, with detection only after selective enrichment. Spray-washing treatments with any of the compounds did not reduce ST at Day 0. After 7 d of storage, TSP, AA, and EO-A water reduced ST 2.17, 2.31, and 1.06 log₁₀, respectively. ST was reduced 2.11 log₁₀ immediately following the multiple interventions, 3.81 log₁₀ after 7 d of storage. Although effective against ST, TSP and AA are costly and adversely affect the environment.

This study demonstrates that EO water can reduce ST on poultry surfaces following extended refrigerated storage.

PMID: 12412930 [PubMed - indexed for MEDLINE]

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Treatment of Escherichia coli (O157:H7) inoculated alfalfa seeds and sprouts with electrolyzed oxidizing water. Acid Water and Food Sanitation

Int J Food Microbiol.

2003 Sep 15;86(3):231-7.

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Electrolyzed oxidizing water is a relatively new concept that has been utilized in agriculture, livestock management, medical sterilization, and food sanitation.

Electrolyzed oxidizing (EO) water generated by passing sodium chloride solution through an EO water generator was used to treat alfalfa seeds and sprouts inoculated with a five-strain cocktail of nalidixic acid resistant Escherichia coli O157:H7. EO water had a pH of 2.6, an oxidation-reduction potential of 1150 mV and about 50 ppm free chlorine. The percentage reduction in bacterial load was determined for reaction times of 2, 4, 8, 16, 32, and 64 min. Mechanical agitation was done while treating the seeds at different time intervals to increase the effectiveness of the treatment. Since E. coli O157:H7 was released due to soaking during treatment, the initial counts on seeds and sprouts were determined by soaking the contaminated seeds/sprouts in 0.1% peptone water for a period equivalent to treatment time. The samples were then pummeled in 0.1% peptone water and spread plated on tryptic soy agar with 5 microg/ml of nalidixic acid (TSAN). Results showed that there were reductions between 38.2% and 97.1% (0.22-1.56 log(10) CFU/g) in the bacterial load of treated seeds. The reductions for sprouts were between 91.1% and 99.8% (1.05-2.72 log(10) CFU/g).

An increase in treatment time increased the percentage reduction of E. coli O157:H7. However, germination of the treated seeds reduced from 92% to 49% as amperage to make EO water and soaking time increased. EO water did not cause any visible damage to the sprouts.

PMID: 12915034 [PubMed - indexed for MEDLINE]

The following information is sourced from various peer reviewed literature as well as various Internet sites. This information is for educational purposes only and is not meant to cure or treat any disease or illness. Consult your doctor for specialized medical advice.

Inactivation of Escherichia coli (O157:H7) and Listeria monocytogenes on plastic kitchen cutting boards by electrolyzed oxidizing water.

Use of Acid Water to clean Plastic Cutting Boards

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One milliliter of culture containing a five-strain mixture of Escherichia coli O157:H7 (approximately 10(10) CFU) was inoculated on a 100-cm² area marked on unscarred cutting boards.

Following inoculation, the boards were air-dried under a laminar flow hood for 1 h, immersed in 2 liters of electrolyzed oxidizing water or sterile deionized water at 23 degrees C or 35 degrees C for 10 or 20 min; 45 degrees C for 5 or 10 min; or 55 degrees C for 5 min. After each temperature-time combination, the surviving population of the pathogen on cutting boards and in soaking water was determined. Soaking of inoculated cutting boards in electrolyzed oxidizing water reduced E. coli O157:H7 populations by > or = 5.0 log CFU/100 cm² on cutting boards. However, immersion of cutting boards in deionized water decreased the pathogen count only by 1.0 to 1.5 log CFU/100 cm². Treatment of cutting boards inoculated with Listeria monocytogenes in electrolyzed oxidizing water at selected temperature-time combinations (23 degrees C for 20 min, 35 degrees C for 10 min, and 45 degrees C for 10 min) substantially reduced the populations of L. monocytogenes in comparison to the counts recovered from the boards immersed in deionized water. E. coli O157:H7 and L. monocytogenes were not detected in electrolyzed oxidizing water after soaking treatment, whereas the pathogens survived in the deionized water used for soaking the cutting boards.

This study revealed that **immersion of kitchen cutting boards in electrolyzed oxidizing water could be used as an effective method for inactivating food borne pathogens on smooth, plastic cutting boards.**

PMID: 10456736 [PubMed - indexed for MEDLINE]

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Effect of electrolyzed water on wound healing.

Acid Water for Burns

Artif Organs.

2000 Dec;24(12):984-7.

Yahagi N, Kono M, Kitahara M, Ohmura A, Sumita O, Hashimoto T, Hori K, Ning-Juan C, Woodson P, Kubota S, Murakami A, Takamoto S. Department of Anesthesiology, Teikyo University Mizonokuchi Hospital, Tokyo, Japan. naokiyah@aol.com

Electrolyzed water accelerated the healing of full-thickness cutaneous wounds in rats, but only anode chamber water (acid pH or neutralized) was effective. Hypochlorous acid (HOCl), also produced by electrolysis, was ineffective, suggesting that these types of electrolyzed water enhance wound healing by a mechanism unrelated to the well-known antibacterial action of HOCl. One possibility is that reactive oxygen species, shown to be electron spin resonance spectra present in anode chamber water, might trigger early wound healing through fibroblast migration and proliferation.

PMID: 11121980 [PubMed - indexed for MEDLINE]

The following information is sourced from various peer reviewed literature as well as various Internet sites. This information is for educational purposes only and is not meant to cure or treat any disease or illness. Consult your doctor for specialized medical advice.

Decomposition of ethylene, a flower-senescence hormone, with electrolyzed anode water. Acid Water used to extend Flower Life

Biosci Biotechnol Biochem.

2003 Apr;67(4):790-6.

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Electrolyzed anode water (EAW) markedly extended the vase life of cut carnation flowers.

Therefore, a flower-senescence hormone involving ethylene decomposition by EAW with potassium chloride as an electrolyte was investigated. Ethylene was added externally to EAW, and the reaction between ethylene and the available chlorine in EAW was examined. EAW had a low pH value (2.5), a high concentration of dissolved oxygen, and extremely high redox potential (19.2 mg/l and 1323 mV, respectively) when available chlorine was at a concentration of about 620 microns. The addition of ethylene to EAW led to ethylene decomposition, and an equimolar amount of ethylene chlorohydrine with available chlorine was produced. The ethylene chlorohydrine production was greatly affected by the pH value (pH 2.5, 5.0 and 10.0 were tested), and was faster in an acidic solution. Ethylene chlorohydrine was not produced after ethylene had been added to EAW at pH 2.6 when available chlorine was absent, but was produced after potassium hypochlorite had been added to such EAW. The effect of the pH value of EAW on the vase life of cut carnations was compatible with the decomposition rate of ethylene in EAW of the same pH value.

These results suggest that the effect of Electrolyzed Anode Water on the vase life of cut carnations was due to the decomposition of ethylene to ethylene chlorohydrine by chlorine from chlorine compounds.

PMID: 12784619 [PubMed - indexed for MEDLINE]

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