Consumption of Alkaline Ionised Water Promotes Optimal Physical Performance

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

Med Sci Sports Exercise

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

American college of sports medicine position stand. Exercise and fluid replacement.

Convertino wa, Armstrong Le, Coyle ef Mac GW, Savko MN Senai LNR Jr, Sherman VM.

It is the position of the American College of Sports Medicine that adequate fluid replacement helps maintain hydration and thus contributes to the health, safety and optimal physical performance of individuals participating in regular physical activity.This position is based on a comprehensive review and interpretation of the scientific literature regarding the effects of fluid replacement on physical performance and the risk of thermal injury associated with dehydration and hyperthermia. Based on the available evidence, the American College of Sports Medicine provides the following general recommendations for 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 for 24 hours prior to competition, especially during a period that includes a pre-exercise meal, to promote proper hydration prior to training or competition

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

3) During training, athletes should start drinking early and at regular intervals in an attempt to consume fluids at a rate sufficient to replace all water lost through sweating (i.e., loss of body weight) or consume the maximum amount that can be tolerated.

4) It is recommended that ingested liquids be cooler than the ambient temperature [between 15 degrees and 22 degrees C (59 degrees and 72 degrees

F])] and flavoured to enhance palatability and promote fluid replacement. Liquids should be readily available and provided in containers that allow adequate amounts of food to be taken with ease and with minimal interruption of exercise.

5) The addition of adequate amounts of carbohydrates and/or electrolytes to a fluid replacement solution is recommended for exercise lasting more than 1 h, as it does not significantly impair body water delivery and may enhance performance.

During exercise lasting less than 1 h, there is little evidence of physiological or physical performance differences between the consumption of a carbohydrate-electrolyte drink and plain water.

6) During intense exercise lasting more than 1 h, carbohydrate intake at a rate of 30-60 g/h(-1) is recommended to maintain carbohydrate oxidation and slow fatigue. This rate of carbohydrate intake can be achieved without compromising fluid delivery by consuming 600-1200 ml h(-1) solutions containing 4% -8% carbohydrate (g.100 ml(-1)). Carbohydrates can be sugars (glucose or sucrose) or starches (e.g. maltodextrin).

7) It is recommended that sodium (0.5-0.7 g 1(-1) water) be included in a rehydration solution taken during exercise lasting more than 1 h because it may be useful in improving palatability, promoting fluid retention and possibly preventing hyponatremia in some people who drink excessive amounts

of fluid. There is little physiological justification for the presence of sodium in an oral rehydration solution to enhance intestinal water absorption as long as sodium is sufficiently available from the previous meal.

Alkaline water and cancer research

Alkaline water vs tap water

Kyu Jae Lee, Suk Kim, Jin Won Kim, Hyun Won Kim, Yonsei University, Wonju, Korea, Sangi University, Korea

Summary:

• Mineral Alkaline Reconstituted Water (ARW) strengthens the immune system.

• Mineral alkaline reduced water inhibited the growth of cancer cells transplanted into mice, demonstrating its

anti-cancer effects.

• Reduced sugar levels.

• Mineral Alkaline Reconstituted Water made the HDL ratio high and also low HDL (high-density lipoprotein)-Also known as "good" cholesterol, already used and unused cholesterol and taking them back to the liver as part of the LDL (low-density lipoprotein)-Also known as "bad" cholesterol recycling process, Higher LDL levels are associated with a greater risk of cardiovascular disease.

Inhibitory Effect of Electrolysed Reconstituted Water on Tumour Angiogenesis

Biological and Pharmaceutical Bulletin. 2008 Jan;31(1):19-26

E. J, Lee G, Hamasaki T Nakamichi N, T, T Kashiwagi, Teruya K Nishikawa R Kawahara T, Osada K Toh

K Abe M, Tian C, Kabayama S Otsubo K Morisawa S Katakura G, Shirahata S.

Graduate School of Systems Life Sciences, Kyushu University, Higashi-ku, Fukuoka 812-8581, Japan

Vascular endothelial growth factor (VEGF) is a key mediator of tumour angiogenesis. Tumour cells are exposed to higher oxidative stress compared to normal cells. Numerous reports have shown that the intracellular redox (redox, redox potential) state is closely related to the expression pattern of VEGF. Electrolysed reduced water (ERW) generated near the cathode during water electrolysis absorbed intracellular H(2)O(2) and reduced the release of H(2)O(2) from human lung adenocarcinoma cell line A549, and downregulated both VEGF transcription and protein secretion in a time-dependent manner.

To investigate the signal transduction pathway involved in the regulation of VEGF expression, specific inhibitors of mitogen-activated protein kinase (MAPK), SB203580 applied (p38 MAPK inhibitor), PD98059 (ERK1/2 inhibitor) and JNKi (c-Jun N-terminal protein kinase inhibitor).

The results showed that only PD98059 blocked VEGF expression, indicating an important role of ERK1/2 in the regulation of VEGF expression in A549 cells. In addition, ERFs inhibited the activation of extracellular signal-regulated kinase (ERK) in a time-dependent manner. Co-culture experiments to analyse tubule formation in vitro revealed that conditioned medium of A549 cell origin significantly stimulated vascular tubule formation in all parameters analysed: total tubule area, tubule connectivity, number of tubules and total tubule length. ERW counteracted the effect of medium conditioned by A549 cells and decreased total tubule length ($p<0.01$). The present study demonstrated that ERW suppresses VEGF gene transcription and protein secretion by inactivating ERK. Suppression of cancer cell invasion and angiogenesis by electrolysed reduced water.

From: In Vitro Biology Society

2004 World Congress on In Vitro Biology, 23 May 2004.

Y. Jun, K. Teruya, Y. Katakura, K. Otsubo*, S. Morisawa*, S. Shirahata. Genetic Resources Division

Technology, Department of Agriculture, Kyushu University, 6-10-1 Hakozaki, Higashi-ku, Fukuoka 812-8581, Japan

***Nihon Trim Co., Ltd. 1-8-34 Oyodonaka, Kita-ku, Osaka 531-0076,**

Cancer cell invasion and metastasis are major causes of death in cancer patients. Cancer cells also secrete VEGF, which stimulates angiogenesis for tumour tissue development. Suppression of invasion/metastasis and angiogenesis is a relevant target for cancer prevention.

Electrolysed reduced water (ERW) is an antioxidant water that contains a high concentration of dissolved hydrogen and can absorb intracellular reactive oxygen species (ROS). ERW contains small amounts of platinum nanocolloids as atomic hydrogen (active hydrogen) donors and AFC absorbers. Here we report the effect of ERW on invasion of human fibrosarcoma HT1080 cells and angiogenesis induced by HT1080 cells. ERW was prepared by electrolysis of 0.002 M NaOH solution using a batch electrolyser

(Type TI-200S, Nihon Trim Co., Osaka, Japan).

ERVs absorbed hydrogen peroxide in both cells and medium. RT-PCR and zymography analysis showed that ERW suppressed the expression and activation of matrix metalloproteinase-2 (MMP2). ERW was assessed to inhibit invasion by suppressing phosphorylation of p38 MAP kinase. ERW also suppressed VEGF expression and secretion in HT1080 cells by inhibiting ERK MAP kinase phosphorylation. ERW

suppressed HT1080 cell-induced angiogenesis by human blood endothelial cells, suggesting that ERW may be useful for cancer prevention and treatment.

Electrolysed reduced water absorbs active oxygen and protects DNA from oxidative damage.

Damage

From US Patent No. 6475371, published on 11 November 2002.

Abstract: An electrolytic reduced water free of perchloric acid and chlorine gas that is effective for treating cancer is provided. Water including sodium hydroxide is subjected to electrolysis. The electrolytically reduced water obtained from the cathode electrode side was found to suppress cancer cell metastasis. The water had no effect on the growth of healthy cells during the one-week test.

Extract:The results of evaluating the cancer cell metastasis inhibitory effects of the resulting

electrolytically reduced water (with electrolysis degree 5 in Table 1) will be described.FIG. 3 shows the inhibitory effects of electrolytically reduced water against highly metastatic strains of human sarcoma cell sarcoma cells

HT1080 in an in vitro metastasis model system. Here, HT1080 cells available from a mobile bank (e.g. OKE Cell Bank or ATCC (in the USA)) were recruited.

HT1080 cells were cultured in 10% fetal bovine serum supplemented MEM medium at 37°C. under 5% CO.sub.2 /95% air medium. A chemotaxel filter (pore size: 8 mu .m) was coated with a matrigel of 25 mu.g/filter.

Subconfluent HT1080 cells were suspended in MEM medium containing 0.1% bovine serum albumin (BSA) and cell counts were adjusted to 4.times.10.sup.5 /ml. 200 .mu.l of the resulting medium was added to the cell in its upper chamber. Immediately after the addition of cells, 700.mu. MEM (Minimum Essential Medium; medium including the lowest possible amount of nutrient ingredients was added) containing 10 μg/ml fibronectin to the chamber in its lower room (having a plate with 24 holes) (side of the plate with 24 holes) and cultured in a CO.sub.2 incubator.

After six hours, the chamber was removed. Cells were removed from the top surface of the filter with a cotton swab and transferred to a 24-well s-plate containing WST-1 (an indicator that changes its colour depending on the metabolic capacity specific to live cells or the number of live cells). After culturing for 16 hours, the following was measured

absorption at 450 nm. Referring to FIG. 3, "ctrl" represents the result of using purified water and "NaOH mixture" represents the result when electrolytically reduced water is obtained with a degree of electrolysis of 5 in the

Table 1 was used. As shown in FIG. 3, the invasive metastasis of HT1080 cells is dramatically reduced in the case of

NaOX mix compared to ctrl.

This means that electrolytically reduced water suppressed invasive metastasis of human fibre sarcoma cells -.

Suppression of two-step cellular transformation by electrolysed reduced Water/platinum nanocolloids.

From:

In Vitro Biology Society

2004 World Congress on In Vitro Biology, 22-26 May 2004 (submitted 23 May 2004).

P. NISHIKAWA, K. Teruya, Y. Katakura, K. Otsubo, S. Morisawa and S. Shirahata. Genetic Resources Division

Technology, Department of Agriculture, Kyushu University, 6-10-1 Hakozaki, Higashi-ku, Fukuoka 812-8581, Japan and Nihon

Trim Co., Ltd, 1-8-34 Kita-ku, Oyodonaka, Osaka 531-0076, Japan.

According to the theory of two-step cellular transformation, cancer cells first receive initiation, which is mainly caused by a

DNA damage followed by promotion that enhance transformation. Balb/c 3T3 mouse cells have been widely used for experiments

on transformation, as cells lose the ability to inhibit contact during transformation.

Electrolysed Reconstituted Water (ERW) is a healthy alkaline drinking water that contains a high concentration of

dissolved hydrogen and can absorb intracellular reactive oxygen species (ROS).

We found that ERWs contain small amounts of platinum nanocolloids as atomic hydrogen (active hydrogen) donors and AFC scavengers. Therefore, ERWs containing synthesised platinum nanocolloids (ERW/Pt) can be considered as a model of strong ERWs.

Here we report that ERW/Pt can prevent transformation of Balb/c 3T3 cells. ERW was prepared by electrolysis of 0.002 M NaOH solution using a batch electrolysis device (type TI-200S, Nihon

Trim Co., Osaka, Japan).

BALB/c 3T3 cells were treated with 3-methylcholantrine (MCA) as the initiating compound and then treated with phorbol-12-myristate-13-acetate (PMA) as the promoting compound. The focus of transformation was strongly

suppressed by co-treatment with MCA/PMA and ERW/Pt. ERW/Pt suppressed transformation at the promoter stage but not at the initiation stage, suggesting that it suppressed the increase in intracellular AFCs by PMA.

Electrolysed reduced water absorbs reactive oxygen species and protects dna from oxidative damage.

Byuh1m.jurn. biophys. Res. Commun., 234, 269174, 1997Dr. Sanetaka Shirahata, S. et al Graduate school of Genetics

Resources Technology , Kyushu University , 6-10-1 Hakozaki, Higashi-ku, Fukuoka 812 8581, Japan.

It has long been established that reactive oxygen species (ROS) cause many types of damage to biomolecules and cellular structures, which in turn leads to the development of various pathological conditions such as diabetes, cancer and aging. Reduced water is defined as antioxidant water produced by reducing water. Electrolysed reduced water (ERW) has been demonstrated to be hydrogen-enriched water and purification of dew in vitro (Shirahata et al.,1997).

Proton reduction in water to active hydrogen (atomic hydrogen, hydrogen radical) capable of absorbing AFCs is very easily induced by a weak current compared to the oxidation of a hydroxyl ion to an oxygen molecule. Activation of water by magnetic field, collision, minerals, etc. etc. will also produce reduced water containing active hydrogen and/or hydrogen molecule. Several natural waters such as Hita

Tenryosui water taken from deep underground in Hita City in Japan, Nordenau water in Germany and Tlacote water in Mexico are known to alleviate various diseases.

We have developed a sensitive method by which we can detect active hydrogen existing in reduced water and demonstrated that not only ERW but also the natural reduced waters described above contain active hydrogen and scavenge AFCs in cultured cells. AFCs are known to cause a decrease in glucose uptake by inhibiting the insulin signalling pathway in cultured cells. Reduced water uptake by intracellular AFCs and stimulated glucose uptake in the presence or absence of insulin in both L6 rat skeletal muscle cells and 3T3/L1 mouse adipocytes. This insulin-like activity of reduced water was inhibited by wortmannin, which is a specific inhibitor of PI-3 kinase, a key molecule in insulin signalling pathways. Reduced water protected insulin-sensitive cells from sugar toxicity and improved the damaged sugar tolerance of model mice with type 2 diabetes, suggesting that reduced water may improve insulin-independent diabetes. Cancer cells are normally subjected to severe oxidative stress. Reduced water induces impaired tumourigenic phenotypes of human cancer cells, such as reduced growth rate, morphological changes, reduced colony-forming ability in soft agar, telomere shortening dependent on the number of passages, reduced binding capacity of telomere-binding proteins and suppression of metastasis. Reduced water suppressed the growth of cancer cells transplanted into mice, demonstrating its anticancer effects in vivo. Reduced water will be applicable not only to medicine, but also to food industry, agriculture and manufacturing industry.

Antitumour effect of alkaline reduced water

Kyu-Jae LI1,2, Seung-Kyu PARK1,2, Jae-won KIM1, Kwang-Yang KIM1, Young-Suk RYAN5, Geun-Ha KIM 1,

Hyun-Cheol CHO3, Su-Ki KIM2,3 and Hyun-Won KIM2,41 Department of Parasitology, 2 Institute of Basic Medicine

Sciences, 3 departments of microbiology, 4 departments of biochemistry, Wonju Medical

College, Yonsei University. (Wonju

Korea) 5Dept. of Biomedical Laboratory Sciences and Institute of Medical Sciences, College of Medical Sciences, Yonsei

Univ. of Korea (Wonju, Korea)

Abstract: Some minerals can produce alkaline reduced water with high pH and low redox potential (ORP) when dissolved in water. Alkaline reduced water (ARW) has shown significant antitumour effects. When B16 melanoma cells were inoculated subcutaneously and intraperitoneally, ARB-treated C56BL/6 mice showed delayed tumour growth and significantly prolonged lifespan. ARB also showed inhibition of metastasis by reducing the number of B16 melanoma colonies when administered via tail vein. The amount of reactive oxygen species (ROS) was very reduced by ARB feeding, except in the spleen, which is the major organ of immunity. Even in normal mice, ARB administration induced systemic cytokines such as as, Th1 (IFN-g, IL-12) and Th2 (IL-4, IL-5), indicating a strong immunomodulatory effect. Both the AFC scavenging effect and immunomodulation effect may be responsible for the antitumour effect of alkaline reduced water.

Electrolysed reduced water absorbs active oxygen and protects DNA from oxidative damage.

Damage

Biochem Biophys Res Commun.

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

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

Institute of Cell Regulatory Technology, Graduate School of Genetic Resource Technology, Kyushu University, Fukuoka,

Japan. sirahata@grt.kyushu-u.ac.jp

Reactive oxygen species or free radicals are believed to cause extensive oxidative damage to biological macromolecules, leading to various diseases as well as aging. The ideal active oxygen scavenger should be "active hydrogen". "Active hydrogen" can be produced in reduced water near the cathode during water electrolysis. Reconstituted water has high pH, low dissolved oxygen (DO), extremely high dissolved molecular hydrogen (DH) and extremely negative redox potential (RP) values. Strongly electrolysed-reduced water as well as ascorbic acid, (+)-catechin and tannic acid, fully purified by O.-2 produced by the hypoxanthine-xanthine oxidase (HX-XOD) system in sodium phosphate buffer (pH 7.0).

The superoxide dismutase (SOD) activity of the reconstituted water was stable at 4 °C for more than a month and was not lost even after neutralisation, repeated freezing and melting, deflation with ultrasound, vigorous agitation, boiling, re-filtration or closed autoclaving, but was lost by open autoclaving or closed autoclaving in the presence of tungsten trioxide, which effectively adsorbs active atomic hydrogen. Water bubbled with hydrogen gas exhibited low DO, extremely high DH and extremely low RP values like the reduced water, but it does not possess turf-like activity. These results suggest that the turf-like activity of reduced water is due to dissolved atomic hydrogen (active hydrogen) rather than dissolved molecular hydrogen. Although SOD accumulated H2O2 when HX-XOD was added to the system, the reduced water reduced the amount of H2O2 produced by XOD. Reduced water, as well as catalase and ascorbic acid, can directly absorb H2O2. Reduced water suppresses the one-strand degradation of DNA reactive oxygen species in formed by Cu(II)-catalysed oxidation of ascorbic acid in a dose-

dependent manner, suggesting that reduced water can absorb not only O2.-U H2O2 but also 1O2 and OH.

PMID: 9169001 [PubMed - indexed for MEDLINE].

Mechanism of Enhanced Antioxidant Action of Reconstituted Water Obtained in the Process of Electrolysis

Biophys Chem. 2004 Jan 1;107(1):71-82. Hanaoka K, Sun D, Lawrence R, Kamitani U, Fernandez G. Bio-Redox Laboratories Inc. 1187-4, Oaza-Ueda, Ueda-shi, Nagano-Ken 386-0001, Japan. hanak@rapid.ocn.ne.jp

In previous work, we reported that reduced water produced by electrolysis enhances the antioxidant effects of proton donors such as ascorbic acid (AsC). We also showed that reduced water obtained by electrolysis of 2 mm NaCl solutions did not exhibit antioxidant effects by itself. We reasoned that the enhancement of antioxidant effects might be due to the increase in the ionic product of water as a solvent. The ionic product of water (pCv) was estimated by pH measurements and neutralisation titration method. DNA strand breaks mediated by reactive oxygen species (ROS) were measured as an indicator of oxidative damage by transforming the super helical double-stranded DNA phiX - 174 RF I into open and linear forms. Reconstituted water tended to suppress single-stranded DNA break induced by reactive oxygen species produced by H2O2/Cu

(II) and HQ/Cu (II) systems. The enhancement of the dismutation activity of superoxide anion radical can be explained by the change of the ionic product of water in the reduced water.

PMID: 14871602 [PubMed - in process]

Oxygen radicals Absorption capacity

Foods with High ORAC Content Can Slow Aging

USDA Agricultural Research Service, 8 February 1999.

Foods that score high in an antioxidant assay called ORAC may protect cells and their components from oxidative damage, according to animal and human blood studies at the Agricultural Research Services Human Nutrition Research Centre. Aging at Tufts University in Boston. ARS-chief scientific agency of the U.S. Department of Agriculture. ORAC, short for oxygen radical absorbance capacity, is a test tube assay that measures the overall antioxidant power of foods and other chemicals. Early research suggests that eating plenty of ORAC-rich fruits and vegetables, such as spinach and blueberries, may help slow the processes associated with aging in both the body and brain. If these findings are further confirmed

According to ARS Administrator Floyd P. Horne, young and old alike can reduce their risk of the diseases of aging (including senile marasmus) simply by adding ORAC-rich foods to their diet.

Many foods high in ORAC were consumed in the studies:

• Increasing the antioxidant power of human blood from 10 to 25%

• Prevented some loss of long-term memory and learning ability in middle-aged rats.

• Preserved the ability of middle-aged rat brain cells to respond to a chemical stimulus-function that normally

decreases with age.

• Protects the tiny blood vessels (capillaries) of rats from oxygen damage.

Nutritionist Ronald L. Pryor states, "If we can show some link between ORAC consumption and health outcomes in humans,

I think we can reach a point where ORAC value becomes the new standard for good antioxidant defence."

(See Table below for ORAC values of fruits and vegetables).

The thesis that oxidative damage leads to many diseases of aging is well accepted in the health care community. This evidence has fuelled a surge in sales of antioxidant vitamins. But several large studies have produced mixed results. Perhaps combinations of nutrients in food have a greater protective effect than each nutrient taken alone, said Guohua (Howard) Cao, a physician and chemist who developed the ORAC analysis. He and Pryor saw the value of ORACUL human blood increase in two studies. In the first, eight women had their blood drawn after separately eating spinach, strawberries and red wine (all ORAC-rich foods) or taking 1,250 milligrams of vitamin C. A serving of fresh spinach resulted in the greatest increase in antioxidant levels in the women's blood (up to 25 per cent), followed by vitamin C, strawberries and finally red wine. In the second study, both men and women experienced a 13-15% increase in blood antioxidant strength after doubling their daily intake of fruit and vegetables compared to what they consumed before the study. Simply doubling consumption, without taking into account the ORAC results of the fruits and vegetables, more than doubled the number of ORAC units consumed by the volunteers, Pryor reported.

Early evidence of the protective power of these diets comes from studies on rats conducted by Prior, Cao and colleagues. Rats fed daily doses of blueberry extract for six weeks before being exposed to two days of pure oxygen appeared to suffer much less damage to capillaries in and around the lungs, Pryor said. The fluid that normally accumulates in the pleural cavity surrounding the lungs was much lower compared to the group that did not receive the blueberry extract. Neurobiologist James Josephy psychologist Barbara Shukitt-Hale of the centre studied middle-aged rats fed diets fortified with spinach, strawberry extract or vitamin E for nine months.

A daily dose of spinach extract prevented some of the loss of long-term memory and learning ability normally experienced by 15-month-old rats, Shukitt - Hale said. Spinach was also most potent in protecting different types of nerve cells in two separate cells, parts of the brain against the effects of aging. These cells were significantly more sensitive when the animals ate diets enriched with high-calorie foods, especially spinach, compared with unrefined diets, Joseph said. The spinach group showed twice as much responsiveness as the control animals. Why spinach is more effective than strawberries (which scored higher on the ORAC test) is still a mystery. The researchers speculate that it may be due to certain compounds or a certain combination of compounds in the greens.

Top-scoring fruits and vegetables ORAC Units per 100 grams (about 3,5 oz) Prunes 5770 Raisins 2830 Blueberries 2400 Blackberries 2036 Cabbages 1770 Strawberries 1540 Spinach 1260 Raspberries 1220 Brussels Sprouts 980 Plums 949 Alfalfa 930 Broccoli Flowers 890 Beets 840 Red Grapes 785 Oranges 750 Red Bell Peppers 710 Cherries 670 Kiwi 602 Pink Grapefruit 483 Onions 450 Corn 400 Eggplant 390

Protection of Alkaline Water from Toxic Effects of Mercury

Hair element concentrations in women in one acid and one alkaline area in southern Sweden, Rosborg i,

Nihlgard B, Gerhardsson L. Department of Occupational and Environmental Medicine, Lund University, Sweden.

The concentrations of 34 trace elements in hair were determined in 47 women from an acidic region in southern Sweden, who were compared with 43 women from an alkaline region. The concentrations of these elements in hair and drinking water were determined by inductively coupled plasma optical emission spectroscopy and inductively coupled plasma mass

spectrometry.

Hair concentrations of boron and barium were significantly higher ($p < 0.001$) in hair samples from the acidic region; hair levels of calcium, strontium, molybdenum, iron and selenium were significantly higher ($p < 0.001$) in the alkaline region. For some metals, such as calcium, lead, molybdenum and strontium, positive correlations were observed between concentrations in hair and water ($rs = 0.34-0.57$; $p <$ or $= 0.001$), indicating the importance of mineral intake in water. Increased selenium/mercury concentration ratios in hair samples obtained from an alkaline area ($p < 0.001$) indicate that these subjects may have better protection against mercury toxic effects.

PMID: 14703901 [PubMed - indexed for MEDLINE]

Use of Ionised Water for Hypochlorhydria, Achlorhydria, Reduction of High Blood Pressure

Prof. Prof. Kuninaka Hironage, Head of Kuninaka Hospital

"Too much fat in the diet, which causes cholesterol to deposit in the blood vessels, which in turn

and constrict blood flow, cause most diseases such as high blood pressure. According to Professor Gato's theory from Kyushu University about vitamin K (because vitamin K allows blood calcium to

increase) or consuming more antioxidant water, the effectiveness of increasing calcium is greatest when blood pressure is high. When alkaline antioxidant water is consumed.

of water for 2 or 3 months, I observed a slow fall in blood pressure due to the solubilising power of water, which

dissolves cholesterol in the blood vessels."

Use of Ionised Water for Gynecological Diseases

Prof. Prof. Watanabe Ifao, Watanabe Hospital

"Ionised alkaline antioxidant water improves body compositions and provides effective healing for many diseases. The use of antioxidant water in gynaecological patients has proved to be very effective. The main reason for its effectiveness is that this water can neutralise toxins.

When given antioxidant water to pre-eclampsia toxemia cases, the results are most significant. In my many years of working with patients with pre-eclamptic toxaemia, I have found that women with pre-eclamptic toxaemia who drink antioxidant water tend to give birth to healthier babies with stronger muscles. A survey done on the infants in this group showed above average intelligence."

Clinical Improvements Obtained from Ionised Water Intake

Excerpts from "Report of the Eighth Annual International Symposium on Human Health and the Environment"

Disease" on 24 February 1990 at the Grand Kempinski Hotel, Dallas, Texas, USA by Dr H. Hayashi, MD and Dr M.

Kawamura, M.D.

Since the introduction of alkaline ionic water in our clinic in 1985, we have had the following interesting clinical experience : using this type of water. Using alkaline ionic water for drinking and cooking for our patients, we noticed that :

Reducing blood sugar levels in diabetic patients.

Improvement of peripheral circulation in diabetic gangrene.

Reduction of uric acid levels in gout patients.

Improvement of liver function in hepatic disorders.

Improvement of gastroduodenal ulcers and prevention of their recurrence. Improvement of hypertension and hypotension.

Improvement in allergic diseases such as asthma, urticaria, rhinitis and atopic dermatitis.

Improvement of persistent diarrhoea following gastrectomy.

Faster improvement in postoperative Bauer's palsy.

Elevated serum bilirubin levels in neonates.

Confirming the clinical improvements, we always observed changes in the stools of the patients, with the colour of their stools changing from black-brown to a brighter yellow-brown, and the odour of their stools becoming almost negligible.

The number of patients complaining of constipation also decreased markedly. The change in stool findings strongly suggests that consumption of alkaline ionic water may reduce the production of putrefactive or pathogenic metabolites.

The devices for the production of reconstituted water were introduced in our clinic in May 1985. Based on clinical experience gained over the last 15 years, we can say that the introduction of electrolysed reconstituted water for drinking and cooking for inpatients should be the most necessary prerequisite in our daily medical practice. Any dietary prescription cannot be scientific unless the property of water, which is not accepted by the patients, is taken into account.

The Japanese Ministry of Health and Welfare announced in 1965 that consumption of reduced water was effective in restoring the metabolism of intestinal flora.

Use of Ionised Water for Heart Diseases And Toxins

Prof. Prof. Kuwata Keijiroo, MD

"In my opinion, the miracle of antioxidant water is its ability to neutralise toxins, but it's not a cure. The difference is,

that medicine can only be used in individual cases, whereas antioxidant water can be consumed as a whole, and its neutralising

strength is something very unexpected. Now, briefly, let me present to you a case of heart disease and how it was cured.

The patient was a 35-year-old man suffering from vascular heart disease. His disease had been worsening for 5 years. He was in Setagaysa Government Hospital for treatment.

In those 5 years, he was in and out of the hospital 5-6 times. He underwent high-tech tests such as an angiogram by injecting VINIL through a vein into his heart.

He consulted and sought help from many good doctors where he subsequently underwent major surgery. After being discharged from the hospital, he quit his job to get better. However, each time his illness returned, the attack became more severe.

Last year, in August, his relatives were desperate and expected he would not live long.

It just so happened that at that time, a relative of the victim came across a water ioniser.

His disease responded well and he is now on the road to recovery." (In the United States, cardiovascular disease accounts for more than half of the approximately 2 million deaths that occur each year.... It is estimated that optimal conditioning of drinking water can reduce deaths from this cardiovascular disease by as much as 15 per cent in the United States)

From the Report of the Committee on Safe Drinking Water of the National Academy of

Sciences, 1977.

Use of Ionised Water for Skin Diseases

Prof. Tamura Tatsuji, Keifuku Rehabilitation Centre

"Eczema is used to describe several varieties of skin diseases that share a number of common features. The exact causes of eczema are not fully understood. In many cases, eczema can be attributed to external irritants. Let me introduce you to a patient who recovered from a skin disease after drinking antioxidant water. This patient had been suffering from eczema for 10 years and could not be effectively cured even with specialised treatment. This patient, who is 70 years old, is the president of an

automobile company company. After the war, his lower limbs suffered from acute eczema, which later became chronic. He was repeatedly treated in a specialised skin hospital.

The left limb responded well to treatment, but not so to the right. He suffered from severe itching which, when scratched

caused the bleeding. He had been seen and treated by many doctors over the past 10 years. When I first examined him, his lower limb around the joints was covered with vesicles. The crying was due to the release of serum from the vesicles.

I advised him to try drinking antioxidant water. He bought a machine and religiously consumed the antioxidant water and used the acidic water to wash the affected areas. After 2 weeks of treatment, the blisters dried up. The eczema was completely cleared without any recurrence after 14 months."

Antibacterial Action of Electrolysed Water on Oral Bacteria

Sh Lee and BK Choi

"Electrolysed tap water was brought into contact with five major periodontal pathogens or toothbrushes contaminated with them with bacteria for 30 sec. In addition, the water was used as a mouthwash for 30 sec in 16 subjects and the antibacterial effect on salivary bacteria was evaluated.

Ionised water significantly reduced the growth of all periodontal pathogens in culture and on toothbrushes, as well as the growth of aerobic and anaerobic bacteria in saliva, compared to exposure to tap water."

Use of Ionised Water for Allergies

Prof. Prof. Kuninaka Hironaga, Head of Kuninaka Hospital

"Mr Yamada, head of the Police Research Institute, suffered from severe allergies. He was repeatedly treated by a skin specialist, but without success. Then he started consuming antioxidant water. The allergy responded very well and was soon completely cured. There was no relapse even though he was taking all kinds of foods. He was very grateful and excited about this treatment.

As for me, I too had severe allergies. Since I started consuming antioxidant water, my allergies have recovered.

I have since started researching the effectiveness of antioxidant water.

I have found that most allergies are due to acidification of the body and are also associated with consuming too much meat and sugar. In each case of allergy, the patient's antioxidant minerals are excessively low, which in turn lowers the body's resistance significantly. The body becomes

overly sensitive and allergies easily develop. To stabilise the sensitivity, calcium solution is injected into the vein. Therefore, it is clear that antioxidant water contains ionic calcium which can help alleviate allergies.

Ionic calcium not only improves heart function, urination and neutralisation of toxins, but also controls acidity. It also improves the digestive system and liver function. This will enhance the natural healing power and hence increase its resistance to allergies. In some special cases of disease that do not respond to medication, it is found to respond well to antioxidant water."

Digestive problems

Prof. Kogure Keizou, Kogure Clinic at Juntendo University Hospital

"The stomach is easily upset both by diseases affecting the stomach and by other general diseases. In addition, any nervous tension or anxiety often causes stomach upset. The important role of antioxidant water in our stomach is to neutralise secretion and strengthen its functions. Usually, after drinking antioxidant water for 1-3 minutes, gastric juice increases by 11 L times. For those who suffer from achlorhydria (low gastric juice), the presence of antioxidant water stimulates stomach cells to secrete more gastric juice. This in turn improves digestion and mineral absorption. However, in people with hyperchlorhydria (high gastric juice), antioxidant water neutralises the excess gastric juice. Hence, it does not create any adverse reaction. According to a medical lecturer from Maeba University says that the pH of gastric secretion still remains normal when antioxidant water is consumed. This proves the ability of antioxidant water to neutralise as well as stimulate secretion."

Use of Ionised Water in the Treatment of Diabetes Mellitus

TWO THESIS AND ONE REPORT ON THE DIABETE/alkaline water study The effect of alkaline ionised water on spontaneously diabetic HC rats fed sucrose

Jin Man Kim Division of Life Science, R&D centre, Sunkyong Industries, Kazuhito Yokoyama Department of Public Health, Faculty of Medicine, University of Tokyo

This study was conducted to evaluate the effect of alkaline ionised water (AI) on spontaneously diabetic HC rats fed sucrose during exacerbation of diabetes mellitus.

One half of the 32 GC rats were given AIW and the other half were given tap water (TW). These two groups were further divided into two subgroups by feeding with or without 30% sucrose solution (8 in each group). In terms of blood glucose levels, sucrose fed to the TW group was significantly higher than the other groups. The sucrose content in both AIW and TW groups was significantly increased in body weight compared to the TW group. Serum malonic dialdehyde (MDA), a marker of lipid peroxide, of sucrose fed to the TW group was significantly higher than that of the AIW and TW groups.

It has been suggested that AIW (Alkaline Ionised Water) supplementation may inhibit the increase in blood glucose and lipid peroxide levels in diabetes mellitus.

Protective mechanism of reduced water against alloxan-induced pancreatic ?- cell damage: Scavenging effect against reactive oxygen species

Cytology 40: 139-149, 2002. Netherlands.139

Yuping Li1, Tomohiro Nishimura1, Kiichiro Teruya1, et al , Department of Genetic Resources Technology, Faculty of

Agriculture, Kyushu University, Fukuoka, Japan; 2 Nihon Trim Co. Ltd., 1-8-34 Oyodonaka, Kita-ku, Osaka, Japan: 3 Hita

TenriosuiCo. Ltd., 647 Nakanoshima, Hita, Oita, Japan; 4 Centre for Holistic Medicine and Naturopathy, Schmallenberg-.

Nordenau, Germany Author for correspondence; E-mail: sirahata@grt.kyushu-u.acjp Abstract

Active oxygen species (AOS) cause irreversible damage to biological macromolecules, leading to many diseases.Reconstituted water (RW), such as hydrogen-rich electrolysed reconstituted water and natural reconstituted waters such as Hita Tenriosui water in Japan and Nordenau water in Germany, which are known to improve various diseases, can protect the hamster's pancreas ?

cell line, HIT-T15 from alloxan-induced cell damage. Alloxan, a diabetogenic compound, is used to induce type 1 diabetes in animals. Its diabetogenic effect is manifested through the production of AFC.

Alloxan-treated HIT-T15 cells exhibited decreased viability, increased intracellular AFC levels, increased cytosolic free Ca2+ concentration, DNA fragmentation, and decreased intracellular AFC levels.

ATP levels and reduced glucose stimulated insulin release. RW completely prevented alloxanin-induced generation, increased cytosolic Ca2+ concentration, decreased intracellular ATP level and reduced glucose-stimulated insulin release, and strong blocking of DNA fragmentation partially suppressed the decrease in viability of alloxanin-treated cells.

Intracellular ATP levels and glucose-stimulated insulin secretion were increased by RW by 2-3, 5-

fold and 2-4-fold, respectively, suggesting that RW enhances glucose sensitivity and glucose response of the body.?-cells. The protective activity of RWW was stable at 4°C for over a month but was lost by autoclaving. These results suggest that RW protects pancreatic ?-cells from alloxan-induced cell damage by preventing the generation of alloxan-derived AFCs. RW may be useful for the prevention of alloxanin-induced type 1 diabetes mellitus.

Diabetes

Prof. Prof. Kuwata Keijiroo, MD

- When I served on the Fire Insurance Association, I screened many diabetic patients. In addition to treating

with medication, I provided them with antioxidant water. After drinking antioxidant water for one month, 15 diabetic patients were

selected and sent to the University of Tokyo for further testing and observation. At first, the more serious patients were a little wary of the treatment. When the antioxidant water was consumed over a period of time, blood and urine sugar levels ranged from 300 mg/L to 2 mg/dc. There was a time when the patient underwent 5-6 blood tests per day and found it to be within the normal range. The results also showed that even 1 / one hour after a meal, the blood to urine sugar ratio was 100 mg/dc: 0 mg/dc . The sugar in the urine disappeared completely."

NOTE: More Americans than ever before are suffering from diabetes, and the number of new cases averages nearly 800,000

every year. The disease has steadily increased in the United States since 1980, and in 1998, 16 million Americans were diagnosed with diabetes (10.3 million diagnosed; 5.4 million undiagnosed). Diabetes is the seventh leading cause of death in the United States, and more than 193,000 people died from the disease and related complications in 1996. From: U.S. Department of Defense **Health and Human Services, Fact Sheet, 13 October 2000.**

Use of Ionised Water in the Treatment of Acidosis

Prof. Hatori Tasutaru, Head of Akajuji Blood Centre, Yokohama Hospital, Faitama District:

"Because of a higher standard of living, our eating habits have changed. We consume too much protein, fats and sugar. Excess fats and carbohydrates are stored in the body as fat. In today's lifestyle, Americans are more wasteful in eating than the Japanese. Because of this excessive consumption, obesity is a significant problem. Typically, one in five men and one in four women are obese.

The degree of "burnout" when eating depends largely on the amount of vitamins and minerals entering the body. When protein, carbohydrates and fats are consumed in excess, the need for vitamins and minerals increases. However, there is not much research on the importance of vitamins and minerals.

Nowadays, many people suffer from acidification which leads to diabetes, heart disease, cancer, liver and kidney disease. If our food can be completely burned, there is no fat deposition. Obviously, there would be no acidification problem and therefore there should be no signs of obesity.

Antioxidant water contains high amounts of ionic calcium. This ionic calcium helps in the "burnout" process. By eating antioxidant water, it provides our body with enough minerals. As a result, we don't need to watch our diet to stay slim. Thus, antioxidant water is a saviour for those who suffer from obesity and many adult diseases, providing good help in promoting good health."

Water consumption for disease prevention

Dr Sanetaka Shirahata

Graduate School of Genetic Resources Technology, Kyushu University, 6-10-1 Hakozaki, Higashi-ku, Fukuoka 812-8581, Japan.

It has long been established that reactive oxygen species (ROS) cause many types of damage to biomolecules and cellular structures, which in turn leads to the development of various pathological conditions such as diabetes, cancer and aging.

Reduced water is defined as antioxidant water produced by water reduction. Electrolysed water reduction (EWR) has been demonstrated to be hydrogen enriched water and purification of dew in vitro (Shirahata et al.,1997). The reduction of proton in water to active hydrogen (atomic hydrogen, hydrogen radical) capable of scavenging AFC is very easily induced by weak current compared to the oxidation of hydroxyl ion to oxygen molecule. Activation of water by magnetic field field, collision, minerals, etc. D. will also produce reduced water containing active hydrogen and/or hydrogen molecule.

Some natural waters, such as Hita Tenriosui water extracted from deep underground water in Hita City in Japan, Nordenau water in Germany, and Tlacote water in Mexico, are known to alleviate various diseases. We have developed a sensitive method by which we can detect the active hydrogen existing in the reconstituted water, and demonstrated that not only ERW but also the natural reconstituted waters described above contain active hydrogen and scavenge AFCs in cultured cells. AFCs are known to cause a decrease in glucose uptake by inhibiting the insulin-signalling pathway in cultured cells. Reduced water uptake by intracellular AFCs and stimulated glucose uptake in the presence or absence of insulin in both L6 rat skeletal muscle cells and 3T3/L1 mouse adipocytes. This insulin-like activity of reduced water was inhibited by wortmannin, which is a specific inhibitor of PI-3 kinase, a key molecule in insulin signalling pathways. Reduced water protected insulin-sensitive cells from sugar toxicity and improved the damaged sugar tolerance of model mice with type 2 diabetes, suggesting that reduced water may improve insulin-independent diabetes. Cancer cells are normally subjected to severe oxidative stress. Reduced water induces impaired tumourigenic phenotypes of human cancer cells, such as reduced growth rate, morphological changes, reduced colony-forming ability in soft agar, passage number-dependent telomere shortening, reduced binding capacity of telomere-binding proteins and suppression of metastasis.

Reduced water inhibited the growth of cancer cells transplanted into mice, demonstrating their anti-cancer effects in vivo.

Reducing water consumption will apply not only to medicine, but also to food, agriculture and manufacturing.

Shirahata, S. et al: Electrolysed reduced water purifies reactive oxygen species and protects DNA from oxidative damage.

Byuh1m.jurn. biophys. Res. Commun, 234, 269174, 1997.

Alkaline Ionised Water For Abdominal Complaints: Placebo-controlled Double Blind Tests Hirokazu Tashiro, Tetsuji Hokudo, Hiromi Ono, Yoshihide Fujiyama, Tadao Baba (Ohkura National Hospital, Division of

Gastroenterology; Institute of Clinical Research, Shiga University of Medical Sciences, Second Department of Internal Medicine)

The effect of alkaline ionised water on abdominal complaints was assessed using placebo-controlled double-blind tests. Overall rates of improvement with alkaline ionised water were

observed to be higher than in the placebo-controlled group and its effect was more pronounced. significantly higher, especially for minor symptoms of chronic diarrhoea and abdominal complaints with general malaise.

The alkaline ionised water group was not interrupted during the test, and it showed no serious side effects or abnormal test data. It was confirmed that alkaline ionised water is safer and more effective than placebo.

Summary

The effect of alkaline ionised water on abdominal complaints was clinically studied by double-blind tests using pure water as placebo. The overall rate of improvement was higher in the alkaline ionised water group than in the placebo group, and the former was significantly more effective than the latter, especially in cases of minor symptoms. Examining the rate of improvement for each case of chronic diarrhoea, constipation and abdominal complaints, the alkaline ionised water group was more effective than the placebo group for chronic diarrhoea and abdominal complaints. The test was stopped in one case of chronic diarrhoea among which the placebo group due to exacerbation, while the alkaline ionised water group did not stop the test without serious side effects or abnormal test data in all cases. It was confirmed that alkaline ionised water was more effective than pure water against chronic diarrhoea, abdominal complaints and general improvement (relief of abdominal complaints) and safer than pure water.

Introduction

Since the approval of alkaline ionised water electrolysers by the Pharmaceutical Affairs Act in 1966 for its antacid effect and efficacy against gastrointestinal disorders including hyperchilia, upset stomach, abnormal gastrointestinal fermentation and chronic diseases.

for diarrhoea, they are widely used among patients. However, medical and scientific evaluation of their validity has not been established. In our study, we investigated the clinical effects of alkaline ionised water on gastrointestinal disorders across multiple symptoms in different institutions. Specifically, we investigated the safety and usefulness of alkaline ionised water by double-blind tests using pure water as a control group.

Subjects and methods

163 patients (34 men, 129 women, age 21 to 72 years, mean age 38.6 years) with gastric upset, abnormal gastrointestinal fermentation (with abnormal gas production and rugitus) and abdominal complaints due to irregular dullness (chronic diarrhoea or constipation) were tested as subjects with good informed consent. Placebo-controlled double-blind tests were conducted using alkaline ionised water and pure water at several sites. A commercially sold alkaline ionised water electrolyser with a pump-driven calcium dispenser was installed in each of the homes studied. The alkaline ionised water tested had a pH of 9.5 and a calcium concentration at 30 ppm. Each subject in the placebo group used a water purifier that has the same appearance as the electrolyser and produces pure water.

The test equipment was randomly assigned by the controller, which scaled a key code that was kept secure until the tests were completed and the print was reopened.

Water samples were given to each patient in the amount of 200 ml in the morning for a total of 50 ml or more per day for one month. Blood, urine and stool were analysed before and after the tests, and a log of subjective symptoms, bowel movements was kept.

movements and associated symptoms. Post-trial results were analysed using logbook and trial data.

Test results

1. Symptom

Among 163 subjects, the alkaline ionised water group included 84 subjects and the placebo

group-79. Background factors such as gender, age, and basal abnormalities did not contribute significantly to the difference in results.

2. Overall level of improvement

Regarding the overall rate of improvement in abdominal complaints, there were 2 cases of outstanding improvement in the alkaline ionised water group

(2.5%), 26 cases of fair improvement (32.1%), 36 cases of slight improvement (44.4%), 13 cases of no change (16%) and 4 cases of

exacerbations (4.9%), whereas the control group exhibited 4 (5.2%), 19 (24.7%), 27 (35.1%), 25 (32.5%) and in 2 cases (2.6%) for the

of the same category. Comparison of the alkaline ionised water and placebo groups showed no significant difference at the 5% significance level by Wilcoxon test, although the alkaline ionised water group was significantly

more effective than the placebo group at the p value level of 0.22.

Looking generally at the rate increase of 7, 2 tests (without adjusting for continuity) between efficient and inefficient

group, alkaline ionised water group 64 (79%) effective disease cases and 17 cases (21%) ineffective cases, whereas placebo

group 50 (64.9%) and 27 (35.1%) cases respectively. The result showed that the alkaline ionised water group was significantly

more effective than the placebo group at the p value level of 0.048.

Looking at only 83 minor cases of abdominal complaints, the overall improvement rate for the alkaline ionised water group was

(45 cases) consisted of 11 cases (242%) of fair improvement, 22 cases (48.9%) for some improvement, 17 cases (44.7%) of

no change and 3 cases (6.7%) of exacerbation, whereas the placebo group (38 cases) had 3 (7.8%), 17 (44.7%), 17 (44.7%) and 1

(2.6%) of cases for the same category. The alkaline ionised water group was significantly more effective than the placebo group, by

compared between groups (p = 0.033).

3. Advanced Course in Basal Symptoms

Basal symptoms were divided into chronic diarrhoea, constipation and abdominal complaints (dyspepsia) and general

to study the effect of alkaline ionised water, the rate of improvement was assessed for each. For chronic diarrhoea, the alkaline ionised water group resulted in 94.1% effective cases and 5.9% ineffective cases. The placebo group showed 64.7%

effectiveness and 35.3% ineffectiveness. These results show that the alkaline ionised water group was significantly more effective than the placebo group. In the case of milder chronic diarrhoea, a comparison between groups showed that the alkaline ionised water group

significantly more effective than in the placebo group (p=0.015). In case of constipation, the alkaline ionised water group consisted of

80.5% effective and 19.5% ineffective cases, whereas the placebo group resulted in 73.3% effective and 26.3% ineffective cases.

Regarding abdominal complaints (dyspepsia), the alkaline ionised water group had 85.7% effective and 14.3% ineffective cases, while the placebo group-47.1% and 62.9%, respectively. The alkaline ionised water group was significantly more effective than the placebo group (p=0.025).

4. Safety

Since one case of chronic diarrhoea in the placebo group experienced an exacerbation, the test was discontinued. In the group

There were no such cases in the alkaline ionised water group. Fourteen cases of associated symptoms were noted, 8 in the alkaline ionised water group and 6 in the placebo group, none

Of which were not serious. 31 of 163 cases (16 in the alkaline ionised water group, 15 in the placebo group)

showed fluctuations in the test data, although the alkaline ionised water group did not have any problematic fluctuations compared to the alkaline ionised water group.

placebo group. In two cases in the placebo group and in one case in the alkaline ionised water group, the serum K value rose

and returned to the normal value after retesting, indicating that the changes in value were temporary.

Conclusion

In double-blind clinical trials of alkaline ionised water and pure water, alkaline ionised water was shown to be more effective than pure water against chronic diarrhoea, abdominal complaints (dyspepsia) and general improvement (relief from abdominal complaints).

The safety of alkaline ionised water has also been confirmed, clinically confirming its usefulness.

Selective Stimulation of Anaerobic Microflora Growth in the Human Intestine

Under the influence of Electrolysed Restorative Water.

Vorobyeva N. V., Med. Hypotheses. 2005;64(3):543-6.

96-99% of the "friendly" or resident microflora of the human intestinal tract are strict anaerobes and only 1-4% are aerobes. Many intestinal diseases are caused by an imbalance in the balance of microorganisms inhabiting the intestine.

Treatment of such diseases involves restoring the number and/or balance of resident microflora in the gut.

. Aerobes and anaerobes are known to grow at different redox potentials (ORP). The former require

positive E(h) values up to +400 mV. Anaerobes do not grow if the E(h) value is negative between -300 and -400 mV. This paper suggests that a prerequisite for the recovery and maintenance of obligate anaerobic microflora in the intestinal tract is a negative ORP value of the intestinal environment. Electrolysed water of decreasing C E(H) values from 0 to -300 MV obtained in electrolysis apparatuses possesses this property. Consumption of such water promotes the growth of beneficial microflora in the intestine.

A sufficient body of data supports this idea. However, most researchers explain its mechanism of action by its antioxidant properties designed to detoxify oxidants in the intestine and other host tissues. Evidence is provided in favour of the hypothesis that the main target for electrolysis of reducing water is the resident microflora in the gut.

Vormann J, Worlditschek M, Goedecke T, Silver B, Alkaline mineral supplementation reduces symptomspatients with chronic low back pain, J Trace Elem. Med. Biol. Vol. 15, pp. 179-183 2001,

Abstract: The cause of low back pain is heterogeneous, it has been hypothesised that latent chronic acidosis may contribute to these symptoms. It was tested whether supplementation with alkaline minerals would affect symptoms in patients with symptoms of low back pain. In an open-label prospective study, 82 patients with chronic low back pain received 30 g of a lactose-

based alkaline multimineral supplement (Basica) daily for 4 weeks in addition to their usual medications. Pain symptoms were quantified using the Arhus low back pain rating scale (ARS). The mean ARS significantly decreased by 49% from 41 to 21 points after 4 weeks of supplementation. In 76 of 82 patients, the reduction in ARS was achieved by supplementation. Total blood buffer capacity was significantly increased from 77.69 ± 6.79 to 80.16 ± 5.24 mmol/L (mean ± SEM, n=82, $p < 0.001$), and blood pH increased from 7.456 ± 0.007 to 7.470 ± 0.007 (mean ± SEM, n=75, $p < 0.05$). Only intracellular magnesium increased by 11%, while other intracellular minerals were not significantly altered in sublingual tissue as measured by the EXA test. Plasma potassium, calcium, iron, copper and zinc concentrations were within normal limits and were not significantly affected by supplementation. Plasma magnesium was slightly decreased after supplementation (-3%, $p < 0.05$). The results suggest that disturbed acid-base balance may contribute to symptoms of low back pain. Simple and safe supplementation with an alkalising multi-mineral preparation reduced pain symptoms in these patients with chronic low back pain.

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25th General Assembly from the Japanese Medical Congress Tunctional Water in Medical Care", Office Departments^, 1999, RR.

10- 11

Effect of Alkaline Ionised Water on Bone Tissue Formation and Maintenance

Rei Takahashi Zhenhua Zhang Yoshinori Itokawa (Kyoto University Graduate School of Medicine, Department of Pathology and Tumour Biology, Fukui Prefecture University)

The effect of calcium alkaline ionised water on bone formation and maintenance in rats was investigated. In the absence of calcium in the diet, no obvious calcification was observed, only osteoid formation was evident. Striking differences were found between groups that received diets with 30% and 60 calcium. Rats reared with ionised water containing calcium exhibited the least osteogenetic abnormalities. Tibia and humerus bones were more susceptible to calcium deficiency than femurs.

The results of the thesis may suggest that calcium in drinking water effectively supplements osteogenesis in dietary calcium deficiency.

The mechanism of osteoid formation, such as the rate of calcium absorption from the intestine and the effect of calcium alkaline ionised drinking water on the maintenance of bone structure during ageing or under calcium deficiency conditions, was investigated.

Osteoporosis, which has recently gained public attention, is defined as "a condition of bone fragility caused by a decrease in the amount of bone framework and deterioration of bone microstructure." Abnormal calcium metabolism is thought to be a contributing factor to this problem, which in turn is caused by inadequate calcium intake, decreased enteral calcium absorption rate and increased calcium in the urine. Under normal conditions, bones absorb old

bone by regular metabolism through the formation of osteoids maintain their strength and function as a support structure. It becomes clear that bone remodelling at the tissue level goes through the processes of activation, reabsorption, reversal, matrix synthesis and mineralisation. Another important function of bone is mineral storage, especially coordinating with the gut and kidneys to control blood calcium concentrations. When something happens to this bone metabolism, it leads to abnormal morphological changes. Our research mainly focused on bone quantity changes to study the effect of calcium alkaline ionised water on the reaction system of bone metabolism and its efficiency.

However, we further investigated it from a histological point of view. In other words, we conducted comparative studies of morphological and kinetic changes in osteogenesis by testing alkaline ionised water, tap water and lactate solution on rats.

Three-week-old male Wistar rats were divided into 12 groups according to feeding and drinking water conditions. Feeds were prepared with 0%, 30%, 60% and 100% of normal calcium and given freely. The rats were also given three types of drinking water: tap water (city water, about 6 ppm Ca), calcium lactate solution (Ca=40 ppm) and alkaline ionised water (Ca=40 ppm, pH=9, produced by NDX 4 LMC electrolyser of Omco OMC Co., Ltd.). The weight of the rats, the amount of drinking water and feed, and the Ca content of the drinking water were analysed each day. On the 19th and 25th days of the test, tetracycline hydrochloride was added to the feed for 48 h to bring its concentration to 30 mg/kg. On day 30, blood samples were taken under nembutal anaesthesia and tibia, humerus and femur bones were

taken to obtain undecalcified samples. Their conditions of osteoid formation and rotation were observed using Villanueva bone staining and Villanueva Goldner staining.

Three groups given different types of drinking water and the same amount of Ca in feed were compared to find no significant difference in weight gain rate and feed and drinking water intake. The alkaline ionised water group had significantly more tibia and humerus with higher bone calcium concentrations.

There was a dramatic increase in osteoid in the 0% calcium in feed group. There was little difference by type of drinking water. Tetracycline was hardly administered to the tibia and humerus, although small amounts were found in the pherorus. Osteogenesis had gone so far as to form osteoid, but it is likely that decalcification had not yet occurred or that much of the newly formed bone had been absorbed.

Regarding the 30% and 60% calcium in feed groups, the increase in tetracycline absorption area was more identifiable with greater clarity in the descending order of the alkaline ionised water, calcium lactate solution and tap water groups. Especially in the case of tap water group, the irregularity among the areas of tetracycline intake was characteristic. In the 100% calcium in feed group, there was some improvement in osteogenesis in descending order of alkaline ionised water, calcium lactate solution and tap water. At any rate, bone formation seemed to be in good condition at near normal level.

Alkaline ionised water was considered effective in improving osteogenesis under conditions of insufficient calcium in feed. As well as the degree. features of dysosteogenesis differed by region. That is, the tibia and humerus tended to have more significant dysosteogenesis than the femur.

In addition, there is the possibility that bone metabolism is altered by the enteral rate of calcium absorption, the regulation of renal excretion and the functional regulation of the accessory thyroid gland in the presence of alkaline ionised water. We are now studying its effect on blood calcium concentration. We are also investigating whether bone deterioration can be prevented by testing in rapidly aging mouse models.

Magnesium and Calcium in Drinking Water and Cardiovascular Mortality

Excerpt from:

Scand J Work Environ Health 1991;17:91-4

Ragnar Rylander, MD, Håkan Bonevik, PhD, Eva Rubenowitz, MD Department of Environmental Health, University of Gothenburg, Gothenburg, Sweden.

Data on drinking water hardness were collected from 27 municipalities in Sweden, where drinking water quality has remained unchanged for more than 20 years. Lead, cadmium, calcium and magnesium were analysed.

These water quality data were compared with age-adjusted mortality rates from coronary heart disease and cerebrovascular disease for the period 1969-1978. Lead and cadmium were not present in detectable amounts except in one water sample. A statistically significant inverse relationship was observed between hardness and mortality from cardiovascular disease in both sexes. Mortality from coronary heart disease was inversely related to magnesium content, especially in men ($P<0.01$). The rather small data set supports previous studies suggesting that high levels of magnesium in drinking water reduce the risk of death from coronary heart disease, especially among men, although the possible importance of confounding factors needs further evaluation.

Key words: cerebrovascular diseases, ischaemic heart disease, magnesium, water hardness. Several epidemiological studies in recent decades have shown an inverse relationship between water hardness and cardiovascular mortality. The first observation was made in 1957 (1) and subsequently elaborated on in studies conducted in many other countries (2-4). A particularly important study was presented by

Crawford et al. (5), who followed mortality rates in 11 English towns where water hardness changed between 1950 and 1960.

Hardiness increased in five cities and decreased in six. Mortality from cardiovascular disease in the general population increased by about 10 per cent over the study period. In cities where hardness decreased, mortality increased by 20%....

Assessment of Ionised Calcium

Chen H, Kimura M, Zhu Z, Itokawa Y, 11th Symposium on Micronutrient Research, Japan Trace Nutrients Research Society, p131-138, 1994.

Summary: To elucidate the effect of ionised calcium water on drinking water in rats, 36 male Wister rats weighing about 50 g were randomly divided into 6 groups and given the following diet and drinking water : (1) Ca-sufficient diet, tap water; (2) Ca-deficient diet, tap water;(3) Ca-deficient diet, calcium lactate-calcium ionised-water : (4) Ca-deficient diet, calcium lactate addedwater ; (5) Ca-deficient diet, calcium lactate addedwater :(6) Ca-deficient diet, calcium lactate added-ionised calcium-water. Diets were given by the pair-feeding method for 4 weeks and drinking water was ad libitum. The significant change in calcium concentration in rats was manner; ca concentrations in plasma, spleen, plasma, spleen, kidney, testis and tibia in CA deficient groups (4),(5),(6) were significantly low compared to those in CA sufficient groups (1),(2),(3) ca concentration in brain group (4),(5),(6) was low compared to those groups (2), ca concentrations in heart and muscle group (4) was low compared to Ca deficient groups (1),(2),(3), but those in group (5) drank added Ca-water and those in group (6) drank ionised-Ca-water was higher than any other groups. Liver calcium concentrations in groups (4) were significantly lower than those in group (1),(3) and CA concentrations in liver in Ca-deficient rats (groups (5),(6)) drank Ca-added-water were high compared to those in group (4). After 24 hours,

urine excretion in group (2) was high compared to groups (4),(5),(6). These results suggest that ionised Ca in drinking water may be active for intestinal absorption.

Calcium and Magnesium in Drinking Water and the Risk of Death from Cerebrovascular Disease

Diseases

and the risk of death from cerebrovascular disease.

MEDLINE ABSTRACT

Author: Yang Qi

Author's affiliation: School of Public Health, Kaohsiung Medical College, Taiwan, Republic of China. chunyuh*cc.kmc.edu.tw Source: Stroke 1998 Feb; 29(2):411-4

BACKGROUND AND OBJECTIVE: Many studies have demonstrated a negative association between mortality from cardiovascular or cerebrovascular disease and water hardness. This report examines whether calcium and magnesium in drinking water are protective against cerebrovascular disease.

METHODS: All eligible cerebrovascular deaths (17133 cases) of Taiwanese residents from 1989 to 1993 were compared with deaths from other causes (17133 controls), and calcium and magnesium levels in the drinking water of these residents were determined.

Data on calcium and magnesium levels in drinking water throughout Taiwan were obtained from the Taiwan Water Supply Corporation. The control group consisted of people who died from other causes, and the control groups were matched to patients by sex, year of birth and year of death.

RESULTS: Adjusted odds ratios (95% confidence interval) were 0.75 (0.65 to 0.85) for the group with magnesium levels in water between 7.4 and 13.4 mg/L and 0.60 (0.52 to 0.70) for the group with

magnesium levels of 13.5 mg/L or more. After adjusting for magnesium levels in drinking water, no differences were found between groups with different calcium levels.

CONCLUSIONS: The results of the present study indicate that there is a significant protective effect of magnesium intake from drinking water on the risk of cerebrovascular disease. This is an important finding for the Taiwanese water industry and human health.

Reduction of Haemodialysis-induced Oxidative Stress in Patients with Terminal Renal Insufficiency by Electrolysed Reduced Water Huang QC, Yang QC, Li QT, Jian QT

Department of Family Medicine, National Taiwan University College of Medicine and National Taiwan University Hospital, Taipei, Taiwan.

KIDNEYS INTERNATIONAL.

2003 Aug; 64(2):704-14.

Increased oxidative stress in patients with terminal renal failure (TRF) may oxidise macromolecules and consequently lead to cardiovascular complications during chronic haemodialysis. Electrolysed reconstituted water (ERW) with reactive oxygen species (ROS) uptake capacity may have a potential effect on reducing haemodialysis-induced oxidative stress in patients with TPN. METHODS: We developed a chemiluminescence emission spectrum and a high-performance liquid chromatographic assay to evaluate the effect of ERV replacement on plasma AFC scavenging activity (H2O2 and HOCl) and production of oxidised lipids or proteins in patients with TPN undergoing haemodialysis. Oxidised markers-dotyrosine, methylguanidine

and phosphatidylcholine hydroperoxide, as well as the inflammatory markers interleukin 6 (IL-6) and C-reactive protein (CRP) .

definite. RESULTS: Although haemodialysis effectively removed dithyrosine and creatinine, haemodialysis increased oxidative stress, including phosphatidylcholine hydroperoxide and methylguanidine. Haemodialysis decreased plasma AFC uptake activity as evidenced by increased reference values of H2O2 and HOCl (Rh2o2 and Rhocl, respectively) and decreased antioxidant activity (expressed as total antioxidant status in this study). ERW administration reduced haemodialysis of Rh2o2 and Rhocl, minimised oxidised and inflammatory markers (CRP and IL-6) and partially restored total antioxidant

status during 1 month of treatment. CONCLUSION: This study demonstrates that haemodialysis with ERW administration can

effectively enhance H2O2- and HOCl-dependent antioxidant defence and reduce H2O2- and HOCl-induced oxidative stress.

Effect of electrolytic water (ionised water) Consumption throughout the life of mice prone to autoimmune diseases

A study by the University of Texas

Recent studies on electrolysed water show that anodic or acidic water is most effective as disinfectants, while reduced or alkaline water treated through the cathode is used as safe drinking water. The present drinking water study was carried out on two strains of mice prone to autoimmune diseases to establish the spontaneous disease process and longevity. Female MRL/lpr and NZBxNZW [B/W] F1 weanling mice were supplied daily with (1) tap water [pH ~7.5, oxygen reduction potential (ORP)~600+] (2) electrolysed water with pH ~9.0 and ORP ~400- and (3) hyper-reduced water with pH~10.0 and ORP~600-. Mice were given H2O and chow diet ad libitum, and body weight and spontaneous death were recorded weekly.

Mean survival data recorded as days for MRL/lpr mice [25 mice/group] are as follows: (1) tap water 235±25, (2) reconstituted water 287±40, and (3) hyper-reduced water 346±45 days [<0.05]. In the case of B/W mice [25 mice/group], (1) tap water 269±16, (2) reconstituted water 298±19 and (3) hyper-reduced water 302±18 days. And significantly reduced (<0.05) serum lipid levels of peroxides were observed in mice receiving hyper-reduced H2O. In addition, the water source did not alter lymphocyte subsets or their response to mitogens. Thus, hyper-reduced water with pH~10.0 appears to inhibit autoimmunity in MRL/lpr mice, whereas only a slight increase in lifespan was observed in h/B mice. The increase in lifespan with H2O electrolysis appears to be due to changes in the levels of free radicals and antioxidant enzymes.

backed by Zanix Co. and Waterman Co.

Tokyo, Japan].

Effect of Alkaline Ionised Water on Reproductive Function of Gestational and Lactating Rats

Watanabe T

Department of Veterinary Physiological Chemistry, College of Agriculture and Veterinary Medicine, Nihon University, Kanagawa, Japan.

JOURNAL OF TOXICOLOGICAL SCIENCES.

1995 May;20(2):135-42.

Alkaline ionised water (AAW) obtained by electrolysis was given to gestational and lactating

rats and its effect on dams, and the growth of fetuses and offspring was investigated. The results showed that food and water intake increased significantly with the administration of ACW from the second half of the gestation period and from the first half of the lactation period.

Body weight of offspring in the experimental group, both males and females, increased significantly from the second half of the actation period. During the lactation period and after weaning, the offspring in the experimental group showed significantly accelerated development.

The appearance of abdominal hair, upper incisor eruption, eyelid opening and other postnatal morphological changes were observed in both males and females, as well as earlier ear separation and testicular prolapse in males compared to controls. As mentioned above, the observations suggested that ACV has a significant biological effect on postnatal growth, as food and water intake and body weight of the offspring increased and postnatal morphological development was also accelerated.

Effect of Alkaline Ionised Water on Aspirin-induced Gastric Mucosal Damage in Rats

Yuji Naito Toshikazu Yoshikawa, Tomohisa Takagi, Tsushi Ishikawa, Osamu Handa, Naoyuki Matsumoto, Kiichi Matsuyama,

Nobuaki Yagi, Norimasa Yoshida, Motoharu Kondo.

Kyoto Prefecture Medical University, First Department of Internal Medicine), Japan.

Summary One of the aims of the present study was to determine the effect of alkaline ionised water (AI) on acute gastric mucosal injury induced by aspirin in rats. Oral doses of acidified aspirin (200 mg/kg) resulted in linear haemorrhagic erosion and an increase in myeloperoxidase (MPO) activity, an indicator of neutrophil infiltration in the gastric mucosa. These increases in total erosion and MPO activity were inhibited by administration of AIW (pH 10.5, ORP 450mV) for a fortnight.

Aspirin administration resulted in an early increase in tumour necrosis factor (TNF a /cinc2 ~) values in plasma and tissues. The increase in TNF a /cinc2 ~ was also blocked by administration of PNS. These results suggest that chronic administration of AIW is effective against aspirin-induced gastric mucosal injury, and its cytoprotective effect is associated with inhibition of neutrophil accumulation on the gastric mucosa or with reduced production of inflammatory cytokines. Trial Objective Encouraging examples of clinical applications of alkaline ionised water in gastrointestinal disorders are as follows:

1) Non-ulcer dyspepsia

2) Irritable bowel syndrome (IBS)

3) Constipation caused by constitutional disorders (e.g. diabetes, hypothyroidism).

4) Peptic ulcer disease

5) Habitual users of non-steroidal anti-inflammatory drug (NSAIDs).

ACID IONISED WATER

Disinfection of E. coli and Listeria on plastic kitchen cutting boards

Acid water

Venkitanarayananan KS, Ezeike GO, Hung EK, Doyle MP.

Department of Zoology, University of Connecticut, Storrs 06269, USA.

One millilitre of culture containing a mixture of five strains of Escherichia coli O157:H7 (approximately 10(10) CFU) was inoculated on a 100 cm2 area marked on uncut cutting boards. After inoculation, boards were air-dried under a laminar flow hood for 1 h immersed in 2 L of electrolysed oxidative water or sterile deionised water at 23°C or 35°C for 10 or 20 min; 45°C for 5 or 10 min; or 55°C for 5 min. After each temperature-time combination, the surviving pathogen population on the cutting boards and in the soaking water was determined. Soaking

inoculated cutting boards in electrolysed oxidising water reduced the E. coli O157:H7 population by > or = 5.0 log CFU/100 cm2 on the cutting boards. However, immersion of cutting boards in deionised water reduced pathogen counts by only 1.0 - 1.5 log CFU/100 cm2. Treatment of cutting boards inoculated with Listeria monocytogenes in electrolysed oxidising water at selected temperature-time combinations (23°C for 20 min, 35°C for 10 min and 45°C for 10 min) significantly reduced the populations of L. monocytogenes compared to counts extracted from immersed boards E. coli O157:H7 and L. monocytogenes were not detected in electrolysed oxidative water after soaking treatment, whereas the pathogens survived in deionised water used to soak cutting boards. This study showed that immersion of kitchen cutting boards in

electrolysed oxidising water can be used as an effective method to inactivate foodborne pathogens on smooth plastic cutting boards.

PMID: 10456736 [PubMed - indexed for MEDLINE]

Bactericidal Action of Electrolysed Oxidising Water on Bacterial Strains in Inpatients

Infections

Vorobyeva N. V., Vorobyeva L. I., Hodjaev E. Yu. Artificial organs.

2004 Jun;28(6):590-2.

Department of Physiology of Microorganisms, Faculty of Biology, Lomonosov Moscow State University, Leninskie Gory 1/12, Moscow 119992,

Russia. nvvorobjeva@mail.ru

The study is designed to investigate the bactericidal effect of electrolysed oxidative water on hospital infections.

Ten most common opportunistic microorganisms are used for this study. Cultures are inoculated in 4.5 ml electrolytic oxidant (EO) water or 4.5 ml sterile deionised water (control) and incubated for 0, 0.5 and 5 min at room temperature. At an exposure time of 30 s, EO water completely inactivated all bacterial strains except vegetative cells and spores of bacilli, which required 5 min for killing. The results indicate that electrolysed oxidative water may be a useful disinfectant for hospital infections, but its clinical application remains to be evaluated.

PMID: 15153153 [PubMed - in process]

Effect of Electrolysis Water on Wound Healing Artificial Organs.

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

Yahagi N, Kono M, Kitahara M, Omura A, Sumita O, Hashimoto T, Hori K, Ning-Huang S, Woodson P, Kubota S, Murakami A, Takamoto S.

Mizonokuchi Hospital of Teike University, Tokyo, Japan. naokiyah@aol.com Department of Anaesthesiology.

Electrolysed water accelerated the healing of full-thickness skin wounds in rats, but only water in the anode chamber (acidic pH or neutralised) was effective. Hydrochloronic acid (HOCl), also produced by electrolysis, was ineffective, suggesting that these types of electrolysed water enhance wound healing by a mechanism unrelated to the well-known antibacterial action of HOCl.

One possibility is that active oxygen species, which have been shown to be electron spin resonance spectra present in anode chamber water, may induce early wound healing through fibroblast migration and proliferation.

PMID: 11121980 [PubMed - indexed for MEDLINE]

Effect of Electrolysed Oxidising Water on Excised Burn Wounds in Rats

J. Traumatol chin.

2003 Aug 1;6(4):234-7.

Xin H, Zheng YJ, Hajime N, Han ZG.

Department of Thoracic Surgery, Sino-Japanese Joint Hospital, Jilin University, Jilin 130031, China. xinhua7254@yahoo.com.cn

PURPOSE OF THE STUDY: To study the efficacy of oxidative water electrolysis (AWE) and hydrocolloid occlusive dressings in accelerating epithelialisation of excised burn wounds in rats.

METHODS: Each anaesthetised Sprague-Dawley rat (n=28) was subjected to a third-degree burn that covered approximately 10% of the total body surface area. The rats were categorised into four groups: Group I (no irrigation), Group II (saline irrigation), Group III (EOV irrigation) and Group IV (hydrocolloid occlusive dressing after EOV irrigation). Wounds were observed macroscopically until complete epithelialisation, then epithelialised wounds were examined microscopically

. RESULTS: Burn wound healing was most rapid in group IV treated with hydrocolloid occlusive dressing in conjunction with EOV. Although extensive regenerative epidermis was observed in each group, lymphocyte and macrophage proliferation associated with dense collagen deposition was more extensive in groups II, III, and IV than in group I

CONCLUSIONS: Wound healing can be accelerated by the application of a hydrocolloid occlusive dressing to burn surfaces after they have been cleaned with EOB. PMID: 12857518 [PubMed - indexed for MEDLINE].

Decomposition of Ethylene, the Flower Ageing Hormone, by Acid Electrolysed Water.

Biosci Biotechnol Biochem. 2003 Apr;67(4):790-6. Harada K, Yasui K.

Research and Development Department, Hokkaido Electric Power Co., Inc. set 2-1 Tsuishikari, Ebetsu, Hokkaido 067-0033, Japan. kharada@h1.hotcn.ne.jp

Electrolysis of anodic water (EAW) markedly prolonged the lifespan of cut carnation flowers. Therefore, the flower senescence hormone associated with the decomposition of ethylene by EAW with potassium chloride as electrolyte was investigated. Ethylene was added externally to EAB, and the reaction between ethylene and chlorine available in EAB was investigated. The EAW had a low pH value (2.5), a high dissolved oxygen concentration, and an extremely high redox potential (19.2 mg/L and 1323 mV, respectively) with an available chlorine concentration of about 620 µm. Addition of ethylene to EAW resulted in the decomposition of ethylene, and an equimolar amount of ethylene chlorohydrin with available chlorine was obtained. That production of ethylene chlorohydrin was highly dependent on the pH value (pH 2.5, 5.0 and 10.0 were tested) and was faster in acidic solution. Ethylene chlorohydrin was not obtained after addition of ethylene to EAB at pH 2.6 when available chlorine was not available, but was obtained after addition of potassium hypochlorite to such EAB. The effect of the pH value of EAB on the shelf life of cut carnations was compatible with the rate of ethylene decomposition in EAB of the same pH value. These results indicate that the effect of EAB on shelf life of cut carnations was due to the decomposition of ethylene to ethylene chlorohydrin by chlorine from chlorine compounds.

PMID: 12784619 [PubMed - indexed for MEDLINE]

ANIMAL HUSBANDRY AND HORTICULTURE

Treatment of Inoculated Lucerne Seedlings with Escherichia coli by Electrolytic Oxidation of Water

Int J Nutrition of Microorganisms.

2003 Sep 15;86(3):231-7.Department of Agricultural and Biological Engineering, Pennsylvania State University, University Park, Pennsylvania 16802, USA.

Electrolysed oxidising water is a relatively new concept that is used in agriculture, animal husbandry, medical sterilisation and food sanitation.

Electrolysed oxidative (EO) water produced by passing a sodium chloride solution through an EO water generator was used to treat alfalfa seeds and seedlings inoculated with a five percent nalidixic acid cocktail. Escherichia coli O157:H7. EO water had a pH of 2.6, a redox potential of 1150 mV, and about 50 ppm free chlorine. The percentage of bacterial load reduction was determined for reaction times of 2, 4, 8, 8, 16, 32, and 64 min.

Mechanical agitation was carried out during seed treatment at different intervals to improve the treatment efficiency. Since E. coli O157:H7 was released by soaking during treatment, initial seed and seedling counts were determined by soaking contaminated seeds/seedlings in 0.1% peptone water for a period equivalent to the treatment time. Samples were then plated in 0.1% peptone water and plated

on tryptic soya agar with 5 µg/ml nalidixic acid (CAN). The results showed that the bacterial load of the treated seeds decreased from 38.2% to 97.1% (0.22-1.56 log (10) CFU/g).

The reduction for seedlings ranged from 91.1% to 99.8% (1.05-2.72 log(10) CFU/g).

Increasing treatment time increased the percentage reduction of E. coli O157:H7. However, germination of treated seeds decreased from 92% to 49% . the current strength 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]

Antimicrobial Interventions to Reduce Salmonella Species in Poultry

TCM Chicken.

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Fabrizio CA, Sharma RR, Demirci A, Cutter KN.

Department of Food Sciences, Pennsylvania State University, University Park 16802, USA.

Foodborne pathogens in cell suspensions or attached to surfaces can be recovered by electrolysed oxidative water (EW) ;

however, the use of EO water against poultry-associated pathogens has not been studied. In this study, EO acid water [EO-A; pH 2.6, chlorine (CL) 20 to 50 ppm and redox potential (ORP) 1150 mV], EO base water (EO-B; pH 11.6, ORP -795 mV), CHL, ozonated water (ml), acetic acid (AA), or trisodium phosphate (TSP) C was applied to broiler carcasses inoculated with Typhimurium salmonellae (ST) and immersed (4 C, 45 min), spray-washed (85 psi, 25 C, 15 C), or multiple interventions (NZ-B spray, immersed in OR-A; AA or TSP splash, immersed in CZ). Remaining bacterial populations were determined and compared on days 0 and 7 of aerobic storage in a refrigerator. On day 0, immersion in TSP and AA reduced ST by 1.41 log10, whereas EO-A Water reduced ST by approximately 0.86 log10. After 7 days of storage, EO-A Water, OZ, TSP and AA reduced ST, with detection occurring only after selective enrichment. Spray washing treatments with any of the formulations did not reduce ST on day 0. After 7 days of storage, TSP, AA, and EO-water decreased ST 2.17, 2.31, and log10 cop 1.06, respectively.

ST was reduced by 2.11 log10 immediately after multiple interventions, by 3.81 log10 after 7 days of storage. Although they are effective against ST, TSP and AA are expensive and negatively affect the environment. This study shows that EO water can reduce ST on poultry surfaces after long-term storage in the refrigerator.

PMID: 12412930 [PubMed - indexed for MEDLINE]