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This is a selection of Clinical Studies on the use of Alkaline Ionized (Basolyte) Water.

Anti-diabetic effects of electrolyzed reduced water in streptozotocin-induced and genetic diabetic mice.

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Oxidative stress is produced under diabetic conditions and is likely involved in progression of pancreatic beta-cell dysfunction found in diabetes. Both an increase in reactive oxygen free radical species (ROS) and a decrease in the antioxidant defense mechanism lead to the increase in oxidative stress in diabetes. Electrolyzed reduced water (ERW) with ROS scavenging ability may have a potential effect on diabetic animals, a model for high oxidative stress. Therefore, the present study examined the possible anti-diabetic effect of ERW in two different diabetic animal models. The genetically diabetic mouse strain C57BL/6J-db/db (db/db) and streptozotocin (STZ)-induced diabetic mouse were used as insulin deficient type 1 and insulin resistant type 2 animal model, respectively. ERW, provided as a drinking water, significantly reduced the blood glucose concentration and improved glucose tolerance in both animal models. However, ERW fail to affect blood insulin levels in STZ-diabetic mice whereas blood insulin level was markedly increased in genetically diabetic db/db mice. This improved blood glucose control could result from enhanced insulin sensitivity, as well as increased insulin release. The present data suggest that ERW may function as an orally effective anti-diabetic agent and merit further studies on its precise mechanism.

PMID: 16945392 [PubMed - indexed for MEDLINE]
Life Sci. 2006 Nov 10;79(24):2288-92. Epub 2006 Aug 2

Preservative effect of electrolyzed reduced water on pancreatic beta-cell mass in diabetic db/db mice.

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AQUAPEARL

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Electrolyzed reduced water (ERW) with ROS scavenging ability may have a potential effect on diabetic animals, a model for high oxidative stress. Therefore, the present study examined the possible anti-diabetic effect of ERW in genetically diabetic mouse strain C57BL/6J-db/db (db/db). ERW with ROS scavenging ability reduced the blood glucose concentration, increased blood insulin level, improved glucose tolerance and preserved beta-cell mass in db/db mice. The present data suggest that ERW may protect beta-cell damage and would be useful for antidiabetic agent.

PMID: 17268057 [PubMed - indexed for MEDLINE]

Biol Pharm Bull. 2007 Feb;30(2):234-6

Electrolyzed-reduced water protects against oxidative damage to DNA, RNA, and protein.

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The generation of reactive oxygen species is thought to cause extensive oxidative damage to various biomolecules such as DNA, RNA, and protein. In this study, the preventive, suppressive, and protective effects of in vitro supplementation with electrolyzed-reduced water on H₂O₂-induced DNA damage in human lymphocytes were examined using a comet assay. Pretreatment, cotreatment, and posttreatment with electrolyzed-reduced water enhanced human lymphocyte resistance to the DNA strand breaks induced by H₂O₂ in vitro. Moreover, electrolyzed-reduced water was much more effective than diethylpyrocarbonate-treated water in preventing total RNA degradation at 4 and 25 degrees C. In addition, electrolyzed-reduced water completely prevented the oxidative cleavage of horseradish peroxidase, as determined using sodium dodecyl sulfate-polyacrylamide gels. Enhancement of the antioxidant activity of ascorbic acid dissolved in electrolyzed-reduced water was about threefold that of ascorbic acid dissolved in nonelectrolyzed deionized water, as measured by a xanthine-xanthine oxidase superoxide scavenging assay system, suggesting an inhibitory effect of electrolyzed-reduced water on the oxidation of ascorbic acid.

PMID: 17159237 [PubMed - indexed for MEDLINE]

Appl Biochem Biotechnol. 2006 Nov;135(2):133-44



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

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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 - indexed for MEDLINE]
Biophys Chem. 2004 Jan 1;107(1):71-82**

Electrolyzed-reduced water reduced hemodialysis-induced erythrocyte impairment in end-stage renal disease patients.

Huang KC, Yang CC, Hsu SP, Lee KT, Liu HW, Morisawa S, Otsubo K, Chien CT.

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

Chronic hemodialysis (HD) patients increase erythrocyte susceptibility to hemolysis and impair cell survival. We explored whether electrolyte-reduced water (ERW) could palliate HD-evoked erythrocyte impairment and anemia. Forty-three patients undergoing chronic HD were enrolled and received ERW administration for 6 month. We evaluated oxidative stress in blood and plasma, erythrocyte methemoglobin (metHb)/ferricyanide reductase activity, plasma metHb, and proinflammatory cytokines in the chronic HD patients without treatment (n=15) or with vitamin C (VC)- (n=15), vitamin E (VE)-coated dialyzer (n=15), or ERW treatment (n=15) during an HD



AQUAPEARL

course. The patients showed marked increases (15-fold) in blood reactive oxygen species, mostly H₂O₂, after HD without any treatment. HD resulted in decreased plasma VC, total antioxidant status, and erythrocyte methHb/ferricyanide reductase activity and increased erythrocyte levels of phosphatidylcholine hydroperoxide (PCOOH) and plasma methHb. Antioxidants treatment significantly palliated single HD course-induced oxidative stress, plasma and RBC PCOOH, and plasma methHb levels, and preserved erythrocyte methHb /ferricyanide reductase activity in an order VC>ERW>VE-coated dialyzer. However, ERW had no side effects of oxalate accumulation easily induced by VC. Six-month ERW treatment increased hematocrit and attenuated proinflammatory cytokines profile in the HD patients. In conclusion, ERW treatment administration is effective in palliating HD-evoked oxidative stress, as indicated by lipid peroxidation, hemolysis, and overexpression of proinflammatory cytokines in HD patients.

**PMID: 16760903 [PubMed - indexed for MEDLINE]
Kidney Int. 2006 Jul;70(2):391-8. Epub 2006 Jun 7**

Influences of alkaline ionized water on milk yield, body weight of offspring and perinatal dam in rats.

J Toxicol Sci. 1998 Dec;23(5):365-71. Watanabe T , Pan I , Fukuda Y , Murasugi E , Kamata H , Uwatoko K .

Department of Veterinary Physiological Chemistry, College of Bioresource Sciences, Nihon University, Kanagawa, Japan.

The authors previously reported that male offspring of mothers rats given alkaline ionized water (AKW) showed a significantly higher body weight by day 14 after birth than did offspring of mother rats given tap water (TPW); furthermore, marked myocardial necrosis and fibrosis were observed particularly in the former male offspring at the age of 15 weeks. In the present experiment we looked for differences in bioparameters, namely the milk yield of mothers and suckled milk volume of the offspring, between the AKW- and the TPW-treated groups in order to reveal the factors which cause the unusual body weight gain in the offspring. Even though we were able to repeat our previous observation (the body weight of the male offspring of the AKW group increased significantly more by day 14 and 20 after birth and of the female by day 20 after birth than did that of the TPW group ($p < 0.05$), no significant difference was noted in any of the bioparameters, including those related to milk production and consumption. It is thus suspected that the water-hydrated cation, which was transferred either to the fetus through the placenta or to the offspring through the milk, might be the cause of the unusual body weight increase. Since calcium plays an important role in skeletal formation, it is tentatively concluded that the higher calcium concentration



AQUAPEARL

of AKW enriched the mother, serum calcium which was transferred to the fetus through the placenta and to the offspring through the milk.

PMID: 9922938 [PubMed - indexed for MEDLINE]

Histopathological influence of alkaline ionized water on myocardial muscle of mother rats.

J Toxicol Sci. 1998 Dec;23(5):411-7. Watanabe T , Shirai W , Pan I , Fukuda Y , Murasugi E , Sato T , Kamata H , Uwatoko K .

Department of Veterinary Physiological Chemistry, College of Bioresource Sciences, Nihon University, Kanagawa, Japan.

We have reported that a marked necrosis and subsequent fibrosis of myocardium occurred among male rats 15 weeks old given alkaline ionized water (AKW) during gestation and suckling periods, and after weaning. In this study, it was examined whether similar lesions would occur in mother rats which were given AKW from day zero of gestation to day 20 of lactation. The myocardial lesion in the mother rats given AKW showed cell infiltration, vacuolation and fibrosis in the papillary muscle of the left ventricle, as were observed in male rats of 15 weeks old. Myocardial degeneration may cause a leakage of potassium into the blood that results in a higher concentration of potassium in the blood in the test group than in that of the control group given tap water.

PMID: 9922944 [PubMed - indexed for MEDLINE]

[Editors note: This and the following study were negative, suggesting that caution should be used on the dosage. Japanese doctors recommend drinking Alkaline Water with pH between 8 and 9, more is not necessarily better. All other clinical studies have been positive]

Degradation of myocardiac myosin and creatine kinase in rats given alkaline ionized water.

J Vet Med Sci. 1998 Feb;60(2):245-50. Watanabe T , Kishikawa Y .

Department of Veterinary Physiological Chemistry, College of Bioresource Sciences, Nihon University, Kanagawa, Japan.



AQUAPEARL

Recently, the authors have shown that marked necrosis and fibrosis of myocardium were observed in rats given alkaline ionized water (AKW). To clarify the cause of myocardial lesions, the activities of myosin ATPase, actomyosin ATPase and creatine kinase (CK) in myocardium of rats given AKW at 15 weeks-old were compared with those in myocardium of rats given tap water (TPW). Furthermore, sodium dodecyl sulfate polyacrylamide gel electrophoresis (SDS-PAGE) of myocardiac myosin and isoelectric focusing (IEF) of myocardiac CK were performed which revealed a distinct difference between AKW and TPW groups. The activities of myosin ATPase and actomyosin ATPase in the AKW group were higher than those in the TPW group, and these elevated activities were caused by the degradation of myosin in the AKW group judging from the SDS-PAGE pattern of myosin. On the other hand, the activity of CK in the AKW group was lower than that in the TPW group, and the IEF pattern of CK showed leakage of myocardiac CK. These results indicate that increases in actomyosin ATPase activity and myosin ATPase activity, plus the decrease in CK activity caused the disorder of coupled reaction in male rats given AKW at 15 weeks-old. It is concluded that this disorder of coupled reaction may cause marked myocardiac necrosis and fibrosis in rats given AKW.

PMID: 9524951 [PubMed - indexed for MEDLINE]

Influence of alkaline ionized water on rat erythrocyte hexokinase activity and myocardium.

J Toxicol Sci. 1997 May;22(2):141-52. Watanabe T , Kishikawa Y , Shirai W .

Department of Veterinary Physiological Chemistry, College of Bioresource Science, Nihon University, Kanagawa, Japan.

Alkaline ionized water (AKW) produced by the electrolysis of tap water (TPW) was given to pregnant rats throughout gestation. AKW was subsequently given to infants as a test group until 15 weeks old to determine changes in body and organ weights, erythrocyte hexokinase (HK) activity and histological preparations of myocardiac muscle. The results were compared with those for rats given TPW. Body weight of male and female rats given AKWA at 3 to 11 weeks of age after birth significantly increased beyond control group values. Organ weights of offspring at 15 weeks-old showed no statistical difference for either group. HK activity, the rate-determining enzyme in erythrocyte glycolysis, significantly increased in males given AKW at 15 weeks-old. This suggests that AKW intake causes elevation of metabolic activity. Hyperkalemia was observed in males and females given AKW at 15 weeks-old. Especially in males, pathological changes of necrosis in myocardiac muscle were observed.

PMID: 9198011 [PubMed - indexed for MEDLINE]



Effect of alkaline ionized water on reproduction in gestational and lactational rats.

J Toxicol Sci. 1995 May;20(2):135-42. Watanabe T .

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

Alkaline ionized water (AKW) produced by electrolysis was given to gestational and lactational rats, and its effect on dams, growth of fetuses and offsprings were investigated. The results showed that the intake of food and water in dams increased significantly when AKW was given from the latter half of the gestation period and from the former half of the lactation period. Body weight of the offsprings in the test group, both males and females, increased significantly from the latter half of the lactation period. During the lactation period and after weaning, the offsprings in the test group showed significantly hastened appearance of abdominal hair, eruption of upper incisors, opening of eyelids and other postnatal morphological developments both in males and females, as well as earlier separation of auricle and descent of testes in males compared with the control was noted. As mentioned above, it was suggested from the observations conducted that the AKW has substantial biological effects on postnatal growth, since intake of food and water and body weight of the offsprings increased and postnatal morphological development was also accelerated.

PMID: 7473891 [PubMed - indexed for MEDLINE]

Impact of extra waters on immunosystem in mice

Wei Sheng Yan Jiu. 2004 Jul;33(4):422-5. [Article in Chinese]

Li Y , Han C , Li Y , Li Y , Zhao X , Zhong K , Chen T , Zhang M , Fan F , Tao Y , Ji R .

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OBJECTIVE: To study impact of extra waters on immunosystem in mice-alkaline ionized water, mineralecology water, activated water, and pure water. METHODS: According to Function Assessment and Experiment for Function Food, 1996, the ratio of spain and body weight, the ratio of thymus and body weight, the delayed type hypersensitivity (DTH), the phagocytosing functions



AQUAPEARL

by cock RBC, the plaque forming cell (PFC) and HC50 testing were assessment with 120 male Balb/c mice of 17.8 - 23.3 g (group I), the mice were divided into four group, and drank daily the four kinds of waters respectively until 50 days. The lymph cell transformation by ConA and NK cell activity were assessment with other 120 male Balb/c mice of 17.8 - 23.3 g (group II), the mice were divided into four group and drank daily the four kinds of waters respectively until 50 days. The phagocytosing functions by carbon powder were assessment with other 120 female Balb/c mice of 16.7 - 22.0 g (group III) were divided into four group and drank daily the four kinds of waters respectively until 50 days. The data were statisticed by Stata soft. RESULTS: Other three waters compared with the pure water: (1) Alkaline ionized water and activated water can alleviate the body weight increase of male Balb/c mouse ($P < 0.01$ & $P < 0.05$), but alkaline ionized water, mineral-ecology water, activated water don't impact on the female Balb/c mouse body weight ($P > 0.05$). (2) Activated water can remarkably increase the ratio of thymus and body weight ($P < 0.05$), and increase the phagocytosing ability by cock RBC ($P < 0.01$), and increase the NK cell activity ($P < 0.01$). (3) The three extra waters don't impact on othe items for the Balh/c mouce. CONCLUSION: The study must be continued to impact on immunosystem in mice for extra waters.

PMID: 15461264 [PubMed - in process]

Selective stimulation of the growth of anaerobic microflora in the human intestinal tract by electrolyzed reducing water.

Med Hypotheses. 2005;64(3):543-6. Vorobjeva NV .

Department of Physiology of Microorganisms, Biology Faculty, Lomonosov Moscow State University, 119992 Moscow, Russia. nvvorobjeva@mail.ru 96-99% of the "friendly" or residential microflora of intestinal tract of humans consists of strict anaerobes and only 1-4% of aerobes. Many diseases of the intestine are due to a disturbance in the balance of the microorganisms inhabiting the gut. The treatment of such diseases involves the restoration of the quantity and/or balance of residential microflora in the intestinal tract. It is known that aerobes and anaerobes grow at different oxidation-reduction potentials (ORP). The former require positive E(h) values up to +400 mV. Anaerobes do not grow unless the E(h) value is negative between -300 and -400 mV. In this work, it is suggested that prerequisite for the recovery and maintenance of obligatory anaerobic microflora in the intestinal tract is a negative ORP value of the intestinal milieu. Electrolyzed reducing water with E(h) values between 0 and -300 mV produced in electrolysis devices possesses this property. Drinking such water favours the growth of residential microflora in the gut. A sufficient array of data confirms this idea. However, most researchers explain the mechanism of its action by an antioxidant properties destined to detox the oxidants in the gut and other host tissues. Evidence is presented in favour of the hypothesis that the primary target for electrolyzed reducing water is the



residential microflora in the gut.

PMID: 15617863 [PubMed - indexed for MEDLINE]

Water desirable for health in terms of ORP (oxidation-reduction potential) to pH relationship

- Review
PMID: 16180690 [PubMed - indexed for MEDLINE] Shokuhin Eiseigaku Zasshi. 2005 Aug;46(4):J228-33. [Article in Japanese]

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Publication Types:

Review

PMID: 2829704 [PubMed - indexed for MEDLINE]

Influences of alkaline ionized water on milk electrolyte concentrations in maternal rats.

J Toxicol Sci. 2000 Dec;25(5):417-22. Watanabe T , Kamata H , Fukuda Y , Murasugi E , Sato T , Uwatoko K , Pan IJ .

Department of Veterinary Biochemistry, College of Bioresource Sciences, Nihon University, 1866 Kameino, Fujisawa, Kanagawa 252-8510, Japan.

We previously reported that body weight on day 14 after birth in male offspring of rats given alkaline ionized water (AKW) was significantly heavier than that in offspring of rats given tap water (TPW), but no significant difference was noted in milk yield and in suckled milk volume between the two groups. Additionally, the offspring in the AKW group and TPW group were given



AQUAPEARL

AKW and TPW, respectively, at weaning, and unexpectedly, the necrotic foci in the cardiac muscle were observed at the 15-week-old age in the AKW group, but not in the TPW group. The present study was designed to clarify the factors which are involved in that unusual increase of body weight and occurrence of cardiac necrosis. Eight dams in each group were given AKW or TPW (control) from day 0 of gestation to day 14 of lactation. The milk samples were collected on day 14 of lactation and analyzed for concentrations of calcium (Ca), sodium (Na), potassium (K), magnesium (Mg) and chloride (Cl). The AKW and TPW were also analyzed. Ca, Na and K levels in milk were significantly higher in the AKW group compared to the TPW group. No significant difference was noted in the Mg and Cl levels between the two groups. These data suggested that the Ca cation of AKW enriched the Ca concentration of the milk and accelerated the postnatal growth of the offspring of rats given AKW.

PMID: 11201172 [PubMed - indexed for MEDLINE]

Electrolyzed-reduced water scavenges active oxygen species and protects DNA from oxidative 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, which brings about a variety of diseases as well as aging. 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⁻ 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



AQUAPEARL

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 $1O_2$ and $\cdot OH$.

PMID: 9169001 [PubMed - indexed for MEDLINE]

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

Biophys Chem. 2004 Jan 1;107(1):71-82.

Hanaoka K, Sun D, Lawrence R, Kamitani Y, Fernandes G.

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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 - indexed for MEDLINE]

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

Authors: Li Y.1; Nishimura T.1; Teruya K.1; Maki T.1; Komatsu T.1; Hamasaki T.1;



Kashiwagi T.1; Kabayama S.2; Shim S-Y.1; Katakura Y.1; Osada K.1; Kawahara T.1; Otsubo K.2; Morisawa S.2; Ishii Y.3; Gadek Z.4; Shirahata S.5

Source: Cytotechnology, Volume 40, Numbers 1-3, 2002, pp. 139-149(11)

Publisher: Springer

Abstract:

Reactive oxygen species (ROS) cause irreversible damage to biological macromolecules, resulting in many diseases. Reduced water (RW) such as hydrogen-rich electrolyzed reduced water and natural reduced waters like Hita Tenryosui water in Japan and Nordenau water in Germany that are known to improve various diseases, could protect a hamster pancreatic beta cell line, HIT-T15 from alloxan-induced cell damage. Alloxan, a diabetogenic compound, is used to induce type 1 diabetes mellitus in animals. Its diabetogenic effect is exerted via the production of ROS. Alloxan-treated HIT-T15 cells exhibited lowered viability, increased intracellular ROS levels, elevated cytosolic free Ca²⁺ concentration, DNA fragmentation, decreased intracellular ATP levels and lowering of glucose-stimulated release of insulin. RW completely prevented the generation of alloxan-induced ROS, increase of cytosolic Ca²⁺ concentration, decrease of intracellular ATP level, and lowering of glucose-stimulated insulin release, and strongly blocked DNA fragmentation, partially suppressing the lowering of viability of alloxan-treated cells. Intracellular ATP levels and glucose-stimulated insulin secretion were increased by RW to 2–3.5 times and 2–4 times, respectively, suggesting that RW enhances the glucose-sensitivity and glucose response of beta-cells. The protective activity of RW was stable at 4 °C for over a month, but was lost by autoclaving. These results suggest that RW protects pancreatic beta-cells from alloxan-induced cell damage by preventing alloxan-derived ROS generation. RW may be useful in preventing alloxan-induced type 1-diabetes mellitus.

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Electrolyzed hydrogen-saturated water for drinking use elicits an antioxidant effect: a feeding test with rats.

Biosci Biotechnol Biochem. 2005 Oct;69(10):1985-7



AQUAPEARL

Yanagihara T, Arai K, Miyamae K, Sato B, Shudo T, Yamada M, Aoyama M.

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A new type of electrolyzed hydrogen-saturated (EHS) water was produced using a water-electrolyzing device equipped with a special cation exchanger. Use of the EHS water for drinking in a feeding test with rats elicited an antioxidative effect. After intraperitoneal injection of 2,2-azobis-amidinopropane dihydrochloride, urinary secretion of 8-hydroxydeoxyguanosine and hepatic formation of peroxidized lipid were significantly lessened in rats which had received the EHS water for one week. These results suggest the possibility that this drinking water shows an effect in reduction of oxidative stress in the body.

PMID: 16244454 [PubMed - in process]

[Editors note: following two studies are not about ionized water, but about effects of increasing alkaline minerals JK]

Effects of supplementing of calcium, iron and zinc on women's health during pregnancy

Zhonghua Yu Fang Yi Xue Za Zhi. 2001 Nov;35(6):365-9. [Article in Chinese]

An H, Yin S, Xu Q.

Department of Maternal and Child Nutrition, Institute of Nutrition and Food Hygiene, Chinese Academy of Preventive Medicine, Beijing 100050, China.

OBJECTIVES: To determine the effects of supplementing biscuits fortified with calcium (Ca) and vitamin D (VD), iron (Fe), vitamin C (VC) and zinc (Zn) to pregnant women from the 5th month of gestation until delivery on their health, and to explore a way to improve their Ca, Fe and Zn nutritional status during pregnancy. **METHODS:** A total of 313 healthy and primary pregnant women were enrolled and divided into five study groups based on their order visiting the hospitals for prenatal care. Each woman of the study groups was given three pieces of biscuit fortified with VD, Ca and VD, Ca, Zn and VD (Ca + Zn + VD), Ca, Fe, VC and VD (Ca + Fe + VD), Ca, Fe, VC, Zn and VD (Ca + Fe + Zn + VD), respectively, from the 15th month of gestation until delivery (24 weeks in total) daily. The fortified levels were 10 micrograms VD, 400 mg Ca from carbonate calcium, 10 mg Zn from lactate zinc, 10 mg Fe from ferrous lactate, and 50 mg VC, respectively. A parturient women was selected from the same hospital as control after one trial subject for each study groups selected. **RESULTS:** The daily dietary intakes of Ca, Zn and Fe in pregnant women were only 47.7%, 54.7% and 86.7% of the Recommended Dietary Allowances for Chinese. Incidence of anemia for mid-term pregnant women was 35.2%, and Fe-supplementation could



AQUAPEARL

significantly improved their hemoglobin level ($P < 0.05$). Prevalence of anemia in the groups of Ca + Fe + Zn + VD and Ca + Fe + VD was 35.3% and 40.7%, respectively, before Fe supplementation and reduced to zero and 4.0%, respectively, after Fe supplementation. Whereas, prevalence of anemia in the other groups without Fe supplementation still kept in a relatively high level. In the groups supplemented with Ca, their plasma Ca level increased, especially with the best results in Ca + VD group. Plasma level of Zn declined with length of gestation, which could be improved by Zn supplementation. Serum level of alkaline phosphatase activity increased a little bit with length of gestation. There was no significant difference in radial and ulnar bone mineral density (BMD) between trial groups and controls two months after delivery. Maternal radial and ulnar BMD correlated significantly with their dietary Ca intakes in Ca + VD group. **CONCLUSION:** The best way to improve maternal nutritional status is supplementation of Ca + Fe + Zn + VitD, based on the Recommended Dietary Allowances for Chinese.

PMID: 11840760 [PubMed - indexed for MEDLINE]

Supplementation with alkaline minerals reduces symptoms in patients with chronic low back pain.

1: J Trace Elem Med Biol. 2001;15(2-3):179-83.

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The cause of low back pain is heterogeneous, it has been hypothesised that a latent chronic acidosis might contribute to these symptoms. It was tested whether a supplementation with alkaline minerals would influence symptoms in patients with low back pain symptoms. In an open prospective study 82 patients with chronic low back pain received daily 30 g of a lactose based alkaline multimineral supplement (Basica) over a period of 4 weeks in addition to their usual medication. Pain symptoms were quantified with the "Arhus low back pain rating scale" (ARS). Mean ARS dropped highly significant by 49% from 41 to 21 points after 4 weeks supplementation. In 76 out of 82 patients a reduction in ARS was achieved by the supplementation. Total blood buffering capacity was significantly increased from 77.69 +/- 6.79 to 80.16 +/- 5.24 mmol/L (mean +/- SEM, $n = 82$, $p < 0.001$) and also blood pH rose 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 changed in sublingual tissue as measured with the EXA-test. Plasma concentrations of potassium, calcium, iron, copper, and zinc were within the normal range and not significantly influenced by the supplementation. Plasma magnesium was slightly reduced after the supplementation (-3%, $p < 0.05$). The results show that a disturbed acid-base balance may contribute to the symptoms of low back pain. The simple and safe addition of an alkaline multimineral prepartate was able to reduce the pain symptoms in these patients with chronic low back pain.

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