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2. Clinical evaluation of alkaline ionized water for abdominal complaints: Placebo controlled double blind tests

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"Effect of alkaline ionized water on abdominal complaints was evaluated by placebo controlled double blind tests. Overall scores of improvement using alkaline ionized water marked higher than those of placebo controlled group, and its effect proved to be significantly higher especially in slight symptoms of chronic diarrhea and abdominal complaints in cases of general malaise. Alkaline ionized water group did not get interrupted in the course of the test, nor did it show serious side effects or abnormal test data. It was confirmed that alkaline ionized water is safer and more effective than placebos.

Summary

Effect of alkaline ionized water on abdominal complaints was clinically examined by double blind tests using clean water as placebo. Overall improvement rate was higher for alkaline ionized water group than placebo group and the former proved to be significantly more effective than the other especially in cases of slight symptoms. Examining improvement rate for each case of chronic diarrhea, constipation and abdominal complaints, alkaline ionized water group turned out to be more effective than placebo group for chronic diarrhea, and abdominal complaints.

The test was stopped in one case of chronic diarrhea, among placebo group due to exacerbation, whereas alkaline ionized water group did not stop testing without serious side effects or abnormal test data in all cases.

It was confirmed that alkaline ionized water is more effective than clean water against chronic diarrhea, abdominal complaints and overall improvement rate (relief of abdominal complaints) and safer than clean water.

Introduction

Since the approval of alkaline ionized water electrolyzers by Pharmaceutical Affairs Law in 1966 for its antacid effect and efficacy against gastrointestinal disorders including hyperchylia, indigestion, abnormal gastrointestinal fermentation and chronic diarrhea, they have been extensively used among patients.

However. medical and scientific evaluation of their validity is not established. In our studv. we examined

clinical effect of alkaline ionized water on gastrointestinal disorders across many symptoms in various facilities. Particularly, we studied safety and usefulness of alkaline ionized water by double-blind tests using clean water as a control group.

Test subjects and methods

163 patients (34 men, 129 women, age 21 to 72, average 38.6 years old) of indigestion, abnormal gastrointestinal fermentation (with abnormal gas emission and rugitus) and abdominal complaints caused by irregular dejection (chronic diarrhea, or constipation) were tested as subjects with good informed consent.

Placebo controlled double blind tests were conducted using alkaline ionized water and clean water at multiple facilities. An alkaline ionized water electrolyzer sold commercially was installed with a pump driven calcium dispenser in each of the subject homes. Tested alkaline ionized water had pH at 9.5 and calcium concentration at 30ppm.

Each subject in placebo group used a water purifier that has the same appearance as the electrolyzer and produces clean water.

The tested equipment was randomly assigned by a controller who sealed off the key code, which was stored safely until the tests were completed, and the seal was opened again.

Water samples were given to each patient in the amount of 200ml in the morning with the total of 500ml or more per day for a month. Before and after the tests, blood, urine and stool were tested and a log was kept on the subjective symptoms, bowel movements and accessory symptoms. After the tests, the results were analyzed based on the log and the test data.

Conclusion

As a result of double blind clinical tests of alkaline ionized water and clean water, alkaline ionized water was proved to be more effective than clean water against chronic diarrhea, abdominal complaints (dyspepsia) and overall improvement rate (relief from abdominal complaints). Also, safety of alkaline ionized water was confirmed which clinically verifies its usefulness.

3. Effect of Electrolytic Water (Ionized Water) Intake on Lifespan of Autoimmune Disease Prone Mice

Research from Texas University

Recent studies on electrolyzed water indicate that anode or acidic water is most effective as disinfectants; whereas, reduced or alkaline water processed through cathode is used as safe drinking water. The present drinking water study was undertaken in two strains of autoimmune disease prone mice to establish the spontaneous disease process and longevity. Weanling MRL/lpr and NZBxNZW [B/W] F1 female mice were provided daily with (1) tap water [pH ~7.5, oxygen reduction potential (ORP)~600+] (2) electrolyzed water with pH of ~9.0 and ORP ~400- and (3) hyper-reduced water with pH~10.0 and ORP~600-. Mice were provided H₂O and chow diet ad libitum and weekly body weights and spontaneous deaths were recorded. The mean survival data recorded as days for MRL/lpr mice [25 mice/group] is as follows: (1) tap water 235±25, (2) reduced 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) reduced water 298±19 and (3) hyper-reduced 302±18 days. A significantly decreased (<0.05) serum lipid peroxides were observed in mice fed hyper-reduced H₂O. Also, the

source of water did not alter lymphocyte subsets or their response to mitogens. In summary, hyper-reduced water with pH~10.0 appears to inhibit autoimmune disease of MRL/lpr mice whereas only a modest increased lifespan was noted for B/W mice. The increased lifespan by electrolyzed H₂O appears to be related to the changes in free radicals and antioxidant enzyme levels. [Supported in part by Zanix Co. and Mr. Waterman Co., Tokyo, Japan].

Summary:

1. Life long intake of both reduced (pH 9.0) and hyper-reduced (pH 10.0) water caused no harm to mice compared to tap water.
2. Survival is increased significantly by hyper-reduced water in one strain (MRL/lpr).
3. Slight increased life span in the other strain (NZBxNZW F1).
3. Reduced and hyper-reduced water appears to increase T cell numbers, and decrease B cells.
4. Both reduced and hyper-reduced water appears to increase antioxidant mRNA levels.
5. New clinical and animal studies are needed to confirm above results.

4. Reduced Water for Prevention of Diseases

Part paper delivered by Dr Shirahata to the Functional Water Symposium in Tokyo by 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, that, in turn result in the development of a variety of pathologic states such as diabetes, cancer and aging. Reduced water is defined as anti-oxidative water produced by reduction of water.

Electrolyzed reduced water (ERW) has been demonstrated to be hydrogen-rich water and can scavenge ROS in vitro (Shirahata et al., 1997). The reduction of proton in water to active hydrogen (atomic hydrogen, hydrogen radical) that can scavenge ROS is very easily caused by a weak current, compared to oxidation of hydroxyl ion to oxygen molecule. Activation of water by magnetic field, collision, minerals etc. will also produce reduced water containing active hydrogen and/or hydrogen molecule.

Several natural waters such as Hita Tenryosui water drawn 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 have demonstrated that not only ERW but also natural reduced waters described above contain active hydrogen and scavenge ROS in cultured cells. ROS is known to cause reduction of glucose uptake by inhibiting the insulin-signaling pathway in cultured cells. Reduced water scavenged intracellular ROS and stimulated glucose uptake in the presence or absence of insulin in both rat L6 skeletal muscle cells and mouse 3T3/L1 adipocytes. This insulin-like activity of reduced water was inhibited by wortmannin that is specific inhibitor of PI-3 kinase, a key molecule in insulin signaling pathways.

Reduced water protected insulin-responsive cells from sugar toxicity and improved the damaged sugar tolerance of type 2 diabetes model mice, suggesting that reduced water may improve insulin-independent diabetes mellitus.

Cancer cells are generally exposed to high oxidative stress. Reduced water cause impaired tumor phenotypes of human cancer cells. such as reduced growth rate. morphological changes. reduced colony formation ability

in soft agar, passage number-dependent telomere shortening, reduced binding abilities of telomere binding proteins and suppressed metastasis.

Reduced water suppressed the growth of cancer cells transplanted into mice, demonstrating their anticancer effects in vivo. Reduced water will be applicable to not only medicine but also food industries, agriculture, and manufacturing industries.

[Also see above for Dr. Sanetaka Shirahata paper " *Electrolyzed reduced water scavengers active oxygen species and protects DNA from oxidative damage* "]

5. Clinical Improvements Obtained From The Intake Of Reduced Water

Extracts from the *Presentation At The Eight Annual International Symposium On man And His Environment in Health And Disease* on February 24th 1990, at The Grand Kempinski Hotel, Dalls, Texas, USA by *Dr. M Kawamura, M.D.*, on:

THE CONCEPT OF PREHEPATIC MEDICINES

Since the introduction of alkaline ionic water in our clinic in 1985, we have had the following interesting clinical experiences in the use of this type of water. By the use of alkaline ionic water for drinking and the preparation of meals for our in-patients, we have noticed: -

- Declines in blood sugar levels in diabetic patients.
- Improvements in peripheral circulation in diabetic gangrene.
- Declines in uric acid levels in patients with gout.
- Improvements in liver function exams in hepatic disorders.
- Improvements in gastroduodenal ulcer and prevention of their recurrences.
- Improvements in hypertension and hypotension.
- Improvements in allergic disorders such as asthma, urticaria, rhinites and atopic dermatitis.
- Improvements in persistent diarrhoea which occurred after gastrectomy.
- Quicker improvements in post operative bowler paralysis.
- Improvements in serum bilirubin levels in new born babies.

Being confirming clinical improvements, we have always observed changes of stools of the patients, with the colour of their feaces changing from black-brown colour to a brigher yellow-brown one, and the odour of their feaces becoming almost negligible.

The number of patients complaining of constipation also decreased markedly. The change of stool findings strongly suggests that alkaline ionic water intake can decrease the production of putrefield or pathogenic metabolites.

Devices to produce reduced water were introduced into our clinic in May 1985. Based on the clinical experiences obtained in the past 15 years, it can be said that introduction of electrolyzed-reduced water for drinking and cooking purpose for in-patients should be the very prerequisite in our daily medical practices. Any dietary recipe cannot be a scientific one if property of water is not taken by the patients is not taken into consideration.

The Ministrv of Health and Welfare in Japan announced in 1965 that the intake of reduced water is effective

for restoration of intestinal flora metabolism.

6. Effects of alkaline ionized water on formation & maintenance of osseous tissues

by Rei Takahashi Zhenhua Zhang Yoshinori Itokawa

(Kyoto University Graduate School of Medicine, Dept. of Pathology and Tumor Biology, Fukui Prefectural University)

Effects of calcium alkaline ionized water on formation and maintenance of osseous tissues in rats were examined. In the absence of calcium in the diet, no apparent calcification was observed with only osteoid formation being prominent. Striking differences were found among groups that were given diets with 30% and 60% calcium. Rats raised by calcium-ionized water showed the least osteogenetic disturbance. Tibiae and humeri are more susceptible to calcium deficiency than femora. These results may indicate that calcium in drinking water effectively supplements osteogenesis in case of dietary calcium deficiency. The mechanism involved in osteoid formation such as absorption rate of calcium from the intestine and effects of calcium alkaline ionized drinking water on maintaining bone structure in the process of aging or under the condition of calcium deficiency is investigated.

Osteoporosis that has lately drawn public attention is defined as "conditions of bone brittleness caused by reduction in the amount of bone frames and deterioration of osseous microstructure." Abnormal calcium metabolism has been considered to be one of the factors to contribute to this problem, which in turn is caused by insufficient calcium take in, reduction in enteral absorption rate of calcium and increase in the amount of calcium in urinal discharge. Under normal conditions, bones absorb old bones by regular metabolism through osteoid formation to maintain their strength and function as supporting structure. It is getting clear that remodeling of bones at the tissue level goes through the process of activation, resorption, reversal, matrix synthesis and mineralization. Another important function of bones is storing minerals especially by coordinating with intestines and kidneys to control calcium concentration in the blood. When something happens to this osteo metabolism, it results in abnormal morphological changes. Our analyses have been focusing mostly on the changes in the amount of bones to examine effects of calcium alkaline ionized water on the reaction system of osteo metabolism and its efficiency. This time, however, we studied it further from the standpoint of histology. In other words, we conducted comparative studies on morphological and kinetic changes of osteogenesis by testing alkaline ionized water, tap water and solution of lactate on rats.

Three-week-old male Wistar rats were divided into 12 groups by conditions of feed and drinking water. Feeds were prepared with 0%, 30%, 60% and 100% of normal amount of calcium and were given freely. Three types of drinking water, tap water (city water, about 6ppm of Ca), calcium lactate solution (Ca=40ppm) and alkaline ionized water (Ca =40ppm, pH=9, produced by an electrolyzer NDX 4 LMC by Omco OMC Co., Ltd.) were also given freely. Rats' weight, amount of drinking water and feed as well as the content of Ca in drinking water were assayed every day. On the 19th and 25th days of testing, tetracycline hydrochloride was added to the feed for 48 hours so as to bring its concentration to 30mg/kg. On the 30th day, blood samples were taken under Nembutal anesthesia, and tibiae, humeri and femora were taken out to make non-decalcified samples. Their conditions of osteoid formation and rotation were observed using Villanueva bone stain and Villanueva goldner stain.

Three groups that were given different types of drinking water and the same amount of Ca in the feed were compared to find out no significant difference in the rate of weight gain and intakes of feed and drinking

water. Alkaline ionized water group had significantly greater amount of tibiae and humeri with higher concentration of calcium in the bones.

The group of 0% calcium in the feed saw drastic increase in the amount of osteoid. There was not much difference by types of drinking water. Almost no tetracycline was taken into tibiae and humeri, although a small amount was identified in femora. As a result, osteogenesis went as far as osteoid formation, but it was likely that decalcification has not happened yet, or most of newly formed bones were absorbed. As to the groups of 30% and 60% calcium in the feed, increase in the area of tetracycline take in was more identifiable with higher clarity in descending order of alkaline ionized water, calcium lactate solution and tap water groups. Especially in case of tap water group, irregularity among the areas of tetracycline take in was distinctive. The group of 100% calcium in the feed saw some improvements in osteogenesis in descending order of alkaline ionized water, calcium lactate solution and tap water. In any case, bone formation seemed to be in good condition at near normal level.

Alkaline ionized water was regarded to be effective for improvements of osteogenesis under the conditions of insufficient calcium in the feed. Also, the extent of dysosteogenesis differed by the region. That is, tibiae and humeri tend to have more significant dysosteogenesis than femora.

In addition, there is a possibility that osteo metabolism varies depending on enteral absorption rate of calcium, adjustment of discharge from kidneys and functional adjustment of accessory thyroid in the presence of alkaline ionized water. We are now studying its impact on calcium concentration in the blood. We are also examining whether it is possible to deter bone deterioration by testing on fast aging mouse models.

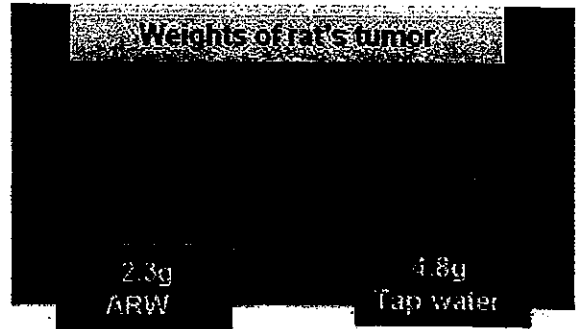
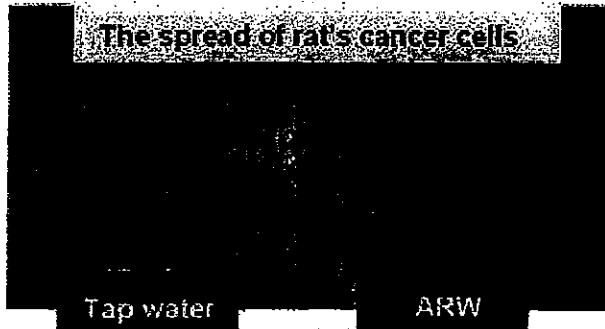
Korean TV Reported scientific Results on the effects of Ionized Water (Broadcast in 2004)

1. **Anti-cancer Effects**
2. **Anti-Oxidization Effects**
3. **Increase of Immune Function**
4. **Diabetes**
5. **Protection of DNA in tissues**

Protection of DNA in tissues

Anti-cancer Effects

After injecting malignant skin cancer cells into cancer-free laboratory mice, they supplied the mice with Alkaline Reduced Water, and compared the size of the tumor after a lapse of 20 days.



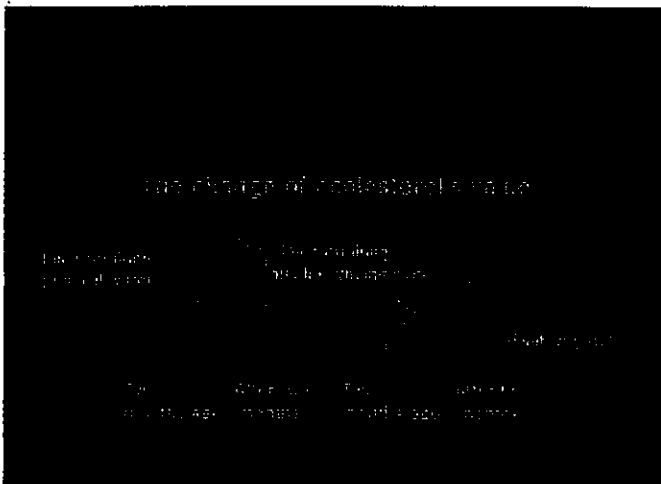
The results

The results showed the mice, which were supplied with the Ionized Water (ARW) showed the growing speed of the **tumor and tumor sizes had been notably reduced** as compared to those that had not taken ARW.

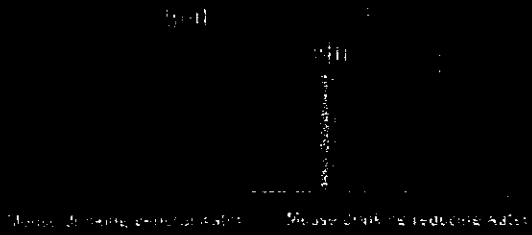
Anti-Oxidization Effects

Mineral Ionized Water (ARW) has action of removing oxygen free radicals. 20 days after injecting skin cancer cells into the tail of cancer-free laboratory mice, the researchers checked the amounts of oxygen free radicals for each separate organ for the mice that had taken normal water and mice that had taken ARW.

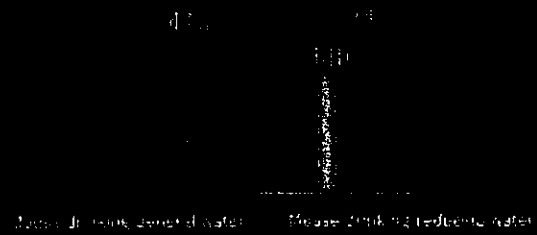
Mice that had taken Ionized Water (ARW) showed reduced amounts of oxygen free radicals in their lungs, livers, and kidneys. Nevertheless, in case of the spleen, which has a central roll in immune system, it was discovered that the quantity of oxygen free radical had increased instead for the mice that had taken ARW. And this indirectly reveals that the oxygen free radicals also directly affect the immune system.



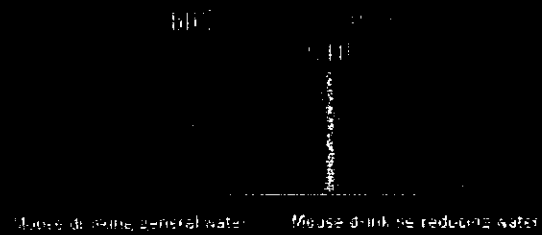
The amount of active oxygen within the kidneys

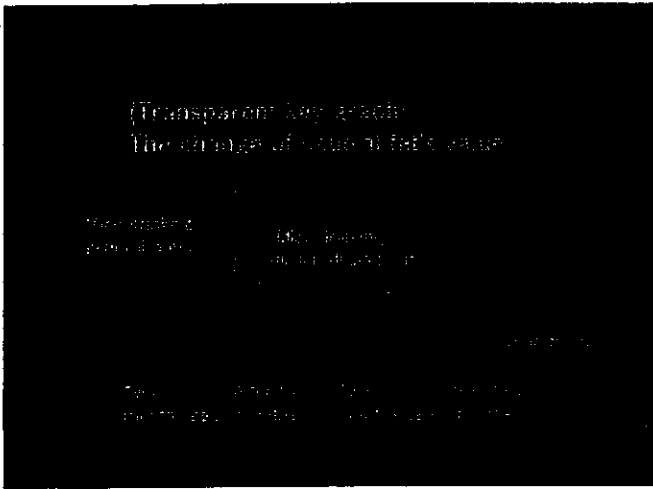


The amount of active oxygen within the livers



The amount of active oxygen within the lungs





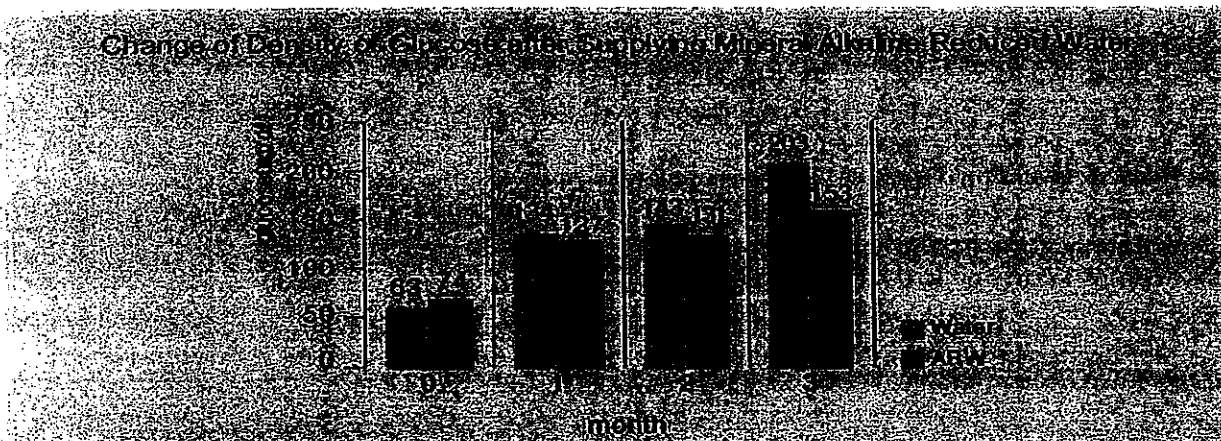
Increase of Immune Function

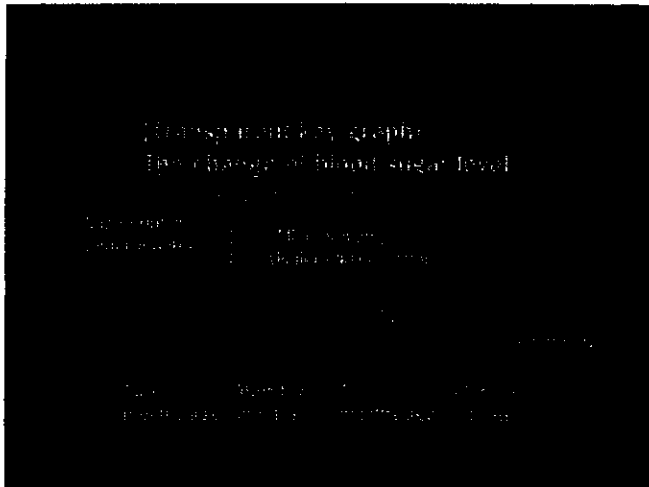
As the result of investigation conducted on the statistical data concerned, it has been observed that for the case of the mice that had taken ARW, the quantities of interferon gamma (IFN- γ) and interleukin12(1-12) which exercise cellular immune function by attacking bacteria directly and destroying them had been increased. And at the same time the quantities of interleukin (I-4 & II-5) showing antigen-antibody reactions of body fluid immunity, have also been increased.

This suggests that Ionized Water (ARW) could promote the overall immune systems.

Diabetes

For the laboratory mice having genetic disorders that can lead to diabetes, the researchers supplied Alkaline Water for about four months. And compared to those mice that did not have the ARW, blood glucose levels had been reduced, also the amount of harmful triglycerides had been reduced significantly, and overall body weight was stable. It also had shown that the amount of neutral fat had decreased noticeably which is harmful to the body.





Diabetes: The first clinical test conducted in Korea shows that water could control diseases!

3 December 2003: The Natural Medicine Research Institute of Hansuh University had invited 15 patients suffering from diabetes and started a clinical test for them.

The scientists divided the patients into two different groups; they stopped insulin treatment completely for the first group of the patients, and they had them drink the Ionized Water (ARW) instead, and the other group of diabetics had been allowed to continue their hospital treatment as well with receiving insulin as usual.

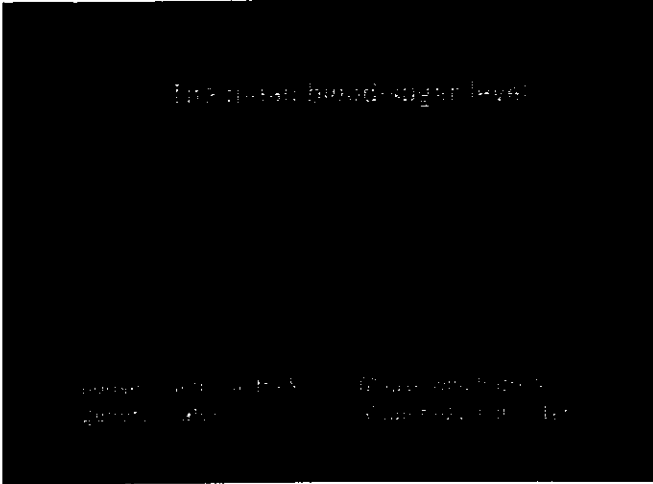
The blood glucose levels have been lowered on the whole, and the blood glucose levels, which had shown wide variations daily before were being stabilized. But the blood glucose levels for those who had not taken the Ionized Water (ARW) but continued receiving insulin everyday under the hospitalized state continued to show wide variations with their blood glucose level.

7 January 2004: Comparison of blood glucose levels before and after experiment conducted. 5 liters ARW/day administered for the 2nd group of patients.

A significant decrease of blood glucose levels for all patients on AKW. Some examples are:

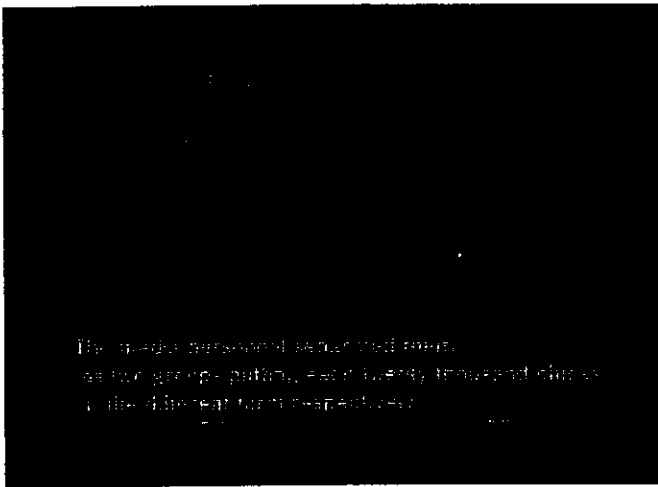
1. Patient Lee: 14 years old, blood glucose level : 250
After drinking the Reduced Water for 36 days : blood glucose level : 204
2. Patient Hwang, 17 years old, blood glucose level : 254
After drinking the Reduced Water for 36 days : blood glucose level : 144
3. Patient Lee2, 9 years old, blood glucose level : 324
After drinking the Reduced Water for 36 days : blood glucose level : 210
4. Patient Lee3: 20 years old, blood glucose level : 400
After drinking the Reduced Water for 36 days : blood glucose level : 168

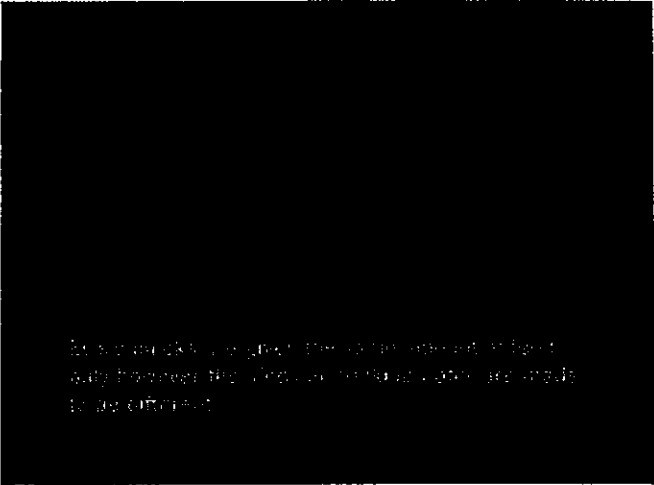
The experiments indicated that the effectiveness of Ionized Water (ARW) was better than insulin.



Experiment on increased immunity

In a detailed experiment involving 40,000 chicks, they let one group of the chicks drink normal underground water (A-farm) and let the other group (B-farm) drink Mineral ARW.



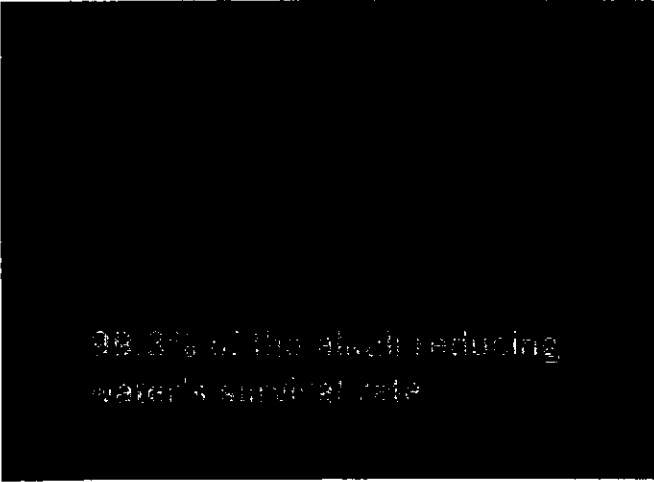


It was found that 1,100 chicks were dead from the A- farm where the chicks were supplied with the normal underground water and recorded a survival rate of 94.5%, while the B-farm, where they supplied the Ionized Water (ARW) found that 140 chicks were dead, and therefore recorded a survival rate of 99.3%.

It was found that **1,100 chicks were dead from the A- farm** where the chicks were supplied with the normal underground water and recorded a survival rate of 94.5%, while the B-farm, where they supplied the Ionized Water (ARW) found that **140 chicks were dead**, and therefore recorded a survival rate of 99.3%.

This was a decline in deaths of around 10% from drinking ARW.

This suggested that depending on the kind of water the chicks were drinking, they developed different immunogenic powers.

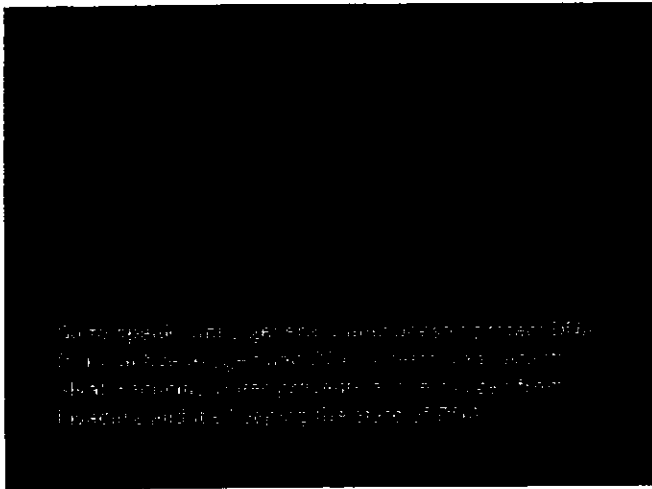


99.3% of the alkali reducing water's survival rate

Protection of DNA in tissues

After mixing DNA extracted from bacteria with the Mineral Ionized Water (ARW) and normal reverse osmosis-filtered water respectively, the researchers generated oxygen free radicals and observed the changes.

It was discovered that the normal water could not protect the DNA from the oxygen free radicals and so the DNA were destroyed, but in the case of ARW, it had protected the DNA from its invasion and the original condition of the DNA was still maintained.



After injecting malignant skin cancer into the body of laboratory mice, they had separated them into two different groups; one group drank the Mineral Ionized Water (ARW) and the other group had to drink normal tap water, and after 20 days they had extracted the internal organs from the mice of the two different groups and carried out measurements on the quantity of the oxygen free radicals contained in them.

It was discovered that the Ionized Water (ARW) has a mysterious power of preventing the aging process as well as preventing all kinds of adult diseases by controlling the actions of oxygen free radicals.

Effect of Electro Oxidizing Water on Skin Ulcers

Toshiaki Sato, Hisasi Aoyama and Haruki Asanuma Department of Plastic Surgery and Department of Clinical Examination Aichi Medical University

There have been great difficulties in the management of infection of burn patients. Effects of antibiotic agents are uncertain. Recently, electrooxidizing water has been used as a disinfectant in many hospitals and the effect of this water is recognized. In this study, we tried to identify the changes of bacterial flora on burned skin to use electro oxidizing water as disinfection and we found that this water clearly affects bacterial flora. There were no bacteria identified for 3 hours after disinfection. We believe that the electro oxidizing water is useful in the management of infections in burn patients.

TREATMENT OF INFECTIOUS ULCERS WITH ELECTRO OXIDIZING WATER

Kiichi Inagawa, Takahiko Moriguchi Department of Plastic and Reconstructive Surgery Kawasaki Medical School

Chronic ulcer with infection such as MRSA (Methicillin Resistant Staphylococcus Aureus) is difficult to heal. We often see resistance to the healing of chronic ulcers from surgical treatments or other conventional treatment methods. Because of this resistance we have applied a conservative treatment method using the electro oxidizing water and have obtained satisfactory results. We have washed the lesions with electro oxidizing water once a day. 12 cases of infectious ulcers were reported where 5 cases were healed, 3 cases were well granulated and the remaining 4 cases where infections were healed.

In a separate test we treated 12 cases of chronic ulcer cases that were resistant against various conservative treatments by electro oxidizing water. They consist of 2 cases of confinement sore (1 at sacrum, the other at ischium), 3 cases of burn (1 at sinciput, 3 at knees), 3 cases of external skin injury (2 at legs, the other at foot), 3 cases of skin fistula (1 at sinciput, 1 at knee, the other at leg), and 1 case of infection by inserting a tissue expander (at cheek).

Pus came out of each lesion. In 6 cases, MRSA was detected in the pus. As a treatment, the lesion was washed with electro oxidizing water once a day. As a result, 5 cases saw the lesions covered by epithelium, 3 cases did not go as far but had granulation, and the rest of the 4 cases saw remission of pus and foul odor. During the treatment, no abnormality was identified seemingly caused by side effects of electro oxidizing water whether it was self-conscious or not. It is reported that lavage of the lesion by electro oxidizing water demonstrates an excellent debridement effect as compared to that by only salt water or iodine solution. In our tests, the debridement effect was recognized since, according to our experience, it was easier to remove the dead tissues in the lesion than otherwise, and also remission of pus and foul odor was identified.

Furthermore, the speed of this function deserves special mention. In all cases, remission of pus and foul odor was identified within 3 days of electro oxidizing water treatment. However, if infection reached deep into the tissues, pus could not be stopped completely. It seems possible that this problem is solved if the application method is somehow improved. Finally, electro oxidizing water can be applied on burn lesions without damaging newly formed granulation. Rather, epithelium was formed quickly by the granulation effect of this water.

EXPERIENCES OF TREATING INFECTIOUS WOUND & CHRONIC ULCER WITH ELECTRO OXIDIZING WATER

Katsumi Tanaka, Tohru Fujii, Department of Plastic & Reconstructive Surgery
Nagasaki University School of Medicine

In cases of infectious wounds and chronic ulcers such as diabetic and ischemic ulcers, it is necessary to treat them by washing and cleansing before application of ointment therapy or performing an operation. Bathing, washing and wet dressing (wet to dry dressing) with electro oxidizing water was applied to 37 clinical cases. Then we observed conditions of the wounds and bacterial changes.

In this study, all cases saw improvement in regards to bactericidal effects and granulation. Among these, the wounds were conservatively healed in 7 cases, whereas the rest of 30 cases had the wounds gradually cleansed and reduced. In most cases, the bacterial counts have dropped down to aseptic condition. It is implied that electro oxidizing water has bactericidal effects in clinical cases and effectively promoted wound healing.

A. Preface

Cleaning the lesion is needed first before the operation or ointment therapy to treat infectious wounds and chronic ulcers. We tried to treat them by bathing, cleansing or wet dressing with electro oxidizing water, and observed remission of infections and formation of granulation to evaluate effectiveness of this method. Our study reports on how to apply electro oxidizing water, list up the clinical cases, and drew a conclusion on the effectiveness of electro oxidizing water.

B. Study Subject and Method

Electro oxidizing water was applied to 37 patients who were treated at the Department of Plastic and Reconstructive Surgery in Nagasaki University, School of Medicine during a 12-month period from August 1994 to July 1995. Among them, 28 were men, 9 women, ranging in age from 3 to 94 averaging 46. 17 cases had infectious wounds due to external damages or operation, 7 had chronic ulcers caused by blood vessel malfunction, 3 had gangrene or chronic ulcers accompanied by diabetes, 8 fresh burns and 2 confinement sores.

The methods of applying electro oxidizing water differ slightly by clinical case. In general, bathing or cleaning by electro oxidizing water and gauze exchanged by wet to dry dressing were applied to the patients of infectious wounds and chronic ulcers. In case of fresh burns, electro oxidizing water was used to clean and remove secretion and pus on the lesion at the time of bandage exchange. The method and frequency of applying electro oxidizing water were decided on a case-by-case basis and were modified whenever the symptoms changed.

C. Evaluation

Criteria were set for each symptom to conduct economic observation. Among these criteria, lesion's characteristics were categorized into location, size, condition of granuloma (color, bleeding), amount and character of secretion, degree of pain, foul odor, extent of epithelium formation. As to bacterial infections, bacteria were cultured on a regular basis. They were identified and the patient's sensitivity was checked. At the same time, types of disinfectants and side medicine, dressing materials, and operations procedures were described.

Regarding the side effects, we made notes about stimuli against skin and membrane, sharp pain and allergy.

D. Study results

The period of treatment by electro oxidizing water was 1 week minimum to maximum of 4 months. In all the 37 cases, each lesion was cleaned and reduced. None of them got worse. The bacteria turned negative or got reduced in 19 cases. In the worst 3 cases where infections spread to the entire body, bacteria colony counts did not decrease dramatically, but the lesions have been reduced and cleaned. 7 out of 37 cases have healed conservatively whereas the other 30 have gone through operations.

As to the side effects, 1 case had reddish skin immediately after the applications of electro oxidizing water, and another had irritation at the lesion. Since the symptoms were so light that the applications has been continued and eventually they healed by themselves without deterioration. No abnormality was found for other treatment cases.

While understanding that there are more clarification that is needed about the bactericidal effects and efficacy of electro oxidizing water, we believe that cleaning the lesion promotes its healing when electro oxidizing water is used for the treatment of infectious wounds and chronic ulcers.

TREATMENT OF SKIN INFECTION ULCERS WITH ELECTRO OXIDIZING WATER

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Electro oxidizing water has unique characteristics including high positive oxidation reduction potential, strong acidity, high concentration of dissolved chloride and oxygen. Skin ulcers with infections by MRSA (Methicillin Resistant Staphylococcus Aureus) is difficult to heal. We, plastic and reconstructive surgeons, treat skin ulcers resistant to surgical procedures of various conservative therapies. We treated the ulcers with the use of electro oxidizing water and have obtained satisfactory results. We hereby report 13 cases of ineffective ulcers.

This clinically applied therapy proved to be so effective against the symptoms that it can be conveniently applied to many more.

A. Preface

In the past several years, Methicillin Resistant Staphylococcus Aureus (hereinafter called MRSA) is becoming the main cause of infections in the hospital. Since our ward combines plastic and reconstructive surgery with dermatology, patients of chronic diseases and skin ulcer due to confinement sore as well as those who need high-tech and long-term treatments are concentrated.

Under these circumstances, it is known that strong acidic electrolyzed solution (hereinafter called EOW) has a powerful bactericidal effect, can be easily produced, and is very cost-effective. The bactericidal effect of EOW comes from physical function of oxidation-reduction potential, which is proved to have a very low toxicity compared to chemical agents.

Therefore, in our department with many skin ulcer patients, it is expected to be widely used if clinical effects and safety of EOW is established. This time, we would like to present some cases of conservative treatment against infectious skin ulcer by EOW together with our analyses.

B. Study Subject and Method

EOW was applied to 13 patients of MRSA-infected skin ulcer from December 1994 to September 1995. 9 of them were men, 4 women, ranging in ages of 16 to 76 averaging at 44. 4 cases were ulcer from confinement sore, 2 burn ulcers, 6 infectious ulcers due to injury or operation, the remaining ulcerous case was caused by blood vessel malfunction.

EOW was produced by the membrane-type electrolyzer systems installed in the hospital. The EOW was stored in shaded air-tight bottles at normal room temperature. The entire water supply was renewed every week.

C. Study Results

The period of application of EOW ranged from 1 week to 1 month. 12 out of 13 cases saw reduction of secretion, cleaning of the lesion, benign granulation etc. In addition, the bacteria turned negative with reduced colony counts. In one case, almost no changes were observed during the treatment by EOW. No particular side effects were in any of the cases.

D. Analysis

Because of its high oxidation-reduction potential, EOW kills bacteria by taking away their electrons and oxidizing them several seconds after the first contact. EOW itself gains electrons and gets neutralized to turn to low-concentration salt water. Unlike regular bactericidal chemical agents (disinfectants), EOW does not have problems of osmosis or residual of chemical substances.

Among others, bactericidal effects of EOW are reported to be effective against not only general germs such as yellow staphylococcus, coliform (*Escherichia coli*) and bacillus pyocyaneus (*Pseudomonas aeruginosa*), but also against drug resistant bacteria such as MRSA. EOW is also said to have even virucidal and eubactericidal effects.

We have applied EOW to treat 10 patients of infectious skin ulcer by washing the lesion. In comparison with the effects by salt water, we had the following impression about EOW:

1. The lesion was cleaned and benign granulation occurred more rapidly.
2. Epithelium formation from surrounding tissues was made more quickly.
3. The total period of treatment was shorter.

As for the MRSA, lavage by EOW made it turn negative quicker than that by conventional method. However, we also had a feeling that it would not be easy to completely kill bacteria in deeply infected lesions.

