The Healing Power of Potassium Iodide (SSKI)

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IODINE IS ESSENTIAL FOR LIFE

Iodine is a halogen, related to bromine, chlorine and fluorine, all of which are essential for human life to exist. (There is some question about the essentiality of fluorine despite the benefits for teeth). The requirement for iodine ranges from 100 to 200 mcg daily, with individual variation due to age, urinary clearance, sex and diet. There is no mechanism for conservation of iodine by the kidneys so it must be ingested regularly to prevent deficiency. Goiter is prevented by a daily intake of about 75 mcg and the RDA is set at 150 mcg. The US diet averages 300 mcg so deficiency is said to be uncommon.

The thyroid hormone, thyroxine, requires four atoms of iodine in order to perform its function of regulating the rate of oxidation in every cell in the body. This is the the essential function of iodine and in case of deficiency the body energy drops and all cells function poorly. This is called myxedema and adults with this condition feel listless and depressed; their skin is dry and cold and the tissues become puffy and edematous. The tongue becomes swollen and the hair and eyebrows thin out so that diagnosis is sometimes obvious from the physical appearance by itself. In children with iodine deficiency, a combination of physical stigmata similar to the above plus severe mental retardation may leave permanent handicaps. Results are more favorable in adults because treatment with thyroxine and/or iodine can reverse the symptoms entirely.

Excessive intake of iodine can also cause low thyroid, a paradox called the Wolf-Chaikoff effect, named after two doctors who found that continous intake of high doses of iodine signal the thyroid gland to stop making the thyroxine hormone. This probably occurs due to feed-back inhibition of thyrotropin, also called TSH, short for "Thyroid Stimulating Hormone." This is a pituitary hormone that regulates thyroid activity appropriate to the calculations of the brain in relation to the total organism. Evidently the brain reads high levels of iodine as a signal to turn off the thyroid. This can be used to advantage in cases of Grave's disease, where an enlarged thyroid gland, a goiter, produces a toxic excess of thyroxine. The use of iodide can reduce the size of the gland and its toxic output in a matter of hours. Unfortunately this does not work for long in most cases and it is seldom attempted these days.

Goiter can also occur due to iodine deficiency. In this case the pituitary over-reacts to low levels of iodine and sends excessive quantities of TSH to encourage the thyroid to produce more thyroxine. The gland manufactures copious amounts of thyroxine storage protein, enough to swell up the storage compartments of the gland to overflowing, hence the goiter. However, without iodine, the protein is counterfeit, unable to maintain the metabolic chemistry of life.

Mountainous terrain and areas that have been covered by glaciers tend to be iodine deficient anywhere in the world. Large areas of the United States, particularly the mid-West and mountain states are our "goiter belt." Populations that live there are at increased risk of both goiter and cancer. In particular, cancer of the uterus, ovary and breast all correlate inversely to iodine intake. It may be

that low iodine leads to increased pituitary gonadotrophin and increased estrogen, which is a tumor promoter. Before the use of iodized salt in 1924 about half the people of Michigan had thyroid goiters! Recently these are found in 3 percent of American men and 10 percent of women. There are many more borderline cases that go undiagnosed, despite complaints of fatigue, cold intolerance and low body temperature. The temperature test is not specific to thyroid and in many cases deficiencies of trace minerals, such as copper and zinc, are at fault. Inadequate caloric intake can also cause thyroid activity to drop; so diagnosis is not so simple.

WHAT IS THE IDEAL IODINE INTAKE

Using the Cornell Index Questionnaire to measure the number of symptoms in a thousand dentists and their wives Drs. Cheraskin and Ringsdorf found that as iodine intake went up the number of symptoms declined so that the ideal daily iodine intake appears to be 1100 mcg., ie. 7 times the RDA, which is the amount contained in most multi-vitamin tablets or in a teaspoonful of iodized salt. Ocean kelp contains about 5000 mcg per teaspoonful. By comparison, potassium iodide, which is available only on prescription, contains 30,000 mcg (ie. 30 mg) per drop. Evidently there are benefits from iodine beyond its essential role in the formation of thyroid hormone. In fact, that is the main conclusion of this review: many uses.

IS IODINE DANGEROUS?

The alcohol tincture of iodine causes painful irritation and tissue damage as the solution penetrates and is caustic. However fatalities are unusual, despite the skull and cross-bones on the label, because few people can down the necessary 2 to 6 tablespoonfuls to achieve a lethal dose. The potassium iodide form of iodine is non-irritating and rarely fatal except due to hypersensitivity reactions. The FDA studies on safety indicate that huge doses of from 40 mg. to several grams daily over a period of months to years may alter thyroid function and cause iodism; but at doses over 2 mg. a protective mechanism actually inhibits excess thyroid hormone synthesis. This does present a hazard in pregnancy, for the baby may be born with a goiter if mother takes too much iodine. Large doses of iodine are not recommended for pregnant women.

Long term ingestion of large doses of iodide may cause symptoms of metallic taste, runny nose, headache, acne and 'iodine mumps,' ie. swollen salivary glands. These symptoms of iodism give fair warning and they clear up when iodine is stopped and cleared from the system. Single doses of iodide are safe even at megadoses up to 4 grams, ie almost 30,000 times the RDA. Note: this refers to iodide, as potassium iodide, not iodine nor tincture of iodine.

Potassium iodide is generally very safe and hyper-sensitivity reactions occur rarely, only about one case in a million, and then mostly in those predisposed to edema of the face, lips and tongue.

However iodine-containing radiocontrast materials for X-ray diagnosis are much more toxic and cause adverse reactions in 5 to 8 percent of cases. About 1 in a 100 patients risk anaphylactoid reactions, with hives, facial swelling, airway obstruction and/or vascular collapse.

Iodides should not be used in pregnancy (unless the mother is herself iodine or thyroid deficient) nor for patients with goiter, where iodine may promote excess thyroxin production. Those with acne are wise to avoid iodine, even the small amounts in vitamin pills.

DOES FLUORIDATION INTERFERE WITH IODINE?

While fluoride is antagonistic towards iodine and is known to inhibit various steps of thyroxine biosynthesis in animals, this occurs at fluoride doses greatly in excess of the 1 ppm used to prevent caries. The weight of medical opinion at the present time is that fluoride does not aggravate iodine deficiency, not even in populations with low iodine intake. Nevertheless, there are some unanswered questions. Some reports indicate that at concentrations of 5 ppm, fluoride does depress thyroid activity in humans and measurements in fluoridated communities find that thyroid tissue concentrates fluoride to an average of 5 ppm, more than double the amount found in kidney, the organ of excretion. Fluoride is more reactive than iodide and forms stronger chemical bonds. It seems logical that ingesting 2000 mcg or more per day of fluoride, as is common amongst my patients, might compete and interfere with the meager amount of iodine, under 100 mcg in those who do not use iodized salt, do not eat dairy products and do not eat fish or shellfish.

On the other hand, Drs.Hillman, Bolenbaush and Convey found that fluoride mineral supplements did interfere with thyroid in dairy cattle. Cattle afflicted with fluorosis suffered from low thyroid, low blood count and an excess of eosinophil cells, indicative of inflammation. These cattle excreted 5 ppm fluoride in their urine, only 4 times more than is found in humans whose water is fluoridated water. The blood levels of thyroid hormones, thyroxine and tri-iodothyronine, decreased and eosinophils increased in proportion as urinary fluoride increased.

USE OF IODINE FOR CARIES AND DENTAL INFECTIONS

On the positive side, Drs. Caulfield and Wannemuehler found that both fluoride and iodide, were able to kill Streptococcus mutans, the bacterium that causes dental caries, and they were more powerful when given in acidic solution. Indeed, topical application of potassium iodide is invaluable in treating gingivitis and pyorrhea. This is very useful after dental hygiene and scaling of plaque, a process that often inflames the gums for many days after. The use of SSKI minimizes the risk of infection in these damaged tissues and I certainly recommend it as a routine in dental care.

Iodine is valuable in more extreme cases as well. For example, one of my patients came to me after a prolonged alcoholic binge. His gums were purulent and teeth so loosened that they were shifting out of place. His dentist advised removing all of them. Within a week of my applications of potassium iodide to his gums along with giving megadoses of vitamin C and a nutrient support regimen, his gums were completely healed and his teeth were almost back to normal strength in the socket. He lost none of them.

USE OF IODINE AS AN EXPECTORANT AND MUCOLYTIC

The textbook on pharmacology by Goodman and Gilman refers to sodium or potassium iodide in a dose of 10 drops (300 mg) every 6 hours in order to liquefy tenacious bronchial secretions. These iodides are especially useful in bronchitis, bronchiectasis and asthma. By the way, Coindet referred to "bronchocele" as an indication for iodide therapy way back in 1820!

USE OF IODINE FOR GRANULOMATOUS DISEASE

Iodide is acknowledged in Goodman and Gilman's pharmacology text for the treatment of granulomas of tuberculosis, leprosy, syphilis and various fungal diseases. Despite the advances in antibiotic therapy for all these diseases, iodine should be kept in mind as an adjunct, particularly because of its recently revealed beneficial effect on the immune system. And in the case of sporotrichosis

there is no other anti-fungal drug therapy as powerful as iodine. That it is the last ditch defense against sporotrichosis tells something of the inherent potency and validity of antifungal and antimicrobial iodide therapy.

One of the most dramatic cases ever in my 50 years medical experience involved a form of granuloma known as "pyogenic granuloma." This type of granuloma can occur when a wound gets infected and fails to heal. The granulation tissue grows from below, the wound fails to close and the tissue takes on the appearance of a growing mass. Such was the condition that brought one of my patients to me in a desperate attempt to avoid surgical removal of her upper lip.

Her dermatologist had treated a canker sore by applying silver nitrate several weeks ago. The combination of caustic tissue damage, virus re-growth and secondary infection had made an ugly mess of her lip. It looked like a rapidly growing cancer. A surgical resection would have altered her facial appearance forever so there was little to lose by trying something as benign as local application of potassium iodide. Nevertheless, I was cautious and kept sterile water on hand to rinse the area if she recoiled in pain. I also had vitamin E to apply as an anti-inflammatory agent but there was no need of either. Within minutes of the iodide application, the size of the mass was reduced by about a third. Astounding! Follow-up with twice a day applications of iodide in the next two days tamed the granuloma entirely and a week later with no further iodide there was nary a trace of the original trouble.

HERPES BLISTERS

Iodide destroys the virus of herpes. Both oral and genital lesions are treatable this way; however there may be some stinging pain for a moment, though this is harmless. If the herpes is treated at the first sign of reddening or blistering, it will disappear overnight and is usually gone within 3 days. Even if the herpes is treated at a more advanced stage, the iodide will debride the blister and shorten the duration by a couple of weeks from the expected 3 weeks from start to finish of a herpes outbreak. Directions for application: apply to affected area and allow 5 to 10 seconds for disinfectant action to be complete. If pain is excessive, blot with tissue or rinse off with water and quench with vitamin E oil.

SAFETY OF IODINE APPLICATIONS

Potassium iodide does not damage intact skin and there is no pain unless the skin is broken. One of my patients used iodide on her skin after burning it with oven-cleaner. She applied the iodide twice a day despite serious pain "because I thought if the doctor prescribed it for me it couldn't possibly do any harm." After two weeks of this self-treatment she came to seem me. There was a silver dollar sized hole in the skin of her forearm with a black scab around the edges. In the center the bone of her arm was clearly visible. I applied vitamin E around the edges of the wound and had her protect it with a clean dressing. Two weeks later the area was entirely healed and without even a trace of scar.

THE USE OF IODINE AS AN ANTISEPTIC:

Iodide disinfects water at a concentration of 8 ppm. If the water is heavily polluted, use a double dose. A single drop of saturated potassium iodide provides 30 mg of iodine and when added to a liter of water this is 30 mg per 1000 grams, ie. 30 ppm, more than enough to disinfect.

It is effective for sterilizing medical instruments. When diluted it is effective as a vaginal douche and a commercial product, Betadine

douche, is available. Ponaris, a commercial nose drop is also available. This provides soothing relief for hay-fever, reducing irritation and crusting. It is also surprisingly effective in chronic sinus infections, even after antibiotics fail! The iodized oil seems to infiltrate into the tissues, thus inactivating both bacterial and fungal invaders. This product is the best treatment available to protect the nasal membranes of our astronauts against the drying effects of space travel.

THE USE OF IODINE AS A URINARY ANTISEPTIC

On a more down to earth level, recall that iodine is excreted primarily in the urine. This offers a way of treating infections of the lower urinary tract. Recurrent urinary tract infections, especially bladder infections, are often responsive to a few drops of potassium iodide in at least a full glass of water, taken apart from meals so as to promote quick excretion. A single dose of 5 drops is sufficient to prevent relapse of bladder irritation, burning and urgency that so often occurs after sexual activity. In cases of mild infection, with bacteria in the urine but few pus cells, the iodide is preferable to antibiotic therapy.

Manipulation of the acidity or alkalinity of urine provides another advantage of iodide in treating the urinary tract. At acid Ph the antiseptic effect of iodine is increased. At alkaline Ph it becomes a powerful antioxidant and anti-inflammatory agent. Urine Ph is easily monitored by Ph test strips available at the pharmacy. With this method it is logical that the use of iodide would be helpful; in treating prostatism and urethritis. I have seen urine flow double in just a few days but it does require some attention to the Ph factor. This kind of "listen to your body therapy" takes full advantage of the many uses of iodine.

COSMETIC USES SINCE ANTIQUITY.

Iodine-containing seaweeds and sponges have been used as cosmetic facial treatment masques since the days of ancient Egypt. The principles behind this are several-fold. First, iodine can absorb into the blood via the skin and mucous membranes, thus to satisfy the amount required for thyroid hormone, which in turn promotes conversion of carotene into retinol, ie. vitamin A, essential to healing and repair of skin. In addition iodine binds to oils in the skin, cleansing them right out of the pores. It removes blackheads easily. It also binds to amino acids that make up the surface proteins of skin and helps separate the surface from deeper layers for a gentle skin peel effect.

USE OF IODIDE FOR INFECTIONS OF SKIN:

In addition to cosmetic effects, iodine kills all types of germs, ie. bacteria, viruses and fungi. Potassium iodide has greater anti-septic power than seaweed, so it is preferred in treating boils, cysts and skin infections. Acne pustules are very responsive, the sebaceous duct discharging easily and permitting prompt healing without scar. The use of iodide makes it unnecessary to ever squeeze a pimple again. Large furuncles, ie. boils, are equally responsive although they take longer to resolve.

USE OF IODIDE FOR SEBACEOUS CYSTS, STYES AND CHALAZION:

Sebaceous cysts soften within minutes of the application of iodide and the sebum plugged hair follicle usually opens so as to permit easy expression of the contents. The only cysts that I have observed to require surgical excision are those hardened and calcified by age or scarred by healed inflammation and it is possible that after a sufficient number of applications even these might respond. I have used iodide successfully in a number of patients with hordeolum (sty) and others with chalazion of the eyelids, who otherwise

would have required surgical incision to release the dammed up ducts.

USE OF IODINE FOR INSECT BITES AND ALLERGIC SKIN LESIONS:

Because iodide penetrates skin it is remarkably effective at aborting the allergic reaction to most insect bites, the sooner after the bite the better the result. Even after a day, when the lesion is full-blown, iodine application gives partial relief, about the same as it offers in cases of already developed allergic lesions, such as hives, eczema and poison oak. It seems that the iodide reacts with the antigens in the tissues, thus altering the signal to the macrophages and lymphocytes, white blood cells, that remove toxins but also generate inflammation, itch and rash.

USE OF IODIDE FOR SCARS AND KELOID:

One day in 1984 I noticed a nodule on my right wrist, at the base of the thumb, caused by a sliver of foxtail. Though it was a small blemish, occupying no more than a half inch of surface, it was directly in my line of sight so I kept watch. It persisted for the next year and seemed permanent. However I had begun to use potassium iodide as an antiseptic, so it occurred to me to put iodide on the nodule. I kept it up every few days and in the course of three months the nodule disappeared.

IODINE DOES NOT DAMAGE INTACT SKIN.

The collagen of skin is called keratin, a protein rich in amino acids containing sulfur, such as cysteine and its oxidized form, cystine. Iodine can combine with sulfhydryl, the sulfur-hydrogen bond of cysteine, removing the hydrogen and by means of this oxidation, setting the stage for sulfur atoms to bind to each other. Thus two cysteine molecules combine into a less reactive molecule of cystine. The low reactivity of the disulfide bond protects skin from destruction by air, water, and in fact all the commonly occurring chemicals that would otherwise turn us into soup.

IODINE CAN STRENGTHEN AND PROTECT SKIN

Because iodine promotes the formation of disulfide bonds, repeated application leads to a denser mantle of keratin. This makes for stronger and smoother skin, less vulnerable to irritations, another reason for the enduring popularity of iodine in skin creams and cosmetic treatments. Disulfide bonds, once established, are slow to react--even with iodide. Thus, the application of potassium iodide to intact skin is painless: it looks and feels like water until it leaves a residue of white powder after drying. This can be wiped or washed off.

IODINE DOES BREAK DOWN HEALING TISSUE

Keratin is present in layers of tough tissue on the surface of skin, the epidermis. Beneath this are the cells of the dermis which manufacture and secrete the keratin. These cells are vulnerable to the destructive effects of iodine because their membranes are more reactive than the keratin proteins they secrete. Thus open wounds dissolve under the influence of iodide and contact produces an immediate burning pain of moderate to severe intensity. Even a tiny break in the epidermis can cause a big ouch when touched by iodide.

When applied to a wound, iodine can slow down healing by interfering with tyrosine kinase. This enzyme catalyzes the mating of tyrosine with phosphorous, an event known to initiate cell division, a crucial step in healing and repair of tissues. In addition, by binding with the polyunsaturated fats and amino acids in cell membranes, iodide breaks down the cell walls in healing tissue and repeated applications will gradually erode the granulation tissue and enlarge the size of the wound. This does not seem to occur after the use of povidone-iodine, an iodine polymer diluted to 10 percent strength. This product is effective as an antiseptic for surgery and first aid and it does not cause pain nor delay healing.

IODIDE IS IDEAL FOR DEBRIDEMENT OF DIRTY WOUNDS

Betadine is not effective at clearing away dead and infected tissue and debris from wounds. This is better accomplished by the stronger action of potassium iodide. Despite the discomfort factor, the pain is quickly past, and the good results and lack of scarring make this the best agent I know for dirty or infected wounds. As always, one must beware of puncture wounds, such as dog bites, for iodide may fail to penetrate deeply enough. Thorough irrigation and possible incision of the wound may be required to sterilize the wound completely. In any case, iodide should not be continued after debridement is complete and infection no longer present, ie. about three days.

IODINE CAN REMOVE HAIR AND PLANTAR WARTS:

The alcohol tincture of iodine is more penetrating and more caustic, than potassium iodide but also more painful and therefore not preferred for wound debridement. However this caustic effect makes the tincture useful for removal of unwanted hair. I have seen permanent results after only several applications. Application of iodide to warts is also effective but it may require a few months, depending on the size of the wart. I have seen plantar warts vanish after iodide and I would expect the tincture to be even more effective

USE AS AN ANTI-FUNGAL ANTIBIOTIC:

Sporotrichosis is a fungus infection, a hazard to farmers, florists veterinarians and pet owners. Infection is usually caused by a penetrating wound but even an abrasion can do it. A typical case was reported in 1991 by Drs. Caravalho and Caldwell,[1] when a 29 year old man was infected by his cat and developed a fungal ulcer on his finger. The infection spread to the lymph nodes in his armpit in the next two months but X ray did not find it spread to his lungs. The doctors began treatment with potassium iodide, SSKI, 5 drops, three times a day and increased the dose to 120 drops, a megadose of 3600 mg per day. The lesions were completely healed in two months but the regimen was continued for a month longer. Iodide was the antibiotic of choice in this case.

IODINE HEALS MOST THYROID DISORDERS

Iodine heals thyroid disease by correcting iodine deficiency, hence curing the underactive colloid type of goiter. It also suppresses pituitary output of thyroid stimulating hormone (TSH), hence removing the stimulus that causes toxic goiter. Carcinoma of the thyroid is known to regress after iodine therapy and Dr. Colletta and his group have shown that TSH induces oncogenes, called c-fos and c-myc,[2] that cause thyroid cells to synthesize DNA. Deficiency of either thyroid or iodine can trigger the pituitary to increase production of TSH, hence promoting cancer growth in the thyroid and other organs. Clinical observations confirm that women with

breast cancer have higher resting levels of TSH and a greater TSH response than women with disorders unrelated to the breast.

IODINE AND T3 MODULATE MIND AND MOOD

A recent population study in China compared intellectual development in high versus low iodine villages.[3] About three fourths of adults born during a time of iodine deficiency had IQ scores below 70. In another rural village with normal iodine levels, less than half as many scored this low. This is an example of the importance of nutrition to the intelligence and adaptability of whole population groups. The iodine deficiency villagers also had a high rate of nerve deafness and spasticity, a sign of gross brain damage.

Iodide therapy can be used to interrupt TSH production and consequent over-activity in Grave's disease. This same mechanism can be useful in some cases of hypomanic excitement, even as an adjunct to lithium and tranquilizers. Another basis for this therapy is implied by results of a study by Drs. Dratman, Futaesaku et al.[4] They demonstrated that the thyroid hormone concentrates in specific areas of the brain, particularly in the cerebellum, which generates habit patterns, the hippocampus, which coordinates memory via attentional mechanisms, and the gray matter of the cortex, which contains memory storage. At low or deficient levels of thyroxin, as are seen in case of iodine deficiency, the more active T3 hormone increases in the brain. This would explain the paradox of mental overactivity in patients with poor nutrition. It also explains the calming effect of iodine.

IODIDE KILLS THE AIDS VIRUS

Research on the ability of iodine to destroy AIDS virus was commissioned by the maker of the povidone-iodine solution, Betadine. HIV was measured by reverse transcriptase levels as well as the cytopathic effect in T-cells.[5] The research at Massachusetts General Hospital concludes: "HIV was completely inactivated and could no longer replicate after exposure to the povidone-iodine preparations even at very low concentrations."

Taking this a step further, Dr. Burhan Yolcuoglu of Turkey writes of good results in his preliminary work with intravenous Betadine, a 10 percent iodine solution,[6] and he also concludes that iodine inactivates free HIV as well as opportunistic organisms in plasma and tissue spaces. The usual dose is 2-5 ml of Betadine intravenous, weekly. The Betadine contains 10 mg iodine per ml, about a third the concentration of SSKI.

IODINE IS ACTIVE AGAINST THE COMMON COLD

Dr. Eliot C. Dick director of respiratory virus research lab at University of Wisconsin used iodine-treated kleenex in US personnel at McMurdo Station in Antarctica. In a 1979 experiment he observed a 50 percent reduction in respiratory illnesses. In my own practice I have had many reports by patients who found that a gargle of ten drops of potassium iodide in a glass of water, with or without additional vitamin C, relieved sore throat in a matter of hours.

IODINE IS ACTIVE AGAINST POLIO

Iodine prevents paralytic polio. Dr. J. F. Edward of Manitoba reported on his extensive experience during the polio epidemics of 1953 and 1954.[7] He referred to reports from a century before, such as one by Dr. Manson of England, recommending iodide in treating palsies, some cases of which must have been polio. The famous neurologist, Brown-Sequard, regarded iodide as the only remedy

without danger in various forms of paralysis. Dr. Mazzitelli was completely successful with iodide to prevent polio in families with cases of polio. In 1931 the famous Dr. von Economo used iodine for human encephalitis and with favorable results.

Dr. Edward himself used intravenous sodium iodide in doses of 500 to 900 mg dissolved in 10 ml of distilled water. Improvement in three cases of bulbar paralysis was so rapid that he considered iodine a virucidal agent. However because the benefits were forthcoming only after multiple doses, he concluded that the iodide must have activated a defense mechanism.

BASIS OF ANTIBIOTIC EFFECT:

Dr. Edward was correct on both counts. Not only does iodide inactivate microbes by direct contact, it also arms the eosinophil cells with hydrobromous acid, a bleaching agent more powerful than Chlorox--powerful enough to destroy allergy causing antigens and to kill the larger sized organisms, including the larvae of intestinal parasites. Experiments by Dr. S J Weiss at the University of Michigan found that iodine yields up to a five-fold increase of bromine in eosinophils.[8] and that iodinated tyrosine interacts with a myeloperoxidase enzyme within these white blood cells to produce the acid. Eosinophils coat their targets, ie. bacteria, fungi, viruses, parasites and other antigens, with the positively charged myeloperoxidase, thus attracting the negatively charged bromine acid.

IODIDE IMPROVES FIBROCYSTIC BREAST DISEASE

Dr. Bernard Eskin reported over 25 years ago that iodine deficient rats develop breast dysplasia.[9] and that estrogen increases iodine excretion, thus aggravating the condition. Dr. William Ghent of Queen's University in Ontario was so impressed by Dr. Eskin's work that he has treated over 1500 women with iodine for breast dysplasia and fibrocystic changes. Almost 90 percent had complete breast pain relief and reduction in lumpiness after supplements of 5 to 20 mg daily for 2 to 3 months and then reducing to weekly maintenance doses.

The physiology behind these beneficial effects is clarified by the recent work of Drs. Strum and Phelps,[10] who found that breast tissue needs iodine in order to produce iodinated proteins that cleanse and maintain the smallest ductules. There the negatively charged iodine atoms repel each other and generate electronic forces that propel the movement of debris out into the larger ducts. This self-cleansing action within the breast ducts also increases the flow of milk during lactation, a fact that is put to good advantage in the widespread use of iodide by dairy farmers. Oddly enough, medical doctors have been slow to catch on.

In case of iodine deficiency this mechanism fails and the breast ducts must be cleansed instead by a back-up system of macrophages and other white blood cells, which secrete inflammatory enzymes to dissolve the debris. These same enzymes also damage the ducts, leading to cyst formation, retained secretions, chronic inflammation and increased risk of cancer. Iodide not only prevents this dismal process, it can actually reverse it. This has been documented by mammography before and after iodide treatment in my own patients.

USE OF IODIDE AS AN ANTI-CANCER AGENT

Throughout the world the occurrence rates of breast, uterine and ovarian cancer all correlate inversely with dietary intake of iodine. The higher the iodide intake the lower the rate of cancer. This lead has not been taken seriously so far and the number of medical reports in this century is few. In fact the use of iodine against tumors was far more widespread in the early 19th Century than today.

Dr. Eskin considered the anti-cancer effects of iodine in a 1986 review article and he had to go back almost 100 years for clinical evidence, to an 1896 medical report on the use of thyroid extract to induce remission in metastatic cancer. Nowadays iodide therapy of cancer is practiced only in alternative cancer clinics in Mexico, especially the Gerson clinic. The only academic paper I could find was an abstract from a 1991 research in Russia. Drs. Aleksander and Fidler verified that tumors decreased in size after treatment with potassium iodide.

USE IN FEMALE DISORDERS: BREAST AND OVARY

Dr. John A. Myers [11] of Johns Hopkins Medical School was a true nutrition pioneer. His vast clinical experience from the 1930s to the 1980s and his lucid writing opened my eyes to the medical uses of iodine and other trace minerals. He preferred to use iodine bound to tyrosine, especially for disorders of the breast and ovary. For example, he used di-iodotyrosine to soften the breasts for nursing. "In one patient where the left breast was involved with severe pain and induration, it required 200 grams of di-iodotyrosine to bring the breast to normal in two days." Dr. Myers also recommended the use of thyroid and iodine for trichomonas, monilia and non-specific vaginal infections. "Iodine intravaginally produced a remarkable improvement in these women. Not only did they have an improvement in their systemic hypothyroid condition, but a remarkable change in the consistency of the vaginal mucous occurred. In the beginning the mucous was thick, white flour-paste-like in consistency. Sometimes this paste would look like cottage cheese. As the iodine intake was increased, the mucous changed to a clear, limpid fluid flowing from the cervix."

"Along with the remarkable improvement in the flow of mucous, was a complete disappearance of all infective organisms in the vagina. It was never necessary to use any kind of antiseptic to free the woman of trichomonas or other infection thereafter. It seemed that she no longer could become infected with these organisms when she excreted sufficient iodine in the mucous."

CAUTION AGAINST IODINE USE IN PREGNANCY

While iodine is quite safe for adults under almost all conditions, it can pose a hazard during pregnancy since persistent excess in the mother can inhibit formation of thyroid hormone and lead to severe physical and mental impairment due to Cretinism, in the fetus. Dr. H. Vorherr[12] found iodine in the blood serum within 15 minutes after vaginal application of Betadine in 12 non-pregnant women and serum iodine remained elevated for over an hour. On this basis he cautions against the use of iodine-containing disinfectants until further study determines whether a single application actually has adverse effects. The possibility that a single dose, or even a few doses interferes with thyroid function is so remote that I dismiss his warning as too extreme. Repeated iodine applications, however, are to be avoided in pregnancy.

Seaweed and sponge have been used in treating goiter and tumors since antiquity but it was not until 1811 that a Frenchman, Bernard Courtois, discovered the active ingredient, iodine, in the ash of burnt seaweed. This breakthrough prompted much research in its day and by 1820 Charles Coindet published on the use of an alcohol tincture of elemental iodine and also a water soluble salt, potassium iodide, both still in use to this day.

The virtues of these substances were obvious in treating thyroid goiter, which would often shrink in a matter of days, and also in tuberculosis of the lymph nodes, referred to as "scrofula". He also reported benefits in treating tumors of the uterus and breast and particularly for tertiary syphilitic gummas, degenerative areas of infection in skin, bone and other tissues.

The English lagged behind the French in this field but by 1844 Dr. Thomas J. Graham, wrote about medical uses of iodine in his book Modern Domestic Medicine. "It is a very active medicine and in all its forms is sometimes used with striking advantage in relieving the acute pain attendant upon hard and malignant swellings"..(and in cases of) "enlargement of the testes in men accompanied with severe pain, it is a valuable medicine, giving more speedy and effective relief than any other substance.."It has proved of uncommon service in some female complaints, especially in tumors of the breast and womb and in diseases of the ovaries."

IODINE IN SEAWEED DILATES THE CERVIX

Seaweed still has a place in medical practice, particularly to help dilate the uterus for curettage. Dr. Raymond H. Kaufman, Professor of Obstetrics and Gynecology at Baylor College of Medicine, in a 1983 article in Medical Tribune recommends Laminaria digitata, a seaweed preparation, and finds it preferable to mechanical dilatation. A 1981 survey by the National Abortion Federation found that 15 percent of member clinics use seaweed in first trimester abortion procedures and 64 percent use it in the second trimester procedures because it is more comfortable and carries a five-fold reduced risk of laceration than does the use of rigid cervical dilators.

SEAWEED IODINE HAS OTHER MEDICALL USES

After almost 200 years much still remains to be clarified about the chemistry of iodine and new uses are being reported for seaweed. Dr. S. Abdussalam recently reviewed some of these.[13] Served as a tea, seaweed is a diuretic. Brown seaweeds have antiocoagulant activity provided by fucose-containing sulfate polysaccharides Red algae, such as Digenia simplex, contain kaenic acid and are very effective against ascaris. In fact, seaweeds in general inhibit roundworms and pinworms and clear up common intestinal disorders, such as ulcers and constipation. Macrocystis seaweed species are antibiotic against influenza and mumps viruses. Anti fungal activity has been reported, especially in red algae and bluegreen algae and Caulerpa racemosa, a green algae, is very active against candida and cryptococcus.

SEAWEED USEFUL AS PESTICIDE

Dr. Abdusallam reported research with extract of Macrocystis, that shows it to be an effective killer of mosquito larvae. Agricultural uses of seaweed are under development as seaweed has been found to improve seedling and root growth and flowering is increased in cabbages and marigolds. A 50 percent increase in yield was produced from ground nut plants treated with seaweed concentrate. In animals it is a growth enhancer with increased growth and muscle lipid content and with greater feed efficiency: it cost less to achieve weight gain. Most of the benefits of seaweed are due to its high content of potassium iodide; but in addition they contain carotenoids, essential fatty acids, amino acids, vitamins, trace minerals and antioxidant enzymes.

IODIDE AGAINST YEAST INFECTIONS

In 1930 Dr. J. Arthur Buchanan wrote of his research on the significance of yeasts in the stomach and intestines and their treatment by iodine[14]. His observations are very timely today due to a reawakening of interest in Candida and other yeasts of medical importance. "Yeasts produce gas more rapidly than any other organism found in nature when in the presence of fermentable sugars. The quantity and quality of these substances varies with the diet." "It is impossible for living yeasts to exist in the intestinal tract of

man without producing substances harmful to the host. The quantities of poisons produced at any one time are usually small, so that the presence of the organisms as causal agencies is of most significance in connection with chronic disease. Diets which inhibit the activities of yeasts are associated with rapid improvement in the condition of the patients in which the organisms are found." "Yeasts are more sensitive to iodine than are bacteria. The usual amount effective in goiter patients would have no action on bacteria."

IODIDE FOR OPTIMUM IMMUNE POWER

Buchanan was correct in recognizing the complications presented by intestinal yeast infection and in that regard he was 50 years ahead of his time. However scientific progress tells us now that the presence of yeasts is more a result than a cause of disease. Iodine deficiency promotes yeast infection because the low thyroxin level interferes with vitamin A synthesis and transport. In addition iodine deficiency weakens the myeloperoxidase enzyme activity of white blood cells and curtails their production of powerful hypochlorous and hypobromous acids that destroy yeasts and parasites.

IODINE TAKES THE GAS OUT OF BEANS

All these accomplishments aside, the good doctor deserves to be remembered for his discovery of a method to prevent intestinal gas after eating cabbages and beans. "Their tendency to form gas in the intestine can be largely controlled by adding a few drops of iodine to the water in which they are cooked or by having the individual take five or six drops of Lugol's (iodine) solution in milk during the meal.

USE OF IODINE IN X-RAY IMAGING

Iodine is relatively radio-opaque and organs that concentrate it can be seen as white areas on X-ray. Dr. D. F. Cameron introduced the use of both potassium and sodium iodides for this purpose in 1918[15] and a few years later Dr. Leonard Rowntree at Mayo Clinic was first to conceive of using iodide to visualize the kidneys, ureters and bladder[16]. Intravenous 10 percent sodium iodide in a dose of 10 grams was found to be free of adverse effects if given slowly over a period of five minutes. Higher doses, up to 20 grams, gave clearer pictures but increased the risk of adverse symptoms.

IODIDE CONCENTRATION IN URINE REACHES ANTIBIOTIC STRENGTH

Another aspect of the research by the Mayo Clinic group that I find especially valuable is their table of measurements of iodine in the urine for 3 days after taking the dose. For example, a one gram dose by mouth led to a peak urine concentration of 1.6 mg per 100 ml after 2 hours. A 5 gram dose led to peak urine concentration of 5.6 mg per 100 ml and a 20 gram dose yielded 8.4 mg after 2 hours. We know that it takes only a 1 to 20,000 dilution, i.e.. 5 mg per 100 ml, to kill most bacteria within a minute and a 10 fold weaker solution is still lethal, though it takes longer, about 15 minutes. Thus a one gram dose of iodide lingers in the urine at 0.5 mg per 100 ml after 24 hours. A 5 gram dose peaks at 5.6 mg per 100 ml in 2 hours and remains at 2.3 mg per 100 ml at 24 hours. This supports the use of iodide as an effective antibiotic in urinary tract infections. It also tells us why the usual dose is 5 to 10 drops of SSKI, taken three times per day. That is the least dose required to achieve the necessary microbicidal concentration.

IODINE FOR SALIVARY GLAND STONES

The presence of peroxidase in salivary glands gives a clue to the reason why stones of the salivary ducts can be broken down by treatment with iodide. Dr. Jonathan Write describes one such case successfully treated with iodide over a period of four months.[17] These stones are hardened deposits of calcium, phosphorous and other minerals that arise within the gland and can obstruct the duct, causing pain, swelling and damage and often requiring surgical removal. Iodine acts via the lacto-peroxidase enzyme, which is richly supplied to the salivary gland and which catalyzes the production of hypochlorous acid by the gland, an acid strong enough to gradually dissolve such stones. Lactoperoxidase is also present in the tear glands and breast.

IODINE FOR KIDNEY AND GALL BLADDER STONES

Though I have seen no medical reports of iodine therapy for kidney stones, the high amount of iodide excretion in urine suggests that it should be worth a try in some cases, particularly those with small stones and signs of infection, ie. white blood cells and bacteria in the urine. Since iodine is not as actively secreted in the bile, it would not seem as profitable. But wait, the Mayo Clinic group reported that iodide showed up not only in kidney and bladder but also in liver and spleen, though in lesser amount. In addition, it is well known that iodide does bind to cholesterol and to unsaturated fatty acids, which are found in bile. There is no reason to doubt that iodine reacts these organs and that it might reach antibiotic concentrations and be sufficiently active to dissolve cholesterol and lipid materials that complicate stones. This deserves formal research study.

USE IN ATHEROSCLEROSIS AND HYPERLIPIDEMIA

Iodides were commonly used in the treatment of arteriosclerosis in the first half of this century. In their 1952 report[18], Drs. Brown and Page wrote: "Iodide is almost traditional in treatment of arteriosclerosis...Its modern use depends in part on the fact that iodide inhibits experimental hypercholesterolemia and atherosclerosis in rabbits." Drs. Fani and Weissman confirmed the previous reports as they studied various concentrations of iodide treatment in cholesterol-fed rabbits.[19] No animals on high iodide developed atheroma after 10 weeks. On the other hand, all the low iodide animals had advanced atherosclerotic damage, i.e.. proliferation of intima and media cells, fat droplets, degeneration of the elastic laminae and thickening of the wall of the aorta.

IODIDE TREATMENT OF RETINAL HEMORRHAGE

Treatment of retinal hemorrhage by iodine was recommended in May's Manual of Diseases of the eye in 1963 and described in an uncontrolled study by Drs. Abrahamson et al in 1968[20]. Dr. Francis Stern observed significant benefits after iodide therapy for elderly patients with cerebral arteriosclerosis, as measured by significant improvements in anxiety, depression and behavior in those treated with iodide by not placebo[21].

IODIDE AS AN ANTI-INFLAMMATORY AGENT

Iodine can be safely used to alter inflammation and allergy by means of its interaction with the sulfhydryl bond. It does not damage tissue structure because it does not react with the disulfide bond, a stable component of collagen structure. Iodine does alter enzymes, particularly by reacting with tyrosine residues, as well as with phenylalanine, tryptophan, histidine, cysteine and methionine, all of which are building blocks of enzyme and receptor molecules.

Sulfhydryl groups are ubiquitous in the body fluids and thus offer natural protection against adverse effects by iodine. However it is

possible that large doses of iodine might get by and inactivate enzymes and regulatory molecules, such as complement C3 and thus trigger the one in a million allergic reaction that has been reported.

In case of alkaline pH and low circulating albumin levels, sulfhydryl groups are at their minimum. This situation is most likely to occur on a low fat, low protein diet or with chronic malabsorptive bowel disease and I would be cautious about the use of iodide therapy in such people.

FREE RADICAL SCAVENGER-ANTIOXIDANT

SSKI 200 mg per day is the best free radical scavenger. At acid pH it is irritant and antibiotic; at alkaline pH it is anti-irritant and anti-inflammatory. This duality of activity offers treatment advantages, particularly in disorders of the urinary tract.

IODIDE INACTIVATES CAUSTIC ENZYMES

The tissue protective effect of iodide is also very likely due to binding to its effect on lysozyme, an enzyme that is released by immune cells at the site of inflammation. Research has shown that iodine combines at the active site of the enzyme.

IODIDE INACTIVATES OTHER PROTEINS

Iodine almost completely inactivates the toxic element of wheat and may offer welcome anti-inflammatory action against celiac disease and wheat intolerance. Luliberin, a pituitary decapeptide that controls the release of Luteinizing Hormone (LH) is inactivated by iodination. This offers a rationale for treating menopausal hot flashes, which are mediated by LH. Fibrinogen, the protein of blood clotting, fails to polymerize if only 4 out of 78 tryptophan residues are modified by iodination; so here is a promising avenue to prevent thrombotic disease and minimize post-traumatic soft tissue injury.

Other enzymes inactivated by iodine in the test tube are: Apolipoprotein A types 1, 2 and 3, which are involved in cholesterol transport and protection of the blood vessel wall. IgG, IgM and IgE, which are the agents of immune and allergic response. Complement C1q and C3 which control the production of immune complexes and major immune destruction. Transcobalamin II which carries vitamin B12 to the liver. Na-K ATPase, which controls energy transport at every cell membrane, is dependent on tyrosyls, and modification of one completely inhibits activity. The inter conversion of glucose-phosphorous depends on the enzyme, Phosphoglucomutase, which loses activity on iodination.

IODINE CORRELATES WITH NERVE DISEASE AND CANCER

Dr. Harold Foster has gathered persuasive evidence that implicates iodine deficiency in diseases in addition to hypothyroidism, goiter and cretinism. Cancer of the thyroid and nervous system correlate at over 0.8 probability with iodine deficiency. Multiple sclerosis and amyotrophic lateral sclerosis have a similar high probability. Thyroid hormone is known to stimulate nerve growth.

Melanoma mortality is more strongly correlated with iodine than any other variable, including sunlight. On the other hand, iodine deficiency is negatively correlated with both skin cancer and melanoma. It is possible that sweat glands contain a lactoperoxidase, which interacts with iodine to produce free radicals, thus increasing the probability of carcinogenesis in skin. Of course, the presence

of adequate antioxidant defenses, such as tocopherol and ascorbate protects against this disaster.

USE IN ERYTHEMATOUS DERMATOSES AND FEVERS

Drs. Horio and Danno reported on their experience with 47 patients whose erythematous dermatoses were treated by potassium iodide, 300 mg orally, three times per day. If no benefits were observed in two weeks, treatment was discontinued. No adverse effects were noted. Excellent results were observed in 38 patients, almost 80% of the cases." Relief of lesional tenderness, joint pain and/or fever occurred within 24 hours. Specific diagnoses were: erythema nodosum, nodular vasculitis, erythema multiforme and Sweet's syndrome, an acute, febrile neutrophilic dermatosis. The author's noted that the response was more impressive in patients with more severe symptoms. Eruptions began to resolve in a few days and subsided almost completely within a week and no new lesions appeared during the medication period. The response was greatest in patients with positive C-reactive protein, joint pains and high fever.

ENVIRONMENTAL IODINE BLOCKERS:

Cabbage, turnips, brussel sprouts, broccoli and rutabaga all contain sulfurous substances, thiocyanates, which bind and prevent absorption of iodine. These are called goitrogens, because they can induce deficiency and thus cause the thyroid to swell into a goiter. Milk from cows feeding on these goitrogenic vegetables can also cause goiter. Cassava, a food staple in many third world countries is especially high in thiocyanate and can induce hypothyroidism, which in turn interferes with vitamin A, weakening immune function and causing high death rates from infection. This may play a part in the current epidemic of AIDS in Africa.

Sulfa containing medications, such as diuretics, anti-diabetic drugs and even sulfa antibiotics all bind iodine. Tetracycline antibiotics likewise. Pesticides also block iodine and the chlorinated hydrocarbons in particular induce thyroid disorders and hypothyroidism. DDT, PCB, PBB are all iodine blockers.

USE OF IODIDE TO BLOCK UPTAKE OF RADIOACTIVE IODINE
How did the Russians deal with the explosion at the Chernobyl atomic power plant?[22] Potassium iodide in 130 mg tablets was distributed at the plant within 2 hours of the accident and to the residents of Pripyat the next morning, within 7 hours. The remaining 100,000 persons in the area were not treated until after May 1 and then they took one tablet daily until May 6th. The Soviet physicians felt that potassium iodide had a good psychological effect in addition to blocking the radioactive iodine uptake by the thyroid gland. Side effects, such as metallic taste and sore throat, were observed but none required medical attention. In Poland 10 million persons received potassium iodide and 17 had severe adverse reactions, a shock-like state that required medical support.

Iodide should be given as soon as possible and continued daily for a week to ten days. If given within an hour a 90% thyroid block of iodine 131 uptake by the thyroid gland occurs; after five hours this falls to only 50% and after 12 hours the iodide has very little effect -- except psychological comfort in those who don't know any better. It is unlikely that anyone in Poland--or anywhere else in Europe was treated in time. Lest we feel smug: here in the US after Three Mile Island, the Anbex company, manufacturers of Iosat, a form of potassium iodide, sent huge amounts to the State of Pennsylvania. It didn't sell. "Nobody believes it works" said the president of the company[23].

IODINE CONCENTRATES IN TESTES ALSO:

Another organ that takes up iodine is the testicle. Proof of this fact is evident in the fact that treatment of thyroid cancer with RAI131 is sometimes followed by diminished or absent sperm counts and elevated pituitary gonadotropin hormone levels up to three and a half years later. Recovery also occurs[24] but sterility is clearly a hazard of radioactive iodine treatment. Cancer is another hazard: One of my patients developed a testicular cancer fifteen years after radio-active iodine treatment for Grave's disease. His father had also had a testicular tumor (seminoma) so it would be prudent to avoid radioactive iodine therapy if one has such a history.

Though this review is less than complete, I hope it persuades you to appreciate this familiar substance, iodine, as a truly essential nutrient and more, a practical therapeutic principle. In fact, Iodine offers dozens of under-utilized applications and many exciting possibilities for advancement in medicine.

ADDENDUM:

Dissolved in pure water, iodine produces seven different iodo species: I_2, I^-, H_2OI^+, HOI, OI^-,IO_3^-, I_3^-. Of these, only I_2, HOI and H_2OI^+ are bactericidal. The biological targets of reactive iodine and iodide are: basic amino acids, such as lysine, histidine and arginine, tyrosine residues, sulfhydryl groups, carbon-carbon double bonds of fatty acids and the bases of nucleotides.

Iodo thyronine deiodinase type I is structurally similar to transthyretin, a prealbumin involved in transport of both thyroxine and retinol. The body produces roughly 90 mcg of T4, thyroxin each day and about half as much T3, tri-iodo thyronine, of which 80 percent derives from deiodination of thyroxin and the remainder is screted from the thyroid. Deiodination of T4 produces equal amounts of T3 and reverse T3.

Thyroglobulin, thyroxine-binding globulin (TBG), binds about two thirds of the total body thyroxin T4. The other third of thyroxin activity binds to a prealbumin protein called, Transthyretin, which binds both thyroxin and retinol. The T3 binds ten times less well than does T4, a fact which protects cells from overstimulation by this regulatory hormone.

The T3 receptor is a DNA binding protein with a sequence similar to a cellular oncogene.

Iodothyronine deiodinase regulation:

Deiodination regulates conversion of T4 to the more active T3. Further deiodination to inactive di-iodothyronine represents a mechanism to regulate activity. There are 3 types of deiodinase. Type II is found in the pituitary, where conversion of T4 to T3 inhibits the release of pituitary thyrotropin (TSH). Deiodination by type III enzyme in the nervous tissue (glia?) yields rT3, which is 50 times more effective as an inhibitor of type II deiodinase than is T3. This mechanism decreases T3 concentration in the pituitary and thus permits increased TSH secretion to maintain homeostatic balance.

T4 is also deiodinated in leucocytes, producing di-iodo thyronine during phagocytosis. Mono-deiodination disposes of 80% of the T4.

Iodination of tyrosine requires a peroxidase, thyroid peroxidase, hydrogen peroxide, I^-, and an iodine acceptor. I_2 is not the iodinating molecule; I^+ is. Di-iodothyronine stimulates iodopoeroxidases and thyroid peroxidase

Conversion of tyrosine to biogenic amines involves enzymes that may also process T3 and T4 to neuroactive amines. T3 appears in rat synapses following administration of either T3 or T4. However a precise adrenergic function for thyroid hormones is not yet confirmed.

THYROXIN DEIODINASE IS A SELENIUM ENZYME.

Type I iodothyronine 5'-deiodinase, is a selenoenzyme, as is glutathione peroxidase. Selenium deficiency may conribute to hypothyroid conditions. For example, acording to JB Vanderpas[25], epidemic myxedema and cretinism in Zaire corresponds to an area of selenium deficiency. However Drs. CE West and AS Truswell challenged this theory inasmuch as serum T4 and T3 and TSH were related to urinary iodide but not serum selenium. [26] Drs. D. Behne, A Kyriakopoulos et al identified the deiodinase as a selenoenzyme however, that much is definite[27].

Haloperoxidases:

These enzymes catalyze the oxidation of ionic iodine, bromine and chlorine to electrophilic halogenating species. Iodooperoxidases can oxidize only I-, bromoperoxidases oxidize both Br- and I-, and chloroperoxidases can oxidize Cl- as well. No peroxidase is capable of oxidizing F-.

Horseradish peroxidase is an iodoperoxidase; lactoperoxidase from milk, saliva and tears is a bromoperoxidase as are many algae and seaweeds. Myeloperoxidase from leucocytes is a chloroperoxidase and fungi are equipped with similar enzyme.

Iodine chemistry is ph sensitive:

In acidic conditions

2KI + H2O2 + 2HCl --- I2 + 2 KCl + H2O.

Alkaline media is quite different.

2KI + H202 --- 2 KOH + I2

I2 + 2 KOH --- KOI + KI + H20.

KOI + H202 --- KI + O2 + H20.

Human bio-system Ph is 7.4, alkaline; therefore HOI is usually converted to potassium iodide (or sodium iodide) with oxygen (O2) and water (H20) as by-products.

At acid pH, however, (as in chronic inflammation) iodide generates elemental iodine (Iodine 2, the diatomic form), which is more caustic and possibly more antibiotic. So it will be more irritating to the tissues but also more protective.

Another advantage of iodine, is that it becomes more antibiotic under conditions of acidosis, as in infection or chronic illness.

Merck Index describes use of iodine for treating lead and mercury intoxication.

Formula for potassium iodide: 1 gram dissolves in 0.7 ml water.

30 grams dissolves in 21 ml water. pH 7-9. Alkali prevents yellowing, ie. oxidation to iodate and elemental iodine.

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