Connecting the dots

Thyroid, Thymus, Iodine & Cancer

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There is growing evidence that Americans would have better health and a lower incidence of cancer and fibrocystic disease of the breast if they consumed more iodine. A decrease in iodine intake coupled with an increased consumption of competing halogens, fluoride and bromide, has created an epidemic of iodine deficiency in America.

People in the U.S. consume an average 240 micrograms (µg) of iodine a day. In contrast, people in Japan consume more than 12 milligrams (mg) of iodine a day (12,000 µg), a 50-fold greater amount. They eat seaweed, which include brown algae (kelp), red algae (nori sheets, with sushi), and green algae (chlorella). Compared to terrestrial plants, which contain only trace amounts of iodine (0.001 mg/gm), these marine plants have high concentrations of this nutrient (0.5—8.0 mg/gm). When studied in 1964, Japanese seaweed consumption was found to be 4.5 grams (gm) a day and that eaten had a measured iodine concentration of 3.1 mg/gm of seaweed (= 13.8 mg of iodine).

According to public health officials, mainland Japanese now consume 14.5 gm of seaweed a day (= 45 mg of iodine, if its iodine content, not measured, remains unchanged). Researchers have determined that residents on the coast of Hokkaido eat a quantity of seaweed sufficient to provide a daily iodine intake of 200 mg a day. Saltwater fish and shellfish contain iodine, but one would have to eat 15—25 pounds of fish to get 12 mg of iodine.

Statistical Facts: Health comparisons between the two countries are disturbing. The incidence of breast cancer in the U.S. is the highest in the world, and in Japan, until recently, the lowest. Japanese women who emigrate from Japan or adopt a Western style diet have a higher rate of breast cancer compared with those that consume seaweed. Life expectancy in the U.S. is 77.85 years, 48th in 226 countries surveyed. It is 81.25 years in Japan, the highest of all industrialized countries and only slightly behind the five leaders — Andorra, Macau, San Marino, Singapore, and Hong Kong. The infant mortality rate in Japan is the lowest in the world, 3.5 deaths under age one per 1,000 live births, half the infant mortality rate in the United States.

Today 1 in 7 American women (almost 15 percent) will develop breast cancer during their lifetime. Thirty years ago, when iodine consumption was twice as high as it is now (480 µg a day) 1 in 20 women developed breast cancer. Iodine was used as a dough conditioner in making bread, and each slice of bread contained 0.14 mg of iodine. In 1980, bread makers started using bromide as a conditioner instead, which competes with iodine for absorption into the **thyroid gland** and other tissues in the body. Iodine was also more widely used in the dairy industry 30 years ago than it is now.

Now iodized table salt is the chief source of iodine in a Western diet. But 45 percent of American households buy salt without iodine, which grocery stores also sell. And over the last three decades people who do use iodized table salt have decreased their consumption of it by 65 percent. Furthermore, the much higher concentrations of chloride in salt (NaCl) inhibits absorption of its sister halogen iodine (the intestines absorb only 10 percent of the iodine present in iodized table salt).

As a result, 15 percent of the U.S. adult female population suffers from moderate to severe iodine deficiency, which health authorities define as a urinary iodine concentration less than 50 µg /L. Women with goiters (a visible, noncancerous enlargement of the thyroid gland) owing to iodine deficiency have been found to have a three times greater incidence of breast cancer. A high intake of iodine is associated with a low incidence breast cancer, and a low intake with a high incidence of breast cancer.

Animal studies show that iodine prevents breast cancer, arguing for a causal association in these epidemiological findings. The carcinogens nitrosmethylurea and DMBA cause breast cancer in more than 70 percent of female rats. Those given iodine, especially in its molecular form as I_2, have a statistically significant decrease in incidence of cancer. Other evidence adding biologic plausibility to the hypothesis that iodine prevents breast cancer includes the finding that the ductal cells in the breast, the ones most likely to become cancerous, are equipped with an iodine pump (the sodium iodine symporter, the same one that the **thyroid gland** has) to soak up this element.

Similar findings apply to fibrocystic disease of the breast. The incidence of fibrocystic breast disease in American women was 3 percent in the 1920s. Today, 90 percent of women have this disorder, manifested by epithelial hyperplasia, apocrine gland metaplasia, **fluid-filled cysts**, and **fibrosis**. Six million American women with fibrocystic disease have moderate to severe breast pain and tenderness that lasts more than 6 days during the menstrual cycle.

Russian researchers first showed, in 1966, that iodine effectively relieves signs and symptoms of fibrocystic breast disease. Vishniakova and Murav'eva treated 167 women suffering from fibrocystic disease with 50 mg KI during the intermenstrual period and obtained a beneficial healing effect in 71%. Then Ghent and coworkers, in a study published in the *Canadian Journal of Surgery* in 1993, likewise found that iodine relieves signs and symptoms of fibrocystic breast disease in 70 percent of their patients

Most physicians and surgeons view iodine from a narrow perspective. It is an antiseptic that disinfects drinking water and prevents surgical wound infections, and the thyroid gland needs it to make thyroid hormones — and that's it. (When painted on the skin prior to surgery, tincture of iodine kills 90 percent of bacteria present within 90 seconds.).

The **thymus** is a lymphoid and endocrine (meaning ductless) gland located in the chest cavity behind the sternum (breastbone). And thyroid gland is located at the front of the neck, nestled just below the larynx; the endocrine **thyroid** gland produces hormones that help the body control

metabolism. Thyroid hormone is also produced in response to another hormone secreted by the pituitary gland. Thyroid hormones include thyroxine (T4) and triiodothyronine (T3).

The function of the thyroid gland is to take iodine and convert it into the hormones thyroxine, and triiodothyronine. These hormones regulate the rate of oxygen use by cells, and regulate the generation of body heat. The purpose of the thymus gland is to produce and process lymphocytes or T-cells, essential cells in the immune system and prevent the abnormal growth of cells, that may lead to cancer.

The T lymphocytes travel from the bone marrow to the thymus gland where they remain till they get activated. Lymphocytes are white blood cells (WBCs), which are also known as leukocytes. After the white blood cells mature, they leave the thymus gland and get settled in the spleen and the lymph nodes, where a fresh batch of T-cells is produced. After maturity, the lymphocytes enter the blood stream from where they travel to other lymphatic organs and protect the body by producing antibodies that stop the invasion of foreign agents, bacteria and viruses.

The thyroid gland needs iodine to synthesize thyroxine (T4) and tri-iodothyronine (T3), hormones that regulate metabolism and steer growth and development. T4 contains four iodine atoms combined with 27 other atoms of carbon, hydrogen, oxygen, and nitrogen, but owing to its large size accounts for 65 percent of the molecule's weight. (T3 has three iodine atoms.) The thyroid needs only a trace amount of iodine, 70 µg a day, to produce the requisite amount of T4 and T3. For that reason thyroidologists say that iodine is best taken just in microgram amounts. They consider consuming more than 1 to 2 mg of iodine a day to be excessive and potentially harmful.

Expert opinion on iodine is now the purview of thyroidologists. Mainstream physicians and surgeons accept their thyroid-only view of iodine and either ignore or discount studies that show iodine in larger amounts provides **extra thyroidal benefits**, particularly for women's breasts. .

Iodine has an important and little understood history. This relatively scarce element has played a pivotal role in the formation of our planet's atmosphere and in the evolution of life. For more than two billion years there was no oxygen in the atmosphere until a new kind of bacteria, Cyanobacteria (blue-green algae), began producing oxygen as a byproduct of photosynthesis. Cyanobacteria also developed an affinity for iodine. The most likely reason is that these organisms used iodine as an antioxidant to protect themselves against the free radicals that oxygen breeds (superoxide anion, hydrogen peroxide, and hydroxyl radical). Studying kelp, researchers have shown how iodine does this and have found that kelp will absorb increased amounts of iodine when placed under oxidative stress. Other researchers have shown that iodine increases the antioxidant status of human serum similar to that of vitamin C.

Iodine also induces apoptosis, programmed cell death. This process is essential to growth and development (fingers form in the fetus by apoptosis of the tissue between them) and for destroying cells that represent a threat to the integrity of the organism, like cancer cells and cells infected with viruses. Human lung cancer cells with genes spliced into them that enhance iodine uptake and utilization undergo apoptosis and shrink when given iodine, both when grown *in vitro* outside the body and implanted in mice. Its anti-cancer function may well prove to be iodine's

most important extra thyroidal benefit. Iodine removes toxic chemicals — fluoride, bromide, lead, aluminum, mercury — and biological toxins, suppresses auto-immunity, strengthens the T-cell adaptive immune system, and protects against abnormal growth of bacteria in the stomach.

In addition to the thyroid and mammary glands, other tissues possess an iodine pump (the sodium/iodine symporter). Stomach mucosa, the salivary glands, and lactating mammary glands can concentrate iodine almost to the same degree as the thyroid gland (40-fold greater than its concentration in blood). Other tissues that have this pump include the ovaries; thymus gland, seat of the adaptive immune system; skin; choroid plexus in the brain, which makes cerebrospinal fluid; and joints, arteries and bone.

Some people taking milligram doses of iodine, usually more than 50 mg a day, develop mild swelling of the thyroid gland without symptoms. The vast majority of people, 98 to 99 percent, can take iodine in doses ranging from 10 to 200 mg a day without any clinically adverse affects on thyroid function. The prevalence of thyroid diseases in the 127 million people in Japan who consume high amounts of iodine is not much different than that in the U.S.

Scientific community agree that a lack of iodine in the diet causes a spectrum of disorders that includes, in increasing order of severity, goiter and hypothyroidism, mental retardation, and cretinism (severe mental retardation accompanied by physical deformities). Health authorities in the U.S. and Europe have agreed upon a reference known as Recommended Dietary Allowance (RDA), for iodine designed to prevent these disorders, which the World Health Organization (WHO) estimates afflicts 30 percent of the world's population. The Recommended daily intake (RDI) for iodine, first proposed in 1980, is 100—150 µg/day. Organizations advocating this amount include the American Medical Association, National Institutes of Health's National Research Council, Institute of Medicine, United Nations Food and Agricultural Organization, WHO Expert Committee, and the European Union International Programme on Chemical Safety. These health authorities consider an RDI of 100—150 µg/day of iodine sufficient to meet the requirements of nearly all (97—98%) healthy individuals.

This consensus on iodine intake flies in the face of evidence justifying a higher amount. This evidence includes animal studies, *in vitro* studies on human cancer cell lines, clinical trials of iodine for fibrocystic breast disease, and epidemiological data. An intake of 150 µg/day of iodine will prevent goiters and the other recognized iodine deficiency disorders, but not breast disease. Prevention of breast disease requires higher doses of iodine. Indeed, a reasonable hypothesis is that, like goiters and cretinism, fibrocystic disease of the breast and breast cancer are iodine deficiency disorders (also uterine fibroids).

What Albert Guérard writes about new truths applies especially to iodine: "When you seek a new path to truth, you must expect to find it blocked by expert opinion." The reigning truth on iodine is that the thyroid gland is the only organ in the body that requires this micronutrient, and a daily intake considerably more than what the thyroid gland needs is potentially harmful.

The new truth is that the rest of the body also needs iodine, in milligram, not microgram amounts. Tell that to a thyroidologist and her response will call to mind this admonition on new truths. These are the four most common formulations of inorganic (nonradioactive) iodine, as

iodide (I^-), and with or without molecular iodine (I_2): Potassium iodide (KI) tablets, in doses ranging from 0.23 to 130 mg; super saturated potassium iodide (SSKI), 19—50 mg of iodide per drop; Lugol's solution, 6.3 mg of molecular iodine/iodide per drop; and Iodoral, each tablet containing 12.5 mg iodine/iodide. Both Lugol's solution and Ioderal are one-third molecular iodine (5%) and two-thirds potassium iodide (10%). Studies done to date indicate that the best iodine supplement is one that includes molecular iodine (I_2), which breast tissue prefers.

Iodine was used for a wide variety of ailments after its discovery in 1811 up until the mid-1900s, when thyroidologists warned that "excess" amounts of iodine might adversely affect thyroid function. It is effective in gram amounts for treating various dermatologic conditions, chronic lung disease, fungal infestations, tertiary syphilis, and even arteriosclerosis. The Nobel laureate Dr. Albert Szent Györgi (1893—1986), the physician who discovered vitamin C, writes: "When I was a medical student, iodine in the form of KI was the universal medicine. Nobody knew what it did, but it did something and did something good. We students used to sum up the situation in this little rhyme:

The standard dose of potassium iodide given was 1 gram, which contains 770 mg of iodine. Regarding KI and other iodine salts (like sodium iodide), the venerated 11th edition of the *Encyclopedia Britannica*, published in 1911, states, "Their pharmacological action is as obscure as their effects in certain diseased conditions are consistently brilliant. Our ignorance of their mode of action is cloaked by the term deobstruent, which implies that they possess the power of driving out impurities from the blood and tissues. Most notably is this the case with the poisonous products of syphilis. In its tertiary stage — and also earlier — this disease yields in the most rapid and unmistakable fashion to iodides, so much so that the administration of these salts is at present the best means of determining whether, for instance, a cranial tumor be syphilitic or not."

This 19th and early 20th century medicine continues to be used in gram amounts in the 21st century by dermatologists. They treat inflammatory dermatoses, like nodular vasculitis and pyoderma gangrenosum, with SSKI, beginning with an iodine dose of 900 mg a day, followed by weekly increases up to 6 grams a day as tolerated. Fungal eruptions, like sporotrichosis, are treated initially in gram amounts with great success. These lesions can disappear within two weeks after treatment with iodine.

For many years physicians used potassium iodide in doses starting at 1.5 to 3 gm and up to more than 10 grams a day, on and off, to treat bronchial asthma and chronic obstructive pulmonary disease with good results and surprisingly few side effects.

Maintaining whole body sufficiency of iodine requires 12.5 mg a day, an amount similar to what the Japanese consume. The conventional view is that the body contains 25—50 mg of iodine, of which 70—80 percent resides in the thyroid gland. Dr. Abraham concluded that whole body sufficiency exists when a person excretes 90 percent of the iodine ingested. He devised an iodine-loading test where one takes 50 mg and measures the amount excreted in the urine over the next 24 hours. He found that the vast majority of people retain a substantial amount of the 50 mg dose. Many require 50 mg a day for several months before they will excrete 90 percent of it.

His studies indicate that, given a sufficient amount, the body will retain much more iodine than originally thought, 1,500 mg, with only 3 percent of that amount held in the thyroid gland.

More than 4,000 patients in one controlled study they took daily doses ranging from 12.5 to 50 mg, and in those with diabetes, up to 100 mg a day. These investigators have found that iodine does indeed reverse fibrocystic disease; their diabetic patients require less insulin; hypothyroid patients, less thyroid medication; symptoms of fibromyalgia resolve, and patients with migraine headaches stop having them. To paraphrase Dr. Szent-Györgi, these investigators aren't sure how iodine does it, but it does something good.

Thyroid function remains unchanged in 99 percent of patients. Untoward effects of iodine, allergies, swelling of the salivary glands and thyroid, and iodism, occur rarely, in less than 1 percent. Iodine removes the toxic halogens fluoride and bromide from the body. Iodism, an unpleasant brassy taste, runny nose, and acne-like skin lesions, is caused by the bromide that iodine extracts from the tissues. Symptoms subside on a lesser dose of iodine.

What concerns me so deeply is that in concentrations as low as 1ppm, fluorides damage the thyroid system on 4 levels.

1. *The enzyme manufacture of thyroid hormones within the thyroid gland itself. The process by which iodine is attached to the amino acid tyrosine and converted to the two significant thyroid hormones, thyroxine (T4) and liothyronine (T3) is slowed.*

2. The stimulation of certain G proteins from the toxic effect of fluoride (whose function is to govern uptake of substances into each of the cells of the body), has the effect of switching off the uptake into the cell of the active thyroid hormone.

3. The thyroid control mechanism is compromised. The thyroid stimulating hormone output from the pituitary gland is inhibited by fluoride, thus reducing thyroid output of thyroid hormones.

4. Fluoride competes for the receptor sites on the thyroid gland which respond to the thyroid stimulating hormone; so that less of this hormone reaches the thyroid gland and so less thyroid hormone is manufactured.

These damaging effects, all of which occur with small concentrations of fluoride, have obvious and easily identifiable effects on thyroid status. The running down of thyroid hormone means a slow slide into hypothyroidism. Already the incidence of hypothyroidism is increasing as a result of other environmental toxins and pollutions together with wide spread nutritional deficiencies.

As these physicians point out, consuming iodine in milligram doses should, of course, be coupled with a complete nutritional program that includes adequate amounts of selenium, magnesium, and Omega-3 fatty acids. Done this way, an iodine intake 100 times the reference daily intake is "the simplest, safest, most effective and least expensive way to help solve the health care crisis crippling our nation," as the leader of The Iodine Project, Dr. Abraham, puts it.

People who take iodine in these amounts report that they have a greater sense of well-being, increased energy, and a lifting of brain fog. They feel warmer in cold environments, need somewhat less sleep, improved skin complexion, and have more regular bowel movements. These purported health benefits need to be studied more thoroughly, as do those with regard to fibrocystic breast disease and cancer.

Meanwhile, perhaps we should emulate the Japanese and substantially increase our iodine intake, if not with seaweed, then with something different and natural.

Recommended Reading:

- Miller DW. Iodine in Health and Civil Defense. Presented at the 24th Annual Meeting of Doctors for Disaster Preparedness in Portland, Oregon, August 6, 2006. The text for this talk, with 68 references
- Abraham GE. *The safe and effective implementation of orthoiodosupplementation in medical practice. The Original Internist* 2004;11:17—36. Available online here. This is a good introduction to The Iodine Project. His other research studies are online here.
- Flechas, JD. *Orthoiodosupplementation in a primary care practice. The Original Internist* 2005;12(2):89—96. Available online here.
- Brownstein D. *Clinical experience with inorganic, non-radioactive iodine/iodide. The Original Internist* 2005;12(3):105—108.
- Derry D. *Breast cancer and iodine: How to prevent and how to survive breast cancer*. Victoria, B.C.: Trafford Publishing; 2002. The book is a bit disorganized, has references at the end of each chapter not cited in the text, and no index; but it is an eye-opener nonetheless.
- Brownstein D. *Iodine: why you need it why you can't live without it*. West Bloomfield, Michigan: Medical Alternatives Press; 2004. Well-written and referenced, with case histories.
- Low DE, Ghent WR, Hill LD. Diatomic iodine treatment for fibrocystic disease: special report of efficacy and safety results. [Submitted to the FDA] 1995:1—38. This study makes a strong case for iodine as the preferred treatment for fibrocystic disease.