

## IODINE AWARENESS

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*Are college students aware of an element essential for metabolic health and thyroid performance that also assists as an anti-proliferative, antioxidant and apoptotic? The element iodine is a powerful aid which can help with fibrous lumpy painful breasts, metabolic issues and cancer. Iodine deficiency contributes to inflammation and poor thyroid health. The response to iodine deficiency is a high percentage of prescriptive synthetic thyroid hormone medication. While goiter is often an iodine-deficiency condition, efforts beginning in the 1920s to reintroduce iodine into salt have not eradicated the problems. If a person consumes a daily diet of a high percentage of processed food and drink, they may increase the rate of thyroid issues, metabolic issues, cancer, and goiter. Foods that contain iodine are typically those from the salty oceans and fortified foods. To research the question, a survey was conducted at University of Wisconsin-Superior asking students about their awareness of and consumption of iodine. The survey results indicate little awareness in this small population sample. A low percentage of those surveyed reported taking iodine supplementation and eating fish, iodized salt, and seaweed. Participants also reported little knowledge of the higher US required daily allowance (RDA) of iodine for adults and for pregnant or lactating women and for the importance of fetal brain development as well as awareness that the Great Lakes region is a higher iodine-deficient region or "Goiter Belt." These findings demonstrate the lack of public awareness about the health benefits of iodine consumption*

### **Iodine Awareness**

When most people think about iodine, they think of Betadine, which has been used for over 25 years for cuts, scrapes and general wound care and also thyroid hormones. Iodine is a molecule that is essential to make thyroid hormones thyroxine, "T4," and triiodothyronine, "T3," four and three atoms of iodine, respectively. Iodine is essential for metabolic energy, which is necessary for fertility and reproduction. Iodine may help with fibrin and therefore has been used with reliable results for fibrin cysts as it aids and assists with detoxification. Iodine is an antioxidant, one that aids inflammation and healing. As early as the time of our evolution, all vertebrates living on land had a cellular requirement for iodine.

### **Literature Review**

#### ***The US RDA***

The US recommended daily allowance, "RDA," for adults is 150 micrograms; for pregnant and lactating adults the amount is greater. Iodine is an element with many purposes: not just thyroid hormones, but dental health, gut health, digestion, thymus gland, and brain. Iodide in the form of potassium iodide is a powerful ionic element proven to reduce inflammation, used to aid and reduce cystic breast issues. Iodine, most often from the salty seas has been identified as an ancient antioxidant (Venturi & Venturi, 2007). The two iodine-using thyroid hormones, thyroxine and iodothyronine, also have antioxidant power.

#### ***The Oceans***

The oceans are vast reservoirs of iodide and iodine, both, often together, have provided a critical role in the lives of homo sapiens throughout our evolution. Iodine is a necessary trace element found abundantly in saltwater oceans. Land has less than adequate levels of this important trace element due to historical rains, and floods have washed this necessary element from terrestrial land into the waters. Life began in the sea and in an iodine-rich environment. We humans developed a thyroidal structure from the gut and with a thyroid and we have need for iodine as land is iodine deficient. Additionally, we consume foods preserved and processed using nitrates and halogens that interfere with our accumulation and storage of iodine (Venturi, 2011).

#### ***Seaweed and Algae as Collectors of Iodine***

Seaweed and algae are collectors of iodine, iodate and iodide with large brown kelp being a large collector of iodine in seawater. Some of the foods that we eat which are preserved and processed with nitrate can affect the iodide-pump as they behave as an iodide imitator, due to similar molecular size (Venturi & Venturi, 2007). One of the sources of iodine that we receive from food comes from salmon and other fish. Processed foods and farmed fish consumed today are often preserved and enhanced for color and flavor; overly processed foods may not contain iodine. Some of the best sources of this essential trace element are seaweed, seafood, and fresh wild caught fish. Preserving methods used for fish can reduce our ability to use iodine. These

methods aim to protect against certain bacteria with nitrates and nitrites; however, this interferes with production of thyroid hormones.

### ***Thyroid Development***

As land animals, our thyroid has developed over time to store iodine Venturi & Venturi, 2007, noted that more research is needed based on iodine and fish. Fresh water fish have a higher rate of diseases and atherosclerotic issues than saltwater fish. Additionally, no coronary lesions were found in some fishes within iodine-rich oceans (Farrell, et al. 1992).

Venturi (2000a) stated that thyroid removal and hypothyroidism may be a metabolic regressed state and much like reptiles we become dry and suffer from other issues related to our hair, skin, metabolism, leading to lethargy and heart rate issues. Iodine is a crucial element for many reasons as it is a brain nutrient involved in our human evolution. Our genes have not adapted or adjusted to our diet and our diseases today of the civilized world are a consequence, the more processed food and drinks may be the cause of so much disease in the western world. (Cordain, et al. 2005).

### ***Iodine as an Antioxidant***

Reactive oxygen species (ROS), an unstable molecule that contains oxygen, an example of which is hydrogen peroxide, may cause damage to DNA, RNA, proteins, and could cause cell death. As early as 1883, Venturi, 2007, refers to researchers such as Kocher who atherosclerosis and other oxidative diseases may be IDD related, particularly with thyroid removal surgery.

### ***Healing Properties of Iodine and Iodine Deficiencies***

Iodine deficiency produces metabolic and thyroid issues; iodine may have a protective benefit for cancer. (Cunnane, 2005). Aceves, et al. (2005), stated, there is data and ongoing research regarding iodine as prevention for breast and stomach cancers. It is important to note, Aceves et al. (2005) stated that the mammary glands require the protection of iodine. It has been suggested that iodine be factored in breast cancer cases among other types of cancer (Kaczor, 2014). Venturi hypothesized about iodine and thyroxine that the antioxidant combination of iodide and tyrosine, forming a protective barrier to oxidation. (Berking et al. 2005; Venturi & Venturi, 2007). Aceves et al. (2005), in a study with rats adding iodine to their food increases protection from lipid peroxidation. This is a significant factor for cellular health and reduction of oxidative cellular and membrane damage. Iodine is a protective antioxidant, decreasing lipid peroxidation which

means it has a powerful action reducing potential for formation of peroxide.

### ***Iodine Deficient Land – Goiter Belt Endemic Areas***

Humans living on iodine-deficient land can have issues such as “physical, neurological, mental, immune, reproductive and skeletal diseases,” because iodine is necessary for development in utero, particularly at critical times and for optimizing cognitive factors and development of an organism (Venturi 2011). Iodine vastly improves nervous system development, which is why it is necessary especially during pregnancy for prevention of cretinism, dwarfism, mental retardation and for brain size (Venturi 2011). Using iodine for nervous system and brain and use of iodine as an intentional supplementation are important, as shown in Hardgrove): goiter, iodine seems to increase resistance to caries, retarding the process and reducing its incidence” (Venturi 2011). It is believed that the human genome has not adjusted to food production and those aspects of our ancestral diets are missing (Venturi 2011).

### ***Iodine Needs during Pregnancy***

As humans develop in utero, iodine is incredibly important. Venturi (2011) states that not enough iodine during critical development periods can cause damage including stillborn, cretinism, and neurological conditions in human infants. The study of freshwater fish which suffer from iodine deficiencies including goiter increased awareness of the importance of iodine. Saltwater fish are far less afflicted than trout, some salmon varieties, and sharks raised in fresh water suffer thyroid enlargement, and metabolic issues (Venturi, 2011). Freshwater fish also have higher levels of infections, coronary disease, and tumors than salt-water ocean-based fish (Venturi, 2011). Human evolution in its adaptation to land, began upon many inland and iodine-deficient land to varying degrees, this often produced these deficiencies in iodine and selenium (Venturi, 2011).

### ***Excessive Amounts of Iodine***

What about excess iodine? Studies have shown that the reverse can be true. In Joanta, et al. (2006), the use of 200 mg of iodine daily produces oxidative stress and the use of selenium in the case of excess iodine is a positive action (Venturi, 2011). The entire body benefits from iodine sufficiency. The thymus gland also has a need for iodine and provides for our immune system. In Venturi & Venturi, 2009, immune deficiency was reported in 1985 in Montefeltro, Italy. There was a high percent-

age of goiter, stomach cancer and dental problems. A study was done with young children as participants who exhibited autoimmune conditions. The use of iodine was preceded by securing information about participants including thyroid testing. The serum testing included TSH, FT3, FT4 and TPA, all of which were in the reference range. The participants were then given 2mg of Lugol's Solution iodine for eight months which rebalanced their immune systems. (Venturi & Venturi, 2009).

### ***Iodine and Food***

As more of our foods are prepared, processed and even ultra-processed food and drinks, "UPFDs," nutrients are stripped from foods which may make up a high portion of daily calories. Some of these ultra-processed food and drinks are processed as industrial formulations according to Monteiro, et al. (2019), including infant formulas. We may not be receiving adequate and necessary required daily amounts of iodine from these types of foods. It is believed that the human genome has not adjusted to food production or processing to various degrees and that aspects of our ancestral diets are missing in the diets of most people (Venturi 2011).

### **Methods**

Participants were students of Psychology 101, professors of Human Behavior, Justice & Diversity and students and staff of the McNair Scholars Program who completed a self-report survey through email in the spring semester. The survey was sent out to Psychology 101 students with a link which gave points to incentivize students to participate. Students were given informed consent that participation was voluntary and could complete an alternative assignment if they declined. Of the total number, N=158, there was variance in the numbers of participants as some students did not complete the entire survey.

Qualtrics was used to create a survey of 13 questions, 7 yes or no styled questions and 6 questions using a Likert-style matrix. A survey link was generated using Qualtrics for use with the University of Wisconsin-Superior institutional email; it was distributed by professors.

The researcher is a senior psychology major student and a McNair Scholar.

This research is guided and overseen by the McNair Scholar Program, and mentor, Dr. Priyanka Mehta, both of University of Wisconsin-Superior. Data Analysis as a quantitative data method using descriptive frequencies. Statistical analysis was conducted using Pearson correlation and logistical regression. No significant findings were produced.

### **Results**

This study asked the following research questions: Would results in this small survey show that this population had awareness of iodine as an essential trace element, and would there be awareness of how it is used, how much and why it is utilized for metabolism, thyroid, and other health purposes? While correlations did not show significance in our small population, it made sense to turn to descriptive statistics to provide percentages of participants who did or did not have awareness. We wanted to know the percentage or frequency of our survey questions (see Appendix for survey questions which were adapted from NIH, 2022

Question one, a first identifier, asked, "Do you take iodine supplementation?" The results showed that 76.6% of participants self-reported never taking iodine supplementation. Question two, asked, "Do you eat seaweed: kelp, nori, kombu or wakame?" Of the participants, 65.6% self-reported never eating seaweed. Question three on the Likert-scale asked about fish: "Do you eat fish such as cod, mackerel, or sardines or other seafood regularly?" The responses identified that 31.2% of participants never consume these items. Question four asked further about common iodine intake: "Do you use iodized salt?" Results showed 20.8% reported never using iodized salt. Question five began inquiry about metabolic energy, which asked, "Do you feel that you have enough energy from the start to the end of your day without using caffeine or energy drinks?" Twenty-six percent reported never. Question six provided insight about stimulant use to get through the day for energy: "Do you use energy drinks or caffeinated soft drinks regularly?" Forty-two percent reported never.

The next seven questions of the survey solicited yes or no answers. Question seven, "Are you aware of the US RDA (Recommended Daily Allowance) adult intake of 150 micrograms per day?" Of the respondents, 68.8% reported no. Question eight asked, "Are you aware that The Great Lakes region is a known area where iodine deficiency is endemic, meaning a region known to be a "Goiter Belt?" (\*Goiter is an enlarged thyroid which may be caused, commonly by iodine deficiency?)" The results showed that 72.7% reported no. For question nine, "Are you aware that very low iodine intakes can reduce thyroid hormone production," 61.7% reported no. Question ten asked, "Are you aware that iodine needs increase during pregnancy and lactation and that many women may consume insufficient amounts of iodine even if they do not have signs or symptoms of overt iodine deficiency?" Of the participants, 69.5% reported no. Question eleven asked, "Are you aware that infants are more sensi-

tive to the effects of iodine deficiency than other age groups, as indicated by changes in their TSH (thyroid stimulating hormone), and T4 levels in response to even mild iodine deficiency?” To this question, 70.1% reported no. For question twelve, “Are you aware that The American Thyroid Association recommends that women who are planning a pregnancy, currently pregnant, or lactating should supplement their diet with 150 mcg (micrograms), per day of iodine?” In response, 75.3% of the participants reported no. For the last question, “Are you aware that breast tissue has a high concentration of iodine, and that lumpy, painful breasts and fibrosis (FBD), may be helped by iodine,” 73.4% reported no.

Survey Questions Likert-scale	Never		Every day		
Iodine supplementation	118	7	3	0	0
Seaweeds	101	17	14	5	0
Fish & seafood	48	52	28	9	0
Iodized salt	32	35	28	13	20
Enough energy, start to finish	40	39	19	18	12
Use of energy and caffeinated drinks	65	34	20	18	0

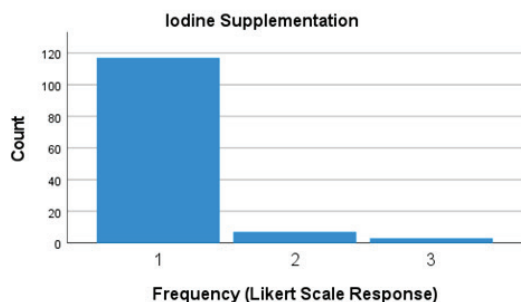
**Table 1**

Note: responses for six Likert-scale survey questions, see Appendix A for questions.

Survey Questions Yes/No	Yes	No
US RDA	21	106
Great Lakes endemic region	15	112
Iodine & Thyroid hormone	32	95
Pregnancy & Lactation	20	107
Infants & iodine deficiency	19	108
ATA recommends	10	116
Breast tissue & fibrosis	14	113

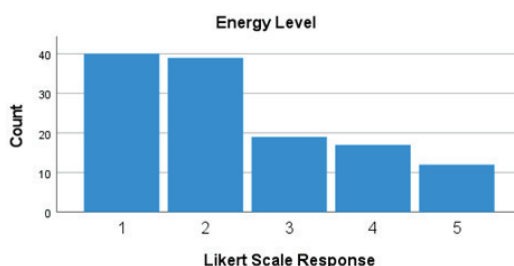
**Table 2**

Note: shows responses for 7 yes or no survey questions, see Appendix A for questions.



**Figure 1**

Iodine Supplementation Frequency, 1=never and 5=every day



**Figure 2**

Daily Energy level, 1=never and 5=every day

## Discussion

This study sought to answer the research question, are students aware of iodine and are they aware of the function it performs for the “engine” of the body, the thyroid gland and thus metabolism – energy? The survey conducted specifically focused on whether students took supplementation, ate foods known to contain iodine, and had energy throughout the day unassisted by stimulants like energy drinks and soft drinks. The results indicate that high percentages of students and staff are not aware of the role iodine plays in our health and wellness and iodine needs for fetal development.

The survey responses identified that participants may not be aware of the importance of this essential trace element particularly as many of the participants reside in an endemic area of the US known as the Great Lakes region. The problem with lack of awareness relates to unsuspected iodine deficiency disorders and metabolic deficiency, particularly thyroid imbalance. Iodine is not factored as an antioxidant and, the significance of iodine is not well known as the raw material for thyroid hormones. At present there is a lack of knowledge as well as confidence and medical trust to factor iodine into prevention and treatment. Most college students and staff did not take iodine supplementation and when surveyed were often unaware of the crucial role iodine plays in the first three months of thyroid gland development in utero. Thyroid hormone T4, commonly serum sampled as thyroxine is four molecules of iodine, thyroid hormone T3, commonly serum sampled as triiodothyronine is three molecules of iodine; thyroid medication is typically in the top three pharmaceuticals dispensed. Thyroid imbalance is pandemic and epidemic yet iodine phobia, (Brownstein, 2014). “Iodophobia” is clear and present as people unfamiliar with the necessity and complexity of iodine-deficiency disorders are skeptical of this over-the-counter element. In Brownstein, 2014 it is noted that common environmental halogens chlorine and fluoride, used in dental care, can interfere with iodine.

The sample population is a small sample and may not represent the geographical area of the Great Lakes region. Emerging adults and young college students often consume processed foods. The young adult students at University of Wisconsin – Superior are “WEIRD” samples, (Heine, 2020), which are Western, educated, industrialized, rich and democratic. The higher percentage of daily calories consumed with processed foods the greater the risk for missing nutrients like iodine. Processed foods often include white sugar, white non-iodized salt, and white brominated flour. Food processing strips foods of vital nutritional elements and prepares foods with white table salt which is non-iodized. Many chefs prefer to use this same type of salt as iodized salt texture interrupts the overall presentation. If participants are unaware of the importance of iodine but do not take supplementation, do not eat seaweeds which accumulate iodine from salty seas, do not eat fish caught from the ocean nor consume iodized salt, they may have deficiencies in nutritional elements and rarely will any doctor ask to check iodine levels. Only recently have urine iodine loading tests become more available but still may not be administered unless requested. As people consume higher percentages of processed foods in their daily diet, they run the risk of developing iodine deficiency most often without knowing. There was an assumption that with dairy products and breads, fortified foods provided all that was needed nutritionally but that is not the case now with the advent of UPFDs, the use of bromide in wheat products, and in soft drinks that list brominated vegetable oil in their ingredients. The consumer is often unaware of the potential risk to their health with consumption of these products.

In the 1960s one sandwich slice of bread contained the US RDA of iodine but today, bromide is commonly used as a dough conditioner in most commercial baked goods which causes problems with thyroid and breast uptake of iodine. With what Dr. Abraham describes as medical iodophobia, the patients also have a distrust while at the same time regularly consuming foods, using products and water all with potential for disruption of iodine in the body; thyroid and breast cancers began to rise (Abraham, 2004).

Previous research made by many including Dr. Abraham, Dr. Barnes, Dr. Flechas and now Dr. Brownstein has identified that iodine deficiency disorders “IDD,” are common and that they can lead to problems as iodine is an ancestral antioxidant which mitigates ROS. Oxidative issues in the body contribute to many conditions including the potential for anxiety and depression. The relevance and importance of this research survey was to bring

about awareness and determine what percentage of this small sample population understands the significance of making sure that at minimum, the US RDA for iodine is met, particularly preconception, during pregnancy and lactation (NIH, 2018). There are serious thyroid and metabolic consequences for babies born to thyroid-deficient mothers who also lack the absolute minimum US RDA of iodine.

Brownstein (2021) identified a study of over 6,000 participants with over ninety-percent iodine deficiency in which the use of iodine and other nutritional elements was an integral part of his successful practice helping patients with SARS-CoV-2 aka “COVID.” The case study can be found in his book, *A Holistic Approach to Viruses* (Brownstein, 2021).

It is possible to create awareness about the halogens like bromide found in nearly all US wheat products: pancakes, muffins, breads, cakes and pasta. It is also possible to reduce further environmental halogens like chlorine found in our water supply, swimming pools, that which we brush our teeth each day, shower and bathe our babies, and opt instead for safer less invasive iodine for our pools and disinfectants. Clinics and hospitals are beginning to offer serum, plasma and urine iodine testing which can be requested or on demand lab tested to identify IDD and treat the condition. The dietary and testing awareness is ideal for implementing iodine proactively for endocrine issues, including minimizing thyroidectomies, the glut of synthetic thyroid medications dispensed, and the growing incidence of autoimmune thyroid-related issues with animals.

One measure of success is to begin to understand the many root causatives of our diseases, of our viral outbreaks, our pandemics, our plagues of depression. This may be done through understanding just what iodine brings to the table as an antiviral, antibacterial, antiparasitic, anti-proliferative, and ancient unique antioxidant. Then we could find more hospitable and safer ways to care for our water, soil which could be better enriched with seaweed, thus enriching the people who are made vital once again through awareness of what is tremendously important.

## Conclusion

This study demonstrates that the college students and staff surveyed do not have awareness of the benefits of iodine.

As the literature review of this study established, there are ample health advantages of iodine supplementation. Future research could explore ways in which the understanding of the value of therapeutic doses of iodine could be enhanced within the population of college students. Identification of nutritional deficiencies could be improved in consideration

of the current wellness model which could better examine the impact of nutritional elemental deficiencies like the essential trace element iodine. As ultra-processed food and drink takes over a higher percentage of daily calories, metabolism suffers and many times the lack of necessary energy is what propels anxiety and depression; it is what disturbs and perturbs the mind.

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## Appendix

### *Survey Questions - Likert-scale*

1. Do you take iodine supplementation?
2. Do you eat seaweed like kelp, nori, kombu, or wakame?
3. Do you eat fish such as cod, salmon, mackerel, sardines or other seafood regularly?
4. Do you use iodized salt regularly?
5. Do you feel that you have enough energy from the start to the end of your day without using caffeine or energy drinks?
6. Do you use energy drinks or caffeinated soft drinks regularly?

### *Survey Questions - Yes/No*

7. Are you aware of the US RDA (Recommended Dietary Allowance), adult intake of 150 micrograms per day?
8. Are you aware that The Great Lakes region is a known area where iodine deficiency is endemic, meaning, a region known to be a “\*Goiter Belt,” (\*Goiter is an enlarged thyroid which may be caused, commonly by iodine deficiency.)
9. Are you aware that very low iodine intake can reduce thyroid hormone production?
10. Are you aware that iodine needs increase during pregnancy and lactation and that many women may consume insufficient amounts of iodine even if they do not have signs or symptoms of overt iodine deficiency?
11. Are you aware that infants are more sensitive to the effects of iodine deficiency than other age groups, as indicated by changes in their TSH (thyroid stimulating hormone), and T4 levels in response to even mild iodine deficiency?
12. Are you aware that The American Thyroid Association recommends that women who are planning a pregnancy, currently pregnant, or lactating should supplement their diet with 150 mcg (micrograms), per day of iodine?
13. Are you aware that breast tissue has a high concentration of iodine, and that lumpy, painful breasts and fibrosis, (FBD), may be helped by iodine?
14. Questions adapted from National Institutes of Health news release 2018 & 2022 cited herein.