Holistic Medicine for the 21st Century

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Iodine is the most misunderstood nutrient. After 12 years of practicing medicine, I can say that it is impossible to achieve your optimal health if you do not have adequate iodine levels. I have yet to see any item that is more important to promoting health or optimizing the function of the immune system than iodine.

David Brownstein, M.D.
Iodine

• I: Introduction
• II: Iodine and Breast Illness
• III: Iodine and Autoimmune Disorders
• IV: Iodine as a Detoxifying Agent
Both benign and malignant thyroid nodules have significantly less iodine than normal thyroid tissue.

- Benign thyroid nodules contain 56% of the iodine content as compared to normal thyroid tissue.
- Malignant thyroid nodules contain 3% of the iodine content as compared to normal thyroid tissue.
History of Iodine

• First discovered in 1811
• Birth of western medicine
  • Boussingault (1824) observed that goiter did not occur at many silver mining sites
  • The use of iodine for treating goiter was the first time that a single item (iodine) was used to treat a specific illness (goiter)
### RDA for Iodine

<table>
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<tr>
<th>Life Stage</th>
<th>RDA</th>
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National Health and Nutrition Survey

- 1971-2000 NHANES showed iodine levels declined 50% in the United States
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During this time, increased incidence of:

- Thyroid illnesses (hypo, autoimmune, cancer)
- Cancers of the breast, prostate, endometrium and ovaries

All of the above conditions can be caused by iodine deficiency.
The proportion of the U.S. population with moderate to severe iodine deficiency (<50ug/L in urine) has increased over 400% in the last 20 years.

- 2.6% NHANES I vs. 11.7% NHANES 3.
NHANES 2000

- **16.8% of U.S. women of childbearing age** had urinary iodine concentrations **<50µg/L**
Severe Iodine Deficiency in U.S. From 1970-2005

- 1970: 2.6%
- 1990: 11.7%
- 2005: 16.8%
- 2009: ????
Why Iodine?

- Iodine deficiency is a worldwide problem
  - Mental impairment, reduced intellectual ability, ADD
  - Goiter
  - Infertility
  - Increased risk of breast, prostate, endometrial, ovarian and other cancers
Newborn Thyroid Gland

- Only holds a 24 hour reserve of iodine
  - Fresh sources must be supplied in diet
Breast Milk Iodine

• 47% of women sampled may be providing insufficient iodine to meet infants’ requirements
Milk and Iodine

- Between 1965 and 1980, U.S. milk iodine content increased by 300-500%
  - Changes in cattle feeds
- 1986, amount of organic iodine ethylenediamine dihydroiodine (EDDI) in cattle limited to 10mg/cow/day

176:1119-1121
Iodine Content of U.S. Dairy Whole Milk

- 1978: 602 µg/L
- 1990: 155 µg/L
- Recent Measurements: <100 µg/L

J. Dairy Sci. 1990, 73, 3421-3427
Why Iodine?

- WHO claims iodine deficiency is the world’s greatest single cause of preventable mental retardation.
- WHO estimates that there are 300,000,000 school-aged children worldwide who are iodine deficient.
- 1/3 of the world’s population live in an iodine deficient area.
  - 129 countries.
  - Decreased childhood survival rate in iodine deficient areas.
    - Neonatal mortality declines over 50% when iodine deficiency is rectified.
- 72% of world’s population is affected by iodine deficiency.

*WHO J. Clin. Endocrinand Metabl. 2007;92:437-442*
Why Iodine?

- 100 consecutive healthy pregnant Bostonians
  - 50% found to be below the RDA 220 µg/day
  - 9% below 50 µg/day
    - WHO recognizes as severe iodine deficiency
Iodine and ADD

- 16 women from iodine-deficient area of Italy compared to 7 women from higher iodine area
  - Pregnancy
- Women from iodine deficient area had:
  - Reduced T4, decrease of FT4 with elevated TSH in 50% of pregnant women

Iodine and ADD

“It is hypothesized that the imbalance of maternal thyroid hormone homeostasis during pregnancy as a consequence of endemic iodine deficiency may be responsible for the impaired psychoneurological development observed in children from that area. Appropriate iodine and/or thyroxine prophylaxis to women in that region may prevent the neurobehavioral, cognitive and motor compromise of that population.”
Iodine and ADD

- 16 Women living in a iodine-deficient area versus 11 women living in an iodine-sufficient area
- 10 years follow-up
- ADHD diagnosed in 11/16 in iodine-deficient area versus 0/11 in iodine-sufficient area
- IQ lower in iodine-deficient area-- 88 versus IQ of 99 in iodine-sufficient area
Cholesterol and Iodine

• 1918, researchers demonstrated that feeding iodine to rabbits could prevent the deposition of cholesterol in arteries of rabbits that were fed cholesterol.

  Trans. Jpn. Path. 8:221-4, 1918.

• These studies were reproduced and similar results reported in the literature four times.

  Arch. Exp. Pathol. Pharmokol. 159:265-274, 1931
  Z. Gesamte. Exp. Med. 87: 683-702, 1933
  J. Exp. Med. 58: 115-25, 1933
Researchers looked at the development of atherosclerosis in rabbits:

- **Control group**: Rabbits fed high cholesterol diet
- **Treatment group**: Rabbits fed high cholesterol diet and treated with:
  - T4
  - Desiccated thyroid
  - Iodine
• Control rabbits fed cholesterol developed marked aortic atherosclerosis

• Rabbits fed cholesterol-rich diet and T4 showed slight to moderate aortic atherosclerosis

• Rabbits fed cholesterol-rich diet and either desiccated thyroid or iodine showed an absence of atherosclerotic lesions

This study showed that iodine has an independent positive benefit in a cholesterol-rich diet as well as a synergistic effect with desiccated thyroid hormone.

J. Exp. Med. 58: 115-25, 1933
High Cholesterol Diets Can Exacerbate Iodine Deficiency

- Rats
  - Iodine deficient diet vs. Iodine sufficient diet
  - Iodine sufficient diet resulted in a much lower thyroid weight (43.4 v. 10.3mg).

When the rats were fed a high cholesterol diet, thyroid weight significantly increased in both groups. The high-cholesterol diet was also found to increase the body’s excretion of iodine.
Iodine and Cholesterol Levels

- 136 Subjects
- Iodine intake and lipid parameters
- Compared to iodine sufficient, non-goiterous controls, iodine-deficient goiterous subjects:

Significantly higher average cholesterol levels and LDL cholesterol levels.
Iodine, Cholesterol and CAD

• Keys (1958) published data that countries with the highest cholesterol levels had the highest rate of cardiovascular disease

• Finland had the highest rate of CAD mortality in Europe
  • More prevalent in Eastern Finland vs. Western Finland

WHY?
Iodine, Cholesterol and CAD

- Researchers looked at a variety of dietary components
  - Proteins, fats, carbohydrates, lipids, amino acids, vitamins and minerals
  - 47 different items studied

Iodine intake showed the greatest statistical difference between Eastern and Western Finland.

Risk of death from CAD was 353% higher in individuals with goiter.

There was also a significantly lowered death age in those with goiter.

Lancet. 2:171-3. 1958
Researchers looked at prevalence of cardiovascular diseases in 21 Finnish cities as it related to trace elements in drinking water. The strongest correlation was iodine. The highest intake of iodine associated with the lowest rates of cardiovascular disease. 

Finland, Mortality and CAD

- Finland increased iodine intake in its population
  - Added to dairy feed
  - Added to animal salt

In the past several decades, cardiovascular mortality has decreased by over 50% and life expectancy has increased by 5 years. Finland currently has the highest iodine intake of any European country.
High Cholesterol Diets Can Exacerbate Iodine Deficiency

- **Rats**
  - Iodine deficient diet vs. Iodine sufficient diet
  - Iodine sufficient diet resulted in a much lower thyroid weight (43.4 v. 10.3mg).

When the rats were fed a high cholesterol diet, thyroid weight significantly increased in both groups. The high-cholesterol diet was also found to increase the excretion of iodine.
Why Iodine?

- Only 35% of prescription prenatal vitamins contain iodine
- Of the prenatal vitamins that do contain iodine, only 15% have more than 150µg of iodine per daily dose

This is a public health disaster that is unparalleled!
Why Iodine?

- Elevates pH
  - Alkalinizing agent
- Deficiency causes intellectual deficiency, goiter, hypothyroidism, autoimmune thyroid illness, thyroid cancer and other cancers
- Production of thyroid hormone
  - T4, T3, T2, T1
- Necessary for the production of all the hormones of the body
  - Adrenals, ovaries, testicles, etc.
- Iodine also responsible for formation of normal architecture of the glandular tissue
  - Breast
  - Thyroid
  - Ovary
  - Prostate?
Iodine

- Trace element found in small amounts in the human body
- Usually found in seawater and sea organisms
  - Seaweed
- Soil near ocean can contain larger amounts of iodine
  - Plants grown on iodine-containing soil will have adequate iodine levels
- Iodine can also combine with salt
  - Iodized salt
Iodine: Therapeutic Actions

- Alkalinizing agent
- Antibacterial
- Anticancer
- Antiparasitic
- Antiviral
- Detoxifying agent
- Mucolytic agent
Conditions Treated With Iodine

- ADD
- Asthma
- Atherosclerosis
- Breast Disease
- Cancer
  - Breast, ovaries, prostate, thyroid
- COPD
- Diabetes
- Dupuytren’s Contracture
- Excess Mucous Production
- Hypertension
- Infections
- Keloids
- Liver Diseases (Enterohepatic Circulation)
- Ovarian Cysts
- Parotid Duct Stones
- Peryonie’s
- Sebaceous Cysts
- Thyroid Disorders (hypo, autoimmune and cancer)
Different Forms of Iodine

- Iodine is not very soluble in water
- Dr. Lugol (1829) found that when potassium iodide added to water increased the solubility of iodine
  - Lugol’s solution: 5% iodine and 10% potassium iodide in distilled water
  - 2 drops of Lugol’s solution contains 5mg of iodine and 7.5mg of iodide
Lugol’s Solution

- Widely available at most apothecaries
- Recommended for almost any condition
  - Infection
- Probably the most used medical item before patent medicine took hold
SSKI

• Saturated solution of potassium iodide
  • 100g KI/100ml (1g/ml)
    • 1 drop = 50mg iodide
  • Other ingredients: glycerin, ethanol, acetone, water.
# RDA for Iodine

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Iodide and Iodine

- Iodine is rare element
  - 62nd in abundance of the elements of the earth
    - Bottom third of elements in terms of abundance
- Reduced form of iodine is known as iodide
  - Extra electron
  - Full complement of electrons
Iodine/Iodide Bind to Different Areas of Body

<table>
<thead>
<tr>
<th>Iodine</th>
<th>Iodide</th>
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<tr>
<td>Breast</td>
<td>Thyroid</td>
</tr>
<tr>
<td>Prostate</td>
<td>Salivary Glands</td>
</tr>
<tr>
<td>Stomach</td>
<td>Skin</td>
</tr>
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Where is Iodine Found in the Body?

- Every cell in the body contains and utilizes iodine
  - WBC’s cannot effectively guard against infection without adequate amounts of iodine
- Concentrated in the glandular system
- Thyroid gland contains the largest amount of iodine (50mg adult saturation)
- Breasts, salivary glands, parotid glands, pancreas, cerebrospinal fluid, brain, stomach, skin, lacrimal glands, etc.
How Much Iodine Stored In The Body?

- Na/I Symporter transports I across the cell membrane, against gradient
  - Maximum $\approx 600\mu$g/day I in thyroid gland
How Much Iodine Stored In The Body?

- Approximately 1.5-2gm stored in body at sufficiency
  - Fat tissue: 700mg
  - Striated tissue: 650mg
  - Thyroid: 50mg

*Every organ and all tissues contain iodine*
First U.S. Iodine Studies

- **David Marine**
  - Looked at iodine results in farm animals
  - Estimated amount of iodine necessary to treat humans

- **Akron, Ohio**
  - 56% of school-aged girls had goiter
  - Higher incidence at puberty
  - 600% increase in girls versus boys
First U.S. Iodine Studies: D. Marine

Two groups of school-aged girls

**Control Group**
- 2305 Students
- No iodine given

**Treatment Group**
- 2190 Students
- 9mg iodine (averaged daily dose) for 2.5 years

Nearly 100x RDA for iodine!
First U.S. Iodine Studies: Results

**Control Group**
- 22% goiter
  - 495 cases/2305
  - No Iodine Given

**Treatment Group**
- 0.2 % incidence of goiter
  - 5 cases/2190
  - 9mg/day Iodine
Michigan Studies

• 1900’s goiter was prevalent in large numbers around Great Lakes
  • 40% of school aged children had goiter
• 1924 iodized salt introduced to the area
• By 1928, goiter decreased 75%
• United States quickly added iodide to salt for the rest of the country.
How Do You Ingest Iodine?

- Trace element, not very common in most foods
- Ocean foods
  - Cod, sea bass, haddock, perch
  - Sea Vegetables such as seaweed
- Can be found in food products if iodine is added to animal feed or the food source
  - Salt
Iodized Salt

- 1831 J.G. Boussingault proposed iodized salt to prevent goiter
- 1920’s iodization of salt implemented in the U.S. to prevent goiter
Iodized Salt

- **Potassium iodide**
  - 74 μg iodine/gram of salt
- **Cost effective way to prevent goiter**
  - Effective tool to decrease the presence of goiter
  - Inadequate to provide the body’s need for iodine
Iodized Salt: Low Bioavailability

- 2 Groups
  - Group 1: Iodized salt
  - Group 2: Iodized bread
  - ≈750µg/day iodide in both groups

Expected result: 17.2µg/L (Serum)

Pittman NEJM 1969; 280:1431
Iodized Salt: Low Bioavailability

Only 10% of iodine in salt is bioavailable

Is this because of competitive inhibition by chloride in salt?

So, who would still recommend iodized table salt?

Pittman NEJM 1969; 280:1431
Abraham, G. 2004
This Book Will Show You Why Salt Is The Most Misunderstood Nutrient!

SALT
Your Way To Health

See How Adding the Right Kind of Salt to Your Diet Can Help:
* Adrenal Disorders
* Blood Pressure
* Cholesterol Levels
* Fatigue

* Headaches
* Immune System Function
* Thyroid Disorders

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1971-2000 NHANES showed iodine levels declined 50% in the United States.
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During this time, increases in thyroid illnesses, cancer of the breast, prostate, endometrium and ovaries elevated.

All of the above conditions can be caused by iodine deficiency.
Iodine Deficiency: CHM

- Over 4,000 patients tested

Results: **96.3%** have tested low via urine or serum testing.
Why the Soil is Deficient in Iodine

- More inland and mountainous areas
  - Midwestern United States
    - Great Lakes Basin
    - Michigan, Ohio, Indiana, Wisconsin
- Soil Erosion
  - Glaciers
  - Deforestation
  - Poor farming techniques
- Pollution
  - Pesticides and insecticides
    - Bromide, fluoride and chlorine
    - National/worldwide problem
## Iodine in Food

<table>
<thead>
<tr>
<th>Food</th>
<th>μg/iodine/serving</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ready to eat Cereal</td>
<td>87</td>
</tr>
<tr>
<td>Dairy-based desert</td>
<td>70</td>
</tr>
<tr>
<td>Fish</td>
<td>57</td>
</tr>
<tr>
<td>Milk</td>
<td>56</td>
</tr>
<tr>
<td>Overall diary products</td>
<td>49</td>
</tr>
<tr>
<td>Eggs</td>
<td>27</td>
</tr>
<tr>
<td>Bread</td>
<td>27</td>
</tr>
<tr>
<td>Beans, peas, tuber</td>
<td>17</td>
</tr>
<tr>
<td>Meat</td>
<td>16</td>
</tr>
<tr>
<td>Poultry</td>
<td>15</td>
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Why?
Why Are People Deficient in Iodine?

- **Stigma of using salt**
  - Hypertension
  - <50% of U.S. households use iodized salt
- **Radioactive iodine use in medicine**
  - Exacerbate an iodine-deficient state
- **Chemical exposures: Goitrogens**
  - Bromine, Chlorine and Fluoride (fluorine)
  - Drugs
    - Fluoride, bromide
    - Competitively inhibit iodine binding as well as decrease iodine uptake
- **Declining mineral levels**
  - Soil erosion, poor farming techniques, etc.
- **Diet**
Soy: Goitrogen

- Contains compounds that inhibit TPO
  - Daidzein and genestein
  - When low iodine levels present, soy compounds block TPO-catalyzed tyrosine iodination by acting as alternate substrates producing mono-, di-, and triiodoisoflavones
    - Further worsens iodine deficiency
    - Can occur with low or intermittent doses of iodine

Dietary Reasons for Iodine Deficiency

- Diets without ocean fish or sea vegetables
- Inadequate use of iodized salt including low sodium diets
- Vegan and vegetarian diets
- Bromine in food and drink
  - Brominated vegetable oils
    - Some Gatorade products, Mountain Dew and other soft drinks
- Bakery products
  - Bread, pasta, cereal, etc.
    - Contain bromine
What Happened to Bakery Products?

- 1960’s iodine was added to bakery products as an anti-caking agent
  - 1 slice of bread contained the RDA for iodine: 150µg
- In the 1970’s, bromine was substituted for iodine due to misinformation about iodine

What did this substitution do?
Bromine for Iodine: DOUBLE WAMMY!!

1. Worsened an iodine-deficiency problem already present in the United States

2. Competitively inhibited iodine in the body by adding a goitrogen (bromine) to bakery products

This could be the most asinine act (amongst many) in the history of the food industry.
Bromine

- Toxic substance with no known value in the body
- Family of halides
  - Iodine, fluorine, chlorine
- All halides compete with one another
  - Absorption
  - Receptor binding
- Bromine interferes with iodine utilization in the thyroid as well as other areas of the body
  - Goitrogen
  - Breast, prostate, etc.
Hard Door Trim
Chlorine/PVC 33%
Bromine 11 PPM

Soft Door Trim
Chlorine/PVC 16.9%

Shift Knob
Bromine 333 PPM
Chlorine/PVC 9.1%

Steering Wheel
Bromine 3 PPM

Arm Rest
Chlorine/PVC 16%

Seat
Lead 94 PPM
Bromine 2.5%
Antimony 6,798 PPM
Bromine

- Animal studies show that bromine intake can adversely affect the accumulation of iodine in the thyroid and the skin
- High bromide intake results in iodine being eliminated from the thyroid gland and replaced by bromine
- Ingestion of bromine has been shown to cause hypothyroidism in animals

When iodine deficiency is present, the toxicity of bromine is accelerated in the body.
Bromine

- Antibacterial agent for pools and hot tubs
- Fumigant for agriculture
  - Sprayed on fruit and vegetables
    - Crops found to contain high bromine levels
- Fumigant for termites and other pests
- 1981: 6.3 million pounds bromide sprayed in California
- 1991: 18.7 million pounds bromide sprayed in California.
32 Patients Studied pre/post 24 Hour Iodine Loading Test (4.19.08-9.10.08)
32 Patients Studied pre/post 24 Hour Iodine Loading Test (4.19.08-9.10.08)
Pesticides and Bromine

- Pesticides contain organic bromine

The amount of bromine in human breast milk has increased 10 fold over the last decade (EPA 2003).
How To Check Iodine Levels

- Blood levels
- Urinary excretion
  - Accepted measure
    - Iodine loading test
Iodine Loading Test

- Iodine loading test done at FFP Labs:

  877-900-5556 or 828-694-1144
Iodine Loading Test

- **Hakala labs**: hakalalabs.com
  - 1.877.238.1779

- **FFP Labs**: ffplab.org
  - 1.877.900.5556
Iodine Adverse Effects

Allergy

- Rare
- Radioactive iodine allergy not a cause of allergy to inorganic, non-radioactive iodine
- NAET very effective.
NAET

- Clear both iodine and iodide
- May need to clear in combination with endocrine glands
- Clear toxic halogens with NAET
  - Bromine, Fluoride and Chlorine

For more information on NAET go to: naet.com
Iodine Adverse Effects

Autoimmune Thyroid Disease

- Iodine was treatment of choice for autoimmune thyroid disease before onset of radioactive iodine
  - Effective treatment dates back over 100 years
- Iodine levels have fallen over 50% in last 30 years
  - Autoimmune thyroid illness has increased at rapid rate during same time
Iodine Adverse Effects

Detoxification Reactions

• Iodine is a detoxifying agent for body
  • Bromine, Chlorine, Fluoride, Mercury and other metals
• Can overload the body’s detoxification mechanisms
  • Proper nutritional support
  • Raise pH
  • Healthy diet
    • Water, salt, etc.
• Liver support
Iodine Adverse Effects

Iodine-Induced Hypothyroidism and Goiter

- Hokkaido, Japan
  - 1960 increased rate of goiter
  - 1987 found no increase rate of goiter

- In patients given from 1.5-150mg daily of iodine
  transient decrease (24-40 hours) in thyroid hormone production noted *
  - Thyroid levels quickly adjust

*Goodman and Gilman’s The Pharmacological Basis of Therapeutics. 2001
Iodine Adverse Effects

Iodine-induced hyperthyroidism

- Hyperfunctioning autonomous nodules
  - Nodule may become hyperfunctioning with iodine replacement
    - Very rare possibility
Iodine Adverse Effects

Iodism

- Metallic taste in mouth
- Increased salivation
- Sneezing
- Coryza
- Frontal sinus headache
- Acne

Rare. Personal experience shows iodism occurs in approximately 1-3% of patients. Easily rectified by using minerals and electrolytes or lowering dose. NAET also effective.
Iodine Adverse Effects

Thyroid Cancer

• 1% of all cancers in U.S.
• Women 3:1

• Iodine levels have fallen 50% over the last 30 years

• Thyroid cancer has significantly increased during the last 30 years
  • From 1993-2002, thyroid cancer increased 2.4x in the U.S.
    • FP News. 4.1.07

• Radiation exposure increases risk
  • Iodine is prophylactic agent against radiation exposure when iodine is sufficient in thyroid gland
    • Chernobyl
How to Minimize Adverse Effects

• Use adequate vitamins and minerals
  • Magnesium
    • ↓ Cytosolic free calcium which causes calcification of mitochondria
    • Free calcium responsible for initiating the oxidizing process of TPO in thyroid gland
    • Magnesium and Iodine can reverse this process

• Electrolytes
  • Salt
Medical Iodophobia

“Medical iodophobia is the unwarranted fear of using and recommending inorganic, non-radioactive iodine/iodide within the range known from the collective experience of three generations of clinicians to be the safest and most effective amounts for treating symptoms and signs of iodine/iodide deficiency (12.5-50mg/day).”

Dr. G. Abraham, 2004
Final Thoughts

• Iodine levels have fallen 50% in the last 30 years
• During this time, elevations in autoimmune thyroid illness, autoimmune disorders, thyroid cancer, breast cancer, prostate cancer and other cancers
• If iodine were a dangerous agent for the above condition, incidences of the above conditions would not be rising over the last 30 years.
Final Thoughts (2)

- Start slow
- Check pre and post levels of iodine
- Follow patients closely
- Get ultrasounds before starting treatment when indicated
- Combine treatment with a holistic plan
  - Diet, vitamins, minerals, detox, etc.