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
CAD: An Underlying Mechanism

- 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.
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 (1)

• 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?
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.
Researchers looked at prevalence of cardiovascular diseases in 21 Finnish cities as it related to trace elements in drinking water:

- Calcium, chlorine, fluorine, bromine, and iodine

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.
Iodine and Lipid Profile

- 262 (5-14 year old) children in Morocco
- Iodine deficient area
- Elevated TSH (>2.5 mU/L)
- 400mg iodine (oral iodized oil)
- After 6 months:
  - Decreased TSH
  - Decreased C-peptide
  - LDL/HDL fell from 3.3 to 2.4

“Correction of iodine associated subclinical hypothyroidism improves the insulin and lipid profile and may...reduce risk for cardiovascular disease.”

Thyroid. Vol. 19. 2009. Released ahead of publication. DOI:10.1089/thy.2009.0001
Most Prenatal Multivitamins Lack Adequate Iodine

BY BRUCE JANCIN
Denver Bureau

CHICAGO — The iodine content of prenatal multivitamins marketed in the United States is disturbingly inconsistent, according to data from a laboratory study of the products.

Most prenatal multivitamins don’t contain the minimum 150 mcg of supplemental iodine per daily serving recommended for pregnant and lactating women.

Moreover, the true iodine content of many prenatal multivitamins is wildly different from what’s described on the label, Dr. Angela M. Leung, a fellow in the pediatric endocrinology division at Nationwide Children’s Hospital in Columbus, Ohio, told Family Practice News.

She added that although standardization of the iodine content of prenatal vitamins is an appropriate job for the federal government, as an interim measure she’d like to see the vitamin industry develop product labeling and consistency standards.

In the meantime, what can physicians do to ensure that their pregnant and lactating patients are getting sufficient iodine for normal neurocognitive development in their offspring? Dr. Leung recommended avoiding kelp-containing prenatal multivitamins, which are typically touted as “natural.”

Instead, she continued, stick to those containing iodine derived from potassium iodide, which she and her colleagues found were much more likely to contain an amount of iodine close to that listed on the label.

However, because the actual iodine content is only 76% of the labelled potassium iodide, it’s important to use a multivitamin that contains at least 197 mcg of potassium iodide per serving to ensure that the American Thyroid Association’s recommendation of 150 mcg of supplemental iodine is met.

Iodine deficiency is the leading preventable cause of mental retardation worldwide. Iodine deficiency affects more than 2.2 billion people—38% of the world’s population, Dr. Leung observed.

Dr. Leung stated that she had no conflicts of interest relating to the study.
Gaaaaawly!
Why Iodine?

- Only 28% of prescription prenatal vitamins contain iodine.
- Average iodine content of I-prenatal vitamins was found to be below the RDA for I (119µg).
- 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

• Alkalinating agent
  • Antibacterial
  • Anticancer
  • Antifungal
  • Antiparasitic
  • Antiviral
• Detoxifying agent
• Mucolytic agent
“Great Scott! Maybe we should be using iodine!”
Conditions Treated/Prevented With Iodine

- ADD
- Asthma
- Atherosclerosis
- Breast Disease
- Cancer
  - Breast, ovaries, prostate, thyroid
- Cerebral Palsy
- COPD
- Dental caries
- Diabetes
- Dupuytren’s Contracture
- Excess Mucous Production
- H. pylori
- Hypertension
- Infections
- Keloids
- Liver Diseases (Enterohepatic Circulation)
- Nephrotic Syndrome
- Ovarian Cysts
- Parotid Duct Stones
- Peyronie’s
- Pre-eclampsia
- 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
## RDA for Iodine

<table>
<thead>
<tr>
<th>Life Stage</th>
<th>RDA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult Male</td>
<td>150µg/d</td>
</tr>
<tr>
<td>Adult Female</td>
<td>150µg/d</td>
</tr>
<tr>
<td>Pregnancy</td>
<td>220µg/d</td>
</tr>
<tr>
<td>Lactation</td>
<td>290µg/d</td>
</tr>
</tbody>
</table>
### Iodine/Iodide Bind to Different Areas of Body

<table>
<thead>
<tr>
<th>Iodine</th>
<th>Iodide</th>
</tr>
</thead>
<tbody>
<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>
</tbody>
</table>
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 concentration of iodine (50mg adult saturation)
- Breasts, salivary glands, parotid glands, pancreas, cerebrospinal fluid, brain, stomach, skin, lacrimal glands, etc.
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

<table>
<thead>
<tr>
<th>Control Group</th>
<th>Treatment Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 2305 Students</td>
<td>• 2190 Students</td>
</tr>
<tr>
<td>• No iodine given</td>
<td>• 9mg iodine (averaged daily dose) for 2.5 years</td>
</tr>
</tbody>
</table>

Over 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\(\mu\)g iodide/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)
Iodized Salt: Low Bioavailability

[Bar chart showing serum levels (mcg/L)]

Pittman NEJM 1969; 280:143
Abraham, G. 2004
Iodized Salt: Low Bioavailability

Pittman NEJM 1969; 280:1431
Abraham, G. 2004
Iodized Salt: Low Bioavailability

Is this because of competitive inhibition by chloride in salt?

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; 280:143
Abraham, G. 2004
SALT
Your Way to Health
2nd Edition

Adrenal Disorders | Blood Pressure | Cholesterol Levels | Fatigue | Headaches | Thyroid Disorders

Learn about the remarkable healing ability of unrefined salt

David Brownstein, M.D.
1971-2000 NHANES showed iodine levels declined 50% in the United States.
1971-2000 NHANES showed iodine levels declined 50% in the United States.

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 5,000 patients tested

Results: **96.4%** 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 dairy 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>
</tbody>
</table>
National Health and Nutrition Survey

• 1971-2000 NHANES showed iodine levels declined 50% in the United States

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
  - Nitrate, perchlorate, thiocyanate
    - Competitive inhibitors of iodine at NIS
- Declining mineral levels
  - Soil erosion, poor farming techniques, etc.
- Diet.
When research reveals both the good and bad sides of a food, should you...

Eat It or Avoid It?

by Joy Bauer

Many new studies are focusing on how what we eat affects our health. But the messages can be puzzling. A number of foods and beverages have both positive and negative effects. Here’s a guide to the pros and cons of some highly debated items on the dinner table.

SOY

You probably didn’t grow up eating soy foods. But now, just about every supermarket carries tofu, soy milk, and products made from soy, from taste like cheese, hot dogs, and sausages, and more.

**Pros:** Soy is an excellent source of high-quality protein and is low in artery-clogging fat. It’s also rich in important nutrients such as iron, zinc, and often calcium.

Some studies show that soy protein moderately lowers cholesterol. Others indicate that soy isoflavones—plant compounds that mimic the effects of estrogen—combat osteoporosis by reducing bone-mineral loss.

Whole soy products, such as tofu, soy beans, soy nuts, tempeh, and soy milk, have also helped some women combat hot flashes and boost levels of sex hormones. Studies have also shown that soy may help reduce the risk of breast cancer.

**Cons:** Soy may also interfere with thyroid function. It may inhibit the gland’s ability to do its job in people who are already deficient, and it reduces absorption of thyroid medications. Deficiency is rare in the U.S., but if you’re on any thyroid medication, take it several hours before or after consuming soy foods.

**Bottom Line:** Adding whole soy foods to your diet unless you have had breast cancer or your doctor advises against it for other reasons.

RED MEAT

Red meat has been demonstrated to such an extent that most people consider it a guilty pleasure at best. While juicy chops may not be my first choice for healthy eating, they’re not off the table either.

**Pros:** Red meat is an excellent source of high-quality protein, containing all of the essential amino acids. Beef also is one of the best sources of bioavailable iron—which our bodies use up—and a good source of B vitamins, zinc, and selenium.

**Cons:** Many meats (prime rib, salami, bologna, hot dogs, and ham) are among the worst saturated fats.

**Bottom Line:** If you choose to eat red meat, buy eye round or sirloin—both among the leanest and easiest cuts. Or try venison, ostrich, or buffalo. Game meats such as these are much lower in fat and calories than beef.

ALCOHOL

Ethanol, the active ingredient in alcohol, is responsible for most of its health benefits and detriments.

**Pros:** Alcohol reduces the risk of cardiovascular disease, heart attack, and ischemic stroke by relaxing blood vessels and boosting levels of HDL (good) cholesterol. A compound found in red wine called resveratrol can improve blood flow and prevent LDL (bad) cholesterol from damaging arteries.

Moderate consumption of alcohol (one glass per day for women and two for men) also is associated with a reduced risk of type 2 diabetes and can lower blood sugar in those with diabetes.

**Cons:** Alcohol can increase blood pressure and triglycerides and should be avoided by those with liver disease, including hepatitis. It also exacerbates heartburn and acid reflux. Even moderate amounts of alcohol can increase a woman’s risk of breast cancer. Meanwhile, excessive drinking has been linked to cancers of the mouth, pharynx, larynx, esophagus, and pancreas. Lastly, alcohol dulls those trying to lose weight. It’s caloric, but it doesn’t fill you up the same way food does, and it can even stimulate your appetite.

**Bottom Line:** If you drink, do so responsibly and moderately. And if you suffer from any illness or take medication, check with your doctor before consuming alcohol.
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 a conditioning 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.
“Stupid is as stupid does.”
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

Shift Knob
Bromine 333 PPM
Chlorine/PVC 9.1 %

Steering Wheel
Bromine 3 PPM

Soft Door Trim
Chlorine/PVC 16.9%

Arm Rest
Chlorine/PVC 16%

Seat
Lead 94 PPM
Bromine 2.5%
Antimony 6,798 PPM
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 conditions, 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.
“Discovery consists in seeing what everybody else has seen and thinking what nobody has thought.”

Albert Szent-Gyorgyi, M.D., Ph.D

Nobel Prize 1937 for the discovery of Vitamin C
Iodine for Thyroid & Health
A Holistic Approach

David Brownstein, MD
May 6th, 2011
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This concludes this presentation of the American Nutrition Association