Cardiac Metabolism: Why Cancer of the Heart is So Rare
My Story

1. Age 2 – Diagnosed with asthma
2. Many allergies – from cats, to grass, to foods
3. Chronic Hives – Had to take prednisone
4. Irritable Bowel Syndrome – IBS
5. Age 9 – Type 1 Diabetes – heavily predisposed to heart disease
6. Age 18 – Doctor tried to put me on BP medication
7. Started to pay attention to lifestyle in college and became passionate about health
8. Age 22 – Doctor tried to put me on statin drug
9. Medical education
Evolutionary origins of heart disease
4th phase water
The heart is not the main mover of blood – heart failure
The true function of the heart
Atherosclerosis is clotting, not an accumulation of cholesterol
Cholesterol and statin drugs
Metabolic heart attacks
High blood pressure
True heart healthy diet
Best biomarkers for heart disease
The Autonomic Nervous System
Chiropractic
Dental health
My heart attack at the age of 34
Heart Cancer Stats

◊ Vast majority of tumors originating in heart are benign
◊ Study: 12,000 heart cancer cases, 7 were primary cardiac tumors
◊ Dr. Robert Cusimono, cardiac surgeon, 12 cases a year
◊ Primary cardiac tumors are 0.3 to 0.7% of all cardiac tumors
◊ Metastasis from other tumors is 30 times more likely
◊ When malignant, survival rate at 9 to 12 months is only 10%

Metabolic

- Metabolic Theory of Cancer
- Metabolic Heart Attacks

Biophysics/Quantum

- Cells, Gels, and Electromagnetism
Metabolic Theory of Cancer

Oxidative Phosphorylation - 89% of total cellular energy

Cancer shows large increase in uptake of glucose
Metabolic Theory of Cancer

“Although no specific gene mutation or chromosomal abnormality is common to all cancers, nearly all cancers express elevated fermentation, regardless of their tissue or cellular origin.”

Why does this not happen often in heart tissue?
Metabolic Heart Attacks
Myocardial Infarction with non-obstructed coronary arteries (MINOCA)

- In 5% to 20% of cases, an angiogram will show “non-obstructive coronary artery disease,” which means that the arteries are less than halfway blocked.
- More common in women than men and affects up to 187,000 people in the United States each year.
Plastic Cast Study

◇ “In the presence of atherosclerotic stenosis with a lumen/diameter reduction greater than 70% there was a dramatic increase in the diameter and length of collaterals…”

◇ “Any severely obstructed coronary artery lesion, even multiple ones, was always found associated with enlarged collaterals.”

◇ “The anastomotic index in these instances ranged from 5 to 33 with a mean value of 16 associated with a single stenosis and 22 in multiple severe stenosis”

Baroldi Autopsies

- In accident victims of all ages, almost 40% had several severe stenoses of the coronary arteries. These people had in general never complained of heart problems.

- Critical stenoses of the coronary vessels were found in 2/3 of all the patients who had not died of heart disease.

- Of those who their heart attack was their first cardiac complaint, most had one or more severe stenoses of the coronary vessels.

What Can Cause a Heart Attack Without a Blockage?

Three Imbalances – Poor Metabolism, Oxidative Stress, Imbalance in the Stress Response of Autonomic Nervous System
Metabolic Health (Insulin Sensitivity)

88% of the American population is metabolically unhealthy!


Joana Araújo, PhD,1 Jianwen Cai, PhD,2 and June Stevens, PhD1,3

Abstract

Background: Several guidelines for cardiometabolic risk factor identification and management have been released in recent years, but there are no estimates of current prevalence of metabolic health among adults in the United States. We estimated the proportion of American adults with optimal cardiometabolic health, using different guidelines.

Methods: Data from the National Health and Nutrition Examination Survey 2009–2016 were analyzed (n = 8721). Using the most recent guidelines, metabolic health was defined as having optimal levels of waist circumference (WC < 80 cm for men/women), glucose (fasting glucose < 100 mg/dL, and hemoglobin A1c < 5.7 %), blood pressure (systolic < 120 and diastolic < 80 mmHg), triglycerides (< 150 mg/dL), and high-density lipoprotein cholesterol (≥ 40/50 mg/dL for men/women), and not taking any related medication.

Results: Changing from ATP III (Adult Treatment Panel III) guidelines to more recent cut points decreased the proportion of metabolically healthy Americans from 19.9% (95% confidence interval [CI]: 18.3–21.5) to 12.2% (95% CI: 10.9–13.6). Dropping WC from the definition increased the percentage of adults with optimal metabolic health to 17.6%. Characteristics associated with greater prevalence of metabolic health were female gender, youth, more education, never smoking, practicing vigorous physical activity, and low body mass index. Less than one-third of normal weight adults were metabolically healthy and the prevalence decreased to 8.0% and 0.5% in overweight and obese individuals, respectively.

Conclusions: Prevalence of metabolic health in American adults is alarmingly low, even in normal weight individuals. The large number of people not achieving optimal levels of risk factors, even in low-risk groups, has serious implications for public health.

Keywords: metabolic health, risk factors, prevalence
“Electron-hungry process”
Oxidative Stress

◊ Properties of Free Radicals
  ◊ Naturally made in the process of burning any fuel source (fat, carbs, protein)
  ◊ Normally neutralized by endogenous antioxidants like glutathione
  ◊ Highly reactive
  ◊ Very short half-life
  ◊ Generate new radicals by chain reaction
  ◊ Cause damage to cells, tissues, and EZ
  ◊ Heavy metals, endotoxemia, high blood sugar, AGE’s, environmental toxins, seed oils, EMF
Autonomic Nervous System Imbalance

- The separate nuclei vagus system is the one that was passed on to all mammals
- DMN – Responsible for stimulating sympathetic nervous system
- NA – Vagal break that evolved to keep our complex brains and emotions from over stimulating the DMN (parasympathetic)
- NA supplies visceral efferent to the heart
Gradual inhibition of parasympathetic activity

Depletion of NO due to oxidative stress

Stressful event leading to sudden increase in sympathetic activity

Surge of adrenaline causes heart cells to revert to burning glucose instead of ketones

Burning glucose causes buildup of lactic acid in cardiac cells

Lactic acid prevents calcium from entering cells, therefore they cannot contract

Pressure buildup causes "paradoxical bulging"

This causes localized edema, dysfunctional cell walls, and necrosis.

HEART ATTACK!

Two Paths to Aerobic Fermentation

Other Tissue Cells

- Mitochondria
- Nucleus (DNA)
- X-rays, chemicals, EMF, ROS

Heart Cell

- Nucleus (DNA)
- Oxygen
- ANS Imbalance
- Parasympathetic, cGMP
- Sympathetic, cAMP
- X

X-rays, chemicals, EMF, ROS
Division Deficiency

- After the 1st week of life, heart cells mature and lose the ability to replicate
- Thought to be because of the unique high metabolic activity of the heart
- Warburg said, “cells that die can never become tumorigenic”.

What Does This Have to do With Cardiac Metabolism?

- Fatty acid oxidation, or fat burning, makes about 70% of the ATP that your heart produces.
- Add burning ketones to the mix and it can improve heart efficiency by 28%.

Heart Protection

❖ Fatty acids packaged in chylomicrons
❖ Heart has direct signaling pathway to fat cells
❖ Heart prefers fatty acids and ketones for fuel!
Evolution was not accounting for the ANS imbalance
Biophysics/Quantum
Human Body of Water

- **Brain**: 83%
- **Kidneys**: 83%
- **Lungs**: 85%
- **Blood**: 60%
- **Blood**: 65%
- **Eye**: 95%
- **Heart**: 75%
- **Muscles**: 75%
Exclusion Zone Water (water, hydrophilic surface, radiant energy)

Hofmeister Series - \( \text{Mg}^{2+} > \text{Ca}^{2+} > \text{Na}^+ > \text{K}^+ > \text{Cl}^- > \text{NO}_3^- \)
Maintaining unfolded proteins that form microtrabecular lattice (hydrophilic surface) requires lots of ATP.

“The irreversible injuring of respiration is followed, as the second phase of cancer formation, by a long struggle for existence by the injured cells to maintain their structure, in which a part of the cells perish from lack of energy, while another part succeeds in replacing the irretrievably lost respiratory energy by fermentation energy. Because of the morphological inferiority of fermentation energy, the highly differentiated body cells are converted by this into undifferentiated cells that grow wildly — the cancer cells.”

-Otto Warburg
Mitochondria

- Heart tissue is one of the densest with mitochondria
- Heart muscle tissue prefers fatty acids and ketones (more ATP)
- Presence of ketones has been shown to increase mitochondrial respiration, oxidative phosphorylation, by 128%
The heart emits an electromagnetic field five thousand times stronger than the brain


Exposure to electromagnetic fields induces oxidative stress and pathophysiological changes in the cardiovascular system

Azab Elsayed Azab,1 Shaban Ali Ebrahim2

1Department of Zoology, Faculty of Science, Zawia University, Libya
2Department of Physics, Faculty of Science, Zawia University, Libya

duration, and prolonged P-R and QT-c intervals. A serious histopathological changes in the heart were seen in experimental animals exposed to EMFs, these changes includes increases the number of apoptotic cells, dark brown stain muscle fiber nuclei, marked cell vacuolation, hyperemia muscle fiber degeneration, distortion of some cardiac myocytes, mononuclear cellular infiltration and histological structure of the myocytes spaces were seen. Ultra structural of the myocardial tissue and sarcomere in experimental animals exposed to EMFs showed that lose of area in sarcomeres, irregular structural of myocardial cells, and ruptures of sarcomeres, lose of mitochondria cristae, blebs of mitochondria.

Conclusion: It can be concluded that exposure of human and experimental animals to EMFs have been a negative effect on the heart and blood vessels by causing a histopathological changes and disturbances in the functions of the organs of the cardiovascular system.
Heart Cancer Stats

◊ Vast majority of tumors originating in heart are benign
◊ Study: 12,000 heart cancer cases, 7 were primary cardiac tumors
◊ Dr. Robert Cusimono, cardiac surgeon, 12 cases a year
◊ Primary cardiac tumors are 0.3 to 0.7% of all cardiac tumors
◊ Metastasis from other tumors is 30 times more likely
◊ When malignant, survival rate at 9 to 12 months is only 10%

Gradual inhibition of parasympathetic activity + Depletion of NO due to oxidative stress + Stressful event leading to sudden increase in sympathetic activity

Surge of adrenaline causes heart cells to revert to burning glucose instead of ketones

Burning glucose causes build-up of lactic acid in cardiac cells

Lactic acid prevents calcium from entering cells, therefore they cannot contract

Pressure build-up causes “paradoxical bulging”

This causes localized edema, dysfunctional cell walls, and necrosis.

HEART ATTACK!

Preventing Metabolic Heart Attacks

- Cellular Fermentation
- Depletion of Nitric Oxide
- ANS Imbalance
“Ketone bodies and fats are nonfermentable fuels in mammalian cells.”
RESULTS

β-Hydroxybutyrate (10 mM) was shown to increase oxygen uptake in both arrested and beating hearts (Table 1). The absolute magnitude of the increase was similar in the two preparations (arrested, +0.04; beating, +0.07 ml O₂/min per g dry wt). However, the percentage increment in the case of the beating hearts was much smaller and of marginal statistical significance.

Fluoroacetate (0.22 mM), an inhibitor of the Krebs cycle (32), reduced the qO₂ of the arrested heart by a small but statistically significant amount (Table 2, exp. 1). The addition of octanoate in the presence of fluoroacetate (Table 2, exp. 2), resulted in a highly significant elevation of qO₂, from 0.12 to 0.24 ml O₂/min per g dry wt. This stimulation was of the same magnitude as that seen previously with octanoate in the absence of fluoroacetate (8).

Oligomycin, an inhibitor of oxidative phosphorylation in mitochondria (13, 22, 26, 27), caused a highly significant decrease in oxygen consumption in the beating heart (Table 3, exp. 1; Fig. 1). This was accompanied by a

Octanoate stimulated qO₂ in the presence of oligomycin (Table 3, exp. 3). The magnitude of this stimulation was similar to that seen previously with octanoate in the absence of oligomycin (8). The octanoate effect in the
Strategies to Improve Metabolic Health

- Exercise (specifically resistance training and HIIT)
- Air Filter
- Avoid Toxins and Chemicals
- Avoid Artificial Sweeteners
- Minimize Endotoxemia
- Get Enough Mineral Salt
- Get Enough Sleep
- Don’t Be Sedentary
- Intermittent Fasting
- Reduce stress
- Diet (avoid seeds oils, excess fructose, processed grain, and processed sugar)
Preventing Metabolic Heart Attacks

- Cellular Fermentation
- Depletion of Nitric Oxide (Oxidative Stress)
- ANS Imbalance
β-Hydroxybutyrate (β-HB) on muscle cell mitochondrial physiology. In addition to increased cell viability, murine myotubes displayed beneficial mitochondrial changes evident in reduced H$_2$O$_2$ emission and less mitochondrial fission, which may be a result of a β-HB-induced reduction in ceramides. Furthermore, muscle from rats in sustained ketosis similarly produced less H$_2$O$_2$ despite an increase in mitochondrial respiration and no apparent change in mitochondrial quantity. In sum,
Repeated Sauna Therapy Increases Arterial Endothelial Nitric Oxide Synthase Expression and Nitric Oxide Production in Cardiomyopathic Hamsters

Yoshiyuki Ikeda, MD; Sadatoshi Biro, MD; Yasuyuki Kamogawa, MD; Shiro Yoshifuku, MD; Hideyuki Eto, MD; Koji Oishi, MD; Bo Yu, MD; Takashi Kihara, MD; Masaaki Miyata, MD; Shuichi Hamasaki, MD; Yutaka Otsuji, MD; Shinichi Minagoe, MD; Chuwa Tei, MD
Repeated Thermal Therapy Improves Impaired Vascular Endothelial Function in Patients With Coronary Risk Factors

Masakazu Iimura, MD,* Sadatoshi Biro, MD,* Takashi Kihara, MD,* Shiro Yoshifuku, MD,* Kunimitsu Takasaki, MD,* Yutaka Otsuji, MD, FACC,* Shinichiro Minagoe, MD,* Yoshifumi Toyama, MD† Chuwa Tei, MD, FACC*

Kagoshima, Japan

Table 2. Changes in Clinical Parameters After Two Weeks of Sauna Treatment

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Before</th>
<th>After</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hematocrit (%)</td>
<td>47.6 ± 2.9</td>
<td>47.2 ± 2.3</td>
<td>NS</td>
</tr>
<tr>
<td>Total cholesterol (mg/dl)</td>
<td>214 ± 44</td>
<td>208 ± 34</td>
<td>NS</td>
</tr>
<tr>
<td>Triglyceride (mg/ml)</td>
<td>268 ± 327</td>
<td>221 ± 159</td>
<td>NS</td>
</tr>
<tr>
<td>HDL cholesterol (mg/dl)</td>
<td>51 ± 11</td>
<td>50 ± 11</td>
<td>NS</td>
</tr>
<tr>
<td>Uric acid (mg/dl)</td>
<td>6.8 ± 1.8</td>
<td>6.6 ± 1.5</td>
<td>NS</td>
</tr>
<tr>
<td>Fasting plasma glucose (mg/dl)</td>
<td>99 ± 25</td>
<td>94 ± 16</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>TBARS (nmol/ml)</td>
<td>2.8 ± 0.6</td>
<td>2.9 ± 0.6</td>
<td>NS</td>
</tr>
<tr>
<td>Resting arterial diameter (mm)</td>
<td>3.9 ± 0.3</td>
<td>3.9 ± 0.3</td>
<td>NS</td>
</tr>
<tr>
<td>Reactive hyperemia (%)</td>
<td>398 ± 170</td>
<td>352 ± 215</td>
<td>NS</td>
</tr>
<tr>
<td>%FMD (%)</td>
<td>4.0 ± 1.7</td>
<td>5.8 ± 1.3</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>%NTG (%)</td>
<td>18.7 ± 4.2</td>
<td>18.1 ± 4.1</td>
<td>NS</td>
</tr>
</tbody>
</table>

Conclusions. Repeated thermal therapy improves impaired endothelial function in patients with coronary risk factors, suggesting a preventive role for thermal therapy for atherosclerosis.

Values are expressed as the mean ± SD.

HDL cholesterol = high-density lipoprotein cholesterol; TBARS = thiobarbituric acid reactive substances; %FMD = percentage of flow-mediated dilation; %NTG = percentage of nitroglycerin-induced dilation.
Preventing Metabolic Heart Attacks

- Cellular Fermentation
- Depression of Nitric Oxide
- ANS Imbalance
Balance the Autonomic Nervous System

- Sunlight/Infrared Sauna
- Proper Sleep
- Laughter
- Positive Social Relationships
- Massage
- Singing
- Deep Breathing
- Chewing Food Thoroughly
- Acupuncture

- Yoga
- Tai Chi
- Meditation
- Prayer
- Fasting
- Eat Enough Omega-3’s
- Heal the Gut
- Gargling
- Acupuncture

- Stimulate Gag Reflex
- Cold Therapy
- Coffee Enemas
- Satiety
- Maintain Serotonin Levels (gut)
- PEMF Therapy
- Grounding
- Music
- **High Fat, Metabolically Flexible Diet**

Omega-3 fatty acid deficiencies in neurodevelopment, aggression and autonomic dysregulation: Opportunities for intervention

JOSEPH R. HIBBELN, TERESA A. FERGUSON, & TANYA L. BLASBALG

National Institute on Alcohol Abuse and Alcoholism, Bethesda, USA

Omega-3 fatty acid tissue composition and heart rate variability

Several studies have suggested that omega-3 fatty acid supplementation leads to increased heart rate variability. Four double-blind placebo-controlled clinical trials of adult subjects have documented increases in heart rate variability after treatments with omega-3 fatty acids during 24-hour monitoring (Christensen et al., 1996, 1997, 1998; Christensen, Christensen, Dyerberg, & Schmidt, 1999). Even currently using these fatty acids to treat their patients, while positive findings would indicate that omega-3 fatty acids can increase heart rate variability, which is associated with a decreased risk of sudden cardiac death. Positive findings would suggest that a low omega-3 level is an important factor linking depression and aggression to increased cardiovascular risk.

One possible clinical application could be the treatment...
Effects of high-carbohydrate and high-fat dietary treatments on measures of heart rate variability and sympathovagal balance

Richard M. Millis a, b, Rachel E. Austin a, Vernon Bond c, Mezbah Faruque d, Kim L. Goring e, Brian M. Hickey a, Raymond Blakely f, Ronald E. DeMeersman g

Conclusion

In summary, metabolism of isocaloric high-carbohydrate and high-fat beverages were found to increase resting energy expenditure and heart rate and shift cardiac sympathovagal balance toward greater sympathetic activation. The sympathetic response was differentiable by the type of test beverage with the high-carbohydrate beverage producing greater sympathetic modulation. Across a wide physiological range of respiratory quotients, indicative of the relative oxygen consumption–carbon dioxide production rates, the metabolism of a high-carbohydrate beverage was associated with relatively higher sympathetic modulation of heart rate, resting energy expenditure and respiratory quotient. The metabolism of stored and ingested fat was associated with relatively lower sympathetic modulation, energy

| Table 2  |
|---------------------------------|--------|---------|
| Pretreatment control (n=12)     | Range  | Mean±SD |
| Heart rate variability low frequency/high frequency ratio | 0.21–0.70 | 0.37±0.18 |
| Heart rate (bpm)                | 47.5–80.0 | 61.9±11.5 |
| Respiratory quotient            | 0.67–0.85 | 0.74±0.05 |
| Resting energy expenditure (Cal/d) | 1682–2656 | 2080±422 |
| Axillary body temperature (°F)  | 95.2–97.9 | 96.7±0.8 |
| Systolic arterial pressure (Torr)| 103–153  | 129±15  |
| Diastolic arterial pressure (Torr)| 57–81   | 70±6  |

<table>
<thead>
<tr>
<th>High-carbohydrate (n=6)</th>
<th>Range</th>
<th>Mean±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>HRV low frequency/high frequency</td>
<td>0.64–1.83</td>
<td>1.18±0.43</td>
</tr>
<tr>
<td>Heart rate (bpm)</td>
<td>69.5–86.1</td>
<td>78.5±7.2</td>
</tr>
<tr>
<td>Respiratory quotient</td>
<td>0.93–0.99</td>
<td>0.96±0.05</td>
</tr>
<tr>
<td>Resting energy expenditure (Cal/d)</td>
<td>1873–3114</td>
<td>2599±471</td>
</tr>
<tr>
<td>Axillary body temperature (°F)</td>
<td>96.6–97.3</td>
<td>97.2±0.4</td>
</tr>
<tr>
<td>Systolic arterial pressure (Torr)</td>
<td>125–150</td>
<td>133±9</td>
</tr>
<tr>
<td>Diastolic arterial pressure (Torr)</td>
<td>61–81</td>
<td>72±8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>High-fat (n=6)</th>
<th>Range</th>
<th>Mean±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>HRV low frequency/high frequency</td>
<td>0.45–1.59</td>
<td>0.86±0.43</td>
</tr>
<tr>
<td>Heart rate (bpm)</td>
<td>67.1–86.5</td>
<td>74.5±8.3</td>
</tr>
<tr>
<td>Respiratory quotient</td>
<td>0.74–0.91</td>
<td>0.80±0.05</td>
</tr>
<tr>
<td>Resting energy expenditure (Cal/d)</td>
<td>1699–2851</td>
<td>2398±498</td>
</tr>
<tr>
<td>Axillary body temperature (°F)</td>
<td>96.6–97.5</td>
<td>97.0±0.4</td>
</tr>
<tr>
<td>Systolic arterial pressure (Torr)</td>
<td>117–156</td>
<td>134±14</td>
</tr>
<tr>
<td>Diastolic arterial pressure (Torr)</td>
<td>67–83</td>
<td>75±7</td>
</tr>
</tbody>
</table>

SD=standard deviation.
*Difference from control statistically significant at P<0.05.
Recovery from sauna bathing favorably modulates cardiac autonomic nervous system

Conclusions

This study demonstrates that a session of sauna bathing induces an increase in HR. During the cooling down period from sauna bathing, HRV increased which indicates the dominant role of parasympathetic activity and decreased sympathetic activity of cardiac autonomic nervous system. Future randomized controlled studies are needed to show if HR and HRV changes underpins the long-term cardiovascular effects induced by regular sauna bathing.
Preventing Metabolic Heart Attacks

- Cellular Fermentation
- Deposition of Nitric Oxide
- ANS Imbalance
Summary

 Dichotomy of the heart is one of the rarest cancers.

 Dichotomy is in large part due to the unique metabolism of the heart combined with the inability of the heart cells to divide.

 Dichotomy however, a forced change in the preferred metabolism of the heart could lead to something acutely worse than cancer, myocardial infarction.

 Dichotomy the presence and preference of ketones seems to be protective (metabolically and biophysically) for the heart.

 Dichotomy a metabolically flexible diet and radiant energy exposure can help balance the imbalances that predispose us to metabolic heart attacks.
Take home

✧ Heart disease and heart attacks are about much more than cholesterol/LDL.
✧ Understanding why the heart is resistant to a certain pathology is just as important as understanding why it commonly gets another pathology.
✧ This gives us new insights into heart metabolism, preventing heart disease, and creating overall health.
✧ Eat in a way that keeps ketones around, expose your body to radiant energy, and keep your body in an electromagnetically appropriate environment.
✧ Ferment your food, not your cellular fuel!
Understanding the Heart

Surprising Insights into the Evolutionary Origins of Heart Disease—and Why It Matters

Dr. Stephen Hussey, MS, DC

WWW.RESOURCEYOURHEALTH.COM

@drstephenhussey

@drstephenhussey

@drstephenhussey

@resourceyourhealth