IVC

Three Key Lectures

IVC & Cancer Care

IVC & Mitochondrial Energy

IVC: Nature’s Remedy for Chronic Disease
Intravenous Vitamin C

1. IVC and Cancer Care

Ron Hunninghake, MD
Chief Medical Officer
IVC & Cancer

Three Core Concepts

- Vitamin C is Nature’s Stress Molecule
- IVC is Good Adjunctive Cancer Care
- The Riordan Approach Cares for the Whole Cancer Patient
Hugh D. Riordan, M.D.

Riordan Clinic Founder

The Riordan Approach to Adjunctive Cancer Care
First Cancer Case at Riordan *

- George Williams, friend and patient of Dr. Hugh
- 1980 – Adenocarcinoma of right kidney
- Underwent nephrectomy → mets to lung, liver
- IVC 30 grams twice weekly…felt well
- After 15 months of therapy, mets were gone
- 14 yrs later, at age 84, George died of CHF

*J Orthomol Med 1990; 5:5-7
“We don’t treat cancer here. We treat patients who have cancer.”

-Dr. Hugh Riordan
1932-2005
Selective Cytotoxicity

Ascorbate (mg/dL) vs Survival % for Mia PaCa-2, SK-MEL-28, SW-620, and U-2-OS.

Redox Cycling
In Vitro vs. In Vivo
Tumor Inhibition by Vitamin C (animal studies)

Survival time of sarcoma bearing mice control and treated with IP ascorbate 700 mg/kg

Clin Cancer Res. 2010 January 15; 16(2): 509–520
In Vivo / In Vitro

1. IVC 60,000 mg given
2. Human serum in vivo
3. Taken from cancer pt.
4. Before IVC and at 30 minute intervals
5. The IVC treated serum
6. Was applied to human cancer cells in vitro
7. That had been previously cultured from an actual prostate tumor
IVC & Cancer
Three Core Concepts

Vitamin C is Nature’s Stress Molecule
Intravenous Vitamin C is Amazing

- Corrects scurvy in cancer patients (less fatigue)
- Supports detoxification systems in the body
- Relieves pain and promotes well-being
- Boosts cellular immunity (to prevent secondary infections)
- Stimulates collagen formation (to wall off tumor)
- Inhibits hyaluronidase (to retard metastasis)
- Relieves cellular hypoxia/restores aerobic metabolism
- Restores mitochondrial functioning, improves apoptosis
- Inhibits angiogenesis and reduces tumor nutrient supply
- Potentiates chemotherapy and radiation
- Reduces side effects & toxicity of conventional therapy
- Plausible oncologic adjunct in cancer patient care
Humans Cannot Make Vitamin C

- Due to a genetic mutation of the "GLO" enzyme
- L-Gulonolactone Oxidase
- "GLO" coverts glucose into vitamin C
### Comparing Vitamin C Synthesis to Predicted Oral Consumption

<table>
<thead>
<tr>
<th></th>
<th>mg/kg/d</th>
<th>Human equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td>humans</td>
<td>1</td>
<td>60 mg/d</td>
</tr>
<tr>
<td>dog</td>
<td>3</td>
<td>200 mg/d</td>
</tr>
<tr>
<td>pig</td>
<td>8</td>
<td>500 mg/d</td>
</tr>
<tr>
<td>monkey*</td>
<td>100</td>
<td>7,000 mg/d</td>
</tr>
<tr>
<td>goat</td>
<td>190</td>
<td>14,000 mg/d</td>
</tr>
<tr>
<td>sick goat</td>
<td>~1300</td>
<td>100,000 mg/d</td>
</tr>
</tbody>
</table>
Plasma Vitamin C Concentrations After IVC

**IVC → 100x higher** plasma C than highest tolerated oral dose

\[
y = 1.01 \times 0.7; \ r = 0.95
\]
“...the chronic underdosing of vitamin C from minimal or no supplementation and from eating depleted food will facilitate the development of nearly all the chronic degenerative disease that affect man.”

Irwin Stone – The Healing Factor
IVC Treatment of Cancer Patients at Riordan Clinic

63%

<table>
<thead>
<tr>
<th>Type of Cancer</th>
<th>Number of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lung</td>
<td>150</td>
</tr>
<tr>
<td>Prostate</td>
<td>202</td>
</tr>
<tr>
<td>Breast</td>
<td>257</td>
</tr>
<tr>
<td>Blood</td>
<td>28</td>
</tr>
<tr>
<td>Skin</td>
<td>33</td>
</tr>
<tr>
<td>Renal</td>
<td>50</td>
</tr>
<tr>
<td>Pancreas</td>
<td>51</td>
</tr>
<tr>
<td>Bladder</td>
<td>22</td>
</tr>
<tr>
<td>Bone</td>
<td>22</td>
</tr>
</tbody>
</table>

Serum C Level µM

- Scurvy: <10
- Low: <30
- Normal: <100
- High: >100
IVC & Cancer
Three Core Concepts

IVC is Good
Adjunctive Cancer Care
IVC

Antitumor Mechanisms
Selective Cytotoxicity on cultured tumor cell lines

Data replicated by National Institutes of Health

Pharmacologic ascorbic acid concentrations selectively kill cancer cells.

Casciari et al. British Journal of Cancer (2001) 84(11), 1544–1550
Selective Cytotoxicity

![Graph showing selective cytotoxicity of ascorbate on different cell lines.](image)
Intravenous Vitamin C is Amazing

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Less Mitochondrial Oxidative Stress

Cellular Hypoxia is relieved by IVC

Cell shifts back to AEROBIC

Improved production of antioxidant enzymes

Enhanced Krebs cycle: increasing ATP !!

Increased CO₂ output

H₂O₂ → OH⁻

Improved OXIDATION of NADH to NAD

Decreased mitochondrial injury

Apoptosis restored

IVC - redox cycling
Ascorbic Acid
Vitamin C Acting as an Antioxidant

Free Radicals are harmful oxidants

\[ 2FR \rightarrow \text{DHA} \text{ (oxidized vitamin C)} \]

\[ \text{Dehydroascorbate} \]

\[ \text{AA}^{2e^-} \]

\[ 2FR^* \]
Dehydroascorbic Acid

Oxidized Vitamin C (DHA) Is Not Reabsorbed

Two ferric ions are reduced to the ferrous state

Two ferric ions are reduced to the ferrous state

2Fe^{3+} \rightarrow 2Fe^{2+}

AA^{2e^-} \rightarrow DHA

DHA \rightarrow kidneys
Pro-oxidant Effect of Vitamin C in the presence of Iron and Activated Oxygen Radicals

\[ \text{Fe}^{3+} \xrightarrow{\text{Superoxide}} \cdot\text{O-O}^\cdot \xrightarrow{\text{Superoxide Dismutase}} \text{H}_2\text{O}_2 \xrightarrow{\text{AA}^{2e^-}} \text{Fe}^{2+} \]

\[ \text{Fe}^{2+} \xrightarrow{\text{AA}^{e^-}} \cdot\text{O-O}^\cdot \xrightarrow{\text{Superoxide}} \text{Fe}^{3+} \]
Fenton’s Reaction
Ferrous Iron is Oxidized Back to Ferric State

Fe^{2+} + H_2O_2 → Fe^{3+} + OH^- + OH\cdot

Nature’s most powerful free radical in the human body
Water Wheel Analogy: 

**IVC generates a powerful oxidant**
Selective Cytotoxicity
Most cancer cells lack Catalase

![Graph showing the effect of ascorbate on survival of different cancer cell lines.](image-url)
OHNO, S. 
Anticancer Research 
29: 809-816 (2009)

Proposed mechanism: IVC antitumor effects

Pharm-Ascorb: Selective Cytotoxicity towards Catalase-deficient cancer cells
Glucose

Ascorbic Acid
insulin receptors → signal transduction → gene expression & growth regulation → GLUT4

- glucose utilization
- glycogen / lipid / protein synthesis

- outside → inside

0074 BETACELL BIOLOGY CONSORTIUM
Large doses of ascorbate can act as a non-rate-limited antioxidant to effectively scavenge ROS.

- Robert F. Cathcart
Toxicity of vitamin C to tumor cells derives from high GLUT1 expression by tumor cells

Vitamin C may alter intracellular metabolism in cancer cells by disrupting the redox balance.

High-dose vitamin C blocked the energy flux in glycolysis and the Kreb’s Cycle

→ ATP production is inhibited

Science. 2015, 350: 1391
Ascorbic Acid is Amazing…dosing is crucial!

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Tumor Angiogenesis

Effect of Tumor Conditioned Medium (TCM) on Angiogenesis

Control

TCM
Effect of Ascorbic Acid on Angiogenesis

Ascorbic acid inhibits migration and angiogenesis of the endothelial cells. AA at 1-3 mg/mL caused the reduction of the growth of sprouts from aortic rings.

Effects of IVC on Inflammation
Inflammation and Cancer

Inflammation is a critical component of tumor progression. Cancers arise from sites of chronic “injury”.

Inflammatory component is present and contributes to

• tumor proliferation
• angiogenesis
• metastasis
• resistance to chemotherapy.

Nature. 2002 December 19; 420, 6917
The Seven Hallmarks of Cancer

1. Self-sufficiency of growth signals
2. Insensitivity to antigrowth signals
3. Evasion of apoptosis
4. Unlimited proliferation potential
5. Enhanced angiogenesis
6. Tissue invasion and metastasis
7. Inflammatory microenvironment

Molecular Cancer Research; 4(4). April 2006
Effect of IVC on inflammation in cancer patients

- IVC reduces CRP
- IVC modulates pro-inflammatory cytokines

Mikirova et al. Journal of Translational Medicine 2012, 10:189
Patients with increased CRP had a higher risk of dying from cancer than from other causes independent of acute infection.

The relation of CRP to cancer death was stronger than to vascular death.

Clinical Chemistry 54:2, 343–349, 2008, Claudia Marsik et al
CRP a Prognostic Indicator

CRP Predicts Cancer Survival in

- Multiple myeloma
- Melanoma
- Lymphoma
- Ovarian Ca
- Renal Ca
- Pancreatic Ca
- GI Cancers
- Prostate ca

Most of the cancer patients, 70 ± 13 % showed a reduction in CRP during IVC therapy.
The Effects of IVC on PSA
The effects of IVC therapy on PSA

70 % of patients showed reduced PSA levels during IVC treatment.

Mikirova et al. 2015
Subject A: initial Gleason score = 6; treatments given weekly or twice weekly at doses of 25 g; PSA levels decreased from initial values of 60 ng/ml to final values in the normal range.

Subject B: Gleason score = 6–9; treatments typically given weekly at doses of either 7.5 g or 25 g (40 IVC); PSA levels decreased from maximum values of 1500 ng/mL to a final value of 7 ng/mL.
Effect of IVC on Bone Regeneration
Effect of vitamin C on bone regeneration

AA deficiency inhibits
- bone formation
- osteoblasts
- differentiation
- bone matrix growth

Immunohistochemical analyses of collagen I (a, b), and osteoblast cells.
Urban et al.
Head & Face Medicine 2012, 8:25
Effect of IVC on Cell Signaling
Unified Theory Of Sustained Illness

Damage

Repair

Adapted

Reserves

Depletion

Genetic Expression

AOS

ROS

Signaling

eOs – External Oxidative Stress

iOs – Internal Oxidative Stress

DNA Membranes

Structural

Chemical
Cellular Injury
Inadequate nutrient reserves
The damage cannot be repaired

Cytokine Signaling
Cytokine signaling intensifies
the inflammatory response
### Cytokine Signaling Categories

<table>
<thead>
<tr>
<th>“Heal the Wound!”</th>
<th>“Turn off Healing”</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Angiogenesis - 62</td>
<td>• Anti-angiogenesis - 6</td>
</tr>
<tr>
<td>• Inflammation - 69</td>
<td>• Anti-Inflammation - 7</td>
</tr>
<tr>
<td>• Differentiation - 53</td>
<td>• De-Differentiation - 6</td>
</tr>
<tr>
<td>• Oncogene-Activation - 47</td>
<td>• Oncogene-DeActivation - 27</td>
</tr>
<tr>
<td>• Apoptosis - 43</td>
<td>• Anti-Apoptosis - 33</td>
</tr>
<tr>
<td>• Cancerezation - 31</td>
<td>• Wound Healing - 29</td>
</tr>
<tr>
<td>• Mitogenesis - 82</td>
<td>• Mitogenesis Down - 22</td>
</tr>
<tr>
<td>• Immunity Up – 54</td>
<td>• Immunity Down – 14</td>
</tr>
<tr>
<td>• Chemoattractant – 5</td>
<td>• Cell Survival – 39</td>
</tr>
<tr>
<td>• Cell Adhesion – 18</td>
<td>• Cell Activation – 11</td>
</tr>
<tr>
<td>• Atherosclerosis – 27</td>
<td>• Glucose metabolism – 14</td>
</tr>
</tbody>
</table>
Modulation of Cytokines with Six IVC’s

Cancer patients were treated with SIX IVC’s at the Riordan Clinic

<table>
<thead>
<tr>
<th>patient</th>
<th>Stage</th>
<th>classification</th>
<th>primary cancer</th>
<th>metastasis</th>
<th>Chemo/radiation</th>
<th>surgery</th>
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<tbody>
<tr>
<td>C1</td>
<td>4(4)</td>
<td>T2 N1 M1</td>
<td>sarcoma</td>
<td>lungs</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>C2</td>
<td>4(3)</td>
<td>T3 N2 M1</td>
<td>colon</td>
<td>lungs, brain</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>C3</td>
<td>4(1)</td>
<td>T3-4 N2 M1</td>
<td>lung</td>
<td>brain</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>C4</td>
<td>3(3)</td>
<td>T3 N3 M1</td>
<td>breast</td>
<td>brain</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>C5</td>
<td>1</td>
<td>breast</td>
<td>renal</td>
<td>pancreas</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>C6</td>
<td>4(3)</td>
<td>T3 N2 M1</td>
<td>ovarian</td>
<td>lungs</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>C7</td>
<td>1</td>
<td>breast</td>
<td>ovarian</td>
<td>lungs</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>C8</td>
<td>3(3)</td>
<td>T3 N1 M0</td>
<td>pancreas</td>
<td>invasive</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>C9</td>
<td>2</td>
<td>T1 N1 M0</td>
<td>breast</td>
<td>invasive</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>C10</td>
<td>4(1)</td>
<td>T1N1M1</td>
<td>breast</td>
<td>lung, liver, BM, brain</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>C11</td>
<td>2(3)</td>
<td>T1 N1 M0</td>
<td>prostate</td>
<td>bone</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>C12</td>
<td>3(4)</td>
<td>T4-3 N1 M0</td>
<td>colon</td>
<td>invasive</td>
<td>yes</td>
<td>yes</td>
</tr>
</tbody>
</table>
Average z-scores for several inflammatory and angiogenesis promoting cytokines were higher than average (healthy controls) decreased over the duration of treatment.

Mikirova et al. 2015
IVC and Sepsis
Given the known role of ascorbate in:
- maintaining endothelial markers
- suppression of inflammatory markers
- protection from sepsis in animal models
- direct antineoplastic effects

We proposed the use of ascorbate as an adjuvant to existing modalities in the treatment and prevention of cancer-associated sepsis.

Thomas E Ichim\textsuperscript{1,2}, Boris Minev\textsuperscript{3}, Todd Braciak\textsuperscript{4,2}, Brandon Luna\textsuperscript{2}, Ron Hunninghake\textsuperscript{1}, Nina A Mikirova\textsuperscript{1}, et.al., JTM, 2011, 9:25
Phase I Safety Trial
Intravenous Ascorbic Acid in Patients with Severe Sepsis

Results:

- No adverse safety events
- Reductions in Organ Failure Assessment (SOFA) scores
- Reductions in inflammatory biomarkers
  - C-reactive protein and procalcitonin

24 patients with severe sepsis randomized to receive IVC every 6 hours for 4 days

CRP in Sepsis: IVC Treated vs. Placebo

Pharmacologic Ascorbic Acid reduces...
Multiple Organ Failure
CRP

8.5% (4 of 47) in the treatment group
40.4% (19 of 47) in the control group (P < .001).
IVC – Compatible with Chemotherapy?

*Note – I am not an oncologist
Ascorbic Acid is Amazing…dosing is crucial!

✓ **Corrects scurvy** in cancer patients (less fatigue)
✓ Supports **detoxification systems** in the body
✓ **Relieves pain** and promotes well-being
✓ Boosts cellular **immunity** (to prevent secondary infections)
✓ Stimulates **collagen formation** (to wall off tumor)
✓ Inhibits **hyaluronidase** (to retard metastasis)
✓ **Relieves cellular hypoxia/restores aerobic metabolism**
✓ Restores **mitochondrial functioning**, improves **apoptosis**
✓ Inhibits **angiogenesis** and reduces tumor nutrient supply
✓ **Potentiates** chemotherapy and radiation
✓ **Reduces side effects** & toxicity of conventional therapy
✓ **Plausible oncologic adjunct** in cancer patient care
Ascorbate treatment did not increase the rate of grade 3 or 4 toxicity.

Grade 1 and 2 toxicities were decreased in the Carboplatin + Paclitaxel + IVC group versus the Cp+Pax group.

Median time for disease progression/relapse was 8.75 months longer in the AA group.

Ma Y et al. Sci Transl Med 6, 222ra18 (2014);
Animal Study of Chemo with Ascorbate

Gemcitabine–ascorbate combinations administered to mice enhanced inhibition of growth compared to gemcitabine alone produced 50% growth inhibition in a tumor type not responsive to gemcitabine.

Espey et al.  
Free Radic Biol Med.  
2011, 50: 1610–1619
Effects of ascorbate alone and in combination with chemotherapy in ovarian cancer

Ma Y.
Sci Transl Med
6, 222 ra18
(2014)

(animal model)
Phase I Evaluation of IVC in Combination with Gemcitabine and Erlotinib in Patients with Metastatic Pancreatic Cancer

- IVC 50-100 grams
- 3 days/wk x 8wk
- 7 patients had stable disease
- 2 patients had progressive disease (non-responders)

IVC → Quality of Life
Survival results on high-dose vitamin C administration to patients with cancer

Survival time in Phase I/II studies IVC with chemotherapy

- Stage IV pancreatic cancer treated with gemcitabine with addition of IVC therapy
- Historic median survival for gemcitabine-treated patients: 5.65 months
- The mean survival with IVC was 12 months

IVC and Quality of Life

Alleviation of
- fatigue
- insomnia
- loss of appetite
- nausea
- pain

Improvements
- physical
- cognitive
- emotional
- social functioning
- overall health

(4 Recent Studies)
<table>
<thead>
<tr>
<th>Prospective</th>
<th>Patients</th>
<th>Patients Intervention</th>
<th>Other Therapies</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ma et al.</td>
<td>25 Ovarian cancer (stage III–IV) 13 Chemo + vit C 12 Chemo group</td>
<td>IV vitamin C 75–100g 2x/week 12 months</td>
<td>Chemotherapy (paclitaxel, carboplatin) 6 months</td>
<td>Grade 1 and 2 toxicities</td>
</tr>
<tr>
<td>Stephenson et al</td>
<td>17 Refractory advanced solid tumors (stage III–IV; colon, pancreas, breast, etc.)</td>
<td>IV vitamin C 0.8–3 g/kg 4x/week 1–4 weeks</td>
<td>None</td>
<td>Fatigue, Pain Nausea/vomiting Insomnia Appetite loss</td>
</tr>
<tr>
<td>Takahashi et al.</td>
<td>60 Advanced cancer (lung, breast, stomach, colon, etc.)</td>
<td>IV vitamin C 25–100g 2x/week 4 weeks</td>
<td>Chemotherapy</td>
<td>Fatigue, Pain Insomnia Constipation</td>
</tr>
<tr>
<td>Yeom et al.</td>
<td>39 Terminal cancer (stomach, colorectal, lung, breast, biliary, etc.)</td>
<td>IV vitamin C 10g 2x/week 4 g oral daily 1 week</td>
<td>None</td>
<td>Fatigue, Pain Nausea/vomiting Insomnia Appetite loss</td>
</tr>
</tbody>
</table>
The effect of IVC on cancer and chemotherapy-related fatigue and QOL

125 Breast cancer (stage IIa–IIIb)

53 Treatment group
72 Control group

IVC 7.5g - 1x/week for 4 weeks

Chemotherapy (epirubicin, cyclophosphamide, methotrexate, fluorouracil)
Radiotherapy

Improvements were seen in Fatigue, Depression, Nausea, Sleep disturbance, Appetite loss, Dizziness

Vollbracht C. in vivo 25: 983-990 (2011)
Intensity score of symptoms during adjuvant therapy and aftercare was nearly twice lower than in the control group.

Vollbracht C. *in vivo* 25: 983-990 (2011)
IVC & Cancer

Three Core Concepts

The Riordan Approach Cares for the Whole Cancer Patient
Ascorbic Acid is Amazing... dosing is crucial!

- **Corrects scurvy** in cancer patients (less fatigue)
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- **Potentiates** chemotherapy and radiation
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- **Plausible oncologic adjunct** in cancer patient care
## Adjunctive Cancer Patient Care

<table>
<thead>
<tr>
<th>Conventional</th>
<th>Adjunctive Care</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treat the Disease</td>
<td>Care for the Patient</td>
</tr>
<tr>
<td>Determine Grade and Stage of Tumor</td>
<td>Search for and Correct Underlying Causes</td>
</tr>
<tr>
<td>Kill Cancer Cells</td>
<td>Strengthen Healthy Cells</td>
</tr>
<tr>
<td>More Oxidative Stress</td>
<td>Lessen Oxidative Stress</td>
</tr>
<tr>
<td>Quantity of Survival</td>
<td>Quality of Life</td>
</tr>
</tbody>
</table>
“We don’t treat cancer here. We treat patients who have cancer.”

-Dr. Hugh Riordan
1932-2005
The Riordan Approach

- **WPH** – Whole Person Healing
- **HPN** – Healing Power of Nature
- **CBI** – Characterize (& Correct) Biochemical Individuality
- **ITC** – Identify The Causes
- **FAM** – Food As Medicine
- **CHR** – Cultivate Healthy Reserves
- **DCR** – Doctor/Co-Learner Relationship
<table>
<thead>
<tr>
<th>The Riordan Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Relationship of Co-learners</td>
</tr>
<tr>
<td>Identify the Causes</td>
</tr>
<tr>
<td>Characterize (&amp; Correct) Biochemical Individuality</td>
</tr>
<tr>
<td>Care for the Whole Person</td>
</tr>
<tr>
<td>Food as Medicine</td>
</tr>
<tr>
<td>Cultivate Healthy Reserves</td>
</tr>
<tr>
<td>Healing Power of Nature</td>
</tr>
</tbody>
</table>
You are the First Cause

IVC First!
The Riordan Clinic Mission

Our mission is to help you create real and lasting health by identifying and correcting hidden root causes of your chronic illness.
Better Self Care

Inflammation
Infection focal
Dysregulated
Adrenal fatigue
Hormones disrupted

Life Structure
Digestive disorders
Balanced Activity

Emotions toxic

Toxins i.e. sugar
Excess i.e. metals

Nutrients missing
Clean Environ
Cleanse

Foods nonwhole

You begin to see yourself as First Cause

S.O.A.P.
Pathways To Better Personal Health

Root Causes: Detect & Correct
<table>
<thead>
<tr>
<th>Nutrient Profile</th>
<th>Nutrient Deficiencies – the Core Root Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>A, E, Lycopene, Lutein, Beta Carotene</td>
<td>Core panel of antioxidants (basic to good health)</td>
</tr>
<tr>
<td>B1, B2, B3, B5, B6</td>
<td>B-Vitamin assessment of actual blood levels</td>
</tr>
<tr>
<td>B12 and Folate</td>
<td>Key B-Vitamins for energy and DNA repair</td>
</tr>
<tr>
<td>Mg, Cu, Zn, Mn, Se</td>
<td>Red Blood Cell (intracellular) mineral levels—enzyme function</td>
</tr>
<tr>
<td>Vitamin C</td>
<td>Plasma Vitamin C level—nature’s healing factor</td>
</tr>
<tr>
<td>Vitamin D</td>
<td>Important in bone health, immunity &amp; blood sugar regulation</td>
</tr>
<tr>
<td>CoQ10</td>
<td>Enhances oxygen utilization in cells</td>
</tr>
<tr>
<td>Chromium</td>
<td>Reduces sugar cravings and promotes better blood sugar control</td>
</tr>
<tr>
<td>Essential Fatty Acids</td>
<td>Omega oils 3, 6, 9 – inflammation regulators</td>
</tr>
<tr>
<td>Amino Acids Profile</td>
<td>Core building blocks for enzymes and cells</td>
</tr>
<tr>
<td>UA + Urine C</td>
<td>Urinalysis with Vitamin C excretion test</td>
</tr>
<tr>
<td>Ferritin</td>
<td>Inflammation and Iron reserves</td>
</tr>
<tr>
<td>Bio-Function Profile</td>
<td>Brain, Heart, Blood, Thyroid, Gut Metabolism</td>
</tr>
<tr>
<td>------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>CBC</strong></td>
<td>Red and White Blood Cell health</td>
</tr>
<tr>
<td><strong>Chemistry Profile</strong></td>
<td>Liver, kidney, and electrolyte balance</td>
</tr>
<tr>
<td><strong>Glutathione</strong></td>
<td>Most important antioxidant in detox, brain health, and immunity</td>
</tr>
<tr>
<td><strong>Homocysteine</strong></td>
<td>Bio-marker for blood vessel health and memory function</td>
</tr>
<tr>
<td><strong>Insulin</strong></td>
<td>Regulates blood sugar and metabolism</td>
</tr>
<tr>
<td><strong>Pyrroles</strong></td>
<td>Anxiety and stress marker</td>
</tr>
<tr>
<td><strong>Histamine</strong></td>
<td>Allergy, inflammation, &amp; methylation marker</td>
</tr>
<tr>
<td><strong>CRP-hs</strong></td>
<td>Highly sensitive inflammation marker</td>
</tr>
<tr>
<td><strong>Cytotoxic #1</strong></td>
<td>Food sensitivity testing – 90 foods tested</td>
</tr>
<tr>
<td><strong>G6PD</strong></td>
<td>Genetic marker for IVC safety</td>
</tr>
<tr>
<td><strong>HbA1c</strong> <em>NEW</em></td>
<td>Marker of blood sugar levels over time</td>
</tr>
<tr>
<td><strong>Lipid Profile</strong> <em>NEW</em></td>
<td>Assessment of cardiovascular risk factors</td>
</tr>
<tr>
<td><strong>MTHFR/COMT Profile</strong> <em>NEW</em></td>
<td>Genetic markers for methylation pathways</td>
</tr>
<tr>
<td>Life Care Hormone Profile</td>
<td>Life Care Anti-Aging and Thyroid Hormones</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>--------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Estradiol</td>
<td>Key hormone for women (also affects men)</td>
</tr>
<tr>
<td>Testosterone</td>
<td>Key Hormone for men (also affects women)</td>
</tr>
<tr>
<td>Progesterone (Women)</td>
<td>Predominantly female hormone (affects DHT)</td>
</tr>
<tr>
<td>DHEA-S</td>
<td>Most abundant adrenal hormone</td>
</tr>
<tr>
<td>FT3, FT4, TSH, RT3</td>
<td>Comprehensive thyroid hormone testing</td>
</tr>
</tbody>
</table>
Ascorbic Acid is Amazing…dosing is crucial!

- Corrects scurvy in cancer patients (less fatigue)
- Supports detoxification systems in the body
- Relieves pain and promotes well-being
- Boosts cellular immunity (to prevent secondary infections)
- Stimulates collagen formation (to wall off tumor)
- Inhibits hyaluronidase (to retard metastasis)
- Relieves cellular hypoxia/restores aerobic metabolism
- Restores mitochondrial functioning, improves apoptosis
- Inhibits angiogenesis and reduces tumor nutrient supply
- Potentiates chemotherapy and radiation
- Reduces side effects & toxicity of conventional therapy
- Plausible oncologic adjunct in cancer patient care
Adjunctive IVC Care

“We don’t treat cancer here. We treat patients who have cancer.”

- Dr. Hugh Riordan 1932-2005
Don’t ever give up ….and take vitamin C

Ascorbic acid in high dose forms is an ideal adjunctive therapy to cancer and the management of most age-related degenerative diseases.
Summary of Case Reports
13 case reports detailed the effectiveness of IVC in a population of 68 patients with the following cancer types:

- colorectal (n=10)
- breast (n=8)
- bladder (n=7)
- kidney (n=7)
- lung (n=8)
- lymphomas (n=8)
- stomach (n=5)
- ovarian (n=5)
- pancreatic (n=3)
- gallbladder (n=2)
- brain (n=1)
- melanoma (n=1)
Collectively, these 13 case reports documented one or more of the following outcomes:

1. Cancer remission and long term cancer-free survival
2. Survival considerably beyond life expectancy
3. Initial disease stabilization but recurrence or death after IVC was decreased or stopped
4. Tumor stabilization and/or regression based on circulating tumor markers, CT scans, x-ray, bone scans, or other imaging techniques
5. Improvements in pain related to bone metastasis, and a reduction in the need for pain medication
### Dr. Riordan’s published case reports
(patients followed the Riordan IVC Protocol)

<table>
<thead>
<tr>
<th>Tumor Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Renal Cell #1</td>
<td>Lived cancer free x14 y and died of CHF at 84 y</td>
</tr>
<tr>
<td>Renal Cell #2</td>
<td>Objective remission at 4 y</td>
</tr>
<tr>
<td>Colorectal</td>
<td>Clear of mets and primary at 1.5 y (CT scan)</td>
</tr>
<tr>
<td>Pancreatic</td>
<td>“surpassed life expectancy”</td>
</tr>
<tr>
<td>Breast / mets</td>
<td>100g x5d in hospital; resolution of skull mets at 3 mo</td>
</tr>
<tr>
<td>Non Hodgkin’s #1</td>
<td>Remains cancer free at 2 y</td>
</tr>
<tr>
<td>Non Hodgkin’s #2</td>
<td>CT scan clear, “complete remission” at 11 mo</td>
</tr>
</tbody>
</table>

CMAJ 174.(7):937-42. 2006
IVC treatment of child with optic pathway glioma: Case report

• 5-year-old child, diagnosed with neurofibromatosis type 1 (NF1) and optic pathway tumor at the age of 14 months.
• Because of the tumor progression, Carboplatin and Vincristine was prescribed and continued for one year.
• Progression of disease continued after CT verification
• At age 2.8 years: IVC (7-15 grams per week) for 30 months.
The MRI showing hypothalamic/optic chiasm and optic pathway tumors before and after IVC
Chemotherapy

IVC Treatments
Ascorbic Acid is Amazing

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- Plausible oncologic adjunct in cancer patient care
Orthomolecular means "the right molecule."

Dr. Linus Pauling
Vitamin C: The Electron Exchanger

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

1937 Nobel Prize winner in Medicine
Awarded for the discovery of vitamin C, in connection with biological respiration

“...one of the primary substances assuring that a vigorous, continuing electron exchange takes place among the body’s tissues and molecules.”
“One definition of life… a state in which an optimal degree of electron interchange among cells can take place.”

Dr. Thomas Levy – Curing the Incurable