TRANSFORMING THE FACE OF CANCER CARE

DELIVERING HEALTH

CHANGING LIVES

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Almost any patient who hears the word "cancer" applied to their pathologic findings experiences their hair catching on fire.
There are close to
14 million cancer survivors
living in the U.S., a number that is
expected to grow to
19 million by 2024,
according to the National Cancer
Institute.

About 40% have been alive
10 years or more after diagnosis.

Cancer Survivors & Thrivers

Estimated Number of Cancer Survivors in the US

Cancer Survival Among US Whites and Minorities
American Cancer Society: Cancer Treatment and Survivorship | Facts and Figures 2014-2015
Oncologists' and Primary Care Physicians' Awareness of Late and Long-Term Effects of Chemotherapy:

Implications for Care of the Growing Population of Survivors

“Primary Care Providers awareness of late and long-term effects of chemotherapy was limited. Education for all providers caring for the growing population of cancer survivors is needed.”
Cancer Journey & Cancer Survivorship

- Transforming Outcomes & Prognosis
- Enhancing Oncology Treatments
- Managing Short Term and Long Term Adverse Effects
- Providing A Health Model
I tell my patients that I think of cancer as a weed.

Modern western oncology is focused on destroying the weed while integrative oncology concentrates on the soil the weed grows in and on making the soil as inhospitable as possible to the growth and spread of the weed.

Donald Abrams, M.D.
The tumor microenvironment contributes to every aspect of carcinogenesis.

*Current Cancer Drug Targets, 2014, 14, 30-45*

Role of Inflammation-Associated Microenvironment in Tumorigenesis and Metastasis  Feng Gao, et al
Create A Body Where Cancer Cannot Thrive  
FIGHT THE TUMOR  
NOURISH THE PATIENT
Recurrence
Unresectable
Inoperable
Aggressive
Endometrial Sarcoma
The Hallmarks of Cancer

Cancers 2016, 8(3), 35; **Review**
Mechanisms of Nuclear Export in Cancer and Resistance to Chemotherapy
Mohamed El-Tanani, et al
Managing The Cancer Terrain

- Reduce Oxidative Stress
- Resolve Infections
- Control Inflammation
- Manage Blood Clotting
- Inhibit Angiogenesis
- Inhibit Blood Sugar
- Inhibit Tumor Growth
- Inhibit Metastasis
- Modulate Hormones
- Modulate Immune Function
- Enhance Detoxification
- Promote Apoptosis Natural Cell Death

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Building a Comprehensive Support Plan
OUTLIER
An Individual who stands apart from others
Outside the range of statistical probability

“I’m afraid you’ve had a paradigm shift.”
The Important Role of Front Line Clinicians
Foundations of Integrative Oncology Course
www.functionalforum.aiiore.com
Expand and grow your practice and your income

100% Online Expert Training plus Grand Rounds Live Calls
Learn at Your Own Pace
Support Patients Already In Your Practice

- Improve patient outcomes
- Provide real cancer prevention
- Transform the health span and life span of your patients
- Support patients during and after their oncology treatments
- Skillfully Use Nutraceuticals, Phytochemicals, and Food Therapies
OutSmart Cancer Care Planner
History & Intake Form

GET STARTED NOW

• Gather Essential Information
• Put Together Elements of Your Care Plan

For Instant Access
www.functionalforum.aiiore.com
The shape of things to come
The Economist, Dec. 2003

Dr. Dwight McKee
January 9, 2017
The Hallmarks of Cancer
(Though its not the Whole Story)
Mechanisms for acquiring the Hallmarks of Cancer

- Activate cellular oncogenes
- Inactivate TP53
- Induce aerobic glycolysis
- Produce IGF survival factor
- Inactivate DNA repair genes
- Redirection of inflammation-promoting cells
- Induce VEGF
- Inactivate E-cadherin
- Sustaining proliferative signaling
- Evading growth suppressors
- Deregulating cellular energetics
- Resisting cell death
- Genome instability & mutation
- Inducing angiogenesis
- Activating invasion & metastasis
- Enabling replicative immortality
- Avoiding immune destruction
- Secrete TGFβ
- Switch on telomerase

Hanahan & Weinberg, 2000 & 2011
The Hallmarks of Cancer
(Though it's not the Whole Story)

**Concept of ‘Partial Carcinogens’**

Historically, the axiom ‘the dose makes the poison’ has had some merit, so many people remain skeptical about the idea that adverse outcomes can result from minute exposures to commonly encountered chemicals. But we are now at a point in time where our knowledge of the biology of cancer has advanced considerably, and we know that carcinogenesis can begin when key events have occurred in a single cell, between cells or in the surrounding microenvironment. So the idea that LDE from many environmental chemicals (acting together) might serve to instigate, support or fully enable carcinogenesis, no longer appears to be an unreasonable assertion.
Promote Gene Stability

GOAL - Control chronic excessive oxidative stress
- may promote genetic instability
- fosters more aggressive tumor behavior

TESTING
- assessments of redox balance
  - ratio oxidized/reduced glutathione is a good marker
  - urinary isoprostanes –end products of lipid peroxidation
- functional Liver Detoxification
  - Phase I and II pathway assessment
- methylation status
  - Homocysteine, methyl malonic acid, organic acids
  - urinary hormone metabolites
Promote Gene Stability

DIET
• Fruits, vegetables, spices
• Diet goal target ≥ 5,000-7,500 ORAC units/day

POTENTIAL AGENTS
• Antioxidant nutrients
  o carotenoids, tocopherols/tocotrienols, polyphenols
• Anti-inflammatory agents (curcumin, boswellia, Ω-3s)
• Methylating agents (Choline, TMG, DMG, methyl-cobalamin, etc)
Modifying Gene Expression
Potential Agents

Nuclear Factor-kB (NF-kB) inhibitors

- culinary spices
  - curcumin, basil, cinnamon, cardamom, clove, ginger, garlic, nutmeg, coriander, cumin, mint, parsley, rosemary
- green tea (EGCG)
- luteolin (artichoke leaf extract)
- parthenolide (feverfew)
- quercetin
- resveratrol
Modifying Gene Expression
Potential Agents

VEGF

- boswellia
- curcumin
- fish oil EPA
- selenium
- grape seed extract
- green tea
- resveratrol
- Baikal skullcap (*Scutellaria baicalensis*)
Modifying Gene Expression
Potential Agents

EGFR (her-1, Erb-B-1)

- green tea
- grape seed extract
- licorice
- pycnogenol
- quercetin
- soy (genistein)
- vitamin D
Modifying Gene Expression
Potential Agents

P53

- soy (genistein)
- folic acid
- selenium
- quercetin
- vitamin E (succinate)
- cruciferous-family vegetables
Modifying Gene Expression
Potential Agents

Her-2/neu (c-erb)

- fish oil DHA
- oleic acid (olive oil)
- flaxseed
- soy genistein
- quercetin
- emodin (in aloe vera latex and Polygonum cuspidatum)
Control Inflammation

**TESTING**

- High-sensitivity or cardio-C-Reactive Protein < 1.0, IL-6, IL-10

**GOAL**

- Block inflammatory compounds that can promote tumor growth, proliferation, metastasis and angiogenesis and also suppress the immune response.
  - COX-2
  - LOX-5
  - 5-HETE
  - 12-HETE
  - 15-HETE
Control Inflammation
Potential Agents

- bromelain
- quercetin
- boswellia
- curcumin
- resveratrol
- hops (*Humulus lupulus*)
- green lipped mussel extract
- sea cucumber
- stinging nettle root
- holy basil (*Ocimum sanctum*)
- fish oil omega-3
- ginger
- pancreatic enzymes
- combination anti-inflammatory formulations
Work Against Immune Evasion by Tumors

TESTING

• NK Cell Cytotoxic Function (4-hr Cr-release assay) > 25 LU
• WBC > 4.0; Lymph % > 20%
• T-cell subsets (CD4:CD8 ratio)
<table>
<thead>
<tr>
<th>Potential Agents</th>
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<tbody>
<tr>
<td>Vitamin C</td>
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<tr>
<td>Bromelain</td>
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<tr>
<td>Selenium</td>
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<td>PSK or PSP from <em>Coriolus versicolor</em></td>
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<tr>
<td>Arginine</td>
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<td>Thymic peptides or Rx: Zadaxin</td>
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<td>Maitake-D fraction</td>
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<td>Arabinogalactans</td>
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<td>Agaricus blazei</td>
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<td>Astragalus</td>
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<tr>
<td>Reishi (<em>Ganoderma</em>)</td>
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<tr>
<td>Lactoferrin</td>
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<tr>
<td>Cordyceps sinensis</td>
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<tr>
<td>Transfer Factor, colostrum</td>
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<tr>
<td>Whey protein</td>
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<tr>
<td>Acidophilus / Bifidus probiotics</td>
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<tr>
<td>Mistletoe (<em>Viscum album</em>)</td>
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<td>AHCC</td>
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<tr>
<td>Panax ginseng</td>
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<td>Chlorella</td>
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<td>Aloe vera</td>
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<td>Zinc</td>
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<td>Schisandra</td>
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<tr>
<td>Vitamin A</td>
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Induce Cytostasis (Cell Cycle Arrest)
Shut down both Sustained Growth signaling, as well as Evasion of Anti-growth Signaling

**GOAL**

• upon completion of chemotherapy and/or radiotherapy, induce residual cells to cell cycle arrest
• may not be an appropriate goal *during* cytotoxic treatment if the therapy is cell cycle dependent

**TESTING**

• not directly available.
• prioritize if ki-67/MIB-1 elevated.
• may be monitored with functional MR-SPECT or PET scans.
Induce Cytostasis
Potential Agents

- melatonin
- garlic
- quercetin
- bacopa
- green tea
- perillyl alcohol
- D-limonene
- blood sugar regulation
- redox balance
Induce Re-Differentiation (Maturation to Healthy Cell Types)

TESTING

• 25-OH-vitamin D₃ (>60 but <80 ng/ml)
• serum retinol 1.2-2.4mg/L
• consider surgical path report
  o description of tumor as well vs. poorly differentiated
Induce Re-Differentiation Potential Agents

- Vitamin D3
- Vitamin A (retinoic acid)
- Butyrate (fiber + bifidus probiotic)
- Boswellia (boswellic acids)
- Berberine
- Monoterpenes (Perillyl alcohol, limonene)
- Caffeic esters (propolis)
- Resveratrol
- Flavonoids (quercetin, apigenin, luteolin)
- Phenylbutyrate to phenylacetate to phenylacetyl glutamine (Burzynski’s ‘anti-neoplastons’)
Induce Apoptosis
Programmed Cell Death

**TESTING**

- may by partially inferred by functional status of p53
- BCL-2
- survivin
Induce Apoptosis
Potential Agents

- Green tea EGCG
- Quercetin
- Vitamin A (retinoic acid)
- Selenium
- Boswellia (boswellic acids)
- Vitamin D3
- Curcumin
- Genistein

- Vitamin E succinate
- Schisandra
- Berberine
- Artemether /artemisinin/artesunate
- Vitamin C
- Monoterpenes (Perillyl alcohol, limonene)
- Fish oil EPA
- Resveratrol
Inhibit Invasion and Metastasis

GOAL

• Select inhibitors of matrix metalloproteins (MMPs)
• Maximize NK Cell function
• Reduce inflammation and hypercoagulation.
Inhibit Invasion and Metastasis: Potential Agents

- Arabinogalactans
- Avemar
- Coriolus versicolor (PSK/PSP)
- Green Tea EGCG
- Flaxseed meal
- Panax ginseng
- Bromelain
- Nattokinase
- Lumbrokinase
- Butyrate-fiber and bifidus probiotic

- Garlic
- Vitamin C Soy esp. genistein
- Bioflavonoids
- Vitamin A
- Anthocyanins
- Alkylglycerols (in brain tumors)
- Proanthocyanidins (GSE, PCO)
- Fish oil EPA
- Melatonin (high dose)
Support Anti-Angiogenesis

TESTING

- serum copper ≤ 90 (rr 70-145mg/dl)
- ceruloplasmin ≤ 22 (rr 18-36μg/L)
- free copper \{serum Cu minus 3x ceruloplasmin\} ≤ 15).

Consider surgical report statement of

- vascularity or microvessel density (if any) and
- immunohistochemistry
  - VEGF
  - EGFR

Also relevant: elevated inflammation and insulin are angiogenesis promoters

- fasting glucose / HbA1c
- hs-CRP
Support Anti-Angiogenesis

**DIET:**

- **avoid** high copper foods (and supplements)
  - organ meats
  - Shellfish
  - prepared chocolates
  - filter water if copper plumbing and water is acidic pH
Support Anti-Angiogenesis Potential Agents

POTENTIAL COPPER LOWERING AGENTS

- **Rx: Tetrathiomolybdate (TM)**
  - 20 mg TID with meals + 60 mg at hs
  - GOAL: 8-12 mg/dl Cu++
- **Molybdenum**
- **Zinc**
- **Chlorella**
- **Sulfur compounds (NAC, taurine)**
- **Lipoic acid**
- **Vitamin C**
Support Anti-Angiogenesis: Potential Agents

OTHER POTENTIAL ANTI-ANGIOGENIC AGENTS

- Apigenin (mint and propolis)
- Selenium
- Soy isoflavones, esp. genistein
- Vitamin D3
- Green Tea EGCG
- Curcumin
- Garlic

- Resveratrol
- Vitamin A
- Cordyceps sinensis
- Shark liver oil (squalene)
- Berry flavonoids
- Fresh/frozen bovine cartilage
- Glycine
- Bindweed (*Convolvulus arvensis*)
Basic Functional Medicine as Primary and Secondary Cancer Prevention

• Find and fix leaky gut—all patients treated with chemo and/or radiotherapy have this, elevated zonulin a good marker in most cases. SIBO also common. Get patients off PPIs, optimize digestion and elimination

• Optimize redox status

• Assess environmental exposures, assist detoxification

• Optimize the Functional Medicine Matrix

• Optimize diet and lifestyle, emotional health, social connectedness (suggest patients read After Cancer Care, by Lemole, Mehta, and McKee, where all of these are covered)