Cancer Prevention: The role of diet and exercise

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OPSO CME Conference 8/15/2014
The formula
with thanks M Frenkel MD

0  Cigarettes
5 serv/ d  Veggies
10 min/ day  Laughter
20 min/ day  Silence, relaxation or meditation
30 kg/m2  Body mass index
30 minutes  Exercise per day
I'll have the half-pound double-deluxe bacon steerburger, please...

You want chemotherapy with that?
Cancer causing agents

- Tobacco
- ETOH
- DIET & Lifestyle
- Unknown
- Food Additives
- Occupational
- Sexual
- Pollution
- Medications
- Geophysical
- Infections
Approximately **70% of deaths** in the Western world are due to chronic diseases that are largely self-inflicted.

An estimated **90% of type 2 diabetes**, **80% of heart disease** and **60% cancers** are entirely preventable.

**Diseases of Lifestyle / Diseases of Affluence**
Regions people commonly live active lives to 90 years or beyond are called “blue zones”

5 Blue zones identified:

Ikaria, Greece
Loma Linda, California
Nicoya Penninsula, Costa Rica
Okinawa, Japan
Sardinia, Italy
Risks of chronic illness

**Highest**
- Inactive populations
- Animal-centered, processed food diets
- Highest rates
  - Northern Europe, North America, numerous developing countries

**Lowest**
- Live simply, active
- Unprocessed, high fiber plant based diets
- Lowest rates
  - Rural China, South America, Japan
Cause of Death

- Poor diet and physical inactivity is second leading cause of death in USA
- It will likely overtake tobacco as leading cause of death
- Every day, 1,560 people in the US die from cancer
- Poor diet:
  - 64% adults are overweight or obese
  - 1 in 50 is severely obese (BMI > 40 kg/m²)

Cause of Death

- Overweight / obesity and cancer deaths:
  - Responsible for 14% of all cancer deaths in men
  - Responsible for 20% of all cancer deaths in women
- True for esophageal, colon, rectum, liver, gallbladder, pancreas, kidney, stomach, prostate, breast, cervix, uterus, and ovarian cancers
- 90,000 deaths per year in the US could be avoided by maintaining BMI <25

Cancer is no more a disease of cells than a traffic jam is a disease of cars. A lifetime of studying the internal combustion engine would not help anyone understand our traffic problems.

DW Smithers

Lancet, 1962
Returning a patient to health and eliminating illness is focused upon treatment of both the host and the disease. Four levels addressed:

1. Impaired structure
2. Impaired function
3. Impaired regulation
4. Impaired information
Diet and Cancer Questions
• Is cancer a genetic or metabolic disease? Or both?
• Overall diet vs. individual nutrients and constituents
• Interaction with Environment
• Overall energy balance
  – Obesity/ body mass index (BMI)
  – Physical activity
  – Genetic differences (nutrigenomics)
“Diet probably plays a major role in controlling
Between 1/3 and 2/3 of human cancers“
Cancer prevention: It’s not the broccoli?

- **Dietary constituents**
  - Dietary fat
  - Whole food, fruit and vegetable intake

- **Systemic factors**
  - Hypoxia
  - Energy balance
    - Obesity and metabolic syndrome
    - Caloric restriction
    - Inflammation
AICR Report 1997

World Cancer Research Fund – American Institute for Cancer Research (WCRF-AICR) meta-analysis report:

- **Convincing evidence:** Oral, esophagus, lung, stomach, colon, rectum cancers

  **Probable evidence:** Larynx bladder, pancreatic, breast cancers

  **Possible evidence:** Liver, ovarian, cervix, endometrial, renal, thyroid, cancers

Diet, physical activity, and smoking are the 3 most important modifiable determinants of cancer risk
Fruits and vegetables show decreased risk for most cancers

Red meat and processed meat show increased risk
Lack of exercise, obesity, and sugars show increased risk for most cancers

Exercise and antioxidant supplements show decreased risk
Dietary Fat vs. Breast Cancer
Dietary fat % is not associated with Breast Cancer Risk
DIETARY FATS AND CELL MEMBRANE DYNAMICS
THE GATE KEEPER

Dietary Fats regulate cell membrane fats.

- Oxygen
- Cytokines
- Toxin/waste removal
- Insulin
- Hormones

Phospholipid bilayer determines membrane fluidity and receptor functioning.
OXYGEN MAGNETS!

PEOs work like tiny “magnets” drawing oxygen into all cells, tissues, and vital organs.
Reduce oxygen by only 1/3 and a cell turns cancerous forever!

The foundation of healthy cellular structure and disease prevention begins with PEOs; in particular, LA.
Fruit, vegetables, and cancer prevention: a review of the epidemiological evidence
Block G, Patterson, S et al.
Dept. of Social and Administrative Health Sciences, School of Public Health, University of California, Berkeley 94720.

Abstract
Approximately 200 studies that examined the relationship between fruit and vegetable intake and cancers of the lung, colon, breast, cervix, esophagus, oral cavity, stomach, bladder, pancreas, and ovary are reviewed. A statistically significant protective effect of fruit and vegetable consumption was found in 128 of 156 dietary studies in which results were expressed in terms of relative risk. For most cancer sites, persons with low fruit and vegetable intake (at least the lower one-fourth of the population) experience about twice the risk of cancer compared with those with high intake, even after controlling for potentially confounding factors. For lung cancer, significant protection was found in 24 of 26 studies after control for smoking in most instances. Fruits, in particular, were significantly protective in cancers of the esophagus, oral cavity, and larynx, for which 28 of 29 studies were significant. Strong evidence of a protective effect of fruit and vegetable consumption was seen in cancers of the pancreas and stomach (26 of 30 studies), as well as in colorectal and bladder cancers (23 of 38 studies). For cancers of the cervix, ovary, and endometrium, a significant protective effect was shown in 11 of 13 studies, and for breast cancer a protective effect was found to be strong and consistent in a meta-analysis.

“It would appear that major public health benefits could be accomplished by substantially increasing consumption of these foods”
Cancer Prevention
Fruit and Vegetable intake

In over 80% (128 of 156) dietary studies fruit and vegetable consumption provided significant protection against cancer

Breast cancer prevention as a result of fruit and vegetable intake

Meta-analysis of breast cancer risk and diet using 26 published studies from 1982 to 1997

- Analysis confirms association between intake of vegetables and fruits and reduced risk for breast cancer
  - Risk reduced in high intake groups
  - Especially vegetables reduce risk for breast cancer

Meta-analysis of esophageal, lung, stomach, bladder, and colorectal cancer risk and diet using published studies from 1973 to 2001

- Significant reduction of cancer risk
  Fruit and vegetables: Lung, esophagus, stomach, colorectal cancers
  Fruits > vegetables: Bladder cancer
  Vegetables > fruits: breast cancer
  Most significant risk reduction overall:
  Lung and bladder cancers and mostly via fruits

Dietary Fruits and Vegetables are not associated with Breast Cancer Risk

<table>
<thead>
<tr>
<th>Study‡</th>
<th>Total Fruits</th>
<th>Total Vegetables</th>
<th>Total Fruits and Vegetables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adventist Health Study</td>
<td>0.97 (0.87-1.08)</td>
<td>1.10 (0.88-1.38)</td>
<td>0.99 (0.91-1.09)</td>
</tr>
<tr>
<td>Canadian National Breast Screening Study</td>
<td>0.98 (0.92-1.05)</td>
<td>0.98 (0.89-1.07)</td>
<td>0.98 (0.94-1.03)</td>
</tr>
<tr>
<td>Iowa Women’s Health Study</td>
<td>1.01 (0.98-1.04)</td>
<td>0.98 (0.93-1.03)</td>
<td>1.00 (0.98-1.02)</td>
</tr>
<tr>
<td>Netherlands Cohort Study</td>
<td>0.97 (0.91-1.04)</td>
<td>0.90 (0.81-1.00)</td>
<td>0.96 (0.91-1.01)</td>
</tr>
<tr>
<td>New York State Cohort</td>
<td>1.01 (0.94-1.08)</td>
<td>1.04 (0.93-1.15)</td>
<td>1.01 (0.96-1.06)</td>
</tr>
<tr>
<td>New York University Women’s Health Study</td>
<td>1.00 (0.95-1.05)</td>
<td>0.97 (0.90-1.04)</td>
<td>0.99 (0.95-1.03)</td>
</tr>
<tr>
<td>Nurses’ Health Study (a)</td>
<td>0.98 (0.95-1.02)</td>
<td>1.01 (0.95-1.07)</td>
<td>0.99 (0.96-1.02)</td>
</tr>
<tr>
<td>Nurses’ Health Study (b)</td>
<td>0.98 (0.95-1.01)</td>
<td>1.01 (0.98-1.05)</td>
<td>0.99 (0.97-1.01)</td>
</tr>
<tr>
<td>Sweden Mammography Cohort</td>
<td>0.99 (0.94-1.03)</td>
<td>1.01 (0.93-1.11)</td>
<td>0.99 (0.96-1.03)</td>
</tr>
<tr>
<td>Pooled</td>
<td>0.99 (0.98-1.00)</td>
<td>1.00 (0.97-1.02)</td>
<td>0.99 (0.98-1.00)</td>
</tr>
</tbody>
</table>
Increased Fruits and Vegetables linked to lower CV Disease risk,
not Cancer Risk
BIOLOGICAL RESPONSE MODIFIERS

Antioxidant

- protect our cells against oxidative damage

Reduce the risk of cancer

- allyl sulfides (onions, leeks, garlic)
- carotenoids (fruits, carrots)
- flavonoids (fruits, vegetables)
- polyphenols (tea, grapes).
BIOLOGICAL RESPONSE MODIFIERS

Stimulation of enzymes

Indoles (cabbage family)
make estrogen less effective

protease inhibitors (soy and beans)

terpenes (citrus fruits and cherries).
Interference with DNA replication

Saponins found in beans interfere with the replication of cell DNA, thereby preventing the multiplication of cancer cells.

Capsaicin, found in hot peppers, protects DNA from carcinogens.
Cancer-Fighting Nutrients

Whole food

In general, whole foods (organic when possible) are better than individual nutrients

- Study comparing different whole foods
  
  Salad diet = raw veggies, olive oil
  Prudent diet = cooked veggies, fish
  Western diet = red meat, eggs, butter

Breast cancer risk 35% lower in salad group (and 61% lower if women had BMI<25!)

Colon cancer 46% increased in Western and 35% decreased in prudent diets (salad diet was not available in this study)

Energy Balance and Cancer

Energy in
- Amount
- Type
- Pattern

Energy Balance:
kcal in = kcal out

Energy out
- Physical Activity
- Routine Metabolism
- Thermoregulation
- Growth
- Storage
Obesity in the United States

1985
- 6 States with greater than 10% obesity

1994
- First year with data from all 50 states
- 50 states with greater than 10% obesity
- No state with greater than 20% obesity

2005
- Only Colorado with less than 20% obesity

2009
- Last year for Colorado under 20%
Obesity And Cancer

- High BMI is associated with increased breast cancer risk in postmenopausal women (30-50%)!
  - Risk increases by 18% for every 5 point increase in BMI
- Increased BMI is independent predictor of treatment failure in prostate cancer
  - Predicts clinical failure
    - High BMI men are at 2-fold risk for metastasis
- An 11 pound weight gain after cancer diagnosis translates to a 14% increase in mortality risk

Strom et al: Cancer 2006; 107 (11): 2662-68
Obesity and Adiposity

• Adipose tissue as an endocrine organ
• Adipokines (Leptin, Adiponectin, Resistin)
• Adipose tissue and systemic inflammation
• Cytokines (IL-1, IL-2, IL-6, VGEF)
• Adipose tissue and the metabolic syndrome
• Insulin, IGF-1
• Metabolic Syndrome & Diabetes Mellitus
Metabolic Syndrome (Syndrome X)

- Linked to progressive abdominal/visceral obesity
- Peripheral insulin resistance & high insulin
- Hyperlipidemia - high VLDL, triglycerides
- Rising incidence 40%+ in adults over 40 yrs
- Excess energy intake, reduced activity
- Risk - Diabetes Mellitus II, CAD, Hypertension
- Rising incidence late 20th century parallels rising
- Incidence of epithelial cancers
Summary of Mortality from Cancer According to Body-Mass Index*
U.S. Men in the Cancer Prevention Study II, 1982 through 1998

MEN

*Highest body BMI category
Summary of Mortality from Cancer According to Body-Mass Index*
U.S. Women in the Cancer Prevention Study II, 1982 through 1998

*Highest body BMI category
Metabolic Syndrome and Overall Cancer Risk

![Graph showing the relationship between Metabolic Syndrome (MS) and overall cancer risk. The graph includes data from different studies, with risk estimates and number of cases indicated for different levels of MS factors.]
Total Cancer Mortality according to the Metabolic Syndrome

Total cancer mortality according to the number of components of the metabolic syndrome

Diabetes Mellitus, Fasting Glucose, and Risk of Cause-Specific Death
The Emerging Risk Factors Collaboration

Increased Cancer Mortality
FBS >100 mg/dl

### A Cancer Death

<table>
<thead>
<tr>
<th>Subgroup</th>
<th>No. of Deaths</th>
<th>Hazard Ratio with Diabetes (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liver</td>
<td>533</td>
<td>2.16 (1.62–2.88)</td>
</tr>
<tr>
<td>Pancreas</td>
<td>2189</td>
<td>1.51 (1.24–1.83)</td>
</tr>
<tr>
<td>Ovary</td>
<td>1149</td>
<td>1.45 (1.03–2.02)</td>
</tr>
<tr>
<td>Colorectum</td>
<td>3876</td>
<td>1.40 (1.20–1.63)</td>
</tr>
<tr>
<td>Bladder</td>
<td>834</td>
<td>1.40 (1.01–1.96)</td>
</tr>
<tr>
<td>Oral</td>
<td>475</td>
<td>1.38 (0.90–2.12)</td>
</tr>
<tr>
<td>Melanoma</td>
<td>547</td>
<td>1.36 (0.83–2.23)</td>
</tr>
<tr>
<td>Kidney</td>
<td>815</td>
<td>1.28 (0.89–1.85)</td>
</tr>
<tr>
<td>Lung</td>
<td>7823</td>
<td>1.27 (1.13–1.43)</td>
</tr>
<tr>
<td>Breast</td>
<td>3338</td>
<td>1.25 (1.02–1.52)</td>
</tr>
<tr>
<td>Esophagus</td>
<td>795</td>
<td>1.21 (0.86–1.69)</td>
</tr>
<tr>
<td>Stomach</td>
<td>1531</td>
<td>1.16 (0.92–1.46)</td>
</tr>
<tr>
<td>Connective tissue</td>
<td>310</td>
<td>1.11 (0.58–2.11)</td>
</tr>
<tr>
<td>Hematologic</td>
<td>3425</td>
<td>0.93 (0.77–1.13)</td>
</tr>
<tr>
<td>Prostate</td>
<td>2217</td>
<td>0.89 (0.71–1.10)</td>
</tr>
<tr>
<td>Endocrine and nervous</td>
<td>1209</td>
<td>0.88 (0.60–1.27)</td>
</tr>
<tr>
<td>Site unspecified or other</td>
<td>8680</td>
<td>1.17 (1.07–1.27)</td>
</tr>
</tbody>
</table>
Diabetes Mellitus, Fasting Glucose, and Risk of Cause-Specific Death
The Emerging Risk Factors Collaboration

Increased Cancer Mortality
FBS >100 mg/dl

PET SCAN
Calorie Restriction (CR) Reduces Bladder Cancer Cell Growth

IGF reverses the benefit of calorie restriction
The Genesis and Growth of Tumors
II. The Effect of Caloric Restriction, per se
Albert Tannenbaum
Cancer Res 2:460-467, 1942

Inhibition of induced epithelial tumors by a calorically-restricted diet.

Cumulative number of spontaneous breast tumors in ad lib vs. calorie restricted female mice
DOES FRUIT (SUGAR?) CAUSE CANCER?

Prospective study of 47,781 men 1986-1994; 1369 cases prostate cancer. "Fruit intake inversely associated with risk of advanced prostate cancer." 47% lower risk in higher fruit intake (>5 servings/day) vs. lower intake <1 serving.

Whole fruit is rich in phytochemicals, antioxidants (ORAC), apoptosis agents, enzymes, low glycemic index.

Effect of Positive Energy Balance

Insulin/IGF

I-R/IGF-R

Promotion of proliferation
Inhibition of apoptosis

VEGF

Neovascularization

Mutagenic insults

Normal epithelium
Initiated epithelial cell
intraepithelial neoplasia
Small cancer focus
Large cancer
Metastatic cancer

BENEFIT FROM ENERGY RESTRICTION
Obesity and Inflammatory Markers

**IL-6 vs BMI**

Plasma IL-6 (pg/ml) vs Body Mass Index

$r_{xy} = 0.636$
Weight Loss Reduces Systemic Inflammation

CRP (μg/mL)

Before

Weight loss

After

*
Adult Energy Imbalance

**STRESS**

- Excessive Caloric intake
- Inactivity

**Visceral Obesity**

- Tumor Cell Proliferation
- Tumor Growth
- Tumor Sensitivity to Treatment

**Insulin resistance**

**Increased IGF-1/Insulin signaling**
INFLAMMATION – The triggering mechanism
The role of inflammation

- Inflammation is the pathophysiologic mechanism underlying most chronic diseases.
- Chronic or systemic, sustained inflammation is the problem.
- Meta-inflammation
  - Chronic, low grade metabolically induced inflammation.
The Inflammatory Switch

NF-κB activation is a major mediator of inflammation in most chronic diseases (including cancer) & inhibition of NF-κB can prevent/delay the onset of the chronic diseases
Activation of NF-κB has been linked with most cancers

Tobacco-linked cancers

Carcinogens

NF-κB

Viral cancers

UV light

Cervical cancer

Mantle cell lymphoma

Multiple myeloma

Mucosal-associated lymphoid tissue

B cell lymphoma

T cell lymphoma

Non-Hodgkin’s lymphoma

Hodgkin’s disease

Acute Myelogenous leukemia

Acute lymphoblastic leukemia

Adult T cell leukemia

Renal carcinoma

Bladder cancer

Lung cancer

Pancreatic cancer

Head and neck SCC

Colon cancer

Pharyngeal cancer

Laryngeal cancer

Esophageal cancer

Thyroid cancer

Liver cancer

Breast cancer

Ovarian cancer

Prostate cancer

Melanoma

Shishodia and Aggarwal, Biochemical Pharmacology, 2004
Role of inflammation in tumorigenesis

NF-κB

- DNA damage Oncogenes
- Bcl-xI, Bcl-2, Survivin, C-FLIP, clAP-1, clAP-2, XIAP
- Cyclin D1, C-myc, TNF, IL-1, IL-6, COX2
- MMP-9, uPA, ICAM-1, ELAM-1, VCAM-1
- VEGF
- CXCR4, TWIST

Transformed

Normal cell
Transformation
Survival
Proliferation
Invasion
Angiogenesis
Metastasis

10-20 Years
10 Years

Inflammation

Aggarwal et al, CCR, 2010
Herbs and Spices in Cancer Prevention and Treatment.

Milner. Nutritional Science Research Group, National Cancer Institute, Rockville, MD 20892, USA.


The role of herbs and spices in cancer prevention.


Molecular Targets of Nutraceuticals Derived from Dietary Spices Potential Role in Suppression of Inflammation and Tumorigenesis

Genetics are responsible for no more than 5-10% of chronic diseases. Comprehensive lifestyle changes can alter our genes:

- Turn on disease prevention genes and turn off disease promoting genes
- Increase telomerase by 30% which influences longevity
CAN LIFESTYLE IMPROVE THE REPAIR OF DEFECTIVE DNA (CANCER)?

Study design: 30 men with indolent prostate cancer (PSA 4.8) were assessed for gene expression profiles from prostate cancer needle biopsy at DX and 3 months after beginning intervention lifestyle program.

**Intervention:**
- **Diet** (plant based, whole food, low fat 11% kcal)
- **Exercise** (3.6 hr/wk)
- **Stress management** (4.5 hr/wk)

Results: Micro arrays detected 48 up regulated and 453 down regulated transcripts after intervention. Side benefits included: increase mental health, decrease BMI, BP, LDL, chol, trig, CRP, waist line (8 cm)

**CONCLUSIONS:** This pilot study is the first to show genetic changes in cancer patients based solely on lifestyle intervention.

Ornish, et al., PNAS, 105, 24, June 17, 2008
CAN DIET ALTER GENETIC EXPRESSION?
EPIGENETICS

1 yr old female Agouti mice, fed normal diet (left) and genistein (right)

Source: Randy Jirtle, Ph.D., Duke University Medical Center. Used with permission.

These inbred mice are genetically identical. They are each about a year old and both are female. Their different characteristics result from differences in the epigenome. The mother of the mouse on the left received a normal mouse diet. The mother of the mouse on the right received a diet supplemented with genistein, the phytoestrogen found in soy products. Genistein increases the incidence of brown offspring by altering the epigenome rather than mutating the genome — an example of nature via nurture.
Rice microsomal RNA is found in both sera and tissues of humans. This has been found to inhibit LDLRAP in the liver.

These findings demonstrate that exogenous plant miRNA in food can regulate the expression of target genes in mammals.
1. Cancer arises from damage to cellular respiration.
2. Glucose fermentation gradually compensates for insufficient respiration.
3. Respiratory damage eventually becomes irreversible.
4. Cancer cells continue to ferment in the presence of oxygen (aerobic glycolysis).
Cellular Energy Metabolism

Glycolysis: Glucose → 2 Pyruvate

Electron shuttle across membrane

2 NADH

Krebs Cycle

2 NADH → 6 NADH → 2 FADH₂

Electron transport chain and oxidative phosphorylation

+2 ATP

+2 ATP

+36 ATP

5.5% by substrate level phosphorylation

5.5% by substrate level phosphorylation

89% by OxPhos

Cytosol

Mitochondrion
Mitochondria: The Ultimate Tumor Suppressor

Seyfried, Cancer as a Metabolic Disease, John Wiley & Sons, 2012
Hypoxia is a critical hallmark of solid tumors

- Hypoxia is a causative factor in pathophysiologic events
- Cancer cells adopt to hypoxic microenvironments
  - Increase genetic instability
  - Preserves the undifferentiated state
  - Causes resistance to chemotherapy agents
  - Growth
  - Angiogenesis
  - High sugar addiction

‘an impaired or altered function of related components of the somatic framework and related vascular, lymphatic and neural elements’
The rule of the artery must be absolute, universal, and unobstructed, or disease will be the result. So if the supply channels of the body be obstructed, and the life-giving currents do not reach their destination full freighted, then disease sets in. ... Under like circumstances an Osteopath would remove the obstruction by application of the unerring laws of his science, and ability for doing the necessary work would follow.

From

"THE RULE OF THE ARTERY IS SUPREME"
When blood and lymphatics flow freely, the tissues can perform their physiologic functions without impedance. With the occurrence of trauma (physical or emotional), the tissues contract, twist, and compress. The fluid flow becomes obstructed. Micro-climates of underperfusion result, and are considered to be a significant contributor to the onset of disease. Osteopathic manipulation restores freedom in the tissues, normalizes fluid flow and thus inherent physiologic function (healing) follows.
The Rule of the Artery Is Supreme (AT Still)

This expression means that, for good health, good circulation of all body fluids is essential. Poor circulation is likely to mean that the cells will be starved of what they need to survive, and will eventually die.

Dr. Warburg (1931) cancer is caused by a lack of oxygen respiration in cells.

He stated in an article titled The Prime Cause and Prevention of Cancer that "the cause of cancer is no longer a mystery, we know it occurs whenever any cell is denied 60% of its oxygen requirements."

"Cancer, above all other diseases, has countless secondary causes. But, even for cancer, there is only one prime cause. Summarized in a few words, the prime cause of cancer is the replacement of the respiration of oxygen in normal body cells by a fermentation of sugar. All normal body cells meet their energy needs by respiration of oxygen, whereas cancer cells meet their energy needs in great part by fermentation."
Exercise

• Traditionally patients, specifically those in the United States, have equated exercise with running, jogging and weight lifting along with a wide variety of sports.

• Physical activity/exercise is any bodily movement produced by skeletal muscles;
  – such movement results an expenditure of energy. Physical activity is a critical component of energy balance, a term used to describe how weight, diet, and physical activity influence health, including cancer risk.
Exercise and Cancer Prevention

- Studies to date suggest that exercise can exert its cancer-preventive effects at many stages during the process of carcinogenesis including both tumor initiation and progression.
- Exercise may be altering tumor initiation events by modifying carcinogen activation, specifically by enhancing the cytochrome P450 system and by enhancing selective enzymes in the carcinogen detoxification pathway, including, but not limited to, glutathione-S-transferases.
- Exercise may reduce oxidative damage by increasing a variety of anti-oxidant enzymes, enhancing DNA repair systems and improving intracellular protein repair systems.
- Scavenging reactive oxygen species (ROS); altering cell proliferation, apoptosis and differentiation; decreasing inflammation; enhancing immune function.
Exercise Benefits

• Many studies in the United States and around the world have consistently found that adults who increase their physical activity, either in intensity, duration, or frequency can reduce their risk of developing colon cancer by 30 to 40 percent relative to those who are sedentary regardless of body mass index (BMI), with the greatest risk reductions seen among those who are most active.
ETIOLOGY FOR MOST DISEASES

Foundational cause → Secondary effect → Diagnosed diseases

NUTRITION
INFECTIONS
EXERCISE
ATTITUDE
TOXINS
ENERGY
GENETIC

INFECTIONS
INFLAMMATION
HYPERCOAGUL
DYSBIOSIS
HYPOTHYROID
MALDIGESTION
IMMUNE DYSFUN
HYPERGLYCEMIA
ALLERGIES
HORMONE IMBAL
OXIDATIVE STRES
ACIDOSIS

HEART DISEASE
CANCER
DIABETES
STROKE
AUTO-IMMUNE
CHRONIC FATIG
MENTAL ILLNESS
ALZHEIMER'S
PARKINSON'S
The Life-Course Origins and Prevention of Cancer

Breast Cancer prevention

• A review of 81 studies on breast cancer estimated that nearly 40% or more of breast cancer could be prevented with basic modification of lifestyle only.

• Recommendations included a healthy weight, less alcohol, more exercise, and breastfeeding.

Can a healthy lifestyle lower overall mortality?


Conclusions: "adherence to a Mediterranean diet and healthful lifestyle is associated with a more than 50% lower rate of all-causes mortality." (95% CI) Knoops, KT, JAMA, 2004;292:1433-9
Lifestyle Interventions in patients treated for breast cancer

68% reduction

Diet, exercise, stress management

Andersen et al: Cancer 2008; 113: 3450-58
Lifestyle Intervention Behavior
Cancer Survivors’ Adherence to Lifestyle Behavior Recommendations: ACS SCS-I

9,105 survivors, 9 different cancers

INTERVENTIONS
Physical Activity, Diet Recommendations, Smoking

RESULTS
Diet ( “five a day”) - 14 – 19 %
PA ( 60 min /week) - 29 – 47%
Smoking Cessation - 82 – 91%
85 -98 % meeting recommendations
Treatment approaches

- Obesity
- Dietary recommendations
- Exercise
Returning a patient to health and eliminating illness is focused upon treatment of both the host and the disease. Four levels addressed:

1. Impaired structure
2. Impaired function
3. Impaired regulation
4. Impaired information
Approach to the cancer patient

- Patient status and health potential
  - High sugar, inflammatory conditions, poor oxygenation
  - Structure-function, genetics, environmental conditions
  - Cancer/Tumor and its effects

Immediate/life threatening
- Tumor reduction
- Host/risk factor reduction and vitality restoration
Metabolic Syndrome and Risk Reduction

**CV / Metabolic Risk Assessment**
- Fasting Lipid Profile
- Smoking history
- Family HX- Ca & DM/CVD
- Blood Pressure
- BMI
- FBS, HgBA1C
- Physical Activity Hx

**At Risk Profile**
- BMI > 30
- BMI < 30 + MS
- FBS > 100, HgBA1C > 5.8%, TG > 150, HDL < 45-55
- BP elevated/ on meds
- Low PA history

**Lifestyle Prescription**
- Diet, Activity, Stress Reduction
- Pharmacologic ie Metformin
- Surgical
Standard American Diet

- 45% Carbohydrate
- 38% Fat
- 17% Protein
What Diet Is Best?

- Flat Belly diet
- Macrobiotic
- TLC diet
- Acid Alkaline diet
- Zone
- Vegan
- Biggest Loser diet
- Mayo Clinic diet
- Anti-Inflammatory diet
- Nutrisystem
- Mediterranean diet
- Weight Watchers
- Ornish
- Engine 2 Diet
- Jenny Craig
- Raw Food diet
- Atkins
- Raw Food diet
- LEARN
- Paleo
- Volumetrics
- DASH
- Slimfast
- Spark Solution diet
- Vegetarian
- Paleo
- Flexitarian
- Dukan
- South Beach diet
Baseline values were carried forward for any missing values. The overall diet group × time interaction was significant (P<.001). The analysis of variance test for differences among diet groups in weight change from baseline was significant at 2 and 6 months (P<.001), and at 12 months (P = .01). Analyses of all pairwise differences by the Tukey standardized range test (<.05) indicate that the Atkins diet group was significantly different than all other diet groups at 2 and 6 months and that the Atkins diet group was significantly different than the Zone diet group at 12 months. There were no significant differences among the Zone, LEARN, or Ornish diet groups at any time point. Error bars indicate standard error of the mean.

Figure Legend:
• Meta analysis of 87 studies

Vegan or vegetarian diet is highly effective for weight loss. Vegetarian populations have lower rates of heart disease, high blood pressure, diabetes, and obesity. Weight loss in vegetarians is not dependent on exercise and occurs at a rate of approximately 1 pound per week.

Plant based diets
Obesity
Berkow and Barnard *Nutrition Reviews* 2006,
The European Prospective Investigation into Cancer and Nutrition (1996) studied BMI in 4 diet groups: meat eaters, fish eaters, vegetarians, and vegans. The average BMI was highest among the meat eaters, lowest among the vegans, and intermediate among the fish eaters and vegetarians.

A study by the Agricultural Research Service ARS (2006) found that: Prevalence of obesity is 40% among omnivores, 29% among semi-vegetarians, and 25% among lacto-vegetarians. This is a result of a higher consumption of fiber-rich plant food and lower intakes of fat and protein.

100 scientists from 30 different countries
Independent panel 21 world renowned scientists

Eat at least 5 servings of a variety of non-starchy vegetables, and fruits each day
Eat unprocessed cereals/ grains and/ or pulses (legumes)
Limit refined starchy foods
People who eat red meat should consume less then 500 g (18 oz) / week
Cancer prudent diet

• Balance your diet
  – Reduce intake sugar, white flour, products with processed omega-6s,
  – Increase omega 3s, increase intake anti-cancer product
Healthy Eating: Cancer prudent diet

- Cruciform vegetables
- Garlic, onions, leeks, shallots, Chives
- Carotenoid vegetables
- Tomatoes
- Mushrooms
- Berries
A healthy, plant-based diet aims to maximize consumption of nutrient-dense plant foods while minimizing processed foods, oils, and animal foods (including dairy products and eggs). It encourages lots of vegetables (cooked or raw), fruits, beans, peas, lentils, soybeans, seeds, and nuts (in smaller amounts) and is generally low fat.
Healthy Eating Pyramid/Healthy Eating Plate

- Developed by Harvard School of Public Health, updated in 2008
- Developed the Healthy Eating Plate to replace My Plate (2011)
- Based on best available scientific evidence about links between diet and health
- The pyramid has a foundation of daily exercise and weight control.
- Simple rule of energy balance:
  - Weight change = calories in – calories out
HEALTHY EATING PLATE

Use healthy oils (like olive and canola oil) for cooking, on salad, and at the table. Limit butter. Avoid trans fat.

The more veggies — and the greater the variety — the better. Potatoes and French fries don’t count.

Eat plenty of fruits of all colors.

Drink water, tea, or coffee (with little or no sugar).
Limit milk/dairy (1-2 servings/day) and juice (1 small glass/day). Avoid sugary drinks.

Eat a variety of whole grains (like whole-wheat bread, whole-grain pasta, and brown rice). Limit refined grains (like white rice and white bread).

Choose fish, poultry, beans, and nuts; limit red meat and cheese; avoid bacon, cold cuts, and other processed meats.

STAY ACTIVE!

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Harvard School of Public Health
The Nutrition Source
www.hsph.harvard.edu/nutritionsource

Harvard Medical School
Harvard Health Publications
www.health.harvard.edu
“Consumers should look at their diets as if food is the medicine necessary to maintain healthy, disease-free lives. Prevention is always better than a cure.”

- William W. Li, M.D
Nutritional Medicine or Culinary Medicine

The practice of nutritional medicine includes several main components. For most patients, nutritional therapy starts with cleaning up the diet by emphasizing a wide variety of whole, unprocessed foods and minimizing intake of refined sugars, other refined carbohydrates, trans fatty acids, food additives, and other undesirable constituents of a typical Western diet.

Emphasizing cooking methods that minimize the formation of potentially toxic compounds.

Nutritional therapy also includes the use of a wide array of vitamins, minerals, amino acids, herbs, and other naturally occurring compounds, individualized according to the patient’s needs.
Cooking methods

Fried foods are high in calories; fried foods can have harmful effects irrespective of their caloric content. Fats and oils are converted in part to various toxic byproducts when subjected to the high temperatures involved in frying.

In experimental animals, feeding thermally oxidized fats produced cellular damage in the heart, liver, and kidneys. In an observational study, consumption of fried fish was associated with systolic dysfunction and other adverse changes in the cardiovascular system, whereas consumption of broiled or baked fish was associated with beneficial changes in the cardiovascular system.

Mozaffarian D, Gottdiener JS, Siscovick DS. Intake of tuna or other broiled or baked fish versus fried fish and cardiac structure, function, and hemodynamics. Am J Cardiol 2006;97:216-222.
Studies show that physical exercise helps fight cancer, but the required dose isn’t the same for all cancer.
In the human body, with its diversified functions, we may add also,

- The blood preserves and defends the cells of the body.
- The nervous system unifies the body in its activities.
- Disease symptoms are due either to failure of the organism to meet adverse circumstances efficiently, or to structural abnormalities.
- Rational methods of treatment are based upon an attempt to provide normal nutrition, innervation and drainage to all tissues of the body, and these depend chiefly upon the maintenance of normal structural relations.

“Eat your rice! Think of the millions of Americans eating nothing but junk food!”

PARADE • JUNE 14, 1981
KEEP CALM AND CALL AN OSTEOPATH

QUESTIONS