MICRONUTRIENTS IN CANCER

Dr. Bilwa Bhanap, MD
Dr. Rath Research Institute
12 million people worldwide are diagnosed with cancer every year. This is expected to rise to 27 million by 2030.
Risk factors for cellular damage triggering cancer

Some of the risk factors for cell damage leading to cancer are:

- Poor diet and malnutrition
- Deficiency of essential nutrients
- Smoking
- Excessive alcohol consumption
- Abundant exposure to carcinogen through air, water, food
Cell damage caused by various carcinogens and is not repaired by body’s natural defenses, e.g., vitamins, minerals and other nutrients. Cause of death in 90% of cancer.
Prevention  Progression  Metastasis

Healthy cells  Cancer cells  Tumor

Conventional Medicine

Cause of death in 90% of cancer
Prevention

Healthy cells

Cancer cells

Tumor

Metastasis

Cellular Medicine

Dr. Rath Research Institute
Why certain organs are prone to cancer

Physiological need for Collagen Digestion Makes These Organs Susceptible to Cancer.

<table>
<thead>
<tr>
<th>Reproductive Organs</th>
<th>Growing Organs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breast</td>
<td>Bone</td>
</tr>
<tr>
<td>Ovary</td>
<td>Blood cells</td>
</tr>
<tr>
<td>Uterus</td>
<td></td>
</tr>
<tr>
<td>Cervix</td>
<td>Filter organs:</td>
</tr>
<tr>
<td>Testes</td>
<td>Lungs</td>
</tr>
<tr>
<td>Prostate</td>
<td>Liver</td>
</tr>
</tbody>
</table>

Dr. Rath Research Institute
Collagen digestion is required for normal functioning.

Excessive Collagen digestion is essential for cancer metastasis.
Biological “Scissors” Are Essential for Normal Body Functions

1. Release of an egg (ovulation)
2. Lactation (formation of milk ducts)
3. Growth (i.e. bone growth)
4. Migration of Leucocytes in tissues
Collagen Digesting Enzymes in Ovulation

Digestion of cell surrounding matrix is essential to release an egg from the ovary wall.
The Same Enzymes Are Needed in Preparing Breast Tissue for Lactation
Collagen digestion also works in Immune function

White blood cells leave blood vessel to enter tissue

With the help of collagen digestion, these cells reach site of the infection.

Dr. Rath Research Institute
Nutrient Synergy Needed to Control Normal Cell Growth

Vitamin C

Vitamin C, Lysine, Proline, EGCG and other nutrients

No Collagen Digestion

No Metastasis of cancer
Individual Nutrients in Cancer

- Vitamin C
- Greet tea extract
- N-Acetyl Cysteine
- Selenium
- Arginine
- Lysine, proline
- Quercetin
Vitamin C

• Mechanism of action
  – Anti-oxidant: Neutralizes reactive oxygen species
  – Inhibits cancer cell growth and division
    • Produces H\textsubscript{2}O\textsubscript{2}
    • Cytolysis
    • Mitochondrial alteration
  – Positively modulates several genes
    • MLH-1, p73
    • Induces apoptosis by up-regulation of p53, p21, Bax
  – Produces strong collagen and ECM
Vitamin C

• Concerns

  – Leads to Kidney stones

  – May act as Pro-oxidant

When vit C was added to healthy volunteers’ urine samples, it converted to oxalic acid and increased in the amount of oxalate. Therefore, the inference was given as calcium oxalate, which are the most common form of kidney stones are caused by vitamin C. However, other clinical trials proved even high dose of vit C does not increase calcium oxalate kidney stones.

When combined with free catalytically active metal ions, Vit C could contribute to hydroxyl radicals and act as pro-oxidant, instead of anti oxidant. Meta analytical review of several animal studies does not support this hypothesis (Carr, Frei, 1999).
Intravenous Vitamin C

- Initially Pauling, Cameron used IV vit. C (10gm) on terminal cancer patients: improved survival in advanced cancer (retrospective study 1978)
- Most recent: Phase I clinical trial to evaluate safety, tolerability of high dose IV vit C (20-30 gm) in advanced cancer.
  - Well tolerated and recommend further studies with 70-80gm. (Stephenson, Levin, Spector, Lis; Cancer Chemother Pharmacol, 2013, May 14, Epub ahead of print)
- IV vit C works in synergy with IV vit B12, oral lipoic acid and other nutrients
Intravenous Vitamin C

- IV vit C has advantages and challenges.
  - Advantages: Very high doses, not dependent on gastrointestinal absorption, patient compliance etc.
  - Challenges: Invasive, dependent on a professional to administer, chances of infection in cancer patients with already low immunity

- Similar high doses can be achieved by oral vit C when given in combination- water soluble and liposoluble.
- Advisable to supplement oral vit C with IV for sustained high levels.
Green Tea Extract

• Types
  – EGCG  Most potent
  – EGC
  – Epicatechin
  – Epicatechin Galate

• Mechanism of action
  – Decreases Angiogenesis
  – Increases Apoptosis
  – Reduces Metastasis
N-Acetyl Cysteine

• **Mechanism of action**
  – Supplies bio available Cysteine required for recycling Glutathione
  – Prevents Carcinogenesis
  – Reduces Metastasis
    • Inhibits ECM degradation by MMP
    • Inhibits tumor cell invasion
  – Reduces Neovascularization
Selenium

• **Mechanism of action**
  – Induces Apoptosis
  – Prevents Metastasis
  – Aids formation of Seleno-protines, which act as Anti-oxidants
  – Reduces expression of Urokinase plasminogen activator
    • Converts inactive pro MMP enzymes to active MMP
Supporting nutrients

• Arginine:
  – Conditionally essential amino acid in stress, injury, and disease
  – Precursor of nitric oxide, which induces apoptosis

• Lysine, proline:
  • Critical cofactors in strong collagen formation

• Quercetin, curcumin, resveratrol:
  – Phytoactive compounds with anticancer action
Micronutrients Control Key Mechanisms in Cancer

1. Inhibition of Cells Multiplication / Tumor Growth
2. Inhibition of Invasion and Metastasis
3. Inhibition of Angiogenesis
4. Induction of Apoptosis
Micronutrient Synergy in Controlling Tumor Growth

Cancer Cell Multiplication/
Tumor Growth
Micronutrients Inhibit Tumor Growth in mice

<table>
<thead>
<tr>
<th>Cancer Type</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breast Cancer</td>
<td>78%</td>
</tr>
<tr>
<td>Pancreatic Cancer</td>
<td>64%</td>
</tr>
<tr>
<td>Colon Cancer</td>
<td>63%</td>
</tr>
<tr>
<td>Fibrosarcoma</td>
<td>59%</td>
</tr>
<tr>
<td>Melanoma</td>
<td>57%</td>
</tr>
<tr>
<td>Osteosarcoma</td>
<td>53%</td>
</tr>
<tr>
<td>Prostate</td>
<td>47%</td>
</tr>
<tr>
<td>Lung Cancer</td>
<td>44%</td>
</tr>
<tr>
<td>Synovial sarcoma</td>
<td>44%</td>
</tr>
<tr>
<td>Liver Cancer</td>
<td>36%</td>
</tr>
</tbody>
</table>

Bone Cancer (Osteosarcoma) in Mice

Micronutrients can inhibit multiplication of cancer cells and tumor growth.

Dr. Rath Research Institute
Micronutrient Synergy in Controlling Cancer Invasion and Metastasis
Natural inhibition of melanoma metastasis to the lungs (*in vivo*)

Normal diet

Plus Micronutrient Synergy

Metastasis inhibited by 87%

Micronutrient Synergy And Formation of Blood Vessels in Tumors (Angiogenesis)
Micronutrients help decreasing tumor growth also by inhibiting the formation of new blood vessels that feed the tumor.
Micronutrients And Natural Death of Cancer Cells

Natural death of cancer cell (Apoptosis)
Micronutrients Induce Cancer Cell Death (Apoptosis)

The higher micronutrient concentrations, the more cells commit suicide.

Dr. Rath Research Institute
Conventional Treatment and side effects

- Chemotherapy
- Radiotherapy
- Surgery

Both, healthy and cancer cells are destroyed

Cancer cells

Infection
Anemia
New Cancers
Bleeding
Heart Attack
Organ failure
Death

MORE DRUGS!

Dr. Rath Research Institute
Does this treatment even work?

Analysis of clinical trials conducted from 1990 to 2004 in 22 types of cancer has shown that chemotherapy can increase 5-years survival by merely 2.1%.

Lack of satisfactory effectiveness in:

- Melanoma
- Prostate cancer
- Uterine cancer
- Kidney cancer
- Breast Cancer

*Medical Oncology 2004, 16, 549-560*
Nutrients Enhance Efficacy of Standard Cancer Treatment

- Increase efficacy of the treatment
- Protect against serious adverse effects
- Increase treatment tolerance
- Decrease chemo-resistance
- Increase overall patient survival
Nutrients with Cancer Treatment

1. Cisplatin + selenium + vitamin C: Protects DNA (Selenium prevents Cisplatin resistant cancer cells in ovarian cancer)
2. Cisplatin + Vit C + Vit E: Reduces cancer cell growth
3. Doxorubicin + Vit E: Reduced cell mutation by 80%.
4. Doxorubicin + NAC: Reduced lung metastasis
5. Radiotherapy + Antioxidants: Prevents DNA damage

<table>
<thead>
<tr>
<th>Chemotherapy Drugs</th>
<th>% Inhibition of cell multiplication</th>
<th>Combined with antioxidants (Vit C, beta-carotene, vit E, retinoic acid)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cisplatin</td>
<td>33%</td>
<td>62%</td>
</tr>
<tr>
<td>Tamoxifien</td>
<td>19%</td>
<td>70%</td>
</tr>
<tr>
<td>Dicarbazine</td>
<td>29%</td>
<td>62%</td>
</tr>
</tbody>
</table>
What oncologists worry about?

- Antioxidants increase cancer risk
- Interference with chemo and radiation
- Uncertainty over long term high doses

Vitamin A, beta-carotene in smokers study:
- Used synthetic form
- Single nutrient effect projected to all antioxidants
- Already high risk people
- Incidence was not proportional to serum levels

Antioxidants increase their efficacy according to research

RDA is only to prevent deficiency diseases; not an optimum required amount.
What is different in Dr. Rath’s approach?

- Use of optimum dosage of nutrients
- Use combination of specific nutrients
- Study the effects of nutrients for adequate duration
- Target multiple mechanisms in cancer development and metastasis

Dr. Rath’s research team has proven the importance and effectiveness of Nutrient Synergy!
(www.drrathresearch.org)
Yes, we can!

Victory Over Cancer!

Matthias Rath, M.D. and Aleksandra Niedzwiecki, Ph.D.

Part 1: Making the Unthinkable Possible

Dr. Rath Health Foundation

www.drrathresearch.org