DISCLAIMER

The information presented herein is meant for educational purposes only and is not meant to replace sound medical or nutritional advice. This material is copyright, 2010.
Concepts, practices and misunderstandings

- Why are some doctors opposed to nutritional and natural approaches to cancer?
- Should you take antioxidants?
- Do CT scans increase your risk of getting cancer?
  - Do mammograms increase your risk of getting cancer?
  - Can this risk be offset?
- What is the role of vitamin C in cancer care?
- What role does thermography play in cancer detection?
- What is the role of herbs in cancer care and prevention?
- What is the role of detoxification in cancer prevention and care?
Why are some doctors opposed to nutritional and natural approaches to cancer?

- Lack of interest personal or professional interest
- Fear of ridicule from colleagues
- Lack of education in medical schools
  - Un-equipped (un-qualified) to properly evaluate nutrition
  - Mis-education, outdated concepts/practices
- Bad professional experience
- Personal bias and prejudice
- Genuine concern for their patients
Is there a scientific basis for the use of nutrition in cancer therapies?

“Progress (scientific advancement) only occurs when one dares to stray from what is accepted.”
- Dr. Michael Wald
CONCLUSIONS: “Since the 1970s, 280 peer-reviewed in vitro and in vivo studies, including 50 human studies involving 8,521 patients, 5,081 of whom were given nutrients, have consistently shown that non-prescription antioxidants and other nutrients do not interfere with therapeutic modalities for cancer”.

Furthermore, they enhance the killing of therapeutic modalities for cancer, decrease their side effects, and protect normal tissue. In 15 human studies, 3,738 patients who took non-prescription antioxidants and other nutrients actually had increased survival.
Exert antithrombotic effects in vivo

Disorders in which inappropriate platelet aggregation plays an etiologic role, including MI, stroke, atherogenesis, pre-eclampsia, and the vascular complications of diabetes

Supplemental antioxidants impede tumor dissemination—an effects complemented by the immunostimulant actions

Exert anticarcinogenic, immunostimulant and anti-metastatic effects, nutritional antioxidants should act to inhibit neoplasia at each stage of its development
Although further studies are needed, the preponderance of evidence supports a provisional conclusion that dietary antioxidants do not conflict with the use of radiotherapy in the treatment of a wide variety of cancers and may significantly mitigate the adverse effects of that treatment.
The majority of cancer patients combine some form of complementary and alternative medicine with conventional therapies.

CONCLUSION: “Antioxidants, when added adjunctively, to first-line chemotherapy, may improve the efficacy of chemotherapy…”

Omission of prominent studies that contradicted the author's conclusions. While acknowledging that only large-scale, randomized trials could provide a valid basis for therapeutic recommendations, the author sometimes relied on laboratory rather than clinical data to support her claim that harm resulted from the concurrent use of antioxidants and chemotherapy.

Physicians whose goal is comprehensive cancer therapy should refer their patients to qualified integrative practitioners who have such training and expertise to guide patients. A blanket rejection of the concurrent use of antioxidants with chemotherapy is not justified by the preponderance of evidence at this time and serves neither the scientific community nor cancer patients.
Antioxidants and cancer – friend or foe
Ascorbic acid inhibits the migration of Walker 256 carcinosarcoma cells.

- Ascorbic acid applied in concentrations ranging from 10 to 250 microM
- Ascorbic acid applied in physiologically relevant and non-toxic concentrations exerts an inhibitory effect on the migration of WC 256 carcinosarcoma cells (anti-metastatic)
- Other than antioxidant effects accounted for these results
Nutrient Mixture (NM) on lung mets in mice – progressed disease

CONCLUSION: Antioxidants, when added adjunctively, to first-line chemotherapy, may improve the efficacy of chemotherapy and may prove to be safe.
Traditional Japanese medicine uses the leaves of Kumaizasa bamboo extract

Oral administration of the extracts was carried out when tumor reached size of approximately 6 mm at concentrations of 0.05% or higher.

Significantly suppressed tumor growth in S-180 and C38 tumor models.

Overall survival was significantly prolonged in the treatment group than that of control.

Activation of macrophages and NK cells by the extracts suggests that the anti-tumor efficacy of the extract is mediated by immunopotentiation.
Proteomic analysis reveals upregulation of RKIP in S-180 implanted BALB/C mouse after treatment with ascorbic acid.

- Metastasis - the main cause of death for cancer patients
- In this study, intraperitoneal administration of a high concentration of ascorbic acid inhibited tumor establishment, increased survival of BALB/C mice implanted with S-180 sarcoma cancer cells
Antioxidative vitamins are known to inhibit metastasis.

Evaluated the impact of vitamins A (retinol), C (ascorbic acid) and E (alpha-tocopherol) on liver metastasis in hamster.

Retinol and alpha-tocopherol decreased the incidence of liver metastases (44.4 vs. 86.7%, \( p < 0.05 \)). The number and size of liver metastases were significantly reduced by retinol.
“The anticancer activity of omega-3 polyunsaturated fatty acids (omega-3 PUFA) has been shown in a large number of studies.”

- Analyzed combined effect of omega-3 PUFA and antioxidative vitamins on the level of spontaneous metastatic dissemination.
- Omega-3 PUFA have anticancer activity: tumor growth slowed, lower metastatic load.
- Supportive effect of omega-3 PUFA in chemotherapy (e.g. with CP) increases when vitamins E and C are also included.
Cancer and radiation
CONCLUSIONS: “Since the 1970s, 280 peer-reviewed in vitro and in vivo studies, including 50 human studies involving 8,521 patients, 5,081 of whom were given nutrients, have consistently shown that non-prescription antioxidants and other nutrients do not interfere with therapeutic modalities for cancer”.

Furthermore, they enhance the killing of therapeutic modalities for cancer, decrease their side effects, and protect normal tissue. In 15 human studies, 3,738 patients who took non-prescription antioxidants and other nutrients actually had increased survival.
Several adverse effects of radiotherapy and chemotherapy in cancer patients have been linked to oxidative cell processes in the human body.

Selenium supplementation may protect healthy tissues and reduce the side effects of treatment.

This systematic review provides the first evidence that antioxidant supplementation during chemotherapy holds potential for reducing dose-limiting toxicities. The pre-clinical and clinical evidence as to whether ingestion of supplemental selenium, in addition to radiotherapy/chemotherapy is beneficial, detrimental or neutral towards patient outcome is also discussed.
Tumor invasion is inhibited by phosphorylated ascorbate via enrichment of intracellular vitamin C and decreasing of oxidative stress.

- Tumor metastasis inhibited by ascorbic acid
- Scavenged most of the intracellular reactive oxygen species
The Essential Role of Nutrition for enhancing the target effects of chemo and reducing short and long-term side effects
Protective action of vitamin C against DNA damage induced by selenium-cisplatin conjugate

- Genotoxicity of anticancer drugs is of a special interest due to the risk of inducing secondary malignancies
- Vitamin C protects against DNA-damaging effects of antitumor drugs
- “Vitamin C can be considered a potential protective agent against side effects of antitumor drugs...”
Protective action of vitamin C against DNA damage induced by selenium-cisplatin conjugate. Blasiak J, Kowalik J. Department of Molecular Genetics, University of Lodz, Poland.

- Genotoxicity of anticancer drugs - risk of inducing secondary malignancies
- Vitamin C protects against DNA-damaging effects of antitumor drugs
- “CONCLUSION: “…Obviously, antioxidative vitamins prevent oxidative stress in hepatocytes.
  - This may be one mechanism decreasing liver metastasis in pancreatic cancer in the present trial”.
Genotoxicity of idarubicin and its modulation by vitamins C and E and amifostine.

- Haematological malignancies
- Main side effect of idarubicin is free-radicals based cardiotoxicity
- “Genotoxicity - consequence induction of secondary malignancies should be taken into account as diverse side effects of idarubicin”.
- “…Vitamin C can be considered as protective agents against DNA damage in normal cells in persons receiving idarubicin-based chemotherapy…”
tamoxifen
Therapeutic potential of riboflavin, niacin and ascorbic acid on carbohydrate metabolizing enzymes in secondary endometrial carcinoma bearing rats

- Curative potential of riboflavin, niacin and ascorbic acid against tamoxifen mediated endometrial carcinoma was established
- “Our results suggest that riboflavin, niacin and ascorbic acid have potential combination therapy against tamoxifen mediated secondary endometrial carcinoma in experimental rats”
Nutrients and immune modulation
Extracts from Kumaizasa bamboo leaves suppressed tumor growth and prolonged survival significantly.

In the chemical carcinogenesis model suppression of cancer incidence on day 100, *tumor size and survival time were significantly improved with the vigorous extract, at/or above 0.03% in the diet, when given two weeks prior to the administration of the carcinogen.*

**CONCLUSION:** “The vigorous extracts of bamboo leaf show immunopotentiating and radical scavenging effects and administration prior to carcinogen exposure or tumor inoculation significantly suppresses tumor incidence and tumor growth and prolongs survival.”
Evidence for induction of anti-angiogenic pathways and induction of transcripts for protection from oxidative stress

CONCLUSIONS: “Our data reveal of large number of potential new, direct vitamin D target genes relevant to prostate cancer prevention.”

Data suggests that rather than having a single strong regulatory effect, vitamin D orchestrates a pattern of changes within prostate epithelial cells that limit or slow carcinogenesis.
Adherence to a relative Mediterranean diet (rMED) and incident gastric adenocarcinoma

CONCLUSION: Greater adherence to an rMED is associated with a significant reduction in the risk of incident GC.
Antioxidant levels and inhibition of cancer cell proliferation in vitro by extracts from organically and conventionally cultivated strawberries.

- Effects of extracts from five cultivars of strawberries on the proliferation of colon cancer cells HT29 and breast cancer cells MCF-7 were investigated, and correlations with the levels of several antioxidants analyzed.

- Extracts from organically grown strawberries had a higher antiproliferative activity for both cell types at the highest concentration than the conventionally grown.

- Higher antiproliferation effects with higher ascorbic acid levels.
Combination of vitamin K3 (VK3) and ascorbic acid (AA) exhibited an anti-cancer synergistic effect, associated with extracellular production of H(2)O(2) that promoted cell death.

Enhanced cell death (apoptosis)
Effect of ascorbic acid

Reduction of iatrogenic of radiation

Recommendation: oral administration of ascorbic acid
Highly metastatic melanoma is resistant to existing therapies.

Main objective was to investigate the effect of a nutrient mixture (NM) on B16FO tumor growth and hepatic metastasis.

Studied cell death and spread.

The survival time of mice receiving NM supplementation and B16FO cells i.p. was greater than in mice which were fed the regular diet.
Melatonin works through receptors and distinct second messenger pathways to reduce cellular proliferation and to induce cellular differentiation.

Melatonin can modulate oestrogen-dependent pathways and reduce free-radical formation, thus preventing mutation and cellular toxicity.
Dosing and route of administration of N-acetylcysteine (NAC) for protection against cisplatin (CDDP) nephrotoxicity was investigated in rats.

Blood concentrations of total NAC showed a dose response after IV NAC, but high dose NAC (1,200 mg/kg) by the PO route gave very low levels of NAC.

Protective properties of NAC are affected by the dose and route of administration.
What is the role of vitamin c in cancer care?

Biochem Biophys Res Commun. 2010 Feb 19., High dose of ascorbic acid induces cell death in mesothelioma cells

- High dose of ascorbic acid induced cell death of all mesothelioma cell lines in a dose-dependent manner.
Sodium ascorbate was found to induce the apoptosis of B16F10 murine melanoma in a time- and dose-dependent manner, and this was prevented by pretreatment with N-acetyl-L-cysteine (NAC).

Sodium ascorbate-treated B16F10 melanoma cells showed increased intracellular reactive oxygen species generation (ROS) levels.

These results indicate that sodium ascorbate induced apoptosis in B16F10 murine melanoma cells by acting as a prooxidant.
Higher concentrations of vitamin C induce apoptotic cell death in various tumor cell lines including oral squamous cell carcinoma and salivary gland tumor cell lines, possibly via its prooxidant action.
Radiation and Cancer

Do CT scans increase your risk of getting cancer?
Do mammograms increase your risk of getting cancer?
Can this risk be offset?
Background Ionizing radiation is a known mutagen and an established breast carcinogen.

population-based case-control study nested within a cohort of 52,536 survivors of unilateral breast cancer diagnosed between 1985 and 2000.

The ATM gene is a key regulator of cellular responses to the DNA damage induced by ionizing radiation.

Conclusions Women who carry rare deleterious ATM missense variants and who are treated with radiation may have an elevated risk of developing contralateral breast cancer.
Conclusion: “Patients with recurrent self-injurious behaviours, frequent users of healthcare services who often undergo repeated medical assessment and treatment, are likely at higher risk for iatrogenic adverse events.

Multiple diagnostic radiology examinations have recently come under scrutiny for causing increased lifetime risk of cancer.

Healthcare providers, in particular psychiatrists and emergency department physicians, should consider the cumulative risks of radiological procedures when assessing and treating patients…”
About 15% of the ionizing radiation exposure to the general public comes from artificial sources, and almost all of this exposure is due to medical radiation, largely from diagnostic procedures.

Radiotherapy also has increased so that today about 40% of cancer patients receive some treatment with radiation.

Following high-dose radiotherapy for malignant diseases, elevated risks of a variety of radiation-related second cancers have been observed. Risks have been particularly high following treatment for childhood cancer. Radiation treatment for benign disease was relatively common from the 1940's to the 1960's. While these treatments generally were effective, some resulted in enhanced cancer risks.
CT scans and mamography – as an example of medical exposure to radiation

Balancing risks vs. benefits of radiation treatments and diagnostic procedures
Controversy exists regarding the biological effectiveness of low energy x-rays used for mammography breast screening. Recent radiobiology studies have provided compelling evidence that these low energy x-rays may be 4.42 +/- 2.02 times more effective in causing mutational damage than higher energy x-rays.

Recent studies have shown that magnetic resonance imaging (MRI) is more sensitive than mammography in detecting invasive breast cancer in women with a genetic sensitivity.

Since an increase in the risk associated with mammographic screening would blur the justification of exposure for this high risk subgroup, the use of other (non-ionizing) screening modalities is preferable.
Computed tomography (CT) examinations account for a significant portion of individuals' increasing exposure to medical radiation.
Target group: women aged 50 to 69 years without evidence of breast cancer are invited to screening mammography every two years.

In the present study the question was raised whether breast cancer screening by means of mammography is—from the point of view of radiation hygiene—justified also for women under 50 years of age.

With regard to both, the benefit and the radiation risk—it appears not to be justified to expose women from the age of 40 years to the additional radiation exposure associated with a mammography screening.
Female breast tissue is highly sensitive to the carcinogenic effects of radiation, particularly when exposure takes place at younger age.

All women are exposed to low doses of radiation for several common reasons (kind of occupation, medical diagnostic procedures, residence background radiation).

The highest risk of radiation-induced breast cancer is evidenced in the sub-population of female patients who have undergone radiotherapy for either malignant or non-malignant diseases, including benign breast diseases in their childhood or young age.
thermography
Advanced integrated technique in breast cancer thermography.

“For breast cancer care, it has become possible to use thermography as a powerful adjunct and biomarker tool, together with mammography for diagnosis purposes.”
Effectiveness of a noninvasive digital infrared thermal imaging system in the detection of breast cancer.

92 patients for whom a breast biopsy was recommended based on prior mammogram or ultrasound underwent DITI.

RESULTS: Sixty of 94 biopsies were malignant and 34 were benign. DITI identified 58 of 60 malignancies.

CONCLUSION: DITI is a valuable adjunct to mammography and ultrasound, especially in women with dense breast parenchyma.
What role does thermography play in cancer detection?

- According to the American Journal of Surgery, “is a valuable adjunct to mammography and ultrasound, especially in women with dense breast parenchyma”.
In human breast tumors there is a 1-2 degrees C increase in skin surface temperature at the periphery.

Proposed that this change is due to the hypervascularity and increased blood flow resulting from tumor-associated angiogenesis (new blood vessel growth).

The findings of the study indicate that thermographic imaging might have considerable potential in monitoring human tumor xenografts and their response to anticancer drugs.
In the US, one in every eight women will develop breast cancer in her lifetime.

Despite the advances made in treating breast cancer, the causal mechanisms underlying this disease have yet to be fully elucidated; 85% of breast cancer cases occur sporadically without any known genetic mutation.

For decades, breast self-examination has been touted as a technique for the early identification of breast cancer. However, it has been recently suggested that this technique is a waste of time and resources for both doctors and patients. Mammography finds breast cancer earlier than breast self-examination, and will reduce the risk of death from breast cancer by approximately 30% in women over 50 years old.

Mammography is limited in that cancer, like breast tissue, appears white on the x-ray; therefore lesions may be difficult to detect in women with very dense breasts, and a tumor may not cast a significant shadow until it is quite large. Some cancers are so aggressive that they can spread quickly, before routine screening can detect them.

About 85% of breast cancers begin in the milk ductal system of the breast. As cancer develops in the breast, abnormalities occur, including atypical hyperplasia, ductal carcinoma in situ, and invasive breast carcinoma.

Thus, the early screening of ductal cells can provide a parallel benefit to the 'Pap' smear, which is used virtually universally to identify the abnormal cells that can lead to cervical cancer.