Food IS Medicine

THE SCIENTIFIC EVIDENCE

.....

VOLUME ONE

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Introduction

Food IS Medicine: The Scientific Evidence represents my three-volume contribution to public education about the nutritional science of how disease prevention and increased longevity can be achieved by proper food choices.

During the past several decades, my work in the health field has focused on the fundamental role that nutrition and unprocessed, unheated, plant-based foods play in the process of disease recovery and prevention. Directing the Hippocrates Health Institute has afforded me the opportunity to conduct clinical research that has produced persuasive evidence to support the words of Hippocrates, the ancient Greek and father of Western medicine, "Let food be thy medicine and medicine be thy food."

Modern health science at some point in the 20th century estranged itself from a simple and practical truth—natural, organic fruits and vegetables in their raw state possess disease prevention and healing properties. Forgetting that the human body's cells require continuous nourishment to function and thrive has been one of the most abominable mistakes made in Western medicine's attempts at providing health care.

During the Institute's early days in the mid-20th century, we were enigmas in the world of futuristic science. We saw little support for our basic concepts and our prescription for healthy lifestyles coming from within the nutritional science departments of academia or among conventionally trained physicians.

As the 1980s drew to a close, there was a slight shift in the research community's traditional apathy about nutrition. Then the 1990s revived serious interest until now, well into the 21st century, there have been tens of thousands of medical science studies performed worldwide that affirm the results of our own half-century of clinical research.

We can now present in one place the collected wealth of science data that clearly demonstrates in fact that the most important ingested medicine comes from the very food we consume. We are giving this important information to you in a three-volume series highlighting the most noteworthy and provocative studies we have amassed.

This may well be the most comprehensive database ever assembled showing the health benefits of specific foods and nutrients, and the dangers to health posed by other foods, based on a chronological listing of relevant scientific medical studies.

Volume One comprises five chapters covering the following topics: phytochemicals in food and their health-creating properties; the importance of nutrient synergies to human health; the health benefits of calorie restrictive diets and fasting; the nutrient retention and health benefits of raw foods as opposed to cooked or processed; the nutrient superiority of organic fruits and vegetables to non-organic.

Volume Two is titled *Edible Plant Foods, Fruits, and Spices from A to Z: Evidence for Their Healing Properties,* and features more than fifty fruits, vegetables and spices, from marine algae to wheatgrass, listing hundreds of research studies that have affirmed their usefulness in treating or preventing dozens of health problems from cancer and diabetes to hypertension, ulcers, and wound healing.

Volume Three highlights the extensive scientific data showing the disease-causing unhealthy foods, from meat and dairy products to sugar and other additives, along with their toxin-producing cooking practices, and how they are often the underlying culprits in sparking health problems in people of all ages.

Although *Food IS Medicine* does not resemble a typical book written in a conversational manner, it is easy-to-read science portrayed in a way that both the layperson or consummate food and nutrition professional can appreciate. The key finding of each study is summarized. These studies are presented chronologically so the reader can grasp the evolution of findings and theories about the health impacts of various nutrients and foods. Tens of thousands of scientific medical studies conducted over a period of eight decades in dozens of countries were examined to bring you the most important three thousand or so in these three volumes.

Let us hope that this contribution once and for all silences the skeptics and ultimately helps to change the dietary patterns of future generations. Not many years ago, a colleague of mine remarked, "We are digging our grave with a knife and fork." The overwhelming data presented in these three volumes supports that analogy 100 percent.

CHAPTER ONE

The General Health Benefits of Phytochemicals in Foods

THROUGHOUT HUMAN HISTORY, our species has instinctually known that food was not only for sustenance, but had the power to protect and enhance health. Much of the evidence for this idea, which took root in ancient cultures, was intuitive or based on observations of what animals in the wild ate when sick. It was also grounded in observations about the results of long-term trial and error as generations of humans experimented with foods and herbs to tap their healing powers.

In the late 18th century, British ships began carrying citrus fruit on ocean voyages for sailors to consume. It was hoped that the fruit would prevent deadly scurvy. It did. No one knew at the time that a substance in citrus fruit, vitamin C, was responsible for this preventative effect. It wasn't until vitamin C was actually "discovered," which is to say isolated, in a laboratory in 1933 that the intuition and observations of the 18th-century British mariners were affirmed by science.

Knowledge about the "invisible" substances within fruits and vegetables that enhance human health took another giant leap forward in 1948 when scientists gave us the first evidence of a new type of chemistry found in plants, later called phytonutrients, or phytochemicals. Plants produce phytochemicals in response to the threat of insects and disease during the crop growing cycle, a process that is shortened and diluted when farmers add pesticides and insecticides to their crops. While phytochemicals are not necessary to the human body for its normal metabolic functioning (vitamins are necessary), they would be shown to have critical roles to play in preventing or healing human illness and disease.

During the early 1980s, the National Cancer Institute chemoprevention program began investigating the role that phytochemicals may play in human health. Seven general families of these nutrients were eventually identified. Within each of the seven groupings, thousands of individual phytochemical agents would be isolated by various teams of researchers worldwide.

Although this exciting finding was a profound and critical event in our understanding of nutrition, further and deeper work on the importance of phytochemicals to health was not fully engaged until the 1990s. From this point forward, biology has been inundated with one phytonutrient after another being discovered and traced to the effect they have on disease prevention and healing.

There is no doubt that this ever-emerging science has become the most important conducted throughout the history of nutritional biology. How wondrous it is to know that plants with origins dating back millions of years afford humans a powerful medicine that helps to maintain our balance and health. Well before the human species began spreading globally, nature had created an organic and natural antidote for our future disease-creating lifestyles.

Phytochemicals play well-documented roles in protecting human health, as revealed by the results of test tube and animal experiments, human epidemiological data, and human clinical trials. These connections are further solidified by the stories told by people who have successfully employed phytochemicals to address health and healing challenges.

Among hundreds of seemingly miraculous healing success stories involving phytochemicals that have been brought to my attention is that of Majlis Tooming Akesson of Stockholm, Sweden. She was diagnosed with breast cancer in 1992 at the age of 45 and had a mastectomy. Eleven years later she was diagnosed with liver cancer that had spread to her back and hip. In November 2003, her oncologist's prognosis was that she would probably not survive beyond Christmas.

While in the hospital, Majlis recalled having read about Ann Wigmore of Boston and how she had overcome cancer by consuming wheatgrass, greens, and other live foods. So Majlis asked her husband to bring her a thermos of wheatgrass juice, spinach soup, and green kale soup each day, instead of consuming the hospital food she was being offered. Her health began to undergo dramatic improvements and she was released from the hospital after only five days.

She continued a diet high in phytochemical nutrients from raw foods and her cancer went into remission. Seven years after being told that she had only a few months to live, she remains not only alive but

vigorously and vitally so. "After nearly eighteen years of fighting for my health, I feel like I am 40-years old again," she told me.

Phytochemical nutrients may also play a role in regenerating fertility. One of many such cases that I'm aware of involves Jennifer Aiello, who wanted to have a child at age 44. But after three miscarriages she was told by physicians that she had chromosomal abnormalities, which made it unlikely that she could ever give birth to a healthy baby.

Jennifer tells her story this way: "I was devastated. My dream of having a child didn't seem possible. But I said to myself there has to be a way to make my body healthier or even to do something to improve the egg quality." She decided to try a raw vegetable diet with its high-density phytochemical nutrient content. She also gave up coffee, meat, sugar, and dairy products.

Within weeks of adopting this new dietary lifestyle, Jennifer became pregnant. "Nine months later," she relates, "I had what I wanted most in life: a baby girl. Not only is she beautiful, she is super healthy, and at birth, she weighed 8 pounds, 8 ounces. She is very alert and smart. At every checkup, the pediatrician remarks about how she is so healthy."

Every new leaf turned in the search for natural, plant-based health remedies reveals stunning and profound information about how raw, plant-based foods can protect us from all known disorders. This nutritional powerhouse carries the potential to alleviate the majority of human diseases and maladies. Rather than spend billions on research that attempts to synthetically replicate isolated chemicals from nature, wouldn't it be more prudent and cost-effective to simply educate and encourage people to consume what nature has provided us already?

With that said, I now present the first chapter of *Food IS Medicine*, detailing the scientific medical studies on phytochemicals that support the idea of natural food as the most important medicine on earth.

Major Phytochemicals in Foods

Phenolic compounds

- **Monophenols**
  - Apiole – *parsley*
  - Carnosol – *rosemary*
  - Carvacrol – *oregano, thyme*
  - Dillapiole – *dill*
  - Rosemarinol – *rosemary*
- **Flavonoids (polyphenols)** – *red, blue, purple pigments*
  - Flavonols
    - Quercetin – *red and yellow onions, tea, apples, cranberries, buckwheat, beans*
    - Gingerol – *ginger*
    - Kaempferol – *strawberries, gooseberries, cranberries, peas, cabbage, brocolli, and other members of the Brassicate family, chives*
    - Myricetin – *grapes, walnuts*
    - Resveratrol – *grape skins and seeds, nuts, peanuts*
    - Rutin – *citrus fruits, buckwheat, parsley, tomatoes, apricots, rhubarb, tea*
    - Isorhamnetin
  - Flavanones
    - Hesperidin – *citrus fruits*
    - Naringenin – *citrus fruits*
    - Silybin – *blessed milk thistle*
    - Eriodictyol
  - Flavones
    - Apigenin – *chamomile, celery, parsley*
    - Tangeritin – *tangerine and other citrus peels*
    - Luteolin

- Flavan-3-ols
  - Catechins – *white tea, green tea, black tea, grapes, apple juice, lentils, black-eyed peas*
  - (+)-Catechin
  - (+)-Gallocatechin
  - (-)-Epicatechin
  - (-)-Epigallocatechin
  - (-)-Epigallocatechin gallate (EGCG) – *green tea*
  - (-)-Epicatechin 3-gallate
  - Theaflavin – *black tea*
  - Theaflavin-3-gallate – *black tea*
  - Theaflavin-3'-gallate – *black tea*
  - Theaflavin-3,3'-digallate – *black tea*
  - Thearubigins
- Anthocyanins (flavonals) and Anthocyanidins – *many red, purple or blue fruits and vegetables*
  - Pelargonidin – *bilberries, raspberries, strawberries*
  - Peonidin – *bilberries, blueberries, cherries, cranberries, peach*
  - Cyanidin – *red apples and pears, bilberries, blackberries, blueberries, cherries, cranberries, peaches, plums, hawthorn, loganberries*
  - Delphinidin – *bilberries, blueberries*
  - Malvidin – *bilberries, blueberries*
  - Petunidin
- Isoflavones (phytoestrogens)
  - Daidzein (formononetin) – *soybeans, alfalfa sprouts, red clover, chickpeas, peanuts, other legumes*
  - Genistein (biochanin A) – *soybeans, alfalfa sprouts, red clover, chickpeas, peanuts, other legumes*
  - Glycitein – *soybeans*
- Dihydroflavonols
- Chalcones
- Coumestans (phytoestrogens)
  - Coumestrol – *red clover sprouts, alfalfa sprouts, soybeans, peas, brussels sprouts*

- **Phenolic acids**
  - Ellagic acid – *walnuts, strawberries, cranberries, blackberries, guava, grapes*
  - Gallic acid – *tea, mangoes, strawberries, rhubarb, soybeans*
  - Salicylic acid – *peppermint, licorice, peanut, wheat*
  - Tannic acid – *nettles, tea, berries*
  - Vanillin – *vanilla beans, cloves*
  - Capsaicin – *chiles*
  - Curcumin – *turmeric, mustard*
- **Hydroxycinnamic acids**
  - Caffeic acid – *burdock, hawthorn, artichokes, pears, basil, thyme, oregano, apples*
  - Chlorogenic acid – *echinacea, strawberries, pineapple, sunflower seeds, blueberries*
  - Cinnamic acid – *aloe*
  - Ferulic acid – *oats, rice, artichokes, oranges, pineapples, apples, peanuts*
  - Coumarin – *citrus fruits, maize*
- **Lignans (phytoestrogens)** – *seeds (flax, sesame, pumpkin, sunflower seeds, poppy), whole grains (rye, oats, barley), bran (wheat, oat, rye), fruits (particularly berries) and vegetables*
  - Silymarin – *artichokes, milk thistle*
  - Matairesinol – *flaxseed, sesame seed, rye bran and meal, oat bran, poppy seeds, strawberries, black currants, broccoli*
  - Secoisolariciresinol – *flaxseeds, sunflower seeds, sesame seeds, pumpkins, strawberries, blueberries, cranberries, zucchini, black currants, carrots*
  - Pinoresinol and lariciresinol – *sesame seed, cabbage, brocolli, and other members of the Brassica family*
- **Tyrosol esters**
  - Tyrosol – *olive oil*
  - Hydroxytyrosol – *olive oil*
  - Oleocanthal – *olive oil*
  - Oleuropein – *olive oil*

- **Stilbenoids**
  - Resveratrol – *grapes, peanuts*
  - Pterostilbene – *grapes, blueberries*
  - Piceatannol – *grapes*
- **Punicalagins** – *pomegranates*

Terpenes (isoprenoids)

- **Carotenoids (tetraterpenoids)**
  - Carotenes - *orange pigments*
    - α-Carotene – *to vitamin A, in carrots, pumpkins, maize, tangerines, oranges*
    - β-Carotene – *to vitamin A, in dark, leafy greens and red, orange, and yellow fruits and vegetables*
    - γ-Carotene
    - δ-Carotene
    - Lycopene – *Vietnam gac, tomatoes, grapefruit, watermelons, guava, apricots, carrots*
    - Neurosporene
    - Phytofluene – *star fruit, sweet potatoes, oranges*
    - Phytoene – *sweet potatoes, oranges*
  - Xanthophylls - *yellow pigments*
    - Canthaxanthin – *paprika*
    - Cryptoxanthin – *mangoes, tangerines, oranges, papayas, peaches, avocados, peas, grapefruit, kiwifruit*
    - Zeaxanthin – *wolfberries, spinach, kale, turnip greens, maize, red bell peppers, pumpkins, oranges*
    - Astaxanthin – *microalgae, yeast*
    - Lutein – *spinach, turnip greens, romaine lettuce, red peppers, pumpkins, mangos, papayas, oranges, kiwifruit, peaches, squash, legumes, cabbage, brocolli, and other members of the Brassica family, prunes, sweet potatoes, honeydew melons, rhubarb, plums, avocados, pears*
    - Rubixanthin – *rose hips*
- **Monoterpenes**
  - Limonene – *oils of citrus, cherries, spearmint, dill, garlic, celery, maize, rosemary, ginger, basil*
  - Perillyl alcohol – *citrus oils, caraway, mints*

- **Saponins** – *soybeans, beans, other legumes, maize, alfalfa*
- **Lipids**
    - Phytosterols – *almonds, cashews, peanuts, sesame seeds, sunflower seeds, whole wheat, maize, soybeans, many vegetable oils*
        - Campesterol - *buckwheat*
        - Beta sitosterol – *avocados, rice bran, wheat germ, corn oils, fennel, peanuts, soybeans, hawthorn, basil, buckwheat*
        - Gamma sitosterol
        - Stigmasterol – *buckwheat*
    - Tocopherols (vitamin E)
    - Omega-3,6,9 fatty acids – *dark, leafy greens, grains, legumes, nuts*
        - Gamma-linolenic acid – *evening primrose, borage, black currant*
- **Triterpenoid**
    - Oleanolic acid - *American pokeweed, honey mesquite, garlic, java apples, cloves, and many other Syzygium species*
    - Ursolic acid - *apples, basil, bilberries, cranberries, elder flowers, peppermint, lavender, oregano, thyme, hawthorn, prunes*
    - Betulinic acid - *Ber tree, white birch, tropical carnivorous plants Triphyophyllum peltatum and Ancistrocladus heyneanus, Diospyros leucomelas (a member of the persimmon family), Tetracera boiviniana, the jambul (Syzygium formosanum), and many other Syzygium species*
    - Moronic acid - *Rhus javanica (a sumac), mistletoe*

Betalains

- **Betalains**
    - Betacyanins
        - betanin - *beets*
        - isobetanin - *beets*
        - probetanin - *beets*
        - neobetanin - *beets*
    - Betaxanthins (non-glycosidic versions)
        - Indicaxanthin - *beets, Sicilian prickly pear*
        - Vulgaxanthin - *beets*

Organosulfides

- **Dithiolthiones (isothiocyanates)**
  - Sulphoraphane – *cabbage, brocolli, and other members of the Brassica family*
- **Thiosulphonates (allium compounds)**
  - Allyl methyl trisulfide – *garlic, onions, leeks, chives, shallots*
  - Diallyl sulfide – *garlic, onions, leeks, chives, shallots*

Indoles, glucosinolates

- **Indole-3-carbinol** – *cabbage, kale, brussels sprouts, rutabagas, mustard greens*
- **Sulforaphane** - *broccoli family*
- **3,3'-Diindolylmethane** or DIM - *broccoli family*
- **Sinigrin** - *broccoli family*
- **Allicin** - *garlic*
- **Alliin** - *garlic*
- **Allyl isothiocyanate** - *horseradish, mustard, wasabi*
- **Piperine** - *black pepper*
- **Syn-propanethial-S-oxide** - *cut onions*

Other organic acids

- **Oxalic acid** – *oranges, spinach, rhubarb, tea and coffee, bananas, ginger, almonds, sweet potatoes, bell peppers*
- **Phytic acid** (inositol hexaphosphate) – *cereals, nuts, sesame seeds, soybeans, wheat, pumpkins, beans, almonds*
- **Tartaric acid** – *apricots, apples, sunflower seeds, avocados, grapes*
- **Anacardic acid** - *cashews, mangoes*

(*Source*: http://en.wikipedia.org/wiki/List_of_phytochemicals_in_food)

Flavonoids are benzo-gamma-pyrone derivatives of plant origin found in various fruits and vegetables but also in tea and in red wine. Some of the flavonoids, such as quercetin and silibinin, can effectively protect cells and tissues against the deleterious effects of reactive oxygen species."

*Relative bioavailability of the **antioxidant** flavonoid quercetin from various foods in man.* Hollman PC, Van Triip JM, Buysman MN, et al. FEBS Lett. 1997 Nov 24;418(1-2):152-6. **Key Finding:** "We fed nine subjects a single large dose of onions, which contain glucose conjugates of quercetin, apples, which contain both glucose and non-glucose quercetin glycosides, or pure quercetin-3-rutinoside, the major quercetin glycoside in tea. Plasma levels were then measured. Bioavailability of quercetin from apples and of pure quercetin rutinoside was both 30% relative to onions. Peak levels were achieved less than 0.7 h after ingestion of onions, 2.5 h after apples and 9 h after the rutinoside. Half-lives of elimination were 28 h for onions and 23 h for apples. We conclude that conjugation with glucose enhances absorption from the small gut. Because of the long half-lives of elimination, repeated consumption of quercetin-containing foods will cause accumulation of quercetin in blood."

Actions of Carotenoids in Biological Systems. Krinsky NI. Annu Rev Nutr 1993 Jul; 13:561-587. **Key Finding:** This review discusses the evidence to date for carotenoid actions in vitro and in vivo **antioxidant,** antimutagenesis, protection against genotoxicity and malignant transformation, and its **anticarcinogenic** role.

Arthritis

*Green tea protects rats against autoimmune **arthritis** by modulating disease-related immune events.* Kim HR, Rajaiah R, Wu QL, et al. J Nutr. 2008 Nov;138(11):2111-6. **Key Finding:** "We investigated whether polyphenolic compounds from green tea can afford protection against autoimmune arthritis and also examined the immunological basis of this effect using the rat adjuvant arthritis model of human rheumatoid arthritis. Green tea induced changes in arthritis-related immune responses. We suggest further systematic exploration of dietary supplementation with

polyphenolic green tea compounds as an adjunct nutritional strategy for the management of **rheumatoid arthritis**."

Anti-inflammatory *and anti-****arthritic*** *effects of Yucca schidigera: a review.* Cheeke PR, Piacente S, Oleszek W. J Inflamm (Lond). 2006 Mar 29;3:6. **Key Finding:** "Yucca schidigera is a medicinal plant native to Mexico. Yucca phenolics are anti-oxidants and free-radical scavengers, which may aid in suppressing reactive oxygen species that stimulate inflammatory responses. Based on these findings, further studies on the anti-arthritic effects of Yucca schidigera are warranted."

Vegetarian diets: what are the advantages? Leitzmann C. Forum Nutr. 2005;(57):147-56. **Key Finding:** "In most cases, vegetarian diets are beneficial in the prevention and treatment of certain diseases, such as **cardiovascular disease, hypertension, diabetes, cancer, osteoporosis, renal disease and dementia**, as well as **diverticular disease, gallstones, and rheumatoid arthritis**."

Divergent responses of chondrocytes and endothelial cells to shear stress: Cross-talk among COX-2, the phase 2 response, and apoptosis. Healy ZR, Lee NH, Gao X, et al. Proc Natl Acad Sci. 2005 Sept 27;102(39):14010-5. **Key Finding:** Compounds in edible plants that boost production of phase 2 enzymes have been isolated in this study. These beneficial enzymes seem to prevent the activation of the inflammatory COX-2 enzyme that triggers inflammation in joints. This finding may help to develop therapeutic strategies for **arthritic disorders**.

Asthma

Dietary intake of flavonoids and ***asthma*** *in adults.* Garcia V, Arts IC, Sterne JA, Thompson RL, Shaheen SO. Eur Respir J. 2005 Sep;26(3):449-52. **Key Finding:** "No evidence was found for a protective effect of three major subclasses of dietary flavonoids on asthma. They were catechins, flavonols and flavones. It is possible that other flavonoids or polyphenols

Ovarian

*A prospective study of dietary flavonoid intake and incidence of epithelial **ovarian cancer**.* Gates MA, Tworoger SS, Hecht JL, et al. Int J Cancer. 2007;121(10):2225-2232. **Key Finding:** "These data suggest that dietary intake of certain flavonoids in the flavonol and flavones subclasses may reduce ovarian cancer risk."

*Risk of human **ovarian cancer** is related to dietary intake of selected nutrients, phytochemicals and food groups.* McCann SE, Freudenheim JL, Marshall JR, Graham S. J Nutr. 2003 Jun;133(6):1937-42. **Key Finding:** "We conducted a case-control study of diet and ovarian cancer in western New York involving 124 primary, histologically confirmed ovarian cancer cases and 696 population-based controls. These results support a protective effect on ovarian cancer of phytoestrogen intakes, and our results support the hypothesis that a plant-based diet may be important in reducing risk of hormone-related neoplasms."

Pancreatic

*Flavonoid intake and risk of **pancreatic cancer** in male smokers (Finland).* Bobe G, Weinstein SJ. Albanes D, et al. Cancer Epidemiol Biomarkers Prev. 2008 Mar;17(3):553-62. **Key Finding:** "Our data suggest that a flavonoid-rich diet may decrease pancreatic cancer risk in male smokers not consuming supplemental alpha-tocopherol and/or beta-carotene."

*A food pattern that is predictive of flavonol intake and risk of **pancreatic cancer**.* Nothlings U, Murphy SP, Wilkens LR, et al. Am J Clin Nutr. 2008 Dec;88(6):1653-62. **Key Finding:** "A food pattern associated with the intake of quercetin, kaempferol, and myricetin was associated with lower pancreatic cancer risk in smokers in a US-based population. However, failure to replicate the associations in an independent study weakens the conclusions and raises questions about the utility of food patterns for flavonols across populations."

*Flavonols and **pancreatic cancer** risk: the multiethnic cohort study.* Nothlings U, Murphy SP, Wilkens LR, Henderson BE, Kolonel LN. Am J Epidemiol. 2007 Oct 15;166(8):924-31. **Key Finding:** "Total flavonols, quercetin, kaempferol, and myricetin were all associated with a significant inverse trend among current smokers, former smokers, or those who have never smoked.This study provides evidence for a preventive effect of flavonols on pancreatic cancer, particularly for current smokers."

*3,3'-diindolylmethane (DIM) and its derivatives induce apoptosis **in pancreatic cancer** cells through endoplasmic reticulum stress-dependent upregulation of DR5.* Abdelrahim M, Newman K, Vanderlaag K, Samudio I, Safe S. Carcinogenesis. 2006 Apr;27(4):717-28. **Key Finding:** "DIM, ring-substituted DIMs and 1,1-bis(3'indolyl)-1-(p-substituted phenylmethanes (D-DIMs) inhibit growth of Panc-1 and Panc-28 pancreatic cancer cells. Activation of both receptor-dependent and receptor-independent (ER stress) pathways by DIM and DIM-C-pPhtBu in pancreatic cancer cells enhances the efficacy and potential clinical importance of these compounds for cancer chemotherapeutic applications."

*Dietary intake of lycopene is associated with reduced **pancreatic cancer** risk.* Nkondjock A, Ghadirian P, Johnson KC, Krewski D, Canadian Cancer Registries Epidemiology Research Group. J Nutr. 2005 Mar;135(3):592-7. **Key Finding:** "In this study, we investigated the possible association between dietary carotenoids and pancreatic cancer risk. A case-controlled study of 462 histologically confirmed pancreatic cancer cases and 4721 population-based controls in eight Canadian provinces took place. The results of this study suggest that a diet rich in tomatoes and tomato-based products with high lycopene content may help reduce pancreatic cancer risk."

*Potent chemopreventive agents against **pancreatic cancer.*** Nishikawa A, Furukawa F, Lee IS, Tanaka T, Hirose M. Curr Cancer Drug Targets. 2004 Jun;4(4):373-84. **Key Finding:** "Phenethyl isothiocyanate (PEITC) remarkably blocked the initiation phase of pancreatic as well as **lung carcinogenesis** in hamsters initiated with N-nitrosobis(2-oxopropyl)amine (BOP). However, PEITC failed to affect both pancreatic and lung carcinogenesis when given during the post-initiation (promotion) phase of carcinogenesis."

CHAPTER TWO

Evidence for the Healing Effects of Nutrient Synergies

OUTSTANDING SCIENTIFIC MEDICAL EVIDENCE has surfaced documenting the essential effect that combined nutrients have in fighting premature aging and disease. Quite simply put, a chemical synergy is a combination of two or more chemical ingredients—in this case, nutrients—that have an impact much greater than any one ingredient can have on its own.

In the same ways that we see the necessity of symbiosis in our general world, we find this process deep in the cells of plant fiber. Like the domino effect or stepping stones leading to success, one nutrient and another must combine to create the maximum health benefit. As nutritional science further delves into this team effect, researchers find that nature has created an infinite web of supporting casts that ultimately creates a pristine product.

This knowledge offers us insight into how wrong we have been in the field of nutritional supplementation. Most manufacturers produce isolated chemicals in high amounts, yet they remain completely naïve to the damaging results. Isolated chemicals alone cause havoc in a body that needs and anticipates a symphonic orchestra, not a soloist.

At the Hippocrates Health Institute, on an ongoing basis, we have observed the powerful nutritional synergistic effects that whole foods and their related supplements have on strengthening the immune system and overall health. We have also observed the ill effect that the long-term use of isolates has on the anatomy and health maintenance.

Although we are all in the beginning stages of understanding nutrient synergies, the one thing that has been well established is that you and all other life forms are dependent upon the utilization and ingestion of a wide and potentially endless gathering of supporting elements.

Human health benefits associated with the synergistic or additive impact of phytochemical combinations has been a focus for mainstream medical and nutrition research for only a decade or so. Of the thousands of phytochemicals in plants identified in laboratories thus far, just a few dozen combinations have been studied for their synergistic potential to address health problems as preventive or healing agents.

But in my own observations and work with people facing health challenges, a cause and effect pattern has been apparent, linking synergies to successful treatment strategies. Here are just two representative examples, from among hundreds that I know of, where a nutrient-dense diet of phytochemicals stimulated synergistic reactions to benefit health once the nutrients are absorbed in the human body.

Erin DeNardo, 23, of New Jersey was a beautiful fashion model traveling the world on modeling assignments. She appeared on the TV series "Project Runway" and her image graced the advertising campaigns of Levi's jeans and Ban deodorant. In 2007 she began to experience migraines that blurred her vision and inflicted severe pressure in her head.

Erin had a CAT scan that showed a brain tumor the size of a golf ball. She went through a seven-hour surgery to have the tumor removed. Still, a second surgery had to be performed to remove even more of the tumor. When she had a three-month follow-up MRI, the tumor had reappeared and physicians wanted her to undergo a third surgery with chemotherapy and/or radiation therapy. After serious consideration, she decided not to undergo the third surgery but would instead explore nutritional treatments.

She adopted a 100-percent raw vegan foods diet that consisted primarily of consuming green drinks made from fresh organic vegetables, along with drinking wheatgrass juice several times a day. Erin's next MRI revealed, to her physician's amazement, that the tumor had dramatically decreased in size and appeared to be gone. He encouraged her to continue whatever it was she had been doing because it seemed to be working. Today, Erin is a proud poster girl for what a nutrient-dense dietary regimen can achieve.

David Strong is a Florida resident and irrigation contractor who faced a similar health challenge and made the same treatment decision. He was diagnosed with prostate cancer and given the options of surgery or radiation treatment. In 2006, his PSA reading had reached more than 16, when a normal reading was 4. He decided to try a living-foods diet with green juices and wheatgrass juice.

David describes what happened: "By the third week on this diet, I had lost 40 pounds and my PSA was cut in half. It was the first time in years that I felt in control of my life. It's now been two years of living this lifestyle and my health is under control. I feel better every day and I'm happy."

The field of nutritional science is poised on a new frontier of discoveries which draw new links between nutrient synergies and human health. Here is the lineup of medical studies that support the important role that combinations of foods and their nutrient synergies play in promoting human health and healing.

Breast

Synergistic effect of apple extracts and quercetin 3-beta-d-glucoside combination on antiproliferative activity in MCF-7 human ***breast cancer*** *cells in vitro.* Yang J, Liu RH. J Agric Food Chem. 2009 Sep 23;57(18):8581-6. **Key Finding:** "The results suggest that the apple extracts plus Q3G combination possesses a synergistic effect in MCF-7 cell proliferation. The two-way combination of apple plus Q3G was conducted. In this two-way combination, the EC(5) values of apple extracts and Q3G were 2- and 4-fold lower, respectively, than those of apple extracts and Q3G alone. The combination index (Ci) values at 50 and 95% inhibition rates were 0.76 +/- 0.39-fold, respectively."

Dietary intakes of mushrooms and green tea combine to reduce the risk of ***breast cancer*** *in Chinese women.* Zhang M, Huang J, Xie X, Holman CD. Int J Cancer. 2009 Mar 15;124(6):1404-8. **Key Finding:** "We conclude that higher dietary intake of mushrooms decreased breast cancer risk in pre- and postmenopausal Chinese women and an additional decreased risk of breast cancer from joint effect of mushrooms and green tea was observed."

Suppression of cell proliferation and gene expression by combinatorial synergy of EGCG, resveratrol and gamma-tocotrienol in estrogen receptor-positive MCF-7 ***breast cancer*** *cells.* Hsieh TC, Wu JM. Int J Oncol. 2008 Oct;33(4):851-9. **Key Finding:** "These results suggest that diet-based protection against breast cancer may partly derive from synergy amongst dietary phytochemicals directed against specific molecular targets in responsive breast cancer cells, and provide support for the feasibility of the development of a diet-based combinatorial approach in the prevention and treatment of breast cancer."

Soy phytochemicals synergistically enhance the preventive effect of tamoxifen on the growth of estrogen-dependent human ***breast carcinoma*** *in mice.* Mai Z, Blackburn GL, Zhou JR. Carcinogenesis. 2007 Jun;28(6):1217-23. **Key Finding:** "**Genistein** and tamoxifen combination synergistically delayed the growth of breast tumor which decreased estrogen level and activity, and down-regulation of EGFR expressions. The results from our studies suggest that further investigations may be warranted to determine if the combination of tamoxifen and bioactive soy components may be used for prevention and/or treatment of estrogen-dependent **breast cancer**."

Cranberry phytochemical extracts induce cell cycle arrest and apoptosis in human MCF-7 ***breast cancer*** *cells.* Sun J, Hai Liu R. Cancer Lett. 2006 Sep 8;241(1):124-34. **Key Finding:** "Epidemiological studies have consistently suggested the inverse association between cancer risk and intake of fruits and vegetables. These health benefits have been linked to the additive and synergistic combination of phytochemicals in fruits and vegetables. Our results suggest that cranberry phytochemical extracts possess the ability to suppress the proliferation of human breast cancer MCF-7 cells and this suppression is at least partly attributed to both the initiation of apoptosis and the G1 phase arrest."

In vitro and in vivo antitumorigenic activity of a mixture of lysine, proline, ascorbic acid, and green tea extract on human ***breast cancer*** *lines MDA-MB-231 and MCF-7.* Roomi MW, Ivanov V, Kalinovsky T, Niedzwiecki A, Rath M. Med Oncol. 2005;22(2):129-38. **Key Finding:** "The results of this study demonstrated that the nutrient mixture tested significantly suppressed tumor growth of breast cancer cells in female athymic nude mice and significantly inhibited MMP expression, angiogenesis, and invasion in breast cancer cells in vitro, offering promise for therapeutic use in the treatment of breast cancer."

Extracts from organically and conventionally cultivated strawberries inhibit ***cancer*** *cell proliferation in vitro.* Olsson ME, Andersson SC, Berglund RH, Gustavsson KE, Oredsson S. Acta Hort. 2007 (ISHS) 744:189-94. Available at: http://www.actahort.org/books/744/744_19.htm. Accessed on May 19, 2011. **Key Finding:** "The strawberry extracts inhibited cell proliferation in **colon cancer** cells HT29 and **breast cancer** cells MCF-7 in a concentration dependent way. Extracts from organically grown strawberries inhibited cell proliferation to a higher extent than conventionally grown at the two highest concentrations. The content of ascorbate was 36% higher and the ratio of ascorbate to dehydroascorbate were eight-fold higher in the organically grown strawberries than in the conventionally grown. Ascorbate is suggested to act synergistically with other substances in the extracts."

Dietary factors modifying ***breast cancer*** *risk and relation to time of intake.* Tsubura A, Uehara N, Kiyozuka Y, Shikata N. J Mammary Gland Biol

CHAPTER FIVE

Studies Contrasting the Nutrients in Organic and Nonorganic Fruits and Vegetables

EVEN AS CONSUMERS PURCHASE INCREASING AMOUNTS of biologically grown organic food each year, corporate nonorganic farming interests continue to insist that there is no nutritional difference between organic and nonorganic plant foods.

Beyond the issue of spraying crops with insecticides, fungicides, and herbicides, known disease causers, nutrient-depleted soil adds another dimension to the problem we face. Over the last century, agricultural experts reported that crop growers had farmed and eroded away at least 75 percent of the nutrients in our soil. This, in turn, strongly reflects how much nutrition will be contained in plants grown and sold to consumers.

With this said, there is accumulating scientific data portraying non-sprayed organic fruits and vegetables, generally grown in nutrient-replenished soil, to be far superior nutrient sources than chemically saturated, commercially grown varieties harvested from virtual wastelands. One of the more significant studies, done in 2007, compared the flavonoid content of organic versus nonorganic tomatoes over a ten-year period. The study demonstrated that organic soils, over time, cumulatively intensify the levels of flavonoids in tomatoes, whereas nonorganic soils produced no such beneficial effect.

The finding that organic soils intensify nutrient levels over time has not been taken into account fully in many subsequent studies. This is especially true with meta-analyses or comparative reviews of studies that purport to examine the differences between organic and nonorganic growing practices. This nutrient difference ultimately shows up in products on grocery store shelves. A ground-breaking study in 1993, for instance, compared the mineral content of five food crops grown organically and conventionally as they were taken from store shelves over a two-year period. Clear gaps in nutrient levels were discovered.

Not long ago, I delved into this important subject by reading, speaking to, and interviewing the world's leading experts on sustainable farming. Those interactions left me even more convinced that organic food, properly grown, builds healthy people.

Eating organic means limiting the levels of synthetic chemicals being absorbed, and so can contribute to a range of health benefits, which I have seen firsthand. Take Rick Metz, for instance, who had been diagnosed with clinical depression. He spent years taking antidepressants and ended up becoming addicted to them.

As Rick told me, "I finally decided to take it upon myself to find the cause of this 'chemical imbalance' instead of simply treating it. After research I found that the chemicals going into my body in my food, as well as personal hygiene products, needed to be examined thoroughly. I gave up all of these products and went organic and vegetarian. While I had some severe withdrawals—incessant itching—the result was far beyond my wildest dreams. I am so happy to be free of medications and to live again without depression."

Michael Lanning is a Vietnam War veteran who embraced a raw organic vegetarian diet after being told in 2006 that he had kidney cancer, which had metastasized to the adrenal and lymph glands and his lungs. He was given only a year or less to live because neither chemotherapy or radiation would help. Resigned to dying, he e-mailed his good-byes to people he loved and respected.

Michael's former battalion commander, a retired major general, convinced him to try a dietary approach to treatment, as a last resort. The recommended diet was raw, organic, and vegan, and consisted mostly of sprouts, greens, onions, wheatgrass and green juices.

Michael picks up his story here: "After the first week I began to detox as more and more dark spots appeared on my body, some with small pus-filled sores. My body was now consuming only good things and was ridding itself of the previous chemical poisons I had taken in. Itching accompanied the detox. I was paying for my past dietary transgressions."

Three months after adopting this diet, Michael went to Houston's MD Anderson Cancer Center for testing. No growth in the tumors was detected. Another year passed and the tumors remained stable. Now,

several years past the date when cancer specialists predicted he would be dead, Michael remains not only alive, but vigorously so. "Since my adoption of the raw diet, I have resumed a normal life. I feel better than I did before my diagnosis. Every day that I live is one more day that seven conventional doctors said that I would not. More importantly, my days are as good as they can get."

While eating organic in and of itself can't explain these medical breakthroughs, the purity of the nutrients we absorb are important factors in the synergies that are created, which are a key to health. Simply said, healthy soil equals healthy plants, and that translates into healthy people. Here are the studies, presented in chronological order, lending support to that point of view.

Strawberry (Frafaria x ananassa Duch) fruit quality grown under different organic matter sources. Abu-Zahra TR, Tahboub AA. ISHA Acta Horticulturae 807: International Symposium on Strategies Towards Sustainability of Protected Cultivation in Mild Winter Climate. 2008. **Key Finding:** "Organic source treatments produced fruit with better color, higher dry matter, total phenols, crude fibre and carotene contents as compared to those produced by the control or conventional treatments. Also, the organic source treatments produced fruit with higher total soluble solids percentage and ascorbic acid content than with the conventional or the control treatments."

Rats show differences in some biomarkers of health when eating diets based on ingredients produced with three different cultivation strategies. Lauridsen C, Yong C, Halekoh U, et al. J. Sci Food Agric. 2008;88:720-32. **Key Finding:** Rats were fed diets of vegetables and rapeseed oil from three different cultivation methods—organic, and two methods using pesticides and varying fertilizer inputs. Rats fed from a diet grown with pesticides and high fertilizer use showed lower health-related biomarkers in most categories measured than the organic.

Intake of purple grape juice as a hepatoprotective agent in Wistar rats. Dani C, Pasquali M, Oliveira MR, et al. J Med Food. 2008 March;11(1):127-32. **Key Finding:** "Antioxidant activities were significantly correlated with polyphenol content. Our findings suggest that the intake of purple grape juice, especially of organic juice, induces a better antioxidant capacity when compared to conventional juice."

Antioxidant content in black currants from organic and conventional cultivation. Kazimierczak R, Hallmann E, Rusaczonek A, Rembialkowska E. EJPAU. 2008; 11(2). **Key Finding:** "The obtained results showed that organic black currant had considerably higher levels of compounds with antioxidant properties and higher antioxidant potential compared to fruits produced using conventional methods."

Isoflavonoids, flavonoids, phenolic acids profiles and antioxidant activity of soybean seeds as affected by organic and bioorganic fertilization. Taie H, El-Mergawi R, Radwan S. American-Eurasian J Agric Environ Sci. 2008; 4(2):207-13.

Key Finding: "Adding multi-bioorganic to 50% or 75% compost treatments produce great enhancement effects on total phenolics, total flavonoids, quercetin, genistein and daidzein contents as compared with other treatments." Addition of organic treatments "resulted in 68% and 40% increases in quercetin and genistein, respectively, as compare with inorganic treatment."

Comparison of lycopene, B-carotene and phenolic contents of tomato using conventional and ecologically horticultural practices, and arbuscular mycorrhizal fungi (AMF). Ulrichs C, Fischer G, Buttner C, Mewis I. Agron. Colomb. 2008 Jan/June;26(1). **Key Finding:** "When comparing the cultivation method, no significant differences for the analyzed nutritional parameters were found; only tomatoes grown organically had slightly lower total phenolic contents. Organic grown tomatoes increased B-carotene and total phenolic contents in fruits as a result of the AMF treatment."

The changes of the bioactive compounds in pickled red pepper fruits from organic and conventional production. Rembialkowska E, Hallmann E. J Research and Applications in Agriculture (Poland). 2008;53(4):51-7. **Key Finding:** "The obtained results of fresh red pepper showed that organic fruits contained more vitamin C, rutin, lutein, also dry matter. Conventional pepper contained more beta-carotene and lycopene."

Comparison of polyamine, phenol and flavonoid contents in plants grown under conventional and organic methods. Lima GP. da Rocha SA. Takaki M. Ramos PR. Ono EO. Int J Food Sci Tech. 2008 Oct.;43(10):1838-43. **Key Finding:** Peels of zucchini, squash, banana, potato, eggplant, orange, lime, mango, passion fruit and radish, and leaves and stalks of zucchini, squash, broccoli, carrot, collard, cassava, radish, grape, and spinach were analyzed. "Most analysed vegetables presented higher contents of polyamines and total phenols under organic cropping, contrary to the results obtained for total flavonoids, possibly because of the cultural practices adopted."

Fruit quality, antioxidant capacity, and flavonoid content of organically and conventionally grown blueberries. Wang SY, Chen CT, Sciarappa W, Wang CY, Camp MJ. J Agric Food Chem. 2008 July 23; 56(14):5788-94. **Key Finding:** "Results from this study showed that blueberry fruit grown from organic