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The Breadth of Evidence Favoring a Whole Foods, Plant-based Diet

Part II: Malignancy and Inflammatory Diseases

Authors' Note

There is perhaps no greater public health passion than that for fighting cancer. There is also perhaps no greater confusion than that surrounding nutrition and cancer. Public "cancer scares" regarding environmental exposures and alternative treatments often capture the public's attention. Though there are many unanswered questions, the enormous body of evidence relating nutrition and cancer suggests that if nutrition matters, the same diet that promotes better outcomes in cancer promotes better outcomes in diseases of metabolism, aging, and inflammation dysregulation disorders.

Part I of this two-part series discussed diseases of metabolism and aging. Part II covers malignancy and diseases of inflammation dysregulation (see Table 1). The fact that similar dietary patterns and nutrient exposures seem to be beneficial across this growing range of diseases adds weight to a very provocative argument: that a whole foods, plant-based diet not only is the optimal diet, but also has many more health effects than currently are recognized in conventional medical care.

Cancer

A 1982 report titled "Diet, Nutrition, and Cancer,"¹ written by an expert panel convened by the National Academy of Sciences, was one of the first major reports to examine the association between diet and cancer. This opportunity developed as the result of long work in the laboratory investigating the basic biochemistry of how diet affects tumorigenesis. Despite the ensuing 30 years of research in the field, and in fact because of the next 30 years of research following this report, the relationship between diet and cancer is probably murkier now than it was when the 1982 report was published.

There are many reasons to think that diet can have an important effect on various cancers, but many recent large studies have found no association between diet and cancer incidence.² This suggests two possible explanations: 1) Perhaps the dietary effect on cancer is weaker than it is for other diseases, and 2) Perhaps we have been studying the wrong diets. The vast majority of recent research on diet and cancer has been done on people in Western countries using relatively homogeneous dietary patterns, even though specific food consumption may differ. It is likely to be overall patterns (unrefined plant-based diet vs meat and processed food-based diet, for example) that best associate with cancer risk.

For example, the well-done European Prospective Investigation into Cancer and Nutrition (EPIC) recently found that there was only a 14% reduction in colorectal cancer in those subjects eating the most fruits and vegetables,³ and this effect was only marginally statistically significant. This weak inverse association disappeared among current smokers. The EPIC lowest vegetable

Executive Summary

Part I of this series examined the relationship between a plant-based diet and chronic disease. This issue reviews the relationship to one of the most feared diseases — cancer. Research over the past 30 years, since the publication in 1982 of *Diet, Nutrition and Cancer* by the National Academy of Sciences, has led to murky conclusions.

- Oral cancer is correlated with a dietary pattern rich in meat and dairy products.
- Although more than 80% of lung cancer is caused by smoking, several studies have found that fruits and vegetables are linked with lower cancer rates.
- The relationship of diet to breast cancer is more nebulous, with conflicting reports of little relationship to strong correlations with fat intake, a marker for animal

product consumption.

- Liver cancer has been associated with higher protein diets with the exceptional promoter being casein, the main protein in cow's milk.
- Colon cancer has had perhaps the most extensive dietary investigations, with reasonably consistent association with the typical Western diet.
- Multiple other associations have been found for a range of conditions such as inflammatory bowel disease and Crohn's disease, pancreatic cancer, and type I diabetes.

These two issues provide a practical compendium for the primary care physician to speak to patients interested in the role of diet in prevention and management of disease.

consumers ate only 95.1 g per day of vegetables, and the highest quintile consumed 284.4 g per day. That may sound impressive — a three-fold difference — but in fact it's a rather narrow range compared to a whole foods, plant-based diet.

By weight, the lowest quintile of vegetable intake was the equivalent of eating 1 small whole raw tomato (about 2.5" diameter) over the course of an entire day. The highest quintile intake cutoff was equivalent to 1.5 large raw whole tomatoes (3" diameter) over the course of an entire day.⁴ Using broccoli as the illustration, those eating approximately ½ cup of cooked broccoli all day as their entire vegetable intake were compared to those eating at least a little less than 2 cups of cooked broccoli all day.⁴ To complicate matters, those who reported eating the higher intake of veggies also reported consuming 27% more total calories from fat and an astonishing 34% more total calories overall (including energy from both fat and nonfat sources).³ The groups all ate about the same amount of red and processed meat by weight and the more veggies subjects ate, the more fish they reported eating. The low vegetable group reported consuming only about 1650 calories a day.

In summary, the comparison of vegetable intake extremes in this

study is between: 1) a group eating a moderately low amount of vegetables, along with increased fat, increased overall calories, and increased meat (adding red and processed meat and fish intake), and 2) a group reporting generally low overall calorie intake with very low vegetable intake. Given that food intake is difficult to measure and all food questionnaires have significant measurement inaccuracies that tend to attenuate observed relationships, it's amazing that the EPIC study found any relationship between diet and colorectal cancer at all. This characterization of the EPIC data is unfortunately applicable to many observational studies produced in North America or Europe. In these places people tend to tinker with one nutrient at a time, trade out red meat for white meat, or eat more fatty, sweet refined carbohydrates in place of meat. Virtually no studies actually have compared a whole foods, plant-based diet to a typical Western diet as they relate to cancer.

Considering these conflicting findings and "nonfindings," one possible conclusion is that altering diet in moderate ways (for example, eating baked meat instead of fried meat, eating chicken instead of beef, or eating two servings of vegetables instead of one half a serving every day) is unlikely to offer detectable

changes in cancer risks. In fact, it may be that cancer is less affected by diet, but the issue has not been studied adequately. However, many studies suggest that diet matters.

Oral Cancer

After controlling for alcohol and tobacco use and other possible factors, an Italian study group recently found that a dietary pattern rich in meat and dairy products was correlated with a 56% increased risk of having an oral cancer, whereas a dietary pattern rich in vitamins and fiber was associated with a greater than 50% reduction in risk for getting an oral cancer.⁵ The authors noted in their discussion that several other studies now have overlapping findings: plant-based dietary patterns are protective and animal-based dietary patterns are disease-promoting.⁵

Lung Cancer

It has been estimated that more than 80% of all lung cancer cases are caused by smoking.^{6,7} However, several studies also have found that fruits and vegetables are linked with lower lung cancer rates. A recent study found that those people with high fruit and vegetable intake, and in particular fruit intake, had about a 20% lower risk of lung cancer, even after controlling for smoking.⁸ This

is consistent with numerous other studies which show that people with increased intake of carotenoids and higher levels of antioxidants in their blood have reduced lung cancer rates of roughly 20%.⁹ It is debatable whether diet has an effect on lung cancer, as smoking is such an overwhelming influence, but one certainly can make an evidence-based argument that if there is any dietary effect, whole plant foods are protective.

Breast Cancer

Although many people believe breast cancer is a genetic disease, genes are to blame in only a small minority of cases; about 1 in 20 breast cancer cases can be explained by genes.¹⁰ The vast majority of women whose mothers had breast cancer, for example, need not worry about a genetic syndrome where they definitely get breast cancer.¹⁰

Beyond genes, diet has been extensively studied. Breast cancer has been connected with diet in human studies for almost 50 years. Populations around the world have widely varying incidence of breast cancer, and early studies highlighted the fact that countries that consumed higher fat diets had higher rates of breast cancer.¹¹ The level of fat in the diets of these early international studies reflected the amount of animal food in the diet. The fat was merely

a dietary marker for animal product consumption.

In addition, a long history of many experimental animal studies have shown that dietary fat can promote tumor growth.¹² Further, it has been found that genetically similar populations adopt the risk of cancer prevalent in the region in which they live. Chinese and Japanese people who live in the United States get breast cancer at far higher rates than those living in their native homeland.^{13,14}

Several biological mechanisms are thought to be involved, most prominently involving estrogen. For more than a decade, it has been noted that higher lifetime exposures to estrogens may increase the risk of getting breast cancer.¹⁵ Asian women, for example, eating a lower fat diet, have much lower levels of estrogen when compared to Western women. In addition, multiple studies have shown that women eating a lower fat diet have lower estrogen levels, though it is likely that low-fat diets don't affect hormone levels until they are "very low" fat.¹⁵ In rural China, rates of breast cancer were about one-fifth the level of what we see in Western countries. Women in rural China also were found to have later onset of menarche and earlier menopause, leaving them with fewer high-estrogen reproductive years.¹⁶ In summary, there is very strong evidence that a low-fat, plant-based diet

is likely to be protective of cancer, possibly explaining the much lower rates of this cancer in traditional cultures.

Many very large recent studies investigating the role of diet in breast cancer have reached conclusions that are equivocal at best, suggesting very little relation between diet and breast cancer.¹⁷⁻¹⁹ These studies are subject to the same criticism described above regarding the EPIC study. A reduction in breast cancer risk may be possible by making a more comprehensive shift to a whole foods, plant based diet, but this range of dietary experience has not been well studied.

Liver Cancer

Hepatocellular carcinoma is fairly rare in the United States but is quite common in developing countries. There are several causes, the largest among them being chronic infection with hepatitis B and C. These hepatitis viruses are associated with as much as 75% of all primary liver cancers, and having chronic hepatitis B increases the risk of getting hepatocellular carcinoma by more than 100-fold.²⁰

Nutrition has a role to play. Nonalcoholic fatty liver disease, which is seen in about 20%-30% of western populations,²¹ significantly increases the risk of primary liver cancer. This fatty liver disease is associated with obesity, diabetes, and the

Table 1: Disease Categorizations

Metabolic Derangements	Diseases of Aging	Malignancies	Inflammation Dysregulation Syndromes
Hypertension	Alzheimer's disease	Oral cancer	Acne
Hyperlipidemia	Parkinson's disease	Lung cancer	Chronic obstructive pulmonary disease
Coronary artery disease	Cataracts	Breast cancer	Ulcerative colitis
Gallstones	Macular degeneration	Liver cancer	Crohn's disease
Peptic ulcer disease	Renal failure	Gastric cancer	Type 1 diabetes
Gastroesophageal reflux disease	Benign prostatic hyperplasia	Colorectal cancer	Rheumatoid arthritis
Type 2 diabetes		Endometrial cancer	Multiple sclerosis
Kidney stones		Pancreatic cancer	
Gout		Prostate cancer	
Obesity			

metabolic syndrome,²¹ all of which are strongly linked to diet. The prevalence of this fatty liver disease is increasing and will be a major contributor to future liver disease burden in Western countries.²² Diabetes increases the risk of getting primary liver cancer by 2-3 fold and obesity almost doubles the risk.²³ Any discussion of liver disease is not complete without mentioning the contribution of heavy drinking. In a recent study in Minnesota, 29% of diagnosed primary liver cancer was ascribed to alcohol.²⁴

Much of the basic understanding regarding diet and cancer associations has been demonstrated through an NIH-funded laboratory research project spanning over 25 years. This program was based largely on a hepatocellular carcinoma model in experimental rodents. Important principles were demonstrated, including:

- Cancer promotion was strongly affected by dietary protein intake. Higher protein diets promoted cancer, and lower protein diets eliminated cancer promotion and even reversed the cancer that had already grown.
- The protein that was such an exceptional promoter of liver cancer was casein, the main protein of cow's milk. Plant proteins did not have the same cancer-promoting effect that casein had.

This series of experiments, funded by academic institutions and published in peer-reviewed journals, is detailed in greater depth in *The China Study*.²⁵

Gastric Cancer

The presence of the bacteria *Helicobacter pylori* is a major risk factor for gastric cancer, but studies again have shown that fruits and vegetables are linked to reduced risk.²⁶ Interestingly, salt intake has been strongly linked to mortality from gastric cancer.²⁷ In one recent study of gastric cancer in Italy, people who ate an "animal products" dietary pattern had 2.1 times the risk of getting stomach cancer while people who ate the "vitamins and fiber" dietary

pattern (fruits and vegetables) reduced their risk of getting stomach cancer by 40%.²⁸ Interestingly, a "starch-rich" pattern was associated with 67% increase in risk, but this pattern was statistically defined by a high salt intake.²⁸

Colorectal Cancer

Colorectal cancer perhaps has been the cancer most associated with dietary choices over the years. In particular, it has long been thought that high-fiber diets (only found in plant foods) protected against colon cancer. The developed world, where people consume diets rich in fat and animal products, has dramatically higher rates of colorectal cancer.²⁹ Obesity is a risk factor for this disease, suggesting that lifestyle factors play an important role.³⁰

One review published in 1990 found that more than 20 studies among 43 studies investigating diet and colorectal cancer provided moderate to strong evidence for a protective effect of dietary fiber on cancer risk.³¹ In the overall analysis, those groups eating the most vegetables had 50% reduced risk of getting colorectal cancer.³¹ This review was supported by the findings of a second review published later.³² As mentioned earlier, the EPIC study also showed a reduced risk of colorectal cancer with increased fruit and vegetable or fiber intake.^{3,33} Among a group of U.S. subjects, researchers found that consuming whole grains, beans, vegetables, and fruit was associated with a lower rate of colorectal cancer.³⁴ Although people have long believed that red meat is healthier than white meat, a study of American Adventists found that those people eating white meat had more than 300% higher odds of getting colon cancer than those people who did not eat white meat.³⁵ In addition, red meat was associated with increased risk and bean intake was associated with around a 50% decreased risk.³⁵ Health conscious, plant-based diet eaters have lower rates of cell proliferation in the colon,³⁶ which is less conducive to growing cancer and may be one mechanism by which

diet exerts its effect.

Perhaps the most impressive evidence comes from a study of people who already have diagnosed colon cancer. One study investigated the subjects' overall dietary pattern rather than trying to isolate the effects of just one food or food group.³⁷ The researchers divided the dietary patterns into a "prudent diet," characterized by fruit and vegetable intake, whole grains, and some poultry and fish; and a "Western diet," characterized by dairy foods, processed carbohydrates (sugary foods, pizza, French fries), red meat, eggs, fat, and processed meats. Those subjects who consumed diets with the highest intake of the "Western diet" pattern had almost three times the risk of having cancer recurrence within 5 years. They had more than three times the risk of having either cancer recurrence or death from any cause.³⁷

However, the effect of diet, even for this classically diet-associated cancer, remains stubbornly murky in the literature. One prospective study found that vegetarians are no less likely to get colorectal cancer than health-conscious meat eaters.³⁸ And a recent large, international review found only limited evidence to support the idea that fruits and vegetables protect against colorectal cancer.³⁹ The limited dietary changes and ranges in Western countries do not correlate to changes in cancer outcomes. Even in those studies that include vegetarians, there is limited dietary range, as most vegetarians consume large amounts of dairy foods.

Endometrial Cancer

Endometrial, or uterine, cancer is the fourth most common cancer among women in the United States. It usually strikes after menopause and only about 1% of endometrial cancers are attributable to genetic factors. It shares several features with breast cancer. Hormone exposure plays a prominent role, as estrogen exposure causes increased proliferation of the endometrial cells. Increased estrogen levels, estrogen use, early age of

menarche, and late menopause have been shown to be risk factors for this disease.⁴⁰ This clustering of lifetime hormone exposure risks is linked to dietary intake.²⁵

Furthermore, we know that obesity, hypertension, and diabetes are all independently associated with increased risk of getting endometrial cancer. Obesity alone has been associated with 40% of the incidence of this cancer.⁴¹ Being both obese and having diabetes has been linked to a three to eight times higher risk of getting this cancer.⁴⁰

A large recent review of studies of Western populations, even for people having a limited range of dietary experience, suggests that meat intake (particularly red meat) is associated with increased endometrial risk.⁴² The risk of getting endometrial cancer was 39-48% higher among the people consuming the most meat or red meat, respectively.⁴² Other studies have found that a more plant-based dietary pattern is linked to a reduced risk of endometrial cancer⁴³ and that a more Western dietary pattern (more meat, more processed foods, more sweets, and more refined carbohydrates) is linked to an increased risk.⁴⁴

Pancreatic Cancer

Like many other cancers, this disease is localized in developed areas. Developed countries have 10 times higher rates of pancreatic cancer.⁴⁵ There are several risk factors, but environment is more important than genes.⁴⁶ The best known environmental risk factor for pancreatic cancer is smoking, which is estimated to cause 25% of all cases.⁴⁶ Alcohol is known to be a cause only when consumed chronically at high levels.⁴⁶ Obesity⁴⁷ and diabetes⁴⁸ also are risk factors for pancreatic cancer, and both are lifestyle related. Some studies have shown that meat,^{49,50} fat,⁵¹ cholesterol,^{52,53} and carbohydrates (likely the refined type)⁵³ are associated with higher risk of pancreatic cancer. A dietary pattern characterized by fruits and vegetables is associated with almost 50% reduced risk.⁵⁴ Other studies have found that

dietary fiber, vitamin C,⁵⁵ and fruits, particularly citrus fruits,⁵⁵ are linked to lower risk. As with all recent cancer studies, not all findings agree.⁵⁶

Prostate Cancer

Prostate cancer is the most commonly diagnosed male cancer in the United States, with almost a quarter of a million men diagnosed per year.⁵⁷ For more than 20 years, it has been known that, like many of the diseases more common in affluent countries, prostate cancer is far more common in countries with a high intake of fat, particularly animal fat, meat, and milk.⁵⁸ Within a large cohort of Americans, obesity was found to be a risk factor for prostate cancer, just as it is for the other cancers more common in developed nations.⁴⁷ In addition, insulin-like growth factor 1 (IGF-1) consistently has been found to be associated with increased risk of prostate cancer.⁵⁹ A recent large study found that those with the highest levels of IGF-1, compared to those with the lowest, had significantly higher risk of not just prostate cancer, but also colorectal cancer and premenopausal breast cancer.⁶⁰

The food most consistently shown to be associated with increased IGF-1 is dairy,⁶¹ as shown by a controlled trial of adults consuming increased amounts of milk for 12 weeks.⁶² Animal protein, and protein in general, has also been linked to higher IGF-1 levels,⁶³ while plant foods are linked to lower levels.⁶⁴ Unsurprisingly, vegans have been shown to have lower IGF-1 levels.^{65,66} Internationally, populations consuming more cow's milk have higher rates of prostate cancer.⁶⁷ A recent meta-analysis found that the highest dairy intake is linked with a 33% increased risk of advanced prostate cancer and the highest calcium intake is linked to 46% increased risk.⁶⁸

In a recent intervention trial, a group of men with low-grade prostate cancer were advised to consume a whole foods, plant-based diet without meat, dairy, or any added fat, the same diet that reverses heart disease

(the men also used supplements: soy, fish oil, vitamins). Men with low-grade cancer had a 4% reduction in PSA levels after 1 year of this lifestyle, while the group consuming their regular diet had a 6% increase PSA levels.⁶⁹ Furthermore, a research group found that after 3 months of this lifestyle intervention, there were significant changes in the cellular genetics that are reported to affect cancer growth.⁷⁰ IGF-1 genes were downregulated.

Inflammatory Dysregulation Disorders

Acne

A recent review of literature suggests that dairy products make acne worse.⁷¹ Populations with very low dairy consumption have low acne prevalence. Among single populations of people, those who consume more dairy have higher rates of acne. Further, there are mechanisms that support our understanding of how dairy exerts its effect. The increase in IGF-1 secondary to dairy intake is thought to be involved.⁷¹

Chronic Obstructive Pulmonary Disease

Chronic obstructive pulmonary disease (COPD) is overwhelmingly caused by smoking with contribution from other factors such as genetic predisposition and occupational/environment exposures. Smoking is thought to cause 50-80% of the cases of this disease.⁷² There are some indications that what people eat also may affect their risk of getting the disease. It should be noted that inhalation of any toxic agents increases oxidative stress, part of the pathogenesis of COPD. Antioxidants may affect this process. Studies that compare intake of vitamins C and E, beta-carotene, lutein/zeaxanthin, and catechin (flavonoid) show that people have better lung function with higher intakes of these antioxidants. Similarly, when measured in the blood, those people with higher

levels of these antioxidants in the blood have better lung function.⁷² Foods linked to poorer lung function include cured meats (bacon, hot dogs, processed meats), with people with high intakes having almost twice the risk of COPD.⁷³ It is most likely not just one chemical from any one fruit or vegetable that is beneficial. Individual antioxidant supplements in mega-doses have never been shown to aid lung function. In fact, beta-carotene taken as a supplement has been shown to increase the chances of getting lung cancer.⁷⁴

Inflammatory Bowel Disease

Inflammatory bowel diseases, including Crohn's disease and ulcerative colitis, are thought to be caused by a combination of genetic predisposition, environmental factors, and an altered immune system. Clearly, environmental factors are very important. Over the past 50 years, the incidence of inflammatory bowel disease has dramatically increased.^{75,76} In Japan, the increase of Crohn's disease was strongly correlated with increased intake of total fat, animal fat, animal protein, and milk protein. Vegetable protein intake decreased as incidence increased.⁷⁶ In addition, migrants who move to Western countries have increasing rates of inflammatory bowel disease.^{77,78} Interestingly, infant nutrition seems to play a role, with those infants who are breastfed being less likely to have inflammatory bowel disease later in life.⁷⁹

More recently, a review of 19 studies found an increased risk of developing ulcerative colitis with high intake of fat, omega-6 fatty acids, and meats.⁸⁰ Crohn's disease was associated with high intake of meat, certain fatty acids, and saturated fat. High total protein intake was associated with an 87-148% increased risk of inflammatory bowel disease. Another recent prospective cohort study of French women found that women with the highest intake of protein had more than a three-fold risk of getting inflammatory bowel disease, and that animal protein was related to increased risk but that

vegetable protein was not.⁸¹ Meat and fish/seafood products as food groups also were associated with increased risk. Another review notes that sugar has been implicated as being associated with increased rates of Crohn's disease.⁸²

Researchers followed 191 patients who had been diagnosed with ulcerative colitis for a year⁸³ and found that those with the highest intakes of meat had 3.2 times the risk of relapse. Red and processed meat had the most negative effect, increasing risk by more than five times. Protein and alcohol intake also increased the risk of relapse.⁸³ Crohn's disease, once established, appears to be far harder to keep in remission through nutritional means. Artificial nutrition, both elemental enteral feeds and total parenteral nutrition, has been shown to treat acute Crohn's flares, though less effectively than steroids.⁸⁴ Limited evidence supports adopting an elimination diet, which is implemented by the patient eating a very basic diet then adding one food per day. If it causes symptoms, the offending food should be avoided. Common foods that provoke symptoms have been found to be cereals, milk, eggs, and certain vegetables and fruits.⁸⁴

Type 1 Diabetes

There is now substantial evidence that type 1 diabetes may be caused or triggered by premature exposure to cow's milk. Certain children have a genetic predisposition that makes them more likely to get this disease. Although many genes have been implicated in the cause of type 1 diabetes,⁸⁵ none guarantees the disease. There also is the possibility that a virus may set off the disease process.⁸⁵ A paper published more than 20 years ago shows that across different populations, the amount of milk consumed is almost perfectly correlated with the incidence of type 1 diabetes.⁸⁶ Other groups have also found positive correlations between the intake of milk, or components of milk, and type 1 diabetes.^{87,88}

Children with diabetes are more likely to have certain antibodies

against components of cow's milk, particularly IgA antibodies to beta-lactoglobulin.⁸⁹ A large, well-designed study is underway comparing genetically susceptible children who were weaned to two different formulas.^{90,91} One formula includes protein already hydrolyzed to its amino acids, while the other formula is the standard cow's milk-based formula with intact proteins. Early results show that children weaned to the hydrolyzed protein formula had only about 50% the cumulative incidence of one or more diabetes-associated autoantibodies.⁹⁰ This supports the idea that intact cow's milk proteins may be a significant contributor to this disease.

Rheumatoid Arthritis

There is some indication that people in developing countries have lower prevalence of rheumatoid arthritis,⁹² although clearly there is less international variation than there is with heart disease or other clearly delineated "diseases of affluence." Twin studies show that there is only a 15-20% concordance rate between monozygotic twins.⁹³

One trial in the late 1990s studied two groups of patients with rheumatoid arthritis.⁹⁴ One group was given an intense dietary intervention that consisted of an initial 7- to 10-day fast where the subjects consumed only vegetable juices and other liquids, followed by a pure vegan, gluten-free diet for another 3 months, and then a vegetarian diet for another 9 months. The control group continued eating a routine omnivorous diet. The experimental group had significantly improved symptoms, including less joint pain, swelling, and tenderness; less morning stiffness; and more weight loss, especially through the first 4 months of the strict vegan portion of the program. Subjects in the experimental group also showed significantly lower white blood cell count, erythrocyte sedimentation rate, and C-reactive protein. Perhaps most interestingly, the microbiology of the colon changed significantly with those people who were experiencing

improved symptoms. The bacterial content of the gut seemed to vary in accord with the symptoms of the disease.⁹⁴

Another group of researchers compared two groups of RA patients for 1 year.⁹⁵ One group consumed a vegan diet, the other continued on an omnivorous diet. Forty percent of the group on a vegan diet had symptoms that improved by at least 20% based on established criteria. Only 4% of the omnivores improved. The researchers noted that the symptomatic improvement among the vegans was concurrent with a reduction in the immune system reaction to both cow and wheat protein (IgG anti-gliadin and IgG anti-beta-lactoglobulin).⁹⁵ Another American study showed that after just 4 weeks of consuming a very low-fat, vegan diet, a group of 24 patients with rheumatoid arthritis had improved symptoms while C-reactive protein and rheumatoid factor showed non-significant decreases.⁹⁶ Other small studies⁹⁷⁻⁹⁹ have shown that vegan diets, or at least dairy-free diets,¹⁰⁰ sometimes with the exclusion of cereals, may improve some aspects of disease symptoms in patients diagnosed with rheumatoid arthritis.

Multiple Sclerosis

Multiple sclerosis (MS) is geographically localized, being far more prominent in some parts of the world than others. MS is more prevalent at higher latitudes, which coincides with lower amounts of time in the sun and lower serum levels of vitamin D, both of which have been associated with higher MS rates.¹⁰¹ In addition, tobacco smoking is now known to be a risk factor.¹⁰¹ Of dietary variables, MS seems to cluster in areas that have higher milk consumption¹⁰² as well as areas that have higher non-fish meat consumption, especially processed meat consumption.¹⁰¹ Protective dietary components include fish, and there have been some indications that vegetable intake is linked to lower MS rates.¹⁰¹

Research by Swank showed that dietary practices of people with

already diagnosed MS show a remarkable effect. Following 144 patients for more than 20 years, Swank showed that a low-saturated fat, more plant-enriched diet dramatically altered the progression of MS. Regardless of the stage of MS when patients started the diet, those people who adhered to this low-saturated fat diet had less progression of neurologic disability, less all-cause mortality, and less death from MS.¹⁰³

Conclusions

As first noted, summarizing and generalizing a biological relationship so complex as food and health or disease is fraught with considerable risk. Judging any argument needs to take into account the depth and breadth of the evidence. Often it seems that a case can be made for almost any recommendation regarding optimal dietary practices, but only a few dietary strategies actually are supportable under the scrutiny of the breadth and depth of the evidence, especially when requiring observational, mechanistic, and interventional evidence.

The breadth of evidence favoring a whole foods, plant-based diet is certainly becoming impressive, though few single studies are strong enough to make absolute conclusions regarding any particular diet-disease relationship. Regarding the depth of evidence, there is substantial evidence favoring unrefined plant-based foods for the metabolic diseases, including cardiovascular disease. However, the benefits of consuming a whole-food, plant-based diet can no longer be ignored.

It is important to note that although most studies are focused on the direct testing of individual food components (especially in animal experiments), the whole foods, not the individual nutrients of those foods, are primarily responsible for the vast majority of food effects on health. This is becoming apparent with the emergence of a considerable number of meta-analyses now showing that individual food components, as in supplements, do not show the same effects as do the whole foods

themselves and sometimes are even harmful. Although sugar cereal can be loaded with a dozen different vitamins, there is no evidence to suggest that the cereal then has the same health benefits of a food that naturally contains the vitamins.

The next frontier of medicine should be to treat the causes of disease, and if the causes include poor dietary and lifestyle choices for so many different ailments, physicians must take a serious look at helping patients make healthier choices. Some patients embrace the chance to treat and prevent disease naturally without pills and procedures laden with potential adverse effects, but reaching these patients requires that physicians know the best dietary and lifestyle prescriptions and that there is a system to educate, inspire, and reinforce patients in making good choices. Given the breadth of evidence in various diet and disease associations, the prescription so vital for many patients with many different conditions should be a whole foods, plant-based diet.

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Primary Care Reports CME Objectives

Upon completion of this activity, participants should be able to:

1. Summarize recent, significant studies related to the practice of primary care medicine;
2. Evaluate the credibility of published data and recommendations related to primary care medicine;
3. Discuss the advantages and disadvantages of new diagnostic and therapeutic procedures in the primary care setting.

CME Instructions

To earn credit for this activity, please follow these instructions.

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CME QUESTIONS

1. What is one of the authors' major concerns about studying nutrition and cancer in Western populations?
 - a. Western populations do not have enough variation in disease outcomes to reliably detect nutrition-disease outcomes.
 - b. Western populations almost uniformly consume animal and processed food-based diets, limiting the ability to detect nutrition-disease relationships.
 - c. Studies routinely focus on food groups rather than individual nutrients, when it has been proven that it is the individual nutrients matter.
 - d. Populations in developed countries cannot be expected to reliably commit to dietary protocols.
2. Which of the following themes of research findings *does not* appear in diet-cancer literature?
 - a. For several cancers, when ethnic groups migrate to foreign countries, they tend to adopt the cancer risk of the country to which they move.
 - b. Certain cancers (i.e., breast, colorectal, prostate) cluster in geographic areas of affluence along with higher incidence rates of metabolic diseases (obesity, cardiovascular disease, hypertension).
 - c. Several large human studies have now shown that dietary interventions can halt or reverse multiple types of cancer.
 - d. Several large studies have recently found that there appears to be no relationship between diet and many types of cancer.
3. Published trials now suggest that once disease is established, dietary intervention can improve disease specific symptoms, markers, and/or outcomes in all of the following *except*:
 - a. rheumatoid arthritis.
 - b. prostate cancer.
 - c. multiple sclerosis.
 - d. gastric cancer.
4. Which of the following may play a role in the pathogenesis of type I diabetes?
 - a. Premature weaning from maternal breast milk
 - b. Exposure to cow's milk
 - c. A virus
 - d. All of the above
5. Regarding inflammatory bowel disease (IBD), which of the following is true?
 - a. The incidence of IBD has been roughly stable over the past 100 years.
 - b. Increased meat intake has been linked to a greater than three-fold risk of relapse in those patients who have been diagnosed with ulcerative colitis.
 - c. A low residue diet has been shown to improve the risk of getting a relapsing Crohn's flare.
 - d. The incidence of Crohn's has never been linked to diet but published trials have now shown that established Crohn's disease can be reversed with whole-food, plant-based diets.

In Future Issues: Medically Self-Sabotage and Borderline Personality

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2011 Subject Index: Volume 17, Numbers 1-12

1. Screening and Brief Intervention: A Framework for Effective Conversations with Your Patients

By Douglas W. Teller, MD; Kriss Haren, MA, MS, PCC-S; Sheryl Gould, MS, PCC-S; and Jennie Strausburg, MS, LSW, LPC-S

2. Acetaminophen Toxicity

By Michael Levine, MD, and Frank LoVecchio, DO, MPH, FACEP, ABMT

3. Syncope

By Azamuddin Khajz, MD, MRCP, and Adam Ahmed, MBBS

4. Childhood Obesity in Practice

By Robert D. Murray, MD, and Samantha Anzeljc, BS

5. Whooping Cough: Management and Diagnosis of Pertussis

By Margie S. Teng, MD, and N. Ewen Wang, MD

6. Medication Safety During Pregnancy

By Nicole M. Acquisto, PharmD, and Wendy B. Gelbard, MD

7. Osteoporosis

By Charlie Abraham, MD

8. Vitamin D: Health and Disease

By Mubeen Khan, MD, and Udaya M. Kabadi, MD

9. Innovative Antidepressant Newcomers: Suitability in Primary Care

By Randy A. Sansone, MD, and Lori A. Sansone, MD

10. Update on Current Management of Atrial Fibrillation

By Sula Mazimba, MD, MPH; Mauricio Anaya-Cisneros, MD; and Analkumar Parikh, MD

11. "Disappearing" Infectious Diseases

By Asim Abbasi, MD, and Colleen O. Davis, MD, MPH, FAAP, FACEP

12. Adult Sickle Cell Anemia

By Karen Kirkham, MD, FACP

A

Acetaminophen toxicity

alcoholic, 2:19
diagnosis, 2:16, 2:18
epidemiology, 2:13
liver failure, 2:14, 2:19
opiates, 2:19
pediatrics, 2:19
pharmacokinetics, 2:14
pregnancy, 2:19
presentation, 2:15
prevention, 2:20
prognosis, 2:19
treatment, 2:16

Acyclovir

intravenous, 11:111
oral, 11:111

Agomelatine (Valdoxan), depression, 9:86

background, 9:90
dosing, 9:91
overdose profile, 9:91
pharmacology, 9:91
sample studies, 9:91
side effects, 9:91

Alcohol

acetaminophen toxicity, 2:19
health risks, 1:3

Alendronate, osteoporosis, 7:66

Amphetamine-type stimulants, health risk, 1:3

Analgesia, patient-controlled, sickle cell disease, 12:129

Antiarrhythmic drugs, 10:102, 103

coronary artery disease, 10:103
heart failure, 10:103
hypertensive heart disease, 10:103

Anticoagulation

atrial fibrillation, 10:102
pregnancy, 6:57

Antidepressant use, 9:85

Asthma, pregnancy, 6:50

Atrial fibrillation

antiarrhythmic drugs, 10:101, 102
anticoagulation, 10:102
causes, 10:99, 100
catheter ablation, 10:103
classification, 10:97, 98

echocardiography, 10:102
epidemiology, 10:97
etiology, 10:97
heart rate control, 10:101
implantable atrial
defibrillators, 10:104
management, 10:101
manifestation, 10:99
pacemaker, 10:103
rhythm control, 10:101
surgical ablation, 10:103
symptoms, 10:99

B
Biphosphonates
alendronate, 7:66
cholecalciferol, 7:66
ibandronate, 7:66
osteoporosis, 7:66
risedronate, 7:66
zoledronic acid, 7:66
Bone mineral density, 7:63
WHO classification, 7:64

C
Calcitonin, osteoporosis, 7:67
Calcium intake, 7:65
Cancer, vitamin D, 8:79
Cannabis, health risks, 1:3
Cardiac pacing, syncope, 3:32
Cardiac syncope, 3:26
Carotid sinus syncope, 3:26;
3:28
Catheter ablation, 10:103
Cholecalciferol, osteoporosis,
7:66
Cocaine, health risks, 1:3
Communication with patients,
1:4-5
Coronary heart disease,
vitamin D, 8:78

D
Defibrillator, implantable atrial,
10:104
Denosumab, osteoporosis, 7:67
Depression, 9:85
new medications, 9:86
prevalence, 9:86
Diabetes, vitamin D, 8:77
Dysrhythmia, pregnancy, 6:52

E
Echocardiography, 10:102
Emsam (see selegiline,
transdermal), 9:87
Exercise, osteoporosis, 7:65

G
Genitourinary tract infection,
pregnancy, 6:56

H
Heart rate control, 10:101
Hormone replacement therapy,
osteoporosis, 7:68
Hydroxyurea, sickle cell disease,
12:129
Hypertension
pregnancy, 6:54
vitamin D, 8:77

I
Ibandronate, osteoporosis, 7:66
Immunization, pregnancy, 6:58
Infection, pregnancy, 6:55

L
Liver failure, acetaminophen
toxicity, 2:14-15, 2:19

M
Malaria chemoprophylaxis,
sickle cell disease, 12:129
Measles
clinical presentation, 11:111
complications, 11:111
differential diagnosis, 11:111
epidemiology, 11:111
exposure, 11:112
treatment, 11:111
vaccination, 11:112
Metabolic syndrome, vitamin D,
8:77
Motivational interviewing, 1:8
Mumps
clinical presentation, 11:114
complications, 11:114
differential diagnosis, 11:114
epidemiology, 11:114
exposure, 11:115
overview, 11:114
treatment, 11:115

N
Nausea, pregnancy, 6:53
NIH consensus statement
calcium intake, 7:65

O
Obesity
body mass index, 4:39
childhood, 4:37
counseling, 4:43

healthy servings, 4:44
internet resources, 4:40
risk, 4:42
Oleptro (see trazodone
extended-release), 9:89
Opioids
acetaminophen toxicity, 2:19
health risks, 1:3
Oral anticoagulant, 10:102
Osteoporosis, 7:61
bisphosphonates, 7:66; 7:68
calcitonin, 7:67
denosumab, 7:67
diagnosis, 7:63
evaluation, 7:63
exercise, 7:65
hormone replacement therapy,
7:68
pathogenesis, 7:61
pharmacologic therapy, 7:68
prevention, 7:65
risk factors, 7:61
screening, 7:69
teriparatide, 7:67
testing, 7:63-64

P
Pacemaker therapy, 10:103
Pain
pregnancy, 6:56
sickle cell anemia, 12:122
Pediatrics
acetaminophen toxicity, 2:19
obesity, 4:37
Penicillin prophylaxis, sickle cell
disease, 12:129
Pertussis
clinical symptoms, 11:115;
5:38
complications, 11:116; 5:40
diagnostic testing, 5:41-42
differential diagnosis, 11:115;
5:40-41
epidemiology, 11:115; 5:38
exposure, 11:116
infants, 5:44
overview, 11:115
presentation, atypical, 5:39
public health implications,
5:45
treatment, 11:116; 5:43
vaccination, 11:116; 5:45
Piracetam, sickle cell disease,
12:129
Polio
clinical presentation, 11:113
complications, 11:113
differential diagnosis, 11:113

epidemiology, 11:113
exposure, 11:111
treatment, 11:114
vaccination, 11:114

**Polysaccharide pneumococcal
vaccination, sickle cell disease,
12:129**

Pregnancy

acetaminophen toxicity, 2:19
anticoagulation, 6:57
asthma, 6:50
dysrhythmia, 6:52
FDA medication categoriza-
tion, 6:49; 6:51
gastrointestinal, 6:53
genitourinary tract infection,
6:56
hypertension, 6:54
immunization, 6:58
medication safety, 6:49;
6:51-52
nausea, 6:53
pain, 6:56
pharmacologic management,
6:50
respiratory tract infection,
6:55
thromboembolic disease, 6:57
urinary tract infection, 6:55
vomiting, 6:53

R

Reflex syncope, 3:26

**Respiratory tract infection,
pregnancy, 6:55**

Rheumatic fever, heart disease

clinical symptoms, 11:116
epidemiology, 11:116
exposure, 11:111
Jones criteria, 11:117
treatment, 11:116

Risedronate, osteoporosis, 7:66

S

SBIRT, 1:2

**Screening and brief interven-
tion, 1:1**

Sedatives, health risks, 1:3

**Selegiline patch (Emsam),
depression 9:86**

background, 9:87
dosing, 9:88
overdose profile, 9:88
pharmacology, 9:88
sample studies, 9:88
side effects, 9:88

Sickle cell anemia, adult, 12:121
cardiac, 12:125

dermatologic, 12:125
gastrointestinal, 12:126
genitourinary, 12:127
gynecologic, 12:130
hematologic, 12:127
interventions, 12:129
management, 12:126
musculoskeletal, 12:128
neurologic, 12:129
obstetric, 12:130
ophthalmologic, 12:130
pain, 12:124
pulmonary, 12:130
renal, 12:132

Situational syncope, 3:26

STAR*D trial, 9:86

Substance misuse, 1:4

Surgical ablation, 10:103

Syncope

arrhythmia, 3:26
autonomic failure, 3:27
cardiac rhythm monitoring,
3:29
cardiac pacing, 3:32
cardiac syncope, 3:26
carotid sinus massage, 3:28
echocardiography, 3:31
elderly, 3:33
electrophysiology, 3:31
epidemiology, 3:25
head up tilt testing, 3:29-30
history, 3:28
orthostatic challenge, 3:29
pathophysiology, 3:35
prognosis, 3:33
psychiatric causes, 3:28; 3:31
reflex syncope, 3:26
structural heart disease, 3:27
tachycardia, 3:27
treatment, 3:31

T

Tachycardia, syncope, 3:27

Teriparatide, osteoporosis, 7:67

**Thromboembolic disease,
pregnancy, 6:57**

**Thymanaz (see agomelatine),
9:90**

Tobacco, health risks, 1:3

**Trazodone (Oleptro), depres-
sion, 9:86**

background, 9:89
dosing, 9:89
overdose profile, 9:89
pharmacology, 9:89
sample studies, 9:89
side effects, 9:89

U

**Urinary tract infection,
pregnancy, 6:55**

V

**Valdoxan (see agomelatine),
9:90**

Varicella

acyclovir, oral, 11:111
clinical symptoms, 11:109
complications, 11:110
differential diagnosis, 11:110
epidemiology, 11:109
exposure, 11:111
overview, 11:109
treatment, 11:110

Vasovagal syncope, 3:26

Viibryd (see vilazodone), 9:89

**Vilazodone (Viibryd), depres-
sion, 9:86**

background, 9:89
dosing, 9:90
overdose profile, 9:90
pharmacology, 9:90
sample studies, 9:90
side effects, 9:90

Vitamin D

cancer, 8:79
coronary heart disease, 8:78
deficiency, 8:75
diabetes, 8:77
disorders, 8:79
extraskeletal effects, 8:76
history, 8:73
hypertension, 8:77
metabolic syndrome, 8:77
metabolites, 8:75, 8:81
mortality, 8:75
pathway of synthesis, 8:74
physiology, 8:74
rickets, 8:80

Vomiting, pregnancy, 6:53

W

**WHO classification, bone
mineral density, 7:64**

Whooping cough, see Pertussis

Z

**Zinc sulfate, sickle cell disease,
12:129**

Zoledronic acid, 7:66

