



*Nutritional Counselling
for Undesirable Dietary
Patterns and Screening
for Protein/Calorie
Malnutrition Disorders
in Adults*

By Christopher Patterson

Nutritional Counselling for Undesirable Dietary Patterns and Screening for Protein/Calorie Malnutrition Disorders in Adults

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The consumption or lack of consumption of certain nutrients has been associated with a wide variety of illnesses. This chapter focuses upon diseases induced by excessive consumption and selected deficiency states. There is a strong association between excessive consumption of saturated fats and coronary artery disease, and weaker associations between consumption of fats and malignancies of the breast, colon and prostate. (Also see chapters on childhood obesity (Chapter 30), obesity (Chapter 48), cholesterol screening (Chapter 54), and lung cancer (Chapter 64). Chapters making nutritional recommendations for pregnant women should also be consulted where possible: neural tube defects (Chapter 7), low birth weight (Chapter 4), iron supplementation (Chapter 6), breast feeding (Chapter 22), iron deficiency anemia (Chapter 23), and dental caries (Chapter 36)). There is good evidence for the efficacy of nutritional counselling by non-physicians. In 1979 the Canadian Task Force on the Periodic Health Examination concluded that there was insufficient justification to screen the general population for malnutrition, but recommended screening and/or case-finding for certain high risk groups. <1> High-risk groups included adolescent girls, pregnant women, women who breast feed for unusually long periods, the elderly (especially if living alone), Native peoples and food faddists.

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Burden of Suffering

Dietary Excess

Diseases associated with dietary excess and imbalance rank among the leading causes of illness and death in the western world. Major diseases in which diet plays a role include coronary artery disease, some cancers and cerebrovascular disease. Coronary artery disease is the leading cause of death in Canada, accounting for about 46,600 deaths per year. Cancer of the colorectum, breast and prostate are epidemiologically associated with nutritional risk factors and together cause 15,500 deaths annually. Cerebrovascular disease is the third leading cause of death accounting for about 13,900 deaths per year. Caloric intake exceeding energy expenditure can lead to obesity, which in turn is a risk factor for both hypertension and type II diabetes mellitus. Hypertension is also associated with excessive sodium intake. Sequelae of hypertension include stroke, cardiac and renal failure. Diabetes is a leading cause of neuropathy, peripheral vascular disease, renal failure and blindness.

Major disparities between recommended dietary practices and actual consumption are most notable in intakes of fat (30% vs. 38%) and complex carbohydrates (55% vs. 48%). There is also concern about excessive consumption of inappropriate vitamin and mineral supplements. Multivitamins are the most commonly consumed supplements, followed by vitamin C, calcium, vitamin E and vitamin A. Men and women over the age of 65 are the primary purchasers. While few individuals consume nutrient and vitamin preparations in amounts considered toxic, the need for these supplements for most people is questionable. Reasons cited for nutrient supplement use are often inappropriate (e.g. to improve general health, to prevent colds and other illnesses, to prolong youth, increase energy level, etc.). Most people receive advice on the use of supplements from unreliable sources. Large amounts of vitamin C can result in a rebound deficiency with clinical signs of scurvy when supplements are stopped abruptly. High doses of vitamin C may interfere with the absorption of vitamin B12, and lead to the formation of oxalate renal calculi. For fat-soluble vitamins, excess intake of Vitamin A may cause bone and joint pains, changes in the skin and hair, hepatomegaly and benign intracranial hypertension. Vitamin D excess may lead to hypercalcemia and excessive excretion of calcium with skeletal decalcification. Self administered calcium supplements from "natural sources" may be contaminated with toxic substances such as lead. Excessive doses of zinc may interfere with immune function.



Excessive dietary fat intake contributes to 75,000 deaths annually in Canada

Deficiency Disorders

Nutritional factor deficiencies have been linked to osteoporosis, diverticular disease, constipation, and iron deficiency anemia. Seventy-four to eighty percent of women do not meet the recommended requirement for calcium. Dietary deficiency of calcium has been implicated in the genesis of osteoporosis. Those who are less exposed to the sun, and hence less capable of dermal photosynthesis of cholecalciferol may be at particular risk; this includes many elderly living alone or in institutions. An estimated 40% of North American women will suffer from osteoporosis-related fractures by the time they reach age 70. Hip fractures are associated with significant pain, disability, decreased functional independence and high mortality. Deficiency of dietary fibre has been implicated in constipation and other gastrointestinal disorders such as diverticulosis. A large number of adults do not consume Recommended Nutrient Intakes (RNI) for dietary fibre. Constipation is a frequent complaint, and diverticular disease produces significant morbidity. Iron deficiency is common in menstruating women whose diet is deficient in foods containing available iron, especially meats. Pregnant women, and those who nurse for a prolonged period of time are also at risk for iron deficiency. Up to 63% of people over age 60 have been documented to have deficient iron intakes.

Chronic alcoholics are at high risk for deficiency disorders as they derive an excessive amount of energy from alcohol to the detriment of other nutrients, resulting in deficiency of water-soluble vitamins, particularly thiamine. Strict vegetarians are another vulnerable group for B group vitamin deficiency.

Five to six percent of males and 15-22% of females in Canada have a low body mass index (BMI less than 20) which may be associated with health problems. Malnutrition is associated with an increased prevalence of complications and high mortality among hospitalized patients. While those living alone are at risk, institutional care is associated with malnutrition in as many as 52-85%. Protein/calorie malnutrition (PCM) is characterized by inadequate intake of both energy and protein or a sufficient energy intake with a high carbohydrate, low protein diet. A weight loss of 10-20% from usual weight represents moderate PCM, and a loss greater than 20% indicates severe PCM. Due to the difficulty of defining PCM the true prevalence is unknown, but in a community study, Canada's Health Promotion Survey, 8% of younger women and 15% of women aged over 65 years had BMI values that placed them in the underweight category. <4> PCM has been reported in 17-44% of general medical and 30-65% of general surgical hospital in-patients.

RNI are based upon average intakes of healthy people, levels of intake that are known to be associated with deficiency, and a limited number of studies of nutrient supplementation. In one Canadian study,

10-28% of elderly were at risk for dietary deficiency of calcium, beta-carotene and vitamins A, D, and C.

Detection Maneuver

There are three principal methods to determine nutrient history: screening questionnaires, dietary records and dietary recall.

Self-administered questionnaires are believed to provide reasonable estimates of current nutritional intakes,^{<5>} particularly for those nutrients that are highly concentrated in relatively few foods. The validity of food frequency questionnaires may be affected by gender, educational, cultural and other factors which influence recall. Alcohol is one of the most difficult items to quantify and underestimates are frequent. Other chapters address alcohol more directly: Chapter 5 on fetal alcohol syndrome, Chapter 41 on children of alcoholics, and Chapter 42 on early detection and counselling of problem drinking. Inaccuracies extend to other food items, and many people have difficulty reporting accurate portion size.^{<6>}

The seven-day weighed dietary record has commonly been regarded as the gold standard for assessing habitual dietary intake. However, recent studies have found significant bias in reporting habitual energy intakes.^{<7-9>} Dietary records are intrusive, which may interfere with compliance.

Recalled diet information more accurately characterizes former dietary intakes than does current diet information.^{<10>} The Food Frequency Questionnaire is more reliable for the distant past than the recent past.^{<11>} When individuals change food consumption during a four year period, their estimates of former consumption are biased towards their current consumption. Where food consumption remains stable, there is good agreement between recalled diet and original diet information.^{<12>}

Determination of dietary intake for older people is problematic. Increased prevalence of memory disorders in old age may interfere with the accuracy of dietary recall. Twenty-four hour recall grossly underestimates actual intake. In young adults, recall is more likely to produce a reliable estimate of intake where a regular meal pattern is maintained, although snacking is often omitted from reports. In the case of dietary records and food weighing, the effort required to weigh food may result in unwillingness to participate, limiting the generalizability of results to those with greater compliance.

Physical Examination

Other than the finding of obesity, physical examination is unhelpful for determining whether appropriate quantities of nutrients are being consumed. In malnutrition, the early changes are not easily distinguished from changes of normal aging. Abnormally thin or sparse

hair, changes to the tongue and angles of the mouth and lips may be seen, but require supporting dietary and biochemical evidence to establish a diagnosis of malnutrition. Anthropometric measures include height, weight and calculation of body mass index (BMI). As older people tend to become shorter, measurement may not reflect former adult height. Ulnar and fibular length appear to correlate well with former height in older people. Adiposity may be assessed by girth or skin fold measurements. Measuring triceps skinfold thickness (TSF) and arm muscle area (AMA) is simple, however interobserver variability is problematic with TSF and adequate norms have not been established for all age groups. Midarm muscle circumference (MAMC) and AMA do not correlate well with biochemical measures of protein status and are insensitive to early changes. In severe malnutrition, an AMA of less than 16 cm² correlates highly with 90 day mortality. Anthropometric measurements may be affected by the accuracy of location for each measurement, and the skill level of the observer.

Laboratory Measurement

Serum protein measurements are commonly used to assess nutritional status. Albumin levels change slowly, due to a long half-life (14 days) and a large pool. Reduced levels are not specific for protein deficiency, as concentrations tend to fall in advanced age and in the presence of chronic disease. Serum transferrin may be more responsive to rapid change due to a shorter half-life (8-10 days) and a smaller body pool of the protein. An absolute lymphocyte count of less than 1500/mm³ indicates malnutrition if other causes of lymphopenia are excluded. Moderate to severe malnutrition is associated with more marked lymphopenia.

While measures of specific vitamins may be valuable to confirm deficiency, normal ranges for the elderly are not clearly established, and blood nutrient levels may not reflect whole body nutrient stores.

The Nutritional Risk Index (NRI) is a risk index based on data collected from personal interviews, anthropometric measurements, laboratory assay of nutritional perimeters, three day food records and medical records review. It is reported to be a valid measure of health status.<13>

Effectiveness of Prevention

Counselling

The media currently serve as the most popular source of nutrition information. Improper nutrition is often due to uninformed food selection, although lack of funds to purchase food is also a factor. The ability to change dietary habits of patients through nutritional counselling by non-physicians has been demonstrated in a number of



Numerous randomized trials establish the value of nutritional counselling to reduce dietary fat intake

clinical trials involving both specialized and community-wide programs.<14> The following randomized trials are representative of the available evidence: in each case the intervention has been carried out by non-physicians.

Comprehensive worksite nutritional intervention, consisting of classes and food demonstrations, labelling nutritional information in cafeterias and individual counselling, produces a small but significant decrease in mean dietary fat intake.<15> In a small study of hypercholesterolemic adults, an initial counselling session accompanied by the distribution of printed materials was effective in lowering dietary cholesterol levels and increasing dietary fibre intake. Follow-up counselling was effective in maintaining positive change.<16> A course of individual instruction, together with behavioral counselling in groups of 12 to 15, initially weekly, then biweekly and later monthly, was effective in reducing the percentage of energy derived from fat from 39% to 21% in middle-aged women; the control group who received no intervention showed no significant change in dietary fat intake.<17> In a study examining the effects of individual and group nutritional education in males recuperating from myocardial infarction, desirable changes in fat intake were seen only in those receiving education. Those receiving lectures did as well as those receiving food preparation demonstrations. Beneficial changes persisted up to 24 months.<18>

In a study designed to simulate the type of intervention possible within the primary care setting, five-minute interviews were conducted at which generic self-help educational materials were distributed by a registered nurse. Ten days later the treatment group received a follow-up telephone call. Three months later a telephone interview was carried out by individuals blind to subject assignment, to determine whether changes in dietary intake had occurred. Even with this brief intervention, small but significant reductions in fat intake and increases in fibre intake were evident, but only in those subjects who had some responsibility for meal preparation.<19> In the Women's Health Trial, groups of 8 to 15 women attended eight weekly sessions, eight bi-weekly sessions and subsequent monthly sessions. Substantial decreases in fat consumption occurred, from 38% of total calories to 21%. The husbands of women receiving the active intervention reported an average weight loss of 2.4 pounds and a reduction in saturated fat intake significantly different from the husbands of control group women.<20>

Although physicians may lack the time and skill to obtain a thorough dietary history, offer specific guidance on food selection, or address potential barriers to change eating habits, general guidelines can be provided, and referral made to others for further counselling.

Effectiveness of Dietary Changes

Reduced intake of dietary fat, especially saturated fat, can reduce the risk of developing coronary artery disease. A large body of epidemiologic evidence links serum cholesterol levels with the development of coronary atherosclerosis. Serum cholesterol levels can be modified by dietary measures. Controlled clinical trials in which diets low in saturated fat were given to asymptomatic middle-aged men with selected cardiac risk factors have reported a 10-15% reduction in serum cholesterol levels, and in most trials a decrease in the incidence of cardiac events such as myocardial infarction and sudden death.<21-26> All cause mortality was not reduced, however. Concern has been raised over studies which have shown that low-fat diets applied to outpatients with moderate hypercholesterolemia result in only a modest reduction of total serum cholesterol (about 5%) and a parallel reduction in HDL which might negate positive effects.<27> The association between dietary fat and various forms of cancer is currently under investigation. An epidemiologic correlation between dietary fat consumption and incidence of cancer of the breast, colon, prostate and lung is present in most case-control studies. There is as yet no evidence that modification of dietary fat intake in humans influences the incidence of these malignancies.

Increased intake of dietary fibre improves gastrointestinal motility. Certain types of fibre may also be useful in controlling carbohydrate intolerance, reducing weight and controlling lipid disorders. A high-fibre diet may be effective in reducing intracolonic pressure and preventing diverticular disease. The risk of developing colorectal cancer may also be influenced by dietary fibre intake. At least fifteen cross-cultural studies have shown an inverse relationship between dietary fibre intake and the incidence of colon cancer. Such studies do not provide direct evidence that high dietary fibre intake, rather than other population dietary characteristics (e.g. low fat intake) is directly responsible for lower cancer incidence rates. Although case-control studies have shown inconsistent results regarding the association between dietary fibre and colon cancer, meta-analyses of these studies suggest an overall benefit from dietary fibre.<28,29> Inappropriate supplementation with bran may impair the absorption of calcium, zinc and iron.

A diet emphasizing the consumption of foods high in complex carbohydrate and fibre (e.g. whole grain foods and cereal products, vegetables and fruits) is an important means of lowering dietary fat consumption. It is desirable to replace foods high in simple carbohydrates (table syrup, honey, corn sweeteners) with those containing starch and fibre. Foods high in complex carbohydrates and fibre have a lower caloric density, and are therefore preferred for maintaining caloric balance and healthful body weight.

Reduced intake of dietary sodium may be of clinical benefit to people who have hypertension, or who are likely to develop it in the future.<30> Cross-cultural studies have shown a correlation between the sodium intake of different populations and the incidence of hypertension. A multi-national study involving 52 sites also demonstrated an association between sodium excretion and the rate of change of blood pressure with age.<31> A number of clinical trials and recent meta-analyses have demonstrated the ability of dietary sodium restriction to lower blood pressure by at least several millimetres of mercury in some hypertensive and normotensive individuals.<32> Only prospective controlled trials can provide definitive evidence that normotensive persons who practice daily sodium restriction are at lower risk of developing hypertension and its complications than are those with more typical sodium consumption. Nonetheless there is at least suggestive evidence of potential benefit and no known harm associated with moderate sodium restriction.

Many North American women and adolescent girls consume less dietary calcium than the recommended nutritional intake (adults 800 mg per day, adolescent, pregnant or lactating women 1200 mg per day). Population cross-sectional studies suggest that reduced calcium intake among women may be an important risk factor for bone mineral loss and postmenopausal osteoporosis. Prospective studies in asymptomatic postmenopausal women have produced inconsistent results about the efficacy of increasing dietary calcium as a means of slowing bone loss. Although some studies have reported that a daily intake of 750-1040 mg per day can reduce significantly the rate of bone loss in asymptomatic postmenopausal women, other controlled studies have shown either no effect or an effect only on compact bone with doses as high as 1800-2000 mg per day. A meta-analysis of intervention and observational studies concluded that 1000 mg of calcium daily would prevent 1% of bone loss per year.<33> For more information on osteoporosis consult Chapter 52. While a high intake of calcium is seen as nutritionally desirable from the point of view of skeletal health, an association has been noted between a high intake of calcium and arterial calcification, and between consumption of milk and mortality from coronary artery disease.

In cases of clear cut specific nutritional deficiencies, supplementation with the deficient nutrient is appropriate. In those individuals who do not consume the RNI for specific nutrients, and who may have serum levels which fall below the accepted normal levels, but who do not have classic deficiency syndromes, controversy exists concerning any possible benefit from supplementation. For example, in a randomized trial of elderly long-term patients, vitamin C supplements reduced the incidence of purpuric spots and petechial hemorrhages, but produced no other beneficial change.<34> In a placebo-controlled trial involving 80 healthy elderly Irish women randomly selected from a population with marginal thiamine deficiency, 63% of those supplemented with thiamine reported increased appetite



Vitamin supplementation in asymptomatic individuals is not of established value

and enjoyment of meals, showed significantly higher energy intakes and weight gain. Fatigue lessened and well-being improved in 88% of treated subjects.<35> Ninety-six independently living healthy elderly individuals, mean age 74 years, were randomly assigned to receive an oral nutrient supplement containing standard doses of multiple vitamins, trace elements, minerals, or matching placebo. By 12 months those receiving active treatment showed improvements in various immunological parameters, and a decrease in the number of days of illness due to infection from 48 to 23.<36>

Recommendations of Others

Canada's Food Guide<37> suggests the following daily intakes for adults: 5-12 servings of grain products

5-10 servings of fruits and vegetables

2-4 servings of milk products and

2-3 servings of meat or alternates.

The guide recommends eating a variety of foods from each group every day, and choosing lower fat foods more often. The number of servings suggested depends on age, body size, activity level, gender, pregnancy or breast feeding.

The U.S. Preventive Services Task Force recommends a diet emphasizing consumption of foods high in complex carbohydrates and fibre (e.g. whole grain foods and cereal products, vegetables, and fruits) as an important means of lowering dietary fat and calorie consumption.<38> The Task Force also recommends that clinicians should provide periodic counselling regarding dietary intakes of calories, fat, (especially saturated) cholesterol complex carbohydrates (starches), fibre and sodium. Women should receive counselling on calcium and iron intake. Adults should be given guidance on how to reduce total fat intake to less than 30% of total calories and dietary cholesterol to less than 300 mg/day. Energy intake and expenditure should be balanced to maintain desirable weight. These recommendations are currently under review.

Specific recommendations for physicians to offer nutritional counselling to patients have been issued by the American Medical Association,<39> the American College of Physicians<40> and the American Heart Association.<41>

Conclusions and Recommendations

There is good evidence that reduction of the dietary intake of fat (especially saturated fat) and cholesterol leads to a reduced incidence of symptomatic coronary artery disease, although not of total mortality. There is no evidence at present that reduction of dietary fat intake has a beneficial effect on the incidence of cancers. Reduction in

the proportion of calories derived from fat to 20-30% does not appear to have significant adverse effects. Avoidance of excessive body weight by reduction of total calories, replacement of refined carbohydrates by complex carbohydrates and increase in fibre intake is also supported by fair evidence. Restricting sodium intake may reduce the incidence of hypertension, and has no serious adverse effects.

While there is evidence that nutritional counselling is effective in changing diet, the role of the physician has not been adequately evaluated. Based on the effectiveness of dietary advice and the association between poor diet and disease, it is reasonable to provide general dietary advice (B Recommendation). For those at increased risk, it is prudent to consider referral to a clinical nutritionist or other professional with specialized nutritional expertise.

Although the prevalence of nutritional deficiency is high in certain groups such as alcoholics, and the elderly living alone and in institutions, there is insufficient evidence to recommend for or against a routine search for malnutrition (C Recommendation).

Evidence

MEDLINE search 1988-1992 identified articles using the following MESH headings: 1) Deficiency diseases or Malnutrition or Nutrition disorders or Nutrition assessment or Nutrition and 2) Adults or Aged.

This review was initiated in September 1992 and recommendations were finalized by the Task Force in January 1994.

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MANEUVER	EFFECTIVENESS	LEVEL OF EVIDENCE <REF>	RECOMMENDATION
Nutritional Counselling	Effectively reduces intake of fat and increases intake of fibre. Reduction of dietary fat intake reduces incidence of coronary artery disease but not all cause mortality. Increase in dietary fibre improves gastrointestinal motility and may reduce colonic cancer; replacing fat foods with fibre reduces serum cholesterol.	Randomized controlled trials<16-19> (I) Randomized controlled trials<21-26> (I) Case-control studies<27,28> (II-2)	Fair evidence to provide general dietary advice (B). For those at increased risk,* it is prudent to consider referral to a clinical nutritionist or other professional with specialized nutritional expertise
Screening for protein/calorie malnutrition	Despite high prevalence in alcoholics, the elderly living alone and in institutions no evidence of benefit.	Expert opinion (III)	Insufficient evidence to recommend for or against a routine search for malnutrition (C)

* High-risk group includes alcoholics and the elderly living alone and in institutions