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In this month's issue we welcome back our New Zealand correspondent Dr. Maurice McKeown. Maurice has long been concerned with the decline in the quality of our food supply and in his article "Is Modern Food Still Your Best Medicine?" he marshals the evidence for his concerns. I agree with Maurice that our food supply is becoming poorer in micronutrient content and personally feel that supplementation is a necessity, not an option, nowadays, especially if organic produce is not readily available. It is a sobering thought that British researchers as early as 1998 concluded that intensive, chemical-based agriculture seriously depletes soil content of organically bound carbon and nitrogen. It may take as much as 200 years for the soil to recover if left in its natural state. The addition of manure can double soil carbon and nitrogen levels in about 40 years. In contrast, organic farming improves soil fertility and produces equivalent crop yields to conventional methods (Nature, November 19, 1998, pp. 211-12, 262-65).

Also in this issue – If you don't have risk factors for cardiovascular disease at the age of 50 years there is a good chance that you may go through the remainder of your life without heart disease, lycopene supplementation may be effective in reducing blood pressure, soy protein loses its image as the "poster boy" for prevention of cardiovascular disease, Celebrex is still on the market even though it is just as dangerous as Vioxx and much more. Read on!

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*All the best,
Hans*

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developing countries. The lifetime risk of CVD for men and women has not so far been calculated, but researchers from Northwestern University felt this would aid efforts towards CVD prevention.

Using data from the Framingham Heart Study, they studied 3,564 male and 4,362 female participants who had no CVD at age 50, and calculated their lifetime risks to age 95. For the men, lifetime risk of CVD was 52 per cent, and for the women, 39 per cent. Once CVD was diagnosed, the mean survival for men was 30 years, and for women, 36 years. The impact of several risk factors on CVD risk was then investigated. These were: diabetes; obesity; smoking; high cholesterol and high blood pressure. Diabetes was the top risk factor for CVD and shorter survival, while high blood pressure and high total cholesterol were also linked to a higher CVD risk and shorter survival, for men and women. CVD risk

CVD risk factors must be tackled early

CHICAGO, ILLINOIS. Cardiovascular disease (CVD) is still the top cause of death and disability in most developed countries, and is increasing in

was increased in overweight men and women, but to a lesser extent. Smoking was linked to CVD events earlier in life. CVD risk rose steeply and survival dropped substantially for participants with two or more risk factors. Compared with this group, participants with no risk factors (of whom there were very few) had much lower CVD risk - 5 per cent versus 69 per cent in men, and 8 per cent versus 50 per cent in women.

The researchers conclude that the absence of established CVD risk factors at 50 years of age is associated with very low lifetime risk for CVD and markedly longer survival, and state that these

results should be used to communicate risks to help prevent development of risk factors in young adults. The lifetime risks found here are substantially higher than those for cancer, although many surveys indicate that individuals perceive their risk of cancer to be higher than that for CVD. The authors hope that this new data will help galvanize media and public interest in preventing CVD in both women and men.

Lloyd-Jones, D.M. et al. Prediction of Lifetime Risk for Cardiovascular Disease by Risk Factor Burden at 50 Years of Age. Circulation, Vol. 113, February 14, 2006, pp. 791-98

Tomato extract may reduce blood pressure through antioxidant action

BEER SHEVA, ISRAEL. High blood pressure is a major risk factor for cardiovascular disease, and it may develop partly due to oxidative stress. Antioxidant vitamins, present in many fruits and vegetables, may help protect against this process.

Researchers from the University of the Negev have investigated a possible benefit from tomatoes and tomato products, which contain antioxidants such as alpha-tocopherol, beta-carotene, and especially lycopene. The team recruited 31 patients - 18 men and 13 women, with an age range of 30 to 73 years. All of the patients were nonsmokers, recently diagnosed with grade 1 hypertension, defined as systolic blood pressure of 140-159 mm Hg, diastolic blood pressure 90-99 mm Hg, or both. They had taken no antihypertensive medication and had no significant cardiovascular risk factors other than hypertension. Participants were given capsules containing tomato extract for 8 weeks and their blood pressure was monitored. The capsules contained 250mg of a supplement called Lyc-O-Mato available commercially and made in Israel. Each daily capsule contained 15 mg lycopene (6 per cent). Blood pressure readings were then compared against those from a 4-week period when the patients took a placebo.

After the course of Lyc-O-Mato capsules, the patients' mean systolic blood pressure dropped significantly from 144 to 134 mm Hg, and diastolic blood pressure from 87 to 83 mm Hg. Significant drops in systolic blood pressure were found from week 6 onwards, and in diastolic blood pressure from week 4 onwards. As expected, blood pressure did not change on placebo.

The researchers conclude that a short-term treatment with antioxidant-rich tomato extract can reduce blood pressure in patients with grade-1 hypertension. Their assumption that the blood pressure drop was due to antioxidants is supported by, and in line with, previous research. They point out that the capsules were easy to administer and caused no side-effects. However, they add that this study was small and the long-term effects of such a treatment on cardiovascular risk factors remain to be seen.

Engelhard, Y.N., Gazer, B. and Paran, E. Natural antioxidants from tomato extract reduce blood pressure in patients with grade-1 hypertension: A double-blind, placebo-controlled pilot study. The American Heart Journal, Vol. 151, January 2006, pp. 100.e1-100.e6

New advice does not recommend soy protein for health

DALLAS, TEXAS. The American Heart Association Nutrition Committee has made a dramatic turnaround on its advice regarding dietary intake of soy protein and its constituent isoflavones (phytoestrogens). In a scientific statement issued recently, updating one published in 2000, the AHA

retreats from its previous strong endorsement of these products as beneficial in reducing cardiovascular risk factors. The new statement no longer endorses the addition of soy protein to the diet.

AHA reviewers analyzed data from 22 recent, randomized clinical trials and concluded that soy protein and isoflavones are ineffective in lowering LDL cholesterol, improving HDL cholesterol or triglycerides, and lowering blood pressure. However, they do believe that soy products such as tofu, soy butter, soy nuts and soy burgers are likely to be healthier for the heart than foods high in animal protein that contain saturated fat and cholesterol, as they are low in saturated fats, high in polyunsaturated fats, fiber, vitamins, and minerals. The committee stated that the large anticipated LDL-lowering effect of soy protein or isoflavones was not confirmed - their research showed that even if soy protein makes up half of a person's daily protein intake, it produces only a 3 per cent decline in LDL cholesterol. This drop seems to be entirely due to soy protein, as isoflavones appear to have no benefit. Soy protein was not shown to significantly benefit HDL, triglycerides, or lipoprotein(a), reduce blood pressure, or lessen hot

flashes during menopause. The reviewers also found no strong evidence that soy isoflavones could prevent or treat cancers of the breast, endometrium or prostate.

In summary, the AHA state that earlier research indicating that soy protein has clinically important favorable effects as compared with other proteins has not been supported by many studies during the past 10 years. They conclude that the direct cardiovascular health benefit of soy protein or isoflavone supplements is minimal at best, therefore the use of these supplements in food or pills is not recommended. Research is continuing on the potential impact of high-protein diets on risk factors for CVD, they add.

Sacks, F.M. et al. Soy Protein, Isoflavones, and Cardiovascular Health: An American Heart Association Science Advisory for Professionals from the Nutrition Committee. Circulation, Vol. 113, February 21, 2006, pp. 1034-44

Big business overrides science on formula milk

MUNICH, GERMANY. The ingredients in babies' formula milk are driven by commercial pressure, rather than scientific knowledge, experts claim. Researchers from Dr von Haunersches Kinderspital have recently drawn doctors' attention to issues affecting the quality of this essential product - the sole source of nutrients for several months during a critical phase of growth and development. The child health researchers explain that guidelines on infant formula are set by an international group to ensure high standards are met. But they warn that decisions made at a meeting in Bonn, Germany in November 2005 are now putting infants' health at risk.

Present at the meeting of the Codex Alimentarius Commission, were government and non-government groups, including the International Dairy Federation. A science-based review was made by an international group of experts on the compositional requirements for infant formula. It was intended to underpin decisions in this area, but the arguments were unduly influenced by commercial considerations, say the authors. For example, representatives of the dairy federation

pressed for a greater cow's milk content than that recommended by the review. Despite a complete lack of scientific evidence, this demand was supported by several member states with strong dairy industries. Some member states also called for no upper limit to be set on certain nutrients - again, going against "strong scientific advice". Maximum values are set for safety reasons, as excessive intakes may put a burden on the infant's metabolism. However, some delegates requested that maximum values should not be set lower than those used for formulas already on the market.

The authors hope the worldwide medical community will question the basis of these decisions and rise to reject such commercial pressures. Doctors should choose and recommend only those infant formulas with compositions based on current scientific knowledge and on the nutritional requirements of infants, they believe. But commercial interests may currently be the strongest driver of what goes into formula milk, they conclude.

Koletzko, B. and Shamir, R. Standards for infant formula milk. The British Medical Journal, Vol. 332, March 17, 2006, pp. 621-22

Calcium supplements for deficient pregnant women

GENEVA, SWITZERLAND. Preeclampsia - high blood pressure and protein in the urine during pregnancy - can lead to severe complications which may threaten the lives of both mother and baby. Its causes remain unclear, but previous findings suggest it could be reduced if women deficient in calcium took a supplement to correct their deficiency.

To confirm these findings, a global study was undertaken by the World Health Organization (WHO) to determine whether providing a calcium supplement could reduce the rate of preeclampsia and premature delivery. Researchers based in Geneva recruited 8,325 women with a low calcium intake (less than 600 mg/day) who were otherwise healthy, with normal blood pressure, and pregnant for the first time. Half of the women were randomly assigned to a 1.5g calcium supplement each day from 20 weeks gestation, or earlier, until the end of their pregnancy. The remaining women took a placebo. Although preeclampsia was not significantly reduced among the supplementation group, other severe complications were significantly less common. Eclampsia (seizures due to preeclampsia) was reduced by 32 per cent, and the rate of severe gestational high blood pressure (160 mm Hg or more systolic blood pressure and/or 110 mm Hg or more diastolic blood pressure) was lowered by 29 per cent. Early preterm delivery (less than 32 weeks gestation) was 18 per cent lower among women on the supplement overall, with further analysis showing that it was lower again among women below 20 years of age - a group

which is known for poor dietary habits and high calcium requirements. Mortality among the women and admission rates to hospital were significantly lower for women in the calcium group, and a 30 per cent decrease was also found in the neonatal mortality rate among the women taking calcium.

The authors conclude that, while the incidence of preeclampsia was not lowered, calcium supplementation significantly decreased the risk of its more serious complications. They explain that these results have been added to a large systematic review, which now includes 12 trials of a total of 15,206 women. Overall, the analysis shows a reduction in preeclampsia of 22 per cent with calcium supplementation.

Villar, J. et al. World Health Organization randomized trial of calcium supplementation among low calcium intake pregnant women. The American Journal of Obstetrics and Gynecology, Vol. 194, March 2006, pp. 639-49

Editor's comment: There is also evidence (from a large British study reported in 2002) that supplementation with magnesium (via intravenous or intramuscular injection of magnesium sulfate) prior to or just after childbirth can reduce the risk of eclampsia by 58% (from 1.9% to 0.8%) in women diagnosed with preeclampsia[1,2]. Thus supplementing with both calcium and magnesium during pregnancy may be a better approach than just supplementing with calcium alone.

[1] The Lancet, Vol. 359, June 1, 2002, pp. 1877-90

[2] The Lancet, Vol. 359, June 1, 2002, pp. 1872-73

Unknown factor drops blood pressure

DUNDEE, UNITED KINGDOM. Average population blood pressure fell in many countries from the mid-1980s to the mid-1990s, as demonstrated by the World Health Organization MONICA (monitoring trends and determinants in cardiovascular disease) project. However, it is not clear what precipitated this fall - whether it was due to drugs or to environmental or lifestyle factors such as diet.

Researchers from the University of Dundee have now compared data taken at the start of MONICA in the mid-1980s and at the end of the project in the mid-1990s. They pooled results from separate MONICA studies of men and women aged 35-64 in 38 population groups from 21 countries. Their aim

was to investigate whether blood pressure dropped across the board of readings, or only among those with high blood pressure and hence would be due to improved antihypertensive medication. Findings showed that, overall, systolic blood pressure dropped by an average of 2.2 mm Hg in men, and 3.3 mm Hg in women. Diastolic blood pressure fell by 1.4 mm Hg in men and 2.2 mm Hg in women. Use of antihypertensive medication in the groups increased by an average of 0.5 per cent, from 10.8 per cent to 11.4 per cent, but changes in medication across populations did not correspond with changes in blood pressure. In fact, analysis showed falls in low and middle blood pressure readings as well as high readings, therefore the researchers believe the

trend is not due to better medical control of high blood pressure.

They state that antihypertensive medication unexpectedly made no detectable contribution to the population decline in blood pressure. Other determinants of blood pressure must have been more pervasive and powerful, they suggest, but they are unable to pinpoint these factors. These

findings do not deny the importance of antihypertensive medication in the individual, they add, and are important in understanding blood pressure as a challenge to public health.

Tunstall-Pedoe, H. et al. Pattern of declining blood pressure across replicate population surveys of the WHO MONICA project, mid-1980s to mid-1990s, and the role of medication. The British Medical Journal, Vol. 332, March 18, 2006, pp. 629-35

NEWSBRIEFS

DVT not just caused by sitting still

Risk of deep vein thrombosis (DVT) is increased 2-4-fold after air travel, especially long flights. But this may not be due simply to sitting still. Instead, the low pressure and low oxygen environment on flights may add to the risk. Researchers at Leiden University Medical Center, The Netherlands investigated signs of clotting in 71 volunteers during an 8-hour flight, 8 hours at a cinema, and 8 hours of normal activity. They found increased concentrations of clotting factors during the flight but not in the other two situations. Concentrations were higher in the 40 per cent of volunteers with other thrombosis risk factors - a mutation in the factor V gene and those taking oral contraceptives. Nevertheless an expert from Switzerland warns that the prolonged immobilisation plays an important role in thrombosis. He adds that an increase of thrombotic events is also found after trips by train or car, and recommends exercising, wearing compression stockings, and avoiding excess alcohol and sedatives during flights.

Schreijer, A. et al. Activation of coagulation system during air travel: a crossover study. The Lancet, Vol. 367, 11 March 2006, pp. 832-38

Stricker, H. Clotting in the air. The Lancet, Vol. 367, March 11, 2006, pp. 792-94

Editor's comment: At least one clinical trial has demonstrated that *Flite-Tabs*, a herbal combination of nattokinase and pycnogenol, are highly effective in preventing flight-associated DVT.

Genes control heart risk from coffee

New research suggests that the impact of caffeine on health may be determined by our genes. It appears that people with different forms of the gene that metabolizes caffeine have very different reactions in terms of heart attack (myocardial infarction, MI) risk. As the findings so far have been inconclusive, researchers from the University of Toronto, Canada tested 2,014 MI patients and the same number of healthy people to see whether they

carried the gene variation for "slow" caffeine metabolism (named CYP1A2*1F) or "rapid" caffeine metabolism (CYP1A2*1A). Among slow metabolizers, 2-3 cups of coffee a day led to a 36 per cent increased risk of MI, and 4 or more cups led to a 64 per cent increased risk. Among the rapid metabolizers, 2-3 cups reduced MI risk by 22 per cent and 4 or more led to a 1 per cent reduction. However, the researchers point out that MI risk could be affected by other chemicals in coffee besides caffeine.

Cornelis, M.C. et al. Coffee, CYP1A2 Genotype, and Risk of Myocardial Infarction. The Journal of the American Medical Association, Vol. 295, March 8, 2006, pp. 1135-41

New concerns regarding the Atkins diet

The Atkins diet can have life-threatening consequences, a US physician has warned following serious complications in an obese dieter. The 40-year-old woman had been strictly following the low-carbohydrate, high-protein Atkins diet, and had lost 20 pounds in the previous month. She was admitted to a New York hospital in February 2004 with breathing problems. The doctors explain that due to the Atkins diet she developed severe ketoacidosis - dangerously high levels of acids called ketones in the blood. This problem may become more widespread because this diet is becoming increasingly popular, they believe. The case report appears alongside a commentary from a public health expert, who states that low-carbohydrate diets are associated with ketosis, constipation or diarrhea, halitosis, headache, and general fatigue. Clinicians' most important criteria should be indisputable safety, she adds, and low-carbohydrate diets currently fall short of this benchmark.

Chen, T.Y. et al. A life-threatening complication of Atkins diet. The Lancet, Vol. 367, March 18, 2006, p. 958.

Steffen, L.M. and Nettleton, J.A. Carbohydrates: how low can you go? The Lancet, Vol. 367, March 18, 2006, pp. 880-81

Painkiller may be as risky as Vioxx

The widely-used drug celecoxib has recently been linked to increased risk of heart attack. This popular COX-2 inhibitor, sold as Celebrex, is prescribed for arthritis and acute pain, but researchers fear it may be as dangerous as Vioxx - another COX-2 inhibitor now withdrawn due to links with heart attack. In an analysis of 4,422 patients, use of celecoxib was linked to a 2.26-fold increase in heart attack compared with placebo. A further analysis of 12,780 patients found a 1.88-fold increased risk of heart attack with celecoxib compared with other classes of painkillers. The researchers believe that drug regulatory authorities need to urgently re-assess the drug. These findings are critical, they write, as the risk is similar in magnitude to that of Vioxx. The editor of the journal publishing these results said he hopes clinicians and regulatory authorities around the world will not make the same mistake twice.

Caldwell, B. et al. Risk of cardiovascular events and celecoxib: a systematic review and meta-analysis. Journal of the Royal Society of Medicine, Vol. 99, March 2006, pp. 132-40

Stroke patients' blood pressure targets are inappropriate

Current guidelines on blood pressure for stroke patients may not be applicable, warn researchers, as they are based on a limited study population. Recommendations are often based on hospital patients, such as in the international PROGRESS trial, so may not apply to patients being seen in primary care. UK researchers compared 520 stroke patients in primary care to the participants in the PROGRESS trial, and found primary care patients were 12 years older and twice as likely to be female. The duration since their stroke was 2-3 years on average, whereas for the trial participants it was only 8 months, and trial patients had a higher diastolic blood pressure. The team explains that these important differences undermine the applicability of trial findings. Research in appropriate populations is urgently needed, they state, before further international guidelines are set.

Mant, J., McManus, R.J. and Hare, R. Applicability to primary care of national clinical guidelines on blood pressure lowering for people with stroke: cross sectional study. The British Medical Journal, Vol. 332, March 18, 2006, pp. 635-37

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Is Modern Food Still Your Best Medicine?

Maurice McKeown, BDS, PhD
(our New Zealand correspondent)

Many of us would like to think that this is the case, but there are growing doubts that the prescription can be relied upon. In recent years we have been assailed by messages about unsafe food. Is it from a mad cow? Is it soaked in pesticide residues? Are the bean sprouts riddled with salmonella? These warning messages are clear, yet one of the most important problems with today's food goes largely unrecognised. There is good reason to believe that the quality of natural foods, like fruit and vegetables, has undergone a dramatic decline. In other words, the food we ate 30 years ago contained more nutrients than the same items do today.

Quasi government agencies worldwide have decided that they will tell us what is good and what is bad for us. They, and supportive dieticians, now tell us to eat so much of this and that, to maintain health and ward off disease. They have decided on a simple message that equates quantity with quality. Publicity campaigns advise us to eat a certain number of portions, of a wide variety of food items. Our diet advisors assume that their recommendations will provide us with all our body's needs, thus eliminating the ridiculous practice of taking

supplements to provide 'extra' nutrients. Interestingly, horticulturalists and farmers involved in animal husbandry have always been acutely aware of the importance of the quality of nutrition. They know that optimum nutrition is essential for their produce and they also know that the quality of the soil and other environmental factors are key to that. Can the best choice of food guarantee us optimum nutrition?

I have decided to examine the problem by trying to answer a few simple questions so that readers can decide for themselves.

Is there any evidence that today's food is less nutritious than that eaten by people 30, 50 or even 100 years ago?

In recent years a growing number of reports have appeared which concluded that some of today's foods are not as nutritious as those eaten in the past. A report in the *Journal of Complimentary Medicine* in 2001 pointed out that US and UK Government statistics show a decline in trace minerals of up to 76% in fruit and vegetables over the period 1940 to 1991. (1)

In 2003 *News Canada* reported that today's fruit and vegetables contain far fewer nutrients than they did 50 years ago. They claimed that potatoes, tomatoes, bananas and apples were notably less nutritious. For example, the study (source unidentified) found that potatoes had lost 100 % of their vitamin A content, 57% of their vitamin C and iron, and 28% of their calcium. The report went on to examine data from the US Department of Agriculture involving vegetable quality, which showed that over the entire 20th century the average mineral content of such vegetables as cabbage, lettuce, spinach and tomatoes (a fruit!), declined from 400mg to less than 50mg. (2)

In 2004 a report in the *Journal of the American College of Nutrition* examined food composition changes from 1950 to 1999 recorded in the USDA food composition tables. Forty-three crops were examined – mostly vegetables. The conclusion was that there were statistically reliable declines for 6 nutrients. The declines were observed in protein, calcium, phosphorous, iron, riboflavin and ascorbic acid. The declines were not insignificant. e.g. 6% in the case of protein and 38% for the B vitamin riboflavin. (3)

The UK publication *Food Magazine* early this year published an analysis of food quality changes in the UK over the period 1940-2002. The analysis was based on the well-known food composition tables published on a regular basis by McCance and Widdowson. (4) In an analysis of milk it was concluded that the iron content had fallen 62%, magnesium – another commonly deficient element, was down 21% and the copper content had disappeared completely. In the context of magnesium it is interesting to note that its levels fell in almost all foods examined – a mere 4% in turkey meat but dramatically lower quantities in many cheeses. Parmesan cheese was the worst affected recording a 70% fall in value. The calcium and iron content of all the foods examined was reduced dramatically in every instance e.g. the iron content of a beef rump steak fell 55%.

How can these changes be explained?

Are there any obvious causes for the general nutritional decline in food? Unfortunately, there appears to be no consensus on what the major factors could be. Indeed it is probable that multiple factors are at work. It is clear that the depleted nutritional value of many food items consumed today is an inherent feature of the foods chosen by consumers. A bottle of soda pop is clearly not as nutritious as a glass of milk or even a glass of pure fruit juice. Today's younger generation seem to prefer soda pop to milk.

Some nutritional changes can be explained by changes in access to foods, which are associated with trade related matters. In Britain, and probably in many other European countries dietary selenium levels have fallen dramatically in the last thirty years, to around half their earlier values. That decline appears to be due primarily to changes in trade regulations, which resulted in dramatic reductions of Canadian and US selenium-rich wheat imports. As a result, bread was produced from low selenium wheat of European origin. This illustrates how important nutritional changes can go unnoticed. Official exhortations to eat two or three pieces of bread each day do not address this problem.

Many modern farming practices lead to a reduction in quality. Grass-fed cattle produce meat that is much higher in nutrients like beta-carotene and vitamin E than their feedlot counterparts. Visit Jo Robinson's website for details – www.eatwild.com

Other nutritional changes can be attributed to changes in industrial practices. In the latest national food survey here in New Zealand (5) iodine was found to be the most deficient element. One reason for the reduced amount in dairy products relates to the declining use of Iodoform disinfectants on equipment used in the dairy industry.

Canadian researcher Harold Foster believes that pollution has resulted in chemical changes in soils, which affects the bio-availability of elements like selenium. Thus the plants grown on them are deficient in the nutrients concerned. He believes that selenium deficiency is a key factor in the current world AIDS epidemic and the increased prevalence of other viral diseases. (6)

One of the leading researchers in the field is Donald Davis, a biochemist at the University of Texas. He has been writing and speaking on the causes of declining food quality for years. At a recent meeting of the American Association for the Advancement of Science at St Louis he discussed the causes and possible solutions to the problem. Davis believes that the cause lies in the way food is grown, processed and prepared. He points out that the commercial imperatives of high-yield, fast growing crops result in a sacrifice of quality. He also observed that recent studies, (which have examined the effects on antioxidant levels of reversing these changes), have revealed that several organic growing methods can increase the broad antioxidant content of produce. Davis observes, *"On average, antioxidant levels increased by about 30 percent in carefully designed comparative trials. Organically grown produce offers significantly enhanced health-promoting qualities, contributing to the achievement of important national public health goals."* (7)

Are people today lacking key nutrients, which may be required for optimum health?

Unfortunately a consensus cannot be reached over what constitutes a deficiency - a very serious problem. The current guidelines issued by regulatory authorities worldwide appear to be mostly derived from historical estimates based on levels related to the prevention of clear and present disease danger. In other words, the recommendations ought to eliminate the risk of immediate disease for most of the population. Alas our long-term health prospects, resulting from the consumption of inadequate amounts of various nutrients over long periods, remain uncertain.

Many studies worldwide have concluded that a large percentage of people examined, are lacking in many nutrients. Perhaps the largest such analysis is presented in the US National and State Statistics. (8) It is clear that a large percentage of the US population are deficient in a wide variety of nutrients. The data records the percentage of people considered to be meeting the DRI values (see below). For example, over the entire US population 32% met the recommendation for magnesium, 9.6% for fibre consumption and 14.1% for vitamin E intake. Interestingly, only 51.7% met the vitamin C requirement. The most ubiquitous nutrient was selenium as 85.2% of people were judged to have an acceptable intake (there may, however, be some concerns over estimated selenium values, as mentioned in the next section). Many researchers feel that recommended intake levels could be grossly inadequate in any case. Thus one could argue that the current nutritional status of the US population, and presumably that of many other countries, is likely to be disastrously low.

How can we estimate our own nutritional deficiencies?

Nutritional advisors base their recommendations on officially established quantities of nutrients in commonly eaten foods. But just how relevant are these database values to the real world? A recently published study in the United States casts serious doubts about their value. (9) The research measured the selenium content of common foods grown in the US upper Midwest. It reported remarkable variations in selenium content for many foods. For example, the selenium content for wheat flakes varied 72-fold in their samples, 57-fold for wheat itself and 11-fold for beef. In particular, the study found that the values they recorded bore little resemblance to the figures provided by the USDA National Nutrient Database for Standard Reference. It was concluded that the differences were so great the reference base was of little value. One can only surmise that the same could be true for the nutrient content of many other foods in many other countries.

In order to identify a deficiency and potentially correct it, we have to have simple inexpensive tests to check our personal nutritional status for specific nutrients. Alas blood tests do not always answer that simple question. Some nutrients are primarily intra cellular. Some like iodine are probably best estimated by their excretion rates in urine. The science of personal nutritional estimation seems to be in its infancy!

We are all supposed to be cognisant of our own government's guidelines for vitamins and minerals (most other nutrients are not included to date). Terminology differs, as do recommendations in different jurisdictions. Unfortunately, the US has gone through a series of changes in terminology in the last 30 years, which challenge the most enthusiastic nutritional mind. The FDA established their RDAs (Recommended Daily Allowances) in 1973. The acronym is the same as the Recommended Dietary Allowances – the RDAs set up in 1941 by the National Academy of Sciences. The RDI system was then introduced – which refers to the Reference Daily Intake. After that the DRV (Daily Reference Value) system was added. Then the system, which currently appears on US food labels, was introduced. It was called the DVs or Daily Values. This was followed in the late 1990's by the Food and Nutrition Board of the Institute of Medicine, who introduced another system called DRIs (Dietary Reference Intakes). The icing on the cake is the UL system (upper safe limits), which seems to be the only one that is not related to minimum desirable amounts! Perhaps the ability to memorise and understand the above information could be used as a test for incipient dementia!

When one looks at the large array of traditionally accepted nutrients - primarily the vitamins and minerals, there is no international consensus on how much we should take to ward off incipient disease or treat that which is present. (In many countries the only officially permitted treatment for a disease is a prescription medicine provided by the pharmaceutical industry). The recommended nutrient values determined by committees worldwide seem to reflect values based on minimum rather than maximum desirable quantities. Such committees seem to believe that over consumption of nutrients is a far greater danger than under consumption. Yet it is hard to find reports of excessive food supplement consumption having resulted in undesirable effects.

Should governments add extra nutrients to common foods to improve our health?

In the late 19th century technological progress led to “advances” in the production and processing of flour, the refining of oils to allow the development of butter substitutes and much else besides. Since then our health authorities have virtuously added missing nutrients (the ones removed in the advanced technical processes) with some success. (See Henry Schroeder's book - *The Trace Elements and Man*). (10) US deaths from pellagra in 1938 were recorded as 2300 and dropped to near zero in the following 20 years with the addition of vitamin B3 (niacin) to bread. Another added nutrient has been iodine, which is usually added to salt to prevent goitre. The modern identification of the disease has been linked to the Goyt valley in Northern England where the iodine-insufficient inhabitants suffered from swollen thyroid glands – Derbyshire neck. The original calculations used in the UK to determine the amount of iodine to be added to salt were based on average daily consumption estimates of 10 grams of sodium chloride. Current health recommendations target salt intakes of less than half that amount. Unfortunately the addition of iodine to salt has been inconsistent internationally. Some countries like Canada have made its addition to all salt compulsory. Others have required it to be added only to the discretionary salt available in the supermarket for addition to food during and after cooking. Many health conscious consumers now avoid the practice as they strive for a lower salt diet.

It seems that health authorities worldwide treat deficiencies, which are readily recognisable sources of disease, much more decisively than those whose longer term effects remain uncertain. Here in New Zealand we have our own unique set of circumstances. No doubt readers elsewhere will face different challenges. Our environment is lacking primarily in selenium, boron and iodine. Interestingly the selenium status of people in our South Island is worse than residents of the North Island. This is because South Island bread is produced from local selenium deficient wheat, while North Island bread is largely produced from wheat imported from Australia and Canada, which is high in selenium. It illustrates a very important principle. You cannot equate the consumption of a specific food product with adequate intake of a key element contained in it. It also shows that national legislation designed to provide adequate access to any nutrient, even in a small country like New Zealand, can be seriously flawed.

In Australia most areas have soils abundant in selenium. Australians obtain a large part of their total selenium by eating bread-related products. Clearly an adequate selenium intake there is dependent on bread consumption. Gluten sensitive Australians beware!

As a retired member of the dental profession I am well aware that the issue of fluoridation has divided society. I have never taken sides in the issue but it is clear that the fluoridation of water and toothpaste results in a situation where it cannot be predicted how much fluoride any one person is imbibing. Any form of 'mass medication' has its limitations. Yet the recent addition of folic acid to bread-related products in a small number of countries appears to be producing a range of benefits. The latest such report concludes that stroke mortality has fallen in both Canada and the US as the result of food folate fortification. (11)

How can we redress the balance and ensure optimum nutrition for our families and ourselves?

Mass medication and government control are not popular measures, but it does seem that if we are to redress the current problems in the quality of food we have to accept fortification of some foods. Hopefully, commercial forces will result in new nutritionally enhanced foods becoming widely available. Plants are now being developed to contain higher levels of nutrients than those commonly available today. We have to remember that the food constituents which have been identified as essential or beneficial are made up primarily of vitamins and minerals. There is now a growing awareness that many other substances in food are key to health. It may take many years to identify all of them and ensure they can be consumed in sufficient quantities necessary for optimum health. Today organic food attracts premium prices. There is a growing belief that organic foods are more nutritious and contain less chemical residues than their counterparts being sold in our mass production food system. Many of us do not have access to a wide variety of organic foods, or we cannot afford the extra costs involved. Perhaps designer food will, in the future, attract only a small premium and be more nutritious than the food on sale today. Until that day arrives the fortification of regular food with a variety of necessary constituents seems essential. The simultaneous consumption of comprehensive nutritional supplements would also appear to be a wise precaution if we are to aim for optimum health throughout our lives.

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