The science of nutrition -- the metaphysics of food

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With respect for the differences between and among regions, there are universal principles on which public health nutrition policy should be based. An adequate food supply containing sufficient energy and all of the nutrients should be available and affordable. This may include nutrient-reconstituted or fortified foods products and supplements. The foods must be coherent with the cultural needs and desires of the citizens. Public and private agencies, like schools and food industries, must provide exciting and accurate nutritional information in the classrooms and by mass media. Individuals must have an accurate knowledge to make healthy dietary selections. The special needs of particular sub-populations, such as pregnant mothers, infants, children, adolescents, women, and the elderly, should be emphasized and addressed. Individuals should be encouraged to assume personal responsibility for their health. The avoidance through healthy lifestyles of obesity, anorexia and nutritional deficiencies should be encouraged. The sensual pleasures of food and the joy of eating with family and friends should be appreciated and enhanced. We should celebrate the complexity and diversity of our foods and cultures.

We should be free to enjoy the foods that bring us health and pleasure. We should have scientific nutritional knowledge to maximize our human potential.

Optimal Diets

A medical breakthrough occurred almost thirty years ago when total parenteral nutrition (TPN) became a reality. For the first time it was possible to sustain growth and development of human life by intravenous infusion in the absence of ingested food and water. A culmination of chemistry, biochemistry, physiology, nutrition and medicine, TPN is an aqueous suspension usually containing 44 essential chemical nutrients. They are:

- Water
- Energy sources - glucose, lecithin (phospholipid), triglycerides
- Minerals - potassium, sodium, calcium, magnesium, chloride, phosphorus, sulphate
- Amino acids - leucine, isoleucine, valine, methionine, threonine, phenylalanine, tryptophan, lysine, arginine, histidine

Vitamins - Fat soluble - A, E, D, K
Water soluble - pyridoxal, riboflavin, nicotinate, thiamin, folate, panthenate, B12, biotin, ascorbate
- Trace elements - iron, copper, zinc, manganese, chromium, molybdenum, nickel, selenium, iodine, fluorine, boron,

Thanks to scientific research, the structure and function of each nutrient in the TPN solution and how each is utilized by our body is understood.

But people can not live by TPN alone. Indeed, life would be less interesting were it not for the sensual joys of eating. Under ideal conditions we should obtain all of the essential nutrients from our foods. Thus, the nutritional challenge is to have access to and to consume a variety of foods that continually provide us, over any given span of three to five days, the optimal amount of energy and nutrients appropriate for our age, sex, height, genetic inheritance and life style. Diet can be considered in terms of a "Three Dimensional" Nutritional Space:

ENERGY

AGE, SEX, HEIGHT, NUTRIENTS

There is an infinite number of optimal diets within the three-dimensional nutritional space, depending on the foods available and the pleasures derived from eating them.

A recent trend in developed nations is to focus dietary attention with special reference to fat, cholesterol, salt and sugar on degenerative conditions found in older populations. Such diets may be less appropriate during the growth and development of infants and children. Nutritional policy and advice must pay attention to age. Efforts should be directed to optimizing human potential, especially during the early years.

The book can be a guide for those interested in nutrition, for those who want to know more about the science of nutrition.
red meat and other effective sources of iron, copper and other elements are expensive, scarce or unacceptable, then fortification and supplementation can be prudently applied to other products.

Despite widespread beliefs to the contrary, there are no ‘good’ foods or ‘bad’ foods. There are ‘good’ diets and there are ‘bad’ diets. All foods have nutritional value. Millions of books are sold in the Western world promising ‘perfect’ diets for the prevention or cure of a myriad of diseases, yet the real solution to diet strategies for public health. There is no single ‘health’ diet that is universally acceptable or is possible to implement. The goal of any national dietary health program is to provide access to safe, nutritious and affordable foods for all age origins, and to educate its citizens to make rational and pleasurable choices concerning their personal diets.

**Nutrients**

Before we consider the metaphysical aspects of food, let us examine scientifically the nutritional chemical components of total parenteral nutrition. Foremost among the nutrients in both concentration and importance is water. This remarkable life-giving component is essential as solvent, chemical reactant, buffer, thermal regulator, electrolyte and structural component. Even in the absence of sufficient water, many steps toward death. The source of the water, beverage or food in which it is ingested is of little importance. Only the volume consumed holds its biological safety importance.

When technology was advanced for the formulation of stable suspensions of phospholipids, it meant that enough energy could be infused to sustain life without disturbing electrolyte balance or osmotic or other properties of the capillaries. The energy requirement of the body is met with both glucose, a simple sugar, and fat as the phospholipid, lecithin. Approximately 35% of caloric energy is supplied by glucose and 65% by fat because not only does it act as a source of calories, but also as an essential chemical precursor to vital biochemical intermediates including other carbohydrates, proteins, and amino acids, and nucleotides. Phospholipids do not only have a high caloric density, but also supply essential polyunsaturated fatty acids as precursors for the hormone-like prostaglandins and thromboxanes.

Major minerals are responsible for: the maintenance of electrolyte balance, enzyme cofactors, the function of excitable membranes, muscle contraction, the structural integrity of membranes, mineralization of bones and teeth, energy conservation and transfer, second messengers, etc.

Eight of the amino acids are essential in that humans have limited or no capacity for their synthesis. Arginine and histidine can be synthesized by animals, but not in optimal amounts for growth and development. All essential amino acids must be present simultaneously to ensure protein synthesis. The aromatic amino acids, tyrosine and tryptophan, cannot be synthesized by humans, yet are precursors for important neurotransmitters and hormones.

Thirteen vitamins, four fat-soluble and nine water-soluble, have been identified and their biochemistry and physiological mechanisms identified. There are no fundamental differences between “natural” and “synthetic” vitamins. All vitamins are small organic molecules that cannot be synthesized in the body. They are required in very small amounts and are metabolically modified prior to or during their biochemical action. The fat-soluble vitamins serve as visual pigments, regulators for cell growth, cell membrane metabolism, cell immunity and neurotransmitter coenzymes. With adequate exposure of the skin to ultra-violet light, the body can synthesize adequate vitamin D. The fundamental role of the water-soluble vitamins is to serve as coenzyme enzymes and prothrombin groups required by a majority of cellular enzymes. Most reactions including redox, group transfer, and energy conservation require such vitamin related coenzymes.

Eleven trace elements comprise less than 0.01% of the weight of the human body. They are essential in a variety of ways: enzymes, hormones, cell growth factors,blind vision, color vision, the eye’s ability to detect objects, and neurotransmitters. Most biochemical reactions require one or more of these elements to proceed. Inadequate intake of a single element can toxic. Fortification of some staple foods can successfully address deficiency problems of iodine and iron.

Although TPN defines basic nutritional needs, it is our diets that must provide these nutritional needs. This is the interface where science must harmonize with both the metaphysical personal and societal beliefs system as well as economic agricultural and political realities.

**Food choice and culture**

The culture, nutritional medicine and culinary art were considered to be one. Diet therapy and herbs were the foundations of Chinese Medicine. Foods were classified as ‘heating’ or ‘cooling’ based on their effects on the body. Vegetables and fruits are classes of various criteria: their color, appearance, flavor, texture, taste, or to the body. The ‘heating’ foods were used to treat the effects of shock, chills, wasting and diarrhea, while ‘cooling’ foods were used to treat fever, constipation, and rash. Meat provided strength. Vegetables could relieve symptoms not associated with vitamin deficiency. The treatment of the four ‘humors’ of the body—heat, cold, wetness and dryness—has a long history in East and West. Certain foods were endowed with special strengthening properties, the power of pu. Wild fowl, sea cucumbers, and bird’s nests for strength, walnut meats for the brain, eggs, dates, and honey for blood are a few examples. Each, in scientific fact, may have been efficacious. Food as nutrient merges with herbs as medicinal with the use of ginseng and herbal tea. Some foods are food and health, such as fish. Lactose intolerance and a diet eaten to improve respiratory function. Blood was consumed to supplement anaemia. Some foods were considered to be ‘hot’ or ‘cold’ and were carefully avoided.

The complexity and richness of Chinese Medicine is, in large measure, due to the pressures upon the people to utilize every available food source and to impart special benefits to its use. The issues of food and culture in the United States have similar traces. The diets of those of Chinese descent in the United States has a comparatively young civilization, barely 300 years old. It is a melting pot of cultures including Asian, European, Native American, African, and Middle Eastern influences. Its dietary reflects its ethnicity and history. It has evolved a food culture that includes such staples as Big Mac Hamburgers, Coney Island hot dogs, Kentucky Fried Chicken, fried potatoes, potato chips, Snickers candy bars, and Twinkies. Sweet wine and orange drinks include soft drinks such as Coke, Pepsi and diet colas, and milkshakes made from ice cream, milk, and flavors.

The US has an eclectic cuisine that embraces foods of all nationalities. Worldwide cuisine is prepared at home as well as served in restaurants. Chinese, Japanese, Korean, French, Italian, Mexican, Middle Eastern, Caribbean, Arabic and African dishes are now an everyday part of American lives. The Chinese should embrace America’s gastronomic contributions. There is much to enjoy. As people share and relish each other’s ethnic cuisine, we also begin to share understanding and appreciation of each other’s social and cultural heritage.

**Overconsumption and deficiency**

America produces an abundance and diversity of agricultural products including grains, nuts, fruits, vegetables, milk, beef, eggs, poultry, pork, eggs, beef, milk, cheese, pork, lamb, and fish. It has the ability to produce, process and distribute food year-round at low cost, ready consumption, and stockpiling. Over-abundance and over-consumption have become major public health problems. The nutritional curse of the economically advantaged nations has become obesity.

Once apparent energy imbalance and over-consumption of foods have been over-consumed and impoverished with obesity. The body is well adapted to storing fat in times of abundance and the brain is wired to expect and look for it. However, within the total balance of calories used and stored, this represents a trivial fraction. The real danger of fat in our diets is that fat makes food taste good, and thus we eat more--we pay the thermodynamic price in obesity.

The effects of dietary cholesterol are often misunderstood. Cholesterol is an integral part of every cell membrane. It is also the essential precursor to all steroid hormones. Cholesterol is synthesized in the liver from the two-carbon mitochondrial intermediate, acetyl-CoA, by a regulated pathway. Too many calories from carbohydrates, fats and proteins in their diet increase the LDL, the low density lipoprotein. The HDL, the high density lipoprotein, concentrations rise and both fatty acid and cholesterol synthesis increase as a function of mass action. Serum cholesterol correlates positively with obesity and coronary heart disease. High serum cholesterol is a strong risk factor for coronary heart disease.

Dietary cholesterol is synthesized and produced by cells of the liver. There is a large pool of cholesterol in the liver due to its synthesis and excretion. Dietary cholesterol is absorbed in the gut and transported to the liver and other tissues. It is then converted to bile acids to facilitate the absorption of fat. The liver is the major site of cholesterol synthesis. Dietary cholesterol is absorbed in the gut and transported to the liver and other tissues. It is then converted to bile acids to facilitate the absorption of fat. The liver is the major site of cholesterol synthesis. Dietary cholesterol is absorbed in the gut and transported to the liver and other tissues. It is then converted to bile acids to facilitate the absorption of fat. The liver is the major site of cholesterol synthesis.
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Eleven trace elements comprise less than 0.01% of the weight of the human body. They are essential in a variety of ways: enzymes, structural components of tissues, transport, regulation of gene expression, thyroid hormone synthesis, and bone structure. Iron, copper and zinc deficiency are frequently observed in both economically developing and under-developed populations. Anemia, impaired growth and development, and poor physical and mental performance constitute a serious public health concern. High concentrations of some trace elements can be toxic. Fortification of staple foods can successfully address deficiency problems of iodine and iron.

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The control of body weight is determined by the balance of energy intake from food with the energy output required for maintenance of basal metabolism plus exercise. Too frequently, weight loss is managed by overemphasis on stringent low calorie dietary restriction. Equally important is the increase of physical activity. Exercise is more effective in stimulating energy use but also provides transitory increase in basal metabolic rate and a suppression of appetite.

It is widely believed that dietary fat and cholesterol are the primary culprits for coronary heart disease, stroke and cancer. Further, it is held that animal fats containing saturated fatty acids are ‘bad fats’, while vegetable oils with mono- and polyunsaturated fatty acids are ‘good fats’. While there are many recommendations and some individuals may consume more without adverse cardiovascular or body fatiness effects, it is recommended that diets should contain no more than 30% of calories from fat and should include a wide variety of low-calorie, low-sodium foods. This lifestyle factor has, as a side effect, decreased smoking and drinking, reduced drug use, and decreased crime and violence. The recommendation is also consistent with the metabolic changes that occur with age. This is the best choice for a long life and a happy, healthy life! The recommendation is also consistent with the metabolic changes that occur with age. This is the best choice for a long life and a happy, healthy life!

The issues of food and culture in the United States have similarities with those of India and other newly developed countries. The United States has a comparatively young civilization, barely 300 years old. It is a melting pot of cultures including Asian, European, Native American, African, and Middle Eastern influence, and this reflects its ethnicity and history. It has evolved a fast food culture that includes such staples as Big Mac hamburgers, Coney Island hot dogs, Kentucky Fried Chicken, French-fried potatoes, potato chips, Snickers candy bars, Twinkies sweet pastries, and diet drinks include soft drinks like Coke, Pepsi and diet colas, and milkshakes made from ice cream, milk, and flavorings.

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densities, depending on other food factors which are bone protective and osteoblastic. Prenatal and postpartum nutritional strategies are essential to promote optimal growth and development of infants. The subsequent nutritional needs of children can focus on developing their understanding and responsibility for healthy diets. The focus of nutritional advice should be on weight management achieved by reducing energy intake and increasing exercise. A great deal of attention has been given to oxidative free-radicals as the causal agents in concerns including cardiovascular disease, stroke and aging. The interest in prevention of oxidative stress by anti-oxidants has led to increased consumption of fruits and vegetables and the use of supplements containing mega-amounts of vitamin E, vitamin C, carotenoids and selenium. There have been some studies in China under conditions of dietary antioxidant deficiencies where such supplements prevented some forms of cancer. However, similar studies in Finland, in the absence of prior deficiencies, found no added benefit by supplements. \(\text{Scientific nutritional knowledge maximizes human potential for health and pleasure.}\)

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营养学与食物的选择理论

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摘要:
营养学是一门自然科学，但人们在选择食物时却受到形状和颜色等自然力量的支配。理想的是两者相辅相成，构成一个协调的整体。世界上没有绝对“好”的食物，也没有绝对“差”的食物；但无论“好”的食物，也有“差”的食物。世界上有十全十美的食物，每个家庭应该得到适当的健康教育以及对食物选择的合理和适合自己的食物。各国之间尽管有巨大差别，但世界上有制定营养政策的普遍适用原则。如，应充分提供有足够热量和所有必需营养素的食物；食物应符合文化需要和消费者的喜好；应根据学校和大众媒体提供的营养信息，使人有正确的知识来选择健康的膳食；应重视特殊人群（婴儿、儿童、老人等）的特殊营养需要；加强自我保健意识，不应依赖保健食品和营养补充剂，而应重视食物所引起的感觉的愉快和与亲朋好友共同进餐的乐趣。

REFERENCES