

Scientific justification of nutritional products consumed as an adjunct to normal, regular diet, however, is a relatively recent phenomenon. The science of nutrition does not predate Antoine Laurent Lavoisier who died in 1794 during the French terror. The idea that consumers could take specific doses or physiological levels of minerals or vitamins, whether in liquid, pill, or tablet forms, would not predate determination of these compounds or elements as essential nutrients, and these discoveries date primarily to the past 150 years. The first commercial marketing of vitamin supplements in the United States dates only to 1936; and influence of maternal pre-natal diet on the health of newborn infants was recognized just 60 years ago in 1941. In that landmark year, too, the first American Recommended Dietary Allowances were published, and presented the first scientific justification for potential use of dietary supplements if physiological requirements of consumers were not met through diet alone.

Dietary supplementation in America became widely available during the 1940s. There was a seductive ease in taking nutrients by pill or tablet, a practice foretold in earlier science fiction and fantasy publications. But with increased supplement use, concerns began to be raised and by the latter decades of the 20th century, dietitians, nutritionists, and other medical-related professional societies produced position papers that stated consumers should obtain nutrients through food, not through supplementation.

In recent decades two conflicting voices have competed throughout America: food not supplements -- and -- supplementation is critical. Both conflicting positions have been voiced by nutritionists and other scientists, so it is understandable that public confusion reigns.

The 1986 National Health Interview Survey (NHIS) reported that 43% of children, ages 2-6, used vitamin and mineral supplements. By the end of the 20th century, one report estimated that four of every ten Americans used dietary supplements regularly; that seven of every ten Americans used supplements occasionally; and that approximately 3,400 dietary supplement products were available to American consumers, with an annual sales gross of four billion dollars.

The informative CDC report authored by Ervin and co-workers, published in June, 1999, considered dietary supplement use in the United States between the years 1988 and 1994. Data for American children were enlightening: dietary supplements were provided to 35-52% of male children between the ages of 1 and 11, and to 33-48% of female children the same age. Use percentage declined, however, as children approached their near teen and teen years: 24% of males between 12 and 19 years of age and 28% of females the same age, reported supplement use. According to Ervin and co-workers, 90% of children were more likely to take or be given only one supplement compared to 76% of adolescents.

Today, I will briefly explore justification of dietary supplements by young athletes and selected sub-groups of American children and teens, then will consider how clever advertising has confounded scientific justification of dietary supplement use by marketing misinformation to concerned parents, especially mothers. I will then summarize and conclude with suggestions for further study.

In 1996 Elizabeth Applegate and I reported that young athletes have used vitamin supplements since the 1930s. During the 1939 Tour de France, young adult cyclists at the front of the pack reportedly performed better after taking vitamin supplements. Such anecdotal comments notwithstanding, research conducted during the early 1940s did not support the role of vitamin supplementation as enhancing athletic performance. Nevertheless, elite athletes throughout ensuing decades continued to pursue single and multi-vitamin and mineral use. Scientific justification use supported or not, the reality has been that athletes continue supplement use whether or not products have demonstrated efficacy. Justification of supplement use by athletes is less an issue of science, more an issue of friendship patterns, belief systems, and magic.

Young athletes, for example, look to role models. Athletes who win Olympic gold medals certainly fit these criteria. Consider Al Oerter, four-time Olympic champion in the discus. In April 1996, on the eve of the Atlanta Games, Mr. Oerter addressed the membership of the American Institute of Nutrition, an later a room filled with press correspondents in

Washington DC. He related his daily practice of taking multi-gram supplements of vitamin C and other anti-oxidants and reported that he had done so since his youth. He also mentioned that by the age of 15, he regularly used dietary supplements, specifically, brewer's yeast, desiccated liver, and rose hips. Were Mr. Oerter's four Olympic gold medals due to supplementation; due to his work ethic; his dedication to excellence; his determination to win; due to his inherent genetic makeup; perhaps due to his long-term dietary practices; or did his medals result because of a mix of these and other factors not identified? At the same symposium and press conference, Bruce Baumgartner, an extraordinary athlete who had won 13 Olympic and World competition medals -- perhaps the greatest wrestler of all time -- reported that most young wrestlers he knew took dietary supplements in their quest for a competitive edge.

Justification of supplement use by athletes to achieve victory certainly is not new, and can be traced to the ancient Greeks and Romans. Tipton wrote that during the 3rd century BC, Greek athletes supplemented training meals with brandy, wine, and specific mushrooms before competition in the justification that these products enhanced human performance. Others have reported that Roman gladiators used strychnine supplements to improve their survival chances in the arena.

The list of athletic-driven supplements in America expands yearly, and many are marketed specifically towards children and teen-age athletes. Curiously, relatively few have been scrutinized, scientifically, to separate

physiological from psychological and placebo effects. Among the dietary supplements that continue to be pitched to athletes, both young and old, include: bee pollen, caffeine, and chromium picolinate; citruline, coenzyme Q10, and creatine; desiccated liver pills, ginseng, royal jelly, and spirulina; the vitamin alphabet in both single and multiple combinations -- in highly variable dose levels -- items purchased, consumed, and justified in the belief that -- since everybody does it, they must do so, otherwise, they cannot be competitive. Thus the search for the competitive edge continues.

Belz and Doering reviewed the efficacy of nutritional supplements by athletes and argued that extra supplementation of protein is dubious; that scientific evidence was lacking to support the use of purified amino acids; that extensive protein supplementation could lead to liver and kidney damage, and calcium loss; that supplementation with vitamins and minerals in excess of recommended RDIs had essentially no effect on increasing muscle mass or improving athletic performance; that nutritional supplements have been promoted by unsubstantiated claims commonly touted through magazine advertisements, health food stores, and uninformed coaches; they also noted that dosage guidelines for nutritional supplements directed towards athletes was inadequate and that quality control remained poor.

While the scientific evidence is clear on certain nutritional supplements, information published in scientific journals commonly is ignored by the general public and especially by young athletes, most who are trained by

coaches uninformed in nutrition science. This gap of knowledge represents a deep, dark Black Hole, where factual science is ignored, where fallacies and misinformation are embraced. This is the realm of magic, not science. Unfortunately, the practitioners of magic continue their quest for mystical elixirs that will grant or assure athletic success, honor, and fame. And while scientific justification of many of these mystical elixirs is lacking, still they are used.

Let me now turn to other sub-sets of American infants, children, and teens, where it would be logical to ask, whether or not, supplement use would be justified. Are dietary patterns of American children generally poor, or is the issue more of problems in groups localized by geography, income, medical conditions, or certain behaviors?

When preparing my presentation I used a standard data base and key word approach. The terms infants, children, teen, teen-agers, were cross-matched with minerals, vitamins, and supplements, and with selected activity/behavior-related, medical-related, and social-related, specifically: athletics and sport; anorexia and bulimia; drug-use; fad diets; homeless; and immigrant-status. Except for an extensive literature on sports and athletes, where justification, placebo, physiological effects, and risk benefit have been widely debated, the results were surprising limited.

In 1995 Porter reported on pending congressional resolutions regarding use of food stamps to purchase dietary supplements. Her essay

summarized public thinking of the time. It was widely claimed, for example, that the dietary patterns of Americans did not result in nutrient intakes that fully met the RDAs for vitamins and minerals; that infants who failed to receive adequate intakes of iron may be impaired in their mental and behavioral development; and that children in low income families often failed to achieve nutritional goals from diet alone.

Justification for dietary supplement use by children and teens commonly is expressed four ways. First: justification to reduce nutrient deficiencies in malnourished children, especially abroad but also to prevent problems in America; Second: justification to increase IQ and memory performance; Third: justification to improve athletic performance; and Fourth: justification for use of calcium supplements in childhood to prevent osteoporosis-related problems in later life.

Regarding supplement use by specific sub-groups of American children let us consider the following:

Anorexics: Winston and co-workers compared 37 anorexic patients with 71 controls. They reported that 24% of anorexics and 30% of controls took vitamin supplements. Hadigan and co-workers investigated 30 anorexic patients and 28 controls. They reported that 63% of anorexics and 61% of controls used dietary supplements. When the nutritional status of both anorexics and controls were compared, the anorexics exhibited significantly lower intakes of thiamin, riboflavin, niacin, B6, B12,

phosphorus, and selenium. Even with supplement use in both groups, dietary and supplement intakes were strikingly low for both calcium and vitamin D. Hadigan and co-workers concluded that supplementation of micronutrients was essential if the health of both groups of young American women were to be maintained. Hartman and co-workers evaluated bone density of young women who had recovered from anorexia nervosa. They reported that the majority exhibited abnormally low bone densities, and concluded that calcium supplements should be recommended to chronically underweight anorectics to offset osteoporosis in later life.

Physicians commonly treat anorexia by advocating vitamin and mineral supplements in the belief that supplements pave the way for slow reintroduction of food to their patients. The supplement of choice commonly is a multivitamin/mineral to provide 100% of the RDIs for essential nutrients, while patients are relearning to eat. Other physicians, however, commonly treat anorexia by recommending supplements of single nutrients, specifically, calcium, iron, potassium, or zinc; vitamins A, B-complex, or E.

Bulimics: Information on dietary supplement use by American bulimics essentially is non-existent. While numerous research articles on bulimic patients exist, those examined were silent regarding use of dietary supplements. There is, however, an interesting German report that provides insights on supplement use in bulimics. Woell and colleagues

investigated 30 German female bulimics. These patients exhibited an average daily energy intake of 3100 kcalories, but dietary analysis revealed that the patients did not reach recommended levels for most vitamins and minerals, even though 40% of the patients claimed that they took dietary supplements. The German team reported an unusual behavior in one patient, who took more than 200 dietary supplements and medications daily.

Bulimia sites on the World Wide Web commonly recommend dietary supplements, usually zinc or a multi-vitamin.

Homeless Children: In 1990 Luder and co-workers surveyed 96 urban homeless adults. They reported that 47% used vitamin supplements. A 1992 study by Drake reported on 96 single American mothers and their 192 dependent children. They reported that both mothers and children consumed less than 50% of the 1989 RDA for iron, magnesium, zinc, and folic acid. Of the 96 mothers surveyed, only 3 reported regular use of dietary supplements. Though not stated directly, an inference could be drawn that poverty and expenses prevented regular supplement use by dependent children of homeless mothers.

Numerous web pages are dedicated to the homeless and report a range of statistics: it is claimed that families with children account for 36.5% of the homeless; that iron deficiency anemia exists at a rate in homeless children 2-3 times that of other children; and that significant numbers of homeless

children experience hunger and lack sufficient caloric intakes. An organization called The Healthy Foundation implemented a Vitamins for the Homeless project in January, 2000, at San Luis Obispo, California, where foundation members distributed what they called -- Packets of Hope -- specifically packets of vitamin and mineral supplements -- to homeless children and others perceived at risk for nutritional deficiencies.

Homeless Drug Users and Homeless Mentally Ill. In 1995 Gelberg and co-workers reported malnutrition among homeless adult drug users, and recommended that both vitamin and mineral supplements be supplied to improve nutritional status, a position first stated least a decade earlier by Winick in his book The Health Care of Homeless People. While the Gelberg team surveyed 457 homeless adults (344 men and 113 women) it was not clear from their report whether or not, children or adult teens were living with the adults surveyed.

Native American Children: Teresa Dillinger and co-workers surveyed access to health care and supplemental food programs available to Native Americans in both rural and urban California. Poor Native American respondents living in Sacramento, California, obtained significant quantities of their food through products donated to food banks. Dillinger and co-workers found that Native American families commonly requested that food banks stock specific items, but such requests were rarely fulfilled. Items commonly requested included: nutrient fortified beverages

(especially high-protein and vitamin types), peanut butter, wheat bread and other whole-grain products, and vitamin supplements.

Children of Extreme Vegetarians: Continued documentation since the early 1960s has identified children of Zen Macrobiotic families to be at nutritional risk. But even in such instances where supplementation would be justified from a scientific, nutritional perspective, parental belief-systems most likely would preclude supplement use. This issue of dietary/religious freedom for adults vs. health/nutritional risk for children raises complicated ethical and practical considerations: what is the responsibility of the state to protect children when dietary practices of adult parents place their children at nutritional risk? In a free society adults can make their own food-related decisions, whether sound or poor, but who speaks for and acts to protect children?

Concept of a Pre-Pregnancy Supplement: In 1994 Keen and Zidenberg-Cherr argued for a folic acid recommendation that would cover the pre-pregnancy period. Their recommendation posed an interesting implementation and action dilemma. If the objective was to reduce folic acid-related birth defects, and scientific evidence existed that taking folic acid supplements prior to pregnancy reduced the incidence of such conditions, implementation of a pre-pregnancy requirement would be logical. But what steps should be taken? The reality is this: in the United States today, thousands of teen-age women become pregnant yearly and the majority of these pregnancies are not planned. Diets of some of these

young women already may be poor or deficient in folic acid, and to supplement after pregnancy is recognized, may be too late, since folic acid-related neural tube defects occur during the initial weeks of pregnancy, commonly before pregnancy is recognized. Results from the 1997 California Women's Health Survey reported that 46% of respondents took multivitamin preparations, and that "current vitamin use" most closely predicted whether or not women took prenatal vitamin supplements before their last pregnancy. Despite widespread available information on the potential benefits of folic acid as part of a prenatal program, data reported in the CWHS study revealed that only 29% of Hispanic women in California had heard of this nutrient, 48% of African-Americans, 54% of Asians, and only 69% of Caucasians.

American obstetricians commonly prescribe multi-vitamin/multi-mineral products to patients when pregnancy first is confirmed. But in the United States today, millions of Americans do not accept or follow the Western Medical Model based upon germ theory. Instead, they practice what is generally called the hot-cold/wet-dry system of medicine, a system that exists side-by-side today with the Western Medical Model.

Consider the Asian countries of Burma, Cambodia, China, India, Indonesia, Laos, or Vietnam, and the millions of Asian-Americans from these countries who live today in the United States. And within specific sub-sets of Asian-American populations the teenagers of some groups fit very different patterns. For example, the Hmong stem originally from Laos

or Vietnam. According to Hmong societal norms, girls come of age at 13, can make contractual decisions at that time to marry, and some will become pregnant as teenagers. Would supplement use be justified in this sub-set of young women? A better question, however, may be: even if justified, would supplements be taken?

Among Asian-American women, who follow traditional behaviors and practices during pregnancy, this period is considered one where the woman is perceived as “hottest hot,” and pregnant women are required at this time to maintain a food intake pattern characterized by foods identified culturally as “coldest cold.” Commonly, these foods are low in protein and energy, and intake of these items during the gestation period commonly results in a low birth-weight baby, and easier delivery. This concept is called “eating-down.”

Upon delivery, the food intake patterns of these traditional Asian-American women changes dramatically when the mother’s condition is perceived as reversed and deemed to be “coldest cold.” At this time the new mothers adopt a food intake pattern that consists of foods commonly perceived to be “hottest hot,” and many of these are, in fact, high in protein and energy. This pattern results in increased caloric intake, energy used to facilitate production of human breast milk. This concept is called “eating-up.”

However justified in the minds of Western-trained physicians, traditional Asian and Asian-American women do not commonly take a multi-mineral or multi-vitamin supplement during pregnancy even if prescribed. Traditionalists hold that nutrient supplements at this time are potentially harmful because certain supplements are thought to “fuse the pelvic bones,” thereby producing very painful, difficult deliveries, sometimes death.

Rejection of multi-mineral or multi-vitamin supplements by such traditional Asian-American women, however, does not preclude their use of a broad range of herbal supplements and tonics during both pregnancy and lactation. And while such supplements may have long traditional histories of obstetrical use in the ancestral homeland -- and in America as well -- few such products have been scrutinized, scientifically, for potential teratogenic harm during pregnancy, or for complications to either mother or infant during the lactation period.

Consumers want to know and ask: what is best for me as a new, pregnant mother-to-be? All this information -- it is conflicting and so confusing. Who do I turn to for correct information? All scientists seem to do is argue, and since government administrators and regulators attempted years ago to limit my free choice in the marketplace, where do I turn for correct advice?

I heard disturbing answers to these questions two years ago. In 1999 Kristen McNutt and I presented papers at an Institute for International

Research Workshop entitled: Health and Wellness Foods. Meeting Consumer Demands for Future Foods. The workshop focused on dietary supplements, functional foods, and the emerging interest in nutraceuticals. A central component of the meeting was a focus group roundtable where 12 randomly selected, middle-age, female, Chicago residents participated. Each explained why they took nutrient supplements, and how they learned about which supplements to take.

Where did these average American consumers gain their nutrition information? Not from scientists or government sources, since these sources could not be trusted. How did these average American consumers evaluate claims and ultimately separate fact from fallacy? Not the way scientists: in this group personal friends were their most important and reliable sources of nutrition information. Other sources for good nutritional information identified included: supermarket newspapers, radio, and television.

Were these typical consumers or not? The answer appears to be yes. Eliason and co-workers reported in 1999 that consumers justified supplement use for two key reasons: lack of success in using conventional medicine to treat chronic illness, and concern that the American food supply could not support consumer nutritional needs. They reported, too, that consumers in their study were not concerned with safety of the supplements used, because not using supplements was perceived to be a greater risk to health than using them.

Where do women of childbearing age receive their nutritional information? Not from scientists. Since parents, primarily mothers, purchase dietary supplements for their children, it is critical in my opinion to better understand parental knowledge of nutrition-related concepts. It is to this issue that I now turn

While the scientific literature is modest regarding supplement use by children and teens -- except for issues related to athletic performance -- this is not the case if information is sought by consumers using the World Wide Web. On January 23rd I used the Yahoo search engine, accessed the World Wide Web, and cross listed the words: children and vitamins. The match identified 154,000 web pages. Two weeks later on February 5th, I the number of web pages for children and vitamins had expanded to 161,000. When the words supplements and children were matched on January 23rd, the result was 165,000 web pages; two weeks later on February 5th, the number of individual web pages had grown to 178,000.

Advertising texts on these sites address supplement needs and justifications for infants and young children, but the target group for this information are mothers. Justification for supplement use on these sites is presented in short text-bites that range from scientifically accurate to outright fallacy; from simple and benign to deceptively clever. Consider the following examples:

Little One's Vitamins Plus: Information on the web-site states that nutritional deficiencies are what lead to disease and mental and physical growth complications. Save yourself hundreds in doctor bills and start your children off right with -- Little One's vitamins Plus for ages 3-7, or use our chewable papaya enzyme with chlorophyll which is very helpful for children with digestive problems. The same web-site touts Little One's liquid iron supplement and provides the following justification for product purchase: cancer, arthritis, parasites, and yeast infections can all decrease iron to dangerous anemia levels, therefore, if your child is under four years of age take 1 teaspoon daily; if four years and up, take 2 teaspoons daily.

Clever marketing is the norm. One product called Eye-Q tells consumers that the eyes and minds of children need DHA, an omega-3 fatty acid, and that low levels of DHA correlate with changes in disposition, memory loss, and other neurological conditions. The same company, Microhydron, an Independent Member of Royal BodyCare Products, hawks a product called FirstFood, and claims that mothers can build their child's immune system for only \$25.00 for 90 capsules of supplemental colostrum, a product identified so good that your child will not get the flu.

Marketers perceived that meat-eating dinosaurs could offend the sensitivities of some mothers, so a new creature, Herbasaur, was created and advertised as containing chewable antioxidants, specifically grapine, and formulated especially for children. Herbasaur with chewable elderberry plus is recommended for the child's immune and respiratory

system, and the advertising text states that the product contains elderberry fruit concentrate, reishi mushrooms, and astragalus, all in a tablet stamped with the friendly herbasaurus character.

Vita-saurus, still another dinosaur-style branded image, is a marketed mineral supplement that contains calcium, chromium, copper, iodine, magnesium, manganese, molybdenum, vanadium, and zinc. The advertising copy claims the product supports pancreatic health and justifies purchase with the statement that children have a tendency to eat far too much sugar and refined carbohydrates. The advertising copy further states that the antioxidants in their product fight free radicals formed because of food preservatives and radiation from television sets.

The Organic Bébé site contains information on a product line is called Herbs for Kids. Once visitors enter the site, a product called Chamomile Calm appears under the Herbs for Kids rubric, one recommended for nerve support. Ingredients for this product include catnip, chamomile, fennel, hops, and skullcap. The advertising, designed for mothers of young children, states that the product calms, balances, and nourishes the nervous system; claims that Chamomile Calm is wonderful for soothing over-energized, anxious, or exhausted children; that the combination of the identified relaxing herbs relieves tension throughout the child's body, encourages the free flow of creative energy and appropriate responses to stress. The text claims that Chamomile Calm will help reduce stressful occasions in the child's life, specifically: fear, pain, public speaking,

teething, tests or grade school examinations, travel, the appearance of too many visitors in the house. The product claims to calm the stress associated with competitive sports, and is recommended to help the child relax after a sugar laden party.

These and tens of thousands of other advertising texts are directed toward concerned mothers, and urge purchase of supplements using a wide range of marketing justification. At the bottom of the web sites, however, the texts conclude with the powerful caveats -- as required since 1994 -- words to the effect: we provide this information as a service; we make no claim that the information herein is any substitute for the advice of your family physician, and nutritional supplements identified here have not been evaluated by the FDA and are not intended to treat, cure, or prevent any disease. Furthermore, many nutritional supplement web sites that advertise and tout children's supplements conclude with an even stronger caveat: you take these supplements at your own risk. How curious. Manufacturers prepare advertising copy, justify claims, target mother's fears that they might not be providing the best for their children, pitch their product, then conclude with the statement the product is to be used at the consumer's risk -- not the manufacturer's risk.

A review of supplement-related web sites revealed that the marketing ploys primarily were directed towards mothers and the strategies used were variable. Some were based upon fear, fear that the American food supply was not safe; fear that children outside of mother's protective eye

would not eat what was good for them; fear of environmental hazards such as ozone, smog, and exposure to carcinogens, and the products pitched such that these hazards could be overcome by having the child take specific supplements.

Other strategies placed mothers in the “driver’s seat,” so to speak, by saying: mom, you know best; you know best because you want the best; the best, of course, is our product which contains everything necessary so your infant or child will grow strong and be healthy. While you cook and prepare good, well balanced meals, mom, and while you offer your infant or child an array of nutritious products, mom, you can never be quite sure, mom, what happens outside of your watchful eye; trust us -- buy our product.

While marketing texts are directed towards adults, product images are designed to be recognized by children when shopping with mother. A range of popular, familiar images include: Flintstone-shaped multi-vitamins, dinosaurs, teddy- bears, and Pokemon figures. The industry strategy has been to develop and implement a two-pronged advertising approach: beam messages to adults, but design images to attract children. Advertising texts stress product taste: the taste that kids will love; just what kids will eat; the taste that children will ask for time and time again. At the same time the specter of accidental vitamin/mineral overdoses creep in so advertising copy commonly presents in bold letters the words: keep our product out of the reach of children.

Herein lies the rub.

If supplements are designed and manufactured to taste as good as “candy,” children logically will perceive these supplements as candy, then the potential risks are obvious. By marketing children’s supplements as “good tasting” or as “tablets your child will love,” companies play with fire. But even if children overdosed on iron or on fat soluble vitamins -- whether by accident or in such cases when uninformed mothers gives their child ten tablets using the logic -- if one tablet is good, then ten must be ten times as good -- then who would be to blame? Certainly not the web site creator: I merely created the site. Certainly not the ad agency responsible for web site and label text: I merely wrote the words. Certainly not the product manufacturer; I merely assembled the nutrients, produced, and distributed the supplements. And if overdoses occurred only one group would be blamed: mothers.

It is important to counter the plethora of confusing and deceptive supplement-related information directed towards children and parents on the world wide web. Fortunately, some responsible food companies have done so and have weighed-in on the topic of children and mineral-vitamin supplements. Parents who log-on to the Quaker Oats web site are alerted that there is confusing and conflicting information produced by supplement companies. The Quaker Oats web site cautions visitors that the FDA no longer regulates dietary supplements, and that there has been little

pre-market testing for many products now available in the marketplace. The Quaker Oats web site text argues that it is best for children to obtain their daily requirements for vitamins and minerals through a healthy and varied diet of food, but that if parents want to give supplements to their children, then parents are advised speak first with their primary care physician.

Good advice in the minefield of conflicting messages.

Summarizing:

1. Information on mineral and vitamin supplement use during infancy, childhood, and teen years is scattered and limited;
2. Justification for supplement use can be considered three ways: scientific justification based upon double-blind studies to determine efficacy; consumer justification, commonly based upon word-of-mouth, friendship patterns, on what consumers works or not; and manufacturer justification, commonly stated on labels or commercial web pages, to attract sales and to capture a larger share of the multi-billion dollar supplement market;
3. Only limited data explore or document why older children and teens take and justify use of vitamin-mineral and herbal supplementation;
4. Some specific groups of American children may be at nutritional risk, among them: anorexics and bulimics; fad dieters; immigrants;

dependent, homeless children; children in families where alcohol and other drugs are abused;

5. While the world-wide-web offers potential platforms for sound nutrition education and clear messages for correct information on supplement use and justification, thousands of sites contain factual errors, and false or misleading information.

Five recommendations logically follow:

First: Re-seize the information initiative: insist that our professional organizations lobby Congress for a return to science-based evidence for supplement claims. Unscrupulous manufacturers seem to have it both ways: they have the protected ability to attract customers through creative and deceptive advertising texts and unsubstantiated claims, but then print disclaimers at the bottom of their labels and web-sites.

Second: Work with responsible media and editors to counter extravagant claims, to expose illogical, advertising copy, and to present clearly written, science-based conclusions that the general public can understand;

Third: Work with our respective professional societies to increase consumer awareness how research works; reasons why information can or cannot be extended or extrapolated, then collaborate with talented reporters and editors, radio and television journalists, to disseminate

accurate findings. And in this way -- recapture the information initiative and regain public trust.

Fourth: Prepare and implement detailed consumer studies to determine the extent of dietary supplement use and justification among infants, children, and teens. Numerous possibilities exist, different universities and colleges, whereby Cooperative Extension programs, opportunities within various local, state, and federal agencies could be joined and encouraged to conduct these needed surveys.

Fifth: Beyond surveys, however, lies the critical issue of parental education regarding nutrition and health. Why are nutritionists and other scientists losing the battle of respect? If, indeed, parental friendship networks serve as the primary means of obtaining nutrition-related information, education clearly is needed.

Finally, food and supplements are not like other products. They enter the mouth, are digested and metabolized, and become the molecular building blocks of the "body temple." This is why every consumer becomes an expert on nutrition. American consumers today want the "quick fix," the "magic pill" that guarantees increased muscle mass, weight loss, perfect health, athletic perfection. Mothers and fathers want the same for their children, a "magic formula" to maximize their child's potential. Magic in a bottle. Why not: there are pills for everything.

Consumers also want to know why scientists don't get it? If a supplement works for me, I will inform my friends through my friendship network. Who cares about FDA regulation and tests for proof of efficacy? Efficacy is nothing but scientific elitism -- let the marketplace decide what works and what does not.

And while we scientists sit in our laboratories and publish our papers in journals ignored by the general public, the charlatans and faddists have usurped the World Wide Web with their creative texts, eye-catching appeal, and dubious messages.

Is the battle lost or not?

Only time will tell.