Jeffrey Blumberg, PhD.

Dr. Blumberg, early in my career, I had conducted research first in psychopharmacology, and then later I investigated the impact of pro-oxidant environmental pollutants on brain biochemistry, particularly lipid peroxidation reactions. When I joined the nutrition program at Tufts, I “flipped the coin” and began studying the protective actions of dietary antioxidants on oxidative stress in the brain. Interestingly, during my previous training and work, it had never occurred to me that what my laboratory animals were eating might have influenced their response to drugs and toxicants. I had never learned about the power of nutrition.

AT: What motivated you to become a researcher?

Dr Blumberg: As a student, I always seemed to have more questions than answers and was excited to be able to generate new findings from experiments. While I always found satisfaction in gaining a better understanding of the problem I was studying, I found I was most thrilled when the data did not share my enthusiasm for the hypothesis and I was forced to rethink entirely my original ideas. Then I knew that a career in research was for me.

AT: Who were your mentors along the way?

Dr Blumberg: Hamish Munro, the founding director of the Human Nutrition Research Center on Aging (HNRCa), was a formative influence on my approach to nutrition science. Hamish had contributed substantially to the seminal work in modern protein metabolism and he taught me to always look beyond the biochemistry I was examining to understand the impact of nutrition on physiological function. Jean Mayer was also an enormous influence on me. Jean was the president of Tufts when I joined the faculty and, with great insight, he told me that nutrition was not just a science but also an agenda. From that day onward, it was clear that our program in nutrition was not just academic but had to address much larger problems—from malnutrition to health promotion—both nationally and globally. It is rare to find an individual that can
inspire you and stimulate your development both personally and professionally. I feel extraordinarily fortunate to have known two such people.

AT: The link between diet and nutrition is the core of your work. Would you provide a little bit of history about it?

Dr Blumberg: The history of nutrition science can readily be traced back even earlier than 400 BC, when Hippocrates so famously said: "Let food be thy medicine and medicine be thy food." The early practitioners of Egyptian, Ayurvedic, and Chinese medicines clearly used food to promote health and treat disease. The 5,000-year-old use of tea illustrates this history with its first medical application to treat digestive and nervous disorders and as a salve for rheumatic pain. And today we are investigating the putative benefits of tea polyphenolics like epigallocatechin gallate as an antioxidant and anti-inflammatory agent in age-related dementias, cardiovascular disease, and cancer. It is worth noting that until the advent of modern pharmacology, most physicians were well trained in nutritional and botanical medicine.

In my view, the first modern era of nutrition occurred during the first half of the last century when beri-beri, pellagra, scurvy, and other conditions were recognized as due to a nutrient deficiency, and those nutrients were what we soon called "vitamins." These 50 years were a remarkable period of ferment in nutrition, with all of the vitamins being discovered, isolated, characterized, and synthesized. The discovery of vitamins was key to demonstrating diet-health relationships. Specific nutrients were found effective in treating specific diseases (ie, deficiency syndromes) and in preventing it from occurring in the first place. The next 50 years were characterized by a second wave of nutrition science, moving beyond deficiency syndromes and recognizing that essential nutrients had other important health-promoting actions, such as discovering in the early 1950s that the B vitamin niacin could lower elevated cholesterol. Indeed, niacin therapy is still used today, either alone or in combination with pharmacological agents like statins in the treatment of hypercholesterolemia.

In the 1990s, folic acid was found to reduce the risk of neural tube birth defects like spina bifida. This is another wonderful example of the power of nutrition, using simple nutrients as supplements or to fortify foods to prevent a chronic disease.

I am really excited by a new, third wave, where nutrition science is taking advantage of all of the "omics"—the genomics and proteomics and metabolomics of nutrition. We can see a future now where these tools will be fully in place to allow for the development of individualized nutrient recommendations for optimal health rather than the population-based averages we now employ for recommended dietary allowances (RDAs). A sample of DNA from a cheek swab or white blood cell will allow your doctor not only to estimate your risk for future disease but to specify how much of a particular vitamin and what ratio of fatty acids will provide you maximum protection against such a condition.

Of course, we are not there yet, but many people would have looked askance if I had suggested this future 25 or 30 years ago. Now I would suggest there is a general agreement that this is more than feasible and is, indeed, the road we are traveling down.

AT: Would you comment on the status of the medical profession's understanding of the diet-nutrition connection today?

Dr Blumberg: Unfortunately, there is an enormous disconnect between what we have established in nutrition science with regard to the relationship between diet and health and the actual practice of healthcare. As we look at the epidemic of overweight and obesity, the skyrocketing incidence of type 2 diabetes, and the well-documented dietary risk factors for cardiovascular disease, we see a gulf between what we know and the health state of the nation.

Something is terribly wrong. We know so much today about the "good" and "bad" fats and carbohydrates, nutrient density, caloric balance, glycemic load, and the role of micronutrients in promoting health, but we see a population that is carrying a burden of chronic disease that should be readily preventable by applying our current knowledge. It seems that
our cornucopia of convenience foods and a lifestyle that has been engineered to make physical activity unnecessary have created a toxic environment that is very difficult to overcome.

As the key healthcare provider, the physician can and should play a major role in correcting this situation, but there is a regrettable lack of nutrition education and current nutrition knowledge among many physicians. There are, of course, other healthcare providers, including dieticians, nurses, and pharmacists, who can and should play a vital role in counseling and guiding their patients. But we face a fundamental problem that our whole healthcare system is still geared principally toward repair and recovery as opposed to health promotion and disease prevention.

This is where the real power of nutrition lies. We must treat patients with diabetes and heart disease and we must put pins in fractured osteoporotic hips, but we must not lose sight of the fact that we must work harder to prevent these conditions in the first place. And the critical tools to doing so are nutrition and physical activity. There is a great deal of discussion regarding preventive medicine, but one need only review how medical care is insured and reimbursed to see how little recognition is granted to the value of health promotion.

AT: What can start to turn this perception around?

Dr Blumberg: I really think that if healthcare providers truly begin to appreciate the demonstrated efficacy of nutrition and physical activity—the two environmental factors that can have an enormous impact on our risk for most of the important chronic diseases associated with aging—then they can start taking action.

Part of the problem from the perception of both the doctor and the patient is accepting that this approach is a slow process often requiring substantial changes in our behavior. It is not so easy as walking into the doctor’s office and leaving seven minutes later with prescriptions for anti-hypertensive and hypocholesterolemic drugs. When we talk about nutrition, be it foods, dietary patterns or nutrient supplements, we are talking about a lifelong effort. Importantly, this is not only the responsibility of the clinician but also the patients who must empower themselves to take control of their own health. The best doctor can only give good advice—and also set a good example!

However, this responsibility to ourselves is difficult when we are all surrounded by an environment with so many less-than-healthy, albeit convenient, products. So some challenge must be presented to food companies to produce affordable and readily accessible products that are consistent with our health promotion efforts. Ultimately, we must find more effective ways to educate and motivate people to choose healthier lifestyles.

But how do we best educate patients, students, or consumers about nutrition? I am a nutrition educator and teach medical and graduate students and dietitians. But this traditional academic approach is far too limited to reach everyone who must learn these lessons. We have to find more ways to inform every citizen, though we have yet to find that food labels, health claims, nutrition classes in school, media reports, and websites are doing the job we need.

AT: Where do you think mainstream medicine is in terms of understanding and incorporating nutrition and nutrition science as it relates specifically to aging, a primary focus of your research?

Dr Blumberg: It is helpful to appreciate that much of health promotion is directed to reducing the risk or delaying the onset of age-related chronic diseases. But mainstream medicine is still too focused on treating these conditions after they have become manifest instead of preventing them. Nonetheless, there are a growing number of integrative clinicians who are adopting diet and nutrition as one of the mainstays of their practice. There is certainly a segment of practicing dietitians as well that are strong advocates for health promotion through diet and the use of supplements, but many are based in hospitals and directed to nutritional support of patients.

AT: To me, this is really a grassroots consumer movement because consumers are the ones who, with greater access to information, are taking responsibility for their health and
learning about diet and nutrition, and in many cases, talking to
their healthcare providers about it. Do you feel that the public
has a different attitude about some of the things we’ve been
talking about?

Dr Blumberg: The general public appears quite advanced in
terms of their motivation and their beliefs in the importance of
nutrition. Interestingly, 43% of Americans take a dietary sup-
plement. This prevalence reflects a widespread recognition of
nutrient inadequacies and a direct effort to correct this situa-
tion. While much of this use is of multivitamins (a reasonable
choice for everyone), many people need guidance in formulat-
ing a rational supplement regimen. Supplements alone are far
from a full solution, but it suggests to me that many people are
taking some first steps to promote their own health. It would
be interesting to learn what percentage of physicians would
recommend their patients take a multivitamin.

Additionally, I think many of the new functional foods
and formulated foods that are now on the market are certainly
in response to consumer demand for healthier foods. Similarly.
the interest by many people in reversion to traditional diets,
such as the Mediterranean diet and classic Asian diets; the
growing number of vegetarians; the emergence of the slow food
movement; and the interest in organic foods suggest con-
sumers are seeing nutrition as a potent force that can help
empower them to take control of not only their health but of
their physical, cultural, and even moral environment.

AT: Speaking of medical care, based on your work, what are the
top facts practitioners should know about nutrition and aging?

Dr Blumberg: We need to appreciate that there are lifecycles for
nutrient requirements, and one of those cycles includes older
adults and the elderly. Of course, aging does not begin at 50 or
any other single age but is segmented by physiological systems.
For example, immunological reserves begin to decline with the
involution of the thymus at puberty, reduction of bone mineral
density occurs in the middle of our fourth decade, and loss of
lean body mass (sarcopenia) becomes apparent when we’re in
our 60s. But we can slow these and many other aspects of the
aging process through earlier nutrition intervention. When
dealing directly with the elderly, we find a marked increase in
nutrient inadequacies for many reasons, including a lack of
attention to nutrient density, no use or misuse of supplements,
and drug-induced nutrient deficiencies. Importantly, in contrast
to earlier beliefs that because older people are smaller and more
sedentary they have lower nutrient needs, we now know that the
requirements for several nutrients increase with age.

The increased requirement for many nutrients with age
often translates into the rational application of dietary supple-
ments. For example, there is an epidemic of vitamin D deficien-
cy among older people that simply cannot be met by food or
synthesis in the skin produced by ultraviolet light. Older peo-
ple are not approaching their recommended daily 600-IU
requirement for vitamin D, and the gap between their usual
intake and actual need will only grow larger if current research
suggesting intake of 1000-2000 IU daily is necessary. The
bioavailability of dietary vitamin B12 declines with age such
that crystalline forms, which are found in supplements and
some fortified foods, become the most effective way to deliver
this essential nutrient.

One other thing that I would stress is that older people as
a group take more medications more frequently and for longer
periods of time than any other age group. And yet we know
there are many drug-induced nutritional deficiencies. This is a
problem that is significantly underappreciated and that often
goes unrecognized despite the simple solution available to pre-
vent it. It is rarely diagnosed, in part because many of the sub-
clinical nutrient deficiencies induced by pharmacotherapies
lead to signs like lethargy and bone pain, which are simply
attributed to aging. But these signs and symptoms are not
caused by aging but by the use of multiple drugs prescribed for
long periods, often the patient’s lifetime. There is an extensive
database of drug actions that impair nutrient bioavailability
and alter nutrient metabolism and excretion. For example,
cimetidine lowers the absorption of folic acid, statins inhibit
the synthesis of coenzyme Q10, and isoniazid reduces the
hydroxylation of vitamin D.
We also need to find ways to keep older people physically active, not only with aerobic exercises to promote their cardiovascular health but with progressive resistance training to help reverse processes leading to sarcopenia. Combining appropriate nutrition interventions with exercise—even in nonagenarians—creates a powerful synergy for promoting health and maintaining independence among this age group. This synergy is developed in part through providing the optimal nutrient substrates necessary for muscle hypertrophy and bone density as well as the antioxidants needed to defend against the exercise-induced increase in free radical production.

AT: How would you characterize the mainstream medical establishment's understanding and acceptance of supplement research and supplements in general?

Dr Blumberg: Investigators readily embrace nutrient supplements as a research tool. Supplements present the most accurate and practical approach to designing long-term, randomized clinical trials on the effect of individual or combinations of nutrients. Changing foods and dietary patterns in a carefully controlled manner is very difficult to achieve and extraordinarily expensive.

However, even when there are successes with supplement trials—and there certainly have been several—there seems to be reluctance to adapt the actual evidence to practice. For example, when folic acid supplements were proven to reduce neural tube birth defects or when supplements of marine omega-3 fatty acids were shown to lower the risk of cardiovascular disease, the strongest recommendations were to eat more vegetables and fish, respectively, even though the trials were conducted with supplements. Similarly, the dramatic reduction in fractures obtained with calcium and vitamin D supplements resulted largely in the recommendation for greater consumption of dairy products, not of the supplements with demonstrated efficacy.

Some clinicians and policy makers fear that recommending dietary supplements will suggest these products are substitutes for a healthful diet. But there should be no dichotomy between foods and supplements. It seems clear to me that both are necessary solutions to promoting health. Of course, all the available evidence suggests that people who use supplements are more likely to engage in other proactive health behaviors, including eating better, exercising more, and not smoking. There is no indication that people use supplements as an excuse to continue with poor dietary choices. Oddly, some people then conclude that those who use supplements do not need them. But they do need them, albeit less desperately than those who do not take...
them. Nonetheless, I have found physicians who actively discourage any use of any supplements rather than try to design a rational supplement regimen for their patients.

AT: What do you think is the genesis of this love/hate relationship with dietary supplements? It seems illogical and not in the best interest of good patient care.

Dr Blumberg: Perhaps many physicians do not feel knowledgeable enough about nutrition to make the recommendation, or they simply do not have the time to assess each patient’s dietary pattern and nutritional status. This only suggests to me the need for a healthcare team approach, actively involving dietitians and pharmacists to contribute to this effort.

It is also likely that some physicians have been discouraged by the null results of recent clinical trials. However, there is a great deal of misunderstanding regarding the conclusions that should be drawn from studies conducted in patient populations receiving polypharmacy therapies and the inappropriateness of extrapolating them to use in primary prevention. For example, do vitamin E supplements reduce the risk of heart disease? Vitamin E given in randomized trials to patients with heart disease and/or diabetes who are also receiving anticoagulants, anti-platelet drugs, beta blockers, calcium channel blockers, diuretics, ACE inhibitors, statins, and other agents does not appear in most studies to provide a benefit. However, most of the observational data on healthy people taking vitamin E indicate a marked reduction in the risk of a first cardiac event.

In this era of evidence-based medicine, physicians are demanding large scale, long-term randomized clinical trials of nutrient interventions as proof of their efficacy and safety in the prevention and treatment of disease. But there are, in fact, very few such studies—most of which are directed to secondary prevention—and very few are planned for the future. I do not feel the appropriate response is that no nutrient recommendations can be made due to insufficient evidence. Instead, we are required to use our best medical and scientific judgment on the totality of available evidence, including basic research and observational studies as well as clinical trials, and reach conclusions today about what to recommend as food choices and supplement use. Why would we want to ignore the data derived from in vitro and cell culture experiments, animal models, case reports, population-based studies, and millenia of traditional medical and dietary practices and presume that a single research approach, randomized clinical trials, is the only way we can come to know about the value of nutritional interventions? Holding out for this single “gold standard” is not only too limiting to a full understanding of nutrition but holds out the false promise that all the necessary trials will be done in our lifetime or even in our grandchildren’s lifetimes.

In addition to considering the potential benefit in the prevention of chronic disease, it is useful to keep in mind the acute actions of nutrients and their role in providing the proper level of substrate to obtain optimal cellular functions. Bruce Ames has discussed the concept of nutrients being used for a “metabolic tune-up” and achieving a “metabolic harmony.” In large part, this concept is the same as the goal of nutritional genomics, assessing DNA to understand how to balance the unique requirements defined by each person’s profile of single-nucleotide polymorphisms (SNPs) and other genetic distinctions that make us different from one another. Interestingly, many SNPs dictate only small changes in the binding affinity of nutrient cofactors to enzymes. Thus, knowing a person’s profile of SNPs will help allow us to determine his or her optimal intake of specific nutrients.

I do not want to suggest that we can effectively accomplish this type of evaluation and employ it widely today, but that future is not very distant. However, it is important to keep in mind that most people are still failing to meet even the population-based RDAs, and it is not clear that simply knowing your personal requirements for optimal nutrition will persuade everyone to reach for that goal. In the meantime, a diet rich in a variety of
fruits and vegetables, whole grains, and nuts and a multivitamin/mineral still remains a useful recommendation. While this is not the full answer to achieving optimal nutrition and wellness, it is important that we not let a good and reasonable approach today be the enemy of some future perfect solution.

AT: What is your overview of the supplements industry today?

Dr Blumberg: The best companies are characterized by a science-driven approach and manufacture high-quality products. But there is still much work required to ensure that everyone in the industry meets these high standards. On the regulatory side, efforts have been underway for some time now to mandate reporting of serious adverse events and define good manufacturing practices. While these requirements seem self-evident, the process to bring them into being is, regrettably, extremely slow. However, these steps are critical to gaining the trust and acceptance not only of the medical community but of consumers as well. I feel we also need to see more imaginative approaches used to promote rational supplement use, including guidelines that would allow for the purchase of selected nutrient supplements from health savings accounts and by recipients of food stamps.

Certainly, the formation of the Office of Dietary Supplements at NIH was one of the great opportunities created by the Dietary Supplement Health and Education Act. The supplement industry needs to find more effective ways to take advantage of the work the ODS is doing.

AT: Where do you feel the media fall into the dissemination of information about nutrition?

Dr Blumberg: I would go back to my earlier statement that relying exclusively on healthcare providers to educate everyone about nutrition is just too much of a bottleneck. The media, both professional and general audience media, are critically important in delivering messages about what we know about nutrition and health.

The problem is that many journalists do not do it well, whether because of a lack of a suitable science background or the apparent need to always post provocative, though not necessarily helpful, headlines. We have to work on improving the reporting of nutrition news because it is a vitally important part of informing people about how to take control of their health. Whether it is newspapers or magazines or the web, there is a wealth of information out there. But how do we make it more accurate, balanced, and responsible?

AT: What is the most promising research you’re excited about?

Dr Blumberg: In my laboratory, we are joining the growing inquiry into the health-promoting role of phytochemicals, especially polyphenolic compounds like the flavonoids. We have so much more to learn about these so-called non-essential nutrients, but they do appear very promising as dietary constituents contributing to the health-promoting benefits of plant foods. We are discovering that these compounds often work in synergy with essential nutrients like vitamins and, thus, we are expanding our understanding about the value of ensuring a diversity of foods in our diets.

However, despite these and other advances, we now have this worrisome gap between twenty-first-century nutrition science and nineteenth-century nutrition practice. I am deeply concerned that we are failing to meet some of the most important problems in public health as a result. Remember, nutrition isn’t just a science; it’s an agenda, and we must address urgently issues like malnutrition and obesity and their many consequences for public health.

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