April 2005 Issue | Michael Wald, DC, CCN, DACBN Advanced Medicine of Mt Kisco

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This entire issue of FMU will focus on the future of primary care and its relationship to the management of chronic disease. There is an increasing aspiration for health throughout the whole life span. "Survival curves have assumed an ever more rectangular form," to quote from Dr. James Fries' classic article which appeared in *The New England Journal of Medicine*in 1980, titled "Aging, Natural Death, and the Compression of Morbidity."[1] Many people now aspire to reach the age of 90 and still be able to engage in going back to law school, do computer programming, play the piano, and a host of other activities. We want to continue to have high vitality, experience low rates of chronic illness, and compress morbidity into the last few breaths of life. That is the theme of Oliver Wendell Holmes' classic poem, titled *The Deacon's Masterpiece Or, the Wonderful One-Hoss Shay: A Logical Story*, in which he provided one metaphor for the perfect life span. He talks about a horse-drawn carriage that ran beautifully for 100 years with no problems. "All of a sudden, on the centenary of the great Lisbon earthquake, the Wonderful One-Hoss Shay collapsed into a mound of dust, going to pieces all at once, and nothing first-just as bubbles do when they burst."[2]

That is what most of us aspire to in terms of our life span. We would like to compress illness into the very end of life and be functional up until that time. That is mapped against what is really happening in the United States-the emergence of a new, dominant form of healthcare problem called "chronic disease." In the past 50 years, chronic disease has become increasingly prevalent. There are significant differences in how physicians and practitioners manage chronic disease versus how they manage acute disease.

Chronic disease has now replaced acute disease as the principal cause of disability and use of health services. As I mentioned in a previous edition of FMU, Dr. Halsted Holman, from the Stanford University School of Medicine, wrote an editorial that appeared in the *Journal of the American Medical Association*, describing the use of medical services and health expenditures for the management of chronic disease and that it now constitutes 78 percent of all healthcare expenditures. Chronic disease also dramatically transforms the role of the patient. As Dr. Holman points out:

"The differences between acute and chronic disease are substantial. Acute disease is episodic. The patient is usually inexperienced and passive while the physician administers treatment."

Therefore, the patient is passive and the practitioner is active. The patient becomes almost a victim. The practitioner is the person who fixes" it. That is the traditional model.

"There is commonly a cure and the patient returns to normal. None of this is true for chronic disease. Chronic disease is continuous. There is rarely a cure. The patient usually lives indefinitely with the disease and its symptoms, with persistent treatment and with multiple consequences, including necessary behavioral changes to forestall worsening of the disease, social and economic dislocation, emotional turmoil, financial fear, lowered self-esteem, and depression."

Often, patients present to a primary care provider who is focused on complete coverage of health problems and who deals with fibromyalgia, chronic fatigue syndrome (CFS), chronic arthritis, headaches, malaise, and chronic gastrointestinal disturbances such as chronic irritable bowel syndrome (IBS). The complaints are common-fatigue and low-grade pain.

"As a result, the patient becomes experienced, is often more knowledgeable than the physician about the effects of the disease and its treatment, and has an integral role in the treatment process."

Chronic disease requires a practice of medicine quite different from that used for acute disease.

"With chronic disease, the nature of care changes." [3]

As Dr. Holman points out, the problem is that we are not educating practitioners about how to manage chronic disease. Graduates from the most esteemed medical institutions are extraordinarily adept at diagnosing and treating acute disease, but their skills in managing chronic disease are primitive. Yet, patients with chronic disease constitute 78 percent of healthcare expenditures. This is called "dissonance"; there is a mismatch between the need and the reality.

With the future of primary care medicine in mind, there is a wonderful editorial written by Drs. Michael Whitcomb and Jordan Cohen in *The New England Journal of Medicine*. Some of you may have heard of Dr. Whitcomb. He is a very strong advocate for changing medical school education. He is affiliated with the Association of Medical Colleges in Washington, DC. In this editorial on the future of primary care, Drs. Whitcomb and Cohen state:

"During the early and mid-1990s, a consensus emerged among physicians and healthcare policy makers that the United States would have a substantial surplus of physicians by the end of the decade. Most people who held this view also believed that the surplus would be limited to non-primary care physicians and that, by contrast, the supply of physicians planning to practice primary care medicine would be barely adequate.

"Now, only a few years later, studies are beginning to suggest that the country may soon be facing an overall shortage of physicians, and market signals suggest that, in some regions, shortages may already exist in some specialties. [4]"

The recent trend may be a harbinger of a real crisis in primary care medicine-one even more severe than the one predicted in the early 1990s.

"Moreover, during the time they spend in out-patient care settings, few students (or residents) have the opportunity to observe the provision of optimal care for patients with chronic disease. Few outpatient teaching sites have established contemporary models of chronic-disease management, in which teams of

heath care professionals are guided by the principles of patient-centered care and are supported by the information-technology systems needed to provide high-quality ambulatory care."

However, few students have access to these learning systems and become adept and skilled in their implementation, meaning that we are not only seeing a potential shortage of physicians, but even a greater shortage of doctors in primary care who are trained to manage the epidemic of chronic disease.

There is a good diagram in the Whitcomb/Cohen article, titled "Match Results According to Primary Care Specialty, 1989 through 2003." Since 1989, there has been a dramatic decline in the number of primary care family practice physicians being trained. We are seeing an increasing need that is not offset by an increasing array of trained professionals. The objectives to rectangularize the survival curve and compress morbidity into the last few moments of life may be unrealistic, based upon the healthcare services we now have. They were built to support the edifice of crisis care at the expense of not having a good chronic care management system.

As Drs. Whitcomb and Cohen point out:

"However, as others have noted, neither family practice nor internal medicine-the two specialties that provide most of the care for adults with chronic diseases-has yet redesigned its residency programs to encompass the knowledge, skills, and attitudes residents must have to care for such patients. Unless these changes are made-and made soon-the practice of primary care medicine seems destined to become the province of nurses and other nonphysician health care professionals."

Whitcomb and Cohen stress the necessity for a chronic disease management system that would be patient-centered and focused on new information technology systems. I would like to add that this is what functional medicine has been talking about for nearly 20 years. This is the focus of what we have been trying to teach, and what our learning systems are all about-the connection of information systems to patient-centered care.

This is supported by a multitude of papers, two of which I would like to cite, that are indicative of this relationship. The first is titled, "Mediterranean Diet, Lifestyle Factors, and 10-Year Mortality in Elderly European Men and Women."[6] This is the HALE Project (Healthy Ageing: a Longitudinal study in Europe), a very interesting, long-term study. It is comprised of individuals enrolled in the Survey in Europe on Nutrition and the Elderly: a Concerned Action (SENECA) and the Finland, Italy, the Netherlands, Elderly (FINE) studies. It included 1507 apparently healthy men and 832 women, aged 70 to 90 years in 11 European countries. This cohort study was conducted between 1988 and 2000.

After looking at hazard ratios of various lifestyle and diet considerations, the authors concluded that, among individuals aged 70 to 90 years, adherence to a Mediterranean diet and healthful lifestyle was associated with a more than 50 percent lower rate of all-cause and cause-specific mortality.

If we could prescribe a drug that would lower mortality of all causes by 50 percent, wouldn't that be a blockbuster? We are talking about the use of a Mediterranean Diet and regular physical activity

A companion paper is titled "Effect of a Mediterranean-Style Diet on Endothelial Dysfunction and Markers of Vascular Inflammation in the Metabolic Syndrome."[7] This also appeared in the *Journal of the*

American Medical Association and discusses work done in the Department of Geriatrics and Metabolic Diseases in Italy. The investigators assessed the effect of a Mediterranean-style diet on endothelial function and vascular inflammatory markers in patients with metabolic syndrome. After two years, patients following the Mediterranean-style diet consumed more foods rich in monounsaturated fat, polyunsaturated fat, and fiber and had a lower ratio of omega-6 to omega-3 fatty acids. Total fruit, vegetable, and nuts intake, whole grain intake, and olive oil consumption were also significantly higher in the intervention group. The levels of physical activity increased in both groups by approximately 60 percent, mainly by walking for a minimum of 30 minutes per day. It was concluded that a Mediterranean-style diet is effective in reducing the prevalence of metabolic syndrome and its associated cardiovascular risk. Reductions in high-sensitivity C-reaction protein (hs-CRP), interleukin-6 (IL-6), interleukin-7 (IL-7), and interleukin-18 (IL-18), markers for immunological functional changes, were also realized-hs-CRP levels, P=.01 and IL-6, P=.4. We are talking about remarkable changes in inflammatory patterns and improved insulin sensitivity with the implementation of a diet and lifestyle program

When we refer to the Mediterranean Diet, we are not necessarily talking about a diet that is very high in protein and low in carbohydrate. In fact, this diet is reasonably high in carbohydrate. However, the carbohydrate is highly unrefined, fiber-rich, and plant-phytonutrient rich, which has a different physiological effect on function than does carbohydrate containing white starch or sugar. You have heard me say in numerous issues of FMU that we have misplaced our concern about carbohydrate as a villain or culprit for the cause of metabolic syndrome, diabetes, and heart disease, and that it is the *type* of carbohydrate that is important. We should be concerned about all the agents necessary for appropriate metabolism and physiochemical control, including gastric emptying and moderate release of glucose. We should therefore be speaking more about glycemic load and glycemic response for all foods, rather than simply talking about percentages of protein, fat, or carbohydrate.

The need to construct a healthy diet often gets confused by popularized diet books and an icon's name, rather than referring to the fundamental things we have learned about the physiology and physiochemistry of the dietary components.

What is the glycemic response and the insulin response in healthy subjects after consuming various types of high-fiber, carbohydrate-rich meals? Are there some individuals, such as a subset of type 2 diabetics, who are more carbohydrate-sensitive? These questions have been asked in many studies. I want to cite one recent example that appeared in the *American Journal of Clinical Nutrition*, titled "Glycemic index, glycemic load, and dietary fiber intake and incidence of type 2 diabetes in younger and middle-aged women."[8] This is one of many papers with the same theme-a diet high in rapidly-absorbed carbohydrates and low in cereal fiber is associated with increased risk of type 2 diabetes. That is not true in the case of a high, slow-release carbohydrate in cereal fiber. It may promote a reduction in the relative risk of type 2 diabetes, metabolic syndrome, and insulin resistance.

Glycemia, Insulinemia and Food Proteins
What about the argument that eating more protein leads to less carbohydrate intolerance? Many papers have dealt with that topic. One of them is titled "Glycemia and insulinemia in healthy subjects after lactose-equivalent meals of milk and other food proteins: the role of plasma amino acids and incretins."[9] The authors of this paper point out that it can be concluded that food proteins differ in their capacity to stimulate insulin release, possibly by differential abilities to affect the early release of a messenger molecule called incretin. Incretin hormones and insulinotropic amino acids may stimulate

higher insulin output, insulin resistance, and glycemia. From reading this paper, it is evident that differing food proteins may have remarkably different effects on postprandial insulin and glucose levels. In this report, milk powder and whey showed an insulinemic effect. We need to keep in mind that the big categories-carbohydrate, fat, and protein-do not really tell us everything we need to know clinically about how individual foods affect particular glucose and insulin responses.

Whole Grain Intake and Insulin Sensitivity
Whole grain intake is more than just carbohydrate. Grains contain a rich array of soluble and insoluble fiber, as well as hundreds of different phytochemicals. All of these have influence on insulin and glucose control through their effects on absorption, liver enzyme activities related to gluconeogenesis, glycogen synthesis, adipocyte physiology, centrally mediated appetite, and peripheral cells such as muscle cells. It is a much more complex story than just giving glucose from starch. We are talking about all the signaling events that occur through complex, unrefined, or partially unrefined food that is also high in complex carbohydrate. I am summarizing from a review paper that appeared in *Nutrition Reviews.*[10]

Are high-protein and low-carbohydrate diets the answer to the question? We need to ask, what *type* of protein is included? What *type* of carbohydrate has been removed? What is the overall diet composition in individual food responses? What I have just said has been discussed in an interesting paper in the *Lancet*, titled "Atkins and other low-carbohydrate diets: hoax or an effective tool for weight loss?"[11] The authors state:

"The apparent paradox that ad-libitum intake of high-fat foods produces weight loss might be due to severe restriction of carbohydrate depleting glycogen stores, leading to excretion of bound water, the ketogenic nature of the diet being appetite suppressing, the high protein-content being highly satiating and reducing spontaneous food intake, or limited food choices leading to decreased energy intake. Long-term studies are needed to measure changes in nutritional status and body composition during the low-carbohydrate diet, and to assess fasting and postprandial cardiovascular risk factors and adverse effects."

To compress morbidity, rectangularize the survival curve, and develop an effective chronic disease prevention and management program, diet must be used in a more prudent way than simply jumping on the bandwagon of fads that are commonly making someone financially successful, but that may not be in the best interest of the individual patient.

As we move to a higher complex carbohydrate, minimally processed type of diet regime, what about the relative effect that the allergenic component of grains might have-things like gluten and reactive proteins? There are certain grain-related products that are low in or devoid of gluten. One grain that has been discussed for some time is oats. There was an interesting article recently published in *The New England Journal of Medicine*, titled "Gluten Contamination of Commercial Oat Products in the United States."[12] The author states that there is quite a bit of published literature suggesting that people with celiac disease or gluten sensitivity can consume moderate amounts of uncontaminated oats because they are low to devoid in gluten. However, some recent studies have looked at various types of commercially available oats to examine the extent of their gluten content. It has been found that there is a high variability from batch to batch, suggesting gluten contamination of some of the oat products, perhaps not native to the oats, but as a consequence of contamination due to being processed in the same plant where wheat had been processed. People are being urged to recognize that contamination of commercial oats in the United States with wheat, barley, and rye, is a legitimate concern for people with severe gluten

sensitivity. Therefore, people should not conclude that these grains are gluten-free. They would probably be low in gluten relative to wheat, but there may be some contamination. I wanted to share that insight because people have been known to experience a reaction to oats and think it is due to gluten content, but it may be that the oats were contaminated with the gluten-containing grains.

In this culture, at a time when we are moving into epidemics and pandemics of things like metabolic syndrome, type 2 diabetes, obesity, CAD, and hypertension, we are witnessing a physiological function change to a different homeodynamic state. The term "homeostasis" is often thought of as meaning that a person is stable around a certain healthy condition, but someone can be homeostatic with diabetes or hyperlipidemia. The question is, how does one modify the environment in such a way as to create a different gene expression pattern so that homeostasis is concentric, overlaps good health, and achieves the objective of rectangularizing the survival curve.

When the wrong information is delivered to the genes in the form of a bad diet not matched to a person's needs, a poor lifestyle, or toxic exposure, those genes respond in a state of alarm and create an environment in the body-the so-called phenotype, the phenomics of the individual-that is shifted toward being unwary, ill at ease, uncomfortable, and prepared to do battle. This is called immunological activation, or immunological imbalance. It is part of the new clinical problems we are seeing in the 21st century, and they can be influenced by many variables-not only diet, but stress, toxins in the environment, endotoxins in the gut, chronic infection, and mechanical trauma, such as over-training in athletes. There are myriad things that can shift the balance in the immunological system, creating in various tissues the message of not feeling at home and being safe because of inflammation. We will be speaking to that topic at great length at the 12th International Symposium on Functional Medicine-how to recognize imbalances in the thymus-dependent 1 (Th1) and thymus-dependent 2 (Th2) immunologically-based system, and what can be done clinically to restore proper balance between the innate immune system and the acquired immune system.

As phenomics are shifted to an inflammatory state, all sorts of other parameters change. The cellular physiology at organ-specific levels starts to change. Body mass is accreted, generally as central body fat, so the body mass index (BMI) increases. It becomes like a dog chasing its tail. Increased visceral adipose tissue and the hypertrophic adipocyte, the fat cell, begin to produce their own inflammatory mediators that trigger more inflammation. This becomes like a round robin, a spiraling upward. As discussed in a recent series of papers, as abdominal fat is increased, insulin sensitivity goes down, inflammation goes up, and the relative risk of heart disease, dementia, and cognitive decline all increase. I am quoting from an article in the *Journal of the American Medical Association* which looks at the effect of various hormone modulators on abdominal fat and insulin action in elderly women and men.[13]

When the balance of inflammatory mediators is shifted through altered gene expression patterns, the central set points of our physiology are being influenced, the so-called homeodynamic set points, which have to do with the neuroendocrine-immune system-the interrelationship among the nervous system, the endocrine system, and the immunological system. They are all one super system, all interrelated, one to the other, by receptor physiology and signaling mechanisms and the passing around of information molecules that alter their function. The endocrine system is changed; the immune system is changed; and the nervous system is changed, as a consequence of the shift toward inflammation. That is why the metabolic syndrome is associated not only with inflammation, but with the risk of cognitive decline, as was pointed out in an article in *JAMA*, which found support for the hypothesis that metabolic syndrome

contributes to cognitive impairment.[14] The mechanism could probably be postulated as being related to activation of certain types of microglial function in the brain associated with apoptotic cellular injury of neurons, leading to loss of neuronal reserve and ultimate cognitive decline in certain regions of the brain associated with memory and cognition-the executive centers of the brain, so to speak.

We are beginning to see a unified concept emerging as to how these variables are shifted in the environment and how they influence a wide range of diseases. For convenience, we put them into a differential diagnosis and ship them off to specialty medicine as if they were not connected. They are all part of the lack of an effective chronic disease management system that encourages looking at early warning signs that deal with these dysfunctions before they become acute.

Truncal fat, or central adipose tissue, contributes to inflammation and relates to many different diseases-stroke risk, heart disease risk, neurological risk, and even renal disease risk. There is a strong correlation between truncal fat mass inflammation and end-stage renal disease. One paper you may want to look at was published in the *American Journal of Clinical Nutrition*, titled "Truncal fat mass as a contributor to inflammation in end-stage renal disease."[15] The authors found that there is a strong relationship between inflammatory biomarkers such as IL-6 and hs-CRP and regional fat distribution in patients with end-stage renal disease. This chronic inflammatory response is an important contributor to the atherogenic lipoprotein profile seen in uremia and the relative risk to heart disease and continuation of renal failure.

The fat cell plays an important role in the whole system. The adipocyte, which used to be thought of as only a storage tissue for extra calories in the form of triglycerides, is now seen as a signaling part of the endocrine system. It is a central player in neuroendocrine-immune imbalance. Obesity researchers have now inched closer to their long-sought goal of understanding how a fat cell burns up calories without causing obesity and how it signals inflammation and messages of alarm at distant sites.[16]

Endocrine regulation of energy metabolism relates to the milieu of various molecules floating around in the system that express alarm. For instance, things like leptin, resistin, hs-CRP, IL-6, or adiponectin, an interesting molecule in the news that is produced by the adipocyte cell. Adiponectin tends to balance against the properties of resistin. Whereas resistin stimulates insulin resistance, adiponectin, produced by the white cells and fat cells, causes insulin sensitivity and is an antiinflammatory. This information was reviewed in an interesting paper in *Clinical Chemistry*.[17] Therefore, one could hypothesize that individuals who change from a traditional American diet to a Mediterranean Diet are likely to have higher adiponectin levels, indicative of improved insulin signaling and reduced inflammation signaling.

Certain people have specific single nucleotide polymorphisms (SNPs) and are more susceptible to oxidative types of reactions and lipoprotein abnormalities associated with the inflammatory profile. For instance, an individual with the 219G→T polymorphism in apoE appears to be more sensitive to saturated fat in the diet, which increases his or her susceptibility to inflammation in response to a diet rich in saturated fat, and increases the relative risk to coronary atherosclerosis, metabolic syndrome, and type 2 diabetes. There are "yellow canaries" that carry higher susceptibilities in their genes to certain types of environmental changes. They are the early-warning individuals in society with increasing prevalence of certain diseases associated with environmental changes. This topic is discussed in an article in the *American Journal of Clinical Nutrition*.[18]

What about the use of various types of essential fatty acids of the omega-3 family-for

example, α-linolenic acid from flax, or EPA or DHA from fish-to support different gene responses? The literature is replete with good studies indicating the positive role that omega-3 balanced diets or omega-3 supplemented diets have on reestablishing proper balance in the neuroendocrineimmune system and the inflammation profile. For instance, there is a paper in the *Journal of Nutrition* that discusses an α-linolenic acid-rich diet that reduces inflammatory and lipid cardiovascular risk factors in hypercholesterolemic men and women.[19]Fish oil (DHA and EPA)also has a positive role in reducing cardiovascular risk and lowering inflammatory potential in women. When there is inflammation, it does not stop with a single disease such as CVD. It cuts across a whole range of age-related chronic diseases.

We have established a good background for the discussion with our Clinician of the Month. How do we take all this research and apply it effectively in patient management in the new type of primary care?

INTERVIEW TRANSCRIPT

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JB: It's time for our Clinician of the Month. This month, we are going to speak with Dr. Michael Wald, a chiropractor who also has a Master's Degree in Nutrition. For more than ten years, he has used his education to create an outcome situation in his clinic that has evolved into a striking model for the definition of a successful functional medicine practitioner. At Advanced Medicine of Mount Kisco, New York, Dr. Wald has delivered the quality of care that functional medicine has to offer to literally thousands of patients. I have known him for more than ten years, and it is a privilege to have him with us as a spokesperson for the clinical application of functional medicine. Welcome to FMU, Michael. I've seen your practice grow tremendously over the last ten years. To what do you attribute its success?

Growth and Vision

MW: First of all, thank you for having me on FMU, Jeff. I hope to contribute something to that very important question. My success, in terms of the growth of my practice, is pretty consistent with my growth and vision. When I first began practicing chiropractic and integrating nutrition, I had a certain base of knowledge and a certain way of framing it intellectually. That translated into how I recommend things for patients. Over the years, being exposed to new information and problematic patients or difficult cases forces one who is up to the challenge to ask where the answers might be for this or that patient. From that exploration, I realized that there is no one area of medicine or natural medicine that can provide all the answers. In the process of grappling with question4 and thinking about my contributions to people, to my life, and to the world, I took certain practical steps on a daily basis to create a visible space in my Advanced Medicine of Mount Kisco practice that would provide structure, and where people could go for real approaches that represented an expression of my expanded view of things. Not a place that pretended to have all the answers, but one that was committed to finding or creating answers for people, either by ourselves or with the help of other colleagues. Essentially, my success has to do with my commitment to not staying the same. Simply put, I continue to be willing to change and to think about not only new information, but also the information I thought I had some understanding of at one level, but which transforms over time into something new, and how to practically apply it. That lends itself to the growth of a practice because people get better. They are able to speak about it to other people in their lives, which

grows a practice and stimulates me to move forward.

JB: As I hear you speak, there are three things that come to mind that would characterize my impression of your personality and how you have employed information in your practice. First, you are a seeker. I've always noted that in you. You appear to be a person with an insatiable thirst for learning and creating new opportunities to do better. Second, you are very strong in your advocacy to continue to advance and grow, expand, and be better in managing the complex health problems your patients present with. Third, there is a level of fearlessness on your part to actually take things you've learned and put them into practice. The third step is probably where a lot of people get hung up. There's a barrier that prevents them from moving from what they know to what they do. Through your advocacy into your fearlessness, how do you reach the point of delivering those new things successfully in your practice?

Successful Delivery of New Concepts into Practice

MW: Fearlessness is an interesting way to describe it, but I think that's very accurate. Think about this for a moment. It's whether practitioners are secure in the commitment to do whatever it takes to help live lives they can love, because that's what it comes down to. People don't get excited about taking lots of vitamin pills or altering their diet and lifestyle, but they might get excited if they know it's part of a plan to help them increase and maintain a higher quality of life. I remind myself every morning before I come to my office that I am here to make a contribution to people, and the best way of demonstrating that is through my sincere enthusiasm. That can't be faked. People pick that up, and that's where the so-called fearlessness comes from. I am so committed to people just having fun, and sometimes health is necessary for that. People recognize that commitment and I will not stop in the face of anything.

Let's talk about a patient who just doesn't get it. He/she just doesn't understand the natural functional model, but for some reason, the family has dragged him/her into my office. If I wasn't fearless, I would just sit back and listen to them converse about what I call limitatio5s. I could do that. I don't have to care about what they choose to do or not to do, but I prefer to acknowledge that the patient has a certain way of thinking about things and I try to introduce a different framework. I might not do that if I wasn't fearless and committed to recognizing a patient's limited thinking about the information and trying to help reframe it. That's far better than being fearful and not acknowledging that there is some difficulty in the mind of the patient. If I don't help manage that, patients won't stay around and wouldn't comply well even if they did. In short, the fearlessness comes from an enthusiasm and a deep commitment to help manage the patients' emotional limitations.

JB: That's beautifully stated and is one of the major pillars of functional medicine-patient centeredness-which is what you are speaking to. As the patients' advocate, you help them to recognize that there are options, they don't have to be mired down in whatever chronic conditions have reduced their quality of life; there are options to explore, to work on, and to practice.

That leads to my second question. We both recognize that,presently, the biggest challenges in the healthcare system are in the area of chronic disease. There are many skills that you have in your tool kit related to the successful management of complex, chronic diseases. If you were talking to your colleagues and they asked you what skills they should develop, what things would you tell them have been very valuable in putting together a chronic disease management strategy?

Components of A Chronic Disease Management Strategy

MW: That's quite a loaded question and I'll attempt to narrow down my response. Through conversations I've had with literally hundreds of practitioners, doing professional workshops, and through emails and phone calls with practitioners of many different types who have visited my office over the years, the main limitation is not being well-grounded in a commitment on the part of practitioners to share their enthusiasm. It has to start there. We have many wonderful tools, procedures, lab tests, and other approaches from a natural perspective, but if practitioners don't consider how to intelligently manage these things for each individual patient, I think it becomes quite disjointed. I commonly see patients who have been to very competent practitioners who are knowledgeable, but from what I can tell, after asking the patients what has and has not worked, the patients say they didn't understand the relationships, the testing, or why these things were being done. One of the most basic concepts I've narrowed down about what it takes for practitioners to be fundamentally successful, is that they need to present everything in their armamentarium, but they also need to acknowledge what the patient needs to hear so they can attempt to do these things.

JB: You just said something very profound that I want to make sure gets the proper shrift from our listeners. The way I interpreted what you said, and it's an "aha" for me, is that you set up a context of healing in your practice, rather than focus on procedures and techniques, the tools that people often get very caught up in. You try to put together the tools that can be applied to a system of healing, but the first priority is setting it up by recognizing that it exists, and that the patient has ownership. That's what I heard you say, versus getting caught up in the procedures, the tools, and whether one uses A or B. Is that correct?

A System of Healing and The Importance of Good Communication

MW: That's absolutely correct. From a practical perspective, it might look as simple as this. Let's say a patient presents with a history of multiple sclerosis (MS). One of the tests we might perform is a homocysteine test, which is well known for its relationship to cardiovascular disease. Sometimes, a practitioner might overemphasize that. In other words, we can do a sophisticated test, but we need to relate it to why the person is there, and we need to further relate it to how, if we correct it, it might affect the patient's quality of life. In summary, we always want to bring back everything we're doing to the condition for which the patient is there. That means we need to have a conversation with the patient about what his/her goals and expectations are, and give them what they need, as opposed to what we think they need. We can ask and the patient will talk and let us know. This is where we get to practice our listening skills. Then, when we make recommendations, we create a value. This goes back to the success that you mentioned earlier and what goes into success in clinical practice. We're not just talking about financial success, but clinical success. It comes by always making sure the patients get the value of the service relative to their needs. Who would want to have extensive testing without understanding the value relative to their concerns? If we have an opportunity to frame the testing relative to their needs, value is created. There's also greater compliance. We have very good compliance with the majority of our patients, which we know is necessary. We have to pay attention to always fulfilling their emotional needs at any point. Are they connecting the technology, the evaluations, and the testing that we might do and our recommendations for what's important for them?

JB: That's a good summary of your philosophical approach and how your patients see themselves within your practice. You are serving in a special king of primary care model. When I say special, I mean you are using techniques that are probably not standard for simply diagnosing disease and providing a pill-type strategy. How do you see the future of primary care changing, given the complex problems of the

patients, and knowing some of the limitations present in our system are related to the way primary care is being practiced? What is your view of the future of primary care?

The Future of Primary Care

MW: My view of the future is something that I am, at least in part, experiencing now in my real life and my real practice. We talk about the future, but it's really what's happening now in our lives. The doctor or practitioner of the future will maintain an open-mindedness, first of all, and will be constantly on guard against getting in the way of the patients' healing process. For example, I might be asked by a patient what I think about a therapy. I might have an emotional reaction that might be initially negative, but I've trained myself to get out of my own way, if I don't have a clue. Even if I do have an opinion, it's only my opinion, and this is what I need to relate to the patient. Practitioners can get in their own way. The future of primary healthcare and my vision of it, is one that removes the practitioner from the total decision-making process and proactively involves the patient in his or her health care, recognizing that no area of health care has all the answers.

It was a big "aha" for me one day several years ago when I was treating many difficult patients and feeling a bit discouraged. It occurred to me that there may be answers for these people somewhere else and that I didn't have to do it all myself. That simple observation took a couple of years for me to digest-that primary care necessitates recognizing the limitations and scope of our practices, and developing an array of other support sources that might fit the growing and ever-changing needs of patients over time. When I get a phone call from a patient who asks if I can help with a problem, I may not be familiar with that problem. If not, I do a search on my computer and I may find there's a doctor in another country who might have something to provide, or perhaps a doctor in the next town from mine. I refer that patient out and they get help. I put the needs of the patient first, knowing my tools might be limited. That is the fundamental vision I have of the practitioner of the future. It involves a certain amount of guidance for the patient and providing other options for them. Those options may not provide all the answers, but it's part of a process, and we encourage our patients for feedback. This is done in a functional medicine practice.

Patients are extremely bright and very practical. They come in with loads of research they've read. To acknowledge that wealth of information and proactivism is such a gift. It's something that is not routine in regular medical practice, but it is included as a necessary part of my vision of the primary healthcare provider of the present and the future.

JB: That's very insightful. If I can recap, you're talking about a multidisciplinary team that would be formed to help meet the needs of that particular patient. The patient is part of his or her own team and looking at a system of healing in the context of a systems approach. This is what we try to get across in the Applying Functional Medicine in Clinical Practice training program-looking at things from a systems approach and recognizing that everything is connected to everything else through a web. It sounds like that's part of the model you are communicating to your patients when they come in to your practice.

The Process of Referral

MW: Absolutely. And what deserves some emphasis is not merely having other resources and practitioners that you can refer patients to, but being able to coordinate that care into a functional medicine concept. Often, patients will tell me that they looked at all the wonderful information I gave them and that it made great sense, but when they presented it to their primary healthcare provider, endocrinologist, or gastroenterologist, they completely dismissed it. We have to have a conversation with

a patient before a referral is made, explaining the process. We need to ask them please not to expect that all doctors will agree with everything we've discussed. We are referring them because other practitioners offer something I believe they need. If the other practitioner does agree or has some knowledge in the area, that's great, but we don't expect it. With that simple conversation, patients will come back and tell me that their doctors reacted exactly as I said they would. Either the practitioner didn't think much of the information or, on the other hand, they might say it's pretty remarkable and that they have some knowledge in this area. But at least you've forewarned the patient so that no further rift is created. Many of the patients don't understand why a seemingly intelligent practitioner doesn't "get it." I try to explain that each physician has a specialty and that they think in terms of a disease paradigm. They are very good at managing disease. I explain that we are talking about prevention, predicting, and also managing what might be considered the dis-ease with an emphasis on the dysfunctional aspect of things. Once they understand that, comments other practitioners may make are heard very differently by the patient. Does it undermine what we are trying to do? No, it doesn't undermine the expertise of the standard practitioner or the allopathic practitioners we refer to. In that way, we're not right; they're not wrong; and we can frame everything for people so they can get what they need without my getting in their way.

JB: That's a beautiful model and it relieves the patient from being in the middle of a conflict between two health practitioners. That's also part of healing-reducing stress. Let me move to some short questions to get some specifics out of your philosophy. You undoubtedly have patients who are talking about longevity, quality of life, or what we might call healthy aging. How do you deliver information related to the aspiration of healthy aging?

The Concept of Healthy Aging

MW: Healthy aging is a concept that most people can wrap their heads around because they equate it to their quality of life. We distinguish for them that it's not necessarily living long-that may or may not happen-but it's living longer during the non-disability stage of life, living longer during active periods of life. I constantly bring people back to the limitations in their lives, physically, mentally, emotionally and socially. As we discuss the different findings and make recommendations, we always bring it back to how it would enhance how they live. For example, if a patient has difficulty just carrying her three-year-old child, taking her supplements or eating in a particular way might help her gain greater strength and energy so she can do that. That has more of an impact and is ultimately what we're trying to do.

JB: With that in mind, you mentioned diet, and I know that this is a commonly-shared human experience. We all have different eating patterns. Is there a specific diet that you employ for your patients? How do you approach the diet question?

The Question of Diet

MW: Regarding the diet, there are certainly some basic concepts. For example, consuming four to six servings of fruits and vegetables each day, drinking four to six glasses of clean water per day, not smoking, minimizing alcohol intake, exercising each day, eating organic food when convenient, not overcooking food, and proper preparation of foods. These are fundamental concepts that we review with every single patient. It's important to emphasize that we don't take a specific dietary approach to each person. We rely on the results of laboratory tests. Probably more important than that, we rely on what the patient's concerns are, what their health goals are, and what type of dietary intake might be most appropriate for what period of time? Perhaps it's a short-term effect we're looking for. After that, we move into more long-term dietary approaches. Based on a combination of different factors that gives us

information to recommend this or that food. For example, if the person has MS, we would want to consider a Swank-type of dietary plan, but we would want to emphasize more than the traditional Swank approach-higher intake of omega 3 fatty acids, for example. Perhaps we would test that patient for gluten sensitivity. We might want to recommend increased intake of omega 3s, perhaps less from fish that is contaminated with mercury, as an example, so that we finally come up with something that is truly most reflective of their needs.

JB: Obesity, type 2 diabetes, and metabolic syndrome, all of which have been called lifestyle diseases, are growing by epidemic proportions. You must see a lot of these types of patients in your practice. Often, they present with many complications. How do you approach them, given the kind of personalized approach that you're using, and are there specific accessory nutrients you find useful?

Approach to Obesity, Type 2 Diabetes, and Metabolic Syndrome
MW: There certainly are. In terms of what nutrients, that would be somewhat based on clinical knowledge, but also on what the patient may have attempted on his or her own. In fact, just this morning, I sat with many patients who are taking what looked like the textbook-perfect nutrients for their hypertension, diabetes, or cerebrovascular disease, and it didn't seem to result in making much difference. We use healthy aging biomarkers. We will do a series of evaluations that might include bioimpedance testing, bone density testing, arterial stiffness markers, along with tests for cholesterol and muscle strength. In terms of some of those chronic conditions you mentioned, most people who are listening to this audio tape know that with a diabetic, we want to think about magnesium. Magnesium is one of the more common mineral deficiencies in diabetics. We might give them magnesium. What if that patient has a loose stool, as well? We might not be able to manage them with the appropriate dose of magnesium for beneficial effects, so we might want to give them a form of magnesium that doesn't affect the bowel, called magnesium glycinate. We might also want to match that magnesium need relative to red blood cell magnesium value, which is certainly more accurate than a serum or plasma magnesium value. If we give chromium, for example, we want to make sure the person has a favorable glycemic response to that particular supplement. I'm not necessarily saying that we're going to be testing each of these parameters with every individual. We never just prescribe a single element for a particular patient. But we do want to see real-world changes. That means we have to involve the patient in measuring blood sugar. We want to look at their glycated albumin, for example, or their glycosylated hemoglobin. We want to look at their red blood cell magnesium over a period of time, and given reasonable compliance, we continually tailor their nutritional needs.

JB: I would like to ask one last question. There are certain things you have probably observed as being very fundamentally important tools. That goes back to a question I asked earlier. If a doctor was to ask you where he or she should start, what would be the first two or three things that you, Dr. Wald, from your years of experience, might suggest to work on in developing competency?

Developing Competency
MW: My first suggestion would have to be to develop the proper communication skills. I was one of those practitioners that had so much to say, but it was not being synthesized in the minds of my patients. One needs to be able to quickly assess how patients hear things. So, first would be to work on communication skills. There are many wonderful books, tapes, and organizations that offer material to help practitioners acquire and practice those skills. I need to underscore that, because all the tools we have will be limited if we don't have the communications skills to match them. Second, as I gather information

over the years, I immediately implement into my daily practice any concept if I feel is worthwhile. For example, when I became familiar with bioimpedance testing, I immediately implemented it with virtually every patient. When I learned about the prevalence, let's say, of increased homocysteine levels in the population, that became a routine test for my patients. It might be true of any number of other factors. By immediately integrating new concepts, the learning curve is tremendous. Practitioners are limited in the sense that there is so much to learn. Well, one learns by doing. Immediately implement new concepts into your practices and you will learn at an extremely rapid and practical pace. You retain that information and then it starts to grow.

JB: You have given us some extraordinary insight into some of your tools. I want to recap a quick summary of my takeaway from the experience you shared with us. First of all, be a seeker; be out there as an advocate for your patients. Develop the communication skills to leverage what you've learned effectively by meeting the patients where they want to be met, and finding out how to match your communication with their listening. Be proactive about implementation. The best way of getting things to work is to practice by doing them rather than just by thinking about them. Get past the barrier of resistance to actually implement things, and start to develop more confidence with them as you gain experience. Be very willing to work within a team setting without pointing fingers and placing blame, and try to put the patient at the center of his or her own system, and to match their needs with available resources. That sets you up as the central practitioner, or kind of gate-keeper, or liaison or the integrator of their system, which is probably what they have been missing-someone to assist them through the morass of sometimes complex and confusing information. Be there for the patients to provide that kind of support and communication. This becomes the cornerstone of what I would say characterizes a very effective functional medicine practice. In addition to that, of course, are all the individual skills related to procedures and techniques, but the system of healing that you described seems to be the character that differentiates your successful functional medicine practice.

MW: Thank you, Jeff.

JB: We want to thank you, Dr. Wald. This has been exactly what I'd hoped we'd be able to share-going from esoterism to the reality of the daily world, which is where these things really work and make a difference in the lives of patients. You have our great admiration and respect for what you're doing, and thanks for sharing it.

MW: Thank you. Above all, have fun doing it.

Once again, I want to thank Dr. Wald for the eloquent discussion on his philosophy and how he is implementing functional medicine in his role as a primary care practitioner.

Rheumatoid Arthritis Increases Risk of Coronary Heart Disease (CHD)

I want to pick up from the previous discussion on Side 1, that being the connection between inflammatory conditions and many diseases, not just heart disease or arthritis. One might ask if a person has an inflammation, does that set up risk to other diseases? Does a person with arthritis have increased risk to heart disease? A person with increased inflammation associated with arthritis might have increased risk to cancer because of its inflammatory component.

The literature is now supporting the connection of diseases on the basis of shared mechanisms. For instance, a recent paper discussed rheumatoid arthritis increasing the risk of CHD as a consequence of inflammation and injury to the vascular endothelium.[20] As the inflammation potential is increased by increased hs-CRP levels, the relative increase of risk to many diseases, not just heart disease, is statistically present. That might also indicate why certain medications or treatment programs that lower inflammation will also lower the risk to so many diseases, as Dr. Simon Lu and his colleagues from Harvard talked about in the paper I described earlier.

Statins and Rheumatoid Arthritis
For instance, it has recently been observed from a number of studies that statins used to lower lipids also lower inflammatory mediators. Not only do they lower the risk to CHD, but they also tend to lower the incidence and severity of rheumatoid arthritis. Statins serve as antiinflammatory agents as one of the pleiotrophic modes of action. I am now referring to an interesting series of Letters to the Editor in the *Lancet* that discusses the role and relationship between statins as disease-modifying agents in reducing the progression of arthritis.[21] These are stories that go beyond a single disease. They go to mechanisms, and that is what the functional medicine curriculum has been trying to teach over the years-to better understand shared mechanisms so we are less focused on individual diseases, as if they were independent of all other diseases-and talk more about underlying mechanisms that create dysfunction in older age and are interrelated with gene susceptibilities.

Measuring CRP for Risk Prediction Before Percutaneous Coronary Intervention

Measuring hs-CRP may provide a helpful biomarker, not only for assessing relative risk to heart disease, but for many other variables associated with chronic disease. There are a couple of interesting editorials that appeared recently on the use of C-reative protein (CRP)for predicting the relative risk of adverse outcome in pre-surgical patients. These editorials appeared in *Clinical Chemistry*.[22],[23] One paper was written from a U.S. perspective; the other from a European perspective, and indicated that patients with elevated pre-surgical levels of CRP had a much poorer prognosis when they had percutaneous coronary intervention than those with low CRP levels. The suggestion is, lower the inflammation potential before going through a procedure that would increase the relative inflammation and might, in itself, precipitate other adverse events.

The inflammation story is also associated with alteration in the reduction/oxidation potential of the cell. What does that mean? When certain types of antioxidants are used, they may also have antiinflammatory effects. How does that work? It is a complicated cell signaling story and beyond the scope of this issue of FMU, but let us say that it is something like a storage battery. If your car can only start when the battery voltage is above 12, and if the voltage drops to 11.5, the car does not have the proper cranking power and the engine will not start. Even though there is battery power, it is not enough to trigger the starting mechanism. The same holds true for redox potential. As there is a reduction in the intracellular battery power, the redox potential is measured by the ratio of things like oxidized and reduced glutathione, ATP to AMP ratios, and the FADH to FAD ratios. If these switching battery voltage gates are low in discharge, meaning the cell is under oxidative stress by that mechanism, lack of reducing potential shifts cell signals over into the inflammation pathway. There is a close correlation between oxidative stress and inflammation. As cells undergo oxidative injury, and the battery voltage goes down, the ATP to AMP ratio goes down, the FADH to FAD ratio goes down, and the oxidized-to-reduced glutathione levels go up, the genomic and proteomic messages increase inflammation signaling.

That suggests that certain antioxidants serve as antiinflammatories. If there is an association between inflammation and insulin resistance, then antioxidants might also serve as insulin-stimulating substances. Take vitamin E, for instance; Vitamin E is an antioxidant in lipid-soluble regions of the cell. If it is an antioxidant, it should improve redox buffering and lower the potential in certain tissues for inflammatory mediator production, and that might subsequently have a positive impact on insulin sensitivity by lowering inflammation. Have there been any clinical studies in which vitamin E has been shown to have an insulin-sensitizing effect? In both animals and humans, lower intake of vitamin E has been associated with decreased insulin sensitivity and a higher incidence of insulin resistance and metabolic syndrome.[24] ,[25] ,[26] By knowing something about the mechanism, we can almost abstract something about the clinical impact.

Antihypertensive Effect of Alpha Lipoic Acid Supplementation

What about lipoic acid? That is another interesting nutrient. There are a variety of studies showing that lipoic acid will improve insulin sensitivity and glucose removal. It will also lower blood pressure, presumably because of its favorable effect on endothelial function due to the proper regulation of endothelial redox potential and lowered inflammatory mediators in hypertensive animals. I am now quoting from a review paper in *Current Topics in Nutraceutical Research* about the use of lipoic acid.[27] Generally, doses in these hypertensive animals ranged between 10 and 500 mg/kg per day. The authors suggest it is time to study this in humans.

Diet and Nitric Oxide Synthesis

Last, what about the emerging story on nitric oxide (NO) modulation, using conditionally essential nutrients like L-arginine and 5-methyltetrahydrofolate (5MTHF)? There is now emerging evidence that endothelial function and endothelial NO are improved, and oxidative stress and inflammation are reduced, by supplementing individuals with insulin resistance and/or inflammatory mediators with endothelial dysfunction with 4-6 grams of L-arginine, along with 1 mg of 5MTHF. A review of dietary factors and NO can be found in the *Annual Review of Nutrition*, titled "Regulation of Nitric Oxide Synthesis by Dietary Factors."[28] There is also an interesting animal study that appeared in the *Journal of Nutrition* on how dietary L-arginine supplementation enhances endothelial NO synthesis in streptozotocin-induced diabetic rats.[29]

I hope I have given you some additions to your tool kits as to how to employ different strategies for achieving the objective that Oliver Wendell Holmes talked about-the One-Hoss Shay. Where is primary care going? How do we manage chronic disease? I believe a functional medicine model provides an answer to those questions.

We will see you in May.

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