Introduction to this Special Section: *Chronic diseases such as heart disease, cancer, diabetes, and others are the leading causes of death and disability in the United States, accounting for 70% of all morbidity.[1] These diseases also cause major limitations in daily living for almost 1 out of 10 Americans, about 25 million people.[2] Other sobering statistics are that, in 2005, 133 million US citizens—almost half of all Americans—lived with at least 1 chronic condition, and spending on chronic diseases accounted for more than 75% of the nation's $2 trillion in medical care costs.[2]*

Clearly, our current medical model is failing and not fiscally sustainable. What is needed are changes that are affordable and scientifically based with high success rates. Fortunately, complementary, alternative, and integrative medicine has many such viable approaches. This issue of IMCJ considers the issues of and possible solutions to the problem of chronic disease. We think you'll find the articles thought provoking and insightful.

—The editors of IMCJ

Reforming the US Healthcare System: Implementing an Effective Approach to Chronic Disease

Jeffrey Bland, PhD

It is widely acknowledged that the future of our US healthcare system is challenged with the rising prevalence of chronic disease:[1] The cost of healthcare per capita is increasing, but there is evidence that children born today will have, on average, a shorter life expectancy than their parents due to the rising incidence and subsequent burden of chronic disease.[2] Thus, the US healthcare system is facing a looming crisis, and medicine is in need of a new healthcare model that sensibly incorporates recent breakthroughs in the origins of chronic disease.

Fortunately, the last few decades have brought about alterations in the healthcare delivery system that provide more effective preventive care and chronic disease management.[3] This article looks at the need to develop reimbursement procedures for prospective, functional interventions that provide support for assessment, patient education, and therapy to reduce the burden of chronic disease.

What Is Missing

The current problems with healthcare originate in part with our current emphasis on disease diagnosis and treatment. The absence of an effective system to assess and intervene at an early stage of illness before the actual onset of disease causes us to rely on ever-more expensive interventions and hospitalizations.[4] Presently, the majority of financial incentives in our healthcare system is focused on disease diagnosis and treatment by specialists. According to a 2008 report by the American Medical Association, general medicine makes up only 14% of total medicine practiced in the United States (family medicine, 12%, and general practice, 2%; see Figure 1).[5] In addition, between 1998 and 2001, there was a 35.3% decline in the number of US graduating seniors choosing family practice—the primary component for the prevention and management of chronic disease.[6] This trend of decreasing student selection for family medicine appears to be persisting.

The US healthcare system is a very effective provider of hospital-based, specialty disease care but is not as effective in providing interventions related to the prevention of disease. It certainly doesn't have to be that way. In 1983, Lewis Thomas, MD, past editor of the *New England Journal of Medicine*, authored a book entitled *The Youngest Science* (Viking Press), in which he described how medicine was evolving from a descriptive science where disease diagnosis was the most important feature of medicine to a predictive science based upon understanding the etiology of disease. He predicted that, by the start of the 21st century, biomedical sciences would have discovered enough about the origin of chronic disease to treat the early cause of a disease and not just its late-state effects.[7] His prediction has proven to be largely correct. Unfortunately, however, it has not been reflected in our healthcare model.

Over the past 30 years, underlying physiological dysfunctions that give rise to later disease have been discovered. Thus, we are witnessing a transition in medical thinking from that which is reactive (ie, pathology-based) to that which is proactive (ie, prognostic-based), a phenomenon arising from the discernment of early alterations in physiological function.[8] Based on this transition,

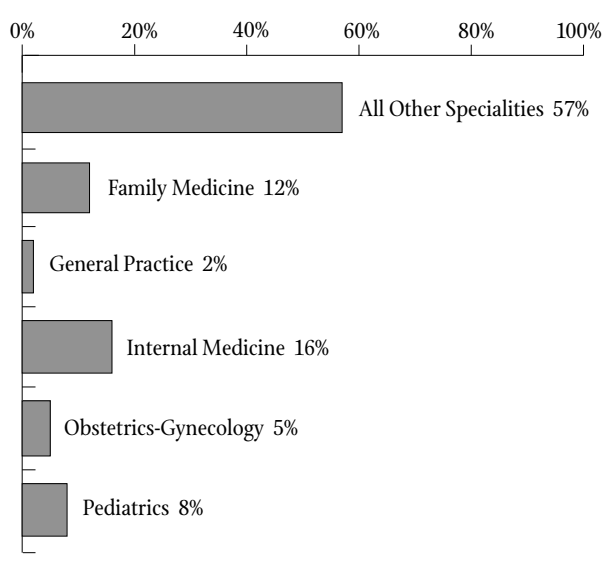

Figure 1. Primary care physicians and other specialists in the United States by percentage.[5]

our current understanding of chronic disease origins is that they emerge from a complex interaction between the genetic uniqueness of the individual and his/her lifestyle and environment.[9]

Chronic disease is, therefore, the result of alterations in an individual's physiological functions that reflect the translation of genetic susceptibilities through exposure to specific lifestyle and environmental factors.[10] In fact, a recent article in the *New England Journal of Medicine* by A.L. Barabasi indicated that the future of medicine will reside in a new kind of system that views disease as arising from a complex alteration in the physiological network that connects genetic uniqueness to environmental and social factors.[11]

A Functional Prospective Medicine

The present debate on healthcare reform has focused heavily on universal access to healthcare and the institutional and financial implications of this objective. These are important objectives, but absent in this dialog has been any discussion about the type of healthcare that will be provided. A continued focus on disease treatment that is deprived of an equally serious discussion as to how medicine will be implemented effectively to improve physiological function in the context of lifestyle will impair expansion beyond the costly disease-intervention model that now exists.

Researchers/authors Snyderman and Hood have defined medicine focused on improving the functional health of the individual as "Prospective Medicine," a practice having the 4 characteristics of being personalized, predictive, preventive, and participatory.[12-15] This medical approach is built upon the emergent science of systems biology, which focuses on underlying functional disturbances in physiology at an early stage in development prior to the onset of severe pathology.[16]

A clinical example of the application of this type of medicine comes from a patient at the Functional Medicine Research Center in Gig Harbor, Washington, which I oversee. John H is a 53 year old with type 2 diabetes and early-stage cardiac disease. He was being seen by 3 different medical specialists, each of whom was treating 1 aspect of his complex, chronic disease presentation using accepted standards of practice. One doctor treated his diabetes with insulin injections and insulin-stimulating medications, another treated his elevated cholesterol and triglycerides with a statin and fibrate medication, and a third doctor treated his hypertension and erectile dysfunction with an angiotensin-converting-enzyme inhibitor and nitric oxide-modulating medications.

When John H presented to our clinic, he was still feeling poorly and his disease indicators were still significant: He had an elevated apoB:apoA1 ratio in his blood chemistry along with increased carotid intimal medial thickness. These were coupled with a very sedentary lifestyle and a diet of "too much of too little," that is to say his food was calorie-rich and nutrient-poor. Using a systems biology, functional approach to his condition, we identified the antecedents and lifestyle/environmental factors that underlay his diseases.

With this patient-focused rather than disease-focused approach, he was then given a treatment program that fulfills Snyderman and Hood's criteria of being personalized, predictive, preventive, and participatory. His outcome on this program over 12 weeks was outstanding—with an improvement in all of his disease indicators and a concomitant reduction in or elimination of all the medications that he was initially taking.

This is a representative example of the type of outcome that can be achieved through effective application of a systems biology–based intervention program. Countless hundreds of clinical outcome examples have been and can be achieved in patients with a variety of chronic diseases through application of such a functional, prospective medicine approach.

Another integral aspect of such medicine is the use of health extenders such as nurses, dietitians, physician assistants, and certified lifestyle educators/wellness coaches. A physician's time is a limited resource. Improvement in patient compliance and outcomes as well as cost reductions have been demonstrated by including health extenders within the healthcare team to improve and personalize the program to the patient's needs.[17] (*Editor's note: For more information on incorporating a wellness coach into your practice, see the interview with Coach Sharon Benedict in* IMCJ *2009;8.4:56-58.)*

On another note, in an article in the *New England Journal of Medicine*, Elias Zerhouni, MD, described the importance of translating the latest in biomedical research progress into clinical practice to improve patient outcomes.[18] He stated that it is "time for a new vision"—a point important for management of both chronic and acute diseases.

The *Textbook of Functional Medicine* (The Institute for Functional Medicine, 2005) describes a successful way of introducing systems biology thinking and prospective medicine into clinical practice for managing complex chronic diseases.[19] Since 1991, the Institute for Functional Medicine has been providing continuing medical education courses surrounding the concept of a patient-centered, systems biology approach to managing chronic disease. Presently, more than 10 000 physicians have attended the Institute for Functional Medicine courses and are utilizing aspects of this patient-centered, prospective approach to healthcare for improved management of their patients.

The Tools We Need Are Available Now

Recognizing that the origin of chronic diseases is rooted in the interaction between an individual's genetic factors and his environment is a major step forward in developing a new medical approach to disease prevention and management. This new medicine is focused on systems biology rather than disease.[20] It is a medicine that seeks to apprehend the nexus between the individual's genetic uniqueness and her lifestyle, environment, and social network.[21] It redefines chronic disease as a functional alteration in the physiological network that requires a systems approach to clinical intervention to improve both safety and effectiveness of therapy.[22,23]

We have the tools to create a more effective healthcare delivery system today. We need to seriously address how to implement a nationwide clinical training program in prospective, functional medicine. We need to develop reimbursement procedures for prospective, functional interventions that provide

support for assessment, patient education, and therapy. We need to harness the talents and expertise of healthcare extenders to provide patient services in delivering a personalized, predictive, preventive, and participatory medicine to reduce the burden of chronic disease.

The tools we need are available, development of many of the clinical biomarkers for the functional assessment of patients has been accomplished, and the effectiveness of this approach has been demonstrated over the past 15 years through clinical application of this model by thousands of healthcare providers.[24] What is now needed is a fundamental paradigm shift in the way regulators, overseers of institutional medicine, and third-party payers perceive the origin of chronic disease from a systems biology, functional perspective.[25]

Jeffrey Bland, PhD, is cofounder and former chairman of the Institute for Functional Medicine (IFM), a nonprofit organization dedicated to supporting the growth of patient-centered medicine. Dr Bland also developed and continues to oversee the Functional Medicine Clinical Research Center, a facility unrelated to IFM. During his career, Dr Bland has been the clinical laboratory director for the Bellevue Redmond Medical Laboratory in Washington, the director of the Nutritional Supplement Research Laboratory at Oregon State University's Linus Pauling Institute of Science and Medicine in Corvallis, and president of the Seattle-based Northwest Academy of Preventive Medicine. He has also authored 8 books and more than 100 peer-reviewed papers. Dr Bland currently serves as chief science officer for Metagenics and president of its biotechnology unit, MetaProteomics, in Gig Harbor, Washington.

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