

The Natural Roots of Functional Medicine

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Abstract

This is a very exciting time for medicine. We are witnessing the creation of a new approach to the prevention and treatment of cardiovascular disease. It is an omnigenic approach—powered by systems biology—to assembling patient-specific information about how genes and lifestyle interact. When combined with other new technologies such as artificial intelligence and

machine learning informatics, the result will be the development of a precision form of personalized lifestyle medicine applied to cardiovascular disease. This advancement will be a gateway for change throughout the entire segment of the health care system that is focused on the many complex chronic conditions affecting our world population.

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People often ask me about the origins of the functional medicine concept. The Institute for Functional Medicine has captured worldwide attention in the last several decades, and it continues to expand its reach in ways that I watch with great pride and pleasure. Like the creation of many new ideas, the functional medicine concept cannot be tracked to a well-defined business plan or an organized management structure. Rather, it emerged organically from conversations and collaborations, and then it continued to evolve due to the shared visions—and hard work—of many dedicated health professionals.

Humble Beginnings, an Open Mind, and Unexpected Attention

In 1971, I took my first “real job.” I was an assistant professor of chemistry and environmental science at the University of Puget Sound in Tacoma, Washington, where I had the opportunity to teach a number of different chemistry-related subjects, including biochemistry and environmental science. One of my first research students was interested in doing work with vitamin E. I knew very little about vitamin E at that time, only that it was an interesting family of molecules with the name *tocopherol*, which—from the Greek—means “to bear offspring.”

Why this name? When vitamin E was discovered in 1922 by Herbert Evans, MD, and his research assistant, Katharine Bishop, MD, at the University of California, Berkeley, their studies indicated that rats fed a diet containing highly purified fat were unable to successfully produce live offspring.¹ With additional research, they discovered that the process of purifying fat removed a fat-soluble family of nutrient molecules, which they later called *vitamin E* or *tocopherols*. My student and I decided to evaluate the effect of vitamin E on the human red blood cell in both controlled in vitro studies and in vivo human intervention trials. Our work, which took place between 1972 and 1975, revealed how vitamin E protects red blood cells against damage associated with aging; we were among the first investigators to report a mechanistic link between vitamin E and a health benefit in humans.^{2,3}

The publication of this work generated significant interest from the medical and nutrition research communities, and even among the general public. My visibility was rising, and I was invited to speak at a number of professional meetings. I suddenly found myself being described as a nutritionist, when in reality my training and background made me more a clinical biochemist and environmental scientist. These new opportunities brought me into contact with a number of very interesting groups that would change my life and career forever.

An Invitation, a Life-changing Introduction, and an Open Door

In 1975, I attended the inaugural meeting of the Northwest Academy of Preventive Medicine, which was founded by Leo Bolles, MD. The conference took place in Seattle, Washington, and Linus Pauling, PhD, 2-time Nobel Laureate in chemistry and peace, was the keynote speaker. It was my honor and privilege to meet Dr Pauling for the first time at this event, and this encounter was the

beginning of a long-term professional relationship, which ultimately led to my work at the Linus Pauling Institute of Science and Medicine in Palo Alto, California, in the early 1980s. While I was still at the university, however, I answered a knock on my office door one memorable day in 1977. In my doorway stood Joseph Pizzorno, ND—to this day, a lifelong friend and colleague—along with a group of naturopathic physicians. In retrospect, I recognize that I hosted an impromptu gathering of naturopathic superstars in my small office that day. The ensemble included Bill Mitchell, Les Griffith, Jenefer Huntoon, Cathy Rogers, Irv Miller, Cathy Naughton, and even the esteemed father of naturopathic medicine in the Pacific Northwest, John Bastyr, DC, ND.

Decades later, time now allows me to recognize that my interaction with this group of young, energetic, dedicated, and very intelligent naturopaths was my first introduction to the field of naturopathy and natural medicine. They had come to me with a request: Would I teach a class in botanical pharmacology—they would be my students—to help facilitate renewal of the ND licensure law in the state of Washington? Naively, I took up the challenge, and for 3 months we came together regularly to complete the course. With a great deal of amusement, I now think back to the scene: There I was—a young hotshot professor of chemistry—trying to teach Dr John Bastyr about botanical pharmacology when he was a respected world expert in this field. It is a testament to Dr Bastyr's character that he thoroughly engaged in the discussions and never held himself above the material; rather, he not only contributed richly to the class dialogue, but also to my own education in the process. When I shared the news of this collaboration with my mother, who was living in California at the time, she indicated that she had gone to a naturopath as a child growing up in Los Angeles; her mother—my grandmother—had been a big supporter of natural medicine. This uniquely personal endorsement of the field somehow solidified the positive impression I had already formed about my new colleagues.

A Sabbatical, Transformative Lectures, and a Chance Encounter

My association with the leaders of the emerging field of naturopathic medicine led to an important introduction and opportunity. Richard Liebmann, ND, was dean of the National College of Naturopathic Medicine in Portland, Oregon, in 1978, and he inquired whether I would teach a course in nutritional medicine at the college. I agreed, and 1978 turned out to be a pivotal year for my career as an educator. I took a sabbatical from my permanent university position. A group of students at Evergreen State College—a school known for innovative course design—had nominated me to teach nutritional biochemistry at the campus in Olympia, Washington. I organized a companion course that was team taught by me, Dr Joe Pizzorno, and Betty Cutter, PhD, that we called “Is there a Healer in the

House?” Together, we coordinated weekly guest lectures about topics connected to the healing arts, and our speakers represented a diverse range of specialties, from natural medicine to surgery. That year—splitting my time between NCIM in Portland and Evergreen in Olympia—my personal knowledgebase expanded well beyond my clinical biochemistry and environmental science training. I was fascinated by the many rich perspectives I was exposed to about medicine, health, disease, and healing. With each lecture I listened to, with each book I read, and with each new relationship I established, my own unique perspective on these topics was taking shape, and my excitement about the future was building.

During this same period of time, I attended a meeting of the Northwest Academy of Preventive Medicine. By chance, I sat next to another “young turk”: David Jones, MD, a family physician from Ashland, Oregon. In the course of the meeting, Dr Jones and I became increasingly dissatisfied with our experience at this conference. The presentations often seemed to lack a thematic direction and we had questions about the scientific rigor of some of the research. Dr Jones and I talked about what we would like to do to make future meetings of this group more successful. As a pair, we were outspoken and unabashed; as a consequence, I became the president of the Northwest Academy of Preventive Medicine in 1979, and Dr Jones started the Southern Oregon Academy of Preventive Medicine. During the next 10 years, Dr Jones and I collaborated on growing our 2 networks. Breaking away from closely held traditions of exclusivity that govern most professional organizations, we were united in our belief that our groups should be open to all upstanding members of the healing arts: naturopaths, medical doctors, chiropractors, dentists, acupuncturists, dietitians, nutritionists, nurses, physical therapists, and physician assistants. We hoped to engage those members of each profession who were dedicated to excellence and life-long learning from one another and from emerging science.

New Ventures, Exciting Times, and a Big Decision

This era was a very dynamic time in the Pacific Northwest, especially in the evolution of natural medicine. I established a monthly study club that served as a gathering place for the leaders of the natural medicine movement. We frequently recorded these sessions, and audiotapes would be shared among people who couldn't attend in person. A decade later, I began producing a monthly audio series based on my experience with the study group, and “Functional Medicine Update”—the name of my recording—became a regular part of my life for more than 34 years. At our study group meetings in the late 1970s, Dr Pizzorno and I frequently discussed the need for a science-based naturopathic medical college, and we believed that Seattle would be the ideal location. Other leaders in the field agreed with the worthiness of this project, and in 1978 the establishment of the

John Bastyr College of Naturopathic Medicine moved from discussion to implementation. I joined Bastyr's first board of trustees and became founding president of the Council of Naturopathic Medical Education. Jointly, these organizations applied to the US Department of Education for official recognition and accreditation, which was ultimately granted.

By 1981, I was once again on sabbatical from my teaching position at the University of Puget Sound. At the invitation of Dr Linus Pauling, I was working under his mentorship at the Linus Pauling Institute of Science and Medicine. For 2 extraordinary years, I had the opportunity to engage in research and program development that was foundational to the integration of systems biology into medicine. I interacted with an amazing group of innovators; Dr Pauling himself was the leader of the institute, and he invited scientific leaders and colleagues from around the world to visit the institute as guest faculty. During this period, I studied the history of medicine and the healing arts in greater detail. I read voraciously about the concept of natural medicine and naturopathy.⁴ In 1983, a conference that was organized as a tribute to Dr Pauling took place in San Francisco. The proceedings from this event were edited by Richard Huemer, MD, and published in a book titled *The Roots of Molecular Medicine*. My contribution was a chapter based on my presentation, "Lipid-Peroxidation-Induced Diseases: A Model of Molecular Disease."⁵ Among the many personal and professional milestones I achieved during my years at the Pauling Institute, a project of particular pride was my work with the noted Scottish cancer specialist, Ewan Cameron, MD, on the development of an integrated approach to cancer therapy that culminated in our completion of an animal study on the differential effects of omega-6 and omega-3 fatty acids. We published our results in 1989, and the findings were surprising: In a mouse model of breast cancer, an omega-6-enriched diet produced a procarcinogenic effect, whereas an omega-3-enriched diet produced a cancer-protective effect.⁶

After completing my second sabbatical year in 1984, I made a dramatic decision: I resigned from my faculty position and relinquished my university tenure. I started a company—HealthComm International—with the intention of teaching practitioners how to implement preventive nutritional medicine in their practices. Why did I move away from academia? Because Dr Pauling had asked me a pointed question when our time together came to an end: "Do you think your classroom will be big enough for you and your vision to bring science-based nutritional medicine to the practitioner?" I decided to rise to the challenge, and so I made the life-changing decision to redefine my professional identity. A new chapter started: I was now an entrepreneur whose focus was to build a new discipline of science—as well as a business—around the concept and power of nutritional medicine.

The Origin of Functional Medicine and the Institute for Functional Medicine

By 1988, HealthComm was well established as a leadership organization in nutritional medicine education and development. My wife, Susan Bland, suggested that we bring together some of the remarkable people I had met through the years—innovators and leaders—to discuss our vision for the future and objectives for collaborative efforts. We convened a meeting in 1989 in Victoria, British Columbia, Canada. A group of key opinion leaders from different backgrounds, and with different perspectives and expertise, were invited to discuss and freely exchange ideas about what the "best practices" of health care in the future might look like. Sponsored by HealthComm, the attendee list was as follows:

- Sid Baker, MD
- Stephen Barrie, ND, PhD
- Jeffrey Bland, PhD
- Susan Bland, MA
- J. Alexander Bralley, PhD
- Leo Galland, MD
- David Jones, MD
- Jeff Katke
- Martin Lee, PhD
- Hakeem Lewis, ND
- Peter Madill, MD
- Wayne Matson, PhD
- Darrell Medcalf, PhD
- Jean Munro, MD (England)
- Stephen Paul, PhD
- Joseph Pizzorno, ND
- Graham Reedy, MD
- Scott Ridgen, MD

From the discussion among this diverse group of experts, the concept of functional medicine as a systems biology approach to health care was born. Systems biology was just emerging as a conceptual way of thinking about the complex interactions in biology and molecular medicine that give rise to function; once established, innovators such as Lee Hood, MD, PhD, would go on to be acknowledged as pioneers in this field.⁷ Among our group, there was considerable discussion as to whether *functional medicine* was an appropriate term; this description was already in use in geriatric medicine and also in reference to psychosomatic illness.^{8,9} It was the consensus of the group that the use of the term *functional* in medicine was starting to change in the late 1980s, especially due to the development of important new technologies and approaches, such as functional MRI and functional cardiology. Our assembled group also believed that *functional medicine* would honor the molecular medicine concept of Linus Pauling and its connection to system biology¹⁰ as well as the roots of science-based natural medicine.¹¹ All these years later, the word *functional*

now applies to states of health that span physiological, physical, cognitive, and emotional issues in health care; the accumulated loss of function across those 4 functional domains defines the early signs of what is later diagnosed as pathological disease.¹²

Nearly 2 decades after our summit in British Columbia, a colleague discovered a stunning article in the medical literature: an editorial published in *Lancet* in 1871 by Sir Willoughby F. Wade, MD, professor of medicine at Queens College in Birmingham, England, titled “Clinical Lecture on Functional Medicine.” Professor Wade wrote the following words: “Whenever we come to treat a case, to prescribe drugs or particular diets, rest or action, we should first of all consider what function of the body it is that is improperly performed.”¹³ As a copy of this article was emailed and shared digitally in a future world that the distinguished Professor Wade most likely never envisioned, my colleagues and I came to recognize that functional medicine is a concept that makes sense in any era when the right questions are being asked. We’ll never know what kind of reception Professor Wade’s lecture received when he presented it in March of 1870, but given the silence that followed for more than 100 years, one can assume he was a unique thinker in a time that preferred conformity to innovation. For a truly successful application of functional medicine to take place—one with widespread impact and clinical success—the science of systems biology and molecular medicine, in combination with a focus on patient-centered health care, represents the right soil for the concept to take root and thrive.

Natural Medicine Education and the Connection to Functional Medicine

In 2016, journalist John Weeks, who is well known for his in-depth reporting on topics related to natural medicine, wrote a column about the early leadership within the naturopathic profession and the later emergence of functional medicine.¹⁴ In this review, he acknowledged the modern rebirthing of a science-based naturopathic profession in the late 1970s and early 1980s and described the significant role this era played in the development of both integrative and functional medicine. What I have written here today is an insider’s view of key events that transpired during that period and the very real people we should honor and credit as we reflect on this history. For me, it all started with a knock on my door. I opened it to find a friendly and smiling group of quiet revolutionaries, and I hold each one in the highest regard to this day. Their work led to the first graduates of distinction from the National College of Naturopathic Medicine in Portland and John Bastyr College of Naturopathic Medicine in Seattle. Later, the movement spread, and I had the opportunity to work with the founders of the Canadian College of Naturopathic Medicine in Toronto on the development of their

science-based curriculum. Later still came the Southwest College of Naturopathic Medicine in Scottsdale, Arizona, and Bridgeport University College of Naturopathic Medicine in Connecticut.

With my wife, Susan Bland, I founded the Institute for Functional Medicine in 1991. The forward-looking dialogue that began with natural medicine has never stopped: How do we balance science with experience, the individual with the average, the diagnosis with the prognosis, the intervention with the intention, the technology with the intuition, and the genes with the environment? More than 100 000 licensed health care practitioners have participated in education programs offered through the Institute for Functional Medicine during the past 26 years. Millions of patients have experienced the functional medicine approach to the clinical implementation of systems biology, as well as personalized prevention and treatment during this period.¹⁵ In 2014, the Cleveland Clinic Center for Functional Medicine was established; hundreds of patients are now seen annually and the success of the functional medicine operating system is being closely measured.¹⁶ For me, this has been a remarkable 40-year journey, and it was the convergence of 3 paths—natural medicine, molecular medicine, and systems biology, viewed through the lens of patient-centered care—that elucidated not only the case for the development of the functional medicine concept, but also the *need* for it as a logical step as an operating system for the transformation of health care. Personalized lifestyle health care, a dynamic field that will introduce even more people to the value of functional medicine applications, is a success story that is just beginning to be fully revealed.^{17,18} A new year has just turned, and therefore the journey—for all of us—continues. The past is important to me and I like to honor the history and lineage that brought us to this time and place, but like so many others, I also look forward with great anticipation to the emergence of a new era of discovery, progress, and empowerment.

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