RCMI 10th Anniversary Celebration

The following address was prepared by Heinz Valtin, M.D., for the tenth anniversary observance of the Research in Minority Institutions (RCMI) Program at the University of Puerto Rico Medical Sciences Campus, held on November 14, 1996. Dr. Valtin chairs the External Advisory Committee for the RCMI Program. He is the Andrew C. Vail Professor Emeritus and the Constantine and Joyce Hampers Professor Emeritus, as well as former Chair of the Department of Physiology, at Dartmouth Medical School. His scientific and academic excellence has been recognized with several awards, including the Arthur C. Guyton Award for Distinguished Teaching in Physiology in 1994 and the Robert Berliner Award for Excellence in Renal Physiology in 1995. Dr. Valtin currently chairs the Dartmouth Medical School Bicentennial Committee.

Due to the richness of his reflection, especially at a time when most institutions vigorously scrutinize the mission and goals of medical education, the RCMI Program would like to share the content of his message with the scientific and academic community.

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On the Importance of Research on a Medical Sciences Campus

President Norman Maldonado, Chancellor Jorge Sánchez, Dean of AcademicAffairs,Adolfo Firpo, NCRR RCMI Program Director, Dr. Sidney McNairy, Dr. Emma Fernández-Repollet, Dr. Susan Opava, Colleagues and Friends, thank you for inviting me to participate in these celebrations. I feel that I am speaking here today on behalf of the entire External Advisory Committee, and I am confident that they would agree with the views that I am about to express.

You have asked me to speak about the importance of research to an academic institution, perhaps specifically about the importance of research on the Medical Sciences Campus of this University. At first glance, the topic may seem like apple pie and motherhood, for we all acknowledge that research is important. But when we pose the question more specifically — namely, why is it important for a medical school, which educates future practitioners in the art of medicine, to have active research programs — then the answer may not be so self-evident. I will divide this talk into two parts: first, to review the importance of basic research to clinical medicine; and second, to consider the role of research — both basic and clinical research — in the education of medical students, and of graduate students in a medical school setting.

Photo by Jonathan E. Sa'adah

First, then, on the relevance of research to clinical medicine. It is a truism that the basic research of today is the clinical practice of tomorrow. Defining basic research as the effort to ascertain how things work — as an effort to expand our knowledge, without the requirement that the newly-gained information will necessarily have utility in the solution of a practical problem — given that definition, the importance of basic investigation to clinical medicine is not self-evident to lay persons, and not even to most medical students. Yet, a few striking examples will clarify the connection.

Gregor Mendel was an Austrian monk and naturalist studying how traits are inherited — what makes peas tall or short, wrinkled or smooth, yellow or green — when he founded the field of genetics, which has led to so many diagnostic and therapeutic miracles of current clinical medicine. Wilhelm Rontgen was a physicist studying the propagation of fundamental particles when he discovered X-rays, the forerunner of the truly incredible imaging techniques of today. Marie and Pierre Curie were chemists who had no idea that their discovery of radioactive isotopes would lead to the treatment of cancer. And Karl Landsteiner was a pathologist studying fundamental questions of immunochemistry when he defined the major blood groups of humans, which led to safe blood transfusions — until, of course, the scourge of AIDS came along.

These are just four among numerous examples, and I will not belabor the point. Although they are anecdotal, their lesson was proven statistically, so to speak, in a famous study by Comroe and Dripps, who asked a panel of experts to identify key articles that led to major advances in clinical practice. To cite just one example from their study: nearly one-half of 88 key articles judged to be crucial to the development of open-heart surgery made no mention of any possible relevance to human disease. The point was echoed by Lewis Thomas when he said in one of his many insightful speeches, "What is needed, if we hope ever to bring down the costs of health care, is more science, and especially at this stage of development, more basic science." Thomas extrapolated advances in the basic sciences to the cost of health care by looking toward the prevention of disease; in the same speech, he stated, "It is quite true that a revolution in biology is now in progress, and I believe it is reasonable to predict that this revolution is bound to affect our capacity to comprehend human disease processes in fine detail, and ultimately to prevent them or turn them around." Thomas was expressing the logical progression of good pathophysiology: first, to understand the normal function of a system; second, to identify the point where a disease process interferes with the normal functioning of that system; and third, to develop new therapies or preventive measures that arise out of that understanding.

I do not want to leave this first part of my talk without referring also to the importance of clinical research. (Parenthetically, I should state that I am often unclear as to what constitutes clinical research. Many of the excellent investigations that are carried out in clinical departments are so-called bench research, which is often indistinguishable from basic research. Perhaps one way to define clinical research is that its investigations must involve patients — examples would include important clinical trials, epidemiologic studies, outcomes research.) This definition emphasizes that, if discoveries in the basic sciences are to advance the practice of medicine, the discoveries must be applied to patients. Thus, both basic and clinical research are crucial to advances in clinical practice.

But granted that research is essential to progress in clinical medicine, one might ask why the work should be carried out in medical schools. Why not conduct the studies in research institutes? The results would not be any less applicable to clinical medicine. Why not train physicians in medical schools and conduct scientific investigations (especially basic science investigations) in research institutes? In my opinion, the answer to this question lies in the atmosphere that active research programs generate, the atmosphere of scholarly inquiry and of healthy skepticism in which our future doctors are educated. I use the term, 'educate', advisedly here, to distinguish it from 'training', for ultimately the importance of fostering research on medical sciences campuses boils down to the question of whether we are satisfied to have our medical schools be training programs in which students learn by rote, or insist that they be graduate schools, in which students learn to think.

During the four years that medical students are with us, we should strive to exemplify a scientific approach to clinical problems, to produce physicians who have mastered continuing self-education and the ability to analyze clinical problems through integrative thinking, starting from first principles. Accordingly, three major phases should be identifiable in a medical curriculum: (1) mastering the principles of basic science (anatomy, biochemistry, cellular and molecular biology, physiology); (2) applying these principles to the understanding, and hence logical management, of disease processes — i.e., mastering pathophysiology, which should concentrate on disease 'processes' rather than on specific diseases; and (3) a clinical experience with patients and specific diseases. (Note that these phases should be identifiable regardless of what mechanical format the curriculum takes — whether it involves mainly 'vertical' rather than 'horizontal' integration, mainly small group conferences rather than lectures, mainly problem-based learning rather than a more traditional format.)

Like the first two phases, the third — the clinical experience — should concentrate on principles; clear and thorough examples of a logical approach to clinical problems (even if only a few) should take precedence over experience with the myriad of diseases. Obviously, practical experience is very important, but while some of that experience can be gained in medical school, the major opportunity for it should be provided during residency training. American clinical practice is at the forefront of world medicine-largely because our medical schools are graduate schools, not

training schools. Doctors can indeed be trained by rote, and they could manage the majority of their patients adequately with that type of training only (as witness the efficacy of barefoot doctors and of medical personnel in much of the world). What we should strive for, however, is what we call 'thinking physicians' — ones who can remain educated in their profession in the face of dramatic developments such as molecular genetics, ones who, when faced with new and difficult diagnostic and therapeutic problems, can handle them logically, correctly, and safely because they (the physicians) had learned how to apply basic science principles to the analysis of clinical problems.

While stressing the role of science in clinical practice, I am by no means unaware of the importance for humaneness in treating our patients. Just recently, this importance was again brought home to me when one of our former chief residents in medicine, a highly intelligent woman trained thoroughly and superbly in science, brought solace to an elderly friend of mine by recognizing and facilitating appropriate grief over the recent loss of a spouse. No application of modern scientific miracles was involved, just the time for sympathetic understanding and listening. American medicine today needs more such, and I fear that the current economic pressure on physicians to see more patients is leading us in exactly the opposite direction. Nevertheless, I submit that when any of us needs a physician, we want to be treated by a humanitarian scientist, not by an unscientific humanitarian.

There is another way of stating my thesis, and that is to say that medicine should be truly a profession, not a vocation. The great American jurist, Louis Brandeis, has offered a definition of a profession that has particular relevance to medicine today. He said: "A profession is an occupation for which the necessary preliminary training is intellectual in character, involving knowledge and to some extent learning, as distinguished from mere skill...". In this definition, Justice Brandeis clearly stressed the importance of mastering the ability to reason, as opposed to learning through memorization. Interestingly, Brandeis' definition went further, listing two additional requirements that the profession of medicine can profitably take to heart today. He said, "[A profession] is an occupation which is pursued largely for others and not merely for one's self...It is an occupation in which the amount of financial return is not the accepted measure of success." But to enlarge further on these requirements — to serve others, and to eschew material profit — would take me beyond my topic for today.

Where do graduate students — candidates for masters and Ph.D. degrees, as well as postdoctoral research fellows — fit into this picture? I think their presence on a medical sciences campus is a key element that supports a scholarly atmosphere in the strongest possible way, for the completion of a research thesis is the cardinal requirement for these students. Productive scholarship is the very nature of graduate education, and it therefore sustains the healthy skepticism that we have been talking about. In turn, there is a great advantage for these graduate students to be educated on a medical sciences campus: by and large, it is these students who will be the future teachers of the basic sciences in medical schools, and their 'growing up', so to speak, in a clinical atmosphere will make them more at ease with clinical jargon and goals, and hence more effective as teachers of medical students. There is, then, a constant interaction between graduate and medical students from which both sides benefit immeasurably.

In summary, then, I see the importance of vital research programs on medical sciences campuses as having at least two invaluable consequences: (1) the generation of new knowledge that benefits patients and, through the prevention of disease, the economy of our currently struggling health care; and (2) the creation and nurturing of a scholarly atmosphere in which the future workers in health care are educated. It has been, and continues to be, a privilege and a pleasure — and again I speak not only for myself but also for the members of the External Advisory Committee — to play a constructive role in the promotion of these benefits at the University of Puerto Rico Medical Sciences Campus.

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