Alumni Interview: Samuel A. Santoro, M.D., Ph.D.
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Dr. Samuel A. Santoro is a 1979 graduate of the Vanderbilt MSTP and is presently the Dorothy B. and Theodore R. Austin Professor and Chair of Pathology. He received his undergraduate degree from Emory University, his M.D. from VUSM, and his Ph.D. in the Department of Biochemistry with Dr. Leon W. Cunningham.

Upon graduation from Vanderbilt, he served a residency in laboratory medicine at Barnes Hospital in St. Louis before joining the Washington University faculty in 1981 as an assistant professor of Pathology and Medicine and to professor in 1992. Dr. Santoro returned to Vanderbilt in 2003 as the Dorothy B. and Theodore R. Austin Professor and Chair of Pathology.

Dr. Santoro’s research specialty is the structure and biology of integrin adhesive receptors for extracellular matrix proteins. His current research focuses upon combining the application of modern protein and peptide biochemistry, immunochemical and molecular genetic approaches (including knockout mice) to address the fundamental roles and mechanisms of cellular adhesion in complex cell biological processes.

The Chimera: In the 1980s, the average time for the award of the M.D./Ph.D. degrees was about 6.5 years. Today it is just under 8 years. Since much of the increase has been due to Ph.D. training since Medical Schools have been fairly fixed at four years in length), what can chairs of basic science departments do to affect this growth in time to degree?

SS: This is part of a much larger issue that has pushed back the time to first R01 for M.D./Ph.D. graduates to the early forties. Virtually all components of the training process from medical and graduate school to residency and research fellowship have increased expectations and requirements regarding what trainees will or can do and accomplish.

Hence, all components of the training process need to be critically examined and become a part of the solution. A number of us who chair departments at Vanderbilt and elsewhere are tackling the back end of the problem with integrated and efficient physician-scientist track training programs for residency, postdoctoral research, and clinical fellowship training.

But to return to your original more focused question about the length of the M.D./Ph.D. program itself, both the educational and medical education components have contributed to the lengthening training time. At Vanderbilt there has certainly been some creep in the length of Ph.D. training. That is all but inevitable as the complexity of the science being done has increased and the amount and depth of work required to produce a quality publication has increased. The type of work we do has also contributed. It is now fairly routine to spend a year or more building tools—creating genetically engineered mice, breeding mice, breeding mouse strains, engineering proteins and cells—that are then used to do the work. A “Ph.D.-light” is not the solution. Those of us who recruit and hire investigators will hire and invest resources in the best and most qualified.

I take issue with the idea that medical school has not contributed to program lengthening. I take medical schools to task for increasingly rigid, lockstep, one-size-fits-all curricula with diminished elective time. At Vanderbilt it is our expectation that M.D./Ph.D. students will have completed their thesis work prior to returning for clinical rotations. Thus the thesis needs to be completed before beginning the third year of medical school. Granted, it was a long time ago, but when I was a M.D./Ph.D. student, half of the senior year was elective and I used that time to complete and defend my thesis. Without that time, I probably would have had to add another year to the length of my program. At my previous institution, Washington University, almost all of the fourth year of medical school was elective. M.D./Ph.D. students could take the year out of order and use it for their Ph.D. research.

This issue isn’t just a task for the basic science chairs to resolve, but rather for both basic and clinical chairs, the deans and other leaders of the educational and academic enterprise to address. I am heartened by Dr. Balser’s visionary thinking about medical education. There is opportunity. I feel strongly that those of us in leadership positions need to do all we can to see that coming generations of physician-scientists can begin their independent careers at a time to take advantage of their greatest creativity and scientific energy.

The Chimera: Primary appointments for graduates to basic science departments have dropped from more than 16% in the mid-1970s to half that today. What can physician scientists do to stem this decline?

SS: Do we really want to stem the decline? In order to answer that question, we need to understand why the decline has occurred. I think the explanation is quite straightforward and not so bad. In the mid-70’s (and I was an M.D./Ph.D. student here in the mid-70’s) the scientific enterprises in clinical departments around the country were relatively weak compared to the robustness of research in basic science departments. There

One of the great transformations that have occurred in academic medical centers around the country has has been the tremendous growth in both the quantity and quality of research in
clinical departments. That has certainly been the case here at Vanderbilt. It is no accident that about half of our graduate students now work in the laboratories of faculty with primary appointments in clinical departments. A consequence of the growth of research in clinical departments is that M.D./Ph.D.s can more readily establish quality scientific bases in the department of their clinical specialty. For the overwhelming majority of our trainees this is desirable. It was the attraction to both scientific research and clinical medicine, and the potential for synergy between the two that attracted so many of us to M.D./Ph.D. programs initially.

**The Chimera:** Many students ultimately pursue research that is very different than their thesis research. At what point in their training programs should students begin to position themselves for their careers paths, that is, at what point in their programs should they begin to act to shape more concretely their career paths?

**SS:** It’s that last research training experience, however it is configured. It is not unusual to make a substantive change from the focus of Ph.D. thesis research, as one’s independent career path becomes defined and longer-term research interests identified. After all, the main focus of Ph.D training is to learn how to do research. The focus of later research experiences becomes more important as a base for that first independent position. It will be the basis of the “job talk.” It will most likely serve as the foundation for the detailed proposal of future independent work that a faculty candidate will need to articulate (both in writing and often as a “chalk talk” presentation to a search committee or group of senior faculty). It will almost certainly serve, along with very recent data from a new faculty member’s lab, as background and preliminary data for first grant proposals. Those of us who hire investigators essentially engage in risk-benefit analysis. The strongest, best prepared, most creative candidates who we judge most likely to succeed will get the jobs. As a former mentor of mine who shall remain nameless once bombastically stated, “Any assistant professor who doesn’t spend most of his/her time doing what he/she knows how to do is a fool.”