Cultivating collaboration

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Bedside-to-bench thinking is just as important to translational research as the more traditional bench-to-bedside approach.

The phrase "translational research" is in danger of losing its meaning. The hype over this catchphrase may have started as a result of two related developments: explosive growth in the biological sciences and demands from the clinical and political realms that increases in knowledge lead directly to cures. Today, many scientists are encouraged to promote their work as translational, and most funding agencies have special provisions for rewarding translational science. In some cases, the intense and competitive funding environment may have led to the marketing of an existing product—basic scientific research—under the more profitable label of translational research.

Generally, translational research is thought of as research that takes findings in the basic sciences and quickly converts them into a form usable in clinical practice. This definition reflects a widespread understanding of the typical direction of translational research: from bench to bedside—that is, from scientific laboratories to hospitals and doctors' offices. But as a student in the M.D.-Ph.D. program, I have had the chance to interact with a number of physician-scientists, and I have realized that this definition is only half of the story. In fact, as many physician-scientists would attest, bedside-to-bench thinking is just as important to translational research as the more traditional bench-to-bedside approach.

Observations: In many cases, experiments in the lab are driven by observations and experiences in the clinic. A well-known example is the work of the noted Harvard physician-scientist Judah Folkman, M.D. He realized that many tumors depend on the formation of new blood vessels to supply the rapidly growing tumor mass. This clinical observation was followed by the isolation and identification of vascular endothelial growth factor (VEGF), which is necessary for the formation and growth of blood vessels. After VEGF research was transferred to the laboratory, drugs that specifically target this molecule, such as bevacizumab (marketed as Avastin), were discovered and introduced to the clinic to treat various forms of cancer.

In my opinion, it is much easier, and possibly more efficient, to bring clinical observations to the lab than to drive basic science research into the clinic. But both directions are necessary if we are to transform scientific knowledge into medical advances. Thus there is a need for closer ties between the basic science community's focus on doing research and the medical community's focus on delivering care.

Unfortunately, the pace at which science and medicine have been moving has pushed the fields farther apart. This alarming separation is unique to recent decades. Until two or three decades ago, many recipients of the Nobel Prize for Physiology or Medicine were physicians who had devoted their careers to research. But this is no longer the case. The speed of scientific discovery and the demands of a medical career are enormous hurdles that make it difficult to attain excellence in both fields. Thus both scientists and physicians should invest energy familiarizing themselves with the other side—otherwise, the divide between the two fields will become so great that scientists and physicians will eventually be two different, noncommunicating species.

Training: The rapprochement of these fields should start with the years of training. Getting medical students involved in research should become an increasing focus. Moreover, the medical curriculum should be changed to familiarize medical students with the methods of scientific investigation instead of filling them with as many facts as possible. We ought to realize that after a certain point, it is virtually impossible to cover even a summary of biomedical knowledge within just the two preclinical years of medical school.

On the other hand, graduate students in the basic sciences would greatly benefit from courses that integrate scientific findings into a broader medical context. For example, I learned about glycolysis a half-dozen times between high school and graduate school, but only when I came to medical school was I taught where in the body it takes place and how it is coordinated with other metabolic pathways. This kind of knowledge could help future scientists think about the medical implications of their work.

Integration: A second step would be closer integration of the M.D. and Ph.D. student populations, to breed a natural cooperation between future physicians and scientists.

Finally, regular grand rounds in medical centers where physicians and scientists can share intellectual and not just physical space would help promote both bench-to-bedside and bedside-to-bench cooperation. As it is now, such joint meetings take place only where there is active collaboration between scientific and clinical groups. More regular interactions between physicians and scientists can only help engender new ideas that would have been unthinkable before.

The health of medicine relies on both scientific research and medical practice. It is our duty to the public, which funds our endeavors, to maximize the effectiveness of the process by which scientific and medical discoveries enhance patient care. Seeking to continuously improve the collaboration between physicians and scientists will both benefit society as a whole and bring the work of physicians and scientists to the forefront of the public conscience. ■

The Student Notebook essay offers insight or opinion from a Dartmouth student or trainee. Bakhoum is a student in the M.D.-Ph.D. program at DMS. He grew up in Nigeria, Egypt, and Italy and received his bachelor's degree from Simon Fraser University in Canada. He has been at Dartmouth since 2005 and completed his Ph.D. in 2009, focusing on mechanisms of chromosomal instability in cancer; he was chosen by his peers as the graduate student speaker at 2009 Class Day. He's currently completing his M.D. studies.