TENSION OVER THE PLACE OF THE BASIC SCIENCES HAS BEEN A HALLMARK OF MEDICAL EDUCATION in the United States for more than 100 years. In 1910, the Carnegie Foundation for the Advancement of Teaching issued *Medical Education in the United States and Canada*. Known as the Flexner report, it recommended devoting the first 2 of the 4 years of medical school to teaching the fundamentals of disciplines such as anatomy, chemistry, physiology, and pathology. This report served as the foundation for important improvements in medical education that lasted until the 1970s. Since then, U.S. medical schools have built on this foundation, with curricula in years 1 and 2 that increasingly aim to better integrate the science that underlies medicine with clinical practice. This path has proven successful, but there remains a lack of consensus on how much exposure to the basic sciences physicians in training need, with some even arguing that a background in science is not needed at all. For this and other reasons, my colleagues and I have recently completed an intensive 4-year study of U.S. medical education. We conclude that science will be critical for the future physician and that preparing physicians to incorporate science and scientific advances over their careers should be a central goal of medical education at all levels.

A basic science education establishes a foundational understanding on which medical practice is, or should be, based. Effective patient care increasingly requires that physicians keep pace with rapidly evolving technologies and treatments, continually assimilating a vast amount of new and complex information. Indeed, studies have shown that both experienced and novice physicians form more coherent, durable, and flexible understandings of diseases and their treatments when they can link conditions to basic science concepts. But there is an even more compelling reason to make basic science education essential for all physicians: stimulating curiosity and creating the scientific habits of mind that are essential for continual learning. Basic science research is a portal to the next generation of medical care. Thus, it is critical that both medical students and residents gain experience in critically assessing and interpreting research, not just in terms of outcomes and clinical effectiveness, but also in the context of biological plausibility and mechanisms. In addition, physicians and physicians-to-be must become familiar with those emerging areas of biomedical science with a potential to affect patient care. Under what circumstances, for example, will personal genome sequences become important for patient care, and what problems and opportunities will they create for a physician?

Engagement with science also must extend far beyond the first 2 years of medical school in order to develop “the intellectual flexibility on which adaptive expertise depends.”* Despite the increased attempts at integration in recent decades, science remains too sequestered in the curriculum, and passive instructional approaches focus on what is already known at the expense of engaging learners in what needs to be discovered. Teaching must emphasize not only today’s knowledge, but also the methods and paths of reasoning that led to it. Even more important is a focus on what we don’t know, in anticipation of unfolding areas of knowledge. Rather than avoid topics in which uncertainty prevails, teachers of clinical medicine need to emphasize the important areas of incomplete knowledge about the condition that a patient has, as well as the scientific disciplines and approaches that will be required to improve diagnosis and treatment.

The real issue is not why basic science, or how much of it, is needed during formal medical education. Instead, the question is how this science is to be much more effectively taught, both throughout the entire 7- to 10-year period of medical school, internship, and residency, and in the continuing education required of physicians.
