

# The Importance of Scientific Research and Teaching Critical Thinking in Academic Dental Institutions: Reactions to Dominick P. DePaola's "The Revitalization of U.S. Dental Education"

A session at the April 2007 Macy study convocation was devoted to reactions from learned colleagues to "The Revitalization of U.S. Dental Education," a presentation by Dr. Dominick P. DePaola.<sup>1</sup>

The reaction session was led by Dr. Lawrence Tabak and Dr. Sharon Turner. Comments by Tabak, director of the National Institute of Dental and Craniofacial Research (NIDCR) of the National Institutes of Health (NIH), addressed NIDCR funding opportunities for dental schools, students, and dentists/researchers. These funding mechanisms offer opportunities for dentistry's involvement in the scientific enterprise. Turner, dean of the University of Kentucky College of Dentistry and professor in the Department of Oral Health Practice, addressed the need for a dental educational approach that applies evidence-based medical treatments to conditions of the oral cavity, encourages interdisciplinary teamwork, and ensures diversity within its ranks and access to care for all.

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## The Role of Scientific Research

Tabak asked the audience to think about the future of dentistry in relation to eye care. Will dentists be educated to the highest level, like ophthalmologists, or at a more technical level, like optometrists, he asked; or will they be concerned only with "looks," as are opticians? How will dentists perform in terms of expertise and scholarship? Will they fully comprehend the biology of oral health and disease and be capable of treating the most complex conditions? If dental schools are to educate dentists to be the highest-level provider, he argued, then the schools must build their base of scientific knowledge as

well as inspire dedication to scientific research and knowledge among dental students.

Tabak reviewed the NIDCR funding programs to which dental schools can apply for building the scientific underpinnings of the profession. He pointed to Ph.D. programs in dentistry as one route and also to a newly announced master's program. He emphasized that it is critical that dentists join the scientific enterprise and, to expand students' interests and opportunities, that dental schools embrace the NIH's Research Education (R25) grant mechanism or the K99/00. The R25 program is designed to be used by educational institutions to create opportunities that attract students to advanced biomedical or behavioral research while fostering their career development. The K99/00—the NIH Pathway to Independence Award—provides promising young scientists both mentored and independent research support. It supports one to two years of mentored research and up to three years of independent research.

Furthermore, said Tabak, students should be encouraged to participate in research programs that connect them to academic health centers. He suggests making better use of the HHMI-NIH Research Scholars Program (the "Cloister Program") designed to give outstanding students at U.S. medical and dental schools up to a year of research training in basic, translational, or applied biomedical research at the NIH in Bethesda, Maryland. He also suggested that dental schools be active participants in the Clinical and Translational Science Awards (CTSAs) funded through the National Center for Research Resources (NCRR). CTSAs are designed to transform the way clinical and translational research is conducted, giving clinicians the knowledge and expertise for providing new treatments more efficiently and quickly to patients. Tabak also pointed to the recent new awardees, who form a nationwide practice-based research

network, as encouraging evaluation of common treatment methods and thus ensuring that dentistry becomes solidly involved in evidence-based treatment, which can greatly inform clinical treatments. He cautioned that the NIDCR research awards must be awarded to scientists who are the best prepared, so unless dental schools build their scientific base, NIDCR awards will go to other parts of the academic health center. He concluded by urging schools to use the NIDCR grant mechanisms as a way to keep dentistry a learned profession.

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## The Central Role of Teaching Critical Thinking

Turner noted her feelings that dentistry is correctly focusing on the need to transform instructional content and methodology in order to enhance critical thinking. She said she also advocates approaches that apply more evidence-based medical than surgical treatments to oral diseases and disorders; that position dentistry as working effectively as part of a team across disciplinary primary providers; and that support efforts to increase diversity within the ranks of dentistry and ensure access to care for the underserved through clinical safety net programs.

Turner said she sees dentistry as having shifted from simply responding to treatment needs—mainly surgically—to one in which differential diagnosis and disease prevention play critical defining roles. New questions for dentists include these:

- What is the etiology of the problem?
- Can it be prevented rather than managed?
- What is the relation of the oral manifestations to other physical symptoms and medical disorders?
- Can we find ever better ways to treat the problems we cannot prevent?

She urged medical and dental professionals to take advantage of their synergies and unique capabilities to think bigger, together, in order to answer these questions. Since William J. Gies encouraged a scientific basis for understanding disease processes, she said that dental schools have evolved in important ways to support that concept over the years; however, she noted a need to pick up the pace in order to keep up.

At the heart of the issue, said Turner, are the following questions: What do we teach to our stu-

dents? How do we teach it? To what level? Is the faculty prepared and willing to teach a problem-based learning approach? What educational research shows that this approach produces a superior outcome? Who is responsible for the learning? The student or the professor? Does the way we teach truly impact the type of professional we produce?

Turner suggested that not only is our fundamental knowledge of basic science changing, but so is our knowledge of and respect for the art and science of educational principles and practices. She asked the following questions that dental educators should consider about educational methodologies: How do we stimulate critical thinking and analysis? Is it by using small group discussions? Essay tests rather than multiple choice? Scholarly papers? Constantly asking “why” and “what have you learned that would make it so”?

These questions, she said, lead to other questions about faculty and costs. Is the profession ready for a change of such magnitude, or is it better to move incrementally? Will the practicing profession support change in its training programs to produce a new type of dentist who is different from his or her teachers, such as in the MIT model cited by Dr. DePaola? For change to occur in dental education, she said, people must understand that the crisis is real and that solutions are possible. There has been some resistance. New models using intermediate level care providers have met with resistance due to perceived or real loss of control of areas of practice or loss of financial share of the market. Unless we convince the profession that the pie expands by treating more people and unless we can truly demonstrate that more people will reach better oral health status at less cost, it may be difficult for practitioners to support the types of educational changes being discussed.

Turner said she believes that tenure is one of the biggest obstacles. It has created ownership of courses and conflicts when course content changes are proposed. How do we deal with individual content experts who must relinquish or share control by merging with others? she asked. Can egos be subjugated for the good of the whole? Can the majority of faculty be convinced of a need for global change in dental education even when some may become disenfranchised? The crux of the issue is that, to make these educational changes, we must have a way to engage faculty as allies.

Implementing the changes is another issue, she said. The schools cannot close down for a year

to readjust, so where in the lifecycle of an academic program do we start? How do we record and measure change in the midst of ongoing programs?

As we move forward, Turner concluded, we must commit to educational research to prove that we really have built a better mousetrap. She said she concurs with DePaola that we need to agree on a vision for the future, and she noted that the Macy study

convocation and the American Dental Education Association's Commission on Change and Innovation in Dental Education are working to develop that vision. Only then, she said, can we embark on the strategic planning that will bring the vision to life.

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## REFERENCE

1. DePaola DP. The revitalization of U.S. dental education. *J Dent Educ* 2008;72(2 Suppl):28–42.