Johns Hopkins education leaders call for radical transformation in graduate biomedical curriculum

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Leaders in biomedical education at Johns Hopkins University School of Medicine are calling for a radical new approach to post-graduate training in the life sciences to address significant challenges, including an avalanche of new discoveries in the last decade and the need to transcend traditional departmental boundaries to understand biological processes at multiple levels.

In a Leading Edge commentary published in the August 19, 2011 edition of *Cell,* the authors present a new model for biomedical education that would break down current silos of particular disciplines, such as biochemistry, cell biology and physiology, and instead teach students to work across those disciplines to study organisms at all levels, from molecules and cells to an entire organism.

"Increasingly, scientists need a multi-disciplinary approach to answer important questions. They must have the ability to use and interpret information from a wide variety of fields. The current framework for advanced biomedical education, which hasn't changed much in three decades, is no longer suited to helping students integrate the vast amount of knowledge on fundamental biological processes," says David G. Nichols, M.D., M.B.A., vice dean for education at Johns Hopkins who co-authored the commentary.

Currently, most biomedical graduate programs teach first year students

in separate silos, giving them separate courses in biochemistry, cell biology, physiology, and so on. The proposed new model would instead divide biology up into the key underlying processes - gene expression, metabolism and cell fate and function. Instructors would teach each of these key processes, or "nodes," in an integrated bottom-to-top manner, incorporating important information from the molecular scale all the way up to the whole organism.

A second major component of the new curriculum would be a year-long, hands-on course in methods and techniques, providing students with skills to pursue their research interests.

"We think the new curriculum would create a valuable foundation for today's graduate students in the life sciences," says co-author Jon R. Lorsch, a professor in the Department of Biophysics and Biophysical Chemistry. "Organizing the material into nodes, which is the way biological systems are actually arranged, will help students retain more of what they learn, and the techniques course will prime them to tackle fundamental biological questions with whatever methods are required."

The proposal follows an innovative curriculum that was implemented for medical students by Johns Hopkins University School of Medicine in 2009, called Genes to Society. The changes were designed to encourage students to see patients in a larger context, integrating the biological and physical aspects with the social, cultural, psychological and environmental variables that also affect their health. Such integration is viewed as critical to realizing the promise of personalized medicine, which was made possible by the human genome project.

"Our proposal represents a significant departure from the traditional way of teaching the life sciences to graduate students," says Lorsch. "Just as the Genes to Society curriculum for medical students addressed the challenges and opportunities facing medicine in the coming decades, our

new framework for graduate education responds to the rapidly changing landscape of biomedical research."

Lorsch adds, however, that their proposed new model, along with similar frameworks, would need to be tested to determine if they achieve the desired results, which wouldn't be an easy task since there are currently no standardized methods for assessing the effectiveness of graduate biomedical education.

"Our main goal is to stimulate new thinking about advanced life sciences education," says Nichols. "We believe significant changes are necessary in order to adequately prepare today's students to keep up with rapidly changing information and advances. These changes should also promote collaboration among scientists in different fields and between scientists and clinicians, as these sorts of collaborations provide the basis for scientific and medical breakthroughs."

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