One-Size-Fits-All Role of Research Faculty

In his review of Stuart Rojstaczer's book *Gone for Good: Tales of University Life After the Golden Age* (Oxford University Press, 1999) (*Science*'s Compass, 24 Sept., p. 2073), Leo M. Chalupa does not mention one obvious way to address the problem of "develop[ing] the full capabilities of students while staying at the cutting-edge of scholarship" in research universities. It is unstated, but the implication in his review seems to be that each faculty member carries out a balancing act to receive a proper reward from a system that operates on the basis of "one size fits all" in terms of expectations of faculty performance.

One problem with teaching load versus research time is the courses with large enrollments. They generate large numbers of credit hours (a benefit at budget review time), but commonly enroll a high proportion of students who are unskilled in or not interested in science. Teaching these students well is desirable from the standpoint of producing a scientifically literate public and arousing interest in science as a career in some students, but it is difficult and time-consuming to do.

Most research universities hire faculty with a teaching obligation, but with little or no reward for doing it well. People who are outstanding at both teaching and research are rare. If universities were to hire an appropriate-size group of faculty who would be expected to be excellent teachers, and be rewarded as much for being so as faculty are for being excellent researchers, then the researchers could focus on upper-level and graduate teaching, which interferes less with research time. The one-size-fits-all reward system assumes an unrealistic expectation of the majority of faculty—why must it be the standard approach at research universities?

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Response

The solution put forth by Boohar is one that has been proposed by others. This approach, however, does not deal effectively with the problem discussed in my review because it is unrealistic for the teaching faculty to be compensated at a level equivalent to that of the research faculty. For instance, faculty on 9-month appointments with research grants can charge as much as one-third of their summer salary to their grant. In contrast, faculty who elect to teach throughout the summer months usually get a set amount corresponding, in most cases, to less than 10% of their total salary for their efforts. The underlying basis for this discrepancy is that research faculty bring in overhead money to their institutions, whereas tuition charges cover only a fraction of the cost associated with teaching students. Under this system, no institution can afford to raise the compensation of the teaching faculty to the level of the research faculty. Finally, many faculty do excel in both research and teaching. Indeed, some of the best teachers are often the best researchers.

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Nutraceuticals

Steven H. Zeisel's Policy Forum "Regulation of 'nutraceuticals'" (*Science*'s Compass, 17 Sept., p. 1853) raises questions about the efficacy and safety of "nutraceuticals" (also called vitamins, dietary supplements, functional foods, phytochemicals, biochemopreventatives, and designer foods). Few would disagree that

their safety should be established before they are made available to the public. We doubt, however, that any of the health products discussed by Zeisel represents a major public health threat. Zeisel states that more than $44 billion worth of nutraceuticals have been purchased since 1990, yet he cites only four products linked to adverse events, all affecting a limited number of people. Prescription drugs, on the other hand, pose a measurable health risk. In 1994, more than 2 million people had adverse reactions to prescription drugs, and an estimated 100,000 died after receiving medications that were properly prescribed and administered, a distinction that ranks the consumption of pharmaceuticals among the top five causes of death in the United States (*1*). The fact that drugs approved by the U.S. Food and Drug Administration (FDA) cause significant morbidity and mortality suggests that increased legislation of nutraceuticals would have limited benefits, but substantial costs.

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Response

Curry, Hazard-Daniel, and Daniel note that despite careful oversight by the FDA, pharmaceuticals still result in adverse reactions and death. But consider how many more adverse events might occur if there were no governmental oversight. That the current drug-monitoring system is not perfect does not mean that we should allow manufacturers to market dietary supplements without some premarketing oversight as to the safety of their preparation. I continue to advocate a sensible modification in the Dietary Supplement Health and Education Act legislation. Dietary supplements that are to be administered at doses that exceed reasonable normal dietary exposure to the active agent should be shown to be safe before they are marketed, and the FDA should review these safety data. Under current rules, this is not the case.

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Transplants from Pigs

In their research article "Search for cross-species transmission of porcine endogenous retrovirus in patients treated with living pig tissue" (20 Aug., p. 1236), Khazal Paradis *et al.* describe the results from their study of 160 patients exposed to pig tissue, most of whom were exposed for less than 60 minutes. They conclude that "[w]e have not detected any conclusive evidence for cross-species or human-to-human transmission of PERV [porcine endogenous retrovirus]," and they suggest that we should proceed with further experiments on transplanting pig cells, tissues, and organs into people.

I question their conclusion, however. The genome of PERV is permanently integrated into the pig genome. Therefore, PERV was probably transmitted to all 160 patients. Paradis *et al.* detected PERV by polymerase chain reaction (PCR) techniques in the blood of 30 of these patients. Not only was the genome transmitted, but pig cells persisted in 23 recipients for up to 8.5 years.

The authors stress that no active infection was found; however, the possibility of infection remains in the four patients with positive antibodies to PERV and in another four patients with unexplained symptoms (skin rashes). In addition, a lack of antibodies to PERV may not exclude the existence of infection. Prion diseases [for example, bovine spongiform encephalopathy (mad cow) disease] cannot be detected by antibody or cellular immune responses.

Who would have predicted that so many patients only transiently exposed to pig tissue would have persistent pig cells (and PERV) in their blood? We also can't confidently predict what infection problems may occur in the future. However, if 20,000 transplants occurred annually, even a 1% infection rate means 200 infections annually. This would be a large reservoir of people who could then transfer a "novel" infection to other people.

There are major theoretical risks from infection to the graft recipient and to the wider community from xenografts (*1*). We need much more data and testing and longer follow-up on those patients who have already received xenografts before we recommence these experiments.

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