Commentary on:
Impact of Fellowship Training on Research Productivity in Academic Neurological Surgery
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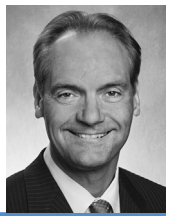

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Academic Productivity in Today's Training Climate: A Fellowship's Impact

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The overarching goal of fellowship training is the acquisition of skills that the fellow may in turn apply in his or her own practice. A loftier prospect is that the fellow goes forth and, armed with the knowledge gained in the post-residency training period, refines techniques, engages in research, and contributes intellectually to the evolution of the subspecialty; this is likely the hope of all fellowship directors. The extent to which this actually happens is less clear.

In their article, Agarwal et al. sought to clarify the relationship between the acquisition of fellowship training and academic output by comparing mean h-indices in fellowship-trained and non-fellowship-trained neurosurgeons in academic centers. The h-index is one of several metrics aimed at measuring individual productivity, weighting number of publications, and citation frequency. Like all measures, it has its limitations. More senior authors have higher indices, driven by the publication number contribution to the metric. The position of an author in publications, which many consider an important factor in the role of the author in the work, is not weighted. In addition, book contributions and journal articles are considered with equal weight. Agarwal et al. found that mean h-indices were higher in surgeons who had completed fellowship when compared to nonfellowship-trained counterparts, and that this difference was most significant at the associate professor level. A stereotactic and functional fellowship portended a higher h-index, particularly at the professor level, although the mean may be driven by several prolific authors. It would be interesting to see the raw numbers of fellowship-trained specialists responsible for the mean valuations, and in particular the median h-index values per specialist. The interesting conclusions noted by Agarwal et al. may generate more questions than answers as the field continues to understand the nuance of predicting academic productivity. Clearly, further analysis is needed in these types of approaches. Academic productivity is a very broad term, and it is difficult to evaluate quality relative to quantity. As a starting point, it would be useful to evaluate, for instance, the number of federal grants obtained by specialists with and without fellowships.

Unquestionably, as Agarwal et al. contend, one cannot advance academically without publishing, and endeavoring to understand at the granular level how to create the right crucible for the young motivated surgeon to produce academically is a critical yet challenging question to tackle. For clinical, translational, or basic research, participants must have the uninterrupted, protected time to be able to think creatively to generate hypotheses, write grants and manuscripts, meet with collaborators, and supervise subordinates. The obstacles to this structure are daunting; the current climate for practicing medicine is irrefutably challenging. Individual neurosurgeons in the clinical space are rewarded financially for sheer surgical volume; young attendings typically take more clinical call than their more established colleagues; and they face a desire to prove themselves and build clinical volume to become a "go to" provider, having trained for 7 years or more to do so. The need to be clinically busy may actually be fueled by the acquisition of fellowship training. In addition to the pressure to produce

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clinically, carving out protected time for academic pursuits by obtaining salary support through nonclinical means has become more challenging. Federal funding has become more difficult to acquire—even when the government is open—and the time-honored model of using departmental clinical revenue ("rainy day" funds) to fund research and its associated staff has been eroded by global decreases in reimbursements.

The seeds of future academic productivity, however, are sewn before the decision to pursue fellowship. Elective time during residency, if appropriately used, can be crucial to the shaping of future academicians. The raw materials are certainly there: neurosurgery continues to attract extraordinarily bright and motivated medical students with a spectrum of research experience before residency. However, the conditions they face during training may not provide adequate preparation for in-training and post-residency academic productivity. The notion of "protected" research time—traditionally thought of as that period in residency where academic interest is first fostered—has disappeared in a number of programs as research residents are needed to unburden their on-service colleagues in the era of the 80-hour work week. In addition, the difficult balancing act undertaken by their junior attending role models who themselves are continually striving for an appropriate balance of clinical and academic enterprise may be uninspiring in the current climate. In our program, we are blessed with enormously talented residents, and there is a heavy emphasis on academic output in a research-oriented medical school setting. We have noted a continued dedication to academic output among our trainees, but with a gradual shift away from laboratory-based research toward clinical projects. Fundamentally, we encourage our trainees to engage in any type of academic endeavor, but we wonder whether among many factors at play the observed challenges of balancing clinical and laboratory work may be dissuasive.

With some exceptions, most trainees need the appropriate encouragement, time, and role models to begin to engage in academic pursuits early in training. These skills should be emphasized and their practice and refinement started early in residency, so that, just as in attending life, residents are learning the skills required to combine academic endeavor with clinical training. As with the acquisition or perfection of clinical skills, the ability to produce academically has to be practiced, and therefore a sufficient amount of time has to be devoted to academic pursuits. The amount of time spent obtaining academic training is clearly related to the ability to train adequately; this may be compromised by undue amounts of clinical responsibility during elective research periods. Ideally, programs would adopt a formal academic development curriculum that would begin at the inception of the training period, and last throughout residency. It must include protected academic time, at least in a 1-year period; an emphasis on writing and meeting attendance, including case reports, book chapters, case series, and technical pieces; and, perhaps most critically, hands-on mentorship to ensure continued progress and facilitate the identification of the most appropriate academic experience.

How fellowship training helps or hinders academic development could likely be argued in both ways. Why subjects selected to do fellowship is a central question; were residents who pursued fellowship more dedicated to academics and thus more likely to be academically engaged after additional post-residency training? Apart from this selection bias, it is not immediately obvious how clinical fellowship training affects academic productivity. Filling a particular clinical niche may overburden fellowship graduates. On the other hand, fellowship training may provide an opportunity to sharpen a trainee's academic focus by encouraging more tailored investigation and the chance to combine clinical subspecialization with a complementary academic enterprise. This scenario is most likely to be successful if a similar formal curriculum exists for the clinical fellow with resources, expectations, and infrastructural support necessary components. What is clear is that at all levels—resident, fellow, and faculty—it has never been more challenging to "do it all." Tailored curriculum-based training in academic productivity, beginning at the resident level and existing as well in fellowship and beyond featuring hands-on mentorship, should be actively incorporated in all programs. Despite the persistent forces at play, we have to continue to value neurosurgeon investigators and provide the climate necessary for the future of our field to benefit from their contributions.

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