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Anesthesiology Residency Programs for Physician Scientists

DRS. Schwinn and Balser are to be commended on their outstanding article entitled "Anesthesiology Physician Scientists in Academic Medicine: A Wake-up Call."[1] Their "call to arms" regarding the urgency of developing the next generation of physician scientists in anesthesiology may serve to further help shake us out of our complacency. These authors have nicely documented the problem and presented easily understood data that support their position as well as their strategy for changing the current culture in the anesthesiology community. However, the situation may actually be worse than they suggest. Drs. Schwinn and Balser are correct that we are not well regarded as a specialty that is supportive of careers for serious physician scientists. We need only to recall the comments made during a general discussion session at a recent national meeting of the Medical Scientist Training Program (MSTP) Directors (the authors are currently [P. R. K.] or formerly [D. C. W.] directors of their institutional MSTPs) that specifically queried whether anesthesiology was suitable as a medical specialty for an MSTP student to develop a academic career as a physician scientist.[2] Even more compelling is the observation that only 10 National Institutes of Heath grants were awarded to anesthesiology departments in 2004.[3] Therefore, not only are we not training an adequate number of new physician scientists in anesthesiology, but we also do not have a sufficient number of academic faculty that can serve as role models. The latter exponentially compounds the problem of the former.

The Schwinn and Balser article[1] is published at a time in which at least part of the academic community of anesthesiology leaders is beginning to become aware that this is a critical issue. Articles about this subject have started to appear with increasing frequency, and now may be the time when a paradigm shift in our specialty can be accomplished. We are in great need of establishing a mechanism that not only will produce the next generation of physician scientists for anesthesiology but will also increase our share of the research support available to all physician scientists. Until we do this, we will not be invited to a place at the table by the other academic specialties. Schwinn and Balser[1] have invited others to consider their "position in light of other alternatives for 'corrective action,' and to advocate for these positions." Therefore, as the authors have encouraged, we too would like to join in this debate.

Having accepted the premise that our specialty is currently deficient in physician scientists and that our prospects for the future are not looking too bright either in this regard, how should we begin to attack this issue? One approach defined by the German philosopher Immanuel Kant in his epistemology and metaphysics work is to allow reason to develop a rule of action for achieving a given end.[4] This hypothetical imperative could be stated in our case in the following form: If you wish to obtain more physician scientists, you must first determine what sort of prospects are available for recruitment. This is an intuitive basic first step toward solving the problem and, like all hypotheses, may be modified or reworked as we gain experience.

Drs. Schwinn and Balser opine that a potential solution is to increase the number of Accreditation Council for Graduate Medical Education (ACGME)–accredited clinical fellowships and lengthen and redesign them to encourage research activity. By this approach, they predict that more physician scientists will be available for recruitment to academic institutions. Although this strategy would certainly increase the pool of anesthesiologists that have been exposed to research, it must also be emphasized that the majority of residents training in anesthesiology will and should practice in the community and not in academic centers. If the solution of the authors of this article[1] is followed, we in anesthesiology training programs would be requiring that most residents lengthen their training time as well as be exposed to research so that we can recruit a few faculty who will have an interest in a career as a physician scientist. This global alteration in the residency may result in reduced numbers of graduating medical students entering our specialty. Furthermore, this approach seems to be in conflict with the national mood regarding residency training. There is clearly a movement by a number of medical specialties to decrease their duration of training to encourage greater numbers of medical students to consider those specialties.[5]

Therefore, we have somewhat of a concern regarding the efficacy of the approach suggested by Drs. Schwinn and Balser. We do not agree that all of the legitimate subdisciplines in anesthesiology must have ACGME-accredited fellowships. Furthermore, although lengthening and redesigning any fellowship to encourage significant research activity is a step in the right direction, it should be available to those to whom it may appeal,

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probably only a select few. Accordingly, we do not support the concept that research training should be mandatory. The approach to expose fellows to research for a more extended period of time is already available at a number of anesthesiology departments at several institutions. We strongly believe that this option should be available in anesthesiology fellowships at even more institutions. To accomplish this scenario, we, as an academic anesthesiology community, should lobby the leadership of our specialty to pursue strategies that raise physician-based research to a higher priority in departments with residency/fellowship training programs.

Schwinn and Balser also suggest other strategies to improve our standing as a specialty that embraces research as an important component to the further development, advancement, and evolution of the practice of anesthesiology. The one we believe would be the most efficacious is "bolstering research experiences within the residency years." Drs. Schwinn and Balser call on the American Board of Anesthesiology and the American Society of Anesthesiologists, as well as other academic anesthesiology organizations, to initiate their suggested changes "through appropriate ACGME and Residency Review Committee channels." We call on these professional organizations to allow individual modification of our basic residency training program in anesthesiology to one that is of special interest for those already having considerable research experience (*e.g.*, both M.D. and Ph.D. degrees), as well as expressing a keen desire to develop an academic career as a physician scientist who spends significant time engaged in research. We also feel strongly that this portion of residency training should occur under the guidance of a mentor, who if at all possible is an outstanding role model of an anesthesiologist physician scientist.[6] Such role models are sorely needed. These individuals understand the commitment to research that must be made by an enthusiastic resident undertaking advanced clinical training. They understand that translational research with a close link between bench and bedside is a powerful stimulus for these young and impressionable trainees. Often, this is not readily apparent to faculty in the classic basic science department. Physician scientist role models in departments of anesthesiology are exceptional. They must be carefully cultivated and are an important area to place resources.

Allowing flexibility to conduct research in our residency programs addresses the problem of the shortage of anesthesiology physician scientists at a much earlier stage than would a combined clinical–research fellowship after a typical residency. Graduates of MSTPs (M.D.–Ph.D. programs) represent a pool of future academicians where we need to focus recruiting efforts. Unfortunately, many faculty in clinical departments have never even heard of this program. We need to reach out to graduates of MSTPs, because these individuals have already declared their interest in academic medicine. They have extended the typical medical school curriculum an additional 3–4 yr for research purposes and have an extraordinarily high rate of choosing careers in academic medicine. Differences in future compensation as academic physicians compared with private practitioners are less likely to impact the career decisions of MSTP graduates. However, a major issue for these students is the inability to conduct research early on in anesthesiology and many other residency programs. Our current clinical scientist track is no exception and does not provide the answer. Greater time for research built into all years of training would be optimum and, we believe, most desirable. Research time must be integrated into the CA-1 to CA-3 years, not just tacked on at the end.

One of the axioms of those of us who have mentored junior physician scientists is that the younger they come to you, the greater the chance for success in achieving an independent, nationally funded investigator status. It makes sense, therefore, that recruiting graduating medical students who already have demonstrated a true desire to conduct research to our training programs would be ideal. We agree with Drs. Schwinn and Balzer that a specialty that is demonstrably research-supportive is essential and that an emphasis on conducting research during fellowship training helps to establish this perception. However, a residency program that allows the prospective physician scientist to train clinically while continuing to develop research skills simultaneously is a powerful approach. Other medical specialties have adopted this strategy as well and have created "fast-track" programs or Physician Scientist Training Pathways (also known as Physician Scientist Development Programs). We are convinced that this can and should be developed within our specialty. A recent analysis of types and numbers of cases required for anesthesiology training as identified by the Resident Review Committee reveals that this can, for the most part, be accomplished and still allow up to 50% time to perform research (table 1). We recommend the development of a 5-yr anesthesiology residency program—an Anesthesiology Physician Scientist Training Pathway—that allows 50% research time during the last 4 yr of training, culminating with the trainee being eligible for board certification.

At our institutions, residents are able to meet these requirements easily within the 3-yr period. In reviewing the residents' case logs, we have been able to determine the number of months a resident would have to spend in a specific rotation to meet the above case requirements. Based on this information, we were able to formulate a suggested rotation template (table 2). Using this template, the resident would be able to meet all of the ACGME requirements while completing 5 yr of residency training, 2 integrated years of which are devoted to research. For example, by doing two cardiopulmonary bypass cases a day, the resident can complete the 20-case requirement in 10 days of clinical time. This leaves

Table 1. ACGME Anesthesiology Residency Clinical Requirements

40 vaginal deliveries
20 cesarean deliveries
100 pediatric patients younger than 12 yr
15 pediatric patients younger than 1 yr, including infants younger than 45 weeks postconception age
20 cardiopulmonary bypass cases
20 other major vascular cases, including endovascular cases
20 intrathoracic (thoracotomy, thoracoscopy) noncardiac cases
20 procedures involving an open cranium, some of which must include intracerebral vascular procedures
50 epidural anesthetics for patients undergoing surgical procedures, including cesarean delivery
10 major trauma cases
50 subarachnoid anesthetics for patients undergoing surgical procedures
40 peripheral nerve blocks for patients undergoing surgical procedures
20 nerve blocks for management of patients with acute, chronic, or cancer pain

Data are presented as numbers of cases.

ACGME = Accreditation Council for Graduate Medical Education.

more than 10 days to perform research in the month the resident is on a cardiac rotation. Many institutions even allow a greater number of months spent in cardiac anesthesia. Minor shortfalls in obtaining ACGME-required numbers of calls would be made up during "Advanced Rotations" in postgraduate year 4 (table 2). Clinical time in postgraduate year 5 might also be applied to fellowship training because it would not necessarily be needed to accomplish the clinical requirements of the residency.

Drs. Schwinn and Balser state that "It would seem to us that the real issue is . . . a commitment to the academic side of the specialty, not adverse economics."[1] We could not agree more with this comment. How many anesthesiology programs touted to be "academic" are there that do not have a physician scientist or even a well-published academician in a major position of leadership within the department? What is even more obscene is the practice of recruiting established investigators with a Ph.D. degree to conduct research in the department to fulfill academic obligations and then sequestering these individuals outside the mainstream of the departmental activity. The subtle message this sends to the residents and young faculty of our departments undermines what should be a priority.

Anesthesiology has its roots in the basic sciences, especially physiology and pharmacology, and now cellular and molecular biology. Issues with manpower, reimbursement, competition between academia and private practice, and a driving force of academic institutions to complete greater and greater amounts of clinical work have diverted academic anesthesiology from its major missions. Drs. Schwinn and Balzer are correct that we face a crisis, and their solution is that we redirect our efforts with a sense of urgency. They are on the mark. We need a paradigm shift to focus our efforts using multiple modalities to address the goal of providing the human resources required to allow a rigorous scientific foundation for further development of our specialty. Perhaps their solution may force programs to make more of a commitment to the "academic side of the specialty." We enthusiastically agree with their goals. However, we believe that there are approaches that can be implemented that would further the objective of obtaining more physician scientists rather than increasing the number of ACGME-accredited clinical fellowships and lengthening and redesigning them to encourage research activity for all. We strongly support the approach of making more research time during residency training available to medical school graduates who already have demonstrated an interest and ability to perform research. Physician scientists must be placed in prominent leadership roles in academic departments. We believe "improved efforts to recruit research-oriented medical students" can be achieved by strongly "bolstering research experiences within the resi-

Table 2. Sample Rotation Template for an Anesthesiology PSTP Resident Integrating Research with Basic and Advanced Clinical Rotations

	PGY 1	PGY 2	PGY 3	PGY 4	PGY 5
July	Ward medicine	Basic anesthesiology	Obstetrics/research	Pain/research	Advanced/research
August	Ward medicine	Basic anesthesiology	Obstetrics/research	Recovery room	Advanced/research
September	Ward medicine	Basic/research	Obstetrics/research	Trauma/research	Advanced/research
October	Night coverage	Basic/research	Pediatrics/research	Trauma/research	Advanced/research
November	Cardiology	Basic/research	Pediatrics/research	Neurosurgery/research	Advanced/research
December	Coronary care unit	Basic/research	Pediatrics/research	Neurosurgery/research	Advanced/research
January	Pulmonary medicine	Basic/research	Cardiac/research	Advanced/research	Advanced/research
February	Medicine ICU	Basic/research	Cardiac/research	Advanced/research	Advanced/research
March	Medicine ICU	Basic/research	Thoracic/research	Advanced/research	Advanced/research
April	Medicine ICU	Basic/research	ICU	Advanced/research	Advanced/research
May	Emergency medicine	Basic/research	ICU	Advanced/research	Advanced/research
June	Research	Basic/research	Pain/research	Advanced/research	Advanced/research

There is a 50% time commitment when research appears in a cell with a clinical rotation. This commitment could be realized by several approaches. For example, 2 days of the first week could be devoted to research, and the following week, 3 days could be dedicated to research. Alternatively, larger research rotation time commitments (*i.e.*, 1- to 3-month blocks) could be interchanged with clinical rotations without research. If this scenario is used, it is suggested that one clinical day/week or one clinical night call/week be maintained during research blocks that are longer than 2 weeks.

ICU = intensive care unit; PGY = postgraduate year; PSTP = physician scientist training pathways.

dency years." Anesthesiology Physician Scientists Training Pathways would be more efficient to implement and would be more efficacious in helping to conduct the hypothetical imperative of encouraging recruitment of physician scientists into the specialty of anesthesiology.

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