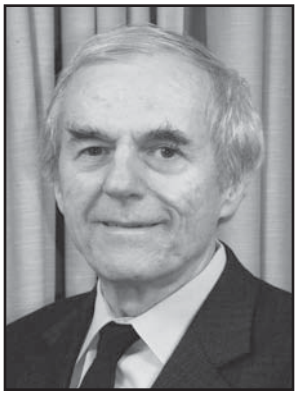
Education and Training



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The looming crisis in medical physics education and training

During the past two decades significant advances in medical physics teaching, training, and research have resulted in general acceptance of medical physics as a profession and scientific discipline. Medical physics organizations are strong, steadily growing and run by medical physicists. Standards for medical physics education programs are set and controlled by a professional commission (CAMPEP) run by medical physicists. Medical physicists are making invaluable contributions to clinical imaging and radiotherapy services and most modern university physics departments regard medical physics as an important and relevant branch of physics. Yet, there is a crisis looming on the education horizon, a crisis that is to a degree self-inflicted by medical physicists but may seriously affect the credibility and the seemingly bright future of the medical physics profession.

Medical physics is not only a scientific discipline, it is also a medical subspecialty regulated by professional certification exams. In the U.S., the medical physics certification exams are conducted by the American Board of Radiology (ABR) which is one of 24 specialty boards under the umbrella of the American Board of Medical Specialties (ABMS). The vast majority of the ABMS affiliated boards require that their certification exam candidates have completed their specialty education and training in accredited programs. A notable exception to the link of certification with education and training program accreditation is the ABR certification exam in medical physics, despite the significant pressure the ABMS has been exerting on the ABR to fall in line with other certifying boards and make eligibility for writing the medical physics certification exam more stringent.

In 2002, partly in response to pressure exerted on the ABR by the ABMS and partly in response to concerns over a relatively poor ABR certification exam performance of medical physics candidates coming from non-accredited medical physics programs, the ABR physics trustees passed a resolution which, as condition for admission to the ABR board exam, will require exam candidates to have completed either a CAMPEP-accredited graduate study or a CAMPEP-accredited residency in medical physics, or both. The resolution was to become effective in 2012 and, with a 10-year lead period, was to meet, at least partially, the ABMS program accreditation requirement and improve the medical physics exam results without undue inconvenience and hardship for potential candidates. The AAPM Board of Directors initially agreed with the ABR resolution but in 2007 strengthened it significantly by stipulating that starting in 2012 only candidates who have completed a CAMPEP-accredited medical physics residency program should be admitted to the ABR certification exam.

The AAPM recommendation for 2012 poses two problems: (1) the current number of available CAMPEP-accredited residency positions meets only about 15% of actual needs and (2) the new AAPM position distances the AAPM from its 20-year history of support and encouragement of CAMPEP accreditation of graduate medical physics degree programs and conveys a message that the accreditation of graduate medical physics programs is not important.

The CAMPEP-accredited graduate programs in medical physics are in excellent shape after 20 years of steady growth and improvement and, moreover, they produce close to the required annual number of new didactically educated medical physicists. It is thus unfortunate that the AAPM would take a stand that is impractical and as well may put into doubt the importance of the CAMPEP accreditation of graduate programs in comparison with CAMPEP-accredited residency programs.

The current confusion around the CAMPEP accreditation requirement, combined with lack of clear understanding of what the 2012 deadline actually means, is causing great consternation among potential candidates for the ABR exam: medical physics graduate students, residents in medical physics, and junior medical physicists. The current conventional wisdom is that candidates who apply to start the ABR examination process before October 2011 will follow the rules in effect today. These rules require that the candidate hold a bachelor's

degree in physics or related science as well as master's or doctoral degree in physics or related science and work in a clinical medical physics environment under the direction of a certified medical physicist.

Today's rules require neither residency nor CAMPEP accreditation; however, they stipulate that a candidate registered in a CAMPEP-accredited medical physics graduate program may start the board examination process prior to receiving the graduate degree. This effectively means that graduate students entering CAMPEP-accredited graduate programs for the next four years and applying for admission to the ABR examination before October 2011 will not be affected by the 2012 rule. On the other hand, if the AAPM 2012 recommendation prevails, candidates signing up for the ABR exam after October 1, 2011 will need a diploma from a CAMPEP-accredited 2-year residency program.

Clearly, the long-term goal should be that all ABR physics exam candidates possess a graduate degree (master's or doctoral) in medical physics from an accredited institution as well as a diploma from an accredited 2-year residency program in medical physics. However, we are not there yet. While the current output of accredited graduate programs almost satisfies the graduate degree component of this goal, the current output of accredited residency programs is much too low to satisfy the residency component of the goal.

In North America, the number of CAMPEP-accredited graduate programs and the number of CAMPEP-accredited residency programs currently each stand at around 15. However, the number of students per graduate program significantly exceeds (by a typical ratio of 6 to 1) the number of residents per residency program. The reasons for this are in funding and staffing requirements. In comparison with graduate students, medical physics residents not only get better remuneration and thus "cost more", they also require from staff a heavier teaching effort, more individual attention, and closer supervision. In comparison with standard medical residencies, funding for medical physics residencies is haphazard and poorly regulated.

The obvious solution to these problems is to encourage accreditation of new and reaccreditation of existing graduate programs, and, more importantly, to increase significantly the number of CAMPEP-accredited residency positions. The AAPM has been addressing the residency issue for the past several years, starting with an ad-hoc committee on alternate pathways to residency that was set up in 2004 by President Howard Amols and chaired by Lawrence Reinstein. The ad-hoc committee work evolved into Task Group 133 chaired by Michael Herman under the auspices of the AAPM Education and Training of Medical Physicists committee. The TG 133 report will be released soon and its main innovation will be a proposal for CAMPEP residency accreditation through a program of affiliated residencies between a primary CAMPEP-accredited program and a satellite (affiliate) institution. This approach is a step in right direction and holds a promise to increase significantly the number of accredited residency positions across North America.

Another proposal purported to hold promise to alleviate the shortage of residency positions is the introduction of professional programs leading to a doctorate in medical physics (DMP). The DMP program would essentially merge the current 2-year master's degree program in medical physics with a 2-year residency program in medical physics into a 4- to 5-year doctoral program and completely dispense with all research training that forms a standard component of graduate studies in sciences.

The DMP option enjoys significant support among medical physicists because it would confer a doctoral title to medical physicists who, for having essentially the same didactic and clinical credentials, currently receive a master's degree title and a residency diploma. Yet, in the Ph.D. degree, medical physicists already have a well-established pathway to a doctoral title. Do we really need to add a diluted degree to get access to another doctoral title?

Supporters of the DMP program believe that funding for DMP studies will be easier to obtain from universities than is the case with the current master's and residency programs. This may be true, however, a closer look at the DMP proposal reveals many disadvantages that will likely outweigh any potential advantages. For example, while the DMP programs for the foreseeable future cannot increase the number of clinical training positions, they will have an immediate deleterious effect on the current master's and Ph.D. programs in medical physics. Why would students register into a master's program and subsequent residency when, for the same didactic and clinical effort, they can obtain a doctoral degree?

Furthermore, a doctoral degree in science implies research training, and medical physics is a scientific discipline which has achieved its position among other scientific disciplines through imaginative research work carried out by our professional grandfathers. DMP programs will not promote this tradition and we will lose the credibility we enjoy now with other physics specialties, credibility that took many years to establish.

Another argument used in support of the DMP idea is that M.Sc. and Ph.D. medical physicists who devote their professional life to clinical work have effectively wasted their research efforts when working on the research

component of their graduate degrees in medical physics. Not so: it is the research training that makes an indelible mark on the performance of clinical physicists, on their interaction with medical colleagues and patients, and on their problem solving skills. Can we imagine AAPM meetings with research not playing a primary role?

A medical physicist, M.Sc. or Ph.D., is not a glorified technician but a scientist who, in addition to clinical training, has some research training, who understands the importance of applied research, and who, through translational research, advances the science of medical physics and its rapid translation into clinical practice. DMP programs will not only redirect medical physics from these basic attributes that define our profession, they will also create confusion between a Ph.D. degree in medical physics and a DMP degree. Moreover, to the detriment of the medical physics profession, they will almost certainly siphon excellent candidates from Ph.D. studies in medical physics.

The requirement for a degree (master's or Ph.D.) from an accredited medical physics graduate program combined with a requirement for a diploma from an accredited medical physics residency program is the best guarantee for improved performance in ABR medical physics board exam which, in turn, will improve the professional standards in medical physics in general. To achieve this goal the medical physics organizations (AAPM, ACMP, COMP, CCPM) as well as relevant medical organizations (ACR, ASTRO, CARO, RSNA) should do their utmost to stimulate an increase in the number of accredited medical physics residency positions; the TG 133 recommendation on affiliated residencies is an important step toward this goal, the DMP idea, on the other hand, seems to be an unnecessary solution looking for a problem.

Since by 2012 the number of accredited medical physics graduate positions are likely to meet the needs, in contrast to accredited medical physics residency positions which will not, it would seem prudent to follow the 2012 resolution proposed in 2002 by the ABR physics trustees (requirement for either accredited graduate degree or accredited residency diploma) and postpone the mandatory accredited residency diploma requirement until the number of available accredited residency positions meets the demand. From then on, requirement for an accreditation of both the graduate degree and the residency diploma would be fair and in the best interest of the medical physics profession and patients the profession serves.