that visited the US in 2007 to discuss food safety. He said that apart from their scientific value, exchanges are useful "to give [a] true view of each country [that] can influence opinions of politicians and the general public." But he expressed frustration with what he describes as the lack of follow-up communication from the US scientists he met. Without ongoing contacts, the delegation meetings had "very limited scientific benefit," Dabiri lamented.

Cooperative approaches

More formal cooperative science and technology programs sponsored by the US have been under way with states in the region that have a cordial relationship with the US. A program with Pakistan has provided funding for 46 mainly applied research projects since its establishment in 2005. The US Agency for International Development and the State Department have contributed $7.5 million in grants that range up to $350 000 each over three years. The Pakistani government has kicked in a somewhat higher amount for the projects, which must involve researchers from both countries. But this year a new round of awards has been delayed as the Pakistanis struggle to come up with their share of the money, said Kelly Robbins, the National Academies staffer who administers the US side of the program.

A State Department–sponsored program with Egypt, in which inventions arising from Egyptian academic research are assessed for their commercial potential, is taking a different sort of cooperative approach. Managed on the US side by the University of Texas at Austin IC^2 Institute, an incubator for technology startup businesses, the program selected four candidates for commercialization from more than 400 submissions. Each of those is to receive a grant of at least $15 000 from the Egyptian Ministry of Scientific Research, and the aspiring inventor-entrepreneurs will also get support and training in the business skills needed to bring their inventions to market. The winning inventions are a compound that could regenerate teeth following a root canal or other dental procedure, a bacterial culture to give low-fat cheese the same texture and taste as full-fat, a genetically modified plant for combating whitefly disease in the developing world, and a thermally stable, solid hydrogel support for immobilizing enzymes used in industrial or laboratory processes.

The same model has been applied in Jordan, which, like Egypt, has signed an umbrella science and technology agreement with the US. Robert Senseney, senior adviser for science partnerships in the State Department's Bureau of Oceans, Environment, and Science, said department officials are examining how to apply the approach to help strengthen economies and create jobs in Morocco, Algeria, Tunisia, Libya, Lebanon, and even the West Bank. Syria, which Senseney said has "strong science," would also be a good candidate, but that level of cooperation will probably have to await improvements in diplomatic relations.

In March a subcommittee of the House Committee on Science and Technology approved legislation designed to better coordinate international science and technology activities across federal agencies. The bill would mandate formation of a new, cabinet-level interagency policy coordinating mechanism. The committee acted out of concern that significant opportunities at the intersection of science and diplomacy may be missed through the lack of coordination.

The subcommittee's chairman, Daniel Lipinski (D-IL), said he welcomed the news that John Holdren, new director of the White House Office of Science and Technology Policy, intends to reestablish the position of associate director for international and national security affairs in OSTP. Holdren's predecessor, John Marburger, had eliminated the position.

David Kramer

Medical physics standardizes clinical training

Public safety is the motivation behind new requirements for becoming certified as a medical physicist.

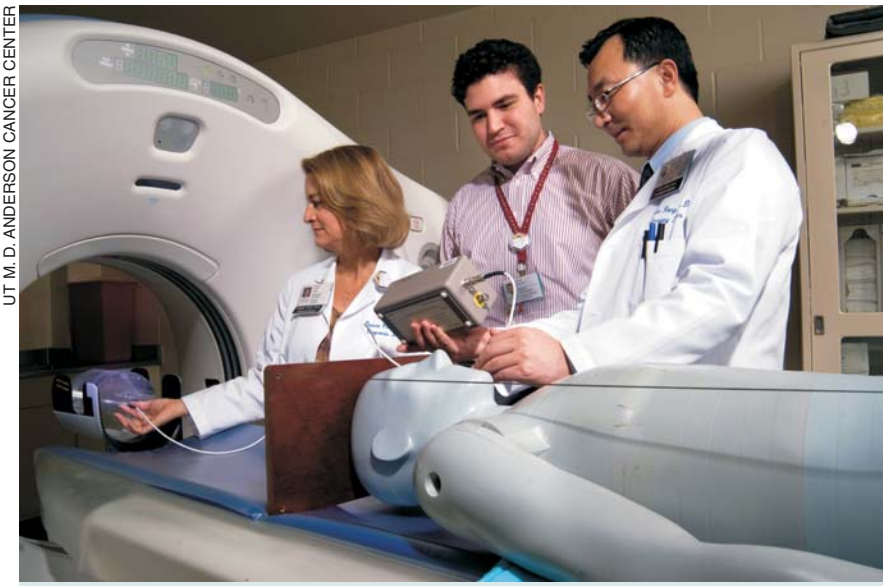
New certification rules intended to improve the quality and uniformity of medical physics training go into effect in a few years. In preparation, the field is scrambling to create enough residency slots for the first classes that fall under the tightened rules.

Starting in 2012, to sit for the board exams the American Board of Radiology will require that people be enrolled in or have graduated from an accredited medical physics master's, PhD, or clinical residency program. At the urging of the American Association of Physicists in Medicine (AAPM), two years later that requirement will be superseded, and test takers will have to be enrolled in or have completed an accredited residency. Passing the ABR exams confers certification that a person is qualified to independently practice radiologic physics and advise physicians about the physical aspects of radiation therapy, diagnostic radiology, or nuclear medicine. Certification for the specialty areas of medical health physics and magnetic resonance imaging is done separately, through the American Board of Medical Physics. Accreditation for degree programs and residencies is by the nonprofit Commission on Accreditation of Medical Physics Educational Programs Inc (CAMPEP).

"All about public safety"

Among other things, medical physicists calculate radiation dose and beam shape for tumor treatment, check that medical imaging equipment—involving x rays, radionuclides, magnetic resonance, computed tomography, ultrasound, and fluoroscopy—is calibrated and used properly, help in selecting new equipment, and train technologists and others to use the equipment. In addition to working in universities, hospitals, and clinics, they serve as independent contractors in practice groups, routinely checking and calibrating mammography equipment or dental x-ray machines, for example. In some cases, medical physicists interact closely with patients.

Each state sets its own requirements for medical physicists. In the four states—Florida, Hawaii, New York, and Texas—that require a license, ABR certification is one way to get it. In many states medical physicists must register to practice. In other states a physicist with no prior clinical training, or even no classroom background in medical physics, might be hired by a hospital or clinic and trained on-site. "A lot of people have learned on the job. Smart people can always get the education they need. But the profession is mature enough for some standards," says Ehsan Samei, Duke University's director of medical physics graduate studies. "There are places that don't do as good a job as they should at making sure their image quality and dose management is where it needs to be," adds CAMPEP chair John Hazle, an imaging physicist at the University of Texas's M. D. Anderson Cancer Center in Houston. Currently, to sit for the ABR exams, a medical physicist "needs three years of experience and someone ready to vouch for you," says Hazle.



UT M. D. ANDERSON CANCER CENTER

A human phantom is used for radiation dosimetry point measurements by medical physicists Dianna Cody and John Rong (right) and physics technologist David Zamora (middle) at the University of Texas's M. D. Anderson Cancer Center.

"There is much interest and excitement about the upcoming changes," says AAPM president-elect Michael Herman, a radiation oncology physicist at the Mayo Clinic in Rochester, Minnesota. "If they [ABR] require accredited training before you sit for boards, it closes the loop." Even in states that do not require certification, he adds, "most practice groups and academics expect their medical physicists to become certified at some point." The CARE bill, which an alliance of nearly two dozen professional societies is hoping to reintroduce to Congress this spring, would mandate minimum standards in education and training for anyone involved in irradiating humans. As federal law, CARE (Consistency, Accuracy, Responsibility and Excellence in Medical Imaging and Radiation Therapy) would help raise the uniformity and level of practicing medical physicists. "You have to be licensed for many professions that involve public health, including cutting hair," says Herman. "Why not to deliver radiation to people?"

The new certification rules, says Hazle, "are all about public safety. They are better for the public and better for the profession. It will make the demonstration of competency for medical physicists more equivalent to physicians." Entering the field via alternative pathways will still be possible under the new certification rules, says the University of Iowa's John Bayouth, the radiation oncology physicist who chairs the AAPM working group that coordinates activities of program directors for medical physics residencies. "Our field has been enormously rewarded from optical physicists, atomic physicists, nuclear physicists—they've made substantial contributions. It's important that we do not dissuade those who bring additional skills from entering the field. This is a challenge."

Meeting demand

Some 20 graduate programs across the US and Canada are currently accredited, with a handful more in the works. "We are not too concerned" about meeting the 2012 deadline, says Hazle. "We are turning out enough graduates. But when we look at 2014, we start running into challenges." The US demand is for about 250 new medical physicists per year. Some 31 residencies, 28 in therapy and 3 in imaging, are accredited, up from 19 about a year and a half ago. "We've seen dramatic growth in the number of residencies," says Bayouth. "If we continue that over the next four years, I think it's very likely that we'll have enough residency programs." The more common view, though, is that it's unlikely that enough accredited residency slots will be available in time despite the efforts of AAPM, the ABR, and others. "I think we could get to 100 or 150 residents," says Hazle.

"It's a great long-term plan to have everyone go through clinical residency who wants to work in a clinic," says Jennifer O'Daniel, a new assistant professor of radiation physics at Duke University Medical Center and a member of the AAPM's student subcommittee. "The main concern is the short-term consequences of our long-term plan."

The people currently in CAMPEP-accredited programs are affected only by the 2014 deadline—depending on timing, they'll need to do a residency before they sit for the boards. But the people who started a non-CAMPEP-accredited PhD after 2006 will likely need to do an accredited residency. "If you need to do one, and you cannot get into a residency program, you are out. There is no recourse," says Samei. There are not enough residency programs in imaging physics, he adds. And master's graduates "cannot currently compete adequately [against PhDs] for the limited number of residency slots. No matter what we do, some people will fall off the cliff."

AAPM, the ABR, and CAMPEP, among others, are urging hospitals, clinics, and practice groups that offer clinical training to become accredited and those that already are to take on more than the typical one or two residents. The hurdles are money and manpower. Residents are typically paid, but unlike with medical residents, whose salaries come from Medicare, the host institution foots the bill. As for manpower, Samei says, "My idea is to hand [new hosts] a person, perhaps a retired medical physicist, for a month or two to help start up" residency programs. "This will help institutions that may have enough manpower to maintain a residency program but not enough to start one." Some places are discussing a hub-and-spoke model, whereby an established training center helps administer and oversee residencies in remote locations.

New degree

Another proposal would turn the residency from an expense for the host institution into a moneymaker: Instead of being paid during their clinical training, residents would pay. Charles Coffey, who is launching a clinical doctorate of medical physics (DMP) at Vanderbilt University this fall, says it's "part of their education. It's a professional degree, not a research degree." The university's existing two-year master's program would be supplemented with courses in ethics and in-depth diagnostic and radiation calculations, in addition to two years of clinical training. The program is off to a running start, Coffey says. At steady state the program aims for about five new students each year. The DMP will only incrementally help meet the immediate need for residency slots. But, says Coffey, "I really think by 2020 it will play a major role."

Samei recently surveyed students, residents, faculty, and directors of medical physics programs about their opinions about DMP degrees. "The results were mixed," he says. "The majority of students said they would apply to such a program. But overall there was a feeling that it could be detrimental to research because the people who in the past would have gotten a PhD would do this instead."

Samei himself worries that the DMP might create two classes, "PhDs that are the 'real' doctors and DMPs that are sort of doctors." But, he says, to meet the need for the 2014 certification requirements "we need a multifaceted approach. I personally feel we are not moving fast enough." **Toni Feder**

New Argonne head is chosen

Eric Isaacs becomes director of Argonne National Laboratory this month, where he expects to refocus the lab on its core strengths in x rays, high-performance computing, materials, chemistry, and energy. Isaacs went to Argonne in 2003 to head the Center for Nanoscale Materials, one of five nanotechnology user facilities located at US Department of Energy labs. He will retain his appointment as a professor of physics at the University of Chicago, which has managed ANL for the DOE and its predecessors since the lab's inception during World War II.

Prior to Argonne, Isaacs spent 15 years at Bell Labs, first as a postdoc, eventually as director of the materials physics research department, and later head of the semiconductor physics department. Isaacs sees the national labs as heirs to Bell Labs' former role as an innovation hub: Both places hired the best scientists and engineers, and both invested in high-risk basic research. What sets the national labs and, historically, Bell Labs apart from research universities, Isaacs says, is their focus on research to meet missions.


ARGONNE NATIONAL LABORATORY

Isaacs

Isaacs says he is grateful for the $13 million in stimulus funding that the lab is receiving for infrastructure upgrades, although it is the lowest amount going to any of DOE's civilian multiprogram labs. "We're in between projects," he explains, noting that the recipients of more funding have major facilities or upgrades under way. Last year ANL lost the competition to host DOE's $550 million Facility for Rare Isotope Beams (see PHYSICS TODAY, February 2009, page 25). But Isaacs vows to do what it takes to keep the lab's Advanced Photon Source at the head of the pack of US synchrotrons that produce hard x rays. A proposed revitalization of the APS, he says, could provide the capability to produce x-ray pulses as short as 1 picosecond, which would give researchers the ability to take snapshots of rapid processes as they occur. **David Kramer** ■

web watch

To suggest topics or sites for Web Watch, please visit http://www.physicstoday.org/suggestwebwatch.html. Compiled and edited by Charles Day

http://www.quantumdiaries.org

In 2005, a diverse group of particle physicists began blogging about their work and life on a website called **Quantum Diaries**. That first group has disbanded, although some members continue to publish their own blogs. Now, a second group of quantum diarists has formed. Among them is Cao Jun, an experimenter who works on the Daya Bay Reactor Neutrino Experiment in southern China. Cao writes in English and Chinese.

http://fas.org/programs/ssp/nukes/fuelcycle/centrifuges

Gas centrifuges are the most efficient tools for separating ^{238}U, uranium's most abundant isotope, from ^{235}U, the isotope that fuels nuclear reactors and powers nuclear bombs. To inform the public about this key technology, the Federation of Atomic Scientists has put together a set of online resources entitled **Uranium Enrichment and Gas Centrifuge Technology.**

http://www.ck12.org/

Providing free, high-quality textbooks online is the aim of the **CK-12 Foundation**. Based in California's Silicon Valley, the nonprofit organization publishes what it calls FlexBooks—collaborative, user-generated texts akin to the entries in Wikipedia. A recent search for physics yielded 22 FlexBooks.