

Kieran Murphy, MD

A renowned interventional neuroradiologist discusses the state of endovascular intervention in the US, explains his recent decision to move to Canada, and offers his advice to new physicians.

The US is often 1 to 3 years behind Europe in terms of new device approval. How does this have an impact on your work, especially as someone with training outside of the US?

There are things I practiced in Europe in 1997 that we still do not do in the US, such as direct puncture of a juvenile navel angiofibroma of the nose. It is unrecognized in the US that this technology gap will cause us to fall behind the rest of the world in technology development. It impairs the quality of the healthcare delivered to our patients. The practice of medicine in the US is essentially determined by what is reimbursed, and what is reimbursed is determined by industry approvals. That approval process establishes what the insurance companies pay for, which means, effectively, that our practice of medicine is determined by people who are driven by commercial benefit instead of scientific proof. Our practice of medicine should really be controlled by the National Institutes of Health—not by industry—and this is a very fundamental problem at the heart of American medicine.

The fact that some procedures are performed in Europe but not here is often the result of the market not being perceived as big enough to cover the cost of the studies necessary to gain approval for those techniques in the US. It is such an odd situation; it is like giving oil companies the right to control exploration in the Arctic wildlife refuge. It is the wrong way to be practicing medicine. Almost every week, I am limited in my ability to treat intracranial stenosis in the Medicare patient population because it is specifically not covered by the Humanitarian Device Exemption approval process for that device. Consequently, the one type of patient that could benefit from having an intracranial stent is excluded from having that therapy based on the way the approval was obtained by industry and the way that approval is interpreted by insurance companies. My 70- or 80-year-old patients are confronted with huge hospital bills or are denied care. That is not the case in Canada or much of the rest of the world.

Is the US continuing to fall behind, or is there hope that the country will catch up?

Disease was never meant to be a product line, although we tend to treat it that way in so many areas. Patients show up with a diagnosis and receive a prescribed treatment, get billed in a prescribed way, and we maximize the billing. Ultimately, none of us want ourselves or our loved ones to be treated like that. We have to take the industry and the profit out of our daily practice so that each patient gets treated as a specific individual. For example, there is very little scientific

proof behind a lot of spinal surgery, yet it is a \$20 billion per year business in the US. An equivalent area in the endovascular world is asymptomatic carotid disease. If we say asymptomatic patients should not be stented, then we have to look at asymptomatic carotid endarterectomy and ask, why is that being performed as well? We have not done that; we have focused on the stenting because that is where industry is interested. But there is an equal problem with surgical endarterectomy in asymptomatic

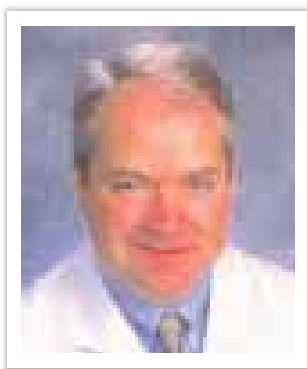
patients—specifically women—and that needs to be addressed as well.

You recently decided to move to the University of Toronto. What were some of the reasons for this choice?

I am moving for personal reasons—my wife is from Toronto—as well as professional reasons. After 10 years with Johns Hopkins, I am going to challenge myself by doing other things, although I will continue to practice interventional neuroradiology. My new position will be as Vice Chair and Vice Chief of Radiology and Medical Imaging at the University of Toronto, and I will be Chair of the Advisory on the technology transfer offices and commercialization of intellectual property for the university health network. I believe intellectual property is a physician group's greatest asset.

There are many positive things about the Canadian healthcare system. Disease is not a product line there. You are not trying to do more; you are trying to do it more

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sensibly. In Canada, primary healthcare workers are paid well. Pediatricians, internists, and general practitioners make \$300,000 to \$400,000 Canadian dollars. In the US, pediatricians make \$135,000 per year pushing 40 patients through the room per day so they can maintain their revenues and pay their overheads. If you remove that pressure, people practice a higher quality of medicine.

What would be the ideal set-up for a dedicated neurovascular suite, and does computed tomography (CT) have a role in this suite?

For about 10 years, I have worked with Toshiba (Toshiba America Medical Systems, Inc., Tustin, CA) to develop their biplane room and 320-detector Aquilion One CT scanner. We have seen that this 320-slice CT can replace diagnostic catheter angiography in many cases. It is outstanding. We get magnificent arterial capillary and venous phase cerebral angiography with the CT scanner—wonderful, beautiful images. This is good news for patients because it makes their lives easier and safer. For our practice, however, it will be a challenge because our revenue is going to drop by 48%. It lowers the level of skill necessary to get the diagnosis and diffuses the technique by having a lower technological threshold entry to get the diagnosis. These 320-slice CT scanners will decrease the amount of diagnostic angiography, and that too will represent a challenge because it will reduce the amount of time needed for training people in the simpler steps before the intervention, removing the substrate for diagnostic angiography that is the training step in preparation for interventional training. This is something we will have to overcome.

What advice would you give radiologists at the start of their career, particularly someone interested in neurointervention?

First of all, they have to do what they are passionate about. They have to do what gives their life a sense of meaning and vocation. They will have to go through an arduous yet worthwhile training process, and there are no short cuts. They should not worry about the turf issues that are always talked about because there will always be some challenge that we will face in that area. I do often encourage people to go to neurointervention or image-guided therapy. We have had a wonderful direct record of getting medical students into radiology programs around the country, and we have a role as mentors to guide people by inspiring them and by showing that these careers are fulfilling. Our task is to fix people; you do not fix them all in one day—you fix them piece by piece. When you practice medicine like

that, it is incredibly rewarding, no matter where you are in the world, no matter what you are doing.

Your focus is the best interest of the patient. How do you maintain that mindset?

I constantly monitor myself to make sure I am being fair and honest, and I think that we only get one opportunity to do so. Integrity can be lost in a second, and some people do lose theirs. I am no saint, but I try to make sure that I do things honorably—that I am honest about my complications when they occur, that if I have a conflict of interest, I declare it, and that I regulate myself to make sure I am approaching whatever I do with a breadth of vision that would spot flaws in my thinking because of how I have been swayed by self interest or the interest of somebody else. We also need reliable opinions for our colleagues who might listen to what we say, and we have to take that responsibility seriously. Also, whenever we step down from the podium, we have to realize that we are there to learn from the people who are asking us questions. Some of the most thought-provoking things that I have ever been asked have occurred after I have spoken at a meeting, and those moments create the innovations that help us improve what we do. When I was a medical student, I wanted to be a neurointerventionist, and I met a lot of neurointerventionists who were so pompous they would not even talk to me. I hoped I would never become like that. I may have and do not realize it, but I always try hard to make sure I do not.

Are there any new neurointerventional techniques that will have a lasting impact on this field?

We have actually hit a plateau in neurointervention. In the last 10 years, there has not been anything new. We have coiled aneurysms successfully for a long time. We need to stop thinking about aneurysms because we are doing pretty well there. We need to look at other types of intracranial hemorrhages and the ventricles of the brain, as well as ways of navigating in the ventricles by putting clot-dissolving agent tissue plasminogen activator directly into the ventricular hemorrhage. We have been doing that with a multicenter study; we have treated many patients with intraventricular hemorrhage and have successfully decreased the morbidity/mortality rate from 77% to 22%. The number of those patients far exceeds the number of aneurysmal ruptures. To do that, we must use real-time CT guidance. Again, it focuses on innovation that stems from imaging rather than devices. We always focus on devices, but imaging is so important. I think there is a plateau on the device side, but there are new diseases and new problems we can approach. The key is simplicity. ■