Marc I. Chimowitz, MBChB

Neurologist and stroke researcher, Professor Marc Chimowitz, speaks about his mentorship of the newest generation of neurologists, the REACH Telestroke Program, and the ongoing research for optimal stroke care.

Did growing up in Zimbabwe and studying in Cape Town influence your career choices in any way?

Honestly, I don't think it had much influence on my career path or how I perform research and treat patients. Medical care is much more sparse in Africa (although it can be in this country in some areas as well), and the emphasis of doctors is less on the latest technology and more on solid clinical skills. Although the geographical location of my upbringing hasn't really affected my career, I think that my background as a math major influenced my choice to practice neurology, as well as my interest in conducting clinical trials. I liked the linear, logical structure of math, and making neurological diagnoses is similar in terms of puzzle solving. In some ways, clinical trials have a lot to do with math because you're comparing two or more groups, and you have to understand statistics and issues of bias. The kind of logic that math utilizes is helpful in designing clinical trials.

Because you spend a lot of time mentoring trainees and junior faculty, what are your observations about the latest generation of neurologists? Are there ways in which they are unique?

First, I think this generation has different expectations about how their work and personal lives interact and balance. So, in a way, it's much more of a challenge for them to conduct successful research because this requires a lot of after-hours work that has to be balanced with personal and family needs. Funding is now also more of a challenge because securing grants is more competitive. Additionally, academic medical center budgets are tighter, and the faculty have to be very efficient and productive with their time to balance their clinical and academic responsibilities and generate sufficient funds to cover their salaries.

It's important to have good research training and the support of the leadership of academic institutions for junior faculty to learn the tools and skills to be as effective as possible in research. This is a lot of what my mentoring responsibilities entail—developing and providing these tools and mentoring young researchers to keep them committed and successful in their research careers.

So far, we haven't seen a significant drop-off in quality research, as many of the funding agencies recognize the challenges young investigators face and have developed programs to support them. There is a real concern nationally, however, and I suspect internationally, that our pipeline for developing the next generation of clinical and translational researchers is at risk, and we need to do something about it.

The REACH Telestroke Program at MUSC seems to have a great impact on your community. Can you tell us about this program and why it has been successful?

Although I have participated in this project, this is truly the brainchild of my colleague, Dr. Robert Adams. He developed this program and helped to spread it statewide, which will soon be expanded to even more hospitals in our area. In states such as South Carolina, which has many rural areas, there is limited patient access to physicians who have experience treating patients with acute stroke. REACH allows doctors to remotely interact with patients and conduct neurological exams, review CAT scans that were performed locally, and determine whether they should receive intravenous tissue plasminogen activator (tPA).

The point is to bring modern-day, high-tech medicine to more areas of the community. At least one of the stroke specialists or neuro intensive care unit doctors is on call 24 hours a day, 7 days a week at our institution to provide this service to these rural hospitals. So, a patient can walk into his or her local emergency department, and we will conduct a consul-

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tation with him or her remotely through the REACH system. To date, 3,400 consultations have taken place using the REACH system, and 500 patients have been treated with tPA as a result. Additionally, with the REACH system, we can identify acute stroke patients who may be more likely to benefit from endovascular therapy and have them transferred to our institution for endovascular treatment.

This is on the clinical side of things, but now we're trying to figure out ways to use the REACH system to conduct research as well. For instance, we could enroll patients in a trial for stroke prevention, and instead of having them travel all the way back to our institution for follow-up, we could use this technology to check in with them where they live. This has the potential to increase recruitment in clinical trials and to provide more complete follow-up data.

Nationally, there are other centers with similar programs and even commercial enterprises that are hiring doctors who will specifically dedicate themselves to telestroke work.

In patients with intracranial atherosclerotic disease, which factors do you think should inform procedural decision making?

The results of the WASID trial indicated that there are two main characteristics that predict a higher risk of stroke on usual medical management. The first is severe blockage (70%–99%) of an intracranial artery, which we can determine via vascular imaging. The second is whether the patient has experienced a transient ischemic attack or stroke from that narrowing within the last 30 days. It is the acuity of the stroke coupled with the severity of the stenosis that determines who is at greatest risk for further stroke.

We have recently completed patient follow-up in the SAMMPRIS trial. These results, which will be available this fall, will provide data on factors that may predict which patients may not respond as well to aggressive medical therapy.

What are some of the ways that high-resolution MRI is being used in patients with intracranial atherosclerosis? What other imaging tools are most helpful to you on a regular basis?

High-resolution MRI is being studied in patients with intracranial atherosclerosis to tell whether the atherosclerotic fibrous cap has ruptured, whether there is bleeding inside the plaque, how much fatty tissue (or lipid core) is inside the plaque, and if these features are found, whether they predict a higher risk of recurrent stroke. Although aggressive medical therapy is used to treat the majority of patients with intracranial atherosclerosis following the SAMMPRIS trial, there are patients who will fail aggressive medical therapy.

Ideally, we would like to be able to identify who these high-risk patients are by clinical features, as well as imaging features, of which high-resolution MRI is just one of the tools available. There are also other imaging tools that focus less on what the plaque looks like and more on what's happening to blood flow distal to the narrowing of the intracranial artery. We have used angiography to identify distal collateral flow for this purpose, but we are also trying to develop noninvasive tests to identify these features, including quantitative MRA, which allows you to quantify the amount of blood flow occurring distal to the stenosis.

Another tool is fractional flow reserve on MRA or CTA to predict which patients are at risk for stroke. There is a lot of focus now on using imaging both at the plaque level and in terms of flow-related issues to predict which patients with intracranial stenosis are high risk for stroke on medical therapy.

What are your thoughts on the Vitesse Intracranial Stent Study for Ischemic Therapy (VISSIT) trial?

I was not involved with that trial, but apparently, recruitment was stopped over a year ago now. The stroke community is hopeful that the final results will be announced later this year. In fact, I'm hoping that the final SAMMPRIS results and the VISSIT results will both be ready for presentation at the ICAS 2013 meeting, which will be held in Houston, Texas, in late October 2013.

What endovascular tools do you think could be used to limit the damage done in patients experiencing a stroke who present to the hospital?

We're now talking about acute stroke therapy, not secondary prevention. The first endovascular treatment that was attempted for acute stroke care was the use of intra-arterial prourokinase. It was not approved by the US Food and Drug Administration, however, for this purpose because they wanted a second trial to confirm the promising results of the first trial before approval was granted. Unfortunately, a second study was never done. Subsequently, the focus on endovascular treatment of acute stroke shifted to using devices that can mechanically remove clot, so-

called thrombectomy devices, which are often used in conjunction with intra-arterial tPA. Currently, there are no randomized studies showing a benefit of these devices compared to medical care, but several ongoing studies are still testing newer thrombectomy devices.

With new technology abounding, what role should today's devices have in treating ischemic stroke?

The newest devices are stent retrievers, which are showing much higher recanalization rates than previous thrombectomy devices. I think the technology and techniques still are undergoing an evolution and will probably provide better and better recanalization results as time goes on. We are already doing quite well, in terms of recanalization rates, with the new tools we have now.

Much of the decision regarding which type of tool is chosen to treat a particular patient is still mainly left to operator preference. As each new technical iteration comes to fruition, operators usually gravitate to the new option and might even use it in a hybrid approach with other therapies. This is still an evolving field, but we're certainly at the point where the latest-approved stent retrieval devices are providing excellent technical outcomes. We need definitive proof, however, that they are limiting disability in patients with acute stroke by performing more randomized trials that focus on the patients who are most likely to benefit from endovascular treatment. ■

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