

Cross-training is a nifty little term. It refers to the act of combining techniques from one activity with techniques from a different activity to achieve a broader range of skills.

Employees get cross-trained on different aspects of a job. People talk about cross-training their brains to enhance creativity. You might even own cross-training athletic shoes.

Not many established physicians cross-train, but it's exactly what Todd Kuether, M.D., did.

NeuroInterventional Services

BY PATTI GREEN | PHOTOS BY PETE STONE

After finishing residency in neurosurgery, Dr. Kuether signed on for in-depth training in a field that would seemingly cast aside the surgical skills he'd spent years perfecting. He enrolled in a fellowship of neurointerventional techniques to study nonsurgical ways of resolving brain and spinal conditions.

Ask him what attracted him to this field, and Dr. Kuether will marvel that he ever entered neurosurgery at all.

"During my residency, I had no intention of going into neurosurgery. I wanted to go into orthopedics. There were no rotations available in ortho at that time, so I took a rotation in neurosurgery. I loved the difficulty of it and the technology involved."

Then came the fellowship in neurointerventional techniques.

"As I was entering my career as a neurosurgeon, I looked down the road 20 years. I realized that it would be important to adapt to changing technology, which will

make new minimally invasive and nonsurgical techniques a reality. This technology will have a major impact on the field of neurosurgery."

In the mid-1990s, very few neurosurgeons in the United States were trained as neurointerventionalists – maybe as few as 80.

Nonetheless Dr. Kuether envisioned the future of neurosurgery by reflecting on the history of cardiac surgery.

"Twenty-five years ago, cardiac surgeons performed coronary artery bypass grafts on just about everybody. They couldn't keep up with the number of people who had blocked coronary arteries and needed bypass grafts. Then interventional cardiology came along, and cardiologists started using mini balloons and stents to reopen blocked coronary arteries. Now cardiac surgery volumes are way down, and interventional cardiology volumes are soaring," he says.

"I could see that with minimally invasive techniques becoming more available,

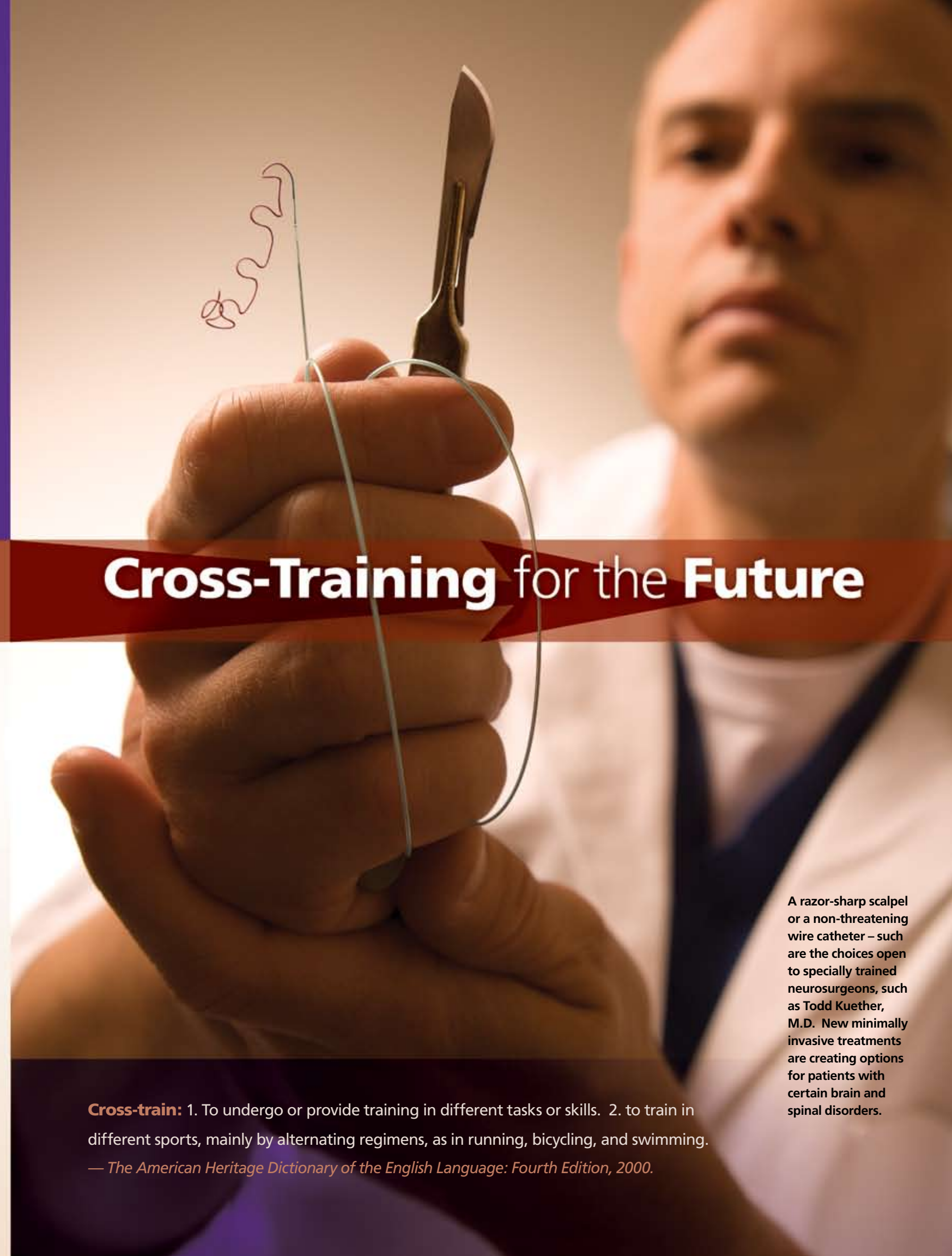
traditional neurosurgery would play a decreasing role. I was fascinated by the new technology," he says with the conviction and eagerness of a true pioneer. "I want to be at the forefront of providing this type of care for my patients."

The Science Behind the Cross-Training

Dr. Kuether's innate fascination with neurosciences and technology is not enough to ensure success as a neurointerventionalist. To succeed, precision and manual dexterity are a must. Fortunately Dr. Kuether has both.

His hands are as important as the high-caliber tools he uses. His dexterity and precision are evident when he expertly casts a fly as he's fishing the Deschutes, when he does oil painting or fine woodworking, and when he sews his daughter's dance costumes. These are the same skillful hands he uses to clear blood vessels and resolve potentially deadly brain disorders.

As a neurosurgeon, Dr. Kuether can cut



Cross-Training for the Future

A razor-sharp scalpel or a non-threatening wire catheter – such are the choices open to specially trained neurosurgeons, such as Todd Kuether, M.D. New minimally invasive treatments are creating options for patients with certain brain and spinal disorders.

Cross-train: 1. To undergo or provide training in different tasks or skills. 2. to train in different sports, mainly by alternating regimens, as in running, bicycling, and swimming.

— *The American Heritage Dictionary of the English Language: Fourth Edition, 2000.*

into the skull, brain and spinal cord area to remove tumors and repair faulty parts. As an interventionalist, he can repair brain and spinal conditions by working from inside tiny blood vessels.

The interventionalist's workshop – a neuro bi-plane room equipped with highly specialized machinery and tools – is as rare as the physicians who work here. Providence St. Vincent Medical Center is home to Oregon's most advanced neuro bi-plane room. Dr. Kuether himself designed and oversaw construction of the room.

At the heart of this one-of-a-kind procedure room is a bi-plane camera. Aided by a contrast dye injected into the patient's circulatory system, it snaps highly detailed photos of the patient's brain and its maze of blood vessels simultaneously from two distinct angles, recording 30 frames per second. Instantly colorful, real-time images of these blood vessels flash onto a monitor where the physician can rotate the images to view the vessels from all angles.

Intently watching the screen, the physician threads a catheter from the patient's groin through blood vessels of the abdomen, chest and neck to the exact site of the problem in the brain or spine.

Using microscopic tools, the physician can lasso blood clots, prevent a bulging aneurysm from bursting, place a permanent scaffolding to maintain blood flow through a vessel, or block off the blood supply that feeds a growing tumor or a dangerous mass called an arteriovenous malformation.

The Beauty of Neuro Cross-Training

Today Dr. Kuether is one of only a few neurointerventionalists in Portland and the only one to maintain an active practice in both neurosurgery and neurointerventional techniques.

"My mentors told me during my fellowship that I would have to choose either neurosurgery or neurointerventional work," he recalls. "They said it was impossible to do both, that I could never keep a viable practice growing unless I focused on one or the other."

They were wrong. With youthful energy, Dr. Kuether maintains his practice with seeming ease, blending



Dr. Kuether chats with sisters Kenya Palmer, left, and Neshia Cameron, center, both of whom he treated with coiling procedures for brain aneurysms. The X-rays behind him read as easily for Dr. Kuether as a child's storybook, showing him where aneurysms and other blockages affect blood vessels in the brain.

traditional neurosurgery and neurointerventional techniques. Besides that, he was recently named medical director of Neurointerventional Services for Providence Brain Institute.

Not surprisingly, he has been named to Portland Business Journal's "40 Under 40" list of young professionals, notable for their accomplishments, recognitions and community involvement.

So what really makes his field of work unusual?

Dr. Kuether explains it this way: "There are many neurosurgeons in town, but they don't do intravascular work. There are also interventional radiologists who are very skilled in intravascular work, but they aren't surgeons."

Cross-training gives Dr. Kuether a dual perspective.

"Let's say a patient has a brain aneurysm," he says. "A neurosurgeon will likely recommend a surgical approach to treating the aneurysm. An interventionalist will likely recommend intravascular therapies. As a neurointerventional, I am just as favorable toward surgery as I am toward intravascular therapies. I will recommend whatever is truly best for that particular patient."

Such was the case when Leon Sanders, 66, needed treatment for an arteriovenous malformation or AVM. This densely

twisted mass of blood vessels was pressing against his spinal cord, causing near-paralysis in his legs. When he met Dr. Kuether in January 2006, the physician proposed alleviating the AVM through noninvasive intravascular techniques.

After seeing the diagnostic angiogram, Dr. Kuether realized traditional neurosurgical techniques would yield the best outcome.

"This particular type of AVM required surgical treatment. A neurointerventional treatment in this instance may have caused further damage and complete paralysis," he says.

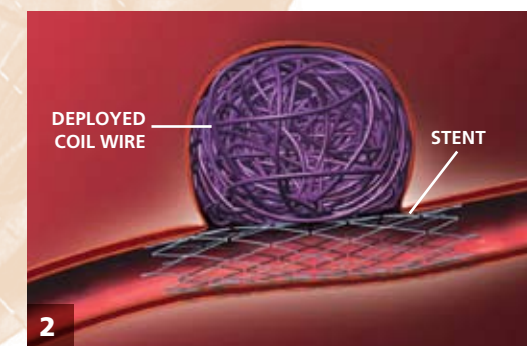
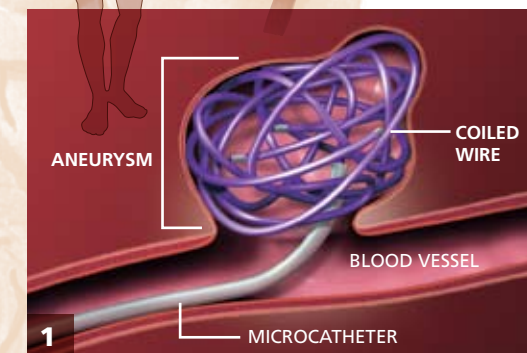
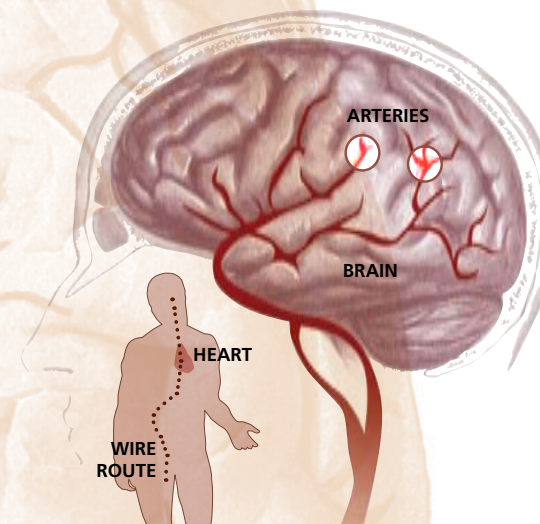
Given his training in both fields, Dr. Kuether was able to care for Sanders himself rather than refer him to another neurosurgeon. "The importance of cross-training in this case was the continuity of care it allowed. Mr. Sanders had already seen another physician before he was referred to me. Being referred to yet a third physician would have been very frustrating to him," explains Dr. Kuether compassionately. "Just as importantly, it would have cost significant time – maybe several weeks – to get another appointment and be evaluated by this next physician."

Following surgery to correct the AVM, Sanders went through rehabilitation to strengthen his leg muscles. He uses a cane to get around now – but he is walking.

Aneurysms and Coiling – A Family Affair

It was Dec. 23, 2004. Kenya Palmer's brain was filled with holiday plans. Sadly it was also harboring an aneurysm.

In simple terms, an aneurysm is a weak point in an artery. As blood pulsates through the artery, the weak point cannot support the pressure of the blood flow. The weak point begins to bulge, like a



1) In a coiling procedure, the physician threads the grey catheter through an artery in the patient's groin to the site of the aneurysm. Flexible, coated platinum coils (detail right) are inserted through the catheter into the aneurysm.

2) Once filled with coils, the aneurysm has no room for blood to pool. Blood flow returns to normal. Often a soft scaffolding of wire, called a stent, is placed in the blood vessel under the aneurysm to hold the coils in place.

Coil images courtesy of Boston Scientific. © 2006 Boston Scientific Corporation.

garden hose with too much water pressure building inside. The bulge can rupture at any time and cause bleeding inside the brain.

Palmer's aneurysm burst as she was driving home. Unconscious, Palmer crashed her car, which came to rest two feet from a lake. Once paramedics extricated Palmer from the badly mangled car, they rushed her to Providence St. Vincent Medical Center where its nationally certified stroke team, including Dr. Kuether, stood ready for her arrival. Dr. Kuether stopped the bleeding in Palmer's brain using a neurointerventional procedure called coiling.

Coiling is considered one of the best treatments for aneurysms. In it, the physician fills the bulge completely with tiny, flexible, platinum coils. Once filled with coils, the bulge is harmless. It has no room for blood to pool. Blood once again flows smoothly through the artery. All threat of rupture is gone.

After receiving 18 coils during her first coiling procedure, Palmer, 58, spent three weeks in the hospital recuperating from the effects of the rupture. Once she regained her strength, Dr. Kuether performed a second procedure, inserting an additional 26 coils plus a stent at the base of her aneurysm to hold the coils in place. By the end of March, Palmer was back at work and enjoying life as she knew it before the rupture.

Eleven months after Palmer's aneurysm ruptured, her sister, Neshia Cameron, 60, began suffering extreme dizzy spells. During one spell, she was admitted to the emergency department at Providence St. Vincent where she was diagnosed with positional vertigo. When doctors

discovered Cameron had a family history of aneurysms – besides her sister's brain aneurysm, her father and grandmother both died from ruptured aortic aneurysms – they quickly ordered an MRI.

It revealed that Cameron had an aneurysm growing in the left side of her brain. Dr. Kuether performed a diagnostic angiogram and also found a second, smaller aneurysm on the right side of her brain.

"Aneurysms can run in families," explains Dr. Kuether. "It's not common, but it does happen. Neshia's aneurysms likely did not cause her vertigo, but in searching for the cause, we found the aneurysms."

It was decided that only the larger of the two aneurysms needed to be treated.

Dr. Kuether successfully coiled the large aneurysm. Cameron spent the night in the hospital and was discharged the following day. Within two days of the procedure, she was back to her normal life routine.

"The speed of recovery is just one of the beauties of neurointerventional techniques," says Dr. Kuether. "Patients typically go home the day after their procedure, and they are free to go back to work the day after that." With traditional neurosurgery, patients typically are hospitalized for several days and then face the next six weeks recovering at home.

Now both sisters laugh and tease each other about their procedures. They schedule their annual follow-up appointments together and give glowing praise for the minimally invasive techniques and exceptional doctors and nurses who saved their lives.

While traditional neurosurgery remains the best way to treat some complicated brain and spinal conditions, minimally invasive interventional techniques offer possibilities only imagined a decade ago.

A new generation of physicians like Dr. Kuether are blending the best of both worlds. Their cross-training is producing a new hybrid career and magnificent new options for patients. ■

