SOCIETY

Rebuilding Sidney Crosby's brain

A little-known treatment by a Canadian-born chiropractor to the stars may be the key to his comeback

By Cathy Gulli
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Fred Vuich/Sports Illustrated

THE RETHINK ISSUE

Ted Carrick is listening to Sidney Crosby's heart. The NHL superstar is strapped into a computerized rotating chair that has just spun him like a merry-go-round. It is, as Carrick likes to tell people who visit his lab at Life University near Atlanta, one of only three "whole-body gyroscopes" in the world, and it's integral to his work as the founding father of "chiropractic neurology." He uses it to stimulate certain injured and diseased brains.

Crosby, who plays for the Pittsburgh Penguins and has been famously sidelined with a concussion since January, is Carrick's newest patient, and this day in August is the first time they've met. Carrick leans in close, his balding, tanned head looming inches from Crosby's face, and rests the stethoscope on his chest. "Let's make sure you're not dead."

Satisfied, Carrick turns to the others in this cramped blue room, who include Crosby's agent Pat Brisson, trainer Andy O'Brien and several chiropractic neurologists or studentsin- training wearing white lab coats. "He's fine," Carrick says. "It's going to be good."

Nodding to his colleague Derek Barton, who usually operates the lab equipment, Carrick signals to restart the gyroscope—with one difference. This time Crosby will be turned upside-down while he is also spun around. He hasn't experienced this dual action yet.

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Barton and Carrick discuss the appropriate speed setting the gyroscope. Then Barton enters Carrick's directions into a computer that controls the gyroscope (chiropractic neurology uses no drugs or surgery), and tells Crosby to keep his head pressed against the back of the black cushioned seat. Crosby, wearing a grey T-shirt, black shorts and white ankle socks, scans the crowd on the other side of the clear plastic cylinder surrounding the machine. The door clangs shut. Above it, a stack of red, yellow and green lights shines while 10 high-pitched beeps signal the gyroscope is about to start. Ding! Ding! Ding! Ding! Ding! Ding! Ding! Ding! Ding! Ding!

A low hum floods the room as the gyroscope begins its 20-second "montage" of rotations. With each flip, Crosby grips the black handles flanking his thighs, his face reddens and his jaw clenches. Before long, the gyroscope, called GyroStim, winds down. "Perfect," Carrick concludes.

As the chair returns to its starting position, Carrick approaches the gyroscope, opens the door, steps in and stands in front of his patient. 6 2 "Still there?" he asks, as he plugs the stethoscope back into his ears. He listens to Crosby's heart again, and checks his eye movements. "That's much better," Carrick informs Crosby. "Just sit there for a sec. Relax for a bit." Carrick asks him a few questions, and then surmises, "That's good. That's good!"

Inside the Pittsburgh hockey arena, known as the Consol Energy Center, Sidney Crosby is sitting behind a long table littered with microphones and audio recorders. His name is typed in bold black letters on a white sign. But Crosby needs no introduction. On this day, Sept. 7, nearly 100 journalists, camera operators, publicists, agents and team executives have convened for a rare press conference updating his health status. Ray Shero, the Penguins' general manager, sits to his left. On the end, farthest from Crosby, is Michael Collins, a neuropsychologist who has been treating him for months. And at Crosby's right hand is Ted Carrick.

It's only been weeks since they were in Georgia together, and 249 days since Crosby sustained the first of two head shots that caused his concussion. That hit, which happened during the annual Winter Classic on New Year's Day, was a blow unlike any the hockey world had ever experienced: the best player since Wayne Gretzky was suddenly knocked out of the game indefinitely because of an invisible injury: no blood on the ice, no cracks on any X-rays and no way to know how bad was the damage done.

And yet Crosby has turned concussion into the most highly visible of sports injuries. Since January, Google searches of "Crosby" and "concussion" have moved in tandem as hockey fans in Canada, the United States and as far away as Finland, Sweden, Germany and the United Kingdom try to make sense of what has happened to their favourite player. Scientists, doctors and equipment makers have used Crosby as a talking point to raise awareness and as a case study in the complexity of concussion. One group at the University of Ottawa has gone so far as to reconstruct Crosby's first head shot to see the link between hits, helmets and brain-tissue stress. The NHL is embroiled in a polarizing debate over fighting in hockey—how to keep it in, but make it safe?—and whether it contributed to the deaths of three players in the past six months. And nervous hockey parents everywhere are reconsidering whether their children should keep playing. How Crosby recovers will help them decide.

Maclean's obtained exclusive access to the lab where Crosby saw Carrick, and learned about his unique methods of treating brain injuries. While the details of Crosby's personal health data remain private, over the course of two days, the magazine was granted access to a range of information about the treatments used on patients, including him. During that time in late September and early October, an astonishing assortment of patients came through the clinic. A wealthy businessman and his son. A prominent NFL player. An NHL rookie and a teenage girl, each with a concussion. An aging biology teacher who'd had a

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stroke. A boy with brain damage sustained after a van ran him over. A middle-aged physician who'd lost his ability to talk or walk after a tick bite. In every case, Carrick ran through a version of the same evaluation, exercises and equipment he used on Crosby. "We saw something like nine MDs, neurologists, cardiologists," says one patient's relative. "I've seen nothing that compares to this."

Nor had most of the people at the press conference now bracing to hear about Carrick's involvement with Crosby. Staring out from behind gold-rimmed eyeglasses, Carrick surveyed the fidgety strangers. "Good day, people. I'm here because Sid asked me to be here to discuss with you some of the things that have been going on in his life over the last little while."

But Carrick's statements were more puzzling than clarifying: he took "a different type of approach" to brain injuries, one that looked at "physicality" and involved "specific measurements" to "make a very good diagnostic impression of what was happening in Sid's brain." Carrick alluded to Crosby's compromised spatial awareness—"areas of space were not in an appropriate grid to where he would perceive them"—and described how he had fixed that. "We were able in our lab to quantify this, and then to develop strategies that allowed us to basically build him a new grid," Carrick declared. "So at the present time he is able to embrace strategies with a new system where everything is in line." And then he added: "It's Christmas, I think, for Sid Crosby and for the people that care for him. And it's a very good start."

When question period finally arrived, the only thing any reporter could think to ask Carrick specifically was: "The Christmas line—I was a little confused by what that meant, so if you could maybe elaborate on that, please?"

For whatever vague or bewildering comments were made during that 40-minute press conference, a singular message came through loud and clear: Sidney Crosby was getting better, and this man, Ted Carrick, was a big reason.

Carrick started out as a chiropractor, but has since developed an encyclopedic understanding of the brain. But what Carrick practises goes far beyond alignment and adjustments or conventional medicine. He is a self-made man: Carrick invented his discipline, and then founded an educational institution, the Carrick Institute for Graduate Studies, devoted to growing it. He lectures and practises around the world, and has legions of earnest students and loyal graduates. Today, 2,700 individuals in the world are board-certified to practise chiropractic neurology or functional neurology, a related field that permits pharmacy and surgery and draws professionals from other backgrounds too.

The method used by Carrick and his colleagues is notably different from the current "rest and wait" approach endorsed by an international consensus group, which recommends patients refrain from any physical or mental activities until all symptoms have disappeared. Then they slowly reintroduce activity, but if symptoms resume, they revert to the "rest" stage again. Carrick encourages his patients to rest immediately after the injury occurs, but then incorporates stimulation into the treatment, based on a "thorough neurological exam" that pinpoints their particular problems or symptoms as well as what brain functions are most viable. The stimulations might include eye or balance exercises, multi-tasking activities or body rotations. "We tailor our treatments very specifically to the individual," says Carrick. "When we have an area that's not working right, we look at other areas that can compensate for that if we need to, or we look at mechanisms to make those areas work right."

The wait list to see Carrick can be as long as three years, though in some cases, such as with Crosby, patients can be expedited. By the time they met in Georgia, the reality of what Crosby could lose if he didn't get better soon was abundantly and uncomfortably clear: his career, his endorsements, the adoration of an entire nation. Yet in many ways, the NHL's golden boy was just like many people stuck in a concussion vacuum where conventional medicine can't readily cure the injury, leagues can't easily curb it from happening and

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patients and their families can't know how long symptoms will last and what life will be like once they're gone, if they ever do go.

However strange and sickening that first day of treatment was for Crosby, it proved encouraging enough that he continued seeing Carrick for the whole next week. They'd meet as early as seven in the morning, and they'd go as late as six at night, says Carrick, running through a circuit of high-tech equipment and low-tech exercises in the lab and at the local hockey rink. By the time Crosby travelled back to Pittsburgh, Carrick says, "he was better than, you know, super-normal." The Penguins' medical team, who have been overseeing Crosby's recovery, also saw an improvement: they ran computerized tests called IMPACT to compare his current neurocognitive abilities with what they were before the concussion. The results: not quite "super-normal," but "the best we've seen" since Crosby got hurt, as Collins said at the press conference. (He declined interview requests.)

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"Carrick had a very prominent role in Sidney's current recovery status," Brisson, Crosby's agent, told Maclean's. "He progressed extremely well under Carrick." Just 10 days after the press conference, Crosby joined his teammates on the ice for the first day of training camp. Three-and-a-half weeks after that, Crosby was cleared for contact—the final step before returning to play. Now, after nearly a year of nagging symptoms that have included fogginess, light-headedness and nausea so paralyzing Crosby couldn't drive or watch TV, and after a slew of setbacks each time he pushed too hard while exercising or skating, the greatest hockey player of this generation is verging on a comeback—perhaps because of a relatively unknown therapy he received at a relatively unknown university from a relatively unknown man who isn't even a medical doctor.

Come what may, Carrick has set out to do what no amount of time or rest or other expert has managed to accomplish so far: rebuild Sid's brain.

It's just before 8 a.m. on the first Saturday of October. Carrick is about to give a four-hour lecture on chiropractic neurology at Life University in Marietta, Ga. He is standing beside a massive screen displaying the first slide of his PowerPoint presentation. It shows the Carrick Institute coat of arms, which features bees because "they represent work and continuous diligence as a team," says Carrick, and the motto "seek wisdom" in Latin because it "is something that I have always ascribed to."

The slide also lists Carrick's professional titles, which include affiliations with Life, Logan and Parker universities, and president of the American Chiropractic Association's Council on Neurology. After his full name, Frederick R. Carrick, there are several acronyms signifying various credentials—60 letters in all, mostly unrecognizable.

A large man stands in front of the slide, and the crowd hushes. John Donofrio, president of the chiropractic neurology board, introduces Carrick by describing the first time he heard him speak. "I was there for one hour when I said, 'My whole life is now changed forever,' " says Donofrio. "He has no idea, okay, of how much of this world he has touched." Carrick "basically is what D.D. and B.J. were back in the 1900s," he says, referring to the Palmers, father and son, who founded the field of chiropractics. "He is really the father of chiropractic neurology."

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Carrick was born on Feb. 26, 1952, in Toronto, and raised in Calgary, Edmonton, Winnipeg—wherever work took his father, a career soldier with the Princess Patricias Canadian Light Infantry who fought in the Korean War. After finishing high school, Carrick says he "had a calling" to join the Princess Pats too, and served in Cyprus. While on leave in the Bahamas, he met his future wife, a New Englander on vacation. After three years in the army, Carrick quit. "I was really going to do it forever, except that I thought that I might be able to help people more in health care."

The decision to pursue chiropractic rather than medical school was a "very calculated coin toss," says Carrick, because, as a lifelong martial artist (he still does karate), it seemed more in line with his preference for natural means of healing and well-being. Carrick was also “more impressed” with the chiropractors he talked to than the medical doctors. “I like to do things with vibrancy,” he says over lunch at a Middle Eastern restaurant near his lab. “Not death and dying.”

Carrick wed in 1973, and after he graduated in 1979, the couple moved to New Hampshire to set up his practice. Over the years, he developed a clientele that included patients from overseas with “everything from strokes, low back pain, dystonia—you name it, I saw it,” recalls Carrick. “People would come to me when other things failed.” Carrick keeps on hand a state of New Hampshire resolution “honouring” his clinic in 1988 for “its contribution to the quality of human life and performance,” and for his ability “to afford his fellow man great relief from physical pain and disability.”

By the mid-1990s, Carrick and his family had relocated to St. Cloud, Fla., and he obtained a self-designed Ph.D. from Walden University in what he calls “brain-based learning.” Around this time, he gained attention for bringing comatose patients out of their vegetative states using stimulation. A program that aired on PBS, entitled Waking up the Brain: Amazing Adjustments, described Carrick as a “remarkable healer and teacher.”

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As Carrick’s practice has grown, so too has the Carrick Institute, which is headquartered in Cape Canaveral. Since the mid-’80s, it has evolved from teaching partnerships between Carrick and a few chiropractic schools into its own educational entity specializing in “clinical neurology.” It has more than a few dozen faculty members who teach courses such as “neuron theory and receptor activation” and a three-part series on “vestibular rehabilitation.” To become a chiropractic neurologist requires three additional years of studying, a residency and board certification exams.

Despite the buzz surrounding this burgeoning field, many people outside it aren’t sure what to think. Before the press conference in September, Blaine Hoshizaki, professor and vice-dean of the University of Ottawa’s school of human kinetics and director of the Neurotrauma Impact Science Laboratory, had never heard of this specialty, despite his extensive work in concussion research. He found it “strange” that a medical neurologist wasn’t included in the Crosby press conference, and is hesitant about Carrick’s approach, saying, “I’m not sure you want your chiropractor as your guide to the new frontier.”

Dr. Kevin Gordon, a pediatric neurologist in Halifax, finds Carrick’s approach intriguing and perplexing. “Are specific exercises targeted at particular parts of the brain likely to change the way in which the brain works? It is a possibility,” says Gordon, a professor at Dalhousie University. Still, he isn’t convinced. “The question is, what’s the science behind these interventions?”

This isn’t Carrick’s first brush with cynics: in 2007, he was the subject of online debate over his credentials and credibility on the website Chirotalk: The skeptical chiropractic discussion forum. “These people are chiropractic haters,” says Carrick now. He gets frustrated that the field is dismissed offhand. “It’s like saying, ‘Hey, what do you think of this curling iron?’ Well, I’m bald. I can’t tell you anything about it. It doesn’t mean it’s bad.” He’s also inflamed by any suggestion that his work is wacky. “To characterize what we do as some fringe science is crazy,” he says. “We don’t have Kool-Aid. We don’t have a little fire. We’re not dancing around naked. There’s no pins in the dolls, and there’s no dolls.”

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In fact, Carrick argues that all of his diagnostic techniques, exercises and equipment, excluding the gyroscope, are used by medical doctors too. “There’s nothing we do that is different from anybody else. But the combinations that we do, the frequency that we do it, are often different,” he says. “If you can imagine, you’ve got some eggs, you’ve got some flour, you’ve got some sugar, you’ve got an oven, you’ve got a ramekin, you’ve got some butter. But your soufflé isn’t as puffy as mine,” Carrick continues. “We just put in our recipe a little bit different.”

One thing Carrick says skeptics fail to mention when comparing his methods to the current

“rest and wait” approach, which is what Crosby adhered to during most of his recovery, is that “the gold standard people had him for eight months, you know?” he says. “That’s the gold standard, right?”

Before Crosby goes in the gyroscope, Carrick learns more about what problems he’s having. That involves another machine, the “computerized assessment of postural systems,” or CAPS. In a small white room, Crosby stands in his skates on a black foam platform while wearing sound-dampening headphones. Carrick and his colleagues surround him in case he gets unsteady; his agent and trainer watch from the doorway.

Crosby’s only objective is to stand still while his eyes are closed and his head points to the left, to the right and to the ground for 25 seconds at a time. Three sensors inside the platform detect motion and transmit the data into a system that calculates his stability and what is described as his fatigability ratio.

“Tuck your chin down to your chest,” instructs Barton, who is running the system. “And close your eyes.”

Crosby obliges. Carrick, standing nearby, responds with encouragement: “That is so helpful to what we’re going to do for you. Just putting those skates on there gives us exactly the information we wanted to get,” he says. “Now we’re going to fix it for you.”

So begins a week of tests and exercises based on Carrick’s neurological exam of Crosby. Standing in front of him, Carrick pulls from his pocket a red-and-white-striped cloth ribbon called an optokinetic nystagmus strip. He moves it horizontally in front of Crosby’s eyes to check how smoothly he can track the stripes as they go by. Other times Carrick flicks his thumbs in front of Crosby to gauge how quickly and accurately Crosby targets objects. Occasionally Crosby lies on a chiropractic table while one of Carrick’s colleagues transmits high-frequency currents into the tympanic membrane in his ears. They put on graphite conductive gloves that are connected to a machine, and insert their thumbs in his ears. Often, Crosby does eye exercises on an iPad that challenge him to stare at a dot or follow a moving pattern.

Sometimes Crosby has to stare at or track red or green laser-beam dots as they appear or move across a wall. For this test, called videonystagmography, or VNG, he sits on a dusty-rose upholstered metal chair like those found in a banquet hall. He is wearing a pair of black goggles with cameras in each lens that transmit live video of his eyes onto a laptop. Carrick, the lab team and Crosby’s agent and trainer watch as two eyeballs dart from dot to dot or glide from side to side. After one such session, Crosby sees the footage of his own eyes.

As the days go on, Carrick incorporates ice time into the treatment. His colleagues have set up a mini lab in an office inside a nearby arena. Canadian and American flags hang at one end. Half a dozen local hockey players have been recruited to practise with Crosby, and it is easy to pick him out. After running through shooting and skating drills—dozens of pucks are strewn across the ice—Crosby is scuttled into the makeshift lab for more tests.

Crosby, who has on a black jersey like the Penguins wear, takes off his white helmet. He is dripping with sweat, breathing heavily and chugging from a cold bottle. Except for Carrick standing in front of him waiting to do the thumb test, it is easy to imagine that this is the same Crosby that fans have come to idolize. He puts down his drink and begins the eye exercise. Carrick catches a glimpse of the old Crosby too: “The reflex is back there, which is great.”

After their time in Georgia, Carrick says he set an alarm on Crosby’s iPad to go off every hour, reminding him to do various eye exercises. Since then, Carrick says he hasn’t seen Crosby, but they have been in frequent contact. “He’s excited about getting back into the game,” says Carrick, “and hopefully things will continue to go very, very well for him.”

Even medical professionals such as neurologist Kevin Gordon acknowledge that Crosby's recent progress has been promising. "You're dealing with a remarkable case report that says this holistic approach with multiple interventions has made somebody with a severe concussion improve on a time course which would seem remarkable compared to how they were recovering before," he says. But Gordon is cautious about what this means for the future. "Is it going to change his ultimate recovery? We can't tell yet. Is he completely recovered? We don't know yet." Having researched and treated concussions for many years, Gordon says that "if indeed this is the solution, then there are a lot of people this needs to be standardized and developed for. We can't ignore it. But we have to study it." At Life University, Carrick and his colleagues have begun a 400-person study to determine whether the gyroscope does improve balance. But he is also emphatic that because his approach is so patient-specific, it is difficult to study. "If you hurt your brain, I'm probably going to treat you differently than this person here. It's hard to design a study like that, because studies like to say we're going to give you this drug and we're going to see what happens," says Carrick.

For those close to Crosby, all that matters now is whether he is well enough to get back in the game. And there is only one person who can ultimately make that call: Crosby himself. "It's like a race-car driver. The car could be fixed, the tires are perfect, the pipes are good, but if the driver isn't mentally prepared to go 250 mph on the track, it outweighs" any expert opinion, says Brisson.

On one of his last days in Georgia, Crosby did another round of VNG. As the testing wrapped up, Carrick responded with unabashed enthusiasm about Crosby's recovery: "This is so exciting for me," he told him. "But for you and your brain, I mean, it's perfect. We shouldn't test you anymore, just send you home."

And Carrick did just that. Crosby returned to Pittsburgh, to his team, to his fans, to the same rink where less than a year ago he was skating toward the best season of his life. He's traded his white helmet for a black one, signalling he can take contact again. He's goading his teammates into hitting him so he can prove his toughness—as much to himself as to them or to the world, which is analyzing his every move. In this way, nothing has changed: he is still the one hockey player everyone watches. Sidney Crosby is home, indeed.

There's only one question left: when the time comes, will Sidney Crosby play as if he was never gone?

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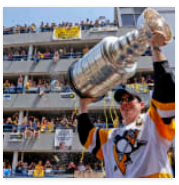

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