

Ann-Christine Duhaime, M.D.: Brain trust

By Jennifer Durgin

The surgeon threads her slender fingers through the patient's hair, gathering it together in her hands. Gently, she parts the black strands and, using small blue elastics, forms tiny ponytails on either side of the part. The patient, who is lying face down, asleep, on the operating table, will probably never know the care with which Ann-Christine Duhaime, M.D., prepared her for surgery.

For Duhaime, the director of pediatric neurosurgery at the Children's Hospital at Dartmouth (CHaD), getting her patients' hair ready for surgery is one part compassion and one part making sure things are done the way she wants. "If I don't do it myself, it doesn't get done the way I like it," says Duhaime, as she shaves a thick band along the length of the girl's part. "It's also a time when you think about what you are going to do."

Not all surgeons take such an active role in prepping their patients for surgery, but Duhaime is "very particular," says Martha Irvine, the scrub tech who will hand Duhaime scissors, clips, scalpels, and the other instruments needed for the operation. Irvine is still setting up her own workstation. She would usually be done by now, but Duhaime insists that the bag of sterilized instruments not be opened until the patient is in the operating room and the flow of traffic in and out of the room has diminished. "She likes things a certain way," says Irvine, "and she's very nice, so we try to accommodate."

Duhaime (pronounced "dew-HAME") has earned the right to be exacting. She became CHaD's first pediatric neurosurgeon in 2001, after 15 years at the Children's Hospital of Philadelphia—ranked the nation's best children's hospital by *U.S. News & World Report*—and 12 years on the faculty at the University of Pennsylvania. "I came to DMS because I thought that it was a wonderful environment to do innovative work both clinically and in research," she explains. A professor of neurosurgery and of pediatrics at DMS, Duhaime has helped double Dartmouth's pediatric neurosurgery patient volume. "CHaD is going through a growth phase," she says. "Right now, we're on, in my mind, the small end of the bell curve of what's ideal. There are some children's hospitals that in my opinion have gotten too big. They get too big and too cumbersome and they lose their collegiality. . . . Here, I have found that collaboration is very easy."

Duhaime, who has written more than 60 papers for such journals as *Brain Research*, *Pediatrics*, and the *Journal of Neurosurgery*, also heads up CHaD's pediatric neuroscience research program. She is currently the principal investigator for a \$1.2-million study, funded by the National Institutes of Health, that's looking at the physiological effects of trauma to immature brains, as well as treatments for such injuries.

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In her clinical work, Duhaime specializes in epilepsy, a disorder characterized by recurrent seizures. "Seizures are basically an electrical storm" in the brain, she explains. "About 80% of kids who have epilepsy can be treated successfully with medication, but that leaves one in five that no matter what you give them they still have seizures or they have unacceptable side effects from the medication. And those are the kids that may be candidates for surgery."

Duhaime is known nationally for her expertise in performing corpus callosotomies—in which the two hemispheres of the brain are disconnected in order to prevent seizures originating on one side from affecting the other side. If the "good" side of the brain is "constantly bombarded with electrical storms [from the seizure-prone side], it can't get a breath in edgewise," she explains. But if

the "bad" side is isolated, the good side has a chance to develop while it's still young and adaptable. "Many centers have become less comfortable with offering corpus callosotomy," says Duhaime, "because they don't do it very often and have little experience." But because the procedure has been done at Dartmouth for decades, and Duhaime has treated a larger-than-average number of such patients, families considering the procedure are often referred to CHaD from afar.

Duhaime is only five feet, four inches tall, but her stature belies her brisk stride and commanding presence. When she burst through the operating-room doors earlier in the afternoon to prep for the procedure, it's clear she's the one in charge. "Everybody get some lunch?" she calls out to Irvine and the others in the room—an operating room nurse, a certified nurse anesthetist, and general surgery resident Tarek Radwan, M.D. "Everybody happy?"

She then focuses on grilling Radwan, who will assist in the operation; as a resident, he's still learning the fine points of the profession. "First thing," she asks him, "is this surgery indicated?" In other words, *Should we be doing this operation?* Radwan hesitates, so together they run through the details of the case. The girl's cerebellum—the part of the brain in the lower back of the skull—is misshapen. Instead of being rounded, it's elongated and descends into the opening to the spinal canal. The misshapen cerebellar tissue, known as a Chiari malformation, puts pressure on the brain stem and spinal cord, which can cause various neurological problems. This afternoon, Duhaime and Radwan will cut open the back of the girl's head and insert a synthetic patch to enlarge the membrane enclosing her brain. "I'll be honest. I'm not sure this surgery is going to help her," says Duhaime.

"I think it's a soft indication," adds Radwan, meaning that the reasons for performing the surgery are debatable.

Duhaime had told the girl's neurologist and parents the same thing. She is always frank with her patients and their families about

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the possible benefits and dangers of surgery. Earlier in the week, she met with a family that was considering invasive monitoring—the placement of electrodes on the brain—in an effort to track down the source of their child’s epileptic seizures. Sitting with them in her cozy office, which often smells of mint tea, Duhaime detailed the limitations of invasive monitoring and the pain that their child would be likely to experience after the surgery. “There is no parent that goes into this that on the second or third day doesn’t doubt that it was the right thing” to do, she told them.

Being a pediatric neurosurgeon is not all about surgical talent. “With this field, you have to like dealing with kids,” Duhaime says, “but you also have to not mind dealing with parents.” Parents of children facing surgery can be frantic, demanding, unreasonable, and pushy, she admits. Yet she cherishes the intimate connections she forms with her patients and their families. The human side of medicine is what drew her to the field in the first place.

As an undergraduate at Brown University in the mid-1970s, Duhaime wanted to be a psychologist. She was interested in what makes people tick. It was one of her three older brothers, an oral surgeon, who pestered her to apply to medical school. “If you really want to study humans, you have to go into medicine,” she remembers him saying. “You will not get an adequate education in . . . how the brain works without having a medical-scientific background.”

In medical school at the University of Pennsylvania, Duhaime found her niche in neurosurgery. “I was taken under the wing, just by chance, of the chairman of neurosurgery,” she says. “He used to let me first-assist on intracranial cases.” She liked seeing “the results of what you did to the brain showing up in how the person was afterwards.” During residency, Duhaime was determined not to go into pediatric neurosurgery “because that was the girly thing to do.” But she found kids to be so much fun, she couldn’t resist. “With adults, you examine them,” she says. “With kids, you play with them.” She was physically suited for the subspecialty, too. In pediatric neurosurgery, she explains, “if you have big hands, they get in your way.”

Almost an hour into this afternoon’s surgery, Duhaime asks if anyone has called the girl’s mother in the waiting room to let her know how things are going. She and Radwan have been cutting deeper and deeper into the girl’s neck, but the going is slow. Duhaime is standing on a stool so she can easily reach the patient’s head, while Radwan is hunched over the other side of her head. The tissue covering the area



JON GILBERT FOX

Perching on the head of a stuffed frog is all in a day’s work for pediatric neurosurgeon Tina Duhaime—but so, too, is probing delicately deep into children’s brains.

they need to get to is so tough that Duhaime jokingly calls the procedure a “gristlectomy.”

“This is not elegant” surgery, she says, “but it exemplifies how careful you have to be.” Only a soft membrane protects this part of the girl’s brain. “This is a very healthy, athletic kid,” Duhaime adds. “We have a lot to lose if we mess up.

“So we did call up to her mother, right?” she asks again.

Duhaime is now doing the most delicate cutting while Radwan uses a suction tube to keep

the open area clear of blood and other fluids. Perhaps trying not to look idle, he is suctioning continuously. “Whatever you have in your hand does not mean that’s what’s needed,” Duhaime scolds. “The hardest thing for a surgeon to do is nothing.”

Finally, after more than an hour of clearing away tissue, the grayish, purplish brain is visible. Radwan suggests using a different instrument. At first, Duhaime ignores him, but he repeats the suggestion. “And how many of these have you done, big guy?” she teases, and everyone bursts into laughter. Duhaime and Radwan then prepare the area for the patch. When it’s in place, Radwan sews a neat stitch at the top of it. “Oh, that’s nice,” she tells him. “Beautiful.”

“Call out to her mom,” Duhaime tells the nurse. “Tell her we’re closing up.” When the last stitch is in place, Duhaime sheds her gloves and checks in with her office assistants. She returns a phone call and then dials into the hospital’s transcription service. Duhaime dictates all of her patient notes by phone. Her dictations are extraordinarily detailed. She mentions, for example, a brand of patch she tried but abandoned because she didn’t like the way it handled. And her notes about office visits often refer to toys the child played with. She reads all the transcripts once they’re finished, too, to make sure they’re accurate and even to fix grammatical mistakes.

When she hangs up the phone, Duhaime notices that Radwan is pulling the elastics out of the girl’s hair; a few strands of hair dangle from one. “Can we get some scissors over here to cut these rubber bands?” she calls out. “He’s sliding them, but it’s gonna hurt.”

Finally, Duhaime, Radwan, and the rest of the team gently roll the patient off the operating table so she’s face up on a stretcher. Duhaime calls for some soap and water and begins washing the girl’s hair and face, paying special attention to some streaks of dried iodine on her forehead. When she’s done, she pats everything dry with a white towel. And runs her fingers one last time through the girl’s hair. ■