

Connecting the Dots to Make a Difference

*Never rest, never tire,
never fail to struggle for the betterment of all.
Then, when your time comes you can say,
"My life made a difference."*

Forrest Lee Horn, "Make a Difference"

IT HAS BEEN 16 YEARS SINCE I (E.F.T.) FIRST PUT ON THE gray laboratory coat of an anatomy teacher. In recent years, I have come to the philosophy that students should not assign names to their cadaver donors. They are real people, who gave to all in service and in death. To give them names that are not their own seems disrespectful and diminishes their dignity. Thus, my student physicians and I are fortunate to know the "real" first names of our donors. However, it was when Fern came into my laboratory that one of my medical students (A.D.P.) and I really learned how much any single donor can affect our lives. In fact, we write this in my office, where her photograph sits on my shelf overlooking us as our thoughts coalesce on paper.

It was through her gift of self that we came to know Fern. Her unique story began to unfold in July 2004, when she came to our gross anatomy laboratory at the Indiana University School of Medicine-Northwest Campus in Gary. Her daughter later said, "Mother recycled everything. Donating her body was just an extension of that."

Fern died on April 29, 2003, from T-cell lymphoma, and bequeathed her body to anatomical science. She was 87 years old. At the time, this was all we knew about Fern. When we entered the laboratory, it was with great trepidation and excitement. We did not know her in life and could only discern by her generosity to and for us that she must have been a very giving person.

So began the process of discovery. We began to study this delicate and powerful engineering masterpiece, examining bones, muscles, nerves, organs, and glands. We proceeded from one body region to the next examining every detail: limbs, thorax, abdomen, pelvis, and then the head. When we removed the calvaria and viewed the inner surface of Fern's skull, we observed large, irregular bony masses unlike those of any other donor we had seen. How did Fern survive to such an old age with these structures impinging on her brain?

Through our literature research, we determined that this condition is called hyperostosis frontalis interna (HFI), a bony overgrowth of the inner table of the frontal bone where it is remodeled into a more cancellous type.¹ Typically, HFI spares the midline.¹ In Fern's case, we immediately noted involvement of the left and right parietal bones. In older medical literature this was termed hyperostosis cranii interna

(ie, hyperostosis extending to all bones that comprise the cranial vault). When we presented this specimen to an osteologist, he noted that this was the "most extensive" case of HFI that he had seen.

Hyperostosis frontalis interna is at best an incompletely understood condition. It was first observed in an adult male in 100 BCE and until modern times was more commonly found in men.² Historically, Morgagni³ proposed that HFI was part of a syndrome that included obesity, diabetes, and virilism, a triad known as Morgagni syndrome. Today, HFI is almost exclusively observed in postmenopausal women and is independent of Morgagni syndrome.¹ The exact etiology is unknown, as are its clinical manifestations. Most cases are discovered only by chance through imaging of the skull or at autopsy. However, some individuals present with headache, lower back pain, motor deficits, and neuropsychoses in association with HFI.^{1,4}

We knew that we had to learn more about Fern. This was a formidable task, for she had lived 87 long years. Suddenly, we had become detectives, and the only clues we had were first name, age, and cause of death. After several exchanges with the Anatomical Education Program, we were given her daughter Katie's name, address, and telephone number. Little did we know that this would be the first time that a medical student and a professor at our university would be in contact with members of a cadaver donor's family.

Katie was pleasantly "surprised" to hear from us. She remarked, "I had hoped to hear from the school and be told if anything came of Mother's donation." She stated that over the last few years since her mother's death one of her brothers or sisters would occasionally comment, "Mama was still working at IU School of Medicine." They'd smile and know that she was still helping. In fact, Katie wrote to our freshman medical class: "My personal thoughts included hopes that her journey here on earth would somehow provide tools for teaching."

Fern was the mother of eight children, six of whom survive today. Fern was a 1937 graduate of the St Vincent Hospital School of Nursing. She lived her life for her family and friends with volunteerism, raising her family, and working as a nurse traveling across the state in interurban trains early in her career. The murder of her husband during a business burglary in 1972 may have given her cause to quit nursing, but she found new interests in community service and self-expression. All who knew her called her an "indomitable spirit": "One could not stop this determined woman

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from writing and living her life . . . for her family and friends." In fact, as a self-styled writer in her senior years, she delighted in telling her own life stories, which were compiled and given to friends and family at her funeral and entitled "Fun, Friends, and Family."

As we were on our way to meet Fern's family, we spoke about what we might expect. Will they show us Fern's picture, or would they have her cremains? Around 10:30 AM when we arrived at the house, a familiar-looking woman stepped outside to greet us. After a few awkward minutes of déjà vu, we discovered that the woman was a teacher at the very high school that Andrew had attended and that she had also been involved in theatrical productions with his father in Lebanon, Indiana. Suddenly, awkward feelings and anxieties lifted, and it became clear that we were in a safe environment with friendly people. The normal distancing of the donor and the family was bridged, and a new road began to form between students of medicine and a donor's family. We spent the afternoon enjoying the meal they had prepared for us, interviewing Fern's children, and listening to stories about her. Katie, Molly, David, Alex, and Will listened intently to our findings and with great interest viewed photographs of Fern's skull and brain. We didn't really know what we were looking for that would give us clues as to the clinical presentation of HFI in Fern. We did know that Fern had extensive nodular areas involving the left parietal bone and pressing on the motor cortex of her brain. But her family noted that "She never had any tremors or palsy-like events." She even drove her own car until she was 80, when her vision began to fail owing to macular degeneration. Katie said, "I think of her head problems or her inability to stand with her feet together without falling." This Romberg sign suggested neurological deficit of proprioception, which might be related to her calvarial anomalies. Her children told us of "spells." They described them as "stopping in her tracks and having no memory of the event." Following these spells, she would "remain in bed, not being quite herself for about 5 days." Could this be a seizure disorder with a prolonged postictal state? "Our mother commented, 'I wish someone could tell me what is wrong with me.'"

In the 1950s, Fern was involved in a motor vehicle collision, where a pickup truck threw her several feet. Years later, medical records after another major traffic incident showed no internal damage, but she continued to feel that there should be a better explanation for her continued malaise. "Even so," Katie said, "she was always trying to help others and was involved in many charitable efforts. She recycled everything for care of her environment, and she even recycled herself to help others." Fern frequently volunteered to knit blankets for children who were seriously ill, traumatized, or otherwise in need. She taught underprivileged children to read while sitting on the front porch of her home. She worked at a home for unwed mothers and routinely offered person-to-person service to individuals who

were poor, suffering, or lonely. She sewed buttons on clothes before sending them to Goodwill. She ironed the clothes, folded them neatly, and even marked the sizes and sorted them. Fern purchased personal essentials at the dollar store and distributed them to persons in need who otherwise could not afford them. She worked at a clearinghouse for the poor and routinely visited their homes to determine that their most basic needs were met.

We did not know Fern during her life, but we had the privilege of learning from her body—a legacy of knowledge that will bring others life through our work as physicians and educators. Fern's donation represents a gift of faith, faith in us to learn all we can learn from her to be competent health care professionals, faith in us to respect human life and dignity, and faith in our teachers to use her gift to help us to help others via our career goals.

Fern was no longer just our research subject. She had transformed into a human being with a wonderful family and altered our motivation for the entire project. Prior to meeting Fern's family it was as if she was a tool that facilitated learning of anatomy and disease processes. As medical students, we are frequently told that our cadaver donor is our first patient, but it wasn't until experiencing the more human side of her life that this became a reality. She became a person who would affect the lives of all those we would treat throughout our careers. Fern's gifts to us are many, and because of her and the participation and enthusiasm of her family, she has renewed in us our dedication and desire to learn all we can to help those we serve through education, research, and clinical medicine. It seems that too often today, in the fast-paced lives of our pay-your-own-way world, we ignore what is most important. Instead we "See the patient, get the diagnosis, give the pill, and move on to the next," or "Dissect in lab, memorize the terms, grade the tests, and move on to the next." Our interaction with Fern has changed all that: Like Fern, we take the time to listen, to act, and to help, by connecting the dots to make a difference.

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