

Country Doctor

How a Physician Solved Riddle of Rare Disease In Children of Amish

Holmes Morton Toiled Alone
Till He Made a Diagnosis
He Links to Cerebral Palsy

But No Money for a Clinic

By FRANK ALLEN

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LANCASTER COUNTY, Pa.—Holmes Morton is making another house call at the farm of Amos and Susan Miller, an Old Order Amish couple.

Two barefoot boys with bowl-shaped haircuts and homespun trousers smile quietly at him as they sit on a sofa beside their 10-year-old sister, who cannot walk or speak. A younger boy, whose limbs are limp, rolls and flops on the floor. Their mother irons clothes at the kitchen table. Fresh vegetables simmer on the stove.

Since 1977, the Millers have watched five of their seven children suffer the ravages of a rare metabolic disease. Two sons, Levi and Sylvan, died from it. The three afflicted children who survived are crippled for life. Despite extensive testing, doctors at Johns Hopkins University in Baltimore and at the best hospitals in Philadelphia didn't make a correct diagnosis.



Holmes Morton

But Dr. Morton did a year ago, and the surviving Miller children are responding to his treatment, including dietary adjustments. Alvin, the four-year-old boy on the floor, is more alert and cheerful and gaining strength. His sister, Levina, is thrilled that her handwriting is legible now.

Their father, a wiry man with a long, graying beard, sits at the end of the sofa and looks at his children. "I think we would have lost Alvin, too, if it hadn't been for Dr. Morton," he says. "I wish he had come 12 years sooner."

Identifying the Disease

Dr. Morton, a bow-tied, 38-year-old pediatrician, has done extensive work with metabolic and neurological illnesses. He diagnosed the Miller children's disease as glutaric aciduria, a devastating disorder that strikes suddenly.

Children with glutaric aciduria are generally healthy for at least six months after birth. But when they develop childhood illnesses such as chicken pox, fever, infections or diarrhea, they often lapse into a coma and die within 48 hours. Under the stress of infection or diarrhea, the child's body doesn't metabolize protein normally. Highly toxic glutaric acid builds up rapidly in the bloodstream and muscle tissue, attacking the liver and the nervous system, including the brain. The condition of most children who survive the initial episode deteriorates as the paralysis progresses and their muscles atrophy.

Other Afflictions

The Amish have endured more afflictions than Job. Nearly all of the 15,000 Amish in Lancaster County are descendants of about 200 Swiss Anabaptist immigrants who settled these fertile valleys beginning around 1720. Marriage outside their religious order is still strictly forbidden. Many generations of inbreeding have made the group susceptible to hereditary disorders, including dwarfism, mental retardation, congenital deafness and cystic fibrosis, all of which have been studied by experts. But until now, glutaric aciduria among the Amish wasn't identified or understood.

Before Dr. Morton started visiting Amish families in the summer of 1988, there were only eight documented cases of this disease in medical literature. In the past 12 months, he has found 15 cases here. The disorder stems from a genetic defect that Dr. Morton's research shows to be common among the Amish. But he believes that the illness can be treated and that, with early detection, brain damage and early death can be prevented.

Dr. Morton is also convinced that glutaric aciduria is the leading cause of cerebral palsy among the Amish. He believes his efforts to learn more about the disease could lead to fresh insights about cerebral palsy among the general population.

About 700,000 Americans have cerebral palsy. Every year, about 3,500 more are affected. Until recently, it was mistakenly assumed that cerebral palsy resulted most often from suffocation or trauma at birth. But researchers now conclude that birth asphyxia doesn't explain most cases of cerebral palsy and that the cause of at least 40% of all cases isn't known.

Dr. Morton's work is drawing attention. "I have been watching his studies with great interest and admiration," says Victor McKusick, a Johns Hopkins geneticist who is recognized for, among other things, extensive research on the Amish. "As far as I can see, this is a true bill."

Dr. Morton estimates that as many as one in every seven Amish living today in the county is a carrier of the defective gene that plagues the Miller family. He explains that one Amish child in 200 thus is likely to be stricken with glutaric aciduria. In families like the Millers, in which both parents are carriers (without having any symptoms), each child has a 25% chance of falling ill.

"This is literally an epidemic for the Amish," Dr. Morton says. "Among these people, the disease is 10 times more com-

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mon than diabetes and 100 times more common than childhood leukemia, but also with much higher morbidity."

The Amish community here is a gentle and devout group, mostly prosperous farmers and carpenters. To outsiders, they are known for driving horse-drawn plows and carriages and for shunning electricity and many other materialistic trappings. They are also widely admired for their mutual support in times of family crisis.

-paying the Bill

The toll of glutaric aciduria on Amish family life is profound. Many whose children are stricken have had to hire drivers to make 50 or more trips to hospitals in Philadelphia and elsewhere. With disabled children needing constant care, the farm and household become harder to manage. Medical bills wipe out savings and often force the sale of land that has been in the family for two centuries.

Four days after Amos Miller's youngest son, Alvin, became paralyzed from the disease, he sold his dairy herd. There simply weren't enough able-bodied family members to manage the milking operation anymore. Elmer, the Millers' eldest son, doesn't have glutaric aciduria, but his severe asthma and allergy to hay prevent him from heavy work in the barn.

"You could see Alvin was going to be a farmer someday," Mr. Miller says. "As an infant, he used to crawl all the way from the house out to the barn to see what we were doing. But now? Well, now I'm working as a carpenter."

Mr. Miller's wife also is drained by what the disease has done to the family. In her diary, she writes about how she felt after learning that a third son, Steve, had the disease: "For a while, life was a dark, dull ache and the future looked so mountainous that I wondered if God had forgotten us."

Death on the Road

Her diary also describes the cold February day they drove the family's horse-drawn carriage to the home of Mr. Miller's parents for Sunday dinner and the second son, Sylvan, died on the way:

"Going through Bartville, I looked back and Sylvan was kicking a little and was covered. Half a mile farther on, Amos looked back and thought Sylvan is laying too flat and hard against Levi. He stopped the horse, for he thought it looks like something is wrong with Sylvan. He picked Sylvan up and said, 'He seems lifeless.' I quick handed baby Steve to Elmer and tried to find a pulse in Sylvan but my hands were shaking, so I couldn't. So I tried to give mouth-to-mouth respiration. There was no response whatsoever."

Danny Lapp, another Amish patient of Dr. Morton, will be seven years old in October. He is a cheerful, bright child, but he is mute and totally disabled. He was well until 14 months of age, when he suffered a severe bout of diarrhea and became paralyzed. Dr. Morton last year made the diagnosis of glutaric aciduria, after the family had piled up medical bills of more than \$70,000.

"The people at the hospital told me to just take him home and love him, there was nothing they could do," recalls Danny's mother, Ida. "But here he is. I don't know what we would have done without the smile."

Constant Threats

Now Danny spends much of his day strapped into a wheelchair, his feet flailing. He has learned to move his big brown eyes up or down to communicate yes or no. He has difficulty swallowing. Dr. Morton says pneumonia and malnutrition are constant threats to Danny's health.

"Once a certain amount of damage is done, you just don't get a whole lot back," he says. "An electric wheelchair, braces, surgeries, medications, physical therapy, special education and the devoted care by his family may make his life better, or more bearable, but all of this is a poor substitute for screening and preventive care."

Dr. Morton is pushing hard to get such screening and prevention started. For the past year, he has spent about 36 hours a week in Baltimore at the Kennedy Institute of Johns Hopkins, doing laboratory analysis of urine specimens and data he has collected from hundreds of Amish and Mennonite children. (Many Mennonites, Anabaptists who are less cloistered than the Amish, suffer from maple syrup urine disease, another inherited disorder that is detectable in newborns and that can be fatal within days.)

Regimen for Patients

The Amish children he has identified with high genetic risk have been put on a protein-restricted diet supplemented by the vitamin riboflavin. During any illness, Dr. Morton says, it is vital to prevent dehydration and buildup of toxic acid, so the chil-

dren consume plenty of fluids and bicarbonate of soda.

A Harvard Medical School graduate who is married and has three children, Dr. Morton pays his household bills by working many nights in the newborn intensive-care unit at Bryn Mawr Hospital near his home in the Philadelphia suburbs. But at least once a week, after being on duty all night at the hospital, he drives his white Honda out to the Amish farmlands for a day-long round of house calls. He hasn't presented any bills for his services.

"Holmes has an extremely deep feeling about doing good for people," explains Harvey Levy, a neurologist who directs newborn screening at Massachusetts General Hospital and who helped supervise Dr. Morton's residency at Children's Hospital in Boston a few years ago. "He was considered by all of us to be one of the top residents we have ever seen. His ability to synthesize everything and make a diagnosis was superb—astounding in some cases."

Confident that glutaric aciduria is treatable, Dr. Morton wants to start a clinic in the county. It would treat Amish children who already have the disease, as well as Mennonites with maple syrup urine disease. It also would screen and evaluate other children so they might be spared the same suffering.

Solitary Struggle

So far, the clinic project has been a solitary and frustrating struggle. Although he was a finalist in competition earlier this year for a research grant from the National Institutes of Health, that organization and others have turned down his funding requests. One reason is that basic studies of the molecular biology of diseases get much higher funding priority than research about the effects and treatment of biochemical disturbances. Moreover, big university hospitals are reluctant to take on clinical research involving long-term patient care for groups like the Amish who lack conventional medical insurance.

Because his grant requests were turned down, Dr. Morton is applying to local banks for a second mortgage on his home to raise funds for the clinic. He says the only expensive piece of equipment he needs for the clinic is a mass spectrometer made by Hewlett-Packard Co. that can detect glutaric aciduria in urine samples. It costs about \$80,000.

Dr. Morton figures he could cover his operating costs by charging the Amish about \$20 a sample for urine screening. The going rate for this kind of analysis at big hospitals like Johns Hopkins is about \$350 to \$400 a sample.

Community's Support

The Amish and Mennonite communities are eager to do their part for the clinic project. Some families have offered to donate land for the site. Several Amish carpenters, including Mr. Miller and his eldest son, have volunteered to build the facility if Dr. Morton can furnish the lumber and materials. Still others promise to contribute their time answering phones and filing paper work.

"This kind of opportunity doesn't come along that often," Dr. Morton says. "Somehow this clinic has to get started. I am impatient enough to make it happen. If I wait too long, I will lose some of the confidence of the Amish community. I just hope I don't go bankrupt."

The families he is helping share that hope. "The Amish are so thankful for Dr. Morton," says Grace Supplee, a home-service nurse in Lancaster County who has worked with disabled Amish patients for about nine years. "He comes to their homes in the middle of the night if they call. I remember one time he drove a very sick girl to Du Pont Hospital in Delaware and stayed with her. Most doctors would never do something like that."

The help Dr. Morton has given Susan Miller and her family has persuaded her to take action. Sitting in her kitchen, she tells him that more Amish families need information about how to respond to the disease.

"I'm afraid when their kids get sick, they won't be alarmed," she says. "The sickness comes on so fast. Two of ours were taking a nap. When they woke up, they were helpless."

Implications Sink In

She remembers the day Dr. Morton first told her about the disease. "I shook when he told me," she says. "Finally, after 12 years, we got a diagnosis. I just never thought we would get one. He told us, 'I believe your babies were all normal when they were born.' Then it sank in—what this could mean for the future. I mean the future of all the children, not just our children. It was a day I will never forget. I cannot keep quiet about this. It is too important."

Dr. Morton, who grew up in a small town in West Virginia, says he pours his energy into the project because he sees a

need for better health-care delivery in rural areas. "You will never be able to take care of these kids without home visits," he says. "That's just part of the culture. I hope this project might teach us something about how to organize this kind of care."

Experts familiar with Dr. Morton's effort say his plan for a clinic is a worthy idea, but they see risks, including some to Dr. Morton's own career. "He is doing something that could be at the cutting edge for developing a model for rural-care delivery," says Massachusetts General's Dr. Levy. "But when you make a move like this, your academic and scientific career is jeopardized. It becomes very difficult to get grants, you lose access to the sophisticated laboratories, you sever academic relationships. Holmes will be, at best, on the very outer circle."

That prospect doesn't seem to bother him. Heading home after a visit to the Lapps and the Millers, Dr. Morton talks about his personal motivation. "When you get out there and see those kids and see those families, that is the force that drives you," he says. "I think it's a real privilege to be able to come out here and do this. If I could figure out a way to do it for nothing, I would do it."