

Hannah Ganoë: Growing Up with WalkAide

By Brady Delander

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As **Hannah Ganoë** plays basketball, she uses a bit too much muscle. Instead of dropping her shots softly through the hoop, she rears back and fires the foam ball right off the Dora the Explorer backboard, and the ball ends up somewhere in the kitchen-on top of the refrigerator, on the counter, in the sink-anywhere but through the net. With each wild shot, though, Hannah smiles and laughs before chasing after the rebound, anxious to shoot again.

For Hannah, this is one of many small miracles that have happened in her life so far. And if anyone deserves such miracles, it's Hannah.

The idea that she would one day use too much muscle was nearly unthinkable a few short years ago, considering that Hannah suffered a postoperative stroke before her first birthday, leaving the left side of her body severely weakened. The eight-year-old third grader from Broomfield, Colorado, is getting around a little better each day with the help of the WalkAide® orthotic device. The so-called "brain in a box" developed by Innovative Neurotronics, Bethesda, Maryland, strapped just below Hannah's left knee can be considered a minor miracle in its own right.



"The WalkAide is a pretty revolutionary piece of technology, especially for orthotics," says Marleta Ouverson, a WalkAide technician and orthotist/prosthetist at Hanger-Scott Orthopedics in Denver. Ouverson fit Hannah with the WalkAide in August 2007, making her the first pediatric patient in the state to use the device. Hannah showed off the benefits, cruising down the sidewalk in front of her house and later chasing around the basketball in her kitchen. But it hasn't been easy getting to this point.

When Hannah was born in 2000, there was no outward sign of trouble. A few months later, however, Hannah's mother, Lori, noticed a strange look on her young daughter's face. Initially, doctors thought the problem might be acid reflux, but it turned out that she was experiencing seizures. Before Hannah was a year old, physicians performed an upper gastrointestinal (GI) tract radiography and CAT Scan and discovered a brain tumor. Surgery was performed, but Hannah suffered a postoperative stroke, which damaged the left side of her body.

"Before the stroke she was almost walking, holding on to the couch and moving around," says Lori. "But after the surgery and the stroke, her left side got really bad, very weak, and she couldn't walk at all. At that point, we didn't know if she would ever walk."

Walking was just one of many concerns for Hannah and her family at that point. The Ganoes took their daughter in for frequent MRIs after the surgery, and eventually it was discovered that a portion of the tumor was still connected to a major artery in her brain and, even worse, it was still growing. Physicians decided to treat Hannah with low doses of chemotherapy, which didn't work; they then prescribed higher doses, which did work but with side effects. Hannah was also treated with stem cells that were removed from her body prior to chemotherapy.

The chemo treatment damaged Hannah's ability to hear, and she now wears hearing aides in both ears. She also suffered from double vision, which was corrected with surgery, and her teeth were affected as well. A number of them had to be capped. "Those high doses of chemo just kill everything," Lori says.

Hannah paid a high price early on, but she is now tumor free. A few years after the surgery and the subsequent chemotherapy, Hannah took her first, labored steps. "She was about 4½ when she started walking again," Lori says. That was progress, no doubt, but the stroke resulted in drop foot on Hannah's left side. As a result, she struggled to walk and spent more time getting up from a spill than moving forward. "We thought about fitting her with a helmet because she fell so much. We were worried about her getting injured," Lori says.



The first remedy for Hannah's drop foot was an ankle-foot orthosis (AFO), which caused Hannah discomfort and kept her restricted on the playground. Before the 2007 school year, however, Ouverson strapped the WalkAide around Hannah's leg and the results were almost immediate. "It's a self-contained unit; there are no wires, no special shoes," says Ouverson. "She can wear any shoes she wants or go around barefoot if she feels like it." On the market since May 2006, the WalkAide runs off a patented tilt-sensor onboard computer, which is programmed to recognize the patient's specific tilt patterns during the end of the stance phase of gait. An electrode then stimulates the peroneal nerve, which picks up the foot through the swing phase of gait.

Hannah, who says she likes art, music, and physical education classes the best at Mountain View Elementary in Broomfield, could barely be contained after being fit with the WalkAide. But when she would climb the ladder to the top of the slide on the playground, the WalkAide unit would catch on a step and fall off. The same thing happened when Hannah went down the ladder, so Ouverson engineered a custom cover out of 1/8-inch polypropylene and added a fancy design.



Now the WalkAide doesn't fall off, but it does slip down on her leg every once in a while. A purple L was drawn just below Hannah's knee to mark the correct placement for the WalkAide. When it's in the correct spot, Hannah said she feels a little "tickle" when the electrode stimulates the nerve. But if the WalkAide drops down a few inches, that stimulation feels like more than just a tickle.

"Zap!" Hannah shouts, laughing again, as she explains the feeling. Ouverson adds that the stimulation shouldn't hurt, but patients do need to get used to the feeling. Lori jokes that she and her husband thought about getting that purple L tattooed on Hannah's leg since it can be difficult to keep the mark in the same place after baths. "We didn't think it would look too good to bring an eight-year-old into a tattoo shop," Lori says.

One of the unexpected benefits of the WalkAide and other functional electrical stimulation (FES) devices like it is signs of neuroplasticity—basically a reeducation of the brain as a result of, in this case, the stimulation of Hannah's peroneal nerve. After prolonged use, some patients have reported that they no longer have to wear the WalkAide every day. (*Editor's note: See also ["FES: The Quiet Revolution"](#)*)

Hannah is not there yet, but there are signs of progress. Using what Ouverson calls the "beep on stim" feature, where the WalkAide emits an audible beep as the device stimulates the nerve, Ouverson has asked Hannah to concentrate on lifting her foot when she hears the sound. It appeared that Hannah had developed added strength at the top of the lift, Ouverson points out.

"When she hears that sound she makes a conscious effort to bring her foot up. That's a way to help reeducate the two nervous systems," Ouverson says. "Besides the functional benefits, there are therapeutic benefits as well. It helps with circulation to the area, reduces muscle atrophy, and it reduces the incidence of osteoporosis."

Hannah gets around much easier now with help from the WalkAide. Lori says her daughter can walk faster and doesn't fall nearly as much. "That helps me a lot, not having to worry so much," Lori says. "Even at school, I don't think they have to watch after her as much as they used to." Hannah may have a future in basketball as well. After taking a few steps away from the hoop to compensate for her power and trading the foam basketball for her favorite blanket, Hannah lets loose with a jump shot that drops right through the net.

"It feels good," Hannah shouts after the successful basket. It's one more step in the right direction.

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