

Eye on the Prize



Children's ophthalmologists provide the best in comprehensive care for infants and children, from problems with vision and balance to research on brain function to surgery that repairs eye injuries.



TOP: Dr. Avery Weiss
BOTTOM: Dr. James Phillips

Children's is one of the few institutions in the world doing this research.

If you took a wrong turn and entered Children's Clinical Oculomotor Laboratory (more commonly called the "eye movement lab"), you might think you had landed on the darkened set of *Star Trek*. Inside you might see a very young child, maybe even an infant, sitting in a rotating chair inside a huge, dark cylinder. Under way is a test that allows James Phillips, PhD, to track eye movement and see how the eyes move when a child's head and body are rotated together in a chair controlled by a computer.

When things are working correctly in the brain, the eye moves at precisely the right time and in the right amount to compensate for the motion of the chair, body and head, explains Dr. Phillips, a researcher at Children's. The eyes move the same way in all people with normally functioning eyes. When something goes wrong in the brain, eye movements are altered in exactly the same way.

Dr. Phillips and Dr. Avery Weiss, Children's chief of Ophthalmology, are studying how eye movement abnormalities can be used as a tool to probe brain function in children. "Tracking eye movement can be more sensitive than an MRI for detecting some brain abnormalities," says Dr. Phillips. "They enable us to identify which brain structures are involved."

Researchers at Children's have begun to link specific genetic disorders with specific patterns of eye movements, helping geneticists identify genes responsible for certain brain malformations. Children's

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Eye movements are also a fundamental component of normal visual development. From infancy, vision is assessed by the ability to hold the eye steady and to move the eye to an interesting new object. Failure to demonstrate these behaviors is often the first sign of an underlying vision problem.

For example, children with visual loss due to albinism (a genetic condition that causes a lack of pigmentation in the eye) or with other visual sensory disorders often present with nystagmus, in which the eyes move rapidly to and fro even when a child is looking at an object that is still. Other children have primary defects in holding the eye still and acquiring new targets. For example, children with oculomotor apraxia have good vision but can't aim their eyes precisely at specific targets. Drs. Weiss and Phillips are looking at the causes of these disorders and the strategies that these children use to compensate for their deficits.

Untangling complex problems

Many of the children tested in the eye movement lab have complex physical and developmental problems. Eye movement tests are one more tool in the diagnostic arsenal for children with multiple problems. This is especially important when children are too young

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— Dr. James Phillips

Children's patient
Jimmy Hayes



to communicate or are nonverbal because of handicaps, cerebral palsy or severe genetic abnormalities.

"We just saw a little girl who uses a wheelchair and tilts her head to the right. No one knew why she was tilting her head," recalls Dr. Weiss. "By testing her eye movements, we found that she could track vertically but not horizontally moving objects. By tilting her head to the right or left 90 degrees, she could now track horizontally moving objects. Another eye movement test revealed that she had no balance system to keep her upright. Knowing this opens the door to vestibular therapy that could help her walk someday."

Treating trauma

It's the moment every parent dreads: You step away for 30 seconds and return to find your child has a severe injury caused by a fluke. That moment came last July to

Raenae and Sean Hayes, during a family gathering at their home in Wenatchee. Their son, Jimmy, now 4, was playing with his cousins in the game room.

"I stepped outside for a quick breath of fresh air. The kids had gotten hold of a dart. Someone threw one; it bounced off the dartboard and struck Jimmy in the eye," recalls Raenae Hayes. Within 15 minutes the family was in the emergency room at Central Washington Hospital, where they were advised to have the lens of the injured eye removed immediately — or to head for Children's to have it treated by a pediatric specialist.

The next morning's journey over the Cascades to Children's was the first in a yearlong series of trips for Jimmy's eye treatment.

"Dr. Weiss was so calm, he helped take our fear away," she recalls. After replacing the fluid lost from Jimmy's eye, Dr. Weiss closed the wound with tiny

stitches and gave the Hayeses three types of eye-drops that had to be administered daily for six weeks.

Surgery to remove a cataract and implant an intraocular lens came next. After a week of recovery and 30 days of intensive patch therapy, Jimmy recovered 20/20 vision in his injured eye.

Many children undergo cataract surgery at Children's every year. "Ten years ago, a child with an eye injury like Jimmy's would have had his lens removed and then worn thick glasses or a contact lens every day," says Julie Jones, an ophthalmic technician at Children's. "Many eventually lost vision in the injured eye because they couldn't wear the contact lens."

"Dr. Weiss' work is an example of the remarkable contributions Children's surgeons make in the lives of children and their families," says Dr. Bob Sawin, Children's surgeon-in-chief. **END**



Sierra Fuller, 8, and her parents, Maria and Neal, threw an unusual party in a barn in Carnation, Wash. this past April. The "end-of-chemo party" gave the Fullers a chance to say thank-you to their community, friends and staff from Children's. The happy crowd had a lot to celebrate. A bone scan in April showed Sierra was cancer-free after a yearlong battle with

orbital rhabdomyosarcoma, a cancer that strikes muscle tissue in the eye.

It was a long year for the Fullers, one that included 71 visits to Children's. With the rigors of the past year behind them, her mom says, "I miss the wonderful people who were part of our family for a year. Her nurse at Christmastime made her a SpongeBob blanket. One

doctor's mother gave her a hand-tailored Raggedy Ann and Andy." The Fullers' battle also was made easier by neighbors, parents of Sierra's classmates and people in the community who provided her family with tremendous support. "At the beginning of Sierra's treatment I didn't cook, do laundry or clean my house for four months. They did it all," says Maria.

Sierra and Maria Fuller