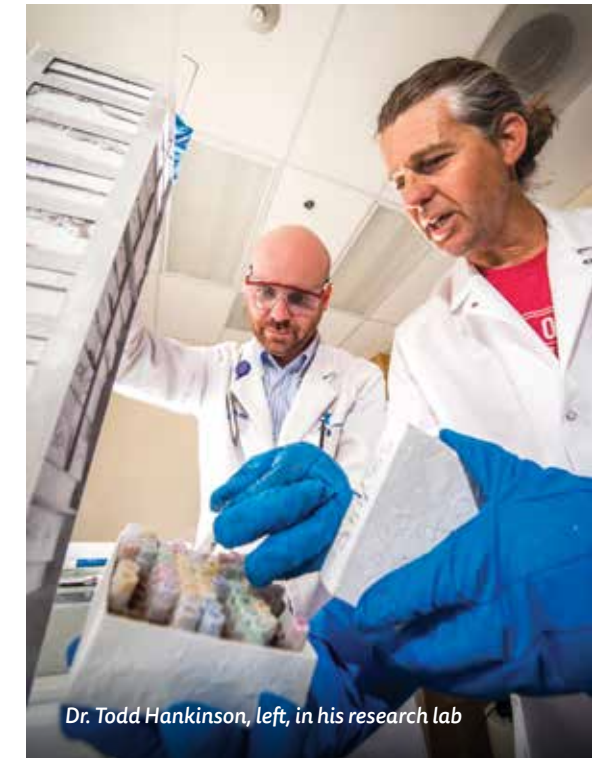




Dr. Todd Hankinson removed Sophia's brain tumor. Now he's aiming to revolutionize therapies for kids with her condition.

# RESEARCH YIELDS HIGH REWARDS

## Donors Propel New Treatments for Kids with Brain Tumors



Dr. Todd Hankinson, left, in his research lab

**T**he tumor went unnoticed at first, a sinister mass growing deep within Sophia's brain. Then her mother started noticing that her bubbly little girl's balance was off. A few weeks later, her vision became blurry. By the time Sophia had an MRI, it was clear that something was very wrong.

"They told us we needed to go to Children's Hospital Colorado right away," recalls Sophia's mother, Paula.

The next day, Sophia's family drove six hours from their home in New Mexico to Children's Colorado. There, Sophia was diagnosed with a rare brain tumor called craniopharyngioma. She was only 3 years old at the time.

Although non-cancerous, craniopharyngioma tumors can be deadly. They tend to grow around the optic nerves and pituitary gland, often causing blindness, hormone imbalances and obesity, plus potential brain artery damage, memory problems and fluid build-up in the brain.

Todd Hankinson, MD, a pediatric neurosurgeon at Children's Colorado, removed most of Sophia's tumor, but he had to leave some of the mass behind to protect critical brain structures, as is the case with most craniopharyngioma patients.

"He described the tumor as a vine wound around her optic nerve and hypothalamus," Paula says.

Sophia's family was terrified, but they soon learned they weren't alone. In addition to a top care team, they also have an army of Children's Colorado researchers, physician-scientists and donors working hard to give Sophia and children with her diagnosis a better future through research.



Sophia at age 3

### Hard to Treat, Harder to Study

Not only is craniopharyngioma hard to treat, it's also extremely difficult to study. The tumors are comprised of both solid and cystic components, and because of how they grow, it's nearly impossible to culture tumor cells and test how they respond to various treatments.

"Craniopharyngioma doesn't have a lot of treatment options, and there haven't been any new ones in many years," Dr. Hankinson says.

Continued on page 8





*Sophia shares a laugh with her parents at a recent check-up.*

Working cooperatively with a group in London that developed the first animal model of the disease, Dr. Hankinson's consortium is currently conducting several studies to identify patterns of gene expression and protein activity that might drive tumor growth. The group recently secured a five-year, \$1.5 million grant to identify specific molecular targets that may be treatable in craniopharyngioma tumors.

"Because craniopharyngioma is so rare, it's not practical to design new drugs for it. Instead, we're working to identify existing drugs that could work," Dr. Hankinson says.

If any one of those drugs is effective — and several are showing promise — it would be the first-ever therapy to treat the underlying mechanisms of the disease. After testing the therapies in mice, Dr. Hankinson plans to conduct early stage clinical trials at Children's Colorado.

In addition to seeking new therapies, Dr. Hankinson is also spearheading research on new diagnostic techniques that could allow doctors to diagnose craniopharyngioma using imaging instead of brain surgery.

"No one else is doing research like this," Dr. Hankinson says. "We're very fortunate to have generous donors who believe in our work and have provided the funding to make a difference for kids."

### Thinking Outside the Box

Dr. Hankinson and his colleagues say that donors are the driving force behind their research efforts.

"We've seen dramatic decreases in government research grants and other funding sources for research nationwide," Dr. Hankinson says. "Private philanthropy has played a significant role in supporting the overall cost of our research."

This is particularly true for the trailblazing research projects that rely on donor funding to pursue radical new ideas.

In addition, it's an extremely rare condition. In the United States, only about 120 children are diagnosed each year, which makes research funding hard to come by and leaves far too many families with a bleak prognosis.

"With surgery and radiation, these patients typically have good survival rates," says Dr. Hankinson. "But they can live with substantial problems for a really long time. One study showed they have the worst quality of life of any pediatric brain tumor."

That may soon change.

Six years ago, Dr. Hankinson started a research consortium, Advancing Treatment for Pediatric Craniopharyngioma, a collaborative effort with 16 other pediatric institutions. Supported by funding from The Morgan Adams Foundation, along with generous donors including Betsy and Bryan Hendershot and Steven and Blanche Goldenberg, the team has made significant progress for children battling craniopharyngioma.

"We've already made exciting discoveries about the biology of these tumors solely with philanthropic support," Dr. Hankinson says. "With additional funding, we could completely revolutionize therapies for these kids."

## More Breakthroughs Fueled by Generosity

Pediatric oncologist Dr. Jean Mulcahy Levy recently made a surprising discovery that's giving new hope to patients whose brain tumors were once considered untreatable.



*Dr. Jean Mulcahy Levy*

With donor support, Dr. Mulcahy Levy's research team discovered that brain tumors with a mutation called BRAFV600E use a process known as autophagy to survive against cancer drugs like chemo. Autophagy allows cancerous cells to reuse proteins for

energy when threatened, making them more resistant to treatment.

Building on research from her colleagues, Dr. Mulcahy Levy hypothesized that an FDA-approved drug that's used to treat malaria would block autophagy in these tumors, making them more responsive to treatment. She introduced the drug to a young patient with an aggressive brain tumor that had the BRAFV600E mutation. Doctors had already tried everything to no avail. Within weeks of starting the new therapy, the patient started getting better.

"Miraculously, she had a response to the treatment," said Dr. Mulcahy Levy. "We have now treated three patients



with this drug, and all three have had a clinical benefit."

Clinical trials are being planned at the Children's Colorado Center for Cancer and Blood Disorders to validate whether the drug can be broadly effective in patients with these types of brain cancers.

"It's really exciting — sometimes you don't see that kind of response with an experimental treatment," she says.

"Philanthropy is the foundation for all the research we do here," says Rajeev Vibhakar, MD/PhD, Director of the Neuro-Oncology Program at Children's Colorado. "It funds cutting-edge ideas that might sound like moonshots at first, but you have to look outside the box to make the next major breakthrough. That's where donors make a big difference."

Dr. Vibhakar cites The Morgan Adams Foundation as a donor that has made a major difference by establishing The Morgan Adams Foundation Pediatric Brain Tumor Research Program at Children's Colorado.

"They were early supporters of the groundbreaking, higher-risk research projects that never would have received grants from the National Institutes of Health (NIH)," he says. "With their seed funding, we were able to conduct the initial experiments and generate data that has since resulted in more than \$11 million in NIH funding. If it weren't for The Morgan Adams Foundation and others, our program wouldn't exist."

Dr. Vibhakar has seen firsthand the impact of research. For example, since he first started in the field 20 years ago, patient survival rates for medulloblastoma, the most common cancerous brain tumor in children, have increased from around 50 percent to 80 percent today. Yet there are many other types of pediatric brain tumors that are still incurable. Dr. Vibhakar and his team intend to change that.

"That's what drives me," he says.

## The Sky's the Limit

As for Sophia, she completed radiation treatment two years ago and is now a happy, energetic 6-year-old. Her vision continues to be impacted — although not as severely — and she takes daily medication to keep her hormones in balance, another area that Dr. Hankinson hopes to improve through research.

A small piece of the tumor remains in Sophia's brain, but, according to Dr. Hankinson, you'd never know it.

"Seeing her now, a few years out from her treatment, she's just a fun, spunky kid," he says. "It's like she never had a brain tumor."

For Dr. Hankinson, success stories like Sophia's are what inspire him to keep seeking new treatments and cures.

"There's almost nothing that Sophia won't be able to do," he says. "The sky's the limit for her."

## Dr. Rajeev Vibhakar Shares What Drives Him to Seek New Cures

"When I was doing my residency in 1999, I saw four kids with brain tumors on the same day. I remember they all had different types of brain tumors, but we were treating them the same, using the exact same drugs. I told the attending physician that this didn't make a lot of sense, but she explained that it was the best option we had, unfortunately. I decided then and there to dedicate myself to finding out as much as I could about new therapies.

"Since then, I have seen firsthand the difference we can make through research. I just got a card from a patient who I treated when she was 16, and now she is getting married. To me, that's amazing. But I have also lost way too many patients. Every time I go to a funeral, I'm reminded that we have a lot more to do. That's what drives me, because I know that the breakthroughs we make can change the outcomes for kids."

— Dr. Rajeev Vibhakar, MD/PhD, Director of the Children's Colorado Neuro-Oncology Program



**YOU CAN HELP**

By donating to the Children's Colorado Research Institute\*, you support new treatments, therapies and cures that benefit kids here and around the world. Email [info@childrenscoloradofoundation.org](mailto:info@childrenscoloradofoundation.org) or call 720-777-1700 for more information.

\* If you are a Colorado resident, your gift to the Research Institute of \$250 or more may qualify for the Enterprise Zone tax credit.

## International Neuro-Oncology Symposium Coming to Colorado

On June 29-July 3, Children's Colorado and The Morgan Adams Foundation will be key sponsors of the 2018 International Symposium on Pediatric Neuro-Oncology, a global biennial meeting of medical professionals who research, diagnose and treat pediatric brain tumors. Children's Colorado is honored to have been chosen by the international community to hold this seminal event and looks forward to showcasing our research and collaborating with others to advance new treatments for brain tumors.