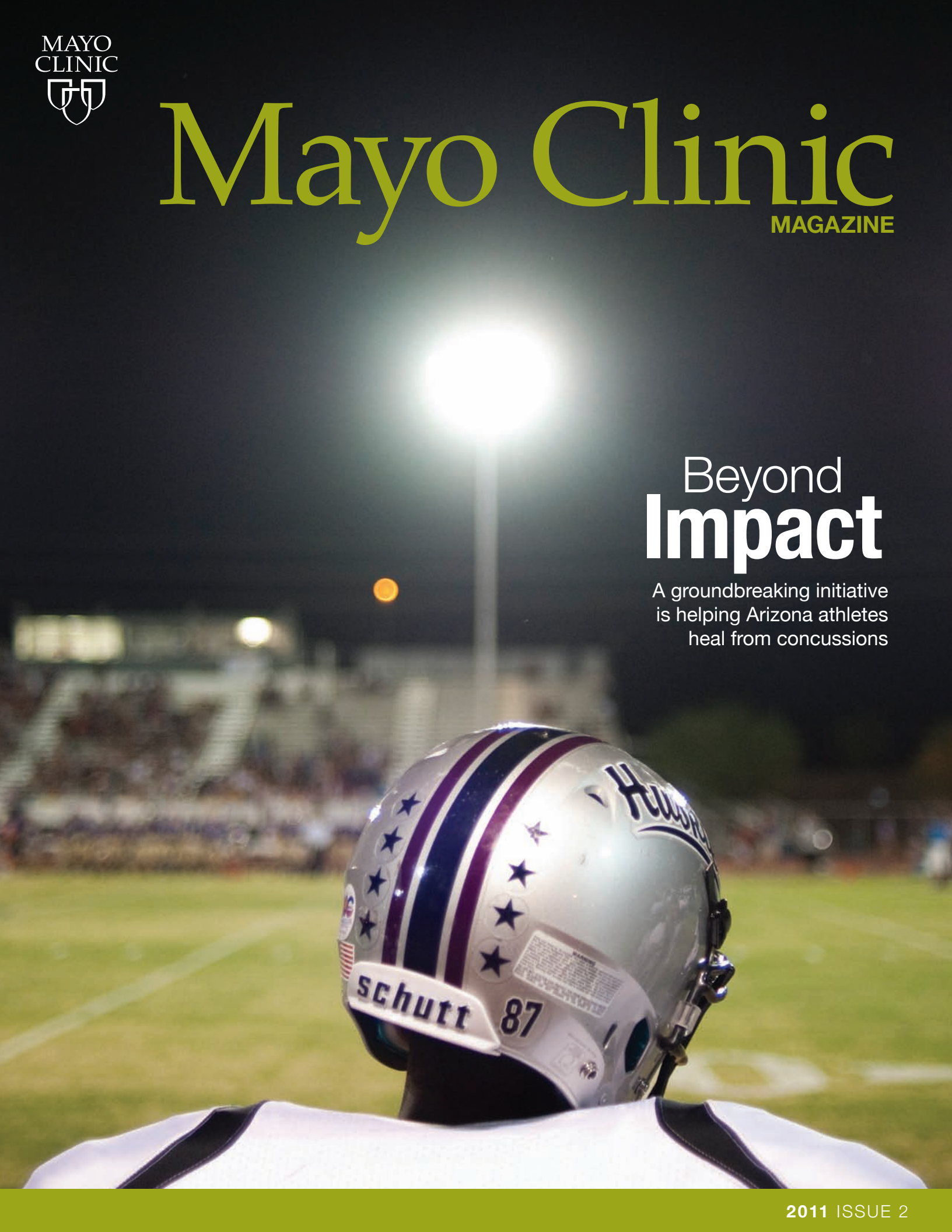


# Mayo Clinic

MAGAZINE

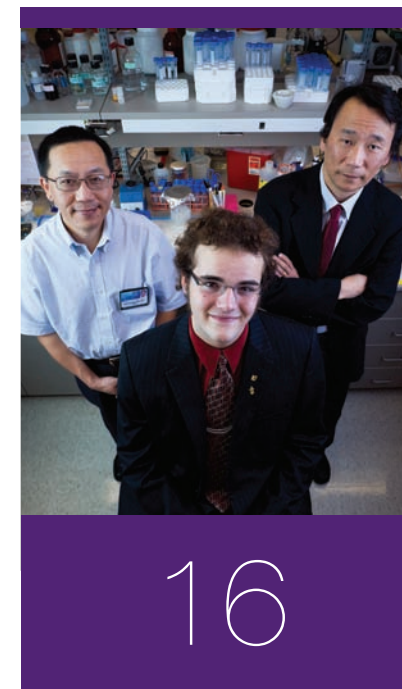
## Beyond **Impact**

A groundbreaking initiative  
is helping Arizona athletes  
heal from concussions



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Health care in America is fragmented and expensive. Mayo Clinic believes one answer to the problem lies in the education of aspiring physicians.

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# Leaders of the New Generation

In September, Mayo Clinic announced the expansion of Mayo Medical School to Arizona, creating a branch to be called Mayo Medical School - Arizona Campus.

This expansion reinforces Mayo's national and international leadership in patient-centered academic excellence. It will provide Mayo with a unique platform to continue to redefine the field of medical education, training the medical professional workforce of tomorrow in team-based, high-quality and affordable patient care.

Mayo Medical School - Arizona Campus represents a key collaboration with Arizona State University (ASU). All students will complete a specialized master's degree in the science of health care delivery that will be granted by ASU concurrently with the medical degree from Mayo Medical School.

“This new branch of Mayo Medical School is firmly aligned with Mayo’s commitment to patient-centered academic excellence and redefining the field of medical education. Together with ASU, we will create the health care workforce of the future,” explains John Noseworthy, M.D., Mayo Clinic president and CEO. “This is one of the most important and exciting initiatives we can undertake.”

### Science of health care delivery

Translating best practices into the delivery of reliable and efficient health care is one component of its transformation. Implementing that new knowledge into medical school curriculum is a valuable means to further ensure that patients benefit from the science.

The science of health care delivery is a burgeoning field that focuses on innovation and systems engineering principles to improve the quality and cost of patient care. Experts in this field will design, implement, measure and disseminate high-value health care best practices. Initial topics will include understanding population health, the importance of nutrition, lifestyle choices and wellness, plus the prediction, prevention and management of acute and chronic diseases.

Mayo’s unique program will provide students with a focus on proficiency and competency in the science of health care delivery which will be integrated into the medical school track. Although a number of other medical schools are considering similar programs, this is believed to be the first medical school in the nation with an embedded master’s degree in the science of health care delivery.

### Collaborating to benefit patient care

This new venture deepens Mayo’s relationship with ASU and affirms Mayo’s role as the premier academic medical center in the Southwest. Since 2003, Mayo and ASU have teamed on a variety of successful efforts, including a joint nursing education program, collaborative research projects, joint faculty appointments and dual degree programs. This summer, ASU’s Department of Biomedical Informatics moved to the Scottsdale campus, providing important collaborative opportunities for students, faculty and staff.

The Arizona branch of Mayo Medical School will be based on the Scottsdale campus in buildings to be remodeled expressly for this purpose. A projected enrollment of 48 students per class will allow the individual attention that has become a hallmark of Mayo’s tradition of academic excellence. Faculty will be drawn from across Mayo Clinic and augmented by experts from ASU, providing a broad array of educational experiences. The curriculum will build on the recognized strengths of Mayo Medical School, including a world-class faculty, a curriculum that uses the most advanced and innovative teaching practices and small class sizes.

“The continuing success of our partnership with ASU allows us the collective ability to redesign medical education in ways that align with the future of health care delivery,” says Wyatt Decker, M.D., vice president, Mayo Clinic and CEO for Mayo Clinic in Arizona. “We are excited that the expansion of Mayo Medical School to Arizona will further

enhance our leadership role in training the next generation of physicians.”

### Transforming medical education together

The timeframe for the opening of the branch of the Mayo Medical School is contingent on formal accreditation as well as philanthropic support.

As with the launch of Mayo Medical School in 1972, benefactors will also play a vital role in providing startup funds and endowment resources for the school’s function and student scholarships. Mayo is seeking philanthropic support to help ensure this project’s success. ■



Left to right:

Wyatt W. Decker, M.D.  
Vice President, Mayo Clinic  
CEO, Mayo Clinic in Arizona

John H. Noseworthy, M.D.  
President & CEO, Mayo Clinic

Janice (Jan) K. Brewer  
Governor, Arizona

Michael M. Crow, Ph.D.  
President, Arizona State University

Speaking: Keith D. Lindor, M.D.  
Dean, Mayo Medical School

“ The science of health care delivery is a burgeoning field that focuses on innovation and systems engineering principles to improve the quality and cost of patient care. ”

# If These Walls Could Talk

## Honoring Our Benefactors



Philanthropy at Mayo Clinic began with its founders and the tradition of giving continues to be a hallmark of Mayo's practice today.

Mayo benefactors are people from around the world and all walks of life. Their generosity supports Mayo's belief that health care is for the good of all people and the needs of the patient come first.

Philanthropic recognition levels honor benefactors who offer their partnership and support to Mayo Clinic.

This outpouring of generosity strengthens Mayo's accomplishments in research, education and patient care. Without philanthropy, Mayo's mission could not be sustained.



Mayo honors benefactors throughout its campuses in a variety of ways. The names of the people and organizations displayed represent unique stories of giving.



Featured in the Halls of Benefactors located at all campuses in Minnesota, Florida and Arizona are the names of those whose giving totals more than \$100,000. Each name is hand engraved on quarried slate from Vermont and Pennsylvania — each slate piece is

different in its veining, which represents the uniqueness of the individuals and organizations named.



Patients, families and visitors see marble from around the world. The different colors, textures and reflections impart a sense of security and well-being.



A green marble wall in Rochester honors the foremost benefactors of Mayo Clinic. The individuals and organizations named here represent many generations, many places and many walks of life. They share a commitment to helping achieve a healthier future by investing their gifts in the facilities and programs of Mayo Clinic.

Mayo recognizes that each benefactor brings a story with their gift. To capture some of the stories and honor Philanthropic Partners, customized storyboards are placed in prominent locations throughout the Mayo campuses.



Electronic recognition kiosks are located in high-traffic areas on the Mayo Clinic campuses. These "electronic family albums" honor members of recognition groups and alumni societies.



For all levels of gifts, Mayo expresses its gratitude. ■

# Enduring Inspiration

David A. Ahlquist, M.D., dares to dream of eradicating colon and rectal cancer. But first his team's stool DNA test, a highly accurate, noninvasive, early warning system, needs approval from the U.S. Food and Drug Administration (FDA).

"Colorectal cancer is entirely preventable if a screening test is regularly given — much in the way that cervical Pap smears have essentially eliminated cervical cancer in women who are tested regularly," Ahlquist says. "The idea is that if you miss a precancer on the first screening chances are it will be detected on subsequent tests, while it is still in a treatable stage."

Ahlquist, a gastroenterologist at Mayo Clinic in Rochester, Minn., has devoted his career as a clinician and researcher to early detection of gastrointestinal cancers. He found inspiration for his invention 17 years ago and more than 3,000 miles away. That's when he learned of some 25,000 Alaska natives, almost all of whom had deadly ties to colorectal cancer.



“ Colorectal cancer is entirely preventable if a screening test is regularly given. ”

In 1994, the Centers for Disease Control and Prevention (CDC) asked Ahlquist to lead an exploration into the cause of iron deficiency and anemia affecting nearly all men, women and children in the Yup'ik people living along the coast and rivers of western Alaska.

Ten days later, a small plane dropped Ahlquist on Nunivak Island, Alaska, in the Bering Sea. Ahlquist was met by the Yup'ik elder and his brother, one of the first patients to undergo open-heart surgery at Mayo Clinic.

As a result of the remarkable historical reach of Mayo Clinic into the lives of this remote people, Ahlquist's team was given a green light to proceed with the study.

Over a span of two years, the elder helped Ahlquist's team overcome cultural barriers to stool samples and endoscopies, and in turn, Ahlquist's team helped improve the health of the Yup'ik people through their research.

They discovered that 1) nearly everyone tested had elevated fecal blood levels, and, 2) their chronic gastrointestinal (GI) bleeding was coming from ulcers and other inflammatory changes in the stomach and 3) a common bacterial infection caused the chronic gastritis. Although treatable, the gastritis was just the tip of the iceberg.

“We also learned that Alaska native people suffer the world's highest rate of colorectal cancer and the poorest survival rate,” Ahlquist says. “They have the worst outcomes because the disease gets diagnosed at a late stage due to the lack of effective screening. Most native peoples in Alaska live so remotely that colonoscopy is simply not practical, and fecal blood testing is impractical because occult bleeding from gastritis is so common in this group.”

Ahlquist left Alaska knowing that the Yup'ik people needed an answer to the question that kept running through his head: “How can we screen for colon cancer with a noninvasive test that patients could send in by mail?”

#### **A new direction**

Ahlquist and his research team focused on developing a patient-friendly test that could outperform existing options. Fecal blood tests don't differentiate between bleeding from

## **A “sincerity test” and a destiny with native people in Alaska**

My first encounter with the native people of Alaska came after I'd been asked by the Centers for Disease Control and Prevention if I'd design and lead a research exploration into the cause of iron deficiency and anemia affecting nearly all men, women and children in the Yup'ik population of coastal western Alaska.

Folks at the CDC warned that I must first pass the “sincerity test” to obtain permission from the Yup'ik elder to conduct the study. He fiercely protected his people from exploitation and flatly rejected most research requests. After a bumpy landing on an uneven permafrost runway, the pilot called my attention to two older Yup'ik men silhouetted against the barren tundra. As I drew closer, their faces emerged as wizened, deeply furrowed and expressionless.

I reached out a hand and was met with a surprisingly warm smile from the elder. Extending both arms, he said, “Gwyanna (thank you) Mayo Clinic.” Next he introduced me to his brother standing at his side. The brother turned out to be one of the first patients to have received lifesaving open-heart surgery at Mayo Clinic several decades earlier. When the elder learned I was from Mayo Clinic, he decided to bypass the ceremonial sincerity test. We were trusted. Along our way, we not only uncovered the cause of this pandemic anemia but we also gained insights into the culture and lives of these beautiful, resourceful and proud people.

— David A. Ahlquist, M.D.

cancer and from benign causes, such as hemorrhoids, and they don't detect precancers. And, native Alaskans, like most people, dread a colonoscopy or sigmoidoscopy, which uses a scope to view all or part of the colon.

As a result, colorectal cancer is now considered the most preventable, yet least prevented cancer. It's highly treatable if found early, but in 60 percent of U.S. cases, it's not detected until a late stage. As such, colorectal cancer is the nation's second-leading cancer killer, annually claiming the lives of 50,000 Americans (600,000 people worldwide).

Ahlquist's team hopes to score a major victory in the war on cancer. Their research has found that colorectal cancer and precancers are associated with characteristic DNA changes, and that cells from the surface of these suspect lesions regularly shed into stool. They developed a new screening test which uses sophisticated, molecular assay techniques to detect these tumor-associated DNA changes that indicate the presence of cancer or precancers anywhere in the colon.

Initially tailor-made for remote populations, like Alaska's native people, the team soon realized that people everywhere were interested. Stool DNA testing involves no bowel preparation, no diet or medication restrictions, no discomfort, no false positives for occult GI bleeding, and no need for an office visit. And, yes, it works on mailed samples.

Ahlquist says the test has potential to boost screening rates, detect more precancer and early-stage cancer, avoid unnecessary colonoscopies, improve surveillance of patients at high risk of colorectal cancer, and save billions of dollars in downstream health care.



David A. Ahlquist, M.D.

### Becoming a reality

According to Ahlquist this big idea would never have budged beyond fantasy without financial support from those who believed in his work, including the Richard M. Schulze Family Foundation, Charles Oswald, and a number of individual benefactors.

Mayo Clinic has collaborated with Exact Sciences Corp. to bring stool DNA technology to patients. An optimized version of the test is undergoing FDA validation studies. By the end of 2012, participation by up to 15,000 patients across 60 medical centers in the United States and Canada will determine the accuracy of the stool DNA test.

If the FDA grants approval, the screening test will go into commercial production and become widely available.

“It could turn into a practice recommendation right away,” Ahlquist says.

At the head of the line are the Yup’ik people for the innovation they inspired. In fact, in July 2011, Ahlquist returned to Alaska to finalize details of a clinical trial with co-investigators at the Alaska Native Medical Center in Anchorage. At least 600 Alaska native people will participate, helping to evaluate the effectiveness of the new stool DNA screening test.

“We were ready for critical evaluation in focused subpopulations,” Ahlquist explains, “and I proposed that we study Alaska native people with this test because it will almost immediately translate to better health care intervention for them.” ■

# Moving on to Multi-Organ Screening

For their next amazing feat, David A. Ahlquist, M.D., and his research team will refine stool DNA testing to screen for cancer and precancer, not only in the colon, but throughout the digestive tract.

“It would be revolutionary,” Ahlquist says. “The potential impact could be enormous.”

The team grabbed headlines in 2009 with a pilot study showing that stool DNA testing found more than 70 percent of gastrointestinal cancers at all stages. Their technology also can detect lung cancers located in the main airways, since cells shed by cancer enter the sputum, which is swallowed, and DNA changes from those shed cells can be recovered in stool.

“It would be revolutionary,” Ahlquist says. “The potential impact could be enormous.”

Today, collectively, cancers of the throat, esophagus, stomach, pancreas, bile duct, gallbladder and small bowel cause twice as many deaths as colorectal cancer, but those organs are not screened for cancer, in part, because effective, affordable screening tools are lacking.

Ahlquist envisions stool DNA tests spurring shifts toward:

- **Early detection of cancers above the colon.**
- **Cancer screening of multiple organs, rather than just one organ, with a single noninvasive test.** “This would be one step closer to screening the whole patient,” Ahlquist says.
- **Prediction of cancer location.** The team is developing a profile of DNA markers linked to cancer or precancer specific to the organ of origin.
- **Prevention rather than treatment of cancer.** “For example, despite decades of trying to treat pancreatic cancer, we still don’t have much success against it,” Ahlquist says. “However, as our data show that precancers of the pancreas can be detected by stool DNA testing, pancreatic cancer now realistically becomes a preventable disease.”

Ultimately, stool DNA testing could reduce costs for screening and intervention while saving countless lives.

“Our team comes to work feeling like we’re going to change the world with our next experiment,” Ahlquist says. “It’s great to see that shared level of excitement, and I believe we will.” ■



# 3 Paths to Mayo

## Why Medicine?

Eugene D. Kwon, M.D.

I wanted to be a rock star. I had the heart and soul of a rock star. I had the hair of a rock star. I had the look of a rock star. But I had no talent. My idols were Pink Floyd. I used to have dreams about them. My parents finally told me, "If you're going to waste your time in college thinking about Pink Floyd, we're not going to pay for college. Don't come home."

I decided to go into medicine because that was the only thing I could spell at the time. But I always thought that I missed out on being involved with Pink Floyd. I felt that all of my life.

Then last year something happened that changed my whole perspective about life.

I was taking care of a patient and the patient was very grateful. It turned out the patient was best friends with the main writer and one of the lead

musicians of Pink Floyd. I received in his own pen, the writings of the lyrics, "Wishing You Were Here" from Roger Waters as well as his own personal copy of *The Dark Side of the Moon* with a letter addressed to me.

It made me feel good, because it felt as though my life had come full circle and instead of me having to drag myself behind Pink Floyd, Pink Floyd came to me. And thanked me for what I do.

The world desperately needs new scientists, new teachers and new health care workers to be our superheroes for future generations. Finally, whatever we do, whatever we choose to do, we should do it with all our heart and soul. Be passionate. Never act by half measures. Don't get in the game halfway. Do it all the way.

*Always believe in yourself and pay it forward.*



## Why Research?

Haidong Dong, M.D., Ph.D.

I was born and raised in northeastern China. In high school I wanted to be a calligrapher, a painter and a writer. I loved to paint watercolors and to write poetry. My father studied computer-based mathematical models for marine engineering. He worked as a professor in the Department of Marine Engineering.

When I told him about my aspirations, he reminded me that China had a 4,000-year history of world-renowned artists and writers. He advised me. He said, "I don't think you will be one of them, Haidong." His words represented a turning point in my life. To find my path in life, I divided it into many smaller questions instead of a few big ones.

So I decided to study math and medicine. I went to medical school in Shenyang, China's fourth largest city. I served as a resident in the oncology department with mentors who operated on people with cancer. I cared for many patients who came for help during the later stages of cancer. We performed open-and-close surgical procedures for people suffering in these advanced stages. There was little else we could do. Each time I looked into a patient's eyes and could not give them hope, I realized that I did not have the heart to be the one to tell them they had no choices.

I wanted to give people hope. I decided to pursue research studies in tumor immunology and immunotherapy at Osaka University in Japan. Between my research in molecular oncology in Japan and my experience with tumor immunology in China, I began to wonder if we could find a way to cue T-cells. At that time, Dr. Leiping Chang from Mayo Clinic contacted me about his research to improve the function of T-cells and their role in killing cancers.

On October 10, 1998, I left Japan and arrived in Chicago. Two days later I started work at Mayo Clinic in Rochester, Minn.



## Why Science?

Michael Zaiken

My dad was diagnosed with Hodgkin's lymphoma before I was born. He was treated with radiation therapy at the time. After 17 years in remission, Dad had a relapse in the summer following my sixth grade year. During his treatments at Mayo Clinic, I remember sitting and watching my father and his brother, Elliot, playing cards while an IV drip ran into my dad's arm. Somehow I felt inspired by the science behind his treatments.

It was at this time that I discovered my passion for science. I took solace in the pursuit of certifiable, repeatable, factual statements. I threw myself into science, which really helped me get through that difficult year. In seventh grade, I did my first science project, a very simple one; I tested the effects of fertilizer on pill bugs.

Then in the winter of eighth grade, my dad was diagnosed with acute lymphoblastic leukemia. It was a rare side effect of the chemo used to treat that earlier, second round of Hodgkin's. I stayed

home from school one day to be with my dad and Uncle Elliot, while my uncle donated bone marrow stem cells to Dad.

That's when I did a science fair project, testing proximity as a way to measure high levels of radon in nearby residential areas. I entered my project in the local science fair and won a first place grand award at the state level. My radon project was eventually put forward as one of Minnesota's entries to the American Junior Academy of Sciences Annual Convention.

For the next four years I paid close attention to Dad's response to his various cancer treatments, especially the graft-versus-host effects. I wanted to know more about Dad's tumor. I witnessed all of the dips and rises associated with his treatments. A turning point came my junior year in high school when I was mentored in regulatory research at Mayo Clinic with Dr. Haidong Dong. He mentored me in Dr. Eugene Kwon's laboratory in immunology and urology.

# The point of convergence

Eugene, Haidong and Michael

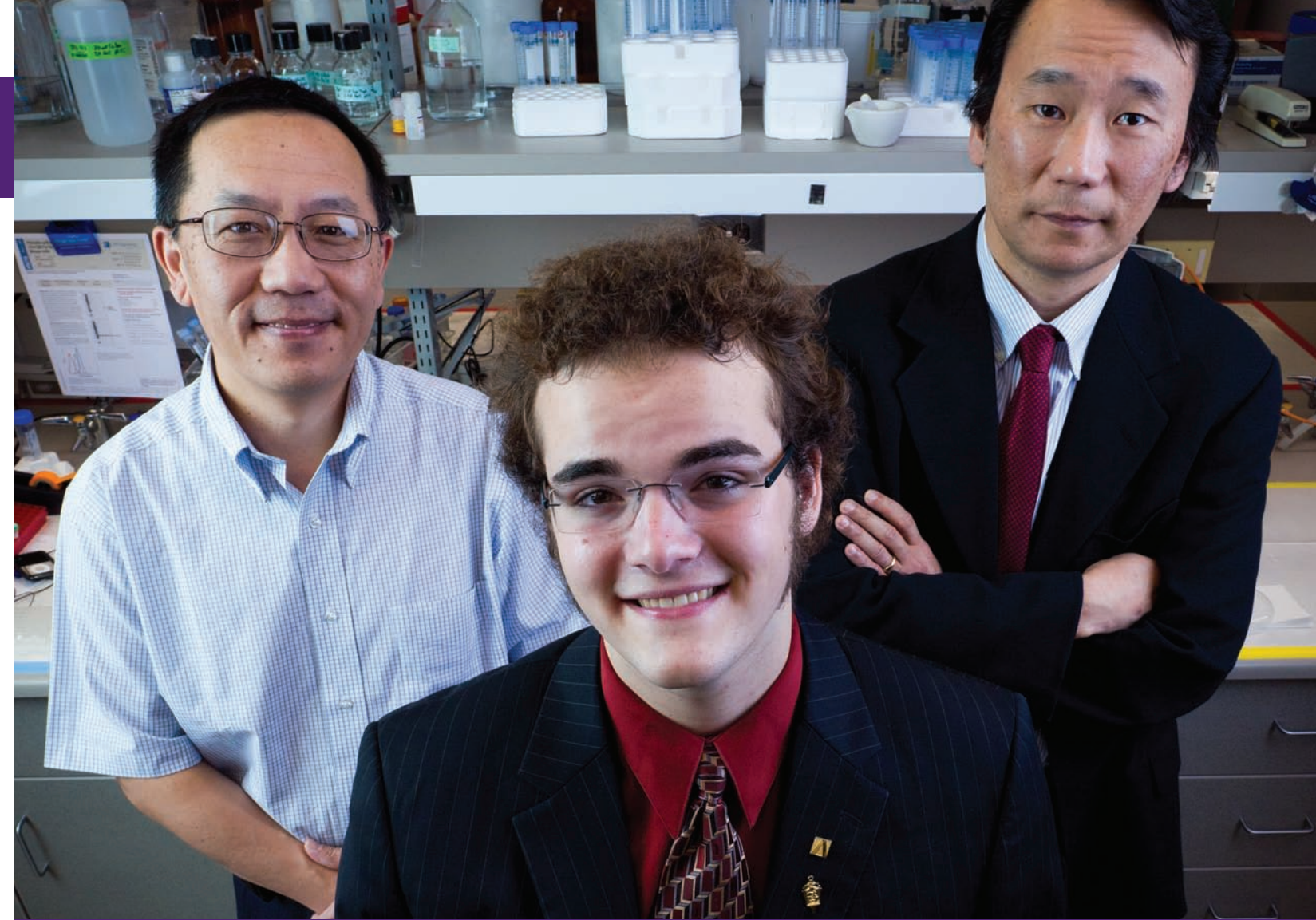
Dr. Haidong Dong participates as a local volunteer mentoring promising high school students in science. He recognized Michael Zaiken's talent and heartfelt concern to know more about his father's tumor. Dong suggested that Zaiken test the correlation between B7-H1, (a third member of the B7 protein family) and P10 signal expression and kidney cancer cells. These particular B7-H1 proteins are known to co-stimulate T-cells, a group of white blood cells known as lymphocytes, and play a central role in the increased ability to ingest or destroy foreign particles and parasitic organisms. The study of tissue culture was above and beyond anything Zaiken had done before. Next he used flow cytometry. He learned how to tag proteins with fluorescent molecules and measure the read-off to determine expression of the molecule.

This was high-end, pushing-the-edge science. Zaiken did most of the statistical analysis after he had finished working in the lab. Then in the fall of 2010, he assembled his research and met all safety and security factors to enter the 75th Annual MN State Science & Engineering Fair. As fate would have it, Dr. Eugene Kwon gave the keynote address at this science fair.

On award night at the fair, Zaiken's project number, which was 1101, flashed on the giant screen with his name as the grand prize winner. Kwon congratulated the young student and expressed amazement that someone of high school age was working on this type of research. "How could you have done this?" Kwon asked. "Actually, I did it in your lab, Dr. Kwon," Zaiken answered.

Kwon sees more than 1,500 patients a year in addition to his research work. But it took only seconds to recognize the young student, Michael Zaiken. That's when Kwon beamed with pride.

Winning the award allowed Zaiken to go forward to compete in the annual Intel International Science and Engineering Fair (Intel ISEF), which was held in May 2011. The Intel ISEF is the world's largest international pre-college science competition, where more than 1,500 high school students from 65 countries showcase their independent research. Michael took a third place Grand Award in the Medicine and Health section and received an award of \$1,000.

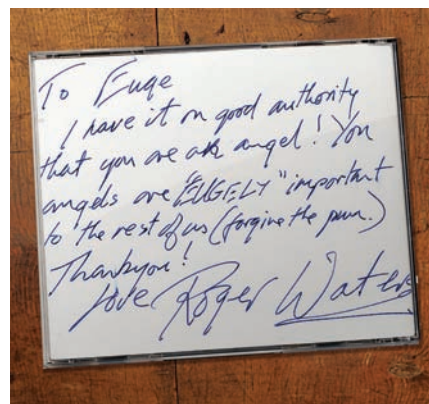


## A Trio of Scientific Inspiration

Haidong Dong, M.D., Ph.D. is an assistant professor of immunology at Mayo Clinic. He believes his cancer research represents a stepping stone in the field of immunology. His scientific research includes extensive publication in scientific and medical journals, including *Nature Medicine*, a biomedical research journal devoted to the newest and most exciting advances in biomedical research. He likes to paint and write poetry.

In September, Michael Zaiken launched his college career with a major in biochemistry at the University of Wisconsin-Madison. He stays busy with studying and designing proteins. His father is doing well.

Eugene D. Kwon, M.D., places a special emphasis on developing state-of-the-art immunotherapies for testing in clinical trials to treat patients with prostate, kidney or bladder cancers. He serves as a program leader for prostate cancer with Donald J. Tindall, Ph.D. Kwon is also a professor of urology and immunology at Mayo Clinic. He still listens to Pink Floyd. ■



A handwritten letter from Roger Waters of Pink Floyd to Dr. Kwon.



One of Dr. Dong's original watercolors.



Michael in his element.


# The Complexity of Discovery

An hour or even a day isn't enough time to talk to Gordon Latz and Steve Mehallis of Ft. Lauderdale, Fla.

Former business associates of Harry T. Mangurian, Jr., Latz and Mehallis now direct Harry Mangurian's foundation, but they can entertain for hours with stories about the old days with Harry, who passed away in 2008, and his wife, Dorothy (Dottie).

"Working for Harry was a revelation," says Mehallis, who left an executive position at a large accounting firm to become the financial adviser for many of Mangurian's business pursuits, including the Boston Celtics. Mangurian purchased the Celtics in 1979, just as the team was about to draft Larry Bird and to assemble one of the best rosters in the history of the NBA.

"The pecking order at big companies is incredible. But with Harry it was like you were family and he let you do your job. At the end of the day, though, he was the decision maker and he did have the Midas touch. The acquisition and development of the Celtics was a perfect example. His timing was always impeccable."



Dennis W. Dickson, M.D., has studied Lewy body dementia for two decades.

Fortune favored him in his personal life, too, says Latz, who was Mangurian's operations manager for nearly four decades. "Harry Mangurian's wife, Dottie, made you feel like she was your best friend as soon as you met her. Everyone fell in love with her right away."

There's more than a hint of wistfulness when Latz and Mehallis talk about Dottie though. At the mention of her name, their eyes drop to the floor for a moment. Their words are a little measured, and a somber feeling enters the room.

Although Harry Mangurian passed away three years ago, at age 82, from leukemia, Dottie is

still alive. Yet the Dottie that everyone remembers started disappearing more than 10 years ago due to a mysterious brain disorder that began subtly.

"I used to walk on the beach every weekend with Dottie," Latz recalls. "Gradually, the distance decreased. Then she couldn't walk anymore and the hallucinations started, so we'd go out on the patio to enjoy the sun. Now she sleeps about 22 hours a day and barely says a word. At first, the doctors told us she had Alzheimer's disease and Parkinson's disease. But then we learned it was something else; something called Lewy body dementia."

### 'Like Alzheimer's and Parkinson's, only worse'

Lewy body dementia in many ways resembles a combination of Alzheimer's disease and Parkinson's disease. It often impairs movement and memory. Plaques and other brain pathology consistent with Alzheimer's and Parkinson's are found at autopsy in patients with this disease. There are no treatments to slow the progress of Lewy body dementia: only symptomatic therapies that improve quality of life.

But it would be a mistake to say the disease is a combination of two other disorders, says Dennis Dickson, M.D., a neuropathologist at Mayo Clinic in Florida, who has studied Lewy body dementia for two decades. "We talk to family members of patients, and they say 'It's like Parkinson's and Alzheimer's, only worse,'" Dickson says. "The combination of disease processes seems to be more than additive; it's synergistic. So patients seem to have greater impairment than we would expect given the amount of pathology we see at autopsy."

That's just one of the unpleasant surprises that go along with Lewy body dementia. Its constellation of symptoms confounds many physicians, who often mistake it for Parkinson's, Alzheimer's or even schizophrenia because patients often have hallucinations. At the same time, patients are especially sensitive to some of the treatments for those disorders, particularly anti-schizophrenia drugs, and the wrong treatment can exacerbate symptoms or even be deadly.

The disease isn't a rarity in the dementia world either. More than 1 million Americans have the disease, and it's common, at autopsy, to find some degree of Lewy body dementia pathology in patients who are diagnosed with Alzheimer's disease. "In some Alzheimer's

“Early diagnosis is incredibly important.”

disease populations, as many as 60 percent will have some degree of Lewy body dementia pathology," Dickson says. "So the picture of all dementias is becoming more mixed. But, we are now realizing that Lewy body dementia is more common than we once thought."

### A sleeping giant

Given all the complexities and challenges of understanding Lewy body dementia, perhaps it's surprising that researchers at Mayo Clinic hold such hope for improving the future treatment of the disease. And sleep — perhaps the most prominent aspect of Dottie Mangurian's existence today — is one of the main reasons.

Mayo Clinic researchers are finding evidence suggesting that excessive daytime sleepiness is a potential indicator of early-stage Lewy body dementia. But their sleep research has gone even further, finding a link between an uncommon sleep disorder, called REM sleep behavior disorder (RBD) and Lewy body dementia.

The finding comes from two decades of research led by Bradley Boeve, M.D., a neurologist; Tanis Ferman, Ph.D., a neuropsychologist; Dr. Dickson and several other Mayo Clinic colleagues. Patients with RBD act out their dreams, often violently, and the Mayo team has discovered that patients with RBD have an increased risk of developing Lewy body dementia.

That discovery offers a potential road to early diagnosis, improved quality of life and, eventually, treatments that finally hit the disease's root causes.



A day with Steve Mehallis, left, and Gordon Latz, right, is filled with one-of-a-kind stories that span business and professional sports. But it also has somber moments, especially when they talk about the effects of Lewy body dementia on Mrs. Dorothy Mangurian, the wife of their friend and former employer, Harry T. Mangurian, Jr.

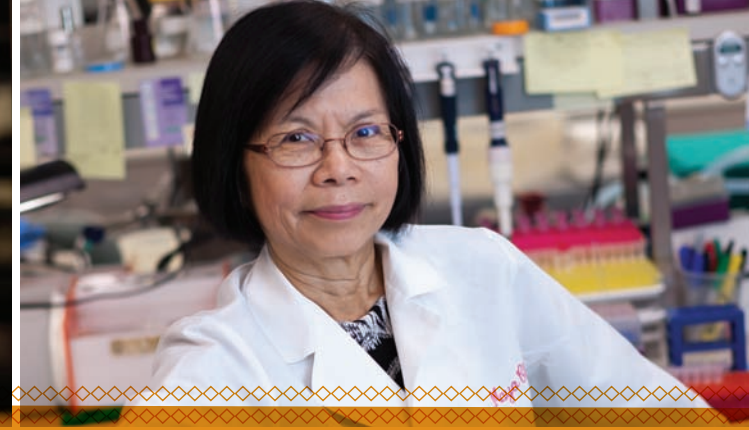
## The Lewy body disease detectives



Bradley F. Boeve, M.D.



Kejal Kantarci, M.D.



Shu-Hui C. Yen, Ph.D.



Tanis J. Ferman, Ph.D.

Why? Because RBD can occur years — even decades — before the first signs of Lewy body dementia.

“Early diagnosis is incredibly important,” says Boeve. “Quality-of-life treatments have the most benefit early on, and we’ve found we can make a tremendous difference if we can start treatment earlier. Plus, a comprehensive approach toward management, including treatment of all sleep disorders, provides the best opportunity for clinical improvement.”

Looking further down the road, Boeve says the RBD discovery and other possibilities for early diagnosis will help make treatments more effective. Earlier diagnosis means earlier treatment. “Once we have therapies that actually modify the disease, not just the symptoms, it makes sense that the impact of those therapies will be greatest when started as early as possible.”

Although the RBD connection is a fruitful avenue for ongoing research and early diagnosis, the Mayo Clinic researchers all agree that it’s just one lead in the mystery that is Lewy body dementia. The solution will come when the various leads from across the spectrum of research come together. “We need to establish a definitive ‘profile’ for Lewy body dementia,” Ferman says. “One that fully defines the cognitive, clinical and pathological features of the disease. With that, we’ll make early, accurate diagnosis possible and help identify new, more effective therapies.”

### The Mangurian Foundation legacy at Mayo Clinic

Through their leadership of the Harry T. Mangurian, Jr., Foundation, Latz and Mehallis are helping Mayo Clinic identify Lewy body dementia’s signature, and generate new possibilities for treating the disease. The foundation recently made a gift to support research on multiple fronts.

In addition to genetics, pathology and cognitive studies, the foundation’s support is helping Kejal Kantarci, M.D., a rising star in the radiology field, to develop a comprehensive imaging test. Kantarci is combining three types of imaging techniques, each of which provides information on different Lewy body dementia pathologies, to help diagnose the disease and differentiate it from Alzheimer’s.

Another recipient of the foundation’s funds, Shu-Hui Yen, Ph.D., is refining a cellular model of the disease. It’s one of the only models of its kind in all medical research. Not only is this model useful for understanding the formation of Lewy bodies, which are twisted bits of a protein called alpha synuclein, it’s also one of the first tools scientists will use to identify new therapies for the disease.

The breadth of research highlights an important and even a unique aspect of Mayo Clinic’s Lewy body dementia research program. “Some places have good

pathology programs for Lewy body dementia and others have good clinical research,” Dickson says. “Mayo has both and we have good genetics research, too. But we aren’t stopping with what we’ve got. We’re recruiting more young scientists as well.”

Harry Mangurian would have applauded that news. “He was always looking ahead, and he was a marketer at heart,” Mehallis says. “He believed we could beat Lewy body dementia if we could get more people involved and if we made more people aware of the disease.” ■



Recovery of

# Life.

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Mary and John Karalis endowed a fund dedicated to traumatic brain injury research.

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**Ted Karalis suffered a severe traumatic brain injury** in a car accident while a college student more than 20 years ago. He dedicated his remaining years, before his death in 2010, to maximizing his recovery through an extensive weight-training program that he developed.

During his recovery, Ted began writing a book to share his insights with others facing disabilities. Although he completed only the introduction, he succeeded in conveying an entire book's worth of insights in those nine pages. "It's gratifying to know that he came back enough to have the instinct and the ability to help others by sharing what he knew," his mother, Mary, says.

After the accident, Ted blazed a remarkable path to recovery, determinedly reaching one personal milestone after another. His parents have kept that legacy alive by establishing the J. Theodore Curtis Karalis Fund in Neurosciences Research with Mayo Clinic. The first use of the fund is to support brain concussion research that could help thousands of high school and middle school athletes.

Ted's accident gave Mary and John an unwelcome education in the world of a severe brain injury. Ted, then a student at Arizona State University, was taken to a trauma center in a coma with little hope of survival. He did survive, though, and emerged from the coma after 12 days. It took months for him to relearn how to walk, talk and get along with his left field of vision gone, and then to change from being left-handed to right-handed. John remembers, "Having been born and raised in Minnesota, our families had often turned to Mayo Clinic. We were familiar with Mayo and wanted to give Ted the best chance for rehabilitation, so we took him to the new Mayo Clinic in Scottsdale, close to where we lived."

One day, early in his rehabilitation, Ted asked his father to try to re-enroll him in Arizona State University. The ASU administrative office

suggested a one-credit adaptive exercise course. Ted returned to school in fall 1991, eventually took a slow but steady schedule of classes, and graduated in 2002 with a degree in interdisciplinary studies. Meanwhile, he had learned how to live independently and even to ride a bike. He'd started working in the university's recreation center and later as a bookstore clerk. He and his father took several trips to Greece, where Ted especially enjoyed visiting the site of ancient Olympia. He regained a rich social life. "All this was important to Ted coming back and feeling confident," his mother says. "He wanted to become 'normal' again, and after several years of hard work, he succeeded."

"I had the nature to exercise to the best of my own personal abilities to heal myself," Ted noted in the introduction to his book. "I have now adjusted to my impairment and have gotten so I rarely recognize

it. Find out your own abilities and proceed with your own genetic self-determination. Impaired or not, it will improve your life."

John has assembled and completed Ted's book to pass on his son's philosophy on recovery and life. "Traumatic brain injury is a leading killer of young people," John says. That explains the family's interest in supporting research on concussions through the fund created in Ted's name. "When Ted passed away, Mary and I discussed what kind of legacy we wanted to put in place for him," John says. "Mayo connected us with Dr. David W. Dodick, who had plans to study concussions among high school athletes. His work takes dedication, time and resources."

Their fund will help make possible Mayo-sponsored baseline cognitive testing for all high school and middle school athletes in Arizona.

The immediate benefit of using those test results is to help doctors and others better understand when to return athletes to normal activities after a concussion. But additionally, there are important advantages to establishing this extensive database of cognitive testing. It will serve future use in the field of regenerative medicine at Mayo Clinic focusing on traumatic brain injury research. This baseline research will be the catalyst for regenerative therapies to treat traumatic brain injury and neurological disease and degeneration.

"Ted made it through a brain injury, but it was a long hard road," John says. "He was motivated and he had a lot of support, but even in the best of conditions it took him years to recover. We wanted Ted to play a part in helping to accelerate the recovery process for others who face the impact of a traumatic brain injury." ■

Mary and John Karalis

“It's gratifying to know that he came back enough to have the instinct and the ability to help others by sharing what he knew.”





# Beyond Impact

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The fund established in Ted Karalis' name supports a groundbreaking initiative to help high school and middle school athletes heal from concussions.

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**This year, after the death of their son Ted** in 2010, Mary and John Karalis endowed the J. Theodore Curtis Karalis Fund in Neurosciences Research with Mayo Clinic to support efforts to understand traumatic brain injuries and brain health. The first initiative to benefit from the fund's aid is a pioneering program that will administer baseline and after-injury cognitive assessments for high school and middle school athletes in Arizona. The goal of the program is to improve recognition and treatment of concussions.

David W. Dodick, M.D., a neurology consultant with Mayo Clinic in Arizona, directs the cognitive testing program and the Mayo Clinic Concussion Program. He remembers his impressions after seeing Ted Karalis' writings about the serious head injury he received in a car accident and his rehabilitation suggestions for other people who are similarly impaired. "I went through a variety of emotions in reading it," Dodick says.

"I cried, I cheered. I thought, 'Wow, this is so inspiring.' And as a parent of a child who now happens to be Ted's age when he wrote his manuscript, it gives me chills. How would I deal with such an event? What would I do?"

Fortunately, the baseline and after-injury assessment program will help many parents avoid grappling with those questions when their children have a concussion. The program provides measurements of healthy brain function in Arizona athletes for later comparisons with post-concussion measurements. In a 10-minute online assessment, students undergo tests of their ability to concentrate, process information, learn and form memories. The comparisons can tell physicians whether an injured athlete has recovered or needs more treatment. This is an important determination because athletes who have not healed from their concussions are more

likely to suffer another one. In addition, the pooled measurements will form a database that will add to the study of regenerative brain medicine and suggest strategies to improve the outcome of brain injuries.

In searching for research focusing on the biology of brain injuries, the Karalises learned about Dodick's research on concussions. "We met with him and asked if there is a way to accelerate the recovery from concussions," says John Karalis. "He's confident that this program involving high school athletes can make a difference."

The baseline testing program contributes to a nationwide effort to raise awareness of the seriousness of concussions. Some athletes do not know when they've suffered a concussion or try to downplay the symptoms because they don't want to let down their teammates. Coaches and trainers may not recognize signs of the injury among their players.



David W. Dodick, M.D.  
conducts an assessment  
on a young athlete.

**Few people know that concussions make up 10 percent of all sports injuries**

and that studies suggest possible connections between multiple concussions and depression, Alzheimer's disease and memory disorders. Although diagnosing and preventing concussions is difficult, the baseline assessments will help teach the health dangers and symptoms of the injuries. More than 200,000 high school and middle school athletes in Arizona, for the first time are benefiting from concussion examinations that are mandated for college and professional competitors. These athletes are eligible to receive the cognitive testing during the 2011-2012 academic year.

Dodick worked with Arizona Gov. Jan Brewer to have Arizona become the first state in the nation to proclaim a day (August 20) as Concussion Awareness Day. It was on this day that Dodick, working with a colleague from Arizona State University, hosted the Arizona Concussion Summit at Arizona State University. The summit featured concussion experts from Mayo Clinic, Arizona State University and Phoenix Children's Hospital, and was attended by athletic trainers, athletic directors, coaches and physicians. Topics focused on the neurobiology of concussion, including the recognition, diagnosis and management of concussion. Mayo Clinic experts also featured the first-ever teleconcussion program, through which Mayo Clinic uses a telemedicine platform to bring expertise into rural Arizona to help young athletes who don't have access to qualified medical providers.

Mary and John Karalis believe that Ted, who worked hard to rehabilitate himself and live independently after his brain injury, would be thrilled with the initiative that the fund endowed in his name is supporting. "I know Ted would be proud of this," Mary says. "Somewhere he's smiling." And Dodick finds Ted an apt inspiration for the program. "He fought his way back and even got his degree from Arizona State University," Dodick says, "but he couldn't have done it without the love, support and commitment from his family." Now other young people are benefiting from a family's tribute to a courageous and hard-working son. ■



# Determined

# Philanthropy

**Sunday evening** is generally a quiet time at Mayo Clinic. And for Richard (Dick) Jacobson it provided an opportunity to pause and plan, and to imagine the future.

Mr. Jacobson often came to Rochester from his home in Des Moines, Iowa on the day before his medical appointments were to begin on Monday morning. This schedule provided respite from the demands of his business and time to reflect on how he might invest in helping other people. "Having to fast on Sunday night gives a person plenty of time to think," he says.

"I'd walk around the campus, seeing these beautiful buildings, and think of all the good work that goes on here."

The inspiration that Mr. Jacobson felt during those Sunday walks is transforming Mayo Clinic and setting a powerful new direction in medicine.

In 2010, Dick Jacobson gave \$100 million to Mayo, which will establish the Mayo Clinic Proton Beam Therapy Program with new buildings in Rochester and Phoenix. The Rochester facility, which broke ground in September, will be named in honor of Mr. Jacobson.

"My dream has always been to establish a major new facility at Mayo Clinic," says Mr. Jacobson. "By supporting Mayo, you help people throughout the country and around the world."



## A mission with Mayo

The man whose philanthropy is shaping the future of medicine has a long family history with Mayo Clinic.

"I was always healthy, but got the typical kid's illnesses," Mr. Jacobson recalls. "When I was six, my mother called Dr. Chuck Mayo for his personal recommendation about what to do. She listened to what he had to say and then replied, 'Fine. We'll see you at 10:00 tomorrow.' That was her sense of determination. The next day, Dad loaded up the spare tires in our car — tires were always blowing out back then — and we made the 120-mile drive to Rochester. And Dr. Mayo saw me at 10:00, not because I was so important or even that sick, but because he didn't want to tangle with my mother."

Ruby Jacobson passed away when her son was a boy, but her spark and drive stayed with him. After the University of Iowa, service in the Army and several years getting started in business, he founded Jacobson Warehouse Company with \$3,500 and two

employees. That was in 1968. In the years that followed, this organization and a consortium of the Jacobson Companies became national leaders, recognized for excellence in customer service and employee satisfaction.

Now retired, Mr. Jacobson still clips coupons, pumps his own gas and can tell you the exact mileage that his car gets. He's a regular at church on Sunday.

When asked who inspired him, Mr. Jacobson answers carefully. "There've been so many people along the way. I can't give you names because I don't want to risk leaving someone out. But I can tell you that each one had a lasting impact on me."

He has received checkups and care at Mayo for more than half a century. This loyalty, built on a strong foundation of values, resonates with Mr. Jacobson's view of Mayo Clinic.

"Mayo is an incredibly well-oiled piece of machinery," he says. This is high praise from a man who built his career in industry. "I've met hundreds of people at Mayo, and they're all top-quality professionals."

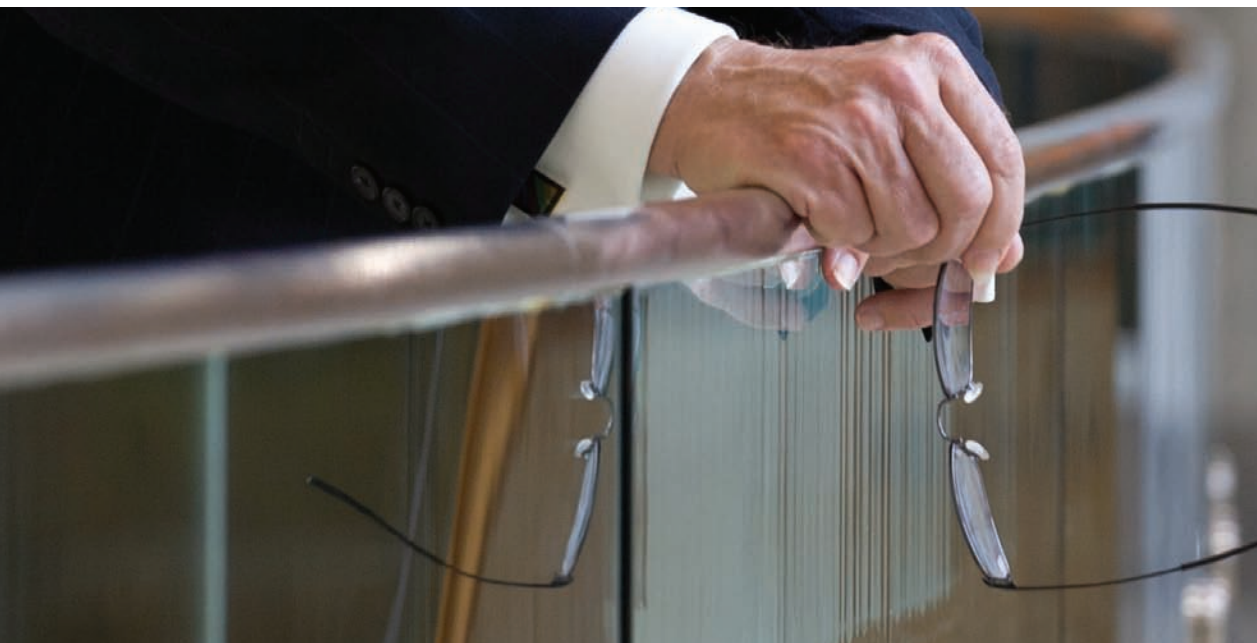
## The human element

At age 40, less than a decade after starting his business from scratch, he established the Richard O. Jacobson Foundation, which provides wide-ranging support for medical, humanitarian and educational programs. "It's all about changing lives," he explains, "working with organizations that help the most people in the most effective way."

He established an endowed professorship in molecular medicine at Mayo Clinic and is excited by the technology that makes proton beam therapy so effective in fighting cancer.

Yet he always keeps sight of the human element. For instance, during the press conference announcing his \$100 million gift, Mr. Jacobson noticed a young man from a local newspaper. "He almost got run over with everything going on. There he was, all by himself. So I went up to him and started talking. We had a good visit. That guy could have been me. Talking to him was the highlight of my day."

There will be more highlights to come, especially for the patients who find new hope from the remarkable technology that Dick Jacobson is making possible at Mayo Clinic. Looking ahead with characteristic optimism, he says, "It's going to be fantastic." ■



“ It’s all about changing lives. ”

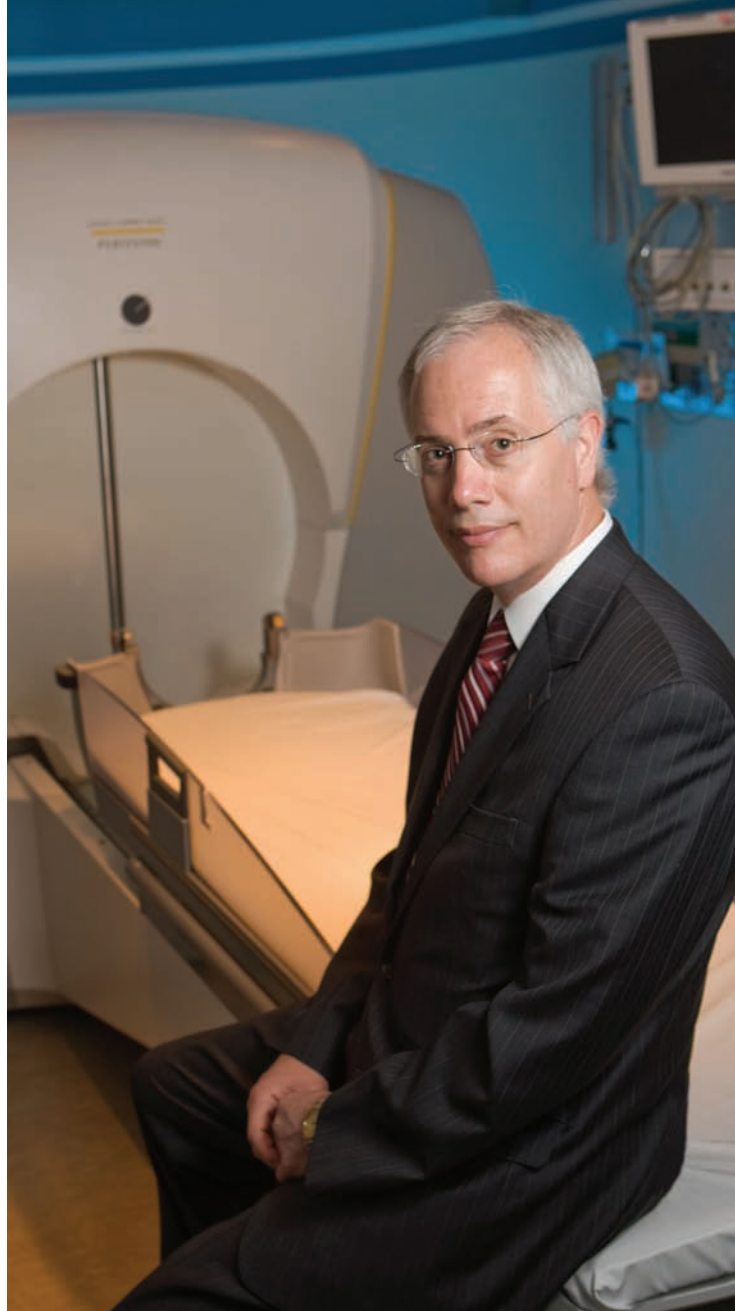


Proposed Jacobson Building



# Focused Future

The words “proton beam” conjure images of futuristic movies whose make-believe heroes battle servants of evil bent on destroying all that is good. At Mayo Clinic, a real life proton beam will help people — especially kids — fight cancer for a better chance to watch such movies throughout their lives.



Robert Foote, M.D.  
Chair, Department of Radiation Oncology in Rochester

“The benefit to children is especially clear. Children with cancer suffer the greatest long-term harm from conventional X-ray therapy since their organs are still developing.”

Mayo Clinic is moving forward with its proton beam therapy program that will build and operate new facilities on its Rochester, Minn., and Arizona campuses. Proton beams have been used to treat cancer for some years now, but the new program will employ “pencil beam scanning” technology, an advancement over traditional radiotherapy because its beam conforms more exactly to the tumor, better sparing surrounding tissue. For patients, this means greater control of radiation doses, shorter treatment times and reduced side effects, compared with conventional photon (X-rays) and first-generation proton therapy systems.

Already Mayo Clinic’s three-site cancer center in Minnesota, Arizona and Florida treats more than 20,000 cancer patients annually, using various methods including all three major types of cancer treatment: surgery, chemotherapy and radiation therapy. Conventional radiotherapy uses X-rays to attack tumors. But that also damages healthy tissue. The advantage to proton beam therapy is that it targets tumors more accurately, allowing delivery of a higher radiation dose to cancers, while greatly reducing radiation delivered to healthy tissues.

“Proton beam therapy is the future of radiation therapy. In fact, it’s rapidly becoming the standard of care for certain cancer patients,” says Robert Foote, M.D., chair, Department of Radiation Oncology at Mayo Clinic’s campus in Rochester. And Mayo Clinic will be a standard bearer. Currently nine centers in the U.S. offer proton beam treatment, two are under construction and two others are on

the drawing board. There is only one other institution in the country that currently offers pencil beam scanning, the more advanced proton therapy technology. All eight treatment rooms at Mayo Clinic’s two facilities will feature pencil beam scanning.

Mayo is investing more than \$370 million in the projects, from Mayo’s capital budget and benefactor support. The facilities have been given a strong start by way of a \$100 million donation from longtime Mayo patient and philanthropist Richard O. Jacobson. Mr. Jacobson’s is the largest lifetime gift from an individual donor. “Awe-inspiring,” is what Mayo Clinic President and CEO John Noseworthy, M.D., called it. “What a profound demonstration of trust and passion for Mayo Clinic.”

Design and construction of both projects has started. The first treatment rooms are scheduled to begin receiving patients in mid-2015 and early 2016. All eight treatment rooms of the Mayo Clinic Proton Beam Therapy Program will be fully operational on both campuses in 2017 and will treat 2,480 patients a year.

### Treatment advantages

Mayo Clinic physicians and scientists will use pencil beam scanning to treat tumors that are deep seated, close to critical organs and body structures. “The goal is to more precisely target protons to ensure they treat cancerous tumors only and spare healthy tissue and organs, thus maximizing the ability to cure more cancers and help people live longer,” says Foote. “Because of the lower dose of radiation to normal tissue, more radiation can be given to the cancerous tumors in fewer therapy sessions to more effectively kill tumors. That makes the treatment more convenient for patients.”



Artist’s conception of proposed Rochester facility. (top)  
Artist’s conception of proposed Arizona facility. (bottom)

The lower dose of radiation to normal organs and tissues is especially important for children, where radiation treatment of developing organs can have significant long-term implications as the child grows into adulthood. And it's particularly important in treating young women with breast cancer because some women develop heart and/or lung damage, as well as secondary cancers decades after initial X-ray treatment.

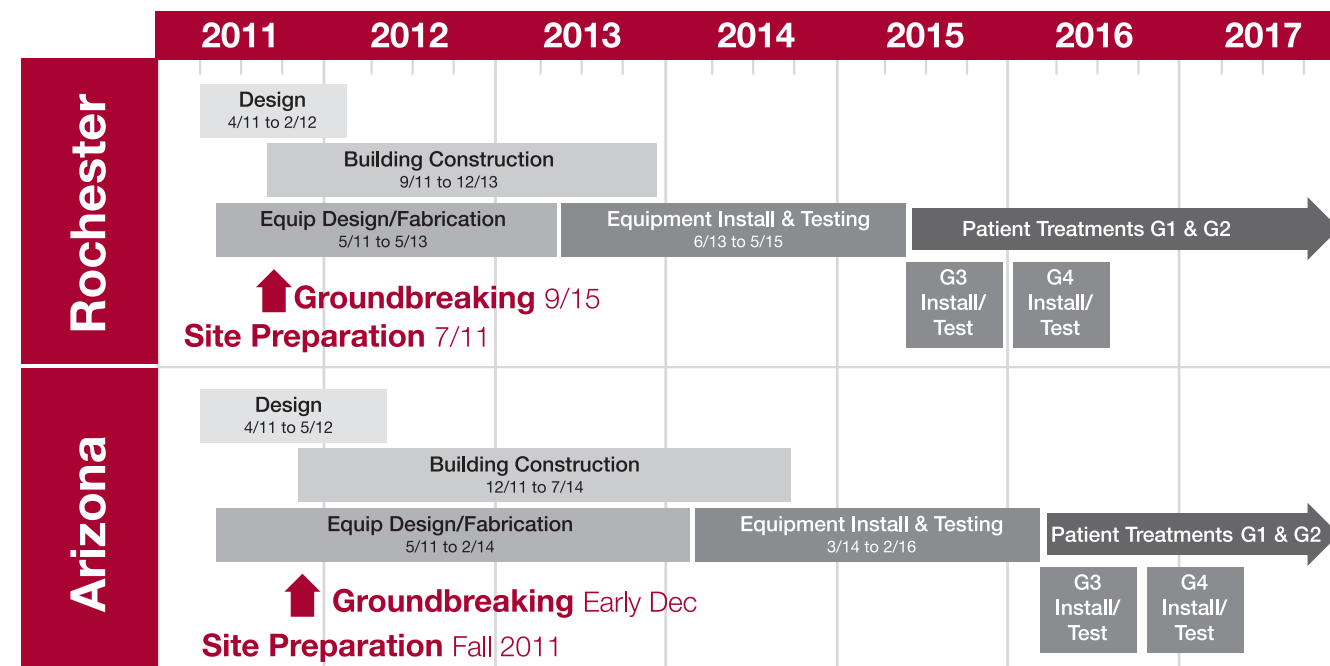
Just as important, proton beam therapy improves the quality of life for cancer patients since they experience less immediate discomfort during treatment, and the procedure has fewer impacts on bodily functions. In most cases, patients can continue with their normal daily activities while undergoing treatment.

Dr. Noseworthy summarizes it this way: "Mayo Clinic is uniquely qualified and capable of applying science, engineering and teamwork to offer this innovative cancer treatment to patients. Proton beam therapy will be integrated into our team approach of clinical practice by combining it with the very best surgical procedures and medical therapies — part of a cancer center within Mayo's full-service medical center." ■



Mayo Clinic in Florida

## Construction Milestones



G = gantry

Celebrating  
**25** Years



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We think of stories as a series of words well told. But for some stories, words alone aren't enough. The **25th anniversary of Mayo Clinic in Florida** is one such story.

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We knew that would be the case, so the staff of *Mayo Clinic Magazine* commissioned a three-day photo journey across the campus that returned more than 1,000 images. Choosing among those images was no easy task.

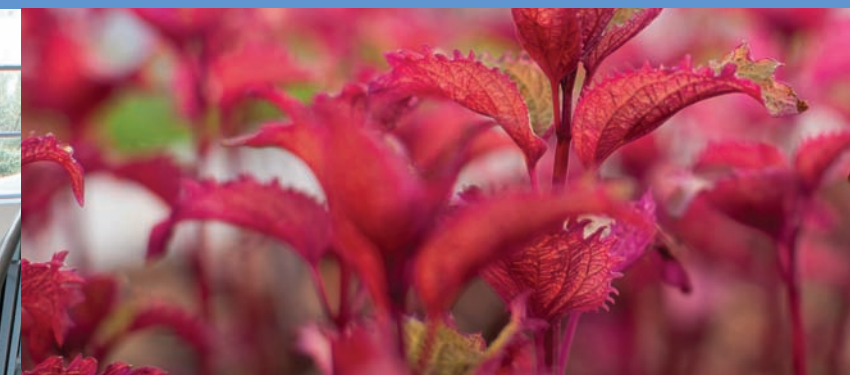
The final choices are spread across the next few pages. They depict a place that is as warm on the inside as it is on the outside. They show the Mayo Clinic mission flourishing in Florida. They underscore something fundamental about the nature of patient care. It's more than treating illness – it's about love, family and the things that make life worth living.

But perhaps most of all, they tell us that Mayo Clinic is timeless. The future is bright, thanks to the Davis family's extraordinary generosity and their unique gift of land, as well as the thousands of benefactors who have joined them in supporting Mayo Clinic in Florida.





A physician starts his day, heading toward the entrance to the Davis Building.



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