What was your favorite story?
What would you like to hear more about?
LET US KNOW!

moran.info@hsc.utah.edu
Moran Eye Center
@moraneayecenter
moraneyecenter.org

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A special thanks to the many hard-working Moran Eye Center employees, management, health care workers, physicians, patients, and researchers who generously contributed their time and talent to make this publication possible. Special thanks also to Kay Spatafore and Lori Garfield, designers.

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NEW TECH FOR A NEW ERA OF CARE

TRACKING DOWN DISEASE EARLIER WITH FLIO

THE ART OF ADJUSTING TO VISION LOSS

LASER SURGERY PROGRAM Removing Barriers to Independence

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A New Era for

OPHTHALMOLOGY

2017-2018 MORAN ADVISORY COUNCIL

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MESSAGE FROM THE CHAIR

There’s always something new happening at the John A. Moran Eye Center.

A unique partnership with the world’s largest eye care provider, Aravind Eye Care System, expands Moran’s commitment to create sustainable global eye care. As we work to train physicians around the world, a new nursing exchange program provides an equally important opportunity for medical professionals in developing nations.

In the fall, we added two new research labs to provide fresh insights and complement advances in the fight against eye diseases, including age-related macular degeneration and glaucoma. Moran also welcomed an exceptional oculoplastic surgeon and added a third uveitis specialist.

Five—that’s right, five—Moran physicians received well-deserved accolades from their peers at the 2017 American Academy of Ophthalmology meeting, and I couldn’t be more proud of them as leaders in the field.

Added to all of this is leading-edge work by Moran physicians and researchers that is truly poised to change the very practice of ophthalmology itself:

The latest research from Nick Mamalis, MD, and Liliana Werner, MD, PhD, at the Intermountain Ocular Research Center shows immense potential for Refractive Index Shaping, which uses a laser to adjust the power of an intraocular lens inside the eye of a patient following cataract surgery. This is remarkable new technology, and it could be a real game-changer in the field.

Next, consider the ongoing research of Paul Bernstein, MD, PhD. A remarkable new camera, the first of its kind in the U.S., is giving ophthalmologists access to information we’ve never had before: the ability to actually see retinal cells struggling to survive. That could lead us to our best and earliest treatment options for a host of eye diseases.

Barbara Wirostko, MD, is making significant strides as she studies Utah families with exfoliation syndrome. Her work has real implications for personalized medicine, and she’s working with national and international colleagues to shed new light on glaucoma and this syndrome as a systemic disease.

I am truly humbled to work with colleagues who have devoted their lives to our collective fight against blinding diseases and who have volunteered so much of their time working to eliminate curable blindness in places like Tanzania.

Our commitment to the people we serve at home and abroad has never been stronger, and I thank each of you for being part of the excitement that continues to build at the Moran Eye Center.

Sincerely,

Randall J Olson, MD
Professor and Chair, Department of Ophthalmology and Visual Sciences
CEO, John A. Moran Eye Center, University of Utah

SPENCER F ECCLES
Salt Lake City, Utah

CHRISTINE A FAIRCLOUGH
Salt Lake City, Utah

WAYNE IMBRECIA
John A. Moran Eye Center

CLAUDIA S LUTTRELL
Salt Lake City, Utah

JOHN A MORAN
Palm Beach, Florida

RANDALL J OLSON, MD
John A. Moran Eye Center

LYNN WARD
John A. Moran Eye Center

JOHN E WARNOCK, PhD
Los Altos, California

NORM A ZABRISKIE, MD
John A. Moran Eye Center

—3—
The Moran Eye Center’s Global Outreach Division travels the world setting up eye camps in some of the most remote and poorest regions on the planet: Tanzania, Micronesia, Haiti, Guatemala, and the Utah strip of the Navajo Nation. Because we need to perform eye exams and sight-restoring surgeries in safe, accessible locations, the patients must come to us.

Some walk from villages miles away. Many are completely blind, led by a caregiver holding a stick. Others ride horse-drawn carts or drive from isolated homes along endless dusty roads.

They are children in need of their first eye exam, teenagers who have suffered blinding eye trauma, grandparents who have never seen their grandchildren because their vision faded before the babies were born. They are people of all ages, unable to work or move forward in school or to cook a meal because of vision loss.

Once they can see, we all share the priceless rewards of smiles, tears, hugs, and the deepest gratitude possible.

In the following pages, we invite you to meet some of the people we serve in Tanzania.
THE GOAL: Sustainable Eye Care Around the Globe

THE CHALLENGE
39 million people on earth cannot see.
90 percent live in poverty in developing nations.
4 out of every 5 could be cured, but most lack access to care.
There simply aren’t enough local doctors.

OUR SOLUTION
Train local ophthalmologists in the blindest places in the world and help them to teach others.

Observerships
International ophthalmologists and medical professionals train at Moran for three months.

Local Outreach
Volunteers provide free eye care, surgeries, and eyeglasses on the Navajo Nation and throughout Utah.

International Outreach
Volunteers perform sight-saving surgeries in the field and train local doctors and staff.

Nurse Training
International nurses learn new skills at Moran, then use them back at home.

Resident Exchange
Moran residents can complete a rotation at an international institution, and vice versa.

Moran CORE
Clinical Ophthalmology Resource for Education, morancore.utah.edu, provides online, peer-reviewed, ophthalmic curriculum for trainees worldwide.

Learn more and/or donate at healthcare.utah.edu/moran/outreach
The John A. Moran Eye Center is supporting global efforts to eliminate curable blindness on an unprecedented scale thanks to a new partnership with the world’s largest eye care provider.

An agreement reached in late 2017 made Moran’s Global Outreach Division a North American academic partner of India-based Aravind Eye Care System, an innovator of low-cost, high-volume surgery. Moran is lending its educational expertise to Aravind, growing the number of eye surgeons in developing nations.

“By combining resources with Aravind we are dramatically improving the efficiency of training ophthalmologists practicing in the developing world,” said Jeff Pettey, MD, Moran’s Global Outreach Division co-medical director. “The impact is magnified as our continued support allows these ophthalmologists to create centers of training excellence in their own countries.”

Moran’s international ophthalmologist partners can now visit Aravind hospitals for training and fellowships. Beyond education, Moran is collaborating with Aravind on large-scale clinical research and intraocular lens technologies and design.

“Our researchers now have access to Aravind’s extraordinary patient volume and innovations,” said Global Outreach Division Senior Medical Director Alan S. Crandall, MD, who traveled to Aravind headquarters in Chennai to demonstrate surgical techniques in December 2017. “Together, we are perfectly aligned to boost training opportunities and to move new treatments and techniques forward more quickly.”

An exchange of ideas also stands to improve care. In Chennai, Crandall tested Aravind’s new, more affordable version of a phacoemulsification machine used during cataract surgery in developed nations.

**About Aravind**

Aravind was founded in 1976 and is renowned for developing a cost recovery model that encourages patients who can afford to pay for surgery abroad to stay in India for their care. Those funds then pay for surgery for someone without financial means. Among 18 hospitals and community eye clinics and 2,500 free vision-screening clinics, Aravind surgeons performed more than 500,000 surgeries in the year ending March 2017.
A new, donor-supported Nurse Exchange Program furthers Moran’s Global Outreach Division’s goal of sustainability.
NURSE EXCHANGE PROGRAM

From Ghana to Moran and Back

MEETVIDA

Growing up in Ghana in western Africa, Vida Addo Boateng, RN, always knew she wanted to be a nurse.

She began her journey with a general nursing diploma from the Nurses and Midwifery Training College in Kumsai, one of Ghana’s largest cities. As her training progressed, she developed a deep interest in eye care—a critical need in her country where only 78 ophthalmologists reside, and out of 24 million citizens, 450,000 are blind or visually impaired.

“I worked in several emergency units in Ghana, and in so many cases of trauma, the eye was the last thing that got attention,” she said. “Once everything else was done to sustain some patients, they ended up losing an eye—and in some cases that could have been prevented. This happened to my own grandma, and it had a big impact on me.”

After advancing through several more degrees, Boateng, 35, became a nursing officer at Komfo Anokye Teaching Hospital (KATH) in Kumsai, where Moran has had a decades-long relationship and was instrumental in establishing KATH’s own Eye Centre, which opened in 2014. While KATH is one of the best hospitals in Ghana, it is still evolving in terms of updating procedures, safety, and efficiency.

In August 2017, Boateng became the third KATH nurse to participate in Moran’s Nurse Exchange Program.

She shadowed nurses and doctors in operating rooms and the post-anesthesia care unit. She learned the detailed process of scrubbing for retinal surgeries, studied Moran’s safety protocols, and joined an outreach mission to the Navajo Nation. In her words, Boateng said, “I also really learned the importance of teamwork.”

Now, Boateng is teaching and training other nurses, readying her team to assist in retinal surgeries—a specialty set to debut at KATH later this year.

“We all connected with Vida,” said Moran’s Carolyn Chappell, RN, BSN. “She’s smart and compassionate—and fun. She now has a vision of the possibilities for improvement in her own center and can go back and be an example to her peers.”

Donors Make it Happen

Moran’s Global Outreach Division is supported solely by donors and staffed by volunteer physicians, nurses, and technicians.

The Lisa and Dave Crandall Endowment for Surgical Support Training made the Nurse Exchange Program possible. David Crandall, MD, is an ophthalmologist and the son of Alan S. Crandall, MD, senior medical director of Moran’s Global Outreach Division. He and his wife, Lisa, have joined several of Moran’s outreach missions.

“Our motivation to create the endowment stemmed from our first-hand experience. Outreach trips are impossible without the amazing support staffs, both from the U.S. and from the local areas,” said Lisa. “The physicians get a lot of glory, but nothing can function without the efforts of techs, nurses, and all-purpose volunteers.”
Ophthalmology outcomes aren’t nationally tracked, so it’s difficult to add them to the methodology. But Olson suggested adding two other factors:
The amount of peer-reviewed publications an institution generates relative to its number of researchers
National Institutes of Health funding relative to researchers

Olson also argued that doctors should only be allowed to vote for institutions outside of their regions and those they haven’t trained at, ranking their top three choices.

“Each year, Moran does exceptionally well in these rankings,” said Olson, “and it’s impressive that many of our peers hold us in such high esteem. But, I believe adding additional measures could provide a more complete picture of the factors that lead to exceptional care.”

The John A. Moran Eye Center’s exceptional clinical care, residency program, and research place it among the top 12 programs in the nation, according to top leadership at eye centers across the country.

An Ophthalmology Times survey of chairpersons and residency program directors released in November ranks Moran at No. 9 for having the best overall program. Nationally, Moran’s residency program ranked No. 6, clinical care ranked No. 10, and research No. 12.

“These rankings are significant since they represent the viewpoints of eye care leaders around the nation,” said Moran Eye Center CEO, Randall J Olson, MD. “We couldn’t be more pleased that the quality of our programs have been recognized in this way.”

Olson recently shared his thoughts on improving the U.S. News and World Report’s ranking systems as an invited speaker at the magazine’s Healthcare of Tomorrow conference held in Washington, D.C. U.S. News uses just one factor to rank specialties like ophthalmology: an institution’s reputation, determined by doctor votes.

As the Moran Eye Center ranked among the nation’s top 12 programs in an Ophthalmology Times poll, U.S. News & World Report invited Moran CEO Randall J Olson, MD, to speak on how their specialty-rankings methodology could be improved.
Moran Eye Center
2017 Profile

142,229
Patient Visits

$572,285.45
Research Grant Funding per Capita

7,027
Surgeries

National Rankings

*Ophthalmology Times*
- **6th**: Residency Education Program
- **9th**: Best Overall Program
- **10th**: Clinical Care
- **12th**: Research Program

*U.S. News & World Report*
- **15th**: Best Hospitals for Ophthalmology

*Doximity*
- **11th**: Residency Education

Patient Visits

- Comprehensive Ophthalmology: 27,054
- Retina: 17,040
- Glaucoma: 17,645
- Cornea/Refractive: 19,700
- Oculoplastics: 3,030
- Uveitis: 16,645
- Optometry: 32,402
- Pediatrics: 4,408
- Neuro-Ophthalmology: 4,154
- General: 151

- Total Patient Visits: 142,229
- Surgeries: 7,027
- Research Grant Funding per Capita: $572,285.45
The Waldron Family
Hopping into the driver’s seat of her off-highway vehicle (OHV), 74-year-old Jeanine Waldron Carter fires up the ignition and floors the gas—but it doesn’t move. To the question, “Are you sure you know how to drive this thing?” she flashes a mischievous sideways smile, pops the emergency brake, and laughs big as the OHV lunges for the dirt road ahead.
Despite having an aggressive form of glaucoma, Jeanine expertly navigates a sharp curve and heads up a steep, windy hill into the foothills of Richville, Utah. Below, a mosaic of farms dots the narrow valley. Jeanine squints, blinks, and dabs at her watery eyes as she points out the farm she grew up on.

“This is the land my great-grandparents settled,” she said. With 12 children and hard work, Gillispie Waldron and his wife, Ann, built a dairy farm and a lasting legacy—Jeanine’s brother Dee and his wife, Sherry, still own and operate the farm today. But, it wasn’t until Jeanine participated in a study with Moran Eye Center glaucoma specialist Barbara Wirostko, MD, that she learned she and her four siblings all share another, more challenging inheritance: exfoliation syndrome (XFS).

The Eye Tells All
A systemic disorder appearing later in life, XFS is caused by a dysfunction in the gene responsible for repairing the body’s elastin tissue. As a result, a protein material resembling whitish specks collects in the eyes, skin, and other organs including the heart, blood vessels, lungs, gallbladder, and uterus.

People with XFS are predisposed to cardiovascular disorders, irregular heart rhythms, hernia, lung disorders, and pelvic prolapse. Yet, while the gene can be discovered through a blood test, it’s not usually identified until an ophthalmologist spots the protein-like material in the eye.

There, the material can make cataracts progress more rapidly and clog the eye’s drainage system, causing glaucoma—an
increase in intraocular pressure that kills retinal cells and can lead to vision loss.

“What we have found is that if you can see this material in the eye, you know your patient has the gene,” explained Wirostko. “But we don’t know why the material shows up in some family members and not others, or why one eye could have a lot of material and horrible glaucoma, and the other eye could have only a little bit of material and no glaucoma.”

**A Common Thread**

Jeanine and her two sisters, Elaine and Christine, all have glaucoma. But Jeanine’s is the most advanced. Under the care of Moran physicians, she’s had surgery in both of her eyes to drain fluid and has undergone cataract surgery. Despite adhering to a strict regime of three different eye drops, three times a day, she recently needed another procedure to lower increasing pressure, performed by Moran glaucoma specialist, Craig Chaya, MD.

Joining the XFS study at the suggestion of Moran glaucoma specialist Alan S. Crandall, MD, Jeanine learned that while her two brothers Dee and Leon aren’t affected by glaucoma, all five siblings have XFS. The revelation allowed family members to quickly recognize the disorder as a common thread in a long history of ailments.

Jeanine was diagnosed with an esophageal hernia 25 years ago, had double bypass surgery 17 years ago, and was diagnosed with glaucoma 10 years ago. She continues to be monitored for heart arrhythmia and takes blood pressure medication.

“Before the study, I had no idea that my eyes and all these other diseases could be related,” said Jeanine. “You don’t know what you don’t know.”

Now, many of the family’s younger generations are participating in the study and aware of their increased risk for XFS-related diseases. But, even those patients who aren’t participating in the study can benefit from better preventative care—if they and their doctors know what to look for.

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*“We need to increase awareness for better testing among physicians. If you don’t dilate the pupil, or if you don’t do a close slit-lamp exam, you may miss some of these XFS patients.”*  
—Barbara Wirostko, MD

*XFS causes a protein-like material, resembling whitish specks, to collect in the eye.*
Utah—An XFS ‘Hot Spot’

Utah might be the perfect place to study XFS. The disorder is often seen in people of northern European ancestry like the Waldrons, and Utah has a predominant population of large families with a similar heritage. It also has a unique resource in the Utah Population Database (UPDB), which has made it possible for researchers to study genetics, epidemiology, demography, and public health for nearly 40 years. The database holds more than 25 million individual pieces of medical information for over 8 million people and genealogical records from the Utah Family History Library.

Wirostko, in collaboration with the University of Utah’s Department of Obstetrics and Gynecology, recently determined that women with POP had a 50 percent increased risk of having XFS. Women between 30 and 65 years of age who had a POP diagnosis, when followed for 20 years, had a 48 percent increased risk of developing XFS during that time.

Wirostko believes cross-disciplinary research will not only shed light on the genetics and related disorders of XFS in future studies, but transform patient care.

“We need to shift our focus from just lowering eye pressures,” she said. “If we can look at the underlying genetic causes and delve into the whole patient—their personal histories and habits—perhaps we can actually find new personalized therapies to cure XFS glaucoma and other related disorders.”

“If patients have elastin-tissue related conditions, like a hernia or pelvic organ prolapse (POP), they should also be getting their eyes checked,” said Wirostko. “We also need to increase awareness for better testing among physicians. If you don’t dilate the pupil, or if you don’t do a close slit-lamp exam, you may miss some of these XFS patients.”

The Goal: Personalized Therapies

In addition to genetics, Wirostko and her collaborators are also examining age, ultraviolet exposure, and higher altitudes as risk factors for XFS. Their efforts have already produced significant new knowledge that could help XFS patients.

Wirostko believes cross-disciplinary research will not only shed light on the genetics and related disorders of XFS in future studies, but transform patient care.

“My advice for my kids is that as they get older, they need to be more diligent about getting checked out because XFS is an age-related disease.”

—Leon Waldron

Utah—An XFS ‘Hot Spot’

Utah might be the perfect place to study XFS.

The disorder is often seen in people of northern European ancestry like the Waldrons, and Utah has a predominant population of large families with a similar heritage. It also has a unique resource in the Utah Population Database (UPDB), which has made it possible for researchers to study genetics, epidemiology, demography, and public health for nearly 40 years. The database holds more than 25 million individual pieces of medical information for over 8 million people and genealogical records from the Utah Family History Library.

For the study, Wirostko is interviewing patients and relatives to learn about their family and medical histories, conducting standard eye exams, and taking blood samples.

“It is a huge benefit having almost the entire Waldron family participating in this study,” said Wirostko, calling it almost “unheard of” to have all five siblings with XFS.

Jeanine is thankful physician-scientists like Wirostko are working to solve XFS. Having received a teacher-of-the-year award, the consummate instructor believes, “If the study helps educate others, then, that’s a good thing.”
### Study Collaborators

**MORAN EYE CENTER**
Barbara Wirostko, MD; Norm A. Zabriskie, MD; Alan S. Crandall, MD; Susan Chortkoff, MD; Craig Chaya, MD; Gregory S. Hageman, PhD, and Moran Steele Center for Translational Medicine.

**UNIVERSITY OF UTAH, PEDIGREE AND POPULATION RESOURCE,**
Huntsman Cancer Institute, Karen Curtin, PhD, MStat; Peggy Norton, MD; Kristina Allen-Brady, PhD.

**SHELLEY AND STEVEN EINHORN CLINICAL RESEARCH CENTER**
The New York Eye and Ear Infirmary of Mount Sinai: Robert Ritch, MD, FACS.

**GENOME INSTITUTE OF SINGAPORE**
Tin Aung, MD, PhD, and CC Khor, PhD.

**DUKE UNIVERSITY**
Rand Allingham, MD.

**GLAUCOMA FOUNDATION, NY, NY,** Awarded Wirostko a $40 K grant to study XFS.

### Waldron Family Tree

Possible XFS-related conditions in the five Waldron siblings and their parents from genetic data, family history, and/or study records.

<table>
<thead>
<tr>
<th>Stuart Waldron</th>
<th>Louise Butars Waldron</th>
</tr>
</thead>
<tbody>
<tr>
<td>1915-1978</td>
<td>1915-2008</td>
</tr>
<tr>
<td>Cataracts</td>
<td></td>
</tr>
<tr>
<td>Hernia-abdominal</td>
<td></td>
</tr>
<tr>
<td>Hernia-esophageal</td>
<td></td>
</tr>
<tr>
<td>Hypertension</td>
<td></td>
</tr>
<tr>
<td>Pulmonary embolism</td>
<td></td>
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</tbody>
</table>

#### Possible XFS-related conditions in the five Waldron siblings and their parents from genetic data, family history, and/or study records.

<table>
<thead>
<tr>
<th>Elaine Waldron Page</th>
<th>Jeanine Waldron Carter</th>
<th>Dee Waldron</th>
<th>Christine Waldron Andrews</th>
<th>Leon Waldron</th>
</tr>
</thead>
<tbody>
<tr>
<td>1935</td>
<td>1943</td>
<td>1948</td>
<td>1952</td>
<td>1956</td>
</tr>
<tr>
<td>Asthma</td>
<td>Cardiovascular disease</td>
<td>Glaucoma</td>
<td>Heart arrhythmia</td>
<td>Hernia-abdominal</td>
</tr>
<tr>
<td>Cataracts</td>
<td>Exfoliation material in the eyes</td>
<td>Glaucoma</td>
<td>Hernia-esophageal</td>
<td>Hypertension</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>Ischemic heart disease</td>
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<td>Lung disease</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Varicose veins</td>
</tr>
</tbody>
</table>

- **Asthma**
- **Cardiovascular disease**
- **Cataracts**
- **Exfoliation material in the eyes**
- **Glaucoma**
- **Heart arrhythmia**
- **Hernia-abdominal**
- **Hernia-esophageal**
- **Hypertension**
- **Ischemic heart disease**
- **Lung disease**
- **Varicose veins**
New Tech for a
NEW ERA OF CARE

Over the past three decades, Moran Eye Center’s Nick Mamalis, MD, and Liliana Werner, MD, PhD, have vetted some of the most innovative devices in eye care.

Intraocular lenses (IOLs) replace the eye’s own natural lens for more than 6 million people—most of them cataract patients—around the globe each year. There’s hardly one on the market that hasn’t been tested at the duo’s nonprofit Intermountain Ocular Research Center at Moran.

While the invention of the IOL dates back to the 1940s, the device is still going through myriad refinements: companies worldwide send the center a steady stream of prototypes and materials in an industry projected to reach $4.7 billion in the U.S. by 2020. The race to develop the ‘perfect’ IOL has created a complex landscape of choices for both doctors and their patients, but the latest technology to arrive in the Mamalis Werner lab—laser-assisted Refractive Index Shaping (RIS)—could change all that, and more.

To grasp the revolutionary nature of RIS, one must understand the challenges of IOLs from a surgeon’s perspective.
‘WE’RE STILL DEALING WITH HUMANS’

In the U.S. alone, cataract surgery accounts for 3.2 million outpatient procedures each year, and it’s one of the safest and most effective surgeries available. Even so, ophthalmologists must help patients choose the IOL that’s right for them.

Surgeons like Mamalis want to give their patients both distance and near vision after surgery. For that, selecting a so-called multifocal or ‘premium’ IOL might be best, although unwanted visual side effects such as glare can occur. Choose a monofocal IOL, and the patient must commit to wearing eyeglasses after surgery.

Beyond selecting IOL type, calculating how powerful its refractive properties should be isn’t an exact science.

“Although techniques for measuring the length and shape of the eye and the formulas for calculating the power of the IOLs themselves are getting better, it’s still not perfect,” said Mamalis. “The problem is that even when we use the best measurements, the best formulas, we’re still dealing with humans. That means there are still going to be some people that end up not having the proper result.”

In some cases, an IOL can later shift its position inside of the eye. Dislocations might be prompted by eye trauma, eye diseases that weaken the tissues holding the lens in place, or even complications from other eye surgeries. Removing an IOL isn’t optimal: the procedure carries a higher risk for complications.

A computer rendering of Refractive Index Shaping, which uses a laser to adjust an IOL while it is in the eye. The high-frequency laser produces no cuts or ablations and takes just 23 seconds.
THE NEXT BIG LEAP

But what if physicians had several opportunities to adjust the IOL power and type weeks and even years after placing it into a patient’s eye—all without making a single incision? Therein lies the appeal of RIS, laser technology owned by California-based Perfect Lens, LLC.

The RIS Perfector laser uses ultra-short pulses to induce a chemical reaction that changes the IOL in just 23 seconds and produces no cuts or ablations on the eye. The result could be incredibly accurate vision. A 2016 study by Mamalis and Werner found RIS to be both biocompatible and extremely accurate, producing IOL power within .01 diopter of its target. That translates into a level of accuracy better than eyeglasses can produce.

The possibilities don’t end there.

“Let’s say a patient already has a multifocal lens, but doesn’t like it,” said Werner. “With this technology, you could erase what’s already on the lens and switch to something else.”

When might RIS be available for patients? Mamalis and Werner are now conducting a second, six-month biocompatibility study that could lead to FDA approval to take RIS into clinical trials at Moran.

A ‘DISRUPTOR’ FOR INDUSTRY

The driving motivation for ophthalmologists to adopt RIS is improving sight—for patients, it may be their pocketbooks.

U.S. health insurers that cover cataract surgery don’t often foot the bill for anything other than a monofocal IOL. Those who can afford it pay thousands out of pocket for premium lenses with additional features, including multifocal IOLs.

Perfect Lens CEO Steven Smathers said RIS could reduce costs, allowing patients to choose a basic, low-cost IOL covered by their insurer. Then, they’d pay a few hundred dollars to have its power and features adjusted through RIS.

“It’s game-changing technology for the industry,” said Smathers, “but attractive for patients.”

At the Intermountain Ocular Research Center, Mamalis and Werner study not only IOL technologies and design, they examine IOL-related complications, surgically removed IOLs, and eye tissue with lens-induced disease.

RIS Could be Life Changing for Pediatric Patients

Four months after her premature birth, Isabella Garcia has already undergone cataract surgery in one eye.

Now, Moran pediatric specialist, Leah Owen, MD, PhD, is teaching Isabella’s mother, Klarita Garcia, how to place a tiny contact lens in her baby’s eye.

“Isabella’s eye will grow a lot before she reaches school age, when we can implant an IOL,” explained Owen.

“But since we can’t change the IOL power once it’s in the eye, we have to ‘over-power’ the IOL so she can grow into it.”

That means multiple contact lens changes and strong glasses.

“All these moving parts must be constantly assessed because it’s a very important time for the brain to learn vision,” said Owen.

RIS would enable Owen to easily adjust the IOL as Isabella grows.

The idea that her daughter could grow up with better vision and face fewer eye surgeries as an adult is an amazing prospect for Klarita Garcia.

“I’m so glad technology is advancing and that this could be a possibility,” she said. “Getting such good care and medical treatment is why our daughter is here with us today.”
TRACKING DOWN DISEASE EARLIER WITH FLIO

Long before retinal diseases begin to rob a person’s eyesight—long before symptoms develop or a thorough dilated eye exam can discover it—retinal cells begin a quiet, unnoticed struggle to survive.

It’s only after a substantial number of cells have died that diseases including glaucoma, age-related macular degeneration, and rarer inherited conditions are discovered and treated.

But a new imaging tool, brought to Moran Eye Center researchers by former visiting international physician Lydia Sauer, MD, suggests a potential shift in the paradigm. An extremely sensitive, non-invasive camera—the first of its kind in the U.S.—has allowed retinal specialist Paul S. Bernstein, MD, PhD, to identify subtle changes in retinal cells that point to disease earlier than ever before.

Using the fluorescence lifetime imaging ophthalmoscopy (FLIO) camera, Bernstein, Sauer, and Moran resident Rebekah Gensure, MD, PhD, identified macular telangiectasia type 2 (MacTel)—a notoriously difficult to diagnose hereditary disease that causes central vision loss. FLIO not only showed a metabolic cell ‘signature’ for early-stage MacTel, but evidence of a difference in the metabolic state of retinal cells in people who are likely to have a carrier gene but no symptoms of the disease.

“We were able to image more than 20 people with MacTel for the study, and that’s a large number for a rare disease,” said Bernstein. “FLIO has a great future as an imaging technique, and MacTel appears to be an ideal condition to demonstrate its potential.”

Since the actual gene responsible for MacTel hasn’t yet been found, genetic testing isn’t available. But FLIO, in the hands of experts, could ferret out a person’s risk for developing it. FLIO might also someday be used, for example, to identify the onset of a host of other inherited eye diseases.

WHAT IS FLIO?
The FLIO camera records the mean lifetimes of fluorophores, a fluorescent chemical compound found in the retina that re-emits light when it is stimulated by a laser. These measurements show the health of retinal cells.

The FLIO images at left show early, intermediate, and advanced stages (blue center) of cell death in three MacTel patients.
Judy Summer has been creating art since 1967’s Summer of Love. And ever since she moved her young family from the wilds of Topanga Canyon, near Los Angeles, to Park City, Utah, in the 1970s, she and the town’s burgeoning arts community have embraced one another. Summer helped establish the Park City Professional Artists Association and the after-school art therapy program, Arts-Kids. She taught art in public schools and in her own studio, all the while creating sculptures and jewelry and selling them in galleries and at festivals. She fell in love with metal forging and learned how to belly dance.

It was, and at the age of 81, still is, a beautiful life, although Summer’s vision is now extremely limited.
Since her vision has diminished, Summer’s art has evolved. She has long been known for the stylized, free-spirited horses she sculpts from polymer clay. While she once used more subtle muted or dark colors, the newer horses pop with bright, vibrant colors, which are easier for her to work with. A long-time horse lover, she owns two of her own. They stand sentinel next to a sage green barn just steps from her hillside home and art studio.

“It’s my challenge every morning to get to them, feed them, and then get back to the house,” she said. “Support comes in many forms. I use ski poles for the walk.” —Judy Summer

She first began going blind in her left eye, due to a decades-past accident. Later, in her 70s, she began to lose vision in her right eye to advanced glaucoma and age-related macular degeneration. Because of these challenges, she’s had to gradually shift the way she works on her sculptures and her life—and she’s done it as artfully as possible. She sees a team of specialists at Moran and works closely with Moran’s Patient Support Program, including one-on-one consultations in her art studio with Certified Low Vision Occupational Therapist, Kasey Mitchell.

“With vision loss, you have to give some things up, so I try and accept what comes each day and hope for the best—but I also try to stay a little ticked off and ask myself, ‘what can I conquer today?’ ” said Summer. “If you stay focused on the things you love to do, you can eventually get from A to B.”

Mitchell has helped Summer continue to create, adjusting contrast and lighting in her studio and suggesting she wear visors to help her eyes focus. She now works against white backgrounds. Every little modification helps.

“Working with Kasey, who is also creative and does woodworking, I feel secure, like I can look ahead,” she said.
“My goal is to be independent again, with my care following me, rather than me living at home or in assisted living. Not having to wear glasses brings me one step closer to that goal.”
—Marshall Burningham

For a decade, 30-year-old Marshall Burningham worked hard to have his own internet technology business.

Working for Apple, he traveled the world to hone his tech skills and become, as he describes, a ‘Swiss Army Knife’ of technology. He loved the single, independent life of living in downtown Salt Lake City—far from his parent’s alpaca farm. There, he walked anywhere and everywhere.

That all changed one evening in 2016. Leaving work around 1 a.m., he grabbed some takeout, walked home, and climbed the five flights of stairs to his apartment. The next thing he remembers is being loaded into an ambulance. He can’t recall falling 50 feet, telling the people who found him he ‘just needed a minute,’ or that he couldn’t lift his hand to take the glass of water they offered him.

“Marshall’s spinal cord was severely damaged; he’s lost all feeling below his shoulders and much of the mobility in his arms, head, and neck,” said Burningham’s father, Kim. “But we are not giving up.”

Spinal Cord Rehab team members and Burningham, from left to right: Sue Sandwick, physical therapist; Brian Guido, program assistant; Marshall Burningham; Tanja Kari, program administrator; and Wendy Carbone, physical therapy student.
“I’ve come a long way from where I was,” said Burningham. “I’m getting used to a new life back with my parents. But, some days are still hard.” By flexing his biceps and triceps, he can drive his chair—which cost $55,000.

“Medicaid covered part of it,” said his father. “We used credit cards for the rest. But anything that makes his life better, helps.”

That includes getting rid of Burningham’s dependence on contact lenses, one of many barriers to independence for spinal cord recovery patients.

Funded by the John A. Moran Eye Center’s Global Outreach Division, a partnership between Moran’s Cornea and Refractive Department and the University of Utah’s Spinal Cord Injury Program and Rehabilitation Center offers the gift of sight at no charge to spinal cord injury patients who have limited or no use of their arms and hands.

“My goal is to be independent again, with my care following me, rather than me living at home or in assisted living,” said Burningham. “Not having to wear glasses brings me one step closer to that goal.”
MORAN PHYSICIANS EARN TOP HONORS

The John A. Moran Eye Center celebrated physicians who earned prestigious honors in 2017 at the American Academy of Ophthalmology (AAO) meeting.

*From left to right, Alan S. Crandall, MD; Nick Mamalis, MD; Mary Elizabeth Hartnett, MD; Randall J Olson, MD; Kathleen B. Digre, MD; Jeff Petrey, MD; Liliana Werner, MD, PhD; Roger Furlong, MD.*
Kathleen B. Digre, MD, was honored with the William F. Hoyt Award for her achievements in neuro-ophthalmology. Digre founded Moran’s Neuro-Ophthalmology Service and directs the Division of Neuro-Ophthalmology and Headache at the University of Utah. There, she started the Headache Clinic, creating a care pathway to improve headache treatment and streamline access for patients.

Jeff Pettey, MD, received the Artemis Award in recognition of his charity care efforts to eradicate preventable blindness locally and globally. He founded Moran’s Operation Sight Day, which provides free, sight-restoring surgeries to Utahns, and works to expand education and training opportunities for international ophthalmologists.

Alan S. Crandall, MD, received the Charles D. Kelman Award for improving cataract surgery through education and innovation. A renowned glaucoma and cataract surgeon, Crandall is one of the few physicians in the country to perform adult and pediatric lens dislocation and explantation surgery, and he works to create sustainable eye care in developing nations.

Also, Crandall was selected to receive the American Society of Cataract and Refractive Surgery (ASCRS) Foundation’s inaugural 2018 Chang Humanitarian Award for his outstanding work to alleviate cataract blindness in the U.S. and abroad.
Mary Elizabeth Hartnett, MD, PhD, was selected to receive the 2018 Mildred Weisenfeld Award from the Association for Research in Vision and Ophthalmology (ARVO). The honor recognizes distinguished scholarly contributions to the clinical practice of ophthalmology in memory of Weisenfeld, who founded the Fight for Sight charity to fund eye and vision research.

A pediatric vitreoretinal surgeon, Hartnett’s National Institutes of Health-funded research has led to breakthroughs in our understanding of retinopathy of prematurity, a blinding disease affecting premature infants, age-related macular degeneration, and diabetic eye disease.

Roger Furlong, MD, was honored with Moran Eye Center’s Distinguished Alumni Award. As a Moran adjunct volunteer, he has lent his surgical skills on countless outreach trips to developing nations under the mentorship of Alan S. Crandall, MD. Furlong, who practices at Montana’s Rocky Mountain Eye Center, completed an advanced fellowship in glaucoma, cataract, and intraocular lens surgery at Moran.

Liliana Werner, MD, PhD, and Nick Mamalis, MD, landed the AAO Best-in-Show Video Award for their film, “Fun with Femtosecond Lasers: Episode II-Adjustment of IOL Power.” The film, which discusses Refractive Index Shaping and the pair’s role in vetting the new technology, also earned Werner first prizes in 2017 video festivals held by the American Society of Cataract and Refractive Surgery and its European counterpart. Mamalis was individually recognized with AAO’s Secretariat Award for Clinical Education for his dedication to lifelong learning.
Ophthalmic imaging technology becomes more sophisticated each year. These five prints, selected from over 900 exhibits submitted internationally, won awards at the Ophthalmic Photographers Society’s Scientific Session at AAO.

**AAO ACCOLADES GO TO MORAN’S OPHTHALMIC IMAGING DEPARTMENT**

“**Asteroid Hyalosis**”  
Jim Gilman, CRA, FOPS, First Place for Ultra-Widefield Imaging.

“**Choroidal Rupture**”  
Melissa Chandler, COA, CRA, OCT-C, Second Place, Monochromatic Photography.

“**Posterior Synechiae**”  
Becky Weeks, COA, CRA, Honorable Mention in Slit Lamp Photography.

“**Giant Retinal Tear**”  
Jim Gilman, CRA, FOPS, Third Place for Ultra-Widefield Imaging.

“**Central Retinal Vein Occlusion**”  
Danielle Princiotto, COA, Honorable Mention in Fluorescein Angiography.
Amy Henderson, LCSW, and Lisa Ord, PhD, LCSW, received the Social Worker of the Year Award for their excellence in social work leadership in Utah, presented by the Utah Society for Social Work Leadership in Health Care. Ord directs Moran’s ophthalmology-based Patient Support Program, and Henderson is the program’s social worker and psychotherapist.

Barbara Wirostko, MD, was honored in the Top Researcher Category for her Jade Therapeutics project at the University of Utah’s Celebrate U, 2017 event, which showcases extraordinary faculty achievements. The event is sponsored by the Marriott Library and the Office of Vice President for Research. A glaucoma specialist, Wirostko was recognized for her research on developing a unique polymer that can be applied to the eye to help heal corneal surface wounds, cuts, and burns faster. Corneal blindness is the fourth leading cause of blindness globally.
At UC Irvine, he founded the International Ultrasound Project, which uses medical students to teach ultrasound and conduct research in Mwanza, Tanzania. He also received a $60,000 John Tu grant to initiate what has now become an integrated medical education course at a Mwanza medical school.

In addition to his retinoblastoma research, Jacobsen is investigating the use of ultrasound as a diagnostic imaging device in low-resource settings. He plans to continue his research at Moran, combining it with his ongoing passion for furthering high-quality care in underserved areas.

First-year ophthalmology resident Bradley H. Jacobsen, MD, is focused on the retina—specifically on researching alternative treatments for patients with retinoblastoma, a type of eye cancer most common in children.

As Moran Eye Center’s latest Achievement Rewards for College Scientists (ARCS) Foundation Scholar, he now has the support he needs to continue his research while completing his residency.

Each year, the ARCS Foundation awards $15,000 to a first-year resident to support ongoing research so that residents don’t have to put their work on hold. Moran matches the award for the following two years of residency, providing a total of $45,000 for a young researcher who shows exceptional promise.

Jacobsen earned his medical degree at the University of California, Irvine School of Medicine and completed his intern year in general surgery at Baylor College of Medicine in Texas.

At UC Irvine, he founded the International Ultrasound Project, which uses medical students to teach ultrasound and conduct research in Mwanza, Tanzania. He also received a $60,000 John Tu grant to initiate what has now become an integrated medical education course at a Mwanza medical school.

In addition to his retinoblastoma research, Jacobsen is investigating the use of ultrasound as a diagnostic imaging device in low-resource settings. He plans to continue his research at Moran, combining it with his ongoing passion for furthering high-quality care in underserved areas.
Moran Adds Two New Specialists

Douglas P. Marx, MD, specializes in oculoplastic and reconstructive surgery and has extensive experience in pediatric oculoplastics related to cancer and other eye socket and eyelid abnormalities. He has a particular interest in orbital tumors, eyelid and orbital reconstruction, and congenital defects.

Marx joined Moran from Baylor College of Medicine in Houston and Baylor Eye Physicians & Surgeons and Texas Children’s Hospital. After graduating from Brigham Young University, he earned his medical degree from the Georgetown University School of Medicine and completed a fellowship in oculofacial plastic and reconstructive surgery at the Oregon Health and Sciences Casey Eye Institute. Marx is also a recipient of the Stephen N. Schindler Award for high ethical and humane standards.

Marissa Larochelle, MD, recently completed Moran’s first Association of University Ophthalmology Professors-compliant uveitis fellowship with uveitis experts Albert T. Vitale, MD, and Akbar Shakoor, MD. The one-year program immerses fellows in the full spectrum of uveitis pathology. As a complex disease, its treatment involves looking at every system in the body.

Larochelle earned her medical degree from the University of Vermont and completed her ophthalmology residency at the University of Colorado. She has co-authored several published studies, presented at regional conferences, and founded a women’s college scholarship fund in the Dominican Republic.
New Researchers Join Moran, Adding Two New Labs

Associate Professor Behrad Noudoost, MD, PhD, studies how the cognitive processes of attention, memory, and eye movement affect visual processing. Funded by the National Institutes of Health and the National Science Foundation, his lab at Moran is currently focused on mapping the role of the brain’s prefrontal cortex in vision. Noudoost joined Moran from Montana State University.

Assistant Professor Frans Vinberg, PhD, works to understand mechanisms in the retina that enable the human eye to function over a wide range of light intensities and colors. At Moran, his lab examines how these mechanisms are affected in major blinding diseases including age-related macular degeneration and diabetic retinopathy. Vinberg was formerly a postdoctoral fellow at Washington University. There, he developed the Ex Vivo ERG, a device that allows researchers to assess the function of retinal cells and how drugs affect them.

Research Assistant Professor Neda Nategh, PhD, works to understand how the visual system functions from a computational perspective, using tools from statistics and mathematical modeling. Her engineering lab conducts several joint research projects with the Noudoost lab, focusing on the effects of eye movements in processing the visual world. Nategh, married to Noudoost, also joined Moran from Montana State University.
Moran offers one of the nation’s top educational programs, providing excellent didactic training and extensive surgical experience. A 2017 Ophthalmology Times survey of eye center chairpersons and residency program directors ranked Moran’s residency program at No. 6 in the country. Why?

A Unique Approach
At Moran, our residents are exceptionally prepared. We require they complete their internship in a combined Ophthalmology and Internal Medicine program, spending four months in ophthalmology including one-half day at Moran’s Continuity Clinic, where they follow a patient’s care throughout their ophthalmology rotation.

Moran goes beyond traditional curriculum to teach residents and fellows how to provide patients with the best outcomes at the lowest cost. Each resident undertakes a quality improvement project, and a chief resident is involved in curriculum development.
INTERNS & OPHTHALMIC PATHOLOGY/RESEARCH FELLOWS 2017-2018

Program Growth
The program has grown—resident applications increased to 488 for four spots in 2017. We've gone from six residents to 12, and one fellow to nine for cornea and refractive surgery, glaucoma, neuro-ophthalmology, pediatric and strabismus, retina and vitreous surgery, uveitis, and international outreach.

High Surgical Volumes
Our 36 specialists perform over 7,000 surgeries per year and see more than 140,000 patients, ensuring residents and fellows have a full range of clinical and surgical experiences. Nationally, residents are required to perform 86 cataract surgeries—the average is 140—but Moran residents perform over 300 cataract and 300 subspecialty surgeries, all supervised by board-certified attending faculty. A new wet lab center gives residents additional opportunity for hands-on experience.

Dedicated Research Time
Moran residents receive protected research time one-half day each week, and we provide funding opportunities, such as the Achievement Rewards for College Scientists (ARCS) Foundation. Each year, a resident is awarded $15,000, and Moran matches funds for their second and third year.

Outreach Opportunities
Moran’s Global Outreach Division travels to 20 countries as remote as Micronesia and as close as Haiti providing eye care, which gives residents and fellows extraordinary opportunities to participate in international electives.

Moran limited-term instructor, Eric Hansen, MD, and uveitis specialist Marissa Larochelle, MD
When Moran’s Griffin Jardine, MD, came across a *Journal of Ophthalmology* editorial that warned of a “steady erosion of ophthalmology content in the mainstream medical school curriculum,” he felt compelled to do something about it.

“As an ophthalmologist, it concerned me,” he said. “Not every medical student does an ophthalmology rotation these days. Some programs have even distilled the eye down to just three or four lectures, and that affects us and our patients directly.”

Primary care physicians are often the first line of defense against eye disease.

“If they don’t know how to filter out urgent or non-urgent eye conditions, we may end up with inappropriate or late referrals,” he said. “So whether it’s an emergency room physician or a family practitioner, the more they know about vision the better.”

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**Online Solution**

As Moran’s Medical Student Educator, Jardine, in collaboration with Director of Education, Jeff Pettey, MD, and neuro-ophthalmology specialist Kathleen Digre, MD, hatched a plan to build a resource to teach fundamentals about eye disease that uses accessible language for non-ophthalmologists. The result is “Med Student Online,” a peer-reviewed ophthalmology curriculum by and for medical students who choose to do a four-week rotation at Moran.

“Med students are a unique bunch,” said Jardine. “They are eager and excited to make a contribution. As their course director, I originally made it optional for them to contribute to the project, but as it turns out, they’ve all taken me up on it and contributed phenomenal videos, diagrams, and articles for the website.”

Jardine reviews each submission and often finds their take on the material refreshing. The students’ work is housed on CORE (Clinical Ophthalmology Resource for Education), Moran’s more high-level open-source online education site.

“It’s a win-win,” he said.
CEO of the John A. Moran Eye Center

Randall J Olson, MD, is the Chair of the Department of Ophthalmology and Visual Sciences and CEO of the John A. Moran Eye Center. He specializes in research dealing with intraocular lens and cataract surgery. Dr. Olson is the author of more than 300 professional publications and has given many named lectures all over the country and worldwide. He was selected to receive the 2016 Jan Worst Medal by the Intra-Ocular Implant Club, the 2015 Lifetime Achievement Award from AAO, the 2014 Rosenblatt Prize for Excellence by the University of Utah, the 2014 Kelman Award by AAO, and the 2012 Binkhorst Medal by ASCRS. Dr. Olson’s practice is limited to consultations and his long-term patients at this time.

SPECIALTY
• Cataract Services and External Eye Diseases

Doctors in alphabetical order

William Barlow, MD, is a comprehensive ophthalmologist and ocular surgeon with a specific interest in cataracts, complex cataract surgery, pterygium removal, and refractive eye surgery such as LASIK and PRK. He provides medical and surgical care for these conditions as well as general ophthalmic concerns.

SPECIALTIES
• Comprehensive Ophthalmology
• Cataract Services

Paul S Bernstein, MD, PhD, specializes in AMD with special emphasis on the role of nutrition and environment in its treatment and prevention; inherited retinal and macular dystrophies; and surgical treatment of vitreoretinal disorders such as diabetic retinopathy and retinal detachments.

SPECIALTIES
• Vitreoretinal Diseases and Surgery
• Retinal Biochemistry
• Macular and Retinal Degeneration

Craig J Chaya, MD, is Co-Medical Director, Moran Global Outreach Division. He practices comprehensive ophthalmology and specializes in the medical and surgical management of adult and pediatric cataracts, glaucoma, and anterior segment surgery. He is actively involved in Moran’s resident and glaucoma fellow training programs and local and international outreach work. His research interests include the management of cataracts and glaucoma in the developing world and glaucoma surgical techniques and devices.

SPECIALTIES
• Comprehensive Ophthalmology
• Cataract Surgery
• Glaucoma

Alan S Crandall, MD, is the John A. Moran Presidential Professor; John E. and Marva M. Warnock Presidential Endowed Chair; Senior Vice Chair; Director of Glaucoma & Cataract; Senior Medical Director, Moran Global Outreach Division; and past president of the American Society for Cataract and Refractive Surgery. He focuses on the medical and surgical management of glaucoma and cataracts. Dr. Crandall has experience with trabeculectomy and laser cyclophotocoagulation. He is involved in numerous clinical research studies at Moran, lectures throughout the world, and was selected by Cataract and Refractive Surgery Today as one of 50 international opinion leaders. Dr. Crandall was selected to receive the ASCRS Foundation’s inaugural 2018 Chang Humanitarian Award. He is the only physician to receive humanitarian awards from all three major ophthalmology organizations: the 2016 AGS Humanitarian Award; the 2014 AAO Humanitarian Award; and the 2013 ASCRS Humanitarian Award.

SPECIALTIES
• Cataract Services
• Glaucoma

James Beson, DO, specializes in comprehensive ophthalmology with a focus on the medical management of routine and complex glaucoma.

SPECIALTIES
• Comprehensive Ophthalmology
• Glaucoma

Susan Chortkoff, MD, focuses on the management and treatment of glaucoma, comprehensive ophthalmology, and has a special interest in the management of dry eye syndrome.

SPECIALTIES
• Comprehensive Ophthalmology
• Glaucoma
Kathleen B. Digre, MD, is a past president of the North American Neuro-Ophthalmology Society and president-elect of the American Headache Society. She specializes in neuro-ophthalmology and evaluates and treats complex visual complaints, which can be due to optic nerve or brain disease. Her interests include gender differences in neuro-ophthalmic disorders, pseudotumor cerebri, ischemic optic neuropathy, temporal arteritis, papilledema, episodic vision loss, photophobia, headaches and eye pain. She worked with the North American Neuro-Ophthalmology Society and the University of Utah Eccles Library to develop a Neuro-Ophthalmology Virtual Educational Library (NOVEL), novel.utah.edu. She chairs the NOVEL and morancore.utah.edu committee for the Moran Eye Center. She received the Rosenblatt Prize for Excellence from the University of Utah.

Alison Crum, MD, specializes in both oculoplastics and orbital surgery—the reconstruction of the bones around the eyes after trauma, correcting drooping eyelids, and aesthetic surgeries, such as eyelid lifts. She also practices neuro-ophthalmology and provides medical and surgical treatments for visual disorders. Her interests include treatment of Graves’ disease and of papilledema.

SPECIALTIES
- Neuro-Ophthalmology
- Oculoplastics and Facial Plastic Surgery

Mary Elizabeth Hartnett, MD, is Director of Moran’s Pediatric Retina Center. She specializes in vitreoretinal surgery, managing both pediatric and adult retinal conditions. She performs surgery at Moran at the University of Utah and at Primary Children’s Hospital. Her clinical interests include vitreoretinal surgical diseases and age-related macular degeneration. As PI of an NIH-funded laboratory, she studies mechanisms of normal and aberrant angiogenesis, particularly related to diabetic retinopathy, retinopathy of prematurity, and age-related macular degeneration. Dr. Hartnett has authored over 170 peer-reviewed publications, 36 book chapters, and created the definitive textbook on the subject, Pediatric Retina. She was selected to receive ARVO’s 2018 Weisenfeld Award.

SPECIALTY
- Pediatric and Adult Retinal Diseases and Surgery

David C. Dries, MD, provides medical and surgical care for eye diseases and visual impairments in children as well as the evaluation and management of strabismus in both children and adults. His special interests include amblyopia, esotropia, exotropia, retinopathy of prematurity, infant and childhood cataracts, and nasolacrimal duct obstruction.

SPECIALTIES
- Pediatric Ophthalmology
- Adult Strabismus

Rachael Jacoby, MD, specializes in medical and surgical diseases of the retina and vitreous. Her clinical and surgical interests include retinal detachments, diabetic retinopathy, and macular and retinal degeneration.

SPECIALTIES
- Retinal Diseases and Surgery
- Macular and Retinal Degeneration

Robert O. Hoffman, MD, specializes in medical and surgical diseases of the retina and vitreous. Her clinical and surgical interests include retinal detachments, diabetic retinopathy, and macular and retinal degeneration.

SPECIALTIES
- Retinal Diseases and Surgery
- Macular and Retinal Degeneration

Griffin Jardine, MD, specializes in pediatric eye diseases as well as adult strabismus. He offers medical and surgical treatment for amblyopia, strabismus, pediatric glaucoma, anterior segment disorders, pediatric cataracts, retinopathy of prematurity, and nasolacrimal duct obstruction.

SPECIALTIES
- Pediatric Ophthalmology
- Adult Strabismus

Bradley J. Katz, MD, PhD, specializes in neuro-ophthalmology, cataract, and comprehensive ophthalmology. He evaluates patients with diseases that affect the optic nerve and diseases of the brain that affect vision and eye movements.

SPECIALTIES
- Cataract Services
- Neuro-Ophthalmology

Joseph L. Hatch, MD, provides expertise and experience in all areas of ophthalmology and has extensive experience in contact lens fitting. Since 2008, Dr. Hatch has served on the Church of Jesus Christ of Latter-Day Saints Vision Initiative. This program sends eye care professionals to countries throughout the world.

SPECIALTY
- Comprehensive Ophthalmology

Joseph L. Hatch, MD, provides expertise and experience in all areas of ophthalmology and has extensive experience in contact lens fitting. Since 2008, Dr. Hatch has served on the Church of Jesus Christ of Latter-Day Saints Vision Initiative. This program sends eye care professionals to countries throughout the world.

SPECIALTY
- Comprehensive Ophthalmology
Nick Mamalis, MD, is Director of the Ophthalmic Pathology Laboratory and evaluates all specimens submitted to the laboratory. He focuses his clinical practice on comprehensive ophthalmology including cataract and other anterior ocular surgeries. Dr. Mamalis is the editor of the Journal of Cataract and Refractive Surgery and is the author of over 200 peer-reviewed publications, one textbook, and 45 book chapters. He is also Co-Director of the Intermountain Ocular Research Center and is performing research in the area of intraocular lenses and postoperative inflammation. Dr. Mamalis lectures throughout the world and was selected by Cataract and Refractive Surgery Today as one of 50 international opinion leaders. He received the 2017 Secretariat Award from AAO, the 2015 Life Achievement Honor Award from AAO, and the 2013 Binkhorst Medal from ASCRS.

SPECIALTIES
- Uveitis and Ocular Immunology
- Comprehensive Ophthalmology
- Cataract Surgery

Bhupendra C K Patel, MD, FRCS, is an expert in the management of disorders involving eyelids, periorbital tissues, the lacrimal system, and facial bones, including fractures. His clinical research interests include thyroid disease, optic nerve disorders, orbital and eyelid tumors, blepharospasm, lacrimal surgery, and facial cosmetic surgery.

SPECIALTy
- Oculoplastic and Facial Plastic Surgery

Amy Lin, MD, specializes in the medical and surgical treatment of corneal and anterior segment diseases. She is Medical Director of the Utah Lions Eye Bank. Her interests include corneal transplantation, anterior segment reconstruction, cataract surgery, refractive surgery, and teaching residents and fellows.

SPECIALTIES
- Corneal Transplantation
- Cataract Surgery (Advanced Technology Intraocular Lenses and Laser-Assisted Cataract Surgery)
- Vision Correction Surgery (LASIK, PRK, Phakic Intraocular Lenses)

Marissa Larochelle, MD, specializes in cataract surgery and the diagnosis and management of patients with infectious and inflammatory eye conditions. She collaborates with rheumatologists, pediatricians, and internists to ensure uveitis patients receive optimum care.

SPECIALTIES
- Uveitis and Ocular Immunology
- Comprehensive Ophthalmology
- Cataract Surgery

Douglas Marx, MD, specializes in pediatric and adult oculoplastic and reconstructive surgery, particularly pediatric and adult orbital tumors, eyelid and orbital reconstruction, and congenital defects. His research interests include congenital ptosis, eyelid, and orbital defects; thyroid disease; orbital inflammation, neoplasms, and reconstruction.

SPECIALTIES
- Brow Ptosis
- Eyelid Reconstruction
- Ptosis
- Ectropion and Entropion
- Nasolacrimal Diseases
- Orbital Tumors
- Orbital Fractures

Leah Owen, MD, PhD, specializes in the medical and surgical treatment of pediatric eye disease, including cataract, nasolacrimal duct obstruction, amblyopia, retinopathy of prematurity, and strabismus. She also specializes in the surgical treatment of adult strabismus.

SPECIALTIES
- Pediatric Ophthalmology
- Adult Strabismus

Mark D Mifflin, MD, is Director of Cornea and Refractive Division, Chief of Surgical Services at Moran, and Associate Medical Director of the Utah Lions Eye Bank. He specializes in the medical and surgical treatment of corneal and anterior segment eye diseases, including expertise in all types of corneal transplantation, cataract surgery, and vision correction using lasers, intra-ocular lenses, and conductive keratoplasty.

SPECIALTIES
- Cornea Transplant Surgery (Penetrating Keratoplasty, Lamellar Keratoplasty, Stem Cell Transplantation, and Eye Banking)
- Cataract Surgery (Premium Intraocular Lenses, Monovision)
- Vision Correction Surgery (LASIK, PRK, Phakic Intraocular Lenses)
Jeff Pettey, MD, is Moran’s Director of Education; Co-Medical Director, Moran Global Outreach Division; and Chief of Ophthalmology, the Salt Lake VA. Dr. Pettey specializes in post-traumatic and complex cataract surgery. His international work focuses on building training capacity through education and academic development. He received AAO’s 2017 Artemis Award in recognition of his international and local work on behalf of the underserved. Dr. Pettey is a provider for the University of Utah Athletics, The US Ski and Snowboard Association, and the Utah Jazz.

SPECIALTIES
- Complex Cataract Surgery
- Complex Anterior Segment Surgery
- Post-Traumatic Eye Injury
- Sports Vision

Jean Tabin, MD, provides urgent vision care and comprehensive ophthalmology services at Moran’s Triage Clinic. There, she both treats patients for any emergency or urgent concerns regarding their vision or eyes while often teaching medical students and residents interested in learning more about ophthalmology.

SPECIALTY
- Comprehensive Ophthalmology

Kim Taylor, MD, practices comprehensive ophthalmology and has extensive experience in fitting contact lenses. He has many years of experience in diagnosing and treating eye diseases of all kinds.

SPECIALTY
- Comprehensive Ophthalmology

Albert T Vitale, MD, is Director of Moran’s Uveitis Division. He specializes in patients with diseases of the retina and vitreous. He is one of the few ophthalmologists in the Mountain West specializing in the diagnosis and treatment of uveitis and other infections and inflammatory diseases of the eye. His research interests include ocular manifestations of systemic diseases, novel therapeutic agents, and new drug delivery systems in the treatment of uveitis and AMD. He is one of a few people in the country with dual training in ocular immunology and inflammatory disease and vitreoretinal surgery. Dr. Vitale is co-author of the definitive text on the subject, entitled, Diagnosis and Treatment of Uveitis.

SPECIALTIES
- Uveitis, Ocular Infections
- Retinal Diseases and Surgery

Barbara M Wirostko, MD, is Moran’s Resident Research Director and has specialized fellowship training in glaucoma. She treats glaucoma and comprehensive ophthalmology patients and specializes in clinical research and drug development for glaucoma pharmaceutical therapies. Her research interest is in sustained delivery of therapeutics for ocular pathologies and in better understanding the genetics and associated systemic diseases of exfoliative syndrome, a common cause of open-angle glaucoma.

SPECIALTIES
- Comprehensive Ophthalmology
- Glaucoma

Marielle Young, MD, provides medical and surgical care for children with eye disease as well as adults and children with strabismus. Her clinical expertise includes the evaluation and treatment of amblyopia, strabismus, infantile and developmental cataracts, and nasolacrimal duct obstruction.

SPECIALTIES
- Pediatric Ophthalmology
- Adult Strabismus

Diplopia, giant cell arteritis, and posterior segment trauma.

SPECIALTY
- Retinal Disease and Surgery

Kim Taylor, MD,
practices comprehensive ophthalmology and has extensive experience in fitting contact lenses. He has many years of experience in diagnosing and treating eye diseases of all kinds.

SPECIALTY
- Comprehensive Ophthalmology

Michel P Teske, MD,
is Director of Vitreoretinal Diseases and Surgery. Dr. Teske specializes in medical and surgical diseases of the retina and vitreous. His primary surgical interests include retinal detachment, proliferative vitreoretinopathy, diabetic retinopathy, macular degeneration, epiretinal membranes, macular holes, and posterior segment trauma.

SPECIALTY
- Retinal Disease and Surgery

Judith E A Warner, MD,
is Chief of Neuro-Ophthalmology. She evaluates complex visual complaints, which can be due to optic nerve or brain disease, and provides treatment for these disorders. Her interests include diplopia, giant cell arteritis, papilledema, optic neuritis, episodic vision loss, idiopathic intracranial hypertension, ischemic optic neuropathy, and unexplained vision loss.

SPECIALTY
- Neuro-Ophthalmology

Akbar Shakoor, MD, specializes in diseases of the retina and vitreous as well as the diagnosis and treatment of uveitis and other infectious and inflammatory diseases of the eye. His primary clinical and surgical interests include retinal detachments, diabetic retinopathy, epiretinal membranes and macular holes, macular and retinal degeneration, and the medical and surgical treatment of uveal inflammatory diseases such as uveitis.

SPECIALTIES
- Retinal Diseases and Surgery
- Uveitis and Ocular Immunology

Albert T Vitale, MD, is Director of Moran’s Uveitis Division. He specializes in patients with diseases of the retina and vitreous. He is one of the few ophthalmologists in the Mountain West specializing in the diagnosis and treatment of uveitis and other infections and inflammatory diseases of the eye. His research interests include ocular manifestations of systemic diseases, novel therapeutic agents, and new drug delivery systems in the treatment of uveitis and AMD. He is one of a few people in the country with dual training in ocular immunology and inflammatory disease and vitreoretinal surgery. Dr. Vitale is co-author of the definitive text on the subject, entitled, Diagnosis and Treatment of Uveitis.

SPECIALTIES
- Uveitis, Ocular Infections
- Retinal Diseases and Surgery

Barbara M Wirostko, MD, is Moran’s Resident Research Director and has specialized fellowship training in glaucoma. She treats glaucoma and comprehensive ophthalmology patients and specializes in clinical research and drug development for glaucoma pharmaceutical therapies. Her research interest is in sustained delivery of therapeutics for ocular pathologies and in better understanding the genetics and associated systemic diseases of exfoliative syndrome, a common cause of open-angle glaucoma.

SPECIALTIES
- Comprehensive Ophthalmology
- Glaucoma

Marielle Young, MD, provides medical and surgical care for children with eye disease as well as adults and children with strabismus. Her clinical expertise includes the evaluation and treatment of amblyopia, strabismus, infantile and developmental cataracts, and nasolacrimal duct obstruction.

SPECIALTIES
- Pediatric Ophthalmology
- Adult Strabismus

Michel P Teske, MD,
is Director of Vitreoretinal Diseases and Surgery. Dr. Teske specializes in medical and surgical diseases of the retina and vitreous. His primary surgical interests include retinal detachment, proliferative vitreoretinopathy, diabetic retinopathy, macular degeneration, epiretinal membranes, macular holes, and posterior segment trauma.

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SPECIALTIES
- Retinal Diseases and Surgery
- Uveitis and Ocular Immunology

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SPECIALTY
- Neuro-Ophthalmology
Derek J Sakata, MD, is Medical Director of Anesthesia Services at Moran. Dr. Sakata provides and directs anesthesia care for ophthalmic patients before, during, and after surgery. He also has a background in engineering and has been involved in medical device design and subsequent company startups. He continues to be involved in research into new medical device designs and drug delivery.

SPECIALTY
• General Anesthesiology

Lisa Ord, PhD, LCSW, is Director of the ophthalmology-based Patient Support Program for people with visual impairment and their families. Services include counseling, support and education groups, vision rehabilitation, occupational therapy, information and referral services, and the Orientation to Vision Loss Program.

SPECIALTY
• Counseling Related to Vision Loss

Lisa Ord, PhD, LCSW, is Director of the ophthalmology-based Patient Support Program for people with visual impairment and their families. Services include counseling, support and education groups, vision rehabilitation, occupational therapy, information and referral services, and the Orientation to Vision Loss Program.

SPECIALTY
• Counseling Related to Vision Loss

Robert M Christiansen, MD, FACS, provides comprehensive vision rehabilitation services through Moran’s ophthalmology-based Patient Support Program. A nationally known expert in low-vision rehabilitation, he has been recognized by AAO with the Achievement Award and the Senior Achievement Award and by other organizations for his work with the partially sighted.

SPECIALTY
• Vision Rehabilitation

Robert M Christiansen, MD, FACS, provides comprehensive vision rehabilitation services through Moran’s ophthalmology-based Patient Support Program. A nationally known expert in low-vision rehabilitation, he has been recognized by AAO with the Achievement Award and the Senior Achievement Award and by other organizations for his work with the partially sighted.

SPECIALTY
• Vision Rehabilitation

Donnell J Creel, PhD, is Director of the Electrophysiology Service at Moran. The Electrophysiology Service provides examinations including visually evoked potentials, full-field electroretinograms, auditory brainstem responses, electrooculograms, multifocal electroretinograms, and multifocal visually evoked potentials. These tests quantitate retinal, optic pathway, visual cortical, and brainstem auditory pathway function. Dr. Creel has written some of the most-read online chapters on these tests.

SPECIALTY
• Electrophysiology

Donnell J Creel, PhD, is Director of the Electrophysiology Service at Moran. The Electrophysiology Service provides examinations including visually evoked potentials, full-field electroretinograms, auditory brainstem responses, electrooculograms, multifocal electroretinograms, and multifocal visually evoked potentials. These tests quantitate retinal, optic pathway, visual cortical, and brainstem auditory pathway function. Dr. Creel has written some of the most-read online chapters on these tests.

SPECIALTY
• Electrophysiology

Norm A Zabriskie, MD, Professor, Vice Chair, and Medical Director of Clinical Service, and Executive Director of Clinical Operations. He specializes in the medical and surgical treatment of glaucoma and cataract and has a research interest in the genetics of glaucoma.

SPECIALTIES
• Cataract Services

Norm A Zabriskie, MD, Professor, Vice Chair, and Medical Director of Clinical Service, and Executive Director of Clinical Operations. He specializes in the medical and surgical treatment of glaucoma and cataract and has a research interest in the genetics of glaucoma.

SPECIALTIES
• Cataract Services

Brian E Zaugg, MD, specializes in the medical and surgical treatment of corneal and anterior segment eye diseases, including expertise in all types of corneal transplantation, routine and complex cataract surgery, anterior segment reconstruction, pterygium removal, and refractive surgery including LASIK, PRK, implantable contact lenses, and clear lens extraction. His research interests focus on improving efficiency and safety in cataract surgery as well as refractive surgery outcomes.

SPECIALTIES
• Cornea Transplant Surgery
• Ocular Surface Reconstruction (Pterygium Excision)
• Cataract Surgery (Premium Intraocular Lenses, Laser-Assisted Cataract Surgery, Monovision)
• Vision Correction Surgery (LASIK, PRK, Phakic Intraocular Lenses, Clear Lens Extraction)

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• Cataract Surgery (Premium Intraocular Lenses, Laser-Assisted Cataract Surgery, Monovision)
• Vision Correction Surgery (LASIK, PRK, Phakic Intraocular Lenses, Clear Lens Extraction)

Roger P Harrie, MD, directs the Ophthalmic Ultrasound Department at Moran. He has been the senior instructor in the ocular ultrasound course at the annual AAO meetings and has published numerous articles, book chapters, and two textbooks. Dr. Harrie has made more than 50 humanitarian trips, mostly training doctors in developing countries in diagnostic and therapeutic techniques. He directs the outreach program in examining and giving glasses to residents of the Salt Lake Valley Youth Detention Center.

SPECIALTY
• Ophthalmic Ultrasound

Roger P Harrie, MD, directs the Ophthalmic Ultrasound Department at Moran. He has been the senior instructor in the ocular ultrasound course at the annual AAO meetings and has published numerous articles, book chapters, and two textbooks. Dr. Harrie has made more than 50 humanitarian trips, mostly training doctors in developing countries in diagnostic and therapeutic techniques. He directs the outreach program in examining and giving glasses to residents of the Salt Lake Valley Youth Detention Center.

SPECIALTY
• Ophthalmic Ultrasound
Robert H. Corry, OD, specializes in ocular pathology, pediatric and general optometry, and contact lenses.
Redwood Health Center
South Jordan Health Center

Timothy L. Gibbons, OD, specializes in comprehensive eye care with special interest in contact lenses, pediatrics, and ocular disease.
Stansbury Health Center
Westridge Health Center

Mark A. McKay, OD, specializes in full-scope optometric care, including adult and pediatric care, contact lenses, and job- or hobby-related visual needs.
John A. Moran Eye Center
Redwood Health Center
Westridge Health Center

David Meyer, OD, FAAO, is the Director of Contact Lens Services. He specializes in fitting contact lenses, primarily focusing on keratoconus, post-surgical corneas, pediatrics, irregular or high astigmatism, and fitting traumatized eyes. He also provides comprehensive eye care for glasses and soft contacts.
John A. Moran Eye Center
Midvalley Health Center

Alan Morgan, OD, practices comprehensive optometric eye care with special interest in contact lenses and dry eye management.
Farmington Health Center

Spencer D. Mortensen, OD, FAAO, specializes in contact lenses, sports vision, and general optometry.
Westridge Health Center

Clair R. Palmer, OD, who has specialized in optometry and contact lenses at Moran for 26 years, retired from his 41-year practice in December 2017.
Parkway Health Center
South Jordan Health Center

Dix H. Pettey, OD, MS, specializes in fitting contact lenses for keratoconus, pediatrics, post-surgical, and eyes with severe or irregular astigmatism. He also provides comprehensive eye care for glasses and soft contacts.
Midvalley Health Center
John A. Moran Eye Center

Colleen S. Schubach, OD, offers full-scope optometric eye care and contact lens services for all ages, with an emphasis on children and sports vision.
Redstone Health Center

Craig M. Smith, OD, specializes in children’s vision, sports vision, contact lenses, and general optometry.
Midvalley Health Center

Bryan H. Vincent, OD, specializes in ocular pathology and contact lenses.
Midvalley Health Center
John A. Moran Eye Center
Balamurali K Ambati, MD, PhD, MBA
Professor, Ophthalmology and Visual Sciences; Adjunct Associate Professor, Neurobiology and Anatomy
SPECIALTIES: Ocular Angiogenesis and Corneal Research

Alessandra Angelucci, MD, PhD
Professor, Ophthalmology and Visual Sciences
SPECIALTY: Visual Cortex Circuitry and Function

Wolfgang B Baehr, PhD
Professor and Director of Research; Ralph and Mary Tuck Professor of Ophthalmology and Visual Sciences
SPECIALTIES: Phototransduction, the Retinoid Cycle, and Membrane Protein Transport in Photoreceptors; Photoreceptor Biochemistry; Molecular and Cell Biology

Paul S Bernstein, MD, PhD
Director of Clinical Research and Associate Director of Research; Mary H. Boesche Professor of Ophthalmology and Visual Sciences
SPECIALTIES: Vitreoretinal Diseases and Surgery; Retinal Biochemistry; Macular and Retinal Degeneration

Lara Carroll, PhD
Research Assistant Professor, Ophthalmology and Visual Sciences
SPECIALTIES: Corneal and Retinal Neovascular Diseases

Donnell J Creel, PhD
Research Professor, Ophthalmology and Visual Sciences; Neurobiology and Anatomy; Neuroscience
SPECIALTY: Electrophysiology

Margaret DeAngelis, PhD
Professor, Ophthalmology and Visual Sciences
SPECIALTY: Multi-Omic and Systems Biology-Based Approaches to Pinpoint Disease Mechanism in AMD, Glaucoma, and Myopia, along with Co-Occurring/Co-Morbid Diseases

Jeanne M Frederick, PhD
Research Associate Professor, Ophthalmology and Visual Sciences
SPECIALTY: Retinal Cell and Molecular Biology

Gregory S Hageman, PhD
John A. Moran Presidential Professor, Department of Ophthalmology and Visual Sciences; Executive Director, Sharon Eccles Steele Center for Translational Medicine
SPECIALTIES: The Genetics and Assessment of Pathways Involved in the Etiology of AMD; AMD Target Identification and Therapeutic Development

Mary Elizabeth Hartnett, MD
Professor, Ophthalmology and Visual Sciences
SPECIALTY: Retinal Angiogenesis Relating to ROP and AMD
<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
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</thead>
<tbody>
<tr>
<td>Bryan W Jones, PhD</td>
<td>Professor, Ophthalmology and Visual Sciences</td>
<td>Research Associate Professor, Ophthalmology and Visual Sciences; Retinal Degeneration Disorders; Retinal Neurotransmission and Neurocircuitry; Metabolomics; Editor, Webmaster, webvision.med.utah.edu</td>
</tr>
<tr>
<td>Binxing Li, PhD</td>
<td>Associate Professor, Ophthalmology and Visual Sciences</td>
<td>Specialties: Biochemistry and Biophysics of Macular Carotenoids; Mouse Models of Retinal Disease; Raman Imaging of Nutrients in the Retina</td>
</tr>
<tr>
<td>Nick Mamalis, MD</td>
<td>Professor, Ophthalmology and Visual Sciences</td>
<td>Specialties: Ocular Pathology; Comprehensive Ophthalmology; Intraocular Lens Research; Postoperative Inflammation</td>
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<tr>
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<td>Distinguished Professor (Emeritus), Ophthalmology and Visual Sciences</td>
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<td>Specialties: Analysis of Genetic and Genomic Contribution to the Pathophysiology of Complex Pediatric Eye Disease including Strabismus, Myopia, ROP, and Amblyopia</td>
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<td>Richard A Normann, PhD</td>
<td>Professor (Emeritus), Ophthalmology and Visual Sciences; Distinguished Professor of Bioengineering, University of Utah; Doctor Honoris Causa, Universidad Miguel Hernandez de Elche, Spain</td>
<td>Specialties: Artificial Vision/Neural Prosthetics</td>
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<td>Helga ET Kolb, PhD</td>
<td>Professor (Emerita), Ophthalmology and Visual Sciences</td>
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<td>Professor, Ophthalmology and Visual Sciences</td>
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<td>Neda Nategh, PhD</td>
<td>Assistant Professor, Electrical and Computer Engineering; Research Assistant Professor, Ophthalmology and Visual Sciences</td>
<td>Specialties: Visual Processing and Computations; Neuro-Inspired Computer Vision</td>
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<td>Haibo Wang, MD, PhD</td>
<td>Research Assistant Professor, Ophthalmology and Visual Sciences</td>
<td>Vascular Biology; abnormal vessel growth implicated in pathological neovascularization in AMD, ROP, and diabetic retinopathy</td>
</tr>
<tr>
<td>Liliana Werner, MD, PhD</td>
<td>Professor, Ophthalmology and Visual Sciences; Co-Director, Intermountain Ocular Research Center</td>
<td>Ocular Biodevices Research; Different Intraocular Lens Designs; Materials and Surface Modifications; Interactions between Ocular Implants and Ocular Tissues</td>
</tr>
<tr>
<td>Larry A Wheeler, PhD</td>
<td>Research Professor, Ophthalmology and Visual Sciences</td>
<td>Ophthalmic Drug Discovery and Development; AMD; Pharmacology of Glaucoma; Dry Eye and Neuroprotection</td>
</tr>
<tr>
<td>Jun Yang, PhD</td>
<td>Associate Professor, Ophthalmology and Visual Sciences</td>
<td>Cell Biology of Photoreceptors; Retinal Diseases</td>
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<td>Ning Tian, PhD</td>
<td>Professor, Ophthalmology and Visual Sciences; Adjunct Professor, Neurobiology</td>
<td>Retinal Neurobiology</td>
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<td>Hironori Uehara, PhD</td>
<td>Research Assistant Professor, Ophthalmology and Visual Sciences</td>
<td>Molecular and Cell Biology; Corneal and Retinal Diseases</td>
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<td>Frans Vinberg, PhD</td>
<td>Assistant Professor, Ophthalmology and Visual Sciences</td>
<td>Biomedical Engineering; Biophysics; Photoreceptor Physiology</td>
</tr>
</tbody>
</table>

MORAN EYE CENTER

RESEARCH TEAM

2017-2018

RESEARCH
MORAN EYE CENTER  
ADJUNCT RESEARCH TEAM  
2017-2018

Paul Bressloff, PhD
Adjunct Professor, Ophthalmology and Visual Sciences; Professor of Mathematics
SPECIALTY Modeling of Visual Cortex

Karen Curtin, PhD, MStat
Adjunct Associate Professor, Ophthalmology and Visual Sciences, Moran Steele Center for Translational Medicine
SPECIALTIES Genetic Epidemiology; AMD

Michael Deans, PhD
Assistant Professor, Otolaryngology; Adjunct Assistant Professor, Neurobiology and Anatomy
SPECIALTIES Sensory System Development; Retina and Inner Ear

Michael Feehan, PhD
Research Professor, Pharmacotherapy; Adjunct Professor, Ophthalmology and Visual Sciences
SPECIALTY Psychosocial Impact of Blinding Disease

Werner Gellermann, PhD
Adjunct Professor, Ophthalmology and Visual Sciences; Research Professor, Physics
SPECIALTY Spectroscopy of Living Human Tissue

Kristen Kwan, PhD
Assistant Professor, Human Genetics; Adjunct Assistant Professor, Ophthalmology and Visual Sciences
SPECIALTIES Ocular Development and Morphogenesis

Jason Shepherd, PhD
Assistant Professor, Neurobiology and Anatomy; Adjunct Assistant Professor, Ophthalmology and Visual Sciences; Adjunct Assistant Professor, Biochemistry
SPECIALTIES Visual Cortex Function and Plasticity in vivo; Cellular and Molecular Mechanisms of Learning and Memory; Cell Biology of Synapse

Monica Vetter, PhD
Adjunct Professor, Ophthalmology and Visual Sciences; George and Lorna Winder Professor of Neuroscience; Chair, Neurobiology and Anatomy; Interim Vice Dean, Research, School of Medicine; Interim Associate Vice President, Research, Health Sciences
SPECIALTIES Retinal Development; Glaucoma

Barry Willardson, PhD
Adjunct Professor, Ophthalmology and Visual Science
SPECIALTIES Phototransduction; Molecular Basis of Retinal Diseases; Assembly of Signaling Complexes; Biochemistry, Molecular and Cell Biology; Structural Biology

Lloyd Williams, MD, PhD
Adjunct Research Assistant Professor, Ophthalmology and Visual Sciences
SPECIALTIES Genetics of Orphan Diseases; International Eye Disease and Population Studies; Cornea

Barbara M Wirostko, MD
Clinical Adjunct Associate Professor, Ophthalmology and Visual Sciences
SPECIALTIES Glaucoma; Corneal Wounds; Drug and Device Development
Adjunct Volunteer

OPHTHALMOLOGISTS
2017-2018

From across the states and around the globe, adjunct volunteer faculty contribute as appreciated members of our Moran team. They collaborate on research projects, participate in clinical studies, attend teaching opportunities, and assist on our outreach medical missions.

Jason Ahee, MD
St. George, Utah

Iqbal “Ike” Ahmed, MD
Mississauga, Ontario Canada

Lisa Arbisser, MD
Sarasota, Florida

Ronnie Bhola, MBBS
St. Augustine, Trinidad

Eric Brinton, MD
Salt Lake City, Utah

Gregory Brinton, MD
Murray, Utah

Kristin O Chapman, MD
Santa Rosa, California

Joseph Chen, MD
Ventura, California

Lauren Johnson, MD
Spokane, Washington

Robert J Cionni, MD
Salt Lake City, Utah

Richard P Corey, MD
Salt Lake City, Utah

David A Crandall, MD
West Bloomfield, Michigan

Sonya Dhar, MD
New York, New York

Jane Durcan, MD
Spokane, Washington

Jayson David Edwards, MD
St. George, Utah

David Faber, MD
Salt Lake City, Utah

William J Fishkind, MD
Tucson, Arizona

Roger C Furlong, MD
Butte, Montana

Mitchell J Goff, MD
Salt Lake City, Utah

Reeta Gurung, MD
Kathmandu, Nepal

Anna Gushchina, MD
Hines, Illinois

Roger P Harrie, MD
Salt Lake City, Utah

Matheson A Harris, MD
Salt Lake City, Utah

James G Howard, MD
Murray, Utah

Khizer Khaderi, MD
Sacramento, California

Krista Kinard, MD
Spokane, Washington

Victoria Knudsen, MD
Murray, Utah

Robert C Kwun, MD
Murray, Utah

David P Lewis, MD
Brigham City, Utah

Majid Moshirfar, MD
Draper, Utah

Valliammai Muthappan, MD
Sewickley, Pennsylvania

Tom Oberg, MD
Salt Lake City, Utah

Hreem Patel, MD
Stickley, Illinois

David B Petersen, MD
Salt Lake City, Utah

Marcos Reyes, MD
St. George, Utah

Trent Richards, MD
Layton, Utah

Sanduk Ruit, MD
Kathmandu, Nepal

Derek Sakata, MD
Salt Lake City, Utah

Joshua Schlissler, MD
St. George, Utah

Loren S Seery, MD
Kennewick, Washington

D Snow Slade, MD
St. George, Utah

Robert E Smith, MD
West Valley City, Utah

R Doyle Stulting, MD, PhD
Atlanta, Georgia

Russell Swan, MD
Sioux Falls, South Dakota

Scott O Sykes, MD
Ogden, Utah

Robert L Treft, MD
Layton, Utah

James Tweeten, MD
Boise, Idaho

Albert Ungerich, MD
Salt Lake City, Utah

Jeremy Valentine, MD
Provo, Utah

Gary Wallace, MD
Idaho Falls, Idaho

Charles H Weber, MD
Salt Lake City, Utah

Robert C Welch, MD
Twin Falls, Idaho

Brice J Williams, MD
Ogden, Utah

Darcy Wolsey, MD
Salt Lake City, Utah

Gilbert C Wong, MD
West Jordan, Utah

Zachary J Zavodni, MD
Salt Lake City, Utah
The following individuals and organizations contributed to the Moran Eye Center from July 1, 2016 through June 30, 2017

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The Huntsman Foundation | David Kelby Johnson Memorial Foundation
Marva M. and John E. Warnock, PhD

**Gifts of $100,000 and Above**

Edmund W. and Carol B. Dumke | Christine A. and Fred W. Fairclough
iVeena, LLC | Research to Prevent Blindness, Inc. | Sharon Steele-McGee | Mark and Laura Willes

**Gifts of $50,000 and Above**

Thomas and Candace Dee Family Foundation | Willard L. Eccles Charitable Foundation
Karl and Stevie Eller Family Foundation | Margaret D. Hicks
Lynda M. Jacobsen | Judelson Family Foundation

**Gifts of $25,000 and Above**

Anonymous
Bamberger-Allen Health and Education Foundation
Bank of American Fork
John* and Toni F. Bloomberg
Lisa Z. and David A. Crandall, MD
George S. and Dolores Doré Eccles Foundation
Willard L. and Ruth P. Eccles Foundation
Grandeur Peak Global Advisors, LLC
James M. and Alison R. Luckman
Mark and Kathie Miller Foundation
Vern H. and Beulah D. Petersen Charitable Trust
Ruvo Family Foundation
Arthur and Haru Toimoto Trust
Wattis Dumke Foundation

**Gifts of $10,000 and Above**

William J. and Sara S. Barrett
Brent and Bonnie Jean Beasley Foundation
Laurie and Kelly Burt
The Jeffrey and Helen Cardon Foundation
William H. and Patricia W. Child Chrisman Foundation
Diamante Cabo San Lucas
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Mary Alice Fortin Foundation, Inc.
The Good Works Institute, Inc.
Robert E. Hafey, JD
Joy and John H. Haines, MD
Jerry S. and Claudia F. Howells
Carolyn Tanner Irish and Frederick Quinn, PhD

**Gifts of $5,000 and Above**

JKS Family Foundation
George S. Kantor, MD
Allan M. and Kay W. Lipman
Mitchell and June Morris Foundation
Gordon Olch
Physician Advisors, LLC
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Q10 Bonneville Real Estate Capital
Lorena Rosenberg
Noel and Florence Rothman Family
Liz and Jonathan Slager
David O. Tanner Trust
Alix A. and Michael M. Truax
Utah Lions Foundation
James W. and Jeanne J. Welch
Terry L. Wright
Cheryl M. Yokoyama, MD, PS
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<td>Scott Bergesen</td>
<td>Aaren Scientific, Inc.</td>
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<td>George M. Ahn</td>
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