What is sight...
Schepens Eye Research Institute fights blindness by developing new technologies, therapies and knowledge to retain and restore vision. Through a continuum of discovery, the Institute works toward a future in which blindness is prevented, alleviated, and, ultimately, cured.

Founded in 1950 by famed retinal surgeon Charles L. Schepens, M.D., Schepens Eye Research Institute is the largest independent eye research institute in the nation and an affiliate of Harvard Medical School. Since our inception, we have trained more than 600 postdoctoral fellows in various disciplines of eye research; trained more than 500 eye surgeons who now practice around the world; and published more than 4,600 scientific papers and books about health and eye disease.
...without vision?
Science, medicine and technology have all been transformed in the 60 years since Dr. Charles Schepens founded this organization. What were remote dreams in 1950, are already realities today. But one thing hasn’t changed—our commitment to his founding mission—to develop new technologies and treatments to preserve and restore vision—and hope to patients with blinding diseases.

In the following pages you will see a snapshot of the Institute’s past and present and its hopes for the future, all of which build on the original vision of our remarkable founder.

Today we are on the verge of fulfilling his mission in ways inconceivable at the Institute’s inception. Our work with stem cells, nerve regeneration, transplantation and drug therapies for retinal and corneal disease promise, in the not too distant future, to regenerate damaged tissues and restore vision to people without previous hope of such cures. And our work to create new visual aids from an influx in new image, optical, and computer technologies promises to restore quality of life and mobility for those affected by vision loss.

As the current administrative leaders of this extraordinary Institute, our vision is to keep the original mission strong by positioning us for a healthy financial future. Accomplishing that vision in today’s world, despite our fierce commitment, is not
simple and requires the combined energy, brainpower and talents of all our scientists and staff and the continued support of friends, donors, foundations, corporate partners, patients and their advocates and government resources.

Our greatest challenge, therefore, is to continue to grow our financial resources to support not only the Institute operations, but also to provide start-up funds to nurture creativity and new projects in advance of government funding.

To meet this challenge we have re-organized the way our scientists interact within the Institute and with other world-class researchers and organizations. We have created Centers of Excellence that reinforce our goals and priorities and encourage collaboration from the scientific community and funding from public and private sources.

We believe the current organization will ensure our financial health and help attract the best and brightest of the next generation of scientists.

We hope you enjoy reading about our plans and hopes for the future and will continue to provide your generous support in the coming 60 years.

Sincerely,

Kenneth M. Fischer
President & Chief Operating Officer

Kennett F. Burnes
Chairman of the Board
When Dr. Schepens created this Institute, he knew, as we do today that our success would be due to the quality of our scientific faculty, our research and commitment to giving hope to patients and their loved ones.

He also understood the importance of sustaining and nurturing this passion for excellence as the Institute grew and passed the scientific gauntlet from one generation of scientists to the next.

His founding principles and beliefs are as true today as they were 60 years ago. We believe he would be proud to see that our faculty and their research are unparalleled in the country and the world, and that our discoveries are considered the best hope for curing blinding eye diseases and helping maximize existing vision.

As the Directors of Research and the keepers of his scientific and clinical legacy, we are dedicated to ensuring that what he began more than a half century ago continues and grows with every passing year.

Therefore, our primary goal in the coming years is to retain and expand our world-class faculty. To do that, we must ensure that our senior scientists have the resources and support to continue their high standard of investigation and to mentor and shape new investigators for the future. Accordingly, we have committed to working closely with the President and the Board to optimize the resources available to our current faculty so that their academic activities are optimally supported given the resources available to us.

At the same time we must offer new young scientists the opportunities and the training they need to begin careers in a rapidly changing, and very complex competitive scientific community.
In each case, these talented individuals require the environment, support, and freedom to generate new and creative ideas and to follow those ideas down the path to discoveries that might impact the way we treat blinding diseases.

That means providing senior scientists state-of-the-art laboratories and skilled staff to carry out multiple innovative projects. For new scientists it means offering guidance in grantsmanship, networking assistance, and opportunities to both publish and increase their visibility in their fields, such as through awards programs.

In recent years we have recruited several young faculty members who are already publishing research that sheds light on new aspects of retinal and corneal diseases. These new scientists are engaged in collaborations and are participating actively in the Centers of Excellence. The Centers of Excellence speed the pace of discovery by allowing all our scientists extraordinary opportunities to collaborate within and across disciplines.

As we step into the next decade and beyond, we are very optimistic. We are entering a future in which our scientists will continue to shape the course of vision research nationally and globally, further enabling us to ultimately eliminate blinding eye disease and restore vision to millions of patients worldwide.
OUR ORIGINAL VISION

Finding Hope for Patients
Known as the “father of modern retinal surgery” and one of the “Ten Most Influential Ophthalmologists of the Twentieth Century,” Dr. Schepens in 1950 founded what was later to be called the Schepens Eye Research Institute. Originally a research laboratory with six staff, it is now the world’s leading independent eye research organization with 202 people working together on solutions to blinding and debilitating eye problems.

Dr. Schepens’ inventions revolutionized the examination of the back of the eye and made possible surgical repairs previously impossible. He developed the binocular indirect ophthalmoscope and other devices and pioneered sight-saving surgical procedures—including scleral buckling techniques and the “open-sky” vitrectomy—that markedly increased the success rate of retinal reattachment surgery from 40% to 90%.

Born in Belgium in 1912, Dr. Schepens received his MD in 1935 and trained in eye diseases at Moorfields Eye Hospital in London. He was a medical officer in the Belgium Air Force before his country fell to the Germans, and he fled to France where he was a hero in the French Resistance, smuggling over 100 people to safety. He came to the United States as a fellow at Harvard’s Howe Laboratory of Ophthalmology in 1947. Two years later, he established the first Retina Service at the Massachusetts Eye and Ear Infirmary and three years later, our research institute. He died in 2006 at the age of 94.

Dr. Schepens was a man who saw injustice and did something about it, who saw research as the best hope for his patients and did something about it. He was a visionary who continues to inspire our quest for cures. Our new generation of scientists are poised to also make the impossible possible—finding new hopes for patients today.
OUR CURRENT VISION

Working Together to Solve Problems
With advances in medicine, the life expectancy in the US is close to 80, but vision loss—particularly in these later years—has reached epidemic proportions and is expected to double by the year 2020. The Schepens Eye Research Institute has responded to the urgency of this crisis with a reorganization and reinvigoration of our research efforts.

A MULTI-DIMENSIONAL APPROACH

Schepens Eye Research Institute has set new sights on excellence. We’ve combined and integrated our world-class research programs into four interdisciplinary Centers of Excellence with one focus: helping patients with the most prevalent, blinding eye diseases. Through cross-pollination of ideas and approaches, our world leading basic scientists collaborate with each other and clinicians to move discoveries more rapidly from laboratory to the clinic, where they will benefit patients struggling with vision loss.
Our research is taking revolutionary approaches to regenerative medicine, leading the way in retinal stem cell and optic nerve regeneration. We’ve broadened this center’s focus beyond the retina to bioengineering of all eye structures including the optic nerve, cornea and ocular surface. By regenerating, transplanting, or engineering healthy ocular structures, the ultimate goal of this center is nothing short of restoring and regenerating ocular tissue from the eye’s surface all the way to the brain. Dr. Michael Young, a pioneer in using stem and progenitor cells to repair and replace damaged retinal tissue, directs the center and its faculty of 13 scientists and physicians.
CENTER FOR CORNEAL AND EXTERNAL EYE DISEASE RESEARCH

Corneal diseases and injuries affect the vision of over 300 million people worldwide and are the leading reason people in the U.S. visit eye care practitioners. The eye's surface is plagued by conditions that range from extremely painful to blinding. Our interdisciplinary research focuses on diseases such as dry eye, corneal dystrophy infection, allergies or ulcers, and injuries due to sports, chemicals or trauma suffered on the battlefield. Dr. David A. Sullivan, renowned for his basic, clinical and translational studies in dry eye, directs this Center, which has 10 scientists on its faculty, as well as 16 other full and adjunct faculty who collaborate in ocular surface research.

MOBILITY ENHANCEMENT AND REHABILITATION CENTER

People with impaired vision deserve freedom of mobility and the higher quality of life that comes with it. Our faculty focus on the development of new low vision aids and evaluation techniques for those with partial visual field loss from stroke, traumatic brain injuries, central vision loss from AMD, and peripheral field vision loss from glaucoma and retinitis pigmentosa so they can navigate and move more safely on foot and by car. The center is led by Dr. Eli Peli, a world authority on low vision rehabilitation.
With its increasing complexity, science requires the collaboration of expertise, techniques and ideas to generate new insights and accelerate progress. Our new Centers of Excellence are founded on the power of collaboration. Single minds can achieve great results, but if two minds are better than one, just imagine what we can achieve.
Where we are headed.

The Centers of Excellence are designed to move research more rapidly along the pipeline of discovery to bring therapies and cures more quickly to patients. If current research under way in each of our centers is ultimately successful, here is a sampling of how patients will be helped.

**CENTER FOR CORNEAL AND EXTERNAL EYE DISEASE RESEARCH**

We are focusing current research on stem cell therapy, treatment of corneal diseases, and methods to protect the surface of the eye from infections and dry eye disease. Pilot projects are planned to manipulate cells to reverse cell degeneration, cultivate stem cells for corneal transplants, and target white blood cells on the eye’s surface to cure conjunctivitis and allergies.

If our current research efforts are successful, we’ll be able to:

- protect the eye’s surface from dry eye disease, which afflicts over 30 million people in the USA alone
- defend the ocular surface against infections, which globally compromise the vision of more than 250 million, and blind 6 million, individuals
- reverse corneal blindness using stem cells
- treat eye allergies more effectively, which impact over 20% of the USA population
- treat inflammatory disorders on the eye’s surface with immunotherapy and regenerative medicine
- discover new treatments for Fuchs Endothelial Dystrophy, a degenerative disease of the cornea, responsible for 1/3 of all corneal transplants in the USA

**THE MINDA DE GUNZBURG CENTER FOR OCULAR REGENERATION**

Our researchers are pursuing investigations that will combine their expertise in stem cells and other regenerative techniques to find cures for AMD, retinitis pigmentosa, glaucoma, corneal injuries/diseases and cancer. We have plans to create a Core Facility for Visual Neuroscience, a dedicated room to evaluate vision in small animals before and after treatment to restore sight.

If our current research efforts are successful, we’ll be able to:

- restore vision to the blind with new methods to harvest, grow, and differentiate stem cells using novel scaffolds and delivery methods to replace dead tissues with healthy new cells
- restore vision to soldiers with injuries to the eye, replacing parts destroyed by blast injury or burned off in battle
- use induced adult stem cells to cure dry eye by repairing the damaged lacrimal gland
- regenerate the retina with novel drugs to restore vision in advanced cases of dry AMD
- create an artificial cornea for people in need of a transplant
- restore vision in AMD patients by using adult skin cells transformed into stem cells, “programmed” to become healthy retinal pigment epithelial cells, and then transplanted to replace the diseased cells
CENTER FOR AGE-RELATED MACULAR DEGENERATION (AMD) RESEARCH
We have brought together outstanding scientists, engineers, and clinicians with expertise in the cell biology of RPE (retinal pigment epithelial cells, where damage begins), vascular biology, growth factor biology, immunology/inflammation, neural retina, and visual optics to unravel the multi-factorial cascade of changes causing AMD.

If our current research efforts are successful, we’ll be able to:
• offer improved drug therapies for wet AMD and new therapies for dry AMD, for which there are currently none
• better understand the complex biological events that lead to AMD and develop strategies to prevent them
• re-engineer and create “replacement parts” for the patient who suffers vision loss
• slow the disease’s damaging effects and possibly improve visual acuity by reversing damage with new neuroprotective drugs
• detect very early signs of AMD with new optical methods, so patients can be treated before serious damage occurs

MOBILITY ENHANCEMENT AND REHABILITATION CENTER
The mobility center works directly at the clinical applied phase of research. Our researchers are creating novel and innovative technologies and techniques to give people with impaired vision greater mobility and quality of life.

If our current research efforts are successful, we’ll be able to:
• produce new portable low-vision aids to maximize existing vision and enable patients to read, watch TV, navigate walking and when appropriate, drive
• make driving safer through driving simulators, robotically-controlled obstacle courses, and in-car surveillance systems
• magnify images on digital televisions by using a remote control

What this means to patients.
People said it couldn’t be done, that it isn’t possible to restore sight after it’s lost. But each year of research brings us tantalizingly closer to this goal, to being able to restore or replace the retina or the cornea—even the whole eye. Better yet, the knowledge we’re accumulating at the genetic and molecular level is bringing us closer to a future when blindness can be prevented from ever happening in the first place.

The hope on which the Schepens Eye Research Institute was founded 60 years ago is closer than ever to being fulfilled. Our stimulating research environment has already led to numerous scientific and clinical breakthroughs. Our renowned and promising young researchers, armed with today and tomorrow’s new technologies, are the ingredients for success. Future miracles are in sight.
Visions of a hope-filled future

“One of the things that I miss the most is being able to see the stars at night. If new treatments would help me see them again, it would be a wonderful thing. Learning about Dr. Young’s work gave me real hope for the future.”

RYCK LENT, RP patient (left)
LIGHT AT THE END OF THE TUNNEL

Former photographer Ryck Lent lost his ability to see starry nights 25 years ago to retinitis pigmentosa (RP), which destroys night vision, causes tunnel vision and eventually loss of central vision as light and color sensitive cells die.

Ryck believes the Institute holds great promise for people like him. He is counting on, and has participated as a subject in multiple studies with the Mobility Center, to create life-enhancing visual aids, such as high-tech tunnel vision glasses already under development.

And, he is confident that the Minda de Gunzburg Center for Ocular Regeneration led by Dr. Michael Young (right) will bring their stem cell therapies for regrowing retinas to patients like him, so that sometime soon he might again enjoy gazing into the starry night sky.
What is vision...

Dr. David Sullivan, Director
CENTER FOR CORNEAL AND EXTERNAL EYE DISEASE RESEARCH

“Without healthy corneas, good vision is simply not possible, no matter how healthy the rest of the eye.”

“My hope is that we can prevent the chronic suffering and loss of quality of life that people sustain with such disorders as dry eye syndrome, allergies and infections with treatments that either prevent the disorder or deal with the underlying causes before they do their damage.”

“I can also imagine a day when we will no longer require donated tissue for people who need transplants, but will be able to generate healthy brand new ‘windows’ of the eye in laboratories to replace corneas damaged by injuries or disease.”

Dr. Michael Young, Director
THE MINDA DE GUNZBURG CENTER FOR OCULAR REGENERATION

“I predict that the eye will be one of the first parts of the body to reap the benefits of regenerative medicine. I believe this because the eye is so accessible, much more so than other parts of the brain, the spinal cord or even the internal organs,” says Dr. Michael Young.

“My hope is that someday when a patient with a blinding disease walks into a doctor’s office he or she will receive an injection to regenerate whatever part of the eye that is damaged or destroyed.”
Dr. Patricia D’Amore, Director

CENTER FOR AGE-RELATED MACULAR DEGENERATION RESEARCH

“Our ultimate goal is to know enough about AMD to prevent it from ever developing or blinding someone,” says Dr. Patricia D’Amore. “For those who have developed it we need ways to repair the damage and restore vision.”

“In the meantime, we seek new treatments especially for dry AMD where none exists and we need better, easier ways to deliver current drugs for wet AMD, perhaps by oral administration or slow release technology.”

Dr. Eli Peli, Director

MOBILITY ENHANCEMENT AND REHABILITATION CENTER

“When a low-vision patient walks into my office now and wants to be able to read again, I can get them to read. But when that same patient wants to drive or walk around the neighborhood without stumbling, that’s another story. We don’t have good answers,” says Dr. Eli Peli.

“My hope is that through our mobility research, we will be able to create devices that will allow low vision patients to drive and walk safely and confidently, both crucial aspects of daily life.”