



National Eye Institute

CONGRESSIONAL JUSTIFICATION
FY 2022

Department of Health and Human Services
National Institutes of Health



National Eye Institute

DEPARTMENT OF HEALTH AND HUMAN SERVICES

NATIONAL INSTITUTES OF HEALTH

National Eye Institute (NEI)

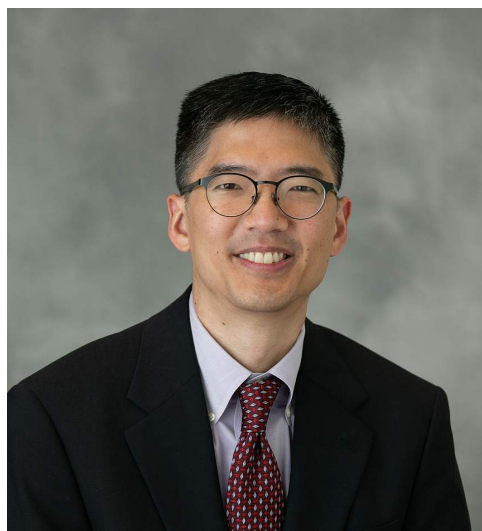
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Director's Overview

Eye diseases that lead to visual impairment and blindness, such as age-related macular degeneration (AMD), diabetic retinopathy (DR), and glaucoma, affect millions of Americans of all ages, ethnicities, and backgrounds. These and other less common eye diseases and disorders restrict productive career choices and can rob people of their full mobility and independence. The National Eye Institute (NEI) aspires to eliminate suffering from eye disease through advances in vision research, education, and dissemination of knowledge. As the largest funder of vision research in the country, NEI supports vision research through approximately 1,700 research grants and training awards made to scientists at more than 270 medical centers, hospitals, and universities across 44 states and around the world. NEI also conducts laboratory and patient-oriented clinical research in facilities at the National Institutes of Health (NIH). NEI fundamental, translational, and clinical research, which includes low vision/blindness rehabilitation and the development of assistive devices, lays the foundation for advancing vision and eye health for the nation.

New Director, New Vision

For only the third time in 52 years, NEI has a new permanent director, Michael F. Chiang, MD. Prior to his appointment, Dr. Chiang was Associate Director of the Casey Eye Institute at Oregon Health & Science University and the Knowles Professor of Ophthalmology & Medical Informatics and Clinical Epidemiology. As an educator, a practicing pediatric ophthalmologist, and clinician scientist, he brings to NIH a diverse research background, including in biomedical informatics, artificial intelligence (AI), data analytics, and telehealth.



Michael F. Chiang, M.D., Director

AI and machine learning approaches are rapidly advancing research and clinical practice by detecting patterns in clinical data that improve diagnosis and treatment. Vision research has been at the forefront of using this new technology, capitalizing on new imaging modalities to detect the presence and progression of ocular diseases; identifying complex relationships in patient data to predict the effectiveness of therapies; and collaborating with physical and computational sciences to engineer new technologies. Building on its initial successes, Dr. Chiang is positioned to lead vision research and clinical eye care patient management into a new era.

2020 in Hindsight

Eye care providers use the term 20/20 to represent normal vision and saw an opportunity during the year 2020 to promote eye health to the American public. However, the coronavirus (COVID-19) pandemic has affected societal health and everyday lives. An existing lack of access to healthcare, including eye care, has become more visible during the COVID-19 pandemic, especially for vulnerable groups such as those with low income and reduced access to

the internet, essential workers, and those reliant on public transportation, all of which are even more difficult for individuals who are visually impaired, blind, or deafblind. Meanwhile, NEI is seeking to understand and mitigate risks for eye care professionals and patients. Fortunately, telemedicine has been used to reduce some in-person ocular examinations, but cannot replace all vision care; even for those with adequate internet access, telemedicine is not a viable option for some individuals with chronic conditions and special needs. There are also health risks associated with cancelled appointments and delayed treatments. An additional consideration is meeting the needs of the visually impaired who may need extra services such as children learning via a computer screen and people in the workforce.

As our society shifts more towards a digital lifestyle, our reliance on digital platforms to work, learn, and connect with loved ones increases, as has become clear during the pandemic. Yet prolonged exposure to digital devices can exacerbate problems, from eye strain to chronic conditions such as dry eye and ocular pain. These ocular problems involve the anterior segment of the eye, which includes the cornea, tear production glands, and the lens. The anterior segment represents the ocular surface that interacts with the outside world and has unique immune defenses to protect the eye. Dry eye affects millions of Americans every year, causing red eyes, light sensitivity, pain, and blurry vision. This condition can be caused by autoimmune disease, as a side effect from certain medications, or as a result of hormonal changes such as among post-menopausal women. NEI is addressing these problems by launching the Anterior Segment Initiative, which aims to create a better understanding of and treatments for dry eye disease, ocular pain at the nerve cell level, and other issues affecting the front of the eye.

At the beginning of 2020, the vision community anticipated opportunities to focus on vision and promote eye health. NEI partnered with Surgeon General Jerome M. Adams on a series of public service announcements, disseminated via social media, informing the public of ways to keep eyes healthy. The series highlighted proper nutrition, getting a dilated eye exam, and wearing sunglasses outside.¹ In August 2020, the Department of Health and Human Services announced the evidence-based public health objectives and targets for the Healthy People 2030 Initiative. NEI leads the Vision work group, with objectives to prevent vision loss from major eye diseases like AMD, DR, glaucoma, and cataracts, through vision screening and regular eye exams.² A new research objective seeks to understand impacts of screen time on visual development in children.

Harnessing Innovation to Improve Health Access and Broaden Equity

Genetic testing to improve understanding of disease risk factors in different populations: High quality biomedical research to develop effective diagnostic tools, treatment interventions, and rehabilitation programs is integral to addressing the eye care needs of the American public. A crucial first step is to understand with greater precision the factors that influence the risk of eye diseases and disorders, including but not limited to age, education, diet, lifestyle, genetic profile, medical history, and the availability and affordability of medical as well as eye care. Glaucoma,

¹“More Than Meets the Eye 2020,” National Eye Institute (U.S. Department of Health and Human Services), accessed October 6, 2020, www.nei.nih.gov/learn-about-eye-health/resources-for-health-educators/more-meets-eye-2020.

² “Vision Workgroup.” Office of Disease Prevention and Health Promotion. Accessed November 4, 2020. health.gov/healthypeople/about/workgroups/vision-workgroup.

one of the leading causes of visual impairment in the U.S., impacts Black or African Americans at a rate four to five times higher than their White counterparts,³ although more granular risk factors, such as genetics, were not explored fully. Previous genome-wide association studies (GWAS) had identified key genetic risk factors in Caucasian populations, though they did not explain disease risk in Black populations.⁴ A large GWAS conducted as part of the African Descent and Glaucoma Evaluation Study identified genes associated with increased intraocular pressure and optic nerve damage in individuals of African ancestry.⁵

Advances for visually impaired people: Advances in rehabilitation are important for optimizing function, independence, and quality of life for approximately 12 million Americans who live with low vision or blindness. Some people who suffer vision loss from strokes regain some visual function immediately after the event. Others may find some incremental improvements in vision for six months after a stroke, although typically there is little improvement in impaired vision after that period of time. NEI studies demonstrated specific vision training interventions administered during that early post-stroke period can help restore some sight. For people who are visually impaired, researchers are working to develop easy to use assistive technology delivered via smartphone-based applications to improve navigation in indoor environments.

Artificial intelligence for improved quality and access of care: With NEI support, AI-based innovations continue to help providers diagnose eye diseases quickly and accurately. For example, an NEI small business grant to EYENUK, Inc., led to the U.S. Food and Drug Administration (FDA) approval for EyeArt, an automated AI-based tool that screens for early to mild stages of DR. Another AI visual screening system, EyeStar, developed by VisionQuest Biomedical, LLC., was instrumental in aiding front-line medical personnel detect DR from 15,000 retinal exams in Mexico and Bolivia. The company is poised to deploy its low-cost, effective tool in a U.S. clinical study, with the hope of making DR screening more accessible and affordable to diabetic patients living in rural and at-risk communities. Researchers have also employed AI-technology to predict the risk for AMD based on data collected from NEI's Age Related Eye Disease Studies (AREDS), helping to address a leading cause of vision loss in older Americans. NEI-supported biomedical engineers introduced a new imaging device that can measure the texture of retinal layers in the back of the eye, which can potentially be used to spot early stages of Alzheimer's disease.

Clinical trials for improved effectiveness of eye care: NEI clinical research is improving access to medical interventions by comparing safety and effectiveness of competing therapy options. For example, a clinical trial focusing on treatments for uveitis, a potentially blinding form of inflammation in the eye, demonstrated that the drug methotrexate performed similarly to a therapy that is over five times more costly, therein providing an effective and less expensive option for patients with this condition, in particular for those who are underserved.

³ Tielsch, James M., et al. "Racial variations in the prevalence of primary open-angle glaucoma: the Baltimore Eye Survey." *Jama* 266.3 (1991): 369-374. jamanetwork.com/journals/jama/articlepdf/386537/jama_266_3_026.pdf.

⁴ Hauser, Michael A., R. Rand Allingham, Tin Aung, Carly J. Van Der Heide, Kent D. Taylor, Jerome I. Rotter, Shih-Hsiu J. Wang et al. "Association of genetic variants with primary open-angle glaucoma among individuals with African ancestry." *Jama* 322, no. 17 (2019): 1682-1691. jamanetwork.com/journals/jama/article-abstract/2753899.

⁵ Ibid.

The Public Health House that Foundational Science Built

Scientific advances that have an impact on eye and vision health often come from years of investing in foundational research. NEI supports a broad range of research to study the underlying science of eye disease, which will lead to improved treatments in the future. For example, the legacy of foundational and clinical AMD research has generated genetic and longitudinal clinical outcome data on AMD patients, along with their tissue samples. A current research priority is to integrate these findings with each other to understand better the disease mechanisms and clinical applications of AMD. To establish a resource for the research community, NEI created the AMD Integrative Biology Initiative in partnership with the New York Stem Cell Foundation, which generated patient-derived cell lines that can help researchers find treatments for degenerative diseases by augmenting a patient's dying cells with healthy ones. The initiative also includes the curation of a data portal with deidentified genomic, ocular imaging, and clinical data associated with the patient-derived cell lines. In return for access to this rich resource, researchers will share findings of their own analyses correlating genetic risk factors to deficiencies in cellular function and the clinical symptoms they cause, enabling development of new targeted therapies for the disease.

Neural connections in the brain use light signals detected by retinal cells and process them into a perceived visual experience. Neuroscience research provides valuable insights by uncovering the nature and mechanisms of conditions that impair vision and establishes broader consensus of visual disease functions. Since 2014, the NIH Brain Research through Advancing Innovative Neurotechnologies® (BRAIN) Initiative has funded projects that explore the complexities of brain neural connections, including those in the eye. Decades of research on the connection between the retina, optic nerve, and primary visual cortex has led to fundamental discoveries on how the brain works and how new technologies can be developed to artificially stimulate neural connections and help visually impaired people see. A team of BRAIN-supported researchers developed and clinically tested the Orion, a novel prosthetic system implanted in the brain's vision center. The device captures a target shape and delivers patterned electrical stimuli in the visual cortex; after training, the Orion enables blind people to reproduce the perceived image on a touchscreen. This process allows researchers to continue fine-tuning the Orion, with the goal of providing wearers the ability to achieve useful artificial vision.

Future Priorities

NEI is poised to start an exciting new era in FY 2021 with a new director and is releasing a new strategic plan. NEI is energized by the development of this new plan, which will evaluate research priorities and address emerging challenges and is organized into seven new areas of emphasis across three research domains.

Visual System in Health and Disease

- From Genes to Disease Mechanisms
- Biology and Neuroscience of Vision
- Immune System & Eye Health

Capitalizing on Emerging Fields

- Regenerative Medicine
- Data Science

Preventing Vision Loss and Enhancing Well-Being

- Individual Quality of Life
- Public Health & Disparities Research

In developing the strategic plan, NEI sought broad public input on major research needs, gaps, and opportunities through a request for information, which informed the creation of expert panels for each area of emphasis. Panel discussions fostered dialogues across traditional vision research disciplines and capitalized on recent scientific opportunities. With input from the new director, NEI is working to develop a detailed implementation strategy to include aspects such as workshops, infrastructure improvements, and new initiatives. Implementation efforts will build on recommendations from the strategic plan.

NEI is establishing the Office of Vision Health and Population Sciences and the Office of Data Science and Health Informatics, two new offices that reflect both a community need and heightened interest by NIH in public health and health data. These offices will work across the NIH and our federal partners, as well as across NEI, bridging activities of both our intramural and extramural programs.

NEI is increasing efforts to diversify the vision science community's workforce in a variety of ways, including the expansion of the Diversity In Vision Research and Ophthalmology program beyond college summer interns to include more experienced trainees, applied science researchers, and collaborators such as scientists outside of vision research. NEI is encouraging greater representation all across the research enterprise, with inclusion of visually impaired individuals and those from underrepresented populations in administrative, communication, information processing, clinical, and foundational research roles.

Overall Budget Policy: The FY 2022 President's Budget request is \$858.5 million, an increase of \$23.0 million or 2.8 percent compared with the FY 2021 Enacted level.



National Eye Institute | Fact Sheet

National Institutes of Health

NEI MISSION

Established by Congress in 1968, NEI is the world leader funding eye and vision research

NEI's mission is to eliminate vision loss and enrich quality of life through vision research

To achieve this mission, NEI provides leadership to:

- Drive innovative research to understand the eye and visual system, prevent and treat vision diseases, and support people who are blind or visually impaired
- Foster collaboration to develop new ideas in vision research and clinical care and share knowledge across other fields
- Recruit, inspire, and train a talented and diverse new generation to strengthen the vision workforce
- Educate health care providers, scientists, policymakers, and the public about advances in vision research and their impact on health and quality of life

NEW NEI DIRECTOR: MICHAEL F. CHIANG, MD



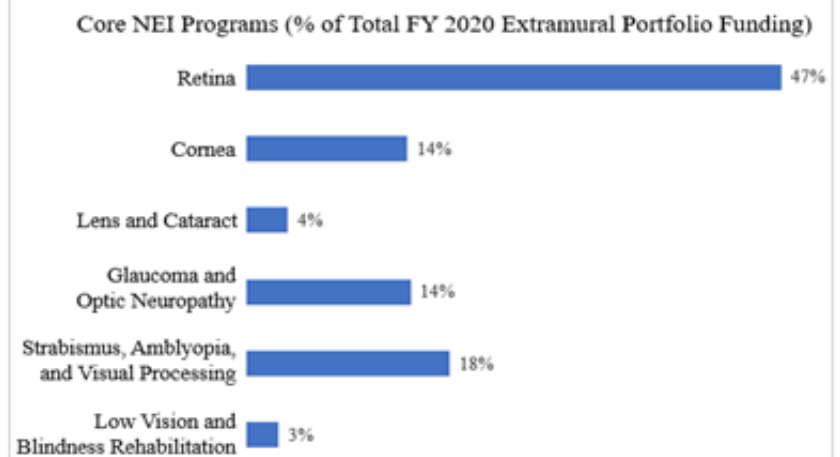
A practicing ophthalmologist, researcher, and educator, Dr. Chiang became the NEI Director in November 2020. With extensive experience in biomedical informatics, artificial intelligence, and telehealth, Dr. Chiang is leading NEI efforts to move vision research forward into a new era

FACTS AND FIGURES



The FY 2022 President's Budget for NEI is \$858.5 million.

In **FY 2020**, \$695 million (84%) went to research and training grants across the country (*Extramural research*); \$96 million (12%) funded research at NEI (*Intramural research*); \$32 million (4%) funded research management and support (*RMS*)



RECENT PUBLIC HEALTH ACCOMPLISHMENTS

Closer to a cure for “dry” age-related macular degeneration (AMD) with launch of first FDA-approved clinical trial based on patient-derived stem cells

Effective option to reduce the progression of myopia (nearsightedness) in children through therapeutic contact lenses as seen in results from new clinical trial

A randomized clinical trial focusing on treatments for uveitis, a common form of eye inflammation, showed that the drug methotrexate performed similarly to a more expensive therapy, providing uveitis patients a cost-effective option



Connect with NEI Online

nei.nih.gov



National Eye Institute (NEI)



: @NatEyeInstitute



: @NationalEyeInstitute

TRANSLATING NEI RESEARCH TO THE MARKET

Artificial intelligence-based devices approved by FDA to aid diagnosis of:

Diabetic retinopathy— NEI small business grant led to EyeArt, which accurately screens for early stages of diabetic retinopathy

Retinopathy of Prematurity — novel software detects a hard-to-diagnose form of blinding disease in extremely premature, low birth weight newborns

blinq™ (pictured) is an easy-to-use device that can accurately screen for amblyopia (lazy eye) and helps identify children who need treatment



Credit: Andrew Schuman, M.D.

ONGOING PROJECTS AND INITIATIVES

NEI Audacious Goals Initiative to restore vision through retinal regeneration **launched three research consortia** representing 16 projects and \$62 million to support the promise of regenerative medicine for patients

3D Retina Organoid Challenge — Prize competition launched in 2017 to develop marketable research resource led to new grants and tripled journal articles on retina organoids

Stem Cell Tissue Bank for AMD research community — Cell lines generated from consenting patients along with their deidentified genetic and clinical histories enables researchers to study how genes and cell mechanisms lead to disease

NIH BRAIN Initiative — 45% of new FY 2020 BRAIN awards fund vision-related research or involved NEI grantees, reinforcing centrality of vision in understanding the brain; the retina is part of the brain that can be imaged directly

HIGHLIGHTS OF NEI STRATEGIC PLAN (2021-2026)

The NEI Strategic Plan, organized through cross-cutting areas of emphasis, will outline research priorities in topics, such as:

Bioinformatics/Big Data in vision research, which is moving into an era of data science and machine learning. As an early leader in this field, NEI will make it easier to share data, while protecting patient information and data security

Cerebral Visual Impairment, a leading cause of visual impairment in children due to damage in the parts of the developing brain that process vision

Advanced technologies, including artificial intelligence and telemedicine, which can help providers diagnose vision conditions, bringing increased access to care to many, including those in resource limited areas

Cross-Cutting Areas of Emphasis

Visual System in Health and Disease

- From Genes to Disease Mechanisms
- Biology and Neuroscience of Vision
- Immune System & Eye Health

Capitalizing on Emerging Fields

- Regenerative Medicine
- Data Science

Preventing Vision Loss and Enhancing Well-Being

- Individual Quality of Life
- Public Health & Disparities Research

NEI Anterior Segment Initiative will target a wide variety of conditions, including dry eye and pain through catalyzing transformative research in the front (anterior segment) of the eye (cornea, iris, lens)

A more diverse workforce is integral to eye and vision research. NEI is working on a variety of projects, such as:

- **Expanding the Diversity In Vision Research and Ophthalmology** training program to include more experienced trainees, applied science researchers, and those outside of vision research
- **Encouraging greater representation and inclusion of visually impaired individuals** in all stages/types of research and its administration

Major Changes in the Fiscal Year 2022 President's Budget Request

Major changes by budget mechanism and/or budget detail are briefly described below. Note that there may be overlap between budget mechanisms and activity detail and these highlights will not sum to the total change for the FY 2022 President's Budget. The FY 2022 President's Budget for NEI is \$858.5 million, an increase of \$23.0 million from the FY 2021 Enacted level.

Research Project Grants (RPGs) (+\$10.9 million; total \$538.8 million):

NEI will support a total of 1,257 Research Project Grants (RPGs) in FY 2022. Noncompeting RPG awards will increase by 13 awards and increase by \$5.7 million. Competing RPG awards will increase by 11 awards and increase by \$4.6 million.

Research Training (+\$0.7 million; total \$12.3 million):

Support for the Ruth L. Kirschstein Training Awards will increase by \$0.7 million to accommodate an average across-the-board stipend increase of 2 percent and costs for the newly implemented childcare allowance per trainee position. These increases are consistent with recommendations from the NIH Director, Institute and Center Directors and the NIH Extramural Activities Working Group (EAWG).

Intramural Research (+\$4.5 million; total \$104.0 million):

Consistent with NIH policy, NEI will increase funding for Intramural Research to accommodate costs for employee salary and benefit increases and to accommodate increases in charges for centrally funded services.

Research & Development Contracts (+\$3.3 million; total \$48.3 million)

NEI will increase funding for Research & Development Contracts to accommodate increases to trans-NIH and trans-HHS initiatives for program evaluation and cybersecurity. Funding is also included to accommodate increases to centrally funded services.

NATIONAL INSTITUTES OF HEALTH
National Eye Institute

Budget Mechanism - Total¹

(Dollars in Thousands)

MECHANISM	FY 2020 Final		FY 2021 Enacted		FY 2022 President's Budget		FY 2022 +/- FY 2021 Enacted	
	No.	Amount	No.	Amount	No.	Amount	No.	Amount
<u>Research Projects:</u>								
Noncompeting	864	\$356,192	890	\$377,304	903	\$382,963	13	\$5,660
Administrative Supplements	(69)	7,254	(30)	4,500	(30)	4,500	(0)	0
Competing:								
Renewal	98	43,917	83	34,020	86	35,323	3	1,303
New	249	104,419	211	86,510	219	89,824	8	3,314
Supplements	0	0	0	0	0	0	0	0
Subtotal, Competing	347	\$148,336	294	\$120,530	305	\$125,148	11	\$4,618
Subtotal, RPGs	1,211	\$511,782	1,184	\$502,334	1,208	\$512,611	24	\$10,277
SBIR/STTR	48	25,464	48	25,586	49	26,222	1	636
Research Project Grants	1,259	\$537,246	1,232	\$527,919	1,257	\$538,833	25	\$10,913
<u>Research Centers:</u>								
Specialized/Comprehensive	39	\$26,785	39	\$26,785	40	\$27,187	1	\$402
Clinical Research	0	0	0	0	0	0	0	0
Biotechnology	0	0	0	0	0	0	0	0
Comparative Medicine	0	144	0	144	0	146	0	2
Research Centers in Minority Institutions	0	0	0	0	0	0	0	0
Research Centers	39	\$26,928	39	\$26,928	40	\$27,332	1	\$404
<u>Other Research:</u>								
Research Careers	102	\$19,959	102	\$19,959	104	\$20,258	2	\$299
Cancer Education	0	0	0	0	0	0	0	0
Cooperative Clinical Research	30	38,230	30	39,814	30	40,411	0	597
Biomedical Research Support	0	0	0	0	0	0	0	0
Minority Biomedical Research Support	0	0	0	0	0	0	0	0
Other	22	20,647	30	30,781	30	31,243	0	462
Other Research	154	\$78,836	162	\$90,554	164	\$91,913	2	\$1,358
Total Research Grants	1,452	\$643,010	1,433	\$645,402	1,461	\$658,077	28	\$12,676
<u>Ruth L Kirschstein Training Awards:</u>	<u>FTTPs</u>		<u>FTTPs</u>		<u>FTTPs</u>		<u>FTTPs</u>	
Individual Awards	108	\$5,271	108	\$5,352	108	\$5,584	0	\$232
Institutional Awards	136	6,097	136	6,288	136	6,739	0	451
Total Research Training	244	\$11,368	244	\$11,641	244	\$12,323	0	\$683
Research & Develop. Contracts (SBIR/STTR) (non-add)	41 (0)	\$40,740 (269)	41 (0)	\$45,024 (269)	41 (0)	\$48,347 (269)	0 (0)	\$3,322 (0)
Intramural Research	189	95,833	198	99,518	198	104,028	0	4,510
Res. Management & Support	80	32,373	84	33,936	84	35,759	0	1,824
SBIR Admin. (non-add)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Construction		0		0		0		0
Buildings and Facilities		0		0		0		0
Total, NEI	269	\$823,325	282	\$835,521	282	\$858,535	0	\$23,014

¹ All items in italics and brackets are non-add entries.

NATIONAL EYE INSTITUTE

For carrying out section 301 and title IV of the PHS Act with respect to eye diseases and visual disorders, [~~\$835,714,000~~]*\$858,535,000*.

**NATIONAL INSTITUTES OF HEALTH
National Eye Institute**

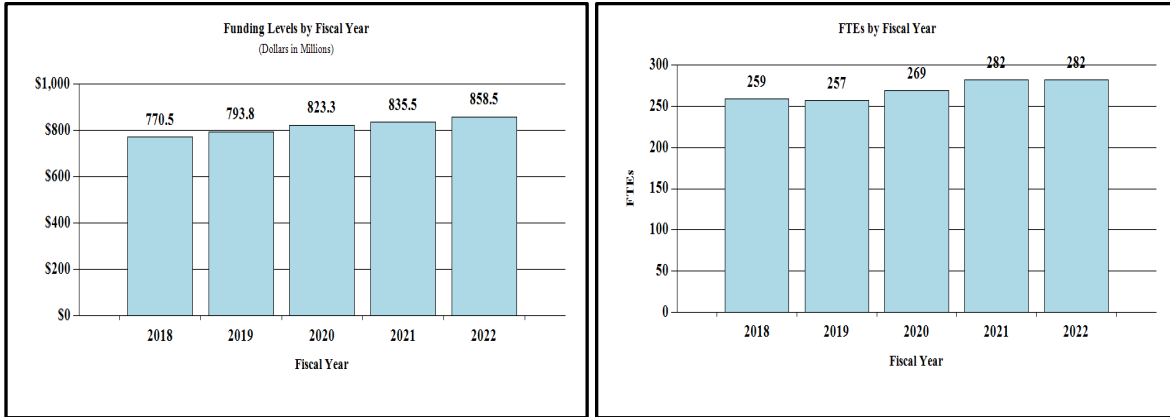
Summary of Changes

(Dollars in Thousands)

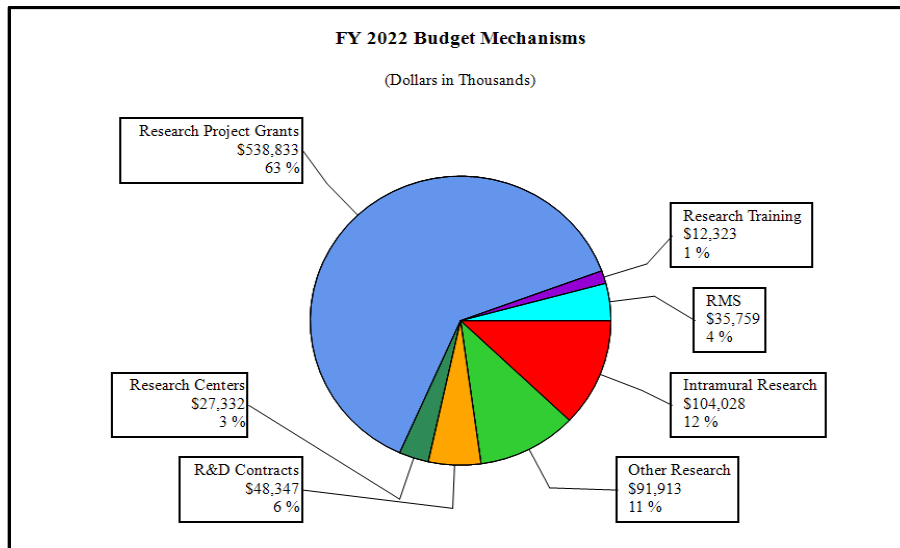
FY 2021 Enacted				\$835,521		
FY 2022 President's Budget				\$858,535		
Net change				\$23,014		
CHANGES	FY2021 Enacted		FY 2022 President's Budget		Built-In Change from FY 2021 Enacted	
	FTEs	Budget Authority	FTEs	Budget Authority	FTEs	Budget Authority
<u>A. Built-in:</u>						
<u>1. Intramural Research:</u>						
a. Annualization of January 2021 pay increase & benefits		\$36,485		\$39,366		\$720
b. January FY 2022 pay increase & benefits		36,485		39,366		2,161
c. Paid days adjustment		36,485		39,366		0
d. Differences attributable to change in FTE		36,485		39,366		0
e. Payment for centrally furnished services		16,868		17,711		843
f. Cost of laboratory supplies, materials, other expenses, and non-recurring costs		46,166		46,951		836
Subtotal						\$4,560
<u>2. Research Management and Support:</u>						
a. Annualization of January 2021 pay increase & benefits		\$16,546		\$17,901		\$339
b. January FY 2022 pay increase & benefits		16,546		17,901		1,016
c. Paid days adjustment		16,546		17,901		0
d. Differences attributable to change in FTE		16,546		17,901		0
e. Payment for centrally furnished services		4,478		4,702		224
f. Cost of laboratory supplies, materials, other expenses, and non-recurring costs		12,912		13,156		232
Subtotal						\$1,811
Subtotal, Built-in						\$6,372
CHANGES	FY2021 Enacted		FY 2022 President's Budget		Program Change from FY 2021 Enacted	
	No.	Amount	No.	Amount	No.	Amount
<u>B. Program:</u>						
<u>1. Research Project Grants:</u>						
a. Noncompeting	890	\$381,804	903	\$387,463	13	\$5,660
b. Competing	294	120,530	305	125,148	11	4,618
c. SBIR/STTR	48	25,586	49	26,222	1	636
Subtotal, RPGs	1,232	\$527,919	1,257	\$538,833	25	\$10,913
2. Research Centers	39	\$26,928	40	\$27,332	1	\$404
3. Other Research	162	90,554	164	91,913	2	1,358
4. Research Training	244	11,641	244	12,323	0	683
5. Research and development contracts	41	45,024	41	48,347	0	3,322
Subtotal, Extramural		\$702,067		\$718,747		\$16,681
6. Intramural Research	FTEs 198	\$99,518	FTEs 198	\$104,028	FTEs 0	-\$50
7. Research Management and Support	84	33,936	84	35,759	0	12
8. Construction		0		0		0
9. Buildings and Facilities		0		0		0
Subtotal, Program	282	\$835,521	282	\$858,535	0	\$16,642
Total built-in and program changes						
\$23,014						

Fiscal Year 2022 Budget Graphs

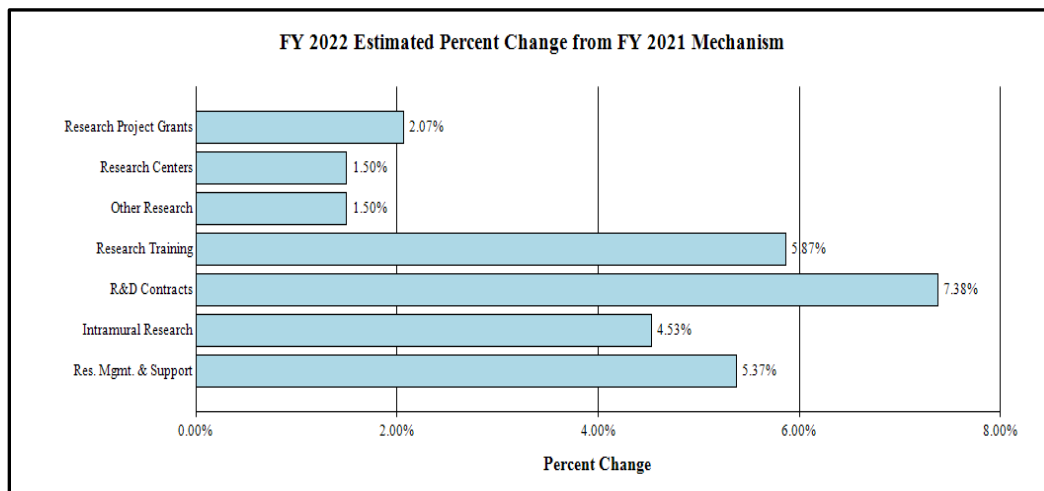
History of Budget Authority and FTEs:



Distribution by Mechanism:



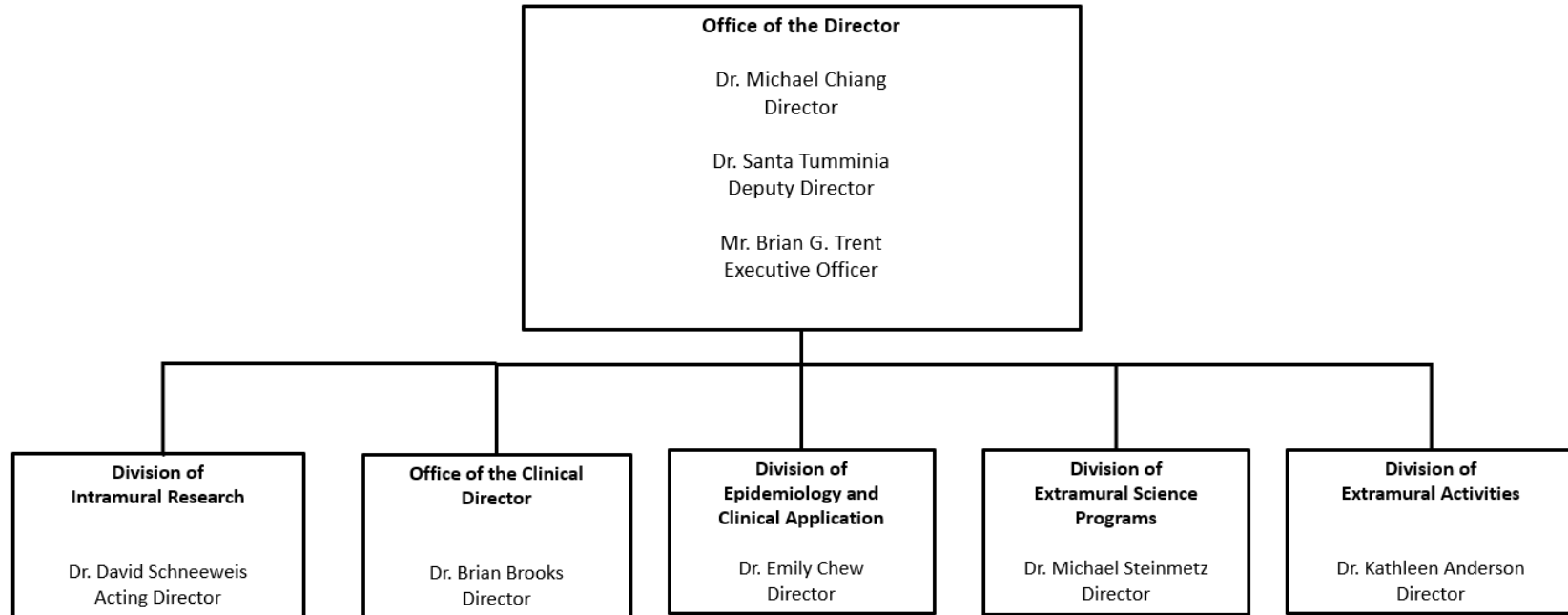
Change by Selected Mechanisms:



NATIONAL INSTITUTES OF HEALTH

National Eye Institute

Organizational Chart



NATIONAL INSTITUTES OF HEALTH
National Eye Institute

Budget Authority by Activity¹
(Dollars in Thousands)

	FY 2020 Final		FY 2021 Enacted		FY 2022 President's Budget		FY 2022 +/- FY 2021 Enacted	
<u>Extramural Research</u>	<u>FTE</u>	<u>Amount</u>	<u>FTE</u>	<u>Amount</u>	<u>FTE</u>	<u>Amount</u>	<u>FTE</u>	<u>Amount</u>
<u>Detail</u>								
Retinal Diseases Research		\$337,101		\$340,471		\$348,560		\$8,089
Corneal Diseases, Cataract, and Glaucoma Research		218,183		220,364		225,599		5,236
Sensorimotor Disorders, Visual Processing, and Rehabilitation Research		139,835		141,232		144,588		3,356
Subtotal, Extramural		\$695,119		\$702,067		\$718,747		\$16,681
Intramural Research	189	\$95,833	198	\$99,518	198	\$104,028	0	\$4,510
Research Management & Support	80	\$32,373	84	\$33,936	84	\$35,759	0	\$1,824
TOTAL	269	\$823,325	282	\$835,521	282	\$858,535	0	\$23,014

¹Includes FTEs whose payroll obligations are supported by the NIH Common Fund.

Justification of Budget Request

National Eye Institute

Authorizing Legislation: Section 301 and title IV of the Public Health Service Act, as amended.

Budget Authority (BA):

	FY 2020 Final	FY 2021 Enacted	FY 2022 President's Budget	FY 2022 +/- FY 2021
BA	823,325,000	835,521,000	858,535,000	+23,014,000
FTE	269	282	282	0

Program funds are allocated as follows: Competitive Grants/Cooperative Agreements; Contracts; Direct Federal/Intramural and Other.

Program Descriptions

Retinal Diseases Research: The retina is the light-sensitive neural tissue that lines the inside of the eye and sends visual messages through the optic nerve to the brain. Damage to the retina through disease such as macular degeneration or diabetic retinopathy are among the leading causes of blindness in the United States. The goals of this program are to increase the understanding of disease mechanisms that cause vision loss and to develop improved methods of prevention, diagnosis, and treatment. To meet these goals, NEI supports research in cell biology, physiology, neuroscience, and immunology related to the retina. Major areas addressed within the Retina Program include key causes of blindness such as:

- **Age-related Macular Degeneration.** A leading cause of vision loss, AMD is a disease that blurs the sharp, central vision required for reading, driving, and face recognition. There are two forms of advanced AMD: geographic atrophy (“dry”) AMD, a breakdown of light sensing photoreceptor neurons; and neovascular (“wet”) AMD, an abnormal growth of blood vessels underneath the retina.
- **Retinopathy.** Diabetic retinopathy is a complication of diabetes mellitus in which abnormal blood vessels grow on the surface of the retina and may swell and leak fluid. Retinopathy of Prematurity (ROP) is a potentially blinding disorder that affects premature infants with very low birthweight.
- **Retinal monogenic disorders.** Single genetic mutations cause some retinal degenerative diseases, including retinitis pigmentosa, Usher syndrome, and ocular albinism.
- **Uveitis.** Inflammatory diseases that produce swelling and destroy eye tissue, sometimes leading to severe vision loss.

Accomplishments: Researchers have been able to restore sight in animal models by replacing dying light-detecting photoreceptor cells in the eye with intermediary stem cells that are

reprogrammed from skin or blood cells. A collaborative team of NEI-supported investigators recently discovered a way to turn skin cells directly into light-sensing eye cells, no longer needing the intermediate stem cell step. For people with blinding diseases caused by dying photoreceptors, these findings provide hope for a potential new and faster strategy to develop life-altering treatments.

By understanding how the visual system works at a cellular level, clinicians are better able to treat patients vision diseases and help patients. Utilizing computational methods, scientists have recently been able to map out how human retinal cells interact with the brain's optic nerve to interpret signals into sight, a feat that has only been done previously with animal cells. This type of research contributes to advancements in visual prosthetics and overall understanding of retinal eye diseases.

Budget Policy: The FY 2022 Budget request for this program area is \$348.6 million, an increase of \$8.1 million or 2.4 percent compared with the FY 2021 Enacted level.

Corneal Diseases, Cataract, and Glaucoma Research: Corneal diseases, cataracts, and glaucoma cause more visits to ophthalmologists a year than any other vision disorder. NEI supports research to address these conditions that originate in the front of the eye.

- **Corneal disease.** Corneal injuries, infections, and diseases can be extremely painful and require immediate medical attention. The ocular surface is the front line against environmental insults, such as viruses (herpes simplex, herpes zoster, bacteria (causing trachoma), fungus (sometimes associated with contact lens wear) and ocular inflammation (uveitis) can be serious and lead to permanent vision loss. NEI's corneal research encompasses ocular injuries sustained from sports and other recreational activities, from workplace accidents, and from eye trauma associated with falls and motor vehicle accidents.
- **Cataract.** Cataracts, a clouding of the lens in the eye that affects vision, are the leading cause of blindness worldwide. NEI researchers investigate strategies to prevent cataract formation and progression through research to understand the physiological basis of how the lens in the healthy eye remains transparent for much of the lifespan.
- **Glaucoma.** Glaucoma refers to a group of blinding diseases that result from damage to the optic nerve, the bundle of fibers that transmit signals from the eyes to the brain. Because there are no early symptoms, half of people with glaucoma don't know they have it, but over time individuals slowly lose side (peripheral) vision. Individuals over age 60, who are Black or Hispanic, or who have a family history of glaucoma have a much higher disease risk. Current therapies focus on reducing excessive fluid pressure in the eye, which causes nerve damage in the most common form of glaucoma.

Accomplishments: The cornea, the transparent outermost layer of the eye, is also the barrier most prone to damage that can come from environmental exposures. As part of an ongoing NEI clinical trial to increase the proliferative abilities of cell regeneration in patients, surgeons were able to replace damaged corneas from four patients who experienced chemical burns by using stem cells derived from their healthy eye. This procedure, a first of its kind to occur in the U.S., is considered an important step for the field of regenerative medicine.

Given the prevalence of dry eye, its impact on quality of life, and its disproportionate burden on post-menopausal women, methods to diagnose and treat the condition are of great importance. The effectiveness of approved drugs to treat dry eye disease can vary based on individual patients' conditions. Recently a small phase 1 clinical trial found that a new DNase enzyme-based eye drop is safe and well-tolerated, and has potential to reduce the severity of a tear-deficient autoimmune form of dry eye disease. This is a welcome discovery to provide new options in the arsenal of treatments for a common and painful condition.

Over time, the ocular lens can lose its transparency and form cataracts, a common condition and significant cause of visual loss that occurs as people age. Researchers have been exploring ways to inhibit or delay the progression of cataracts by targeting specific lens fibers associated with a particular family of proteins. A recent study using a rodent model system found that immune

Focusing on the Front of the Eye— NEI's Anterior Segment Initiative

In December 2018, NEI initiated discussions around the potential to catalyze transformative research in the front of the eye known as the anterior segment (e.g., cornea, iris, lens) with the goal to tackle difficult-to-treat eye conditions, such as dry eye, eye pain, Sjogren's syndrome—an autoimmune disease that can cause chronic dry eye, and uveitis—a form of eye inflammation that can lead to redness, blurred vision, and pain. The Anterior Segment Initiative (ASI) aims to parallel NEI's successes with the Audacious Goals Initiative, which addresses the posterior or back of the eye (e.g., retina, choroid, optic nerve) by assembling collaborative research consortia focused on accelerating translational research, with close interaction with the external scientific community for all phases of planning and implementation. While NEI routinely studies the anterior segment through existing programs in Cornea, Lens/Cataract, and Glaucoma, one goal of the ASI is to attract new talent from other disciplines, such as expertise outside of vision research, to prioritize pressing challenges and address gaps in the research portfolio.

In early FY 2020, NEI issued a Request for Information to receive feedback and expert advice on unmet research needs and unique opportunities within the front of the eye. NEI received a total of 52 responses, including over 200 signatories and stakeholders from anterior segment science and medicine, as well as feedback from researchers with various professional backgrounds. Key topic areas that emerged were ocular pain, dry eye disease, inflammation, and ocular microbiome.

NEI established the following core criteria to help prioritize future ASI community-framed workshops and targeted funding opportunity announcements: (1) innovative new approaches and research topics, beyond the scope of the existing portfolio, (2) multi-disciplinary research involving multiple components of the anterior segment, possibly involving diverse mechanisms, and their interactions, (3) fostering collaborative and cross-disciplinary research bringing in as partners those with relevant expertise from outside the vision community.

cells can move along the lens fibers in response to injuries in other regions of the eye, providing insight on potential ways that the immune system can help people who have sustained eye injuries or have suffered complications from cataract surgery. Another new study explored the stability and reactions of specific eye proteins when faced with environmental damage from ultraviolet light and other stressors, providing insight on how the process of aging can deplete the eye lens. Understanding the mechanics of eye proteins can also help uncover other neurodegenerative conditions that affect the aging population, such as Alzheimer's, Parkinson's and Huntington diseases.

In glaucoma, increased pressure in the eye can cause damage to retinal ganglion cells (RGCs), the neurons that connect the eye to the brain through the optic nerve.

Researchers have made important progress in identifying mechanisms of neuronal cell death in glaucoma, which may lead to future treatments for the disease. For example, researchers identified specific RGCs that have the ability to support the regeneration of dead or damaged neural connections. Another new investigation exploring the link between ocular pressure and cell death found that a star-shaped cell, called astrocytes, in the central nervous system

releases a toxin that kills neurons in the presence of increased ocular pressure. These findings highlight research pathways useful to creating potential therapies that can target this cell, which can help not only glaucoma patients but also people facing neurodegenerative diseases like Alzheimer's, Parkinson's, and Lou Gehrig's disease.

Budget Policy: The FY 2022 Budget request for this program area is \$225.6 million, an increase of \$5.2 million or 2.4 percent compared with the FY 2021 Enacted level.

Sensorimotor Disorders, Visual Processing, and Rehabilitation Research: Vision is the dominant sensory system in humans, occupying over one third of the brain neocortex. NEI funds basic and applied research on the brain as it relates to the visual system and perception, and research on rehabilitation for individuals with low vision. NEI neuroscientists have made remarkable progress in understanding what goes on in the face-processing areas in the brain.

- **Sensorimotor disorders and visual processing research.** Strabismus (misalignment of the eyes) and amblyopia (commonly known as “lazy eye”) are common disorders that develop during childhood, and are a major cause of irreversible vision loss in children. Program goals center on gaining a better understanding of the neuromuscular control of gaze and the development of the visual system in babies and young children at high risk for these disorders. Neuroscientists working in vision research seek to understand how the brain processes the visual information that floods our eyes, how neural activity is related to visual perception, and how the visual system interacts with cognitive and motor systems. Additional research is directed at trying to open the so-called “critical period” and thereby allow some recovery of visual function and stereopsis in adult amblyopia subjects.
- **Refractive errors.** Refractive errors, such as nearsightedness (myopia), farsightedness, and astigmatism, are, once diagnosed, commonly correctable with eye glasses or contact lenses, but these conditions often worsen and therefore remain a costly, recurring economic and personal burden to many in the United States and globally. Increases in the prevalence of these conditions are a public health concern. People with complications, such as severe nearsightedness, can also be at risk of vision loss from glaucoma or retinal detachment. The major goals of this program are to discover the biochemical pathways that govern eye growth and to uncover the risk factors associated with refractive errors with the goal of prevention of disease onset or progression.
- **Rehabilitation research.** Some causes of blindness and visual impairment are not treatable at this point. Low vision is the term used to describe chronic visual conditions whose visual impairment is not correctable by eye glasses or contact lenses. NEI supports rehabilitation research to improve the quality of life for people with visual impairments by helping them maximize the use of remaining vision and by developing improved assistive and adaptive aids and devising new strategies proven to assist those without useful vision.

Accomplishments: Researchers are uncovering the ways that people blind at birth or when very young interpret the world. Recently, investigators examined how blind versus sighted people interpret what animals look like and found that blind people categorize animals by biological classifications such as taxonomy and habitat, whereas sighted people characterize based on appearance. The study concluded that despite the absence of direct sensory access like vision,

people are able to infer appearances that are both detailed and accurate. Neuroscience research has shown that the visual cortex in blind individuals is repurposed for other non-visual and cognitive functions, as shown in a study that observed harmonization in areas of the brain that process vision when stimulated with certain forms of audio. Future research on the rewiring of neural connections in people with visual loss may be able to improve methods of learning and rehabilitation.

Studies on visual processing have primarily focused specifically on the interactions between the brain and eyes fixed on a single point in space. New technologies provide opportunities to study natural vision in freely moving experimental subjects, and approaches involving naturalistic visual input and modeling are improving the understanding of interactions between movement and vision. For example, neuroscientists are challenging theories about visual processing of optic flow—the translation and expansion of motion information—by tracking subjects’ natural movements and measuring the flow of visual stimuli on the retinas.

Budget Policy: The FY 2022 Budget request for this program area is \$144.6 million, an increase of \$3.4 million or 2.4 percent compared with the FY 2021 Enacted level.

The Role of Collaborative Clinical Research in Children's Vision

Clinical research plays a pivotal role in advancing the health of the American public by evaluating the efficacy and possible adverse effects of medical interventions. The NEI Collaborative Clinical Research (CCR) program supports large-scale trials for drug therapies, human gene-transfer, and stem cell therapy; epidemiological research; rare diseases research and other complex, clinical studies. CCR projects focus on eye conditions and diseases occurring across the lifespan—from infants to the elderly. Recent research on children's health have advanced treatments that improve eye health for future generations.

The Pediatric Eye Disease Investigator Group is a network of doctors and scientists from academia and private practice dedicated to facilitating multicenter clinical research and developing community-based practices studying eye disorders that affect children. PEDIG studies have helped change the practice of pediatric eye care worldwide. Recent research revealed that a large proportion of children with amblyopia or "lazy eye" can be successfully treated with less intense treatment regimens than previously thought. Amblyopia is a condition where the brain ignores input from one eye but can be treated during a critical window of vision development with eyedrops or by patching one eye. These positive findings reduce amblyopia treatment burden and increase care for millions of children.

ROP is a leading cause of blindness in children; babies born prematurely are at risk for this disease. Results of a recent study provided early indication that a very low fraction of the current standard dose of the drug Avastin could be used to treat the disease and preserve sight for these preterm infants. Advances such as the FDA breakthrough status for a new artificial intelligence device that uses a software algorithm to detect an aggressive and hard-to-clinically-diagnose form of ROP in extremely premature newborns and the potential for machine-learning technologies to model the risks of treatments show great promise to reduce lifelong blindness.

Myopia (nearsightedness) is a public health concern—the prevalence of this condition among children worldwide is increasing at alarming rates. Myopic patients, especially those with severe cases, are at increased risk for a variety of serious eye conditions. Recently, findings from a 3-year clinical trial conducted by the collaborative study group, Bifocal Lenses In Nearsighted Kids, showed that therapeutic contact lenses were able to slow the progression of visual impairment in nearsighted children by 43 percent compared to regular contact lenses. Studies that explore a wide range of children's health needs will help support the preservation of sight and allow kids to continue learning, playing, and interacting with the world.

Intramural Research: NEI basic and clinical studies conducted on the NIH campus are focused on the cause, prevention, and treatment of eye diseases and vision disorders; cellular and molecular mechanisms of eye development, infectious diseases of the eye; inflammatory and immunological responses; mechanisms of visual perception by the brain; and sensory control of movements.

Accomplishments: Remarkable discoveries from NEI's intramural investigators have progressed the vision research community and helped address our society's public health needs. The foundational efforts of AREDS and AREDS2 provided enormous amounts of information about the relationship between nutritional supplements and AMD, and continue to shape research in this area. In March 2020, NEI gathered experts to a nutrition workshop that focused on B vitamins and very long chain fatty acids as a potential precursor to AREDS3, a clinical trial of nutritional supplements for earlier stages of AMD. Utilizing AREDS and AREDS2 data, NEI investigators discovered that tracking the severity of AMD progression over two years can predict the likelihood of vision loss five years later, suggesting that this scale can be used to shorten clinical trials focused on AMD and bring treatments earlier to people who need them.

NEI researchers have explored how DNA modifications can influence visual function as people age. By analyzing the changes in mouse eye genes due to age-related mutations or expression patterns, researchers were able to observe how varied and vulnerable cell functions became with aging, uncovering clues about susceptible developmental stages and factors conferring risk of age-associated eye diseases. NEI

scientists found insights to potential therapies for glaucoma through bone marrow stem cell

secretions called exosomes that are able to preserve RCGs often damaged in people with the disease.

NEI also conducts population-based research and contributes to federal surveys components involving vision loss, functional abilities and the prevalence of eye diseases and disorders; a new study published in collaboration with the Centers for Disease Control and Prevention found that approximately 40 percent of adults in the United States over 18 years of age (93 million people) were at high risk for vision loss in 2017. Among these high-risk adults, about 40 percent did not receive an eye exam in the past year. Furthermore, over 8 million Americans need glasses, but could not afford them. The analysis of national survey data suggests that improvements in eye care and affordable options for eyeglasses may be crucial ways to prevent unnecessary vision loss.

Budget Policy: The FY 2022 Budget request for intramural research is \$104.0 million, an increase of \$4.5 million or 4.5 percent compared with the FY 2021 Enacted level.

Research Management and Support (RMS): RMS is a budget category that supports leadership and administrative personnel whose job it is to supply direction for the Institute, provide essential services, manage research programs, and monitor budgets. Under this line item includes functions and activities such as management of human resource support, training, travel, purchasing, facilities, budget, planning and oversight, information technology, and extramural grant awards. NEI currently oversees more than 1,700 grants and contracts, including research project grants, core center grants, research career development awards, cooperative clinical research agreements, and research and development contracts.

Accomplishments: Over the past two decades, the intramural clinical program at NEI has doubled its clinical footprint within the NIH Clinical Center (CC), from an average of 3,000 patient visits to now approaching 5,000 visits per year and increasing clinical studies from 25 to 47, focusing on rare disease and first in-human trials as well as public health concerns. Also, NEI has built a robust intramural consult service seeing an additional 3,000 visits per year referred from all of the NIH CC supporting trials from other Institutes and investigating ocular components of other conditions. NEI maintained continuity of essential eye clinic operations despite massive workplace transformations due to the COVID-19 pandemic. NEI also harnessed staff expertise to participate in NIH's COVID-19 research planning and response.

Budget Policy: The FY 2022 Budget request for RMS is \$35.8 million, an increase of \$1.8 million or 5.4 percent compared with the FY 2021 Enacted level.

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Appropriations History

Fiscal Year	Budget Estimate to Congress	House Allowance	Senate Allowance	Appropriation
2013	\$693,015,000		\$695,115,000	\$702,712,359
Rescission				\$1,405,425
Sequestration				(\$35,271,328)
2014	\$699,216,000		\$701,407,000	\$682,077,000
Rescission				\$0
2015	\$675,168,000			\$684,191,000
Rescission				\$0
2016	\$695,154,000	\$698,108,000	\$709,549,000	\$715,903,000
Rescission				\$0
2017 ¹	\$707,998,000	\$735,576,000	\$740,826,000	\$732,618,000
Rescission				\$0
2018	\$549,847,000	\$743,881,000	\$758,552,000	\$772,317,000
Rescission				\$0
2019	\$711,015,000	\$781,540,000	\$796,955,000	\$796,536,000
Rescission				\$0
2020	\$685,644,000	\$835,465,000	\$840,163,000	\$824,090,000
Rescission				\$0
2021	\$749,003,000	\$831,177,000	\$850,135,000	\$835,714,000
Rescission				\$0
2022	\$858,535,000			

¹ Budget Estimate to Congress includes mandatory financing.

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Authorizing Legislation

	PHS Act/ Other Citation	U.S. Code Citation	2021 Amount Authorized	FY 2021 Enacted	2022 Amount Authorized	FY 2022 President's Budget
Research and Investigation	Section 301	42§241	Indefinite	\$835,521,000	Indefinite	\$858,535,000
National Eye Institute	Section 401(a)	42§281	Indefinite		Indefinite	
Total, Budget Authority				\$835,521,000		\$858,535,000

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Amounts Available for Obligation¹
(Dollars in Thousands)

Source of Funding	FY 2020 Final	FY 2021 Enacted	FY 2022 President's Budget
Appropriation	\$824,090	\$835,714	\$858,535
OAR HIV/AIDS Transfers	-765	-193	0
Subtotal, adjusted budget authority	\$823,325	\$835,521	\$858,535
Unobligated balance, start of year	0	0	0
Unobligated balance, end of year	0	0	0
Subtotal, adjusted budget authority	\$823,325	\$835,521	\$858,535
Unobligated balance lapsing	-15	0	0
Total obligations	\$823,310	\$835,521	\$858,535

¹ Excludes the following amounts (in thousands) for reimbursable activities carried out by this account:
FY 2020 - \$18,581 FY 2021 - \$25,100 FY 2022 - \$25,100

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Budget Authority by Object Class¹
(Dollars in Thousands)

	FY 2021 Enacted	FY 2022 President's Budget	FY 2022 +/- FY 2021 Enacted
Total compensable workyears:			
Full-time equivalent	282	282	0
Full-time equivalent of overtime and holiday hours	0	0	0
Average ES salary	\$199	\$205	\$5
Average GM/GS grade	12.4	12.4	0.0
Average GM/GS salary	\$117	\$120	\$3
Average salary, Commissioned Corps (42 U.S.C. 207)	\$112	\$115	\$3
Average salary of ungraded positions	\$149	\$153	\$4
OBJECT CLASSES	FY 2021 Enacted	FY 2022 President's Budget	FY 2022 +/- FY 2021
Personnel Compensation			
11.1 Full-Time Permanent	21,492	23,193	1,701
11.3 Other Than Full-Time Permanent	11,713	12,575	862
11.5 Other Personnel Compensation	1,663	1,764	101
11.7 Military Personnel	129	133	4
11.8 Special Personnel Services Payments	5,163	5,395	232
11.9 Subtotal Personnel Compensation	\$40,159	\$43,059	\$2,900
Civilian Personnel Benefits	12,729	14,062	1,333
12.2 Military Personnel Benefits	142	146	4
13.0 Benefits to Former Personnel	0	0	0
Subtotal Pay Costs	\$53,030	\$57,267	\$4,237
21.0 Travel & Transportation of Persons	423	430	8
22.0 Transportation of Things	157	160	3
23.1 Rental Payments to GSA	0	0	0
23.2 Rental Payments to Others	2	3	0
23.3 Communications, Utilities & Misc. Charges	307	313	6
24.0 Printing & Reproduction	32	33	1
25.1 Consulting Services	23,144	24,243	1,100
25.2 Other Services	24,776	27,704	2,927
25.3 Purchase of goods and services from government accounts	50,235	51,132	897
25.4 Operation & Maintenance of Facilities	41	41	0
25.5 R&D Contracts	13,050	13,285	235
25.6 Medical Care	279	290	10
25.7 Operation & Maintenance of Equipment	3,132	3,188	56
25.8 Subsistence & Support of Persons	0	0	0
25.0 Subtotal Other Contractual Services	\$114,657	\$119,883	\$5,226
26.0 Supplies & Materials	4,754	4,840	86
31.0 Equipment	5,043	5,133	91
32.0 Land and Structures	49	50	1
33.0 Investments & Loans	0	0	0
41.0 Grants, Subsidies & Contributions	657,057	670,415	13,358
42.0 Insurance Claims & Indemnities	0	0	0
43.0 Interest & Dividends	9	9	0
44.0 Refunds	0	0	0
Subtotal Non-Pay Costs	\$782,491	\$801,268	\$18,777
Total Budget Authority by Object Class	\$835,521	\$858,535	\$23,014

¹ Includes FTEs whose payroll obligations are supported by the NIH Common Fund.

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Salaries and Expenses
(Dollars in Thousands)

OBJECT CLASSES	FY 2021 Enacted	FY 2022 President's Budget	FY 2022 +/- FY 2021
Personnel Compensation			
Full-Time Permanent (11.1)	\$21,492	\$23,193	\$1,701
Other Than Full-Time Permanent (11.3)	11,713	12,575	862
Other Personnel Compensation (11.5)	1,663	1,764	101
Military Personnel (11.7)	129	133	4
Special Personnel Services Payments (11.8)	5,163	5,395	232
Subtotal Personnel Compensation (11.9)	\$40,159	\$43,059	\$2,900
Civilian Personnel Benefits (12.1)	\$12,729	\$14,062	\$1,333
Military Personnel Benefits (12.2)	142	146	4
Benefits to Former Personnel (13.0)	0	0	0
Subtotal Pay Costs	\$53,030	\$57,267	\$4,237
Travel & Transportation of Persons (21.0)	\$423	\$430	\$8
Transportation of Things (22.0)	157	160	3
Rental Payments to Others (23.2)	2	3	0
Communications, Utilities & Misc. Charges (23.3)	307	313	6
Printing & Reproduction (24.0)	32	33	1
Other Contractual Services:			
Consultant Services (25.1)	23,144	24,243	1,100
Other Services (25.2)	24,776	27,704	2,927
Purchases from government accounts (25.3)	29,242	29,668	426
Operation & Maintenance of Facilities (25.4)	41	41	0
Operation & Maintenance of Equipment (25.7)	3,132	3,188	56
Subsistence & Support of Persons (25.8)	0	0	0
Subtotal Other Contractual Services	\$80,335	\$84,845	\$4,510
Supplies & Materials (26.0)	\$4,754	\$4,840	\$86
Subtotal Non-Pay Costs	\$86,011	\$90,623	\$4,612
Total Administrative Costs	\$139,041	\$147,890	\$8,849

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Detail of Full-Time Equivalent Employment (FTE)

OFFICE/DIVISION	FY 2020 Final			FY 2021 Enacted			FY 2022 President's Budget		
	Civilian	Military	Total	Civilian	Military	Total	Civilian	Military	Total
Division of Epidemiology and Clinical Applications									
Direct:	10	-	10	10	-	10	10	-	10
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	10	-	10	10	-	10	10	-	10
Division of Extramural Activities									
Direct:	17	-	17	17	-	17	17	-	17
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	17	-	17	17	-	17	17	-	17
Division of Extramural Science									
Direct:	18	-	18	18	-	18	18	-	18
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	18	-	18	18	-	18	18	-	18
Division of Intramural Research									
Direct:	129	-	129	142	-	142	142	-	142
Reimbursable:	3	-	3	3	-	3	3	-	3
Total:	132	-	132	145	-	145	145	-	145
Office of the Director									
Direct:	91	1	92	91	1	92	91	1	92
Reimbursable:	-	-	-	-	-	-	-	-	-
Total:	91	1	92	91	1	92	91	1	92
Total	268	1	269	281	1	282	281	1	282
Includes FTEs whose payroll obligations are supported by the NIH Common Fund.									
FTEs supported by funds from Cooperative Research and Development Agreements.	0	0	0	0	0	0	0	0	0
FISCAL YEAR	Average GS Grade								
2018	12.4								
2019	12.4								
2020	12.4								
2021	12.4								
2022	12.4								

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Detail of Positions¹

GRADE	FY 2020 Final	FY 2021 Enacted	FY 2022 President's Budget
Total, ES Positions	1	1	1
Total, ES Salary	197,300	199,273	204,653
General Schedule			
GM/GS-15	36	36	36
GM/GS-14	31	31	31
GM/GS-13	43	43	43
GS-12	33	33	33
GS-11	25	25	25
GS-10	1	1	1
GS-9	17	17	17
GS-8	2	2	2
GS-7	3	3	3
GS-6	1	1	1
GS-5	0	0	0
GS-4	3	3	3
GS-3	0	0	0
GS-2	0	0	0
GS-1	0	0	0
Subtotal	195	195	195
Commissioned Corps (42 U.S.C. 207)			
Assistant Surgeon General	0	0	0
Director Grade	0	0	0
Senior Grade	1	1	1
Full Grade	0	0	0
Senior Assistant Grade	0	0	0
Assistant Grade	0	0	0
Subtotal	1	1	1
Ungraded	78	85	85
Total permanent positions	196	196	196
Total positions, end of year	275	282	282
Total full-time equivalent (FTE) employment, end of year	269	282	282
Average ES salary	197,300	199,273	204,653
Average GM/GS grade	12.4	12.4	12.4
Average GM/GS salary	116,063	117,228	120,393

¹ Includes FTEs whose payroll obligations are supported by the NIH Common Fund.