



National Eye Institute  
Research Today...Vision Tomorrow

# Focus on Myopia: Perspectives from the National Eye Institute

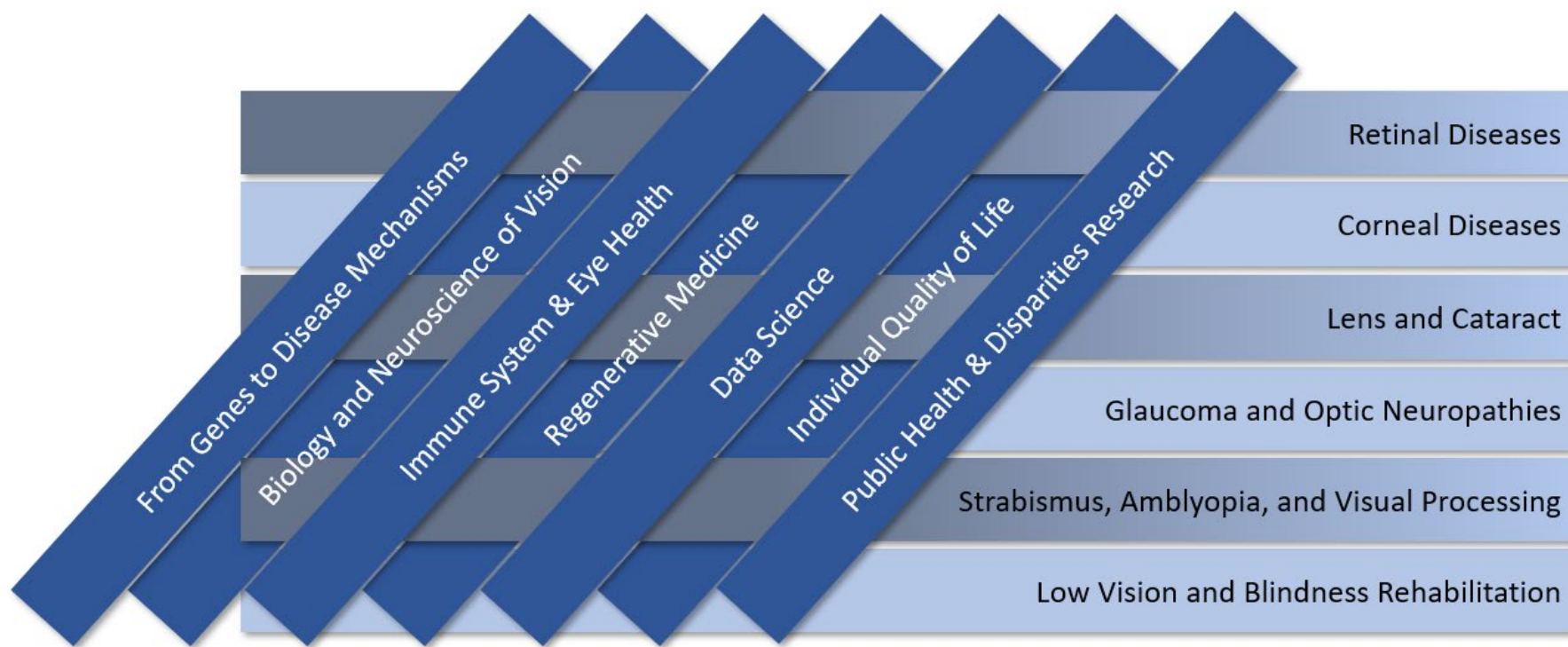
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# About the National Eye Institute

**Mission: eliminate vision loss and improve quality of life through vision research**

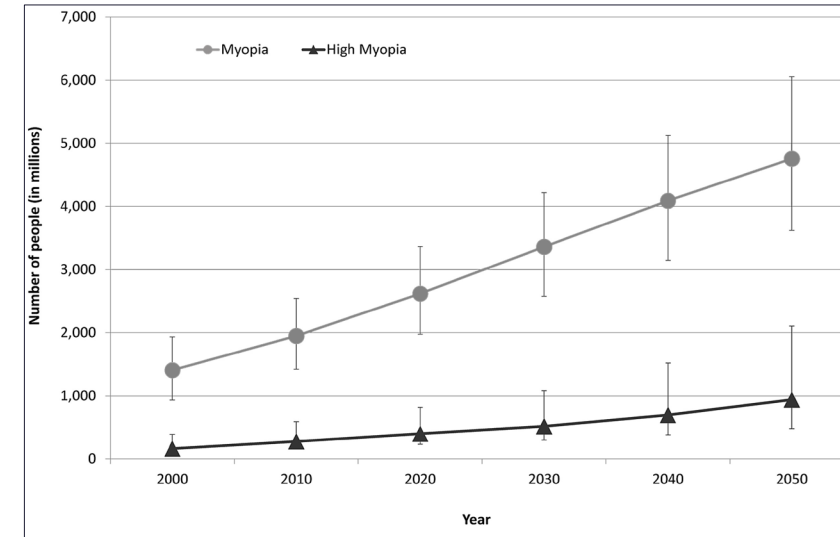


<https://www.nei.nih.gov/about/strategic-planning>

# Myopia: Why now?

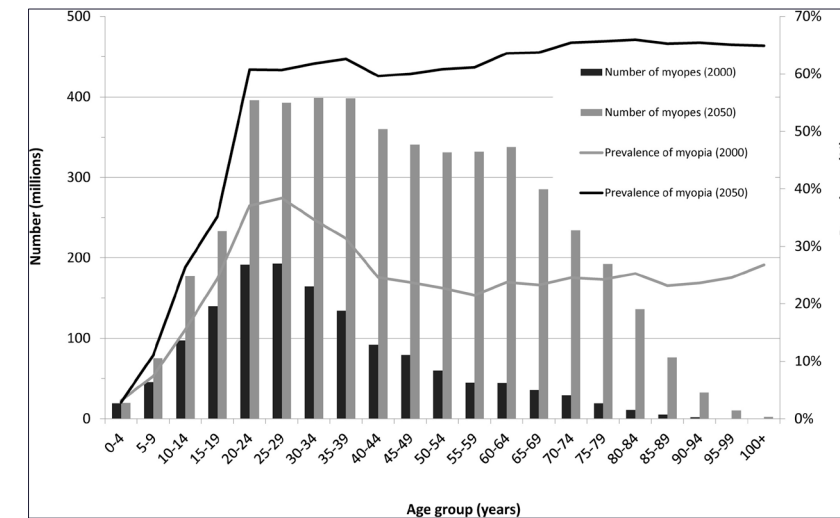
## ■ Rising Prevalence

- Prevalence varies widely around the globe, with rates approaching 90% in some areas of Asia, worse during pandemic
- High myopia may affect up to 1 billion people by 2050



## ■ Consequences of high myopia

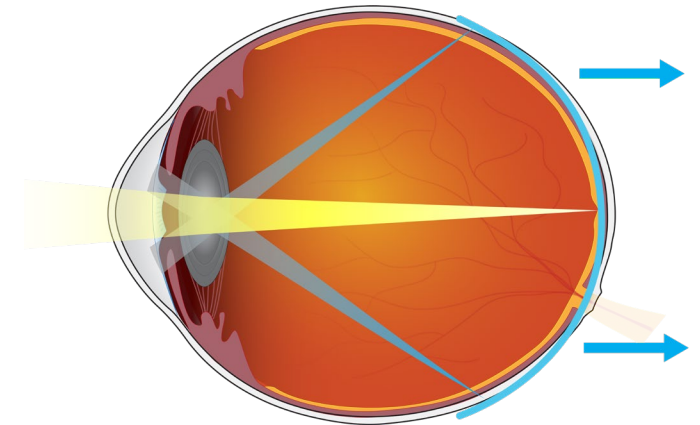
- Increased risk of blinding conditions (retinal detachment, glaucoma, myopic maculopathy)
- Risk increases with axial length



Holden BA, Fricke TR, et al. "Global Prevalence of Myopia and High Myopia and Temporal Trends from 2000 through 2050." *Ophthalmology* 2016;123:1036-1042.

# Myopia Risk Factors & Eye Development

- Genetic vs. Environmental & Behavioral Factors
  - **Genetics:** extensive work, family history
  - **Environment:** near work, light spectrum and intensity, peripheral versus central defocus, sleep & circadian rhythm
  - Link between environmental risks & biological mechanisms?
- Physiology of myopia development
  - Retinal signaling, choroid thickness, sclera
  - What are eye growth signals & cellular and molecular biology that underly ocular growth and myopia?
- Management: different options, unclear guidance, unclear mechanisms



# Challenges in Experimental Design

- Disentangling genetic from environmental risks
  - Many behavioral and social risk factors are overlapping; families often share behavioral and environmental factors
- Confounding variables & reporting error
  - How to accurately measure light intensity, near work time, etc.?
  - Is behavior most accurately measured by parental surveys?
- Variability in outcomes for interventions
  - Similar intervention studies have very different outcomes: why?



Bhandari KR, Shukla D, et al. "Objective Measures of Near Viewing and Light Exposure in Schoolchildren during COVID-19." *Optom Vis Sci* 2022;99:241-252.

# Electronics & Myopia Development

- Rise in myopia prevalence began decades ago, but continues to increase
  - 1970-2004 saw large (~60%) increase in myopia across racial groups in U.S.
  - Myopia development now appears to start at earlier ages
- What is the role of electronic devices in myopia development?
  - Lack of definitive data: earlier near work, light spectrum, light timing, light intensity?
  - How to mitigate risk in children?



# Health Disparities and Myopia

- Uncorrected refractive error is the leading cause of vision impairment
  - Disadvantaged groups have lower access to vision care & higher rates of uncorrected RE
  - Correcting refractive error → better school outcomes
- School-based vision programs: connecting to community care
  - School-based vision programs help, but should be tailored to individual school (urban vs. rural, availability of community care)
  - Community care required for interventions for myopia, other vision problems



# Welcome to the NASEM Committee

- Hopes for this study:
  - Assess the current mechanistic understanding of myopia pathogenesis and causes of its increased prevalence
  - Identify knowledge gaps and barriers to progress
  - Develop a research agenda aimed at better understanding the biological and environmental factors that could explain its increasing incidence
- Excited to participate in this project, importance toward NEI Strategic Plan

