HAYSTACK PROJECT
The Voices of Rare & Ultra Rare

POV
Patient Oriented Value

PATIENT ORIENTED VALUE (POV©) REPORT
CHOROIDEREMIA

Choroideremia
RESEARCH FOUNDATION

Choroideremia Research Foundation

Founded in 2000 by a small group of individuals affected with choroideremia (CHM), the **Choroideremia Research Foundation (CRF)** is the largest organization in the world focused on the search for a cure for CHM. Their mission is to raise funds in support of scientific research leading to a treatment or cure of CHM, a hereditary retinal-degenerative disease that causes blindness; to educate people affected by the disease; and to inform the public.

CRF has funded over $5 million in research on the causes and potential cures for choroideremia since being granted nonprofit status in 2000.

The organization hosts regular conferences for patients and families as well as scientific symposia for researchers and clinicians. It also offers one-day regional meetings several times a year around the world. Webinars and interactive online chats are offered (and recorded) several times monthly on topics such as emotional support, research, assistive technology, clinical trials and genetic testing.

In August 2021, the CRF spearheaded the launch of the International Choroideremia Research Network (ICRN), a global alliance of researchers from around the world who are working in concert to accelerate scientific knowledge about CHM. The network is composed of over 130 multi-disciplinary vision professionals with varied experiences, backgrounds, and interests from 25 countries.

CRF hosts a CHM patient registry.[1] The organization legislatively advocates for patients nationally and internationally, provides education for medical professionals, and offers information and one-on-one support to patients and family members.

Haystack Project

Haystack Project is a 501(c)(3) non-profit organization enabling rare and ultra-rare disease patient advocacy organizations to address systemic value and access barriers. Their core mission is to evolve health care payment and delivery systems to make innovative and quality treatments accessible to all Americans living with or caring for someone with a rare or ultra-rare condition. Haystack strives to amplify the patient and caregiver voice in disease states where unmet need is high, and treatment delays and inadequacies can be catastrophic.

Support

A grant from Biogen to Haystack Project supported the research, survey administration, statistical analyses, and writing of this POV© Report.

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Executive Summary and Key Findings

Choroideremia (CHM). CHM is a rare genetic retinal dystrophy. Because CHM is an x-linked disorder, males are primarily affected though females may present with a wide variation of symptom severity. The *CHM* gene codes for Rab escort protein 1 (REP1) which is critical for intracellular membrane trafficking. Although REP1 is ubiquitously expressed throughout the body, an absence or deficiency of this protein specifically affects the fundus of the eye. Fundus changes within the eye include atrophy of the retinal pigment epithelium (RPE), photoreceptor (PR), and choroid. A variety of imaging and electrophysiological modalities can be used to monitor these changes.

Because it is ultra-rare, and few ophthalmologists or specialists have seen a patient with CHM, the diagnostic journey can be lengthy and challenging. A diagnosis of CHM can be confirmed with genetic testing.
In males, CHM symptoms typically occur in the first or second decade of life when problems with night vision occur. In the 20s, gradual loss of peripheral vision begins but visual acuity is often preserved into the 30s or 40s creating a tunnel vision effect. As males with CHM age into their 50s - 70s, central visual acuity is also lost resulting in severe vision impairment or total blindness.

To date, there are no FDA-approved therapies for CHM and current management is symptomatic and supportive. CHM natural history studies have provided valuable information regarding disease progression; however, a better understanding of visual changes over time, modalities for detection of these changes, and improved outcome measures are needed for future clinical trials.

The Patient Oriented Value (POV©) Report. The potential that a promising new treatment for CHM may be developed underscores the need for a clear understanding of the natural history of CHM as well as real-world patient and economic impacts. ***Accurately assessing value for a treatment will be vital to ensuring that patients with CHM have access to therapies when they can have the greatest impact on slowing or halting disease progression.***

Patient-centered care is recognized as a key element in delivering high-quality, high-value treatment, and was incorporated into several initiatives within the Affordable Care Act legislation. Studies have shown that placing patients at the center of care results in greater participation in clinical decision-making, as well as higher patient satisfaction and adherence to treatment plans. POV© Reports provide critical information on patients' perspectives regarding disease burden, care gaps, priority outcomes, and other factors essential to understanding "value" for current standards of care (if applicable), treatments in development, and any FDA-approved therapies, on- or off-label, that may exist. This Report is designed to enable insights into the real-world experience of CHM patients, including:

- Journey from initial symptoms to diagnosis.
- Genetic testing access to confirm CHM diagnosis.
- Impact on quality of life.
- Impact on participation in workforce.
- Economic burdens of CHM; and
- Preferences in choosing a treatment option.

Methods. In collaboration with the Choroideremia Research Foundation (CRF), Haystack Project designed a survey instrument to explore the preferences that drive decision making throughout the CHM patient and caregiver journey.

Key Findings. The following tables summarize the key findings from this Report.

General Findings

- ✓ Because no treatment options currently exist for CHM, patients may feel uninterested in seeking care from a retinal specialist or feel afraid to learn about accelerating vision decline.
- ✓ CHM substantially impedes the ability to drive both during the day and at night, potentially impeding social interactions and recreational activities especially as patients age
- ✓ Like males, females with CHM can experience symptoms that impact quality of life
- ✓ As patients age, the burden for CHM increases, but current cost of care for CHM patients is quite low. **If entities assess the value of an emerging treatment option without considering the patient-perceived value of preserving remaining vision, the treatment is likely to be regarded as a "low value for the money", especially if the treatment effect is considered modest.**
- ✓ Increasing awareness of genetic testing options should continue to reduce the diagnostic journey

Patient Perspectives on Preservation of Vision and Treatments

- ✓ **Regardless of their remaining level of visual acuity, CHM patients place a high value on vision preservation.**

Patients:

- ✓ Prefer to receive treatment early in the disease process and as soon as treatment options become available.
- ✓ Place a high value on treatments that slow and/or halt disease progression and potentially restore vision.
- ✓ Have a relatively higher tolerance for treatment risk involving more invasive procedures.
- ✓ Expect that a future CHM treatment will likely be high-cost and therefore not accessible without insurance reimbursement.

Clinical Trials

- ✓ Night blindness is a typical first symptom for CHM. Efforts (discussed above) to develop outcome measures capturing this early symptom and its progression may aid researchers in demonstrating clinical benefit of new treatment options.
- ✓ As the rate of BCVA decline may not be the same between the right and left eyes, to effectively capture a treatment effect that slows disease progression alternate clinical trial designs should be developed that *do not* rely on a "better-seeing" bilateral control.
- ✓ In an attempt to control variability within trial designs, many clinical trials limit patient access to individuals with more advanced disease and often compare the treated "worse" eye with disease progression in the untreated eye.
- ✓ Patient advocates, researchers and industry sponsors need to proactively address the knowledge gaps that preclude inclusion of symptomatic females in clinical trials so that this subset of patients has access to investigational and approved therapies.
- ✓ Despite the current lack of therapies, patient education raising awareness for the importance of regular visits with a retinal specialist before and after participation in a trial could enrich natural history data and help:
    - ensure that clinical trial design and endpoints are sufficiently aligned with disease progression to ascertain even moderate treatment responses with reasonable accuracy,
    - extrapolate visual decline in both eyes, and potentially broaden inclusion criteria for patients who have previously participated in a clinical study.

Introduction

Choroideremia (CHM) is a rare (affects approximately 1:50,000-1:100,000 individuals) X-linked genetic disorder that causes progressive retinal dystrophy and blindness. As CHM has an X-linked pattern of inheritance, males are primarily affected. However, female carriers may present with variable, but milder symptoms and very rare cases of severe CHM have been reported in females. [2, 3]

Genetics and Pathophysiology

CHM is caused by predominantly null mutations resulting from insertions, deletions, frameshifts, splice site, and nonsense mutations. Disease causing missense variants in *CHM* have been identified but are extremely rare. Pathogenic mutations occur throughout the *CHM* gene including the promoter region and within deep intronic sequences. *CHM* encodes Rab escort protein 1 (REP1) which is essential for the proper functioning of small GTPases called Rabs that regulate and coordinate intracellular membrane trafficking. REP1 is critical for the addition of geranyl-geranyl groups onto Rabs, a process call prenylation. REP1 then 'escorts' the prenylated Rabs to their proper intracellular membrane targets. Although ubiquitously expressed throughout the body, a deficiency or absence of REP1 specifically affects the eye. This is likely because within the eye REP1 *preferentially prenylates* particular Rab proteins (e.g., Rab27a); however, in other cells a closely related protein, REP2, may compensate for the absence of REP1. [2, 4, 5]

Within the eye, CHM is characterized by fundus changes including atrophy of the retinal pigment epithelium (RPE), photoreceptors (PRs), and choroid. Imaging and electrophysiological modalities are used to detect and monitor CHM related changes in the fundus of the eye. These include optical coherence tomography (OCT), fundus autofluorescence (FAF), and full-field electroretinogram (ERG). OCT detects several structural changes early in the disease process including changes in the RPE. FAF detects remaining functional retina and chorioretinal atrophy and is therefore used to monitor clinical CHM progression. [2, 3, 6] Using FAF, Jolly et al. demonstrated that, in CHM patients, retinal area reduction occurred at a rate of 7.7% each year.[7] ERG is also used to monitor reduction in retinal function; however, ERGs eventually become undetectable as patients age and CHM progresses. Other screening modalities for CHM include optical coherence tomography angiography (OCTA; to visualize the RPE, photoreceptor layer and choroid), fluorescein angiography (FA; when choroidal neovascularization is suspected), and confocal adaptive optics scanning light ophthalmoscopy (AOSLO; for characterization of photoreceptor cellular structure). [2, 4, 6]

CHM Carriers

Female individuals carrying the CHM gene may be asymptomatic or may present with widely variable symptom severity and progression. This heterogeneity is attributed to random X-inactivation or skewed X-inactivation where either the maternal or paternal X chromosome is preferentially inactivated. [2, 3] Mosaicism in female carriers may result in patchy fundus pigmentation and, depending on the number of retinal cells that contain mutant *CHM,* severe retinal degeneration may be present. [8]

Diagnosis and Natural History

For males, the typical age of CHM symptom onset is in the first or second decade of life when nyctalopia (difficulty seeing at night or in dim light) develops. Gradual but noticeable loss of peripheral vision usually begins in the teens or 20s; however, visual acuity is often preserved well into midlife (30s-40s) producing a tunnel vision effect. As male patients continue to age into their 50s-70s, formerly preserved central visual acuity is typically lost resulting in severe vision loss and/or total blindness. Clinically, CHM is characterized and monitored using visual field

examinations, the various anatomical and functional imaging modalities noted above (e.g., OCT and FAF), and ERG when applicable.[3]

Diagnosis of CHM can be confirmed with genetic testing to identify pathogenic variants in the *CHM* gene. Because mutations can occur within the promotor and deep intronic regions, if standard exome sequencing fails to reveal pathogenic variants, sequencing of these regions should be considered in patients with clinical features of CHM. [2] Genetic confirmation of CHM can be achieved through a panel targeting relevant genes associated with inherited retinal diseases such as that offered through the Foundation Fighting Blindness' My Retina Tracker program®[9] or as CHM-specific genetic testing.

CHM is ultra-rare, few ophthalmologists and specialists encounter CHM patients, and the condition shares overlapping clinical features with other retinal disorders and dystrophies (e.g., retinitis pigmentosa [RP]).[3, 8] Given CHM's rarity, slow early progression, and similarity with other inherited retinal diseases, unless there is a known family history of CHM or other retinal dystrophy, the diagnostic journey can be challenging and prolonged.[3]

Although retrospective natural history data have provided valuable information regarding the progression of CHM, there is a need to better understand visual changes with age and the modalities that can detect these changes for use in clinical trials [3] (see Table 1). The largest prospective longitudinal natural history study of CHM to date (Natural History of the Progression of Choroideremia Study (NIGHT: NCT03359551) assessed approximately 300 adult males with genetically confirmed CHM every 4 months over a 20-month period. Best corrected visual acuity (BCVA) declined slowly among participants (~0.5 Early Treatment of Diabetic Retinopathy Study scale [ETDRS] letters annually); but older individuals with more advanced disease may have experienced greater decline.[10] Declines in preserved area of autofluorescence (PAF), preserved ellipsoid zone (EZ) area, and mean retinal sensitivity were consistently observed at each visit, and were generally symmetric. BCVA and its progressive decline, however, were bilaterally asymmetric in most individuals. The mean inter-eye difference among participants was nearly 20 ETDRS letters, with just 26% of individuals experiencing <5-letter differences in BCVA between their right and left eyes.

A recent meta-analysis of visual acuity in CHM patients examined 23 studies (not including the NIGHT study) and found that individuals initially experience slow decline in visual acuity followed by a transition to rapid BCVA decline in their late 30s to early 40s.[11] Bilateral asymmetry between the right and left eyes generally increases as BCVA worsens. This meta-analysis also demonstrated that the rate of BCVA decline was independent of eye laterality, so that CHM can be considered a "bilateral disease." *Because some patients experience very different BCVA between eyes, and the rate of BCVA decline may not be the same between the right and left eye, caution should be taken when using the "better-seeing" eye as the control in treatment trials.*

The prospective NIGHT study demonstrated that preserved areas of the EZ and RPE could be reliably and reproducibly quantified in a longitudinal fashion using OCT and FAF, and therefore represent candidate outcome measures for CHM trials. [12] The NIGHT study and recent meta-analysis by Shen et al. also demonstrate the importance of BCVA, preserved EZ area, and PAF as measures of natural CHM progression, and reinforce the need for long-term follow-up of CHM patients to ensure that clinical trial design and endpoints are sufficiently aligned with disease progression to ascertain treatment response with reasonable accuracy. This is particularly important in clinical trials enrolling CHM patients with relatively poor BCVA that compare visual acuity outcomes in the treated eye (usually the eye with poorest BCVA) with the untreated eye.

Table 1. Retrospective and Prospective Natural History Studies for CHM.
From clinicaltrials.gov April 14, 2022

Clinicaltrials.gov Identifier	Type	Title	Status
NCT04750785	Prospective	A Study to Assess Choroideremia (CHM) Health Outcomes	Recruiting
NCT03359551	Prospective	Natural History of the Progression of Choroideremia Study (NIGHT)	Completed
NCT02994368	Prospective	"Natural History" Study of Choroideremia	Recruiting
NCT04795206	Retrospective	Natural Disease Progression in Participants with Choroideremia	Completed

Current Treatments / Standard of Care and Therapies in Clinical Development

Current management of CHM is symptomatic and supportive to treat comorbidities and maintain or improve quality of life. Strategies to help with activities of daily living include assistive/adaptive technologies (e.g., accessibility features on smartphones, ZoomText, JAWS), rehabilitative therapy (e.g., occupational therapy and educational support), and supportive vision aides (e.g., magnifiers and contrast-enhancing filters).[4] Regular visits with a retinal specialist are critical to monitor CHM progression and the occurrence of comorbidities.[3]

LUXTURNA's success demonstrates the promise of gene therapies in addressing inherited retinal disorders. However, several challenges remain including identifying an ideal therapeutic window, ensuring adequate transduction of necessary cell types, minimizing viral toxicity, and improving safe access to the subretinal space.[14]

Although there is no FDA-approved treatment for CHM, potential disease-modifying therapies are being studied (Table 2). These include dietary supplements like Lutein and vitamin A, retinal prosthesis systems, and gene therapy. Based on early clinical trial data, and bolstered by the approval of LUXTURNA (2017; Roche/Spark Therapeutics) for another rare retinal dystrophy, adeno-associated virus (AAV)-based gene therapy appeared to be one of the most promising potential treatments for CHM. Unfortunately, recent late-stage trial data from Biogen/Nightstar's BIIB111 (AAV2-REP1) for CHM failed to meet its primary endpoint. Biogen will be reviewing the data, but future development of BIIB111 is now uncertain.

Each of the naturally developed AAV vectors has certain properties, characteristics, limitations and challenges to effectively reach the therapeutic target and deliver therapy. To overcome challenges associated with naturally developed AAV vectors, researchers are working to design new and improved AAV vectors through directed evolution or therapeutic vector evolution. The CRF has partnered with 4D Therapeutics to create a novel CHM gene therapy vector that could have the potential to reach more retinal cells via **intravitreal injection** in the front of the eye (as opposed to subretinal injection). Although both procedures have associated risks, IVT injection has a safety advantage over subretinal injection as it is not a surgical procedure and does not require a hospital visit.[13] This trial is in its early stages (Table 2).

There are also a number of potential non-viral vectors in development for delivering gene therapy or other therapies without the immune response associated with viral vectors. Additionally, researchers are investigating the potential for delivering therapy through injection into the suprachoroidal space (SCS) as an alternative to subretinal and intravitreal injections. This method may offer a more targeted approach to drug delivery with the potential to achieve chorioretinal concentrations that are much higher than what is seen with traditional intravitreal injections.

In addition to vector-based therapies, there are several alternative strategies under development with a potential to treat CHM. Retinal prosthetics, which provide long-term retinal stimulation and may be useful for advanced retinal dystrophy/outer retinal disease, are under clinical development (Table 2).[6]

Another approach is directed at the approximately 30% of CHM cases related to in-frame nonsense mutations resulting in premature termination codons (PTCs).[4, 15] Ataluren (PTC Therapeutics) is a small molecule used to treat Duchenne muscular dystrophy caused by nonsense mutations in the dystrophin gene. When tested in *in vitro and in vivo* preclinical models of CHM, Ataluren was found somewhat promising conceptually, but limitations in ability to target delivery as well as lack of specificity to the CHM gene have impeded development of near-term treatment advances. Therefore, more research is needed regarding the potential for stop codon and tRNA therapies.

Stem cell therapies may also hold promise for more advanced-stage CHM patients when there is extensive retinal and/or photoreceptor cell loss. This therapeutic approach may have the potential to restore partial sight in not only CHM patients but also other patients with different forms of vision loss. Development of stem cell-based treatment is still in its infancy; advancement of this approach depends on identification of the correct cell type and stem cell system to achieve tissue regeneration, as well as the delivery method and therapeutic window.[16]

Researchers at Duke University have hypothesized that one of the key events causing night blindness in CHM is deficiency in the chromophore of the rod visual pigment, rhodopsin, due in part to inadequate delivery of vitamin A (all-trans-retinol) to the PRs from the RPE. A study is set to enroll participants and determine whether oral vitamin A supplementation can improve nighttime and peripheral vision in CHM patients (NCT05045703; Table 2). The Duke study also seeks to collect data enabling a detailed characterization of dark-adapted visual function outcome measures in CHM that can guide future treatment trials.[17] Importantly, much research is ongoing to identify meaningful and objective outcome measures that are applicable early in the disease process for use in CHM clinical trials.

Table 2. Clinical Trials for CHM.
From clinicaltrials.gov April 16, 2022

Clinicaltrials.gov Identifier	Intervention	Primary Endpoint	Inclusion	Exclusion	Sites
Gene Therapies					
NCT02553135 Phase 2 Completed	AAV2-REP1 (10e11 vg)	change in best corrected visual acuity from baseline compared to control eye	Male, >18, visual acuity between 20/32 and 20/200, genetic confirmation	Prior gene therapy, amblyopia, grossly asymmetrical disease	Miami, FL
NCT02077361 Phase 1/2 Active not recruiting	rAAV2.REP1 vector	ocular and systemic adverse events	Male, >18, genetic confirmation	History of retinal surgery or uveitis, grossly asymmetrical disease	Alberta, Canada
NCT01461213 Phase 1/2 Completed	rAAV2.REP1	Best corrected visual acuity	Male, >18, active CHM, acuity 6/60 or better in the study eye	History of retinal surgery or uveitis, grossly asymmetrical disease	UK
NCT02671539 Phase 2 Completed	rAAV2.REP1	24-mo. change in corrected visual acuity compared	Male, >18, genetic confirmation, corrected visual	history of amblyopia, previous retinal	Tuebingen, Germany

		to untreated control eye	acuity 6/9 or worse	surgery or uveitis, grossly asymmetrical disease	
NCT02407678 Phase 2 Completed	AAV2-mediated REP1 gene replacement	change in best corrected visual acuity from Baseline	Male, >18, genetic confirmation, acuity 6/60 or better in the study eye	Amblyopia, inability to take systemic prednisolone for a period of 45 days	UK
NCT02341807 Phase 1/2 Active, not recruiting	AAV2-hCHM	Safety, tolerability	Male, >18, genetic confirmation, Central visual field (VF) < 30° in any of the 24 meridians, functioning outer retinal cells within the central 10°	Prior gene therapy, amblyopia, grossly asymmetrical disease, Visual acuity < 20/200	Boston, MA; Phila, PA,
NCT03507686 Phase 2 Active, not recruiting	BIIB111 (AAV2-REP1)	Best corrected visual acuity	Male, >18, genetic confirmation, BCVA of ≥34 ETDRS letters (20/200 or better Snellen acuity) in both eyes	Other gene therapy, amblyopia or other inflammatory eye disease,	US sites – Miami, Boston, Cincinnati, Portland
NCT03496012 Phase 3 Completed (not promising)	BIIB111 (AAV2-REP1)	% of pts w/ a ≥15-letter improvement in best corrected visual acuity at 12 mos.	Male, >18, genetic confirmation, corrected visual acuity between 20/40 and 20/200 in study eye.	Prior gene therapy, amblyopia, significant comorbidities	US sites – Los Angeles, Miami, Baltimore, NY, Cincinnati, Portland, Dallas, Madison
NCT03584165 Long term follow-up	BIIB111 (AAV2-REP1)	Long-term follow-up	Previous BIIB111 study participation		Enrolling by invitation
NCT04483440 Phase 1 Recruiting	4D-110 (AAV capsid variant + codon-optimized human CHM gene)	**Frequency and severity of ocular and systemic adverse events (AEs)**	Male, >18, genetic confirmation, Visual acuity at least 20/200 in both eyes.	Significant infection or inflammation in study, previous AAV treatment	Dallas, Salt Lake City
Other Interventions	**Intervention**	**Primary Endpoint**	**Inclusion**	**Exclusion**	**Sites**
NCT05045703 Not yet recruiting	Vitamin A palmitate (supplement)	Change in dark-adapted full-field visual field sensitivity at baseline, 4 mos., and 8 mos. (4-month treatment; 8 month eval follows washout.	Male, >18, genetic confirmation	Inability to participate in visual field testing reliably and reproducibly	Durham, NC
NCT01603576 Completed	Prototype wide view suprachoroidal retinal prosthesis	# of device-related AEs (18 months)	Male or female w/ history of CHM or other outer retina degenerative disease, at least	Condition causing pt to rub eyes, unrealistic expectations of bionic eye device	Australia

			10 yrs useful form vision in worst eye		
NCT03406416 Completed	44Ch Bionic Eye Device (Prototype wide view suprachoroidal retinal prosthesis)	number and severity of serious adverse events (SAEs) compared to other retinal prosthesis.	Male or female w/ history of CHM or other outer retina degenerative disease, at least 10 yrs useful form vision in worst eye	Condition causing pt to rub eyes, unrealistic expectations of bionic eye device	Australia
NCT01864486 Completed (Last update, Oct 2017)	Intelligent Retinal Implant System (IRIS V1)	Number of Adverse Events	25 or older, memory of former useful form vision, eye and head dimensions suitable for device	Varies by location	Multiple international, no US locations
NCT02670980 Completed (Last update, May 2019)	Intelligent Retinal Implant System (IRIS V2)	Number of participants with treatment-related adverse events	25 or older, memory of former useful form vision, functional ganglion cells and optic nerve activity		Multiple international, no U.S. locations

Disease Burden

CHM disease burden is being explored as part of the prospective "Study to Assess Choroideremia (CHM) Health Outcomes" (Table 1). In addition to natural history data, this study aims "to assess quality-of-life, work productivity, and impact on daily activities in caregivers of participants with CHM at different stages of disease progression."[18]

Global studies have confirmed that vision loss incurs substantial economic burdens for patients, their families, and society. This includes direct costs associated with health care utilization as well as indirect costs such as lost productivity, unemployment, and loss of income.[19, 20] One recent analysis of the socioeconomic impact of inherited retinal diseases (IRDs) in the United States and Canada estimated that costs related to CHM were between $484.5 million and $1.1 billion in 2019.[21]

This study also sought to estimate the annual cost of IRDs, including CHM, in the US and Canada from a societal perspective, i.e., including health system costs, individual and family productivity costs, lost wellbeing and other societal economics using a cost-of-illness methodology based on the prevalence of IRDs in each country.[21] The authors quantified otherwise intangible costs of reduced wellbeing by converting disability-adjusted life years to monetary values using the value of a statistical life. The resulting cost estimate for US IRD patients was between $13.4 billion and $31.8 billion, with the bulk of that cost borne by patients and their families. ***As treatments are developed and evaluated for coverage by various payers, it will be essential to ensure that value assessments fully consider disease burden and incorporate consideration of both direct and indirect costs associated with CHM.***

The Institute for Clinical and Economic Review's (ICER's) assessment of LUXTURNA (voretigene neparvovec [VN]; Spark Therapeutics) underscores the importance of ensuring that each gain in vision or reduction in disease progression is of substantial value. An ICER review of any CHM treatment should consider the fact that, for these patients, ***the value of preserved vision is substantial even when remaining vision is minimal***.[22] In its recent review of LUXTURNA, ICER noted the progression toward blindness in childhood and likelihood that individuals over age 15 would have very limited vision to preserve, stating that:

- "When used to treat individuals at age 15, VN does not meet commonly accepted cost-effectiveness thresholds of $50,000–$150,000 per quality-adjusted life year (QALY). However, decision-makers may give special weighting to other contextual factors given VN's intended use for an ultra-rare condition. "

- "On average, younger patients with this condition have better baseline vision. Because of this, VN appeared to be more cost-effective for individuals treated at age three, particularly when evaluated from a societal perspective. However, it is not clear how many individuals could be diagnosed and treated at this young age."

- "Cost-effectiveness of VN was considered both from a health care system perspective that included only direct medical costs, and from a societal perspective, which also accounted for benefits related to education, greater productivity, reduced caregiver time, and other factors."

It is important to note that ICER's cost-effectiveness analysis did not quantify or take into account:

- Patient benefits not captured in the quality adjusted life year (QALY) calculation,
- Reduced caregiver burden,
- Significant impact on productivity, and
- The high burden and severity of the condition.

Patient Oriented Value (POV©) Reports and Objectives for CHM

POV© Reports are undertaken to provide insight into the patient journey, articulate disease burden from the patient perspective, reveal real-world care gaps and communication deficiencies, and better understand treatment priorities and perceived value *from the patient perspective.*

Health care systems seeking to transition from volume- to value-based payment have accelerated the use and relevance of methodological frameworks for assessing and assigning "value" to medical therapies. Entities that evaluate the clinical effectiveness and economic value of pharmaceuticals and other health care interventions in the US, including the Institute for Clinical and Economic Review (ICER), generally adopt a payer or societal perspective. Model designs, input selection, and metrics such as QALY were developed to aid payer decisions toward cost-effective care, primarily in highly prevalent conditions with multiple treatment options.

Treatments for very rare diseases present unique challenges for value frameworks given the high disease burden, limited treatment options, and potentially dire health consequences for patients if treatment access is delayed or denied due to payer-perception of low or questionable value. Similarly, a treatment option could have a high value from a payer or societal perspective yet be associated with an unacceptable side-effect or risk profile, or address outcomes that are not meaningful to patients living with the condition. This information may not be available within clinical trial data evaluating the safety and efficacy of new treatments. POV© Reports are designed to reflect patient advocacy organizations' understanding of care gaps, unmet needs, and real-world disease burden, as well as patient preferences and value perception on treatment and symptom management options. These factors are more than just "contextual." *POV© Reports enable a more robust participation from patient advocates to facilitate the integration of their voice into the health care value frameworks that often drive access to new and evolving standards of care*.

Patient-centered care has been recognized as a key element in delivering high-quality, high-value treatment, and was incorporated into several initiatives within the Affordable Care Act legislation. Many studies have shown that placing patients at the center of care results in greater participation in clinical decision-making, as well as higher patient satisfaction and adherence to treatment plans. POV© Reports provide critical information on patients'

perspectives regarding disease burden, care gaps, priority outcomes, and other factors essential to understanding "value" for current standard(s) of care (if applicable), treatments in development, and any FDA-approved therapies, on- or off-label, that may exist.

Value frameworks have been developed to guide pricing and reimbursement decisions by key stakeholders in healthcare delivery, yet they are frequently criticized for not being sufficiently patient-centered and relying solely on data from clinical trials to assess the comparative value of therapies in disease states with multiple treatment options. When treatments emerge to address indications that previously had no effective options to manage disease burden or improve survival, value frameworks focus instead on the incremental increase in survival, quality of life, and other metrics to determine whether the benefits of a treatment justify its price. *However, the metrics excluded from such economic value frameworks are those that represent "value" from the patient perspective. This is particularly true for CHM patients given that there are no available treatments presenting costs to payers – the full burden of disease falls on patients and their families.*

The potential that a promising new treatment for CHM may be developed underscores the need for a clear understanding of the natural history of CHM as well as real-world patient and economic impacts. ***Accurately assessing a treatment's value will be vital to ensuring that patients with CHM have access to therapies when they can have the greatest impact on slowing or halting disease progression.***

This Report was designed to enable insights into the real-world experience of CHM patients, including:

- Journey from initial symptoms to diagnosis.
- Access testing to confirm CHM diagnosis.
- Impact on quality of life.
- Impact on participation in workforce.
- Economic burdens of CHM, including costs of paid and familial caregivers.
- Preferences in choosing a treatment option.

Because no treatments are currently available to address CHM or its progression, the direct costs of CHM to the health system are relatively low. ***It is, therefore, essential that any assessment of treatment value fully consider indirect costs related to potential productivity and quality of life gains from a new treatment, even if it has a moderate effect on clinical trial outcome measures.***

Methods

Survey Instrument

In collaboration with the Choroideremia Research Foundation (CRF) and utilizing a Survey Monkey platform, Haystack Project developed a survey instrument to explore the preferences that drive decisions throughout the CHM patient journey. The CRF provided critical input on how the survey should be modified for accessibility by individuals with CHM. For example, a Survey Monkey accessibility feature was used to give the survey a high contrast blue background (see Appendix A). Additionally, menu drop downs were replaced with multiple choice-style answers.

The survey instrument consisted of an introductory statement (Appendix A) followed by an initial set of demographic questions, then inquiries into the individual's diagnostic journey, comorbidities, disease burden, use of assistive technology, and perception on value of evolving treatment options. Participants were also asked about the extent to which a caregiver is needed, and CHM impact on work and personal life. At the end of the survey, participants were given an opportunity for open-ended responses (Appendix B) designed to illuminate preferences related to future treatments for CHM. Asymptomatic female carriers were not included in the survey but, using

Survey Monkey skip logic, were given the opportunity to provide open-ended responses regarding thoughts on their son or other relative's journey with CHM.

Participant Recruitment

Through an email invitation containing a Survey Monkey link, the CRF distributed the survey to approximately 1090 individuals in their registry including CHM patients, parents of children with CHM, carriers, and caregivers. Individuals electing to participate submitted responses electronically. The survey was open for approximately six weeks, during which responses were received from a total of 325 individuals. 145 CHM patients took the survey for themselves, and 116 carriers or caregivers took the survey on behalf of someone with CHM. 48 respondents identified as *asymptomatic female carriers* and therefore answered only a single open-ended question. The remaining respondents either agreed to take the survey but failed to answer any questions (n=15) or declined to take the survey (n=1) (Appendix B, Q2, Skipped: 16). These 16 respondents were excluded from this report. The remaining responses were reviewed for completeness.

Statistical Analysis

Statistical analysis of the survey responses was performed by the Johns Hopkins Biostatistics Center (JHBC), Johns Hopkins Bloomberg School of Public Health, Baltimore, MD. For data analyses, all participant responses were de-identified, without inclusion of email address or other contact information utilized in recruitment.

The goal of statistical analyses was to understand CHM patient clinical history, including visual symptom type, prevalence, diagnosis, and treatment, as well as the impact on activities of daily living, the use of assistive technology, and caregiver support.

Although the survey included caregivers and carriers who answered on behalf of a patient with CHM**, the statistical analyses focused only on CHM patients (n = 145)**.

Descriptive statistics, including frequencies and percentages for categorical variables and medians with ranges and means with standard deviations (SD) were calculated for numeric variables.

For several of the statistical analyses, CHM respondents were segmented into age subgroups categorized as <25, 25-<40, 40-<65, and 65 and older (65+). Prevalence of comorbidities, difficulty with activities of daily living, caregiver coverage, and accommodations were compared by age using Fisher's exact test. Confidence and anxiety levels were compared using Kruskal-Wallis test.

Statistical analysis was performed using Stata statistical software program 17.0 (StataCorp. 2021. Stata Statistical Software: Release 17. College Station, TX: StataCorp LLC).

Results

Participant Demographics

Of the 145 CHM respondents, 117 were male, 14 were female, 1 identified as "other" for gender, and 13 failed to answer any questions beyond "Person filling out survey". Due to survey skip logic not all questions were answered by all CHM patient respondents, and some respondents elected not to answer certain questions.

The survey demographic of the CHM patient respondents was consistent with published data regarding age of symptom onset and the primarily male population of symptomatic individuals with CHM (Table 3).

Table 3. Respondent demographics and status of disease and genetic testing

	Statistics	Total
	N=145	
Age at Start of Survey		145
<25	5 (3%)	
25-<40	31 (21%)	
40-<65	69 (48%)	
65+	27 (19%)	
Missing	13 (9%)	
Average age of First Visual Symptoms, mean (SD) (n=127)	*16.5y (12.6)*	
Age of First Visual Symptoms		
<12 years	54 (37%)	
12-<18 years	39 (27%)	
18+ years	34 (23%)	
Not ascertainable	18 (12%)	
Gender		145
Female	14 (10%)	
Male	117 (81%)	
Other	1 (1%)	
Missing	13 (9%)	
Race/Ethnicity		145
Asian (East Asian South Asian or Asian Indian)	3 (2%)	
Latinx or Hispanic	8 (6%)	
Middle Eastern, Arab or North African	1 (1%)	
Non-Hispanic White or Euro-American	114 (79%)	
Other Race/Ethnicity	6 (4%)	
Missing	13 (9%)	
Insurance		145
Medicare	36 (25%)	
Medicaid	6 (4%)	
Employer	67 (46%)	
Other: ASA/Self/International	23 (16%)	
Missing	13 (9%)	

Diagnostic Journey

In agreement with the literature, most CHM respondents reported night blindness as an early symptom (Table 4). Other prominent first symptoms included problems with glare and peripheral vision.

Individuals exhibiting symptoms associated with a very rare condition often face protracted timelines from symptom onset to a confirmed diagnosis. Responses were consistent with the fact that obtaining a rare disease diagnosis can still be challenging in that 57% of all CHM respondents were unable to obtain a correct diagnosis on their first visit to the eye doctor (Table 4). Of these individuals, again, a little over half required *more than 5* separate doctor visits to obtain a correct diagnosis.

Availability of testing to confirm CHM in both symptomatic individuals (primarily, but not exclusively male) and their family members (including potential female "carriers") can alert families to the likely cause of visual symptoms as they emerge in current and future generations. The majority of CHM respondents (88%) indicated that they received genetic confirmation of CHM; however, fewer than half indicated that they had knowledge of a familial history of the disease. Despite this, diagnostic efficiencies seemed to be gained from the genetic confirmation or knowledge of CHM in family members. Of those respondents who reported having a family history of CHM (n=56), 89% said that this knowledge helped facilitate their CHM diagnosis (Table 4). Additionally, a substantial proportion of individuals with a confirmed family history of this disease indicated that they were able to obtain a correct diagnosis in less than three years (70%) or that their correct diagnosis occurred on their first visit to an eye doctor (59%) (Table 4).

Table 4. Respondent experience from initial symptoms to CHM diagnosis

	Number	
	N=132*	
First Visual Symptoms**		
Night blindness	118	
Problem with glare	40	
Problems seeing details or with reading while using proper correction	22	
Problems with peripheral vision	42	
Problems with color perception	6	
Other (photo sensitivity, balance, distance vision, small blind spot)	7	
	N=132	**Percent**
At FIRST visit to the eye doctor for visual symptom(s), were you correctly diagnosed with CHM?		
No	**75**	**57%**
Yes	52	39%
Missing	5	4%
If NO - Number of doctor visits to obtain CHM diagnosis	**N=75**	**Percent**
Two	7	9%
Between 2 and 5	25	33%
More than 5	43	57%
Missing	0	0%
	N=132	**Percent**
Time to obtain correct CHM diagnosis		
Less than or equal to 1 year	55	42%
Between 1 and 3 years	18	14%
More than 3 years	53	40%
Missing	6	5%
Genetic Confirmation of CHM		
Yes	116	88%
No	10	8%
Missing	6	5%

Family history of CHM before diagnosis?		
Yes	**56**	**44%**
No	55	43%
Unknown	14	11%
Missing	7	2%
YES-Family history of CHM before diagnosis	**N=56**	**Percent**
Were you aware of this information so that it helped facilitate your CHM diagnosis?		
Yes	**50**	**89%**
No	6	11%
Missing	0	0%
Time to correct diagnosis		
Less than 3 years***	39	70%
More than 3 years	17	30%
Missing	0	0%
Correctly diagnosed at FIRST visit to the eye doctor		
Yes	33	59%
No	23	41%
Missing	0	0%

***N=132**: 145 CHM respondents total minus 13 who failed to answer any survey questions beyond "Person filling out survey." Of the 132 who did respond to subsequent questions, not all answered every question and the survey employed skip logic.
****Respondents were asked to "check all that apply" in identifying first visual symptoms.
*****Less than or equal to 1 year (n=29 [52%]) **+** Between 1-3 years (n=10 [18%])

Specialist Care

The majority of respondents (84%) were diagnosed by a retinal specialist, or it was recommended that they see a retinal specialist (Table 5). However, outside of a treatment trial or natural history study, fewer respondents (56%) reported seeing a specialist on a regular basis. 54% of CHM respondents reported having seen a retinal specialist as part of a clinical trial or natural history study.

For those *that do* see a retinal specialist outside of a clinical study/trial (n=74), the majority reported more frequent visits (86%, More than once a year + Every year + Every 2 years) vs. less frequent visits (14%, Every 3+ years).

The most common reasons chosen for NOT seeing a retinal specialist on a regular basis were, "*I only visit a retinal specialist occasionally or as needed*." and "*There are no treatments for CHM, and I am not motivated to do so*." (Table 5)

Table 5. CHM-related specialist care

	Number	Percent
	N=132	
Diagnosis was made by -or it was recommended to visit- a retinal specialist		
Yes	111	84%
No	12	9%
Missing	9	7%

Outside of a natural history study or treatment trial for CHM, currently visit a retinal specialist on a regular basis		
Yes	**74**	56%
No	49	37%
Missing	9	7%
	N=74	
If Yes - Frequency of visits to a retinal specialist		
More than once a year	15	20%
Every year	32	43%
Every 2 years	17	23%
Every 3+ years	10	14%
Missing	0	0%
If No - Reason for NOT visiting a retinal specialist on a regular or routine basis*		
It was not recommended that I do so.	9	
I only visit a retinal specialist occasionally or as needed.	25	
I do not feel that my disease is "severe enough."	0	
It's too expensive and my insurance doesn't cover it.	5	
There are no treatments for CHM, and I am not motivated to do so.	20	
Other**	14	
Have visited a retinal specialist in association with a natural history study or treatment trial for CHM		
Yes	71	54%
No	52	39%
MIssing	9	7%

*Respondents asked to choose all that apply

**Some "other" reasons are in the comments box below. 5 respondents who chose "Other" reported seeing a retinal specialist as part of a current natural history study or treatment trial.

RESPONDENT COMMENTS ON LACK OF ENGAGEMENT WITH ROUTINE CARE AND RETINAL SPECIALISTS

"I was told there was no need because they could not help me. I am too far advanced."

"It's not lack of motivation, just don't want to hear how much more vision I've lost. They can't offer me any treatment. It's just depressing."

"I was told to wait, until a suitable treatment was ready."

"I'm scared"

"My sensitivity to bright light is acute and the specialist failed to understand the consequences for me."

"I have lived in Malaysia for the past 2 years and not many specialists are there."
"I do not believe there is one in my area."

CHM Disease Burden

In total, approximately half the CHM survey respondents reported experiencing perception problems (57%) and decreases in contrast perception (52%) (Table 6, Totals). Very few patients reported more severe comorbidities like retinal detachment, retinal hole, cystoid macular edema, or choroidal neovascularization.

Comorbidities experienced by CHM participants were consistent with the general understanding of CHM as a retinal disease for which symptoms appear and progress slowly throughout adolescence and early adulthood. Although there were only 5 respondents under the age of 25, these younger CHM patients tended not to report the presence of comorbidities. The exceptions were perception problems (n=3), eye strain (n=1), headache (n=1), eye pain (n=1), and other (n=1) (Table 6). Decreases in contrast perception appear to become more common as CHM patients age (p=0.001). The increased frequency of certain comorbidities like double vision, eye strain, and headache in participants between 25 and 65 years of age, as compared to both their younger and older counterparts, may be associated with active participation in the workforce.

Table 6. CHM comorbidities

Age at Start of Survey	<25	25-<40	40-<65	65+	p-value	Totals (%)
Comorbidities	**N=5**	**N=31**	**N=69**	**N=27**		**N=132**
Perception problems					0.43	
No	2 (40%)	12 (39%)	17 (25%)	10 (37%)		41 (31%)
Yes	3 (60%)	14 (45%)	42 (61%)	16 (59%)		75 (57%)
Missing	0 (0%)	5 (16%)	10 (14%)	1 (4%)		16 (12%)
Decrease in contrast perception					0.001	
No	5 (100%)	15 (48%)	23 (33%)	5 (19%)		48 (36%)
Yes	0 (0%)	11 (35%)	36 (52%)	21 (78%)		68 (52%)
Missing	0 (0%)	5 (16%)	10 (14%)	1 (4%)		16 (12%)
Double vision					0.007	
No	5 (100%)	18 (58%)	35 (51%)	24 (89%)		82 (62%)
Yes	0 (0%)	8 (26%)	24 (35%)	2 (7%)		34 (26%)
Missing	0 (0%)	5 (16%)	10 (14%)	1 (4%)		16 (12%)
Eyestrain					0.018	
No	4 (80%)	11 (35%)	22 (32%)	18 (67%)		55 (42%)
Yes	1 (20%)	15 (48%)	37 (54%)	8 (30%)		61 (46%)
Missing	0 (0%)	5 (16%)	10 (14%)	1 (4%)		16 (12%)
Headache					0.034	
No	4 (80%)	20 (65%)	41 (59%)	25 (93%)		90 (68%)
Yes	1 (20%)	6 (19%)	18 (26%)	1 (4%)		26 (20%)
Missing	0 (0%)	5 (16%)	10 (14%)	1 (4%)		16 (12%)
Macular edema					0.16	

No	5 (100%)	22 (71%)	55 (80%)	26 (96%)		108 (82%)
Yes	0 (0%)	4 (13%)	4 (6%)	0 (0%)		8 (6%)
Missing	0 (0%)	5 (16%)	10 (14%)	1 (4%)		16 (12%)
Eye pain					0.068	
No	4 (80%)	21 (68%)	43 (62%)	25 (93%)		93 (71%)
Yes	1 (20%)	5 (16%)	16 (23%)	1 (4%)		23 (17%)
Missing	0 (0%)	5 (16%)	10 (14%)	1 (4%)		16 (12%)
Dry eyes					0.25	
No	5 (100%)	19 (61%)	35 (51%)	16 (59%)		75 (57%)
Yes	0 (0%)	7 (23%)	24 (35%)	10 (37%)		41 (31%)
Missing	0 (0%)	5 (16%)	10 (14%)	1 (4%)		16 (12%)
Cataracts					0.082	
No	5 (100%)	21 (68%)	39 (57%)	14 (52%)		79 (60%)
Yes	0 (0%)	5 (16%)	20 (29%)	12 (44%)		37 (28%)
Missing	0 (0%)	5 (16%)	10 (14%)	1 (4%)		16 (12%)
Retinal detachment					0.74	
No	5 (100%)	26 (84%)	58 (84%)	25 (93%)		114 (86%)
Yes	0 (0%)	0 (0%)	1 (1%)	1 (4%)		2 (2%)
Missing	0 (0%)	5 (16%)	10 (14%)	1 (4%)		16 (12%)
Retinal hole					1.00	
No	5 (100%)	25 (81%)	57 (83%)	26 (96%)		113 (86%)
Yes	0 (0%)	1 (3%)	2 (3%)	0 (0%)		3 (2%)
Missing	0 (0%)	5 (16%)	10 (14%)	1 (4%)		16 (12%)
Cystoid macular edema					1.00	
No	5 (100%)	25 (81%)	57 (83%)	26 (96%)		113 (86%)
Yes	0 (0%)	1 (3%)	2 (3%)	0 (0%)		3 (2%)
Missing	0 (0%)	5 (16%)	10 (14%)	1 (4%)		16 (12%)
Choroidal neovascularization					1.00	
No	5 (100%)	25 (81%)	57 (83%)	25 (93%)		112 (85%)
Yes	0 (0%)	1 (3%)	2 (3%)	1 (4%)		4 (3%)
Missing	0 (0%)	5 (16%)	10 (14%)	1 (4%)		16 (12%)
Other (please specify)					0.69	
No	4 (80%)	22 (71%)	53 (77%)	23 (85%)		102 (77%)
Yes	1 (20%)	4 (13%)	6 (9%)	3 (11%)		14 (11%)
Missing	0 (0%)	5 (16%)	10 (14%)	1 (4%)		16 (12%)

CHM survey participants over the age of 40 reported: taking more time to complete work-related tasks; having difficulties navigating the workplace; and having had to change their job or reduce their work hours (Table 7). 46% of respondents between the ages of 40 and 65 reported that their employers have accommodated their visual impairment, compared to 29% for 25-<40 and 26% for 65+. Although the majority of respondents did not report problems maintaining part- or full-time employment, for those that *did* report these problems, there was a direct correlation with increasing age or disease progression (Table 7).

Table 7. CHM impact on employment

	Age at Start of Survey					p-value
	<25	25-<40	40-<65	65+	Total	
Impact on Paid Employment	N=5	N=31	N=69	N=27	N=132	
I take more time to complete tasks at work						0.007
No	2 (40%)	12 (39%)	10 (14%)	4 (15%)		
Yes	1 (20%)	15 (48%)	49 (71%)	16 (59%)		
Not Applicable	1 (20%)	2 (6%)	4 (6%)	6 (22%)		
Missing	1 (20%)	2 (6%)	6 (9%)	1 (4%)		
Navigation around the workplace is challenging.						<0.001
No	3 (60%)	17 (55%)	12 (17%)	4 (15%)		
Yes	0 (0%)	11 (35%)	46 (67%)	16 (59%)		
Not Applicable	1 (20%)	1 (3%)	5 (7%)	6 (22%)		
Missing	1 (20%)	2 (6%)	6 (9%)	1 (4%)		
My employer has made accommodations for my vision loss.						0.088
No	2 (40%)	17 (55%)	21 (30%)	11 (41%)		
Yes	1 (20%)	9 (29%)	32 (46%)	7 (26%)		
Not Applicable	1 (20%)	3 (10%)	10 (14%)	8 (30%)		
Missing	1 (20%)	2 (6%)	6 (9%)	1 (4%)		
I have changed my job or reduced my hours at work.						<0.001
No	3 (60%)	24 (77%)	26 (38%)	5 (19%)		
Yes	0 (0%)	4 (13%)	33 (48%)	14 (52%)		
Not Applicable	1 (20%)	1 (3%)	4 (6%)	7 (26%)		
Missing	1 (20%)	2 (6%)	6 (9%)	1 (4%)		
I have chosen a career or job that can accommodate the progression of CHM						0.13
No	3 (60%)	15 (48%)	30 (43%)	12 (44%)		
Yes	0 (0%)	13 (42%)	28 (41%)	8 (30%)		
Not Applicable	1 (20%)	1 (3%)	5 (7%)	6 (22%)		
Missing	1 (20%)	2 (6%)	6 (9%)	1 (4%)		
I am not able to maintain full time paid employment.						<0.001
Agree	0 (0%)	1 (3%)	25 (36%)	15 (56%)		
Disagree	3 (60%)	27 (87%)	34 (49%)	8 (30%)		
Not Applicable	1 (20%)	1 (3%)	4 (6%)	3 (11%)		
Missing	1 (20%)	2 (6%)	6 (9%)	1 (4%)		
I am not able to maintain part time paid employment.						0.002
Agree	0 (0%)	1 (3%)	11 (16%)	12 (44%)		
Disagree	3 (60%)	25 (81%)	47 (68%)	11 (41%)		
Not Applicable	1 (20%)	3 (10%)	5 (7%)	3 (11%)		
Missing	1 (20%)	2 (6%)	6 (9%)	1 (4%)		

Less than half of the participants in the <25 and 25-<40 age groups reported use of assistive technology (Table 8). In the 40-<65 age group, roughly the same number use assistive technology as those who do not (46% and 45%

respectively). The greatest use of assistive technology aids was reported by the 65 and older group (63%). Of those who answered, the most common reason given across all age groups for NOT using assistive technology was, "*I do not believe my vision loss is serious enough yet to require it*."

With age, and as disease progresses, there appears to be an increasing reliance by CHM patients on caregiver support, both part and full time. However, most respondents reported receiving no insurance coverage for these services; only 0-11% (depending on age group) reported that their insurance covers caregiver services part or all of the time (Table 8).

Table 8. CHM participant use of assistive technology and caregiver assistance

						p-value
Age at Start of survey	**<25**	**25-<40**	**40-<65**	**65+**	**Total**	
	N=5	**N=31**	**N=69**	**N=27**	**N=132**	
Use of Assistive Technology?						0.32
No	3 (60%)	16 (52%)	31 (45%)	9 (33%)		
Yes	1 (20%)	13 (42%)	32 (46%)	17 (63%)		
Missing	1 (20%)	2 (6%)	6 (9%)	1 (4%)		
Reason for NOT using assistive technology						0.047
I am unaware of what [type of] assistive technology can help me	0 (0%)	0 (0%)	10 (14%)	2 (7%)		
I cannot afford the cost of assistive technology	1 (20%)	0 (0%)	1 (1%)	1 (4%)		
I do not believe my vision loss is serious enough yet to require it	2 (40%)	15 (48%)	14 (20%)	5 (19%)		
I prefer not to call attention to my vision loss	0 (0%)	1 (3%)	3 (4%)	1 (4%)		
Other	0 (0%)	0 (0%)	2 (3%)	0 (0%)		
Missing	2 (40%)	15 (48%)	39 (57%)	18 (67%)		
Does participant rely on caregiver support?						0.002
All the time	0 (0%)	0 (0%)	5 (7%)	6 (22%)		
Part of the time	0 (0%)	9 (29%)	26 (38%)	14 (52%)		
None of the time	4 (80%)	20 (65%)	31 (45%)	6 (22%)		
Missing	1 (20%)	2 (6%)	7 (10%)	1 (4%)		
Insurance coverage for caregiver services						0.45
All the time	0 (0%)	0 (0%)	3 (4%)	3 (11%)		
Part of the time (example: insurance covers some services, but not others)	0 (0%)	1 (3%)	7 (10%)	2 (7%)		
None of the time	4 (80%)	28 (90%)	52 (75%)	21 (78%)		
Missing	1 (20%)	2 (6%)	7 (10%)	1 (4%)		

Participant responses indicated that CHM impacts the ability to both walk independently and drive. As the disease progresses, individuals face increasing limitations with 85% and 93% of CHM patients over age 65 indicating an inability to drive during the day and night, respectively (Table 9). 30% of those 65+ are unable to live alone (Table 9).

Reduced confidence navigating alone, being in crowds, and engaging socially also tended to progress with age with ability to participate in recreational activities most affected (Table 10). Most respondents noted that using their

remaining level(s) of independence caused stress and/or anxiety. Although the majority of respondents did not report being prescribed medications for anxiety or depression, those who *did report taking these medications* were in the older age groups (40-<65 and 65+).

Table 9. CHM impact on independence

Age at Start of Survey	<25	25-<40	40-<65	65+	Total	p-value
	N=5	N=31	N=69	N=27	N=132	
I can no longer walk independently in daylight.						0.002
No	4 (80%)	29 (94%)	47 (68%)	17 (63%)		
Yes	0 (0%)	0 (0%)	15 (22%)	9 (33%)		
Missing	1 (20%)	2 (6%)	7 (10%)	1 (4%)		
I can no longer walk independently at night.						0.062
No	2 (40%)	13 (42%)	25 (36%)	4 (15%)		
Yes	2 (40%)	16 (52%)	37 (54%)	22 (81%)		
Missing	1 (20%)	2 (6%)	7 (10%)	1 (4%)		
I no longer drive during the day						<0.001
No	4 (80%)	21 (68%)	15 (22%)	3 (11%)		
Yes	0 (0%)	8 (26%)	47 (68%)	23 (85%)		
Missing	1 (20%)	2 (6%)	7 (10%)	1 (4%)		
I no longer drive at night						0.057
No	2 (40%)	6 (19%)	8 (12%)	1 (4%)		
Yes	2 (40%)	23 (74%)	54 (78%)	25 (93%)		
Missing	1 (20%)	2 (6%)	7 (10%)	1 (4%)		
I cannot live in the area I prefer due to my need to be near public transportation						0.44
Agree	0 (0%)	7 (23%)	20 (29%)	5 (19%)		
Disagree	4 (80%)	22 (71%)	42 (61%)	21 (78%)		
Missing	1 (20%)	2 (6%)	7 (10%)	1 (4%)		
I can no longer commute using public transit services.						0.001
Agree	0 (0%)	2 (6%)	8 (12%)	12 (44%)		
Disagree	4 (80%)	27 (87%)	54 (78%)	14 (52%)		
Missing	1 (20%)	2 (6%)	7 (10%)	1 (4%)		
I cannot live alone						0.11
Agree	0 (0%)	2 (6%)	10 (14%)	8 (30%)		
Disagree	4 (80%)	27 (87%)	52 (75%)	18 (67%)		
Missing	1 (20%)	2 (6%)	7 (10%)	1 (4%)		
I use a cane						<0.001
No	4 (80%)	23 (74%)	30 (43%)	6 (22%)		
Yes	0 (0%)	6 (19%)	32 (46%)	20 (74%)		
Missing	1 (20%)	2 (6%)	7 (10%)	1 (4%)		
I rely on a service dog						0.082
No	4 (80%)	29 (94%)	55 (80%)	26 (96%)		

Yes	0 (0%)	0 (0%)	7 (10%)	0 (0%)
Missing	1 (20%)	2 (6%)	7 (10%)	1 (4%)

Table 10. Psychosocial impact of CHM

Age at Start of Survey	<25 N=5	25-<40 N=31	40-<65 N=69	65+ N=27	Total N=132	
		Ranking median (range)				p-value
My confidence level navigating alone and avoiding injury is: 0=Not at all confident to 5=Extremely confident	4 (3.5-4.5)	3 (3-4)	3 (2-4)	3 (2-3)		0.029
The extent to which I feel comfortable in crowds or large gatherings 0=Not at all confident to 5=Extremely confident	4 (3-4.5)	3 (1-4)	1.5 (1-3)	1.5 (1-3)		0.036
The extent to which I can participate in recreational activities 0=no participation to 5=normal participation	5 (3.5-5)	4 (3-5)	3 (1-4)	1.5 (1-3)		0.003
The extent of mental and emotional strain including anxiety and depression 0=no anxiety or depression to 5=severe anxiety or depression	2.5 (1.5-3.5)	2 (2-3)	3 (1-4)	1.5 (1-3)		0.31
My ability to interact socially (example, spend time with family and friends) has been affected						0.15
Not at all	0 (0%)	16 (52%)	19 (28%)	8 (30%)		
Moderately or to some degree	4 (80%)	9 (29%)	32 (46%)	14 (52%)		
Severely	0 (0%)	4 (13%)	11 (16%)	4 (15%)		
Missing	1 (20%)	2 (6%)	7 (10%)	1 (4%)		
I have experienced separation or divorce from my spouse/significant other						0.62
No	2 (40%)	16 (52%)	45 (65%)	21 (78%)		
Yes	0 (0%)	2 (6%)	8 (12%)	3 (11%)		
Not applicable	2 (40%)	11 (35%)	9 (13%)	2 (7%)		
Missing	1 (20%)	2 (6%)	7 (10%)	1 (4%)		
Using the levels of independence or functional abilities that I still have causes stress and/or anxiety						0.11
Agree or Strongly Agree	2 (40%)	19 (61%)	47 (68%)	16 (59%)		
Disagree or Strongly Disagree	1 (20%)	7 (22%)	13 18%)	9 (33%)		
Not applicable	1 (20%)	3 (10%)	2 (3%)	1 (4%)		
Missing	1 (20%)	2 (6%)	7 (10%)	1 (4%)		
I have been prescribed medications for anxiety and/or depression						0.19
No	4 (80%)	26 (84%)	46 (67%)	18 (67%)		
Yes	0 (0%)	3 (10%)	16 (23%)	8 (30%)		
Missing	1 (20%)	2 (6%)	7 (10%)	1 (4%)		
I currently take medications for anxiety						

and/or depression.						0.012
No	4 (80%)	29 (94%)	50 (72%)	19 (70%)		
Yes	0 (0%)	0 (0%)	12 (17%)	7 (26%)		
Missing	1 (20%)	2 (6%)	7 (10%)	1 (4%)		

RESPONDENT COMMENTS EXPRESSING CHM DISEASE BURDEN AND IMPACT

"I am a young man who lives with stress about a future where I lose my vision. I am about to get married and wish to have children and am currently in my 3rd year of medical school. All I want is a normal life where I can be a good father to my kids, husband to my wife, and doctor to my patients. I worry that losing my vision will make all of these things far more difficult. I would do anything for an FDA-approved treatment to save my vision before it is lost."

"My grandmother was a carrier, I have my dad and 3 uncles who are blind, and I'm scared to have kids as I don't want to give them the disease!" *(symptomatic female CHM carrier)*

"Onset of CHM is different for every patient. I am fortunate in that I can still drive and navigate on my own. There will be a time, however, when I cannot. Not only is it inevitable, but I can feel the creep of narrowing field of vision. Any progress in treatment and its coverage is wholly appreciated."

Symptomatic Female Carriers

We received 14 responses from female participants self-identifying as symptomatic CHM patients, all of whom were over age 25. These individuals represent the rarest of the already-rare CHM population.

Although this sample size is very small, symptomatic females in general may be moderately affected in terms of their comfort in crowds or large gatherings, and (consistent with both the literature and the total population of respondents which is predominantly male) there appears to be more disease impact on vision at night (Table 11).

Symptomatic females 65 and older (65+, n=6) may show a trend toward more disease impact on social interactions, and 4 out of 6 respondents in this group agreed or strongly agreed that using existing levels of independence/functional abilities causes stress and/or anxiety (Table 11).

Table 11. CHM Impact on independence and psychosocial impact for symptomatic female respondents

	AGE	
	<65 Range: 26-64 N=8	65+ Range: 67-79 N=6
I can no longer walk independently in daylight.		
No	7	5
Yes	0	1
Missing	1	0
I can no longer walk independently at night		
No	4	2
Yes	3	4

Missing	1	0
I no longer drive during the day		
No	3	3
Yes	4	3
Missing	1	0
I no longer drive at night		
No	2	1
Yes	5	5
Missing	1	0
My confidence level navigating alone and avoiding injury is: 0=Not at all confident to 5=Extremely confident	4^*	3^
My ability to interact socially (example, spend time with family and friends) has been affected		
Not at all	5	2
Moderately or to some degree	2	4
Severely	0	0
Missing	1	0
The extent to which I feel comfortable in crowds or large gatherings is: 0=Not at all confident to 5=Extremely confident	3^*	3^
Using the levels of independence or functional abilities causes stress and/or anxiety		
Agree or Strongly Agree	4	4
Disagree or Strongly Disagree	2	1
Not applicable	1	1
Missing	1	0
^The extent of mental and emotional strain including anxiety and depression. 0=No anxiety/depression to 5=severe anxiety/depression.	2^*	3^
I currently take medications for anxiety and/or depression		
No	5	3
Yes	2	3
Missing	1	0

^Results represent the mean for each age group

*****N=1 respondent in the <65 group did not respond to this question.

This ultra-rare subpopulation of CHM patients and/or their caregivers seem to experience unique frustrations over specialist bias as well as denied access to clinical trials and experimental therapies. The box below represents female patients and/or caregiver responses to certain 'please specify' or open-ended survey questions.

RESPONDENT COMMENTS REFLECTING FRUSTRATIONS AND CARE GAPS EXPERIENCED BY SYMPTOMATIC FEMALE PATIENTS AND THEIR CAREGIVERS

"I would visit a retinal specialist for treatment or natural history study if I could qualify but I am a female, and the studies exclude me unfortunately."

"My daughter is not asymptomatic, although to convince non specialist vision doctors is very challenging and annoying when they buy into the idea of only men can get this so you are really lucky. She is very handicapped."

"I wish treatments and therapies would include females and not just males because I am a female with [C]HM and that is even more rare than CHM alone. It's very frustrating being denied participation."

"One of our daughters HAS CHM. Confirmed by Ian McDonald, at the University of Alberta. To continue concentrating your language to include only MEN is alienating and hurtful."

Preferences for treatment options

Most survey participants across all age groups expressed a willingness to undergo relatively invasive therapies like retinal surgery, subretinal injections, and device implantation to retain or improve their vision (Table 12). This is not surprising given that Individuals with CHM face challenges to their independence and productivity throughout disease progression. Although each CHM patient lives with significant uncertainty with respect to how quickly their vision loss will progress toward blindness, the general path is clear and these individuals face a future of near-certain blindness. This mix of knowledge and uncertainty may play a role for younger patients expressing a willingness to tolerate invasive procedures and accept a risk of worsened vision associated with new and/or experimental treatments.

Responses to the open-ended inquiry provided additional insights into the lived experience of CHM patients as they age and the disease progresses toward blindness.

Table 12. Attitudes and perceptions on treatment options

Age at Start of Survey	<25 N=5	25-<40 N=31	40-<65 N=69	65+ N=27	Total N=132	p-value
I would want to try the therapy as soon as possible						0.42
No	0 (0%)	0 (0%)	2 (3%)	2 (7%)		
Yes	4 (80%)	29 (94%)	59 (86%)	24 (89%)		
Missing	1 (20%)	2 (6%)	8 (12%)	1 (4%)		
CHM patients should not have to wait until a certain age to be eligible for treatment						0.59
Agree	4 (80%)	27 (87%)	58 (84%)	26 (96%)		
Disagree	0 (0%)	2 (6%)	3 (4%)	0 (0%)		
Missing	1 (20%)	2 (6%)	8 (12%)	1 (4%)		
Willingness: A one-time injection into the eyes that requires retinal surgery						0.27
No	0 (0%)	1 (3%)	0 (0%)	1 (4%)		
Yes	4 (80%)	28 (90%)	61 (88%)	24 (89%)		
Missing	1 (20%)	2 (6%)	8 (12%)	2 (7%)		

Willingness: Multiple eye injections requiring retinal surgery					0.57
No	0 (0%)	1 (3%)	3 (4%)	3 (11%)	
Yes	4 (80%)	28 (90%)	58 (84%)	22 (81%)	
Missing	1 (20%)	2 (6%)	8 (12%)	2 (7%)	
Willingness: A one-time injection into the eyes that does not require retinal surgery					0.17
No	0 (0%)	2 (6%)	0 (0%)	0 (0%)	
Yes	4 (80%)	27 (87%)	61 (88%)	25 (93%)	
Missing	1 (20%)	2 (6%)	8 (12%)	2 (7%)	
Willingness: Multiple eye injections that do not require retinal surgery					0.74
No	0 (0%)	1 (3%)	1 (1%)	0 (0%)	
Yes	4 (80%)	28 (90%)	60 (87%)	25 (93%)	
Missing	1 (20%)	2 (6%)	8 (12%)	2 (7%)	
Willingness: A surgical procedure to implant a device in my eyes that delivers electric stimulation					0.061
No	0 (0%)	1 (3%)	7 (10%)	7 (26%)	
Yes	4 (80%)	28 (90%)	54 (78%)	18 (67%)	
Missing	1 (20%)	2 (6%)	8 (12%)	2 (7%)	
Willingness: Lifetime monitoring of my vision with regular visits to a specialist					0.74
No	0 (0%)	1 (3%)	1 (1%)	0 (0%)	
Yes	4 (80%)	28 (90%)	60 (87%)	25 (93%)	
Missing	1 (20%)	2 (6%)	8 (12%)	2 (7%)	

RESPONDENT COMMENTS ON VALUE OF PRESERVING REMAINING VISION AND WILLINGNESS TO SEEK TREATMENT IF ONE BECOMES AVAILABLE

“I would go anywhere, accept ANY and all treatments available, meet with doctors to discuss progress or monitor improvement every day for the rest of my life if I could only GET treatment of some kind that will AT LEAST allow me to keep the vision I have now! As long as the price was something I could possibly afford at least. Just call me . . . and I will come running...with bells on!”

“Currently I'm in a crucial moment where a CHM treatment would save the remaining vision I have. I immensely appreciate all the scientific community efforts trying to develop a treatment that can be approved by the FDA as soon as possible. “

“The sooner I get treatment the better. I don't want to lose what little vision I have left if possible and I'm willing to accept the risk of clinical trials and FDA-approved treatment if available. “

“I want to receive treatment very soon so I can retain or regain some vision loss so I can watch my baby daughter grow up. That is my biggest worry is not being able to be there for my kids like I want to. The sooner the better as right now I am 34.”

“I would much prefer a treatment involves less invasive procedures requiring surgery. Intravitreal delivery or topical delivery of neuroprotective agents”

"I will happily entrust my vision (and its maintenance/recovery) to the retinal specialists doing the research and providing the cures. If they recommend something, I will follow that recommendation"

"Myself and two other Brothers are ready to take our place in line for a therapy that may slow down or stop the vision loss progression"

"My preference with the previous treatments listed is the one with less risks to my remaining vision. Which I believe was the injections without surgery. Vision is such a precious sense for remaining independent in this world. As the disease progresses and there is less of my natural vision to maintain I would do any of the riskier options listed to maintain vision. So in the end all options are welcome but obviously the most minimally invasive options are preferred."

Discussion and Conclusions

CHM is an ultra-rare genetic retinal condition that primarily effects males, with symptom onset in childhood or adolescence and relatively rapid progression starting in the third decade of life. This survey of individuals with symptomatic CHM revealed key information about the real-world experience of patients and their attitudes toward potential treatment options.

General findings

Data on the racial and ethnic characteristics of the CHM patient population is largely based on participation in clinical trials, natural history studies, and patient registries. The predominantly white male respondent population is consistent with published demographics of the CHM population.

In agreement with the literature, CHM survey respondents are impacted mostly at night or in dim light (night vision). CHM substantially impedes the ability to drive at night for patients 25 years of age and older. This can have an impact on certain life decisions and may impede particular social interactions and recreational activities.

Despite the impact of vision loss on CHM patients and their ability to continue engaging in their preferred work, familial, and recreational activities, only about half of individuals between ages 25 and 65 reported using any assistive technology to augment their ability to navigate, interact, and live independently. However, in the 65+ subgroup the use of assistive technology was reported by most respondents (63%). This may reflect the slow, albeit relentlessly progressive nature of vision loss in CHM.

CHM patients can experience a sense of desperation with respect to losing remaining vision and place a high value on vision preservation regardless of their remaining visual acuity. Based on survey responses, individuals with CHM place a high value on preserving their existing vision, receiving treatment early in the disease process, and accessing treatment options as soon as they are available. Most respondents expressed a relatively higher tolerance for treatment risk (e.g., more invasive therapeutic procedures). However, open-ended comments reveal that patients are also concerned that treatment costs may be beyond their reach if not covered by insurance.

Availability of genetic testing to confirm CHM has likely shortened the diagnostic journey for individuals with a family history of CHM. Over 90% of respondents indicated that they had received genetic confirmation of CHM. The relatively short diagnostic journey experienced by a significant proportion of respondents appears to confirm

diagnostic efficiencies gained from genetic confirmation of CHM in family members as 89% of those with a known family history of CHM reported that this knowledge facilitated their own diagnosis. Emergence of treatments for conditions with similar early symptoms, including retinitis pigmentosa, has likely increased payer interest in covering genetic testing for individuals with suspected genetic retinal disease. Efforts of advocacy organizations, such as the CRF, to increase awareness of testing availability among clinicians and patients will continue to be important in reducing the time from initial symptoms to diagnosis.

Symptomatic female patients with genetic confirmation of CHM may be excluded from research and may not have access to a CHM treatment. The CHM POV survey allowed input from the extremely rare sub-population of symptomatic female CHM "carriers." As discussed briefly above, and in agreement with the literature, our survey results indicate that these individuals are not asymptomatic as the term "carrier" may imply – they may experience CHM at varying levels of severity. Although the sample size is small, female respondents described CHM-associated limitations in terms of night vision and, for those over the age of 65, a potentially greater impact of disease burden on social interactions and stress/ anxiety when using their existing levels of independence/functional abilities.

Unfortunately, these individuals are excluded from natural history studies and from all US clinical trials on emerging CHM therapies. They experience significant and understandable frustration with the predominant narrative that CHM is a condition that only impacts males. Without an evidentiary "bridge" between CHM in male and female patients, it is possible that the FDA would include a sex-based limitation on the label for any therapeutic option that limited clinical trial participation to male patients.

Stakeholders, including patient advocates, researchers, and industry, will have to proactively address the question of treatment benefit in symptomatic female patients, as well as the gaps in scientific knowledge that impede incorporation of female CHM patients in research and treatment development.

Current and potential cost of care

The current cost of care for CHM patients is minimal given that there are no available therapies to reverse, slow, or halt progressive vision loss. Current CHM-related medical care is largely limited to periodic examinations by a retinal specialist (54% of CHM respondents saw a retinal specialist as part of a clinical trial or natural history study and 56% currently visit a retinal specialist on a regular basis *outside of* a natural history study or treatment trial for CHM). If entities assess the value of an emerging treatment option without considering the *patient-perceived value of preserving remaining vision*, the treatment is likely to be regarded as a "low value for the money", especially if the treatment effect is considered "modest."

The CHM stakeholder community should ensure that insurers and value frameworks have a clear understanding on the value of vision preservation throughout CHM's progression trajectory. Although CHM clearly exacts a devastating emotional burden on the lives of patients and their families, it is not currently associated with a high financial burden for insurers. This means that traditional health economic analysis frameworks will tend to assign a high cost-per-quality-adjusted-life-year to emerging treatments, particularly if the treatment goal for most patients would be to retain a level of visual acuity that is a small increment of "improvement" over blindness. It will be imperative that patients, clinicians, and technology sponsors fully capture and articulate the "value" associated with vision preservation. *During peak productivity years, retaining the ability to fully participate in employment and family responsibilities, with or without assistive technologies, is of higher value than the utility values assigned within traditional value frameworks.* Similarly, individuals seeking to preserve sufficient functional vision to enable relative independence would place a high value on their remaining vision. While the ideal treatment would reverse progression and restore perfect or near-perfect vision, *CHM patients have a very strong interest in receiving an available, less-than-perfect and relatively higher-risk treatment option*. Deployment of instruments capable of

capturing patient experience data on the incremental value of vision lost or gained throughout the spectrum from perfect vision to functional blindness within natural history studies and clinical trials could provide a set of utility values with particular relevance to the CHM patient population and emerging treatment options.

Patients express concerns that a treatment will be beyond their reach if it is not covered by their insurance. Several open-ended responses revealed patient concerns that lack of insurance coverage could preclude access to future CHM treatments. Although it is unlikely that a first FDA-approved treatment with disease modifying potential in CHM would not be covered at all, *high treatment costs could lead payers to constrict or delay access to individuals not precisely fitting within the inclusion and exclusion criteria of the pivotal clinical trial(s).* Expanded access programs that collect and report data could provide a sufficient evidentiary basis for coverage in patients who were or would have been ineligible for treatment within the clinical trial context.

Clinical Trials

***CHM patients may have limited access to emerging treatment options within clinical trials*.** There are currently no on-label or off-label treatments that have demonstrated utility in impacting the progressive trajectory of CHM. Clinical trials in the US primarily focus on gene therapy interventions and are conducted within a limited set of facilities in urban locations, including Miami, Boston, Cincinnati, Portland, Los Angeles, Baltimore, New York, Dallas, Madison, Philadelphia, and Salt Lake City. All current studies limit enrollment to male patients over age 18, and most preclude enrollment of individuals who have previously received retinal surgery and/or gene therapy. In addition, several studies exclude individuals with "gross [bilateral] asymmetry" in visual acuity.
Research of potential treatments for CHM is challenged by:

- Variable rates of progression among patients
- Variable rates of progression over time and between eyes. *As visual acuity declines, asymmetry tends to increase, meaning that an untreated "better" eye may be a poor control for the treated "worse" eye in patients with diminished visual acuity.*
- Study designs generally exclude participants with gross asymmetry in visual acuity. There remains a potential for asymmetric visual acuity decline between treated and control eyes even if asymmetry was not significant at the time of enrollment.
- Potential difficulties obtaining historic patient-specific data that would, together with general natural history data, be useful in predicting rate of progression in each eye before and after treatment.
- Exclusion of individuals who may have been effective treatment candidates if they had not participated in a previous clinical study.

The CRF should explore the potential for leveraging its patient registry and outreach efforts to encourage all CHM patients to receive annual (or more frequent) examinations from a retinal specialist and augment existing natural history information at the general and patient-specific level. Alternative trial designs that rely on evidence to extrapolate progression trajectory in each eye may reduce the need for study designs that rely on a control eye and allow for enrollment of patients with previous gene therapy clinical trial experience.

Finally, open-ended responses and survey results indicated that patients may struggle to acquire and/or fully understand information on emerging treatment options. Many patients approach their CHM as a condition that cannot be treated and are uninterested in seeking care from a retinal specialist or are afraid that they will learn that their vision loss is accelerating.

The CRF website provides a set of resources for patients, including membership options that enable CRF to update patients on treatments in development and advances in research.[23]

Strengths and Limitations

Access to the extensive CRF patient database was a significant strength for this Report. For example, we were able to begin to assess the preferences/feelings of symptomatic females with CHM. However, post-survey follow-up with respondents to seek clarity or granularity was not performed but may have enabled expanded or more in-depth response acquisition.

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Appendices

Appendix A: POV CHM Survey Introduction and Consent

Patient Oriented Value (POV©) / Choroideremia Survey

WE NEED YOU TO TAKE THIS VERY IMPORTANT SURVEY TO HELP BUILD OUR CASE FOR INSURERS TO COVER CHM GENE THERAPY AND OTHER FUTURE CHM THERAPIES.

Please ask all your CHM relatives to take it too!

There are currently no approved treatments for CHM. However, encouraging medical progress is taking place and a novel gene therapy for this disease is in late-stage clinical development. With this good news comes the very real concern of how much this therapy will cost and to what extent insurance companies will pay for it.

The Institute for Clinical and Economic Review (ICER) is a non-profit entity that issues reports on how effective certain new therapies and medical tests are and their 'economic value', or how much they should cost. ICER -and the insurance companies utilizing its analyses for treatment coverage- relegate the 'patient perception of value' to sidebar discussions of "other considerations," rather than incorporating it into numeric calculations of value that are actionable. *Patient groups would like to translate their understanding of value into quantitative terms used by health economists so treatment 'value' incorporates the patient perspective! *

The new gene therapy in clinical trials for CHM is likely to be a subject for ICER review at or before FDA approval. Therefore, this survey is designed to capture the patient journey and perception of 'value' for disease modifying treatments, like gene therapy, for CHM.

*** 1. CONSENT**

During this survey you will be asked to provide certain demographic information (example: date of birth, gender, race/ethnicity) and information regarding your personal and healthcare experiences with CHM. You will also be asked to provide a valid email address and/or phone number in case we require clarification about your responses. Taking part in this survey is voluntary and contact information will not be shared with third parties.

De-identified information that you provide will be used to generate a Patient Oriented Value (POV©) Report that will be shared with various healthcare stakeholders.

Please check AGREE to consent and continue the survey. Checking DISAGREE will end the survey.

Appendix B: POV CHM Survey Questions and Aggregated Responses

Q2 Person filling out survey

Answered: 309 Skipped: 16

ANSWER CHOICES	RESPONSES	
Self - Person with vision loss or other symptoms due to a CHM diagnosis	46.93%	145
AAA	0.00%	0
Asymptomatic female carrier relative/caregiver (with known CHM gene but WITHOUT symptoms) on behalf of person with CHM	13.59%	42
Other caregiver, relative, or friend on behalf of person with CHM	23.95%	74
Self - Asymptomatic female carrier (with known CHM gene but WITHOUT symptoms)	15.53%	48
TOTAL		309

Q3 Method(s) of contact

Answered: 235 Skipped: 90

ANSWER CHOICES	RESPONSES	
Email address and/or phone number (with area code)	100.00%	235

Q4 Gender

Answered: 235 Skipped: 90

ANSWER CHOICES	RESPONSES	
Male	69.36%	163
Female	30.21%	71
Other	0.43%	1
Prefer not to say	0.00%	0
TOTAL		235

Q5 Race/Ethnicity

Answered: 235 Skipped: 90

ANSWER CHOICES	RESPONSES	
Non-Hispanic White or Euro-American	89.36%	210
Black or African American	0.00%	0
Latinx or Hispanic	5.11%	12
Asian (East Asian South Asian or Asian Indian)	2.13%	5
Middle Eastern, Arab or North African	0.43%	1
American Indian or Alaskan Native	0.00%	0
Native Hawaiian or Other Pacific Islander	0.00%	0
Other Race/Ethnicity	2.98%	7
TOTAL		235

Q6 Date of birth (mm/dd/yyyy)

Answered: 235 Skipped: 90

Q7 What type of insurance coverage do you currently have? (Please check all that apply)

Answered: 235 Skipped: 90

ANSWER CHOICES	RESPONSES	
Medicare (traditional or fee-for-service)	20.85%	49
Medicare Advantage	10.64%	25
Medicare Part D	5.96%	14
Medicare supplemental plan (Medigap or other non-Medicaid supplement)	6.38%	15
Medicaid	4.68%	11
Employer-sponsored coverage through MY employer	31.49%	74
Employer-sponsored coverage through a FAMILY MEMBER	22.13%	52
Affordable Care Act (ACA or "Obamacare") plan	2.13%	5
CHIP	0.00%	0
Patient assistance through a charitable organization or drug company assistance program	0.43%	1
Other (please specify)	17.02%	40

Q8 Year in which you received your CHM diagnosis (yyyy)

Answered: 224 Skipped: 101

Q9 Is there a history of genetic or hereditary vision loss OTHER THAN CHM in your family?

Answered: 224 Skipped: 101

ANSWER CHOICES	RESPONSES	
Yes	12.95%	29
No	71.88%	161
Unknown	15.18%	34
TOTAL		224

Q10 If yes, what was the diagnosis for your family member?

Answered: 29 Skipped: 296

ANSWER CHOICES	RESPONSES	
Retinitis pigmentosa	58.62%	17
Other inherited retinal dystrophy or disease (please specify)	41.38%	12
TOTAL		29

Q11 How old were you when you first experienced visual symptoms (please state in years; example: 11)?

Answered: 210 Skipped: 115

Q12 When you first experienced vision problems, what symptoms did you notice? (please check all that apply)

Answered: 210 Skipped: 115

ANSWER CHOICES	RESPONSES	
Night blindness (problems seeing at night or in dim lighting)	85.24%	179
Problems with glare	26.67%	56
Problems seeing details or with reading vision while using proper correction with glasses	14.29%	30
Problems with peripheral vision (e.g., bumping into objects or people, negotiating obstacles or walking up and downstairs)	31.90%	67
Problems with color perception	6.19%	13
Other (please specify)	12.38%	26

Q13 When you FIRST went to the eye doctor for the symptoms above, were you correctly diagnosed with CHM at this visit?

ANSWER CHOICES	RESPONSES	
Yes	41.43%	87
No	58.57%	123

Q14 If no, how many visits did it take -either with the same or different doctors- to receive a correct diagnosis of CHM?

Answered: 123 Skipped: 202

ANSWER CHOICES	RESPONSES	
Two visits	12.20%	15
Between two and five visits	37.40%	46
More than five visits	50.41%	62

Q15 How long did it take to obtain a correct diagnosis of CHM?

Answered: 206 Skipped: 119

ANSWER CHOICES	RESPONSES	
Less than or equal to one year	47.09%	97
Between one and three years	14.08%	29
More than three years	38.83%	80
TOTAL		206

Q16 My diagnosis of CHM has been genetically confirmed.

Answered: 206 Skipped: 119

ANSWER CHOICES	RESPONSES	
Yes	91.26%	188
No	8.74%	18

Q17 If no, please specify why not (check all that apply)

Answered: 17 Skipped: 308

ANSWER CHOICES	RESPONSES	
I was not offered the option of getting genetically tested	47.06%	8
Genetic testing was too expensive	17.65%	3
I did not know that I needed genetic confirmation	64.71%	11
A member of my family had already received a genetic confirmation of CHM	35.29%	6
Other (please specify)	5.88%	1
Total Respondents: 17		

Q18 Year in which you received genetic confirmation of CHM (yyyy; please use "NA" if Not Applicable)

Answered: 201 Skipped: 124

Q19 BEFORE your CHM diagnosis, was any family member diagnosed with CHM or known to have a mutated CHM gene?

Answered: 201 Skipped: 124

ANSWER CHOICES	RESPONSES	
Yes	47.26%	95
No	42.79%	86
Unknown	9.95%	20
TOTAL		201

Q20 If yes, were you aware of this information so that it helped facilitate your CHM diagnosis?

Answered: 95 Skipped: 230

ANSWER CHOICES	RESPONSES	
Yes	88.42%	84
No	11.58%	11
TOTAL		95

Q21 Please specify which family member(s) was(were) diagnosed with CHM or identified as having a mutated CHM gene (check all that apply)

Answered: 95 Skipped: 230

ANSWER CHOICES	RESPONSES	
Mother	36.84%	35
Father	15.79%	15
Brother	32.63%	31
Sister	10.53%	10
Aunt	12.63%	12
Uncle	31.58%	30
Grandfather	25.26%	24
Grandmother	22.11%	21
First cousin(s)	29.47%	28

Other (please specify). Note: if you have an extensive family history of CHM (example: great-grandparents, great uncles/aunts, 2nd or 3rd cousins, etc.) you may simply state "extensive family history."

Q22 AFTER your diagnosis, has any other family member had a confirmed diagnosis of CHM or been identified as having a mutated CHM gene?

Answered: 200 Skipped: 125

ANSWER CHOICES	RESPONSES	
Yes	49.50%	99
No	42.00%	84
Unknown	8.50%	17
TOTAL		200

Q23 If yes, please specify which family member(s) (check all that apply)

Answered: 99 Skipped: 226

ANSWER CHOICES	RESPONSES	
Mother	36.36%	36
Father	2.02%	2
Brother	31.31%	31
Sister	18.18%	18
Son	11.11%	11
Daughter	18.18%	18
Other (please specify)	47.47%	47

Q24 Because of my CHM, I was diagnosed by -or it was recommended that I visit- a retinal specialist.

Answered: 198 Skipped: 127

ANSWER CHOICES	RESPONSES	
Yes	89.39%	177
No	10.61%	21

Q25 I have visited a retinal specialist in association with a natural history study or treatment trial for CHM.

Answered: 198 Skipped: 127

ANSWER CHOICES	RESPONSES	
Yes	51.52%	102
No	48.48%	96

Q26 Outside of a natural history study or treatment trial for CHM, I currently visit a retinal specialist on a regular basis.

Answered: 198 Skipped: 127

ANSWER CHOICES	RESPONSES	
Yes	55.05%	109
No	44.95%	89

Q27 Outside of a natural history study or treatment trial, I regularly visit a retinal specialist

Answered: 108 Skipped: 217

ANSWER CHOICES	RESPONSES	
More than once a year	13.89%	15
Every year	50.93%	55
Every 2 years	24.07%	26
Every 3+ years	11.11%	12
Occasionally or only as needed (not on a routine or regular basis)	0.00%	0

Q28 I do NOT visit a retinal specialist on a regular or routine basis (outside of a natural history study or treatment trial for CHM) because (check all that apply)

Answered: 89 Skipped: 236

Total respondents = 89

ANSWER CHOICES	RESPONSES	
It was not recommended that I do so.	24.72%	22
I only visit a retinal specialist occasionally or as needed.	40.45%	36
I do not feel that my disease is “severe enough.”	6.74%	6
It's too expensive and my insurance doesn't cover it.	8.99%	8
There are no treatments for CHM, and I am not motivated to do so.	37.08%	33
Other (please specify)	29.21%	26

Q29 I suffer from the following co-morbidities or aggravating symptoms because of my CHM (please check all that apply or "Not Applicable")

Answered: 195 Skipped: 130

ANSWER CHOICES	RESPONSES	
Not Applicable	24.10%	47
Perception problems	50.26%	98
Decrease in contrast perception	43.59%	85
Double vision	19.49%	38
Eye strain	39.49%	77
Headache	17.95%	35
Eye pain	13.85%	27
Macular edema	4.62%	9
Dry eyes	26.67%	52
Cataracts	23.59%	46
Retinal detachment	2.05%	4
Retinal hemorrhage	0.00%	0
Retinal hole	2.05%	4
Cystoid macular edema	1.54%	3
Choroidal neovascularization	2.05%	4
Other (please specify)	10.77%	21

Total Respondents: 195

Q30 I take more time to complete tasks at work (example: due to reading or writing tasks).

Answered: 192 Skipped: 133

ANSWER CHOICES	RESPONSES	
Yes	56.25%	108
No	32.81%	63
Not Applicable	10.94%	21
TOTAL		192

Q31 Navigation around the workplace is challenging.

Answered: 192 Skipped: 133

ANSWER CHOICES	RESPONSES	
Yes	51.56%	99
No	35.94%	69
Not Applicable	12.50%	24
TOTAL		192

Q32 My employer has made accommodations for my vision loss.

Answered: 192 Skipped: 133

ANSWER CHOICES	RESPONSES	
Yes	31.25%	60
No	50.00%	96
Not Applicable	18.75%	36
TOTAL		192

Q33 I have changed my job or reduced my hours at work.

Answered: 192 Skipped: 133

ANSWER CHOICES	RESPONSES	
Yes	34.38%	66
No	52.08%	10

Q34 I have chosen a career or job that can accommodate the progressive nature of my vision loss.

Answered: 192 Skipped: 133

ANSWER CHOICES	RESPONSES	
Yes	36.46%	70
No	50.00%	96
Not Applicable	13.54%	26

Q35 I am not able to maintain full time paid employment.

Answered: 192 Skipped: 133

ANSWER CHOICES	RESPONSES	
Agree	28.13%	54
Disagree	61.46%	118
Not Applicable	10.42%	20

Q36 I am not able to maintain part time paid employment.

Answered: 192 Skipped: 133

ANSWER CHOICES	RESPONSES	
Agree	18.23%	35
Disagree	70.31%	135
Not Applicable	11.46%	22

Q37 Because of vision loss, I use assistive technology (examples include accessibility features on smartphones, ZoomText, JAWS, etc.).

ANSWER CHOICES	RESPONSES	
Yes	43.46%	83
No	56.54%	108
TOTAL		191

Q38 If no, please specify why not.

Answered: 106 Skipped: 219

ANSWER CHOICES	RESPONSES	
I do not believe my vision loss is serious enough yet to require it	56.60%	60
I am unaware of what assistive technology can help me	13.21%	14
I cannot afford the cost of assistive technology	5.66%	6
I prefer not to call attention to my vision loss	6.60%	7
Other (please specify)	17.92%	19

Q39 In the past year, how much of a typical NON-work day involved the use of assistive technology?

Answered: 83 Skipped: 242

ANSWER CHOICES	RESPONSES	
All day	13.25%	11
More than 8 hours per day	19.28%	16
Less than 8 hours per day	15.66%	13
Only for isolated or specific tasks	44.58%	37
Not applicable	7.23%	6

Q40 In the past year, how much of a typical WORK day involved the use of assistive technology?

Answered: 83 Skipped: 242

ANSWER CHOICES	RESPONSES	
All day	21.69%	18
More than 4 hours per day	14.46%	12
Less than 4 hours per day	6.02%	5
Only for isolated or specific tasks	19.28%	16
Not applicable	38.55%	32

Q41 Because of vision loss, I need caregiver support (examples: for transportation, childcare, housekeeping, shopping, paying bills, and/or for personal activities of daily living like feeding, bathing, dressing, grooming, etc.)

Answered: 188 Skipped: 137

ANSWER CHOICES	RESPONSES	
All the time	13.83%	26
Part of the time (example: for certain activities but not others and/or for so many hours per day or so many days per week)	32.98%	62
None of the time	53.19%	100
TOTAL		188

Q42 My caregiver support (examples: for transportation, childcare, housekeeping, shopping, paying bills, and/or for personal activities of daily living like feeding, bathing, dressing, grooming, etc.) is covered by my health insurance

Answered: 188 Skipped: 137

ANSWER CHOICES	RESPONSES	
All the time	3.19%	6
Part of the time (example: insurance covers some services, but not others)	5.85%	11
None of the time	90.96%	171
TOTAL		188

Q43 I can no longer walk independently in daylight.

Answered: 185 Skipped: 140

ANSWER CHOICES	RESPONSES	
Yes	19.46%	36
No	80.54%	149

Q44 I can no longer walk independently at night.

Answered: 185 Skipped: 140

ANSWER CHOICES	RESPONSES	
Yes	58.38%	108
No	41.62%	77

Q45 I can no longer drive independently during the day.

Answered: 185 Skipped: 140

ANSWER CHOICES	RESPONSES	
Yes	52.97%	98
No	47.03%	87

Q46 I can no longer drive independently at night.

Answered: 185 Skipped: 140

ANSWER CHOICES	RESPONSES	
Yes	71.89%	133
No	28.11%	52

Q47 I cannot live in the area I prefer due to my need to be closer to public transit services.

Answered: 185 Skipped: 140

ANSWER CHOICES	RESPONSES	
Agree	23.24%	43
Disagree	76.76%	142
TOTAL		185

Q48 I can no longer commute using public transit services.

Answered: 185 Skipped: 140

ANSWER CHOICES	RESPONSES	
Agree	18.92%	35
Disagree	81.08%	150
TOTAL		185

Q49 I can no longer live by myself.

Answered: 185 Skipped: 140

ANSWER CHOICES	RESPONSES	
Agree	19.46%	36
Disagree	80.54%	149
TOTAL		185

Answered: 185 Skipped: 140

ANSWER CHOICES	RESPONSES	
Yes	40.54%	75
No	59.46%	110
TOTAL		185

Q51 I now use a service dog.

Answered: 185 Skipped: 140

ANSWER CHOICES	RESPONSES	
Yes	5.41%	10
No	94.59%	175
TOTAL		185

Q52 My confidence level navigating alone and avoiding injury is: 0=Not at all confident to 5=Extremely confident.

Answered: 182 Skipped: 143

ANSWER CHOICES	RESPONSES	
0	6.04%	11
1	10.99%	20
2	14.84%	27
3	23.08%	42
4	27.47%	50
5	17.58%	32
TOTAL		182

Q53 The extent to which I feel comfortable in crowds or large gatherings is: 0=not at all comfortable to 5=very comfortable.

Answered: 185 Skipped: 140

ANSWER CHOICES	RESPONSES	
0	17.30%	32
1	20.00%	37
2	13.51%	25
3	15.14%	28
4	15.68%	29
5	18.38%	34
TOTAL		185

Q54 The extent to which I can participate in recreational activities I once enjoyed (examples: afterschool activities, athletic activities, reading for entertainment, watching movies, playing video games, texting friends, etc.) is: 0=no participation to 5=normal participation.

Answered: 183 Skipped: 142

ANSWER CHOICES	RESPONSES	
0	10.38%	19
1	16.94%	31
2	9.84%	18
3	19.67%	36
4	16.39%	30
5	26.78%	49

Q55 My ability to interact socially (example, spend time with family, friends and acquaintances) has been affected

Answered: 185 Skipped: 140

ANSWER CHOICES	RESPONSES	
Severely	11.89%	22
Moderately or to some degree	45.95%	85
Not at all	42.16%	78
TOTAL		185

Q56 I have experienced separation or divorce from my spouse/significant other since my CHM diagnosis.

Answered: 185 Skipped: 140

ANSWER CHOICES	RESPONSES	
Yes	7.03%	13
No	57.30%	106
Not applicable	35.68%	66
TOTAL		185

Q57 Using the levels of independence or functional abilities that I still have causes stress and/or anxiety.

Answered: 183 Skipped: 142

ANSWER CHOICES	RESPONSES	
Strongly agree	20.77%	38
Agree	40.98%	75
Disagree	14.21%	26
Strongly disagree	6.01%	11
Not applicable	18.03%	33

Q58 The extent of mental and emotional strain including anxiety and depression because of my CHM is: 0=no anxiety or depression to 5=severe anxiety or depression.

Answered: 181 Skipped: 144

ANSWER CHOICES	RESPONSES	
0	17.68%	32
1	17.68%	32
2	20.44%	37
3	20.99%	38
4	17.13%	31
5	6.08%	11
TOTAL		181

Q59 I have been prescribed medications for anxiety and/or depression.

Answered: 183 Skipped: 142

ANSWER CHOICES	RESPONSES	
Yes	22.95%	42
No	77.05%	141
TOTAL		183

Q60 I currently take medications for anxiety and/or depression.

Answered: 183 Skipped: 142

ANSWER CHOICES	RESPONSES	
Yes	18.03%	33
TOTAL		183
No	81.97%	150

Q61 Because of my CHM, I take more than one prescription medicine.

Answered: 183 Skipped: 142

ANSWER CHOICES	RESPONSES	
Yes	7.10%	13
No	92.90%	170
TOTAL		183

Q62 I would want to try the therapy as soon as possible because it is extremely important for me to maintain the vision I currently have.

Answered: 180 Skipped: 145

ANSWER CHOICES	RESPONSES	
Yes	93.89%	169
No	6.11%	11
TOTAL		180

#	IF "NO," PLEASE SPECIFY WHY YOU WOULD NOT WANT TO TRY SUCH A THERAPY.	DATE
1	I basically have no vision. It would not apply to me.	6/26/2021 12:25 PM
2	no need yet	6/23/2021 11:00 PM
3	My vision loss is not so far along that I'd want to step in line before another with more pressing needs. I will need something in upcoming years, however; it is progressive.	6/23/2021 4:10 PM
4	Blind now	6/17/2021 10:52 AM
5	Because I have already lost functional vision so halting progression would do me no advantage. I need some thing to improve vision level	6/6/2021 10:39 AM
6	I'm already blind.	5/25/2021 11:54 PM
7	because I have no vision	5/25/2021 11:50 AM
8	I would love my husband to keep the vision he has	5/24/2021 12:14 PM

Q63 CHM patients should not have to wait until a certain age (risking further vision loss) to be eligible to receive the approved treatment.

Answered: 180 Skipped: 145

ANSWER CHOICES	RESPONSES	
Agree	97.22%	175
Disagree	2.78%	5
TOTAL		180

#	IF YOU DISAGREE, PLEASE SPECIFY WHY.	DATE
1	There is a risk to sight because of the surgery. It has to be on a risk / benefit basis	6/30/2021 4:47 PM
2	should be at least 21	6/21/2021 7:41 PM
3	I think consideration for therapy should be closely evaluated, based on current stage of CHM, and not age	6/16/2021 10:59 AM
4	If there is a chance to take the treatment before it would be come worse, I would try 8t as soon as possible	6/15/2021 12:37 PM
5	Worried about the effectiveness of the trial.	6/15/2021 11:33 AM

Q64 A one time injection into the eyes that requires retinal surgery.

Answered: 176 Skipped: 149

ANSWER CHOICES	RESPONSES	
Yes	94.89%	167
No	5.11%	9
TOTAL		176

Q65 Multiple eye injections requiring retinal surgery should subsequent therapy become necessary one or more years later.

Answered: 176 Skipped: 149

ANSWER CHOICES	RESPONSES	
Yes	92.05%	162
No	7.95%	14
TOTAL		176

Q66 A one time injection into the eyes that does not require retinal surgery.

Answered: 176 Skipped: 149

ANSWER CHOICES	RESPONSES	
Yes	97.73%	172
No	2.27%	4
TOTAL		176

Q67 Multiple eye injections that do not require retinal surgery should subsequent therapy become necessary one or more years later.

Answered: 176 Skipped: 149

ANSWER CHOICES	RESPONSES	
Yes	96.02%	169
No	3.98%	7
TOTAL		176

Q68 A surgical procedure to implant a device in my eyes that delivers electrical stimulation to the retinal surface.

Answered: 176 Skipped: 149

ANSWER CHOICES	RESPONSES	
Yes	84.66%	149
No	15.34%	27
TOTAL		176

Q69 Lifetime monitoring of my vision with regular visits to a retinal specialist.

Answered: 176 Skipped: 149

ANSWER CHOICES	RESPONSES	
Yes	96.59%	170
No	3.41%	6
TOTAL		176

Q70 For all survey respondents: Please comment on thoughts and preferences you may have related to future treatments for CHM?

Answered: 138 Skipped: 187

#	RESPONSES	DATE
1	We need a cure for this awful disease!	7/2/2021 6:44 PM
2	release the gene therapy, let us decide. Mike	7/2/2021 2:54 PM
3	I am willing to consider any treatment to halt determination and improve my vision.	7/2/2021 1:32 PM
4	i am late stage chm and do not have much vision left but i would want to do anything to keep what i have left as it is better then nothing which is not far away for me. I fear that things are talking too long for me but for a young person to possibly be able to avoid further deterioration is a miracle i have dreamed of for myself and anyone else who could benefit so good luck to all our cherished scientitists.	7/2/2021 12:07 PM
5	Very anxious for something to be approved that is safe. Want to preserve remaining vision.	7/2/2021 10:29 AM
6	Making tools and assets more readily available to those who have CHM. Awareness is lacking, costs too high, insurance doesn't cover, and if you don't know what is out there - you are missing out / lost for help.	7/2/2021 10:07 AM
7	I was in the placebo group of one of the gene therapy trials. It's frustrating hearing them say the trials are not meeting expectations. However, if you ask any of the participants who vision is no longer changing I'm sure they met their expectations.	7/1/2021 5:14 PM
8	I have several male family members with CHM. I am a CHM carrier without symptoms - i have 4 children. 3 boys - none of which have any symptoms. I have had them checked, but not DNA tested. I'm nervous for them. I hope if they ever do start showing symptoms that treatment will be accessible.	7/1/2021 10:16 AM
9	I will do anything I can that would help find a treatment for this disease.	6/30/2021 7:35 PM
10	I hope treatment come soon	6/30/2021 6:27 PM
11	Stem cell therapy is the most exciting. Halting loss is awesome and I am glad I have been part of a trial to move it forward, but the idea of restoring vision is the most exciting frontier.	6/30/2021 4:56 PM
12	The current therapy will enable sufferers to maintain the current quality of life without further sight loss.	6/30/2021 4:49 PM
13	Future treatment for CHM patients depends upon getting past the barrier of orphan disease status. Big pharma won't support R&D to find theraputic treatments -- unless perhaps CHM is scientifically grouped with other disease candidates for genetic disease therapies. Thus, CHM patients need medical insurance coverage for participation in R&D studies, the only road to treating a progressive and devastating loss of vision.	6/28/2021 5:37 PM
14	I participated in the phase 2 trial of the Gemini Study out of Bascom Palmer in Miami, Florida under the care of Doctor Byron Lam and Ninel Gregori. I consider myself incredibly blessed and hope that this surgery has halted my vision loss. I hope this is the beginning to not only stopping loss, but restoring vision for all affected by this disease. Nobody should have to fear losing their ability to be independent in their 20s...nobody.	6/26/2021 4:01 PM
15	I have hope there will be a treatment such as gene therapy stem cell therapy in the not far off future	6/26/2021 1:06 PM
16	I'm holding on to hope though I mostly feel helpless and hopeless.	6/24/2021 5:07 PM
17	I am 24 years old now, and I expected that there will be available a treatment to stop my vision loss before I lose all my sight. For me, even if the treatment comes later and saves only a small percent of my vision, I would be so grateful and happy. The main point for me is to keep *some vision* and not reaching total blindness.	6/24/2021 10:21 AM

18	At my age (79), it's too late to save my eyes, I'm sure. But I pray my son and my grandchildren can benefit from therapies when they become available.	6/23/2021 5:57 PM
19	Onset of CHM is different for every patient. I am fortunate in that I can still drive and navigate on my own. There will be a time, however, when I cannot. Not only is it inevitable, but I can feel the creep of narrowing field of vision. Any progress in treatment and its coverage is wholly appreciated.	6/23/2021 4:14 PM
20	I do not have a lot of confidence in experimental treatments for myself, but would do so in furtherance towards a cure for my daughter and other family members. 6 family members were genetically confirmed for CHM at the Flaum Eye Clinic at the University of Rochester.	6/23/2021 2:42 PM
21	All People all countries!	6/23/2021 12:53 PM
22	I have been tested three times for clinical trials, but denied each time because my vision is "too good." I understand the need to prioritize those more severe vision loss to halt progression. So I patiently wait for the opportunity to halt or reverse my vision loss.	6/22/2021 9:51 PM
23	Profound information needed before any therapy	6/22/2021 4:56 PM
24	I want to be sure that in the future, as my son starts to exhibit vision loss, we will be able to afford to get him treated if those treatments are available.	6/22/2021 12:21 PM
25	stem cell	6/21/2021 7:44 PM
26	More aggressive action	6/20/2021 7:41 AM
27	Am willing to try anything, especially if might help grand children	6/19/2021 12:46 PM
28	I hope the treatment can at minimum stop the progression of the disease. It would be amazing if it could correct all signs and symptoms. I would hope that insurance could cover the treatment. It would be extremely difficult for me to know there was a cure for my disease, but I could not receive it due to cost.	6/19/2021 12:06 PM
29	As a carrier with 2 children it is important for me treatments continue to be researched	6/18/2021 3:44 PM
30	A treatment that could halt further vision loss permanently would be something highly desirable. Any vision improvement would be a secondary goal	6/18/2021 3:20 PM
31	anything that is proven and approved to help	6/18/2021 11:56 AM
32	I will happily entrust my vision (and its maintenance/recovery) to the retinal specialists doing the research and providing the cures. If they recommend something, I will follow that recommendation.	6/18/2021 6:35 AM
33	Want affordable treatment for my five year old grandson so his CHM diagnosis does not impede his choices in life. Also would like to participate in stem cell research for myself.	6/17/2021 2:38 PM
34	I am thrilled to finally work with professionals and families who understand the disease. My family has three generations of both carriers and actively symptomatic members , yet refuse to talk openly about their symptoms and seeking care.	6/17/2021 1:02 AM
35	I am a female carrier and have some night blindness, but otherwise am able to see and function.	6/16/2021 10:21 PM
36	I have received the treatment in both eyes already	6/16/2021 9:48 PM
37	It's important to me that any progress made with gene therapy for people with CHM is covered by insurance. Also, gene testing!	6/16/2021 8:07 PM
38	would like some type of treatment that will help retain what sight my daughter still has.	6/16/2021 3:30 PM
39	Please, please allow iMedicaid insurance to cover treatments. Because of my CHM, I can't work and live on SSI in extreme poverty. I am lost fully blind and it is my only hope . I just want to be able to see the faces of my family.	6/16/2021 3:18 PM
40	Gene therapy is so important and great strides are being made, but it must be covered by insurance and available to EVERYONE who has this devastating diagnosis.	6/16/2021 12:26 PM
41	I realize that I have the same eye cells I was born with, to wit, any surgery to the eye could cause irreparable damage. But when I read question 48, my eyes teared up. I had forgotten all	6/16/2021 9:47 AM

	the things I used to be able to do, to see. I really miss those things, badly. Mentally, t'm good until I remember what used to be. So, please, hurry with a cure or vision saving procedure before I'm all cried out. I would gladly participate in ahything that helps me see my grandchildren for the 1st time, instead of imagining what they look like. So, Godspeed.	
42	I would love to see insurance companies pay for treatments of this disease if a cure is found. It would be wonderful for all who have this disease to be able to get the treatment to save their eyesight.	6/16/2021 1:24 AM
43	It’s all for my son who is only 9 and already experiencing issues.	6/15/2021 11:27 PM
44	Participation may be limited to those that can improve my quality of life by improving my vision.	6/15/2021 9:35 PM
45	Please, anything to save my son’s vision!	6/15/2021 9:28 PM
46	All treatment considered	6/15/2021 9:00 PM
47	Just hope they’re available soon and covered by insurance. And not cost millions of dollars so no one can benefit.	6/15/2021 7:11 PM
48	I will be willing to participate in future treatments of CHM as long as a placebo treatment is not given to me. Also, it will have to be a genetic or stem cell treatment.	6/15/2021 6:52 PM
49	Wē need a treatment as soon as possible.	6/15/2021 5:32 PM
50	My son needs treatment now, whatever that may mean.	6/15/2021 4:23 PM
51	I really hope that There will be a Cure before my son loses all sight.	6/15/2021 2:50 PM
52	From my perspective, any treatment that can help to save the vision I still have is critically important to my quality of life. While I have needed to make significant adjustments to how I live my daily life because of CHM, I hope things do not continue to get worse. A treatment for CHM would give me the ability to maintain the quality of life I still have today.	6/15/2021 2:34 PM
53	Looking forward to being able to halt or improve my vision loss	6/15/2021 2:12 PM
54	Any or all treatments!	6/15/2021 2:10 PM
55	I'd really want to be treated like a human being instead of a lab rat. I need no guarantee of success. I just want facts presented to me through the process by the professionals running the study or treatments.	6/15/2021 1:55 PM
56	None	6/15/2021 1:34 PM
57	Affordable treatment is important. Would like treatment to be as least invasive with as most benefit as possible. Willing to try anything once proven safe though.	6/15/2021 1:00 PM
58	I am willing to do what is necessary to get the treatment as soon as possible	6/15/2021 12:53 PM
59	Please help get these approved for my son's future!	6/15/2021 12:46 PM
60	I'm willing... I haven't been given any direction	6/15/2021 12:45 PM
61	I want to see my life...my future wife...my future children...my future grandchildren. I want to see expressions to read faces. I want to see!!!	6/15/2021 12:43 PM
62	I would love to know any treatments available!	6/15/2021 12:31 PM
63	I will try any thing to save the site that I have	6/15/2021 12:25 PM
64	Looking for some that that works . Don’t care where it is or how we get there .	6/15/2021 12:22 PM
65	My preference would obviously be to avoid more invasive procedures with more risks; however, if no other options existed…	6/15/2021 12:22 PM
66	They can't come quick enough.....I'm 46 years old with very limited vision. I'm so sad all the time and need something positive to look forward to	6/15/2021 12:14 PM
67	Please note that questions regarding employment do not account or can be accurately answered for those no longer working (e.g. retired, fired from job)	6/15/2021 12:11 PM
68	I am in!	6/15/2021 11:52 AM

69	As a mother, and a carrier of CHM, it is very important for treatment of this disease. I would do anything in my power to find a cure or treatment.	6/15/2021 11:45 AM
70	I am part of a trial with Spark	6/15/2021 11:34 AM
71	Always will to help	6/15/2021 11:32 AM
72	I am willing to consider any option to retain my remaining vision.	6/15/2021 11:29 AM
73	Would like to be part of treatment studies and maintain my vision as long as possible	6/15/2021 11:28 AM
74	I am grateful to be a part of a program that can potentially save the sight I have remaining. Thank you for this opportunity!	6/15/2021 11:28 AM
75	My only thought is that I hope successful treatment comes soon and is offered to all with this disease	6/15/2021 11:23 AM
76	Can't come fast enough. I am eager and willing to try all therapies.	6/15/2021 11:17 AM
77	Any treatment, no matter how small, is better than no treatment	6/15/2021 11:15 AM
78	I think gene therapies are the most promising therapies regarding CHM	6/15/2021 11:14 AM
79	I am willing to try whatever we could afford or have access to.	6/15/2021 11:12 AM
80	None	6/13/2021 8:48 PM
81	Very interested in how the covid mRNA style of vaccines could morph to addressing CHM gene mutations.	6/13/2021 7:55 PM
82	I am disturbed by the use and exploitation of laboratory research animals, even if the outcome is improvements in my vision that I can take advantage of. I find this practice to be unethical.	6/12/2021 8:04 PM
83	Help me please	6/9/2021 2:11 AM
84	Treatment is needed for CHM. CHM is taking vision away from males at varying ages and with varying symptoms. I have two very young sons who may have this. I need there to be a treatment to help my sons have a bright future.	6/6/2021 9:32 PM
85	Gene therapy to help progression is of limited benefit to people with very advanced disease. However would be very important for early-stage diagnoses in younger patients. The real advance for older patients would have to be stem cell therapy or other treatments to improve very poor vision.	6/6/2021 10:44 AM
86	I have 2 sons with CHM under the age of 18. It is my greatest hope that there will be an affordable effective treatment that will preserve as much of their vision as possible from a younger age, allowing them to follow the careers and lives they desire.	6/5/2021 9:17 PM
87	CHM is so rare but devastating for the individual who is affected, through no fault of their own. For that person and their family, research is the only hope.	6/3/2021 7:06 PM
88	I'm praying for help before I go blind.	6/2/2021 7:38 PM
89	Of course preference would be for best outcome and improvement of vision with limited risk associated. I am also scared of the cost, if insurance will help, and having a treatment that no one can afford.	6/2/2021 2:09 PM
90	Please continue this valuable work. We are in our journey with CHM and we see hope, but cannot stress enough how much a treatment is needed. We are ready and willing to participate in future treatment methods. My preference is for these promising treatments to become widely available. It appears this disease is curable with proper gene therapy. Please keep up the work and stay focused on the amazing relief you will provide those who suffer from this disease.	6/1/2021 5:21 PM
91	I hope a treatment becomes available very soon so my vision can be preserved and I'm still hoping to start driving again one day!	5/31/2021 9:52 PM
92	At 75 years old, I'm running out of time. I had to back out of the history study because of injurious tests involving intense light but would take my chances with an actual gene therapy.	5/26/2021 5:44 PM
93	I received a subretinal injection in 2019. I have late stage vision loss, with vision remaining	5/26/2021 12:30 PM

	only in one eye, with a field of view of approximately 8°, and a visual acuity of 20/50. I am in a unique position as a survey taker as I am a professional in the field of blind rehabilitation, and I'm certified in various aspects of vision loss including training individuals and adaptive daily living skills, adaptive technology, orientation and mobility travel, and the use of specialty low vision aids such as magnifiers. As a child and young adult, I received no additional services to help accommodate my vision loss has my family did not notice such were available. I was exposed to orientation and mobility training at the end of college and learned to use the long white cane at that point, 2009. since that training, I became much more confident and independent travel and challenging situations. as a contributor and aid to others in the CHM community, I find often, in my opinion, to few of those with CHM pursue training related to their site loss. While at the same time, too many appear to live quite restrictive lifestyles due to their vision loss but don't feel they are the appropriate candidate for such training as they still have most of the time remaining central acuity. as of this writing, it is hard to tell and I do not believe my vision has improved in any sense due to my injection, but also, it has not been measurably worse. I am elated these surgical options are becoming closer as an available option in the marketplace.	
94	I would like treatment for being an asymptotic female carrier to help my children.	5/25/2021 10:33 PM
95	I am willing to participate in any trials or test available immediately. In the late 90s, my sister had a genetic study done of our entire family through Vanderbilt University in conjunction with a university in Norway I believe. All those documents are available. I have one sister who is an asymptomatic carrier, one sister who is not a carrier, and a brother who does not have chm	5/25/2021 3:20 PM
96	I wish treatments and therapies would include females and not just males because I am a female with HM and that is even more rare than CHM alone. It's very frustrating being denied participation.	5/25/2021 2:44 PM
97	Anything is better than nothing!	5/25/2021 2:24 PM
98	The options for this survey are missing one HUGE category of respondents that I fall into, along with all the women in my family: Female SYMPTOMATIC carriers. This is a HUGE myth that female carriers do not have symptoms and it's extremely unsupportive of the makers of this survey to not include us. With respect to future treatments of of CHM, my huge hope is that it is classified as medically necessary for BOTH affected males and affected female carriers. I too need treatment for my vision loss, but if the treatment guidelines are sexist and are strictly only for men, this will ensure that affected female carriers will be marginalized.	5/25/2021 2:01 PM
99	request more federal, etc., funding especially for stem cell therapies NOTE: Questions 26-32 no response as I'm retired	5/25/2021 11:55 AM
100	I would prefer a gene therapy	5/25/2021 9:44 AM
101	Make treatments available as soon as possible	5/25/2021 9:03 AM
102	I would go anywhere, accept ANY and all treatments available, meet with doctors to discuss progress or monitor improvement every day for the rest of my life if I could only GET treatment of some kind that will AT LEAST allow me to keep the vision I have now! As long as the price was something I could possibly afford at least. Just call me @ 585-738-7537 and I will come running...with bells on!	5/25/2021 2:22 AM
103	Hopeful that stem cells will be available in the next few years, to improve vision for pts with CHM	5/24/2021 6:51 PM
104	Since I have already lost my focal vision, the current treatments would not help me. However, if a newer treatment became available with potential to regenerate healthy retinal tissue, I would indeed be interested in trials.	5/24/2021 6:29 PM
105	N/A	5/24/2021 4:32 PM
106	I would love to have access to this treatment as soon as it's available that's at a price that is actually feasible for a family.	5/24/2021 4:25 PM
107	Are there any therapies that involve stem cell research?	5/24/2021 3:56 PM
108	Waiting impatiently. Every year that goes by it means more cells my son has lost	5/24/2021 3:06 PM
109	I am a symptomatic female. So I will take what treatment I can get.	5/24/2021 2:50 PM
110	I have a 9yr old boy with CHM. We desperately want a non-invasive cure!!!	5/24/2021 2:48 PM

111	Need more clinical surgeries	5/24/2021 2:34 PM
112	All for it	5/24/2021 2:26 PM
113	Really hoping we could get an effective treatment for CHM soonest which would help CHMers change their lives... Willing to take what it takes to go thru if the novel treatment proved to be effective, even it only prevent the vision from getting worse (vs improvement), it would be a huge plus for CHMers.	5/24/2021 1:46 PM
114	I hope you come up with a cure or treatment soon.	5/24/2021 1:41 PM
115	Praying constantly	5/24/2021 1:26 PM
116	The sooner I get treatment the better. I don't want to lose what little vision I have left if possible and I'm willing to accept the risk of clinical trials and FDA-approved treatment if available.	5/24/2021 12:58 PM
117	Currently I'm in a crucial moment where a CHM treatment would save the remaining vision I have. I immensely appreciate all the scientific community efforts trying to develop a treatment that can be approved by the FDA as soon as possible.	5/24/2021 12:50 PM
118	Gene therapy to halt progression. Stem cell to restore vision to some degree.	5/24/2021 12:42 PM
119	Would love to see any treatments	5/24/2021 12:42 PM
120	We would like to know when the treatments will be available??? About 11 years ago we were told the treatements would be available in 5-10 years, and we are still waiting anxiously!	5/24/2021 12:34 PM
121	I have known my husband for over 12 years and his disease. Before him I was unaware of this disease. I would love my husband to keep the vision he has and my kids to keep their vision as well. Hopefully a cure/treatment would be available sooner rather than later and offered to everyone at a reasonable price.	5/24/2021 12:22 PM
122	I would like to see proven successful therapy treatment available to those who have chm and be covered 100% by insurance	5/24/2021 12:14 PM
123	I want to receive treatment very soon so I can retain or regain some vision loss so I can watch my baby daughter grow up. That is my biggest worry is not being able to be there for my kids like I want to. The sooner the better as right now I am 34.	5/24/2021 12:07 PM
124	It can't happen soon enough.	5/24/2021 12:01 PM
125	My preference with the previous treatments listed is the one with less risks to my remaining vision. Which I believe was the injections without surgery. Vision is such a precious sense for remaining independent in this world. As the disease progresses and there is less of my natural vision to maintain I would do any of the riskier options listed to maintain vision. So in the end all options are welcome but obviously the most minimally invasive options are preferred.	5/24/2021 11:58 AM
126	I have also been diagnosed - and am being treated for - with Acute Angle Glaucoma. My family's (6 Members) were diagnosed by Dr. Mina Chung of The Flaum Institute at University of Rochester. Dr. Chung doubted the Glaucoma theory as I have no Optic Nerve damage. (I do have elevated Ocular pressure and reduced peripheral vision possibly solely from CHM.) Dr. Chung was tragically killed in a ski accident so I have little follow up info.	5/24/2021 11:54 AM
127	Myself and two other Brothers are ready to take our place in line for a therapy that may slow down or stop the vision loss progression	5/24/2021 11:21 AM
128	That they are accessible for everyone from anywhere in the world	5/24/2021 11:11 AM
129	Gene therapy tone more widely tested.	5/24/2021 10:59 AM
130	I will try any treatment.	5/24/2021 10:58 AM
131	I am open to trying any number of options to save the vision I have remaining.	5/24/2021 10:58 AM
132	A one time treatment that is affordable (not an 850K like Luxturna + the cost of two surgeries.	5/24/2021 10:54 AM
133	I am hopeful that these treatments become available soon for my family and many others. Thanks for all your hard work.	5/24/2021 10:53 AM
134	Sign me up. If it helps me or the next person, I am in.	5/24/2021 10:49 AM

135	Thank you, I so want to help any way I can.	5/24/2021 10:40 AM
136	I am diagnosed with gene testing without symptoms. I am 46 yr old female. My son is 10 and opthamalogist saw something unusual in routine eye exam. He hasn't been gene tested yet and currently has not had symptoms. We are both seeing Dr. Tsang at Columbia university, NYC. We also have genetics therapy as well.	5/24/2021 10:31 AM
137	I am a young man who lives with stress about a future where I lose my vision. I am about to get married and wish to have children and am currently in my 3rd year of medical school. All I want is a normal life where I can be a good father to my kids, husband to my wife, and doctor to my patients. I worry that losing my vision will make all of these things far more difficult. I would do anything for an FDA-approved treatment to save my vision before it is lost.	5/24/2021 10:27 AM
138	I would much prefer a treatment involves less invasive procedures requiring surgery. Intravitreal delivery or topical delivery of neuroprotective agents	5/21/2021 11:31 AM

Q71 For asymptomatic female carriers: If applicable, please provide your thoughts on your son or other relative's journey with CHM.

Answered: 68 Skipped: 257

#	RESPONSES	DATE
1	I have a brother 90% blind and my Son has it too. He is being monitored biannually and has the beginning signs of night vision issues and peripheral vision.	7/2/2021 6:44 PM
2	Ability to find out if you truly are a carrier or not. My brother has CHF but my one test which I asked to get done didn't really provide much info other than a 20%+ chance not a carrier. Insurance didn't cover the test.	7/2/2021 10:07 AM
3	My son registered blind with CHM. Attending oxford over 7years now, has done nightstar, never got on clinical trials unfortunately, so disappointing, very afraid for my son as he has also learning difficulties that cause severe problems for him. I just dont see any hope at the minute. My daughters are also carriers and have 4 grandchildren we are so frightened for them.	7/1/2021 2:34 AM
4	Progressive darkness brought on by CHM causes loss of vision and loss of hope. As carriers, we want R&D into genetic links so future generations can prevent the onset or occurrence of CHM, as well as therapies, genetic or other, made available to individuals suffering from CHM today. We need help with financial, medical and knowledge barriers to give hope to the CHM community.	6/28/2021 5:37 PM
5	Not an easy journey has caused anxiety and depression	6/26/2021 1:06 PM
6	This is hard. No child should have to experience the challenges young CHM boys endure. Accelerated research, treatment, prevention and coverage are all essential	6/23/2021 11:02 PM
7	My father is now completely blind due to CHM and my son, age 10, while not yet experiencing symptoms, does show some signs of CHM toward the back of his retina in scans done at his eye doctor. We know he has CHM after doing genetic testing at age 1.	6/22/2021 12:21 PM
8	information	6/21/2021 7:44 PM
9	I have 2 sons with CHM and it has effected them both in different ways. It developed in oldest son very early in childhood and 2nd son not until late thirties.	6/20/2021 1:48 PM
10	N/A	6/19/2021 12:06 PM
11	As my son is 3 I have not tested him yet. So far his sight is excellent in the dark	6/18/2021 3:44 PM
12	I am a carrier, I have a son who has the disease and a daughter that is a carrier. I hope they all can be helped.	6/18/2021 11:56 AM
13	I hope that there will be a cure soon. It prevented me earlier not become pregnant. For now I know I want to be a mother despite my age. I wish there was more info in The Netherlands through eye specialists.	6/17/2021 4:20 PM
14	Both son's have had the natural history study and one son has had an injection in one eye. He feels the injection neither helped or hurt his vision. He is unable to drive, but still works full time fixing hand held computers because they are in his field of vision. My other sons lack of field of vision is decreasing and is hoping to be part of the injection study.	6/16/2021 10:21 PM
15	My father had CHM, but was unable to receive care. We recently learned that my nephew has it. He's young and I hope by the time he begins to lose his vision, breakthroughs in gene therapy will have led to a cure.	6/16/2021 8:07 PM
16	My daughter is not asymptomic, although to convince non specialist vision doctors is very challenging and annoying when they buy into the idea of only men can get this so you are really lucky. She is very handicapped.	6/16/2021 3:30 PM
17	Watching my father, my nephew, and my son gradually losing their sight is very painful. My father was always very upbeat about his situation and set a fine example for my son and	6/16/2021 12:26

	nephew. It is frustrating to watch a disease that is gradually stealing their sight with a cure that is slowly coming our way.	
18	Vision loss has affected my son's life greatly, making it difficult for him to find and hold a job. It makes getting around difficult. Even using public transportation is challenging.	6/16/2021 12:00 PM
19	My son has not be diagnosed yet and hasn't experienced symptoms however I educating myself about CHM.	6/16/2021 11:48 AM
20	I am concerned for my son's emotional well being as navigates through the mid to later stages of CHM, but at the same time, hopeful of a treatment on the horizon that will stop CHM in it's tracks, or even better, restore any vision already lost. I am extremely grateful for the Choroideremia Research Foundation for guiding us through this journey.	6/16/2021 11:09 AM
21	My grandmother was a carrier, I have my dad and 3 uncles who are blind, and I'm scared to have kids as I don't want to give them the disease!	6/16/2021 7:02 AM
22	I have a grandson who is 9 years old and is already being affected by CHM. Since I passed it on to my daughter who passed it on to him, I would love for this sweet little boy not to lose his eyesight. It is hard to watch him try to compete with his 11 year old brother who does not have the disease. I have cousins who are blind and nephews who are going blind.	6/16/2021 1:24 AM
23	It's all for my son who is only 9 and already experiencing issues. I'll do anything to help his chances of having reduced degeneration.	6/15/2021 11:27 PM
24	I have tried to respond for my 60 year old brother, as best since can. I have never been genetically tested fir CHM, only had my retinal examined prior to his CHM diagnosis. Prior to his CHM diagnosis at ~50 years of age, he was thought to have had RP. My brother had not pursued a career conducive to his progressive blindness. He has plenty of family and friend support and has remained active in outdoor sports through the help of good friends and family members. At 60 he is getting to the point of severely limited social activity but refuses getting a seeing eye dog or getting more specialized training fir the blind or visually impaired.	6/15/2021 9:35 PM
25	I'm crying now as I'm writing this to beg you to please approve a treatment. My dad was blind from CHM. He died at 36 a very depressed man who turned to drugs to cope. Please, I beg you, please provide coverage for treatment. We've come so far. When I was a young girl diagnosed as a carrier they didn't even know where the mutation was on the chromosome. We know now, we've come so very far. Please help us with covering treatment. It is such a dismal prognosis and devastating. Please!	6/15/2021 9:28 PM
26	Support all their attempts to keep their sight	6/15/2021 9:00 PM
27	N/a	6/15/2021 6:52 PM
28	Fortunately my son is very bright and is successful in his IT profession. However, his sight is deteriorating noticeably. His quality of life is limited to his house, as he is currently working from home. He needs more social contact which is limited because of his disability.	6/15/2021 4:23 PM
29	It's hard to watch the progression of this disease. I really hope that they develop a treatment that works or at least slows the progression.	6/15/2021 3:56 PM
30	Most days I just "accept" the changes. I feel guilt most of the time. Watching my son's vision deteriorate without being able to do anything is frustrating. He now has a daughter. I'm sure she will be a carrier. I worry about her children later in life. I worry about my son's depression. He isn't prescribed anything but utilizes THC to "calm him". I'm a nurse, and it's so hard to stand by and do nothing. Night activities that he enjoyed like cookouts in the summer, only frustrate him. His need to be guided around, brings too much attention that he doesn't desire. So he just stays home. He is a full time mechanic. Dropping bolts, nuts ect is challenging without peripheral vision. But he does it. He dreads the day that he can't work and he won't be able to "see" his daughter.	6/15/2021 3:47 PM
31	It was a chock to hear that he had chm. He was 17 year and wanted to take his driverslicsens. But he realized that he didn't se Good enough in the dark.	6/15/2021 2:50 PM
32	So far he's doing well, so worried about his future.	6/15/2021 2:10 PM
33	My father is legally blind due to CHM. I watched him lose his job as a result of his vision loss. My son (22) is in the beginning stages, experiencing night blindness. I worry about my son's future. And, of course, I feel guilt that, as a female carrier, I passed the gene to my son. It has	6/15/2021 1:54 PM

	also been so hard for me to watch my son watch my father struggle. I can't imagine what goes through my son's mind as he watches is grandfather and knows that may be his fate. I would move the earth to ensure my son never reacjes the stage of vision loss that my father has.	
34	NA	6/15/2021 12:53 PM
35	We are very worried about my son's future eye health. He could start losing his sight at any time!	6/15/2021 12:46 PM
36	There is a lot of stress surrounding being a carrier and family planning. Knowing that you are responsible for the future health of your children and/or grandchildren is a heavy weight. Treatment for CHM lessens that burden somehat	6/15/2021 12:41 PM
37	My father has CHM. I don't remember him every being able to see clearly. I am 37 years old. He is now 75 years old. I have a son with CHM and he is experiencing night blindness right now but no other symptoms. He is 11 years old. My sisters son has it, my other sisters both sons have it. My cousins two sons have it. My cousin has it. It is very prevalant in our family.	6/15/2021 12:31 PM
38	Have 2 sons with it . I think they handle it well all things considered . I imagine it will get harder as time goes on . I think they get frustrated with it at times .	6/15/2021 12:22 PM
39	Please allow the surgery to happen and insurance	6/15/2021 11:56 AM
40	I am very proud of my son. He has a great attitude but I know life is harder for him with this disease. Would love to see a cure and I will never give up hope for one.	6/15/2021 11:45 AM
41	I am so so proud of my son and how well he is handling this condition. we pray that one day sight will improve.	6/15/2021 11:32 AM
42	He's 18 years old and trying to figure out what his life goals are and has these symptoms and this disease glooming over him. He did not pass his sports physical to play sports his senior year of high school due to this diagnosis and his symptoms. He also has high eye pressure, along with pockets of fluid in his retinas, from choroideremia that is not getting any better from prescription eye drops and is beginning to affect his Central vision	6/15/2021 11:15 AM
43	My infected son is still young (6 yrs old). I'm terrified of what he might go through, afraid of the future and of the sight loss.	6/15/2021 11:14 AM
44	...	6/13/2021 7:55 PM
45	One of my sons is thought to have this but it has not been genetically confirmed. My father and two uncles have it. I have watched my father and uncles sight be taken away from them. I have guided each of them around the house and have watched my dad not be able to see the food in his plate. This is heartbreaking. We need to do something to stop the progression and treat this disease.	6/6/2021 9:32 PM
46	My dad will be 74 & though his eye dr's are baffled at how, he still retains a very little sight. He was discouraged by medical professionals from pursuing a career. He worked as his dad did as a meat cutter & was told to stay with that until he couldn't do it anymore. His condition was not something that was discussed much. He made the most of his situation over the years & with as light a heart as possible. It weighs heavy on him as it does me, that his 2 grandsons have it. With my boys we try to be as open as we can without focusing on it too much. They both have a hard time in the dark & low light situations, but nothing as of yet that presents itself during the day or in well lit circumstances. My oldest (15) struggles with some anxiety concerning it. My youngest (12) doesn't think about it too much yet & enjoys getting to stay in a hotel every 2 years when we have to see specialists. They recently felt comfortable enough with making their condition more public by agreeing to do fundraising. I think the more they can open up about their thoughts & feelings, & tangibly do something to try & help themselves & others, is very important in helping them yto process. The fact that there are potential therapies on the horizon gives unimaginable hope. My hope & theirs is for them to be able to pursue careers that they love & be able to continue in them even if/when some impairment occurs. I don't want them to fear blindness or feel inadequate or incapable, or to think themselves a burden (as I know my dad has struggled with).	6/5/2021 9:17 PM
47	Both of my sons have CHM, totally a shock. I feel the guilt of being responsible for their disability, although they both have accepted this diagnosis, but we pray for treatment.	6/3/2021 7:06 PM
48	I see my son having an opportunity to directly help others in the medical field and be a contributor to society for his entire life if we can save his vision. I have seen how devastating	6/2/2021 2:09 PM

	this disease is with my brother and my mom, I want to see this stop with this generation and treatment that is available to end the needless suffering and let these people contribute instead of being limited.	
49	It is scary and heartbreaking. We always know it is there and always know there is a threat to their eyesight. As a mother, I only want what is absolutely best for my children and have great faith a cure will be found. I pray for these gene therapy treatments to be authorized and widely-available for the benefit of those who live with this disease.	6/1/2021 5:21 PM
50	One of our daughters HAS CHM. Confirmed by Ian McDonald, at the University of Alberta. To continue concentrating your language to include only MEN is alienating and hurtful.	5/25/2021 11:57 PM
51	I want my children to not grow up with this. I am interested in treatments how to help it.	5/25/2021 10:33 PM
52	My father and three of his brothers are blinded from CHM and have been for over 50 years. I believe a treatment for CHM isn't just going to need to be a way to shut off the disease process, but to restore the vision that has been lost (restore the vision cells that have died off).	5/25/2021 2:01 PM
53	NA	5/25/2021 9:44 AM
54	Help with dealing with the changes	5/25/2021 9:03 AM
55	My son is amazing, he feels everyone has something in thing in their life, CHM is his speed bump. He walks to work about a mile away of takes UBER, he has 3 degrees, is Smart,Kind, and a great husband and DAD,and great Uncle, Brother and friend.	5/24/2021 6:51 PM
56	My dad is a strong and courageous man that has done the best he can.	5/24/2021 4:32 PM
57	My son just turned 4 and my dad just turned 64. Both have CHM. My dad has very low vision but I'd still love for him to have treatment as soon as possible so he can actually see something for the rest of his life than nothing. And for my son, the idea of him not having to face the challenges my dad has gone through is an incredible and life giving thought. I want him to have all the possibilities that my dad was limited in having. My dad switched his career from being in a corporate office to a massage therapist so that he could continue to work after he can't see anymore. I know that there are many jobs still available to the blind, but my son has a strong artistic talent and I'd love to know that he could use it his whole life without his eye sight lessening.	5/24/2021 4:25 PM
58	It's been absolutely devastating	5/24/2021 3:06 PM
59	My son would like any treatment available. (I am a symptomatic female.)	5/24/2021 2:50 PM
60	I am devastated for my 9yr old son to be diagnosed this year with CHM. My father had it and it ruined his life (lost his career as a chef and restaurant owner, ruined his marriage, divorced, negatively impacted his relationships with kids and society, he went completely blind and was heart broken. He died at 72 from pancreatic cancer. It was traumatic to see him go through a life time of pain and loss. I don't want that for my innocent sweet child.	5/24/2021 2:48 PM
61	Scary, sad, worst sense to loss	5/24/2021 1:26 PM
62	N/A	5/24/2021 12:42 PM
63	It's very hard to see my husband vision deterriorating. He struggles on his daily task and wishes his life was better. We are all optimistic that a treatment would be offered to stop his progress. Countless of hours have been spent researching and calling different doctors to inquire about chm. We are told progress is great and the FDA needs to approve a study. We hope this study is approved and the treatment is offered to people suffering from chm soon.	5/24/2021 12:22 PM
64	Easy access to treatment. My son called about cane training in February and is still waiting. If this is any indication of how slowly things work ..... well it's just depressing and not very hopeful at all	5/24/2021 12:14 PM
65	Really bad	5/24/2021 12:03 PM
66	My son became so depressed over the prospect of going blind, he took his own life when he was 19 years old. He gave little outward sign of his severe depression. In 1990 there was no prospect for a cure or procedure to arrest the disease progress.	5/24/2021 12:01 PM
67	No one deserves to lose their vision.	5/24/2021 10:54 AM

68	I am diagnosed through gene testing without symptoms. I am 46 yr old female. My son is 10 and opthamalogist saw something unusual in routine eye exam. He hasn't been gene tested yet and currently has not had symptoms. We are both seeing Dr. Tsang at Columbia university, NYC. We also have genetics therapy as well. We will do yearly exams to monitor.