RETINA REPORTER

Retina Australia's Bi-Annual Newsletter

DECEMBER 2023

CONTENT

40 years of impact

Originally known as the Australian Retinitis Pigmentosa Association, Retina Australia was incorporated in October 1983.

Initially it was made up of the State based bodies from Western Australia, South Australia, Victoria and New South Wales. The Queensland, ACT, Tasmania and Northern Territory groups joined between 1985 and 1991. Renamed Retina Australia in 1993 to broaden its focus, its aim was to combine funds raised by the States and support Australian research into inherited retinal disease. In 2019, Retina Australia became a single, national body under a new Constitution. Since inception, $6.4 million has been awarded in research grants to more than 60 different Chief Investigator researchers across over 140 research projects.

CEO Report

Retina Australia Celebrates 40 years

Retina Australia celebrated its 40 year anniversary at the Annual General Meeting on 28 October 2023. As a result of the dedication and fundraising efforts of so many volunteers around the country over the years, Retina Australia has had an amazing impact in driving research developments in inherited retinal disease (IRD), particularly supporting seed ideas which have been leveraged for further research funding. Retina Australia's Grants Program has also supported the IRD researcher community, especially through funding of early career researchers.

We thank you for the wonderful messages of congratulations, especially from those who have sent in personal stories of Retina Australia's impact and influence. You can read reflections from Life Member - Richard Rigby, Researchers - Associate Professor Lauren Ayton, Associate Professor Rick Liu and Associate Professor Riccardo Natoli, and from the Centre of Eye Research Australia's Bionic Eye team on our website.

We are incredibly excited about the accelerating pace of research progression resulting in an increasing number of clinical trials, some of which are expected to expand into Australia in the near future, which will hopefully be the precursor to new treatments for IRDs. If you are interested in participating in research, you can find information on our Research Project and Clinical Trial Register for Inherited Retinal Disease which is continually being updated for new programs.

You can also support research by donating to Retina Australia's Christmas Appeal which is dedicated to funding our recently announced Research Grants for 2024. Thank you so much for your kind donations.

From the Board of Directors and staff of Retina Australia, we wish you and your families a safe and happy holiday season.
Warmest regards,

Julia Hall
Chief Executive Officer

Pictured on the right: From left - Joshua Ginpil (Director), Dino Farronato (Director), Leighton Boyd AM (Chair), Ed Tarrant (Director), Sally Turnbull (Administration Officer), Julia Hall (CEO), in front from left - Rosemary Boyd OAM (Company Secretary) and Lindsay Da Costa (Director)

2023 Christmas Appeal

Help us fund our two new research projects into inherited retinal disease

Give the gift of hope this Christmas by supporting life-changing research

DONATE NOW

REGISTERED CHARITY
acnc.gov.au/charityregister

All donations $2 and above are tax deductible

www.retinaaustralia.com.au (03)9650 5088
info@retinaaustralia.com.au

Research Grant Impact Highlight

Retina Australia Research Grant Awardee

In 2018, Associate Professor Riccardo Natoli (pictured on the right) was awarded a research grant from Retina Australia of $39,591 for the project "Microglia and retinal degenerations: Identifying key modulators of inflammation as therapeutic targets".

This project aimed to explore if RNA, specifically whether microRNA (miRNA) could be used as a therapeutic for the treatment of retinal degenerations.

The preliminary data generated as part of this work, contributed either directly to, or laid the foundation for five research publications and significant further funding.

Funding leverage of nearly 50 times

As a result of the initial data, evidence and outcomes from the exploratory project funded by Retina Australia, Riccardo was successful in his applications to further develop this research. He received:

- $780,000 from an Australian National University (ANU) Translational Fellowship to explore “Novel neuroinflammatory targets for the treatment of AMD”(2019-2021)
- $1,189,692 from a National Health and Medical Research Council (NHMRC) Ideas Grant to explore “The role that miRNA plays as key drivers or retinal degenerations” (2020-2024)

The original Retina Australia grant has therefore to date, already been leveraged nearly 50 times.

Support for Early Career Researchers

These subsequent grants supported the establishment of the Clear Vision Research Lab at the John Curtin School of Medical Research at the ANU. The Lab revolves around uncovering the root causes of retinal and neuronal degenerations and investigates various retinal diseases, including Retinopathy of Prematurity, Retinitis Pigmentosa, and Diabetic Retinopathy. However, its focus remains on pioneering innovative RNA and Extracellular Vesicle diagnostics and treatments for Age-Related Macular Degeneration (AMD) and other neurodegenerative conditions.

Riccardo is the Head of the Clear Vision Research Lab and is passionate about developing the next generation of vision researchers through its funding initiative of PhD scholarships and support to guide PhD students and early-career researchers through the transition to independent researchers.

Research Grant Impact Highlight

In 2023, Retina Australia awarded Dr Adrian Cioanca, Postdoctoral Fellow at the Clear Vision Research Lab, a grant of $59,869 for the project "Using RNA-silencing to tackle neuroinflammation in retinal degenerations". Adrian is pictured in the left image below with Riccardo. In addition to funding new seed ideas, Retina Australia also plays a significant role in the support and development of early-career and mid-career researchers in the area of retinal degeneration through its funding grants.

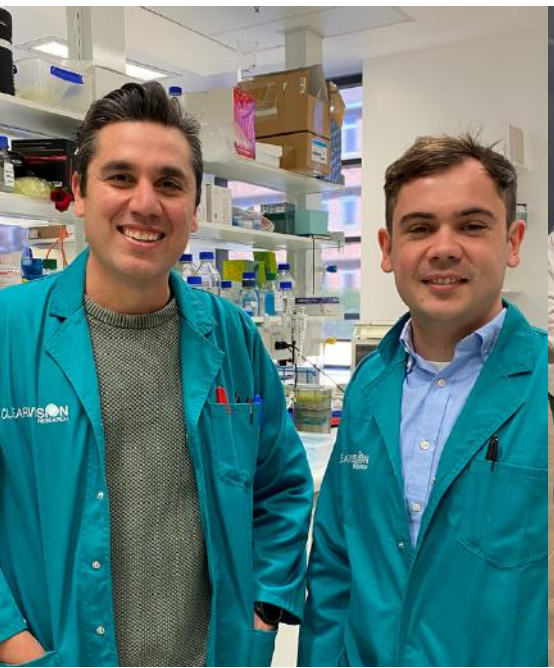
The Natoli Group supports Retina Australia

Retina Australia is delighted to have also engaged other members of the Clear Vision Research Lab, also known as the Natoli Group (as pictured below on the right). Honours student, Marissa Ellis, fundraised for Retina Australia while running the Sydney Marathon in September 2023. Marissa has also already signed up to run her second marathon at the Canberra Times Marathon Festival 2024, joining the Macula Madness team set up by PhD student Nicholas Bariesheff.

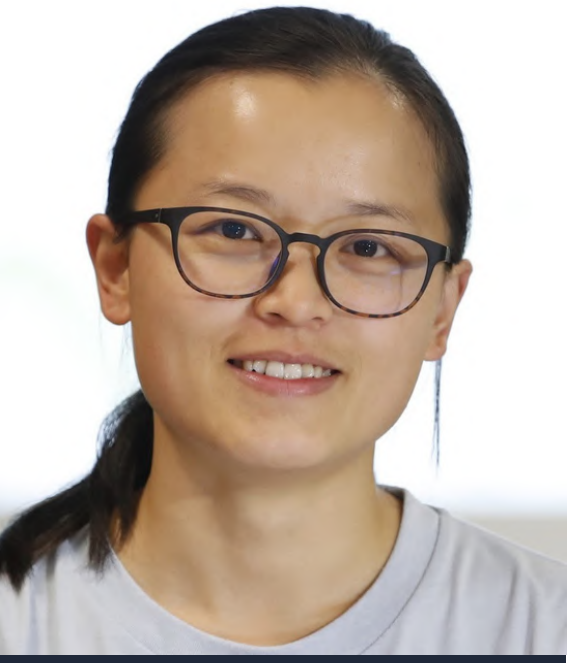
Nick was recently awarded the runner up prize at the ANU 3 Minute Thesis Finals for his presentation on how we could use the special molecular messages of exercise to stop that blind spot from being in the centre of your vision, which is the reality for 1 in 7 Australians who suffer with Age-Related Macular Degeneration.

Welcome to the Board of Retina Australia

At our October AGM this year, we were delighted to welcome Associate Professor Riccardo Natoli to the Board of Directors of Retina Australia . We look forward to his expertise and contribution to the organisation. You can read Riccardo's full bio on our website and his 40 year anniversary story here.



2024 Research Grant



Chief Investigator
Dr Di Huang, Lions Eye Institute, Perth

Co-Investigator
Associate Professor Fred Chen, Lions Eye Institute Perth

Grant awarded
$60,000

Timing
1 Year 2024

Characterising Stargardt Disease Mutations for Splice Intervention Therapeutics

Project Aim

This project aims to find a treatment for Stargardt disease (STGD1), an inherited genetic eye condition caused by mutations in the *ABCA4* gene.

Project Summary

In this project, the researchers will utilise STGD1 patient skin cells from the Western Australian Retinal Disease (WARD) Study biobank to study the specific genetic changes in *ABCA4* that lead to the disease and try to develop a type of treatment called splice-switching antisense oligonucleotides (SS-AONs). SS-AON drugs will then be tested in STGD1 patient-derived retinal cells to identify suitable candidates for future clinical trials.

These SS-AONs are like temporary "modifiers" for the gene and can be used to fix the gene's behaviour at the level of its messengers (mRNA) without making permanent changes to the DNA.

This can be safer than other gene therapies.
One advantage of SS-AONs is that they are easy to deliver into the eye through injections, and they can be made in large quantities. They are also small and pure, which makes them effective. Other treatments using SS-AONs have shown promise in genetic disorders, which makes this approach very exciting for potentially treating Stargardt disease.

Expected outcomes

1. The identification and characterisation of *ABCA4* variants in STGD1 patients, providing valuable insights into the underlying mechanisms of the disease to enable further progress into potential treatments.
2. The assessment of the effectiveness of SS-AONs as a potential successful treatment for STGD1.

2024 Research Grant

Virtual Reality Assessment of Functional Vision in Achromatopsia and Albinism

Chief Investigator
Dr Elisa Cornish, Save Sight Institute, Sydney

Co-Investigators
Professor Gregg Suaning, Save Sight Institute, Sydney

Professor John Grigg, Save Sight Institute, Sydney

Grant awarded
$52,639

Timing
1 Year 2024

Project Aim
This project aims to assess whether a virtual reality (VR) mobility and environmental background lighting assessment tool can pick up changes in functional vision and light sensitivity in patients with achromatopsia (ACHM) and albinism to be used for measuring clinical trial success of new developing treatments.

Project Summary
This observational, cross-sectional study will assess 20 patients with achromatopsia, 20 patients with albinism and 20 healthy volunteers, a total of 60 participants will be recruited. The project will use three different courses and different luminances to test whether a Virtual Reality (VR) luminance assessment tool can be used to assess functional vision in participants with ocular disease associated with photoaversion.

A main contributor to disability in the real world for visually impaired patients is poor mobility and in patients with ACHM, photosensitivity. Assessing movement of low-vision patients in a safe environment is a quality-of-life measure that can be used to assess their residual vision. This may provide an alternative method to those such as visual acuity, visual field and area of retinal atrophy in determining clinical trial outcome measures for advanced retinal dystrophies, which are challenging due to the significant vision impairment and slow progression.

Expected outcomes

1. The identification of the most useful VR parameters to assess function for individuals with photoaversion and photophobia.
2. This may prevent future failure of clinical trials to reach their trial endpoint by meeting National regulatory authorities' criteria to see real world improvements in visual function, and therefore enabling the progression of successful clinical trials for inherited retinal dystrophies.

In Focus: Stargardt disease

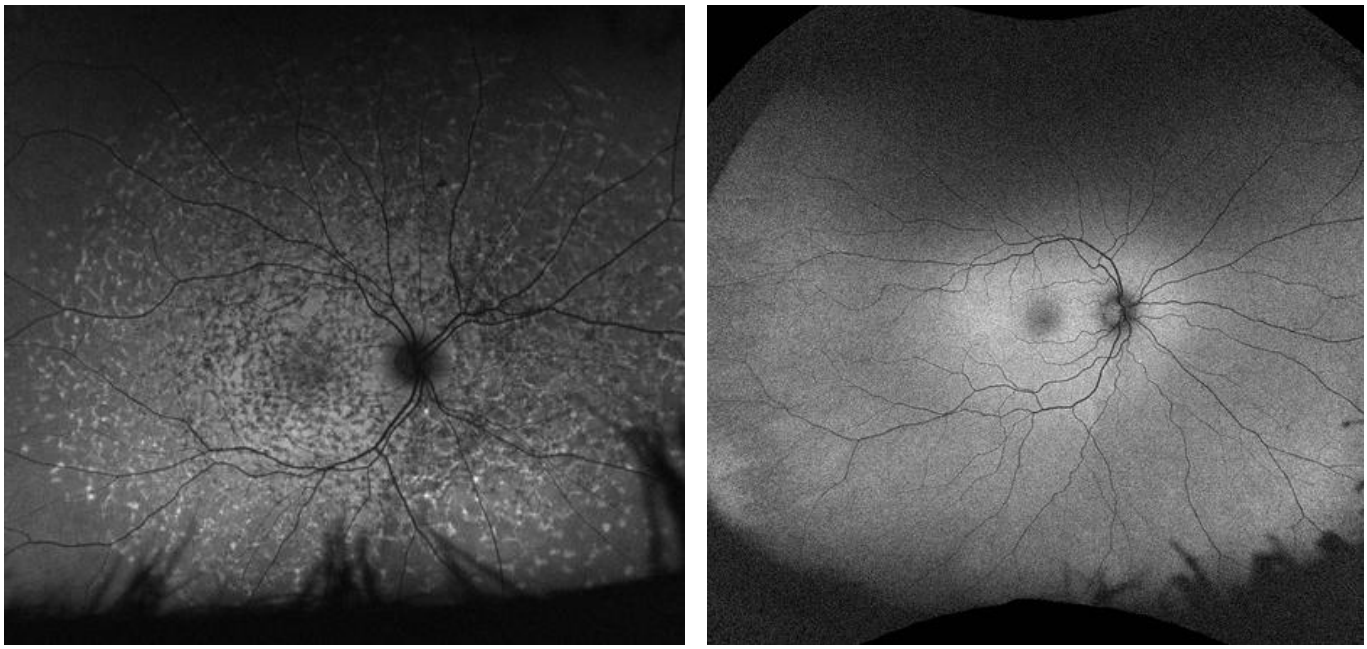
What is Stargardt disease?

Stargardt disease is the most common form of inherited macular degeneration. It differs from other inherited retinal diseases like retinitis pigmentosa, as it primarily affects the centre of the retina, in a region known as the macula. This means that it affects central vision (reading, face recognition etc), and generally does not affect side vision as much.

Stargardt disease is usually diagnosed in individuals under the age of 20. The progression of visual loss varies between individuals, but peripheral vision is usually preserved. This means that patients with Stargardt disease rarely have issues with independent mobility.

Fundus flavimaculatus is similar to Stargardt disease but has a later onset and slower progression resulting in a milder condition. Both Stargardt disease and fundus flavimaculatus are linked with mutations in the *ABCA4* gene, and so represent variations along a spectrum of disease caused by this gene.

The presence of Stargardt disease is often identified through the presence of "piscine" or fish-shaped flecks in the retina.



Images above: On the left above is an image of a retina with Stargardt disease compared to a healthy retina (image above right). The retina with Stargardt disease shows white, fish-shaped flecks at the central macular region. Images have been taken on a wide-view fundus autofluorescence camera (Optos), which shows areas of unhealthy and dead retinal cells more clearly. Images are courtesy of the VENTURE study.

In Focus: Stargardt disease

What are the symptoms of Stargardt disease?

As Stargardt disease affects the macular, symptoms are in the central vision. Common initial symptoms are difficulty reading or recognising faces. Blind spots can occur, and these may increase in size over time. The condition can be slowly degenerative and progressive, but it is very uncommon for someone with Stargardt disease to become completely blind. Both eyes are usually affected in a similar manner, and colour vision may be affected in the later stages of disease.

The rate of progression and degree of visual loss can vary from person to person, even among affected members of the same family. However, a rapid decline in central vision is typically experienced between adolescence and young adulthood. The age of onset varies widely with some individuals experiencing delayed vision loss between between the 4th and 7th decades of life.

What is the cause of Stargardt disease and how is it inherited?

The prevalence of Stargardt disease worldwide is estimated to be one in 8,000 to one in 10,000. In Australia, this equates to approximately 2,650 to 3,300 affected individuals. It is one of the most common IRDs that leads to blindness, accounting for 12% of all IRD-related blindness.

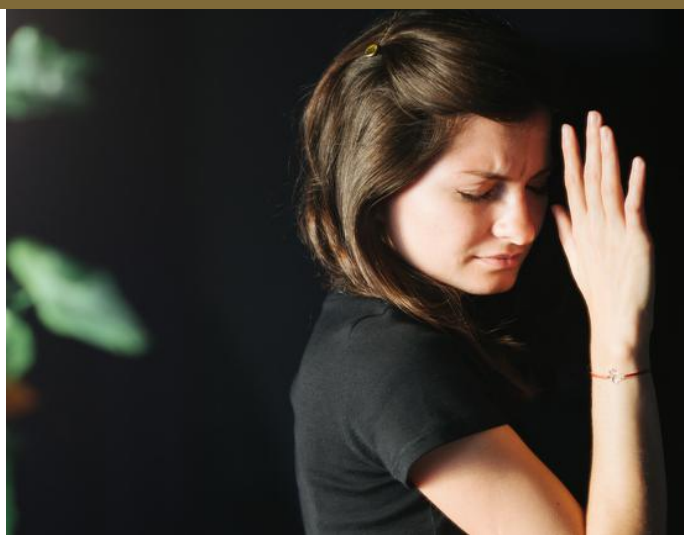
The majority of people with Stargardt disease have an autosomal recessive form of disease, involving mutations in the *ABCA4* gene. Autosomal recessive inheritance means each parent is a carrier, but is not affected by the disease themselves. Each of their children will have a 25% chance of being affected, with males and females having an equal chance of being affected. The children have a 50% chance of being a carrier (having one healthy and one mutated copy of the gene).

A very rare form of Stargardt disease may be caused by mutations in the *ELOVL4* gene, which follows an autosomal dominant form of inheritance. If a family member is diagnosed with Stargardt disease, it is strongly advised that other members of the family also have an eye examination by an ophthalmologist. In autosomal dominant inherited retinal disease one parent is affected, and each pregnancy has a 50% chance that the child will be affected. Males and females are equally affected.

What treatments are available?

There are no effective treatments for Stargardt disease. Research suggests that UV sunlight can increase the toxicity of the waste products accumulating in the retina. It is therefore recommended that people with Stargardt disease wear UV screening sunglasses when out in direct sunlight. Recent evidence also suggests that taking extra vitamin A, such as vitamin supplements, can be damaging in people with Stargardt disease and should be avoided.

In Focus: Achromatopsia



What is achromatopsia?

Achromatopsia is a rare IRD which leads to the cone photoreceptors not working well (incomplete achromatopsia) or at all (complete achromatopsia). This leads to poor or no colour vision, as well as low vision. It is known as a stationary IRD; this means that, unlike conditions like retinitis pigmentosa, the condition is not progressive. Most people with achromatopsia will maintain some level of vision through life.

What are the symptoms of achromatopsia?

The condition is often first noticed in a young child by their parents, as children with achromatopsia may dislike bright lights (known as photophobia). Nystagmus is another symptom of the condition, where their eyes may involuntarily move and "dance" from side to side. Other symptoms of achromatopsia may include:

- High levels of refractive error (requiring high-prescription spectacles or contact lenses)
- Colour blindness
- Poor central vision

What is the cause of achromatopsia and how is it inherited?

Achromatopsia is very rare, and is thought to affect around 1 in 30,000 people around the world. In Australia, it is estimated to affect around 880 people. Researchers have identified six genes which are known to cause achromatopsia. The condition is inherited in an autosomal recessive manner. Two of the most common genes linked to the condition (*CNGB3* and *CNGA3*) account for 75% of achromatopsia cases.

What treatments are available?

Due to the high rates of photophobia (glare intolerance) in people with achromatopsia, it is highly recommended for people with this condition to wear tinted sunglasses and/or brimmed hats to reduce brightness.

There are currently no specific treatments for achromatopsia, but a number of emerging treatments are being developed that may assist people with achromatopsia in the future.

For more information on Stargardt disease and achromatopsia, including research references, please refer to Retina Australia's website.

Friends of Retina Australia Perth

The Friends of Retina Australia Perth (FRAP) group had another very enjoyable bush walking season thanks to our wonderful friends and volunteers from Perth Bush Walkers (PBW) club. We are indebted to them for their dedication and expert leadership – finding interesting and varied trails in and around Perth which challenge us but maintain our safety.

This year in May we warmed up with a hilly walk through coastal heath, admiring abundant birdlife and some early wildflowers. In June it was a 10km walk through mostly shady Jarrah forest with stops at some historical sites. Our balance was challenged in July on a walk through some pleasant bushland on gravelly paths (thank goodness for hiking poles) and a steep descent to Nyaania Creek which was flowing nicely. August saw us tackle part of the Bibbulmun track, successfully negotiating tree roots, rocky steps and low hanging branches. In September we were rewarded with a comparatively easy 10km walk through a riot of wildflowers and gushing waterfalls, thanks to recent rains.

Since the walks began 3 years ago, our numbers have grown to a total of 19 vision impaired walkers and a group of dedicated sighted guides. Our walks usually have a total of 18-20 walkers allowing us the opportunity to chat along the way and learn about nature around us from our knowledgeable PBW leaders. The walks always end with a gathering for brunch at a nearby café, kindly sponsored by Retina Australia, thanks to generous donations. All our vision impaired walkers have commented on how beneficial these walks have been for their physical and mental health.

By Angela Boothroyd, FRAP Convenor

Friends of Retina Australia Perth

Retina Australia Christmas Office Hours

The office will be closed from Friday 15th December 2023 and reopen on Tuesday 9th January 2024

The Board and Staff of Retina Australia wish you a safe and happy holiday season!