

Uncovering the secrets within visual field test results: can we learn more about primary angle closure glaucoma?

Joanna Hodgkinson, Head of Research



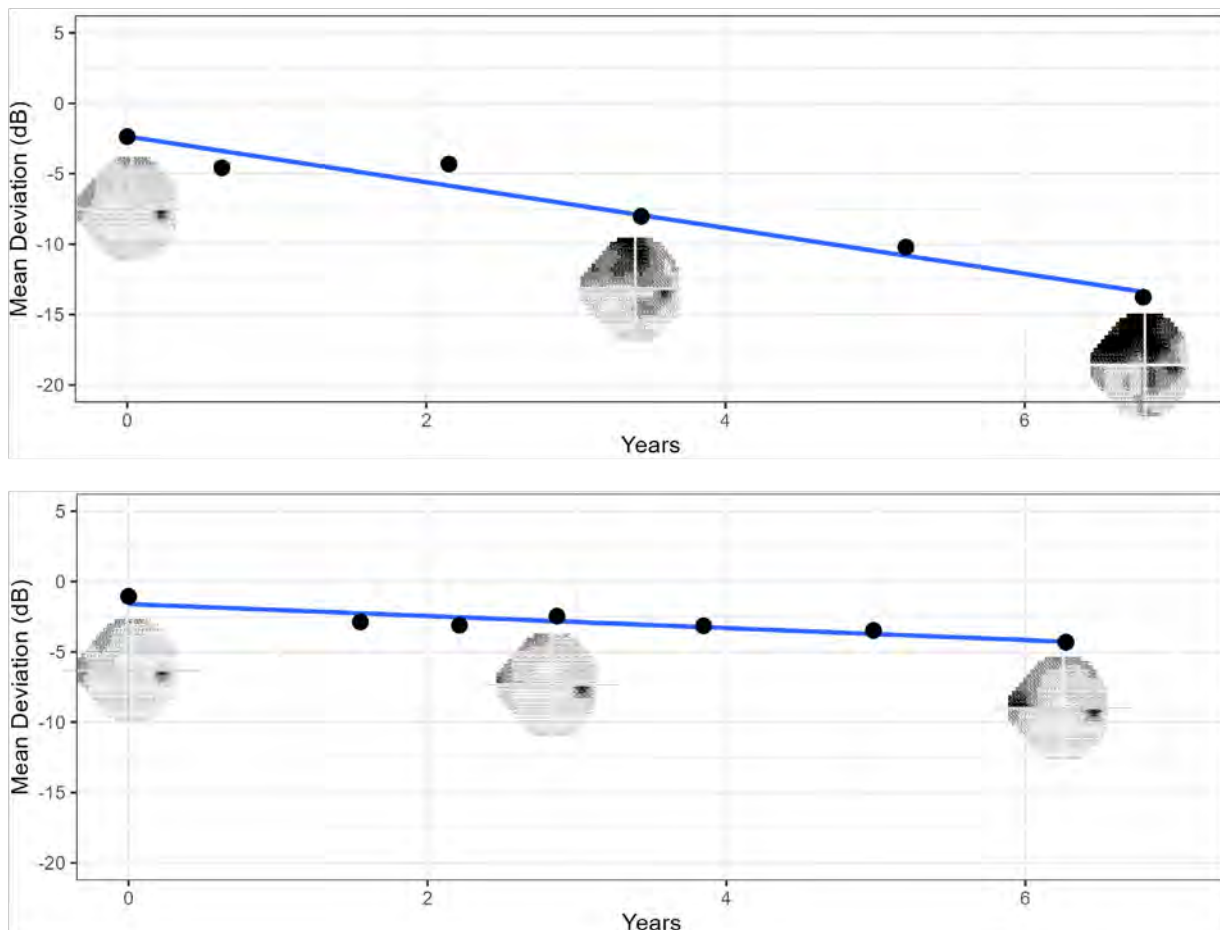
This year, our 2024 Open Call grant was awarded to Dr Giovanni Ometto, a biomedical engineer based at City, University of London. We awarded just under £50,000 for his project “Visual field loss in primary angle closure glaucoma”. Joanna Hodgkinson, our Head of Research, spoke to Giovanni to discuss his project.

Images courtesy of Dr Giovanni Ometto

Can you briefly explain what your project is about?

We are looking at primary angle closure glaucoma, and investigating how different treatments affect visual field changes over time. Many people will be familiar with the visual field test, which evaluates how glaucoma affects your vision. People may have had their visual field tested many times. Until recently, the result was typically provided as a print-out on paper, making it difficult to evaluate the visual field, where the sections of sight loss are, and how it's changing over time. We've developed an algorithm which takes the scans of these printouts and allows us to analyse the results.

For this particular project, we're looking at data from the EAGLE study. This study involved patients newly diagnosed with primary angle closure, with or without glaucoma. The study compared whether it was better to have a type of laser treatment called peripheral iridotomy (PI, the standard treatment) or a clear lens extraction. The participants were divided into two groups; one group received peripheral iridotomy (PI) and the other underwent clear lens extraction. The study compared outcomes such as quality of life,



▲ **Two patients with similar visual field tests results at diagnosis. The top one loses sight much faster.**

and vision, and lower intraocular pressure between the two groups.

A peripheral iridotomy is where a small hole is made in the iris to improve the flow of fluid through the eye. A clear lens extraction is where the natural lens in the eye is replaced with an artificial lens, which is narrower and provides more space in the front of the eye. Both procedures can be used to reduce eye pressure and prevent acute angle closure.

When the study was conducted, visual field tests were done but they weren't fully analysed. Our study will digitise and analyse the visual field tests to see whether one treatment is more effective than the other in preventing gradual vision loss. If there

are differences, we'll see if we can spot any further correlations — for example, whether certain patient groups respond differently to the different treatments. We'll also work with patients to see to what extent certain patterns of visual field loss impact quality of life.

We believe this is a highly valuable study, because we're taking advantage of data that's already been collected, just not analysed.

What difference do you hope this research will make for our members and glaucoma patients?

We're really excited, as it could potentially have a big impact on care. Most glaucoma research is into primary open angle

glaucoma, as it's more common. We know that patients with angle closure can progress despite receiving treatment. We just don't understand why some people develop a chronic disease even though their angle closure has been treated, and we have a limited understanding of what that visual loss looks like, and how it affects patients.

This research has the potential to help clinicians and patients to make better decisions about the treatment and management of angle closure glaucoma. We'll have a better understanding of the benefits of the different treatments for different groups of people. This should help people decide whether they want a particular treatment or not. It could also prompt better guidance from organisations such as the Royal College of Ophthalmologists or The National Institute for Health and Care Excellence (NICE) regarding angle closure.

When might we expect to see some of your results?

The first step is to digitise all the visual field tests, and then to analyse them to identify differences between the two treatments. This will help us understand the impact of the treatment on the visual field progression. The next stage will be seeing if certain groups of people lose sight faster, for example women or older people. The third phase will be to examine quality of life in relation to visual field loss. The project started in early 2025 and will run for 21 months. We will publish our results as we go along, as soon as they become available.

What would be next steps for the research, if all goes well?

There are many possible directions this

research could take. There are numerous other trials with unanalysed visual field test results. We can also analyse other types of information, such as OCT scans. All those data are often sitting in databases from previous studies just waiting to be explored. As our techniques and algorithms grow and expand, there are so many opportunities! This study could even prompt further questions about angle closure which need researching.

How did you get into glaucoma research, and can you tell us a bit about yourself?

My background is in biomedical engineering and image processing. In Padua, Italy — my hometown and where I studied — there is a lot of research focussed on imaging for ophthalmology. I've always worked on imaging of the eye — it lends itself to imaging because we're supposed to be able to see through it! If you're working in imaging in ophthalmology, you'll end up working on glaucoma because imaging is so important in monitoring the disease and deciding on treatment options. For example, we use images such as photos of the optic disc, and OCT scans, as well as visual fields. Glaucoma offers a unique opportunity to understand how gradual changes seen on images correlate with changes in patients' vision, which is what initially sparked my interest in visual fields.

I did my PhD in diabetic retinopathy in Denmark, then I joined Professor David Crabb's lab at City, University of London for my postdoctoral research, looking at several other conditions, including glaucoma. I love working there – it's also close to Moorfields Hospital, and we collaborate with many outstanding researchers.