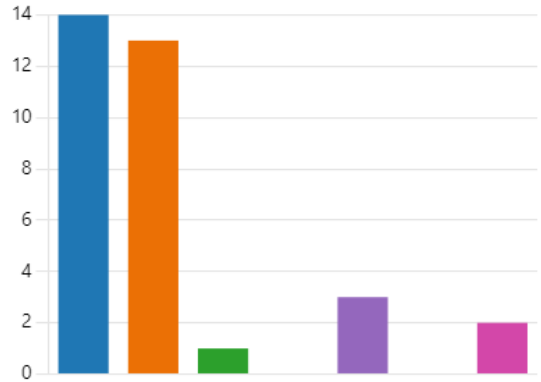
Round 1 Final Results – 33 Participants – Anonymised

2. Please indicate your Professional background:

More Details Insights

Ophthalmology	14
Optometry	13
Nursing	1
Neurology/Neurophysiology	0
Psychology/Psychophysics	3
Physics/Optics	0
Other	2



3. Please indicate which if the following you identify with:

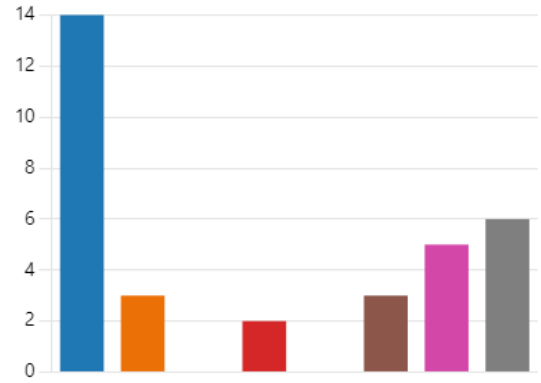
More Details Insights

Clinician	7
Researcher	8
Both (clinician and researcher)	18

4. Please indicate your Primary Specialty area of practice/interest:

More Details Insights

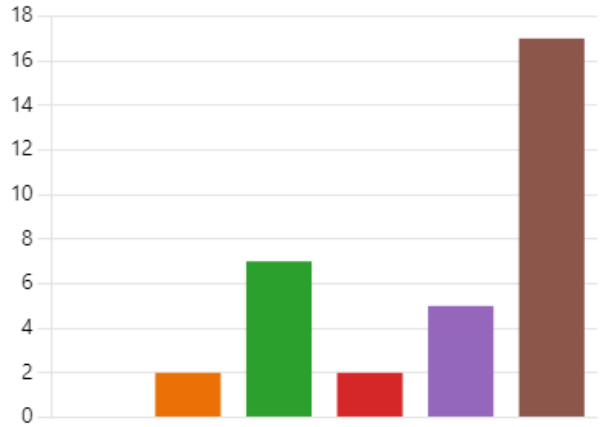
AMD	14
Diabetic eye disease	3
Non-diabetic retinovascular dise...	0
Neuro-ophthalmology/glaucoma	2
Inflammatory retinal disease	0
Inherited retinal disease/ genetics	3
General/multi-condition	5
Other	6



5. Please indicate the number of years post-graduate experience you have in your specialty area:

More Details Insights

1-5 years	0
6-10 years	2
11-15 years	7
16-20 years	2
21-25 years	5
>25 years	17



6. In the future, do you think Retinal disease will be detected and monitored more by:

More Details Insights

7. Please elaborate on your response to question 6 above, and add any qualifications to your answer:

ID	Name	Responses
1	anonymous	Detection will probably be more based on structural testing such as OCT. For monitoring, structural change will probably remain the medical mainstay, but the importance of functional change in terms of the impact on the person (as assessed by clinical measures, and also PROMs (patient reported outcome measures)) should be incorporated.
2	anonymous	Structural testing, especially with the enhancement supported by deep learning will continue to predominately for detection and monitoring of retinal disease. At the same time, functional metrics such as low luminance visual acuity seems to be a precursor to structural changes in , will be acquiring greater significance for early disease detection
3	anonymous	structural assessment can detect disease activity at an earlier stage than functional testing
4	anonymous	Modality most appropriate for detection and monitoring depends upon stage of disease. Early and very early disease is much more likely to be picked up by functional testing (but not visual acuity).

ID	Name	Responses
5	anonymous	Clinical examination (structural) will always be necessary in the evaluation of retinal disease. However, early disease detection is heavily reliant on functional testing (OCTA/Electrodiagnostics). Combining structure and function provide a complete picture of retinal health.
6	anonymous	Although functional testing is very important, structural testing when done properly is much more objective providing specific biomarkers for narrowing a diagnosis and plan the management
7	anonymous	I believe that advancements in OCT / OCTA / FAF and advancements in microperimetry / other visual field testing will allow for both modalities (structural and functional) to be integral in retinal disease diagnosis and management.
8	anonymous	structural testing is more objective and reliable. Functional will always be required to reflect real-world experience
9	anonymous	There will always be a role for functional tests, but structural tests will be used more and more for screening
10	anonymous	I believe we have a much better chance of developing novel strategies for monitoring through functional testing as structural testing modalities are already well established.
11	anonymous	Structure and function are both critical endpoints, and may show differing sensitivities to disease progression at different stages
12	anonymous	Home OCT will detect CNV, DME, etc
13	anonymous	I am of the belief that retina function suffers before changes to retinal anatomy, however in some cases (eg. AMD) the disease acts in a regional manner and the sampling of retina with functional tests can be either too coarse or too large/broad (size) to find early localised loss. What is needed is an optical functional test that can "see" and reflect abnormal neural activity of say, photoreceptors and/or downstream neurones as they are activated.
14	anonymous	Detection is likely to rely more on structural testing, particularly with advances in Artificial Intelligence systems. Monitoring is likely to involve a combination of functional and structural testing, the relative proportion depending on multiple factors such as disease type, treatment type, disease and treatment impact on functional and structural components. Eye care professionals also have a strong reliance on functional aspects.
15	anonymous	I suspect structure will be the most important but function can and should always have a role - structure can look what it likes but function matters most to the patient. Initial identification and home monitoring are likely to be more dependent on function but diagnosis and clinician monitoring more likely to be dependent on structure.
16	anonymous	Structure and function are keys to accurately diagnosing the stage of a disease and the two can vary at times.

ID	Name	Responses
17	anonymous	As structural imaging tests (like OCT) becomes more widely available and cheaper (now present in many community eye care settings), this is likely to continue to grow in use. However, home visual function monitoring is already being trialled, and there are more portable versions now developed for other functional tests (such as electroretinography) not requiring mydriasis, so it is very likely that functional monitoring will continue also.
18	anonymous	We will need functional tests like VA contrast, ERG, Dark Adaptation as well as DS OCT
19	anonymous	Structural testing will be necessary for assessing the anatomical responses to interventions whereas functional is necessary for impact on day to day life and also the integrity of the structure- there may be photo receptors but are they working? Functional dysfunction may proceed structural impact of pathology, however getting sufficient sensitivity/specificity of tests that can pick up early structural dysfunction is a challenge
20	anonymous	Structural testing is objective and can be reliably repeated to monitor disease activity. Functional testing is highly useful but current methods such as visual acuity are unreliable in the real world setting. Other methods of functional testing eg hand held ERG or dark adaptometry may be of benefit if these are developed to be be easier to use/ more accessible.
21	anonymous	What matters to the patient is as to how well they see; so even if the structure is not normal, but their vision is, they are happy. On the other way around, even the structure is normal, but the vision is lost, patients wish to have treatment/intervention.
22	anonymous	Functional testing like visual acuity is usually a late indicator of retinal disease in comparison to structural testing. However, in areas/communities who are unwilling/ unable to access/ unaware of screening (high street optoms), we may still need to rely on visual acuity for disease detection. Microperimetry and dark adaptation are very sensitive markers of disease. However, we need to achieve a balance as these tests take a long time to complete and there is no infrastructure to do so in clinic.
23	anonymous	There are likely to be parallel advances in ocular imaging and functional testing!
24	anonymous	Structural testing is obviously advancing exponentially with advances in hardware and software /AI developments - of course functional testing will develop but at present structural changes for monitoring out play the functional changes
25	anonymous	More is the important word here: Whilst the primary aim of treatment is to preserve vision, vision measurements are noisy and insensitive and may be affected late in the disease (ie in geographic atrophy) or even be irrelevant ie RP. Imaging changes may detect disease recurrence or progression before there is a measurable impact on vision measurement. The current optimal way to achieve the primary aim is through maintaining structural integrity.
26	anonymous	Both are important to assess whether to treat or not.

ID	Name	Responses
27	anonymous	I think the most useful approach in retinal disease are functionally validated structural endpoints. I think trials and observational studies need both types of measures, and also we need to understand how they are related.
28	anonymous	I think both will be needed, but ultimately retaining or improving function is most important
29	anonymous	The relationship between structure and function in retinal disease is complex. Test-retest variability in both functional and structural tests, limits the test sensitivity and specificity in detecting a change in clinical status. For example, the error inherent in gold standard ETDRS visual acuity measurements is such that changes of up to 2 logMAR lines can be observed when no actual change has occurred. Currently, most structural tests rely on examiner interpretation of the results, and this can differ based on the examiners experience. Often, functional tests on their own show poor agreement with patient reported difficulties. For example, good visual acuity scores can be reported in even advanced macular degeneration, until the fovea is affected. Until a 'perfect' single test is available, using both functional and structural testing gives the highest probability of detecting the presence of retinal disease and detecting change in retinal disease progression or treatment benefit.
30	anonymous	Although most advances are in structural testing like OCT or adaptive optics, it only describes how retina looks, not how it works. Further advances in functional testing like electrophysiology, reading speed, low luminance visual acuity etc will help detect function and are equally or more important.
31	anonymous	Structural testing is more objective and can detect earlier changes however from a patient perspective and management of ADL including driving and CVI registration and financial help - subjective measurements are still very important.
32	anonymous	While there are clear advances in structural assessment and decision support systems around this (e.g., AI), the issue remains that there is often poor concordance between structure (e.g., as measured using OCT) and function. Reasons for this are likely multifactorial and are unlikely to be related solely to imaging limitations such as limited resolution, etc. and highlight the need for both measures of structure and function to be embedded in clinical practice and further developed.
33	anonymous	Structural testing (imaging) will be prevalent because it is quick. Functional testing will always be needed to validate the imaging. Functional testing for clinical use has to get better than it is.

8. Do you encounter clinical situations in patients with retinal disease where Visual Acuity results seem poorly correlated with visual symptoms and/or macular/retinal condition severity?

More Details Insights

Yes	33
No	0

9. Please elaborate on your response to question 8 above:

ID	Name	Responses
1	anonymous	Often this mis-match comes down to loss in contrast sensitivity - those with poorer CS have more visual difficulties with a variety of tasks (particularly reading) than someone with the same VA and good CS (https://journals.lww.com/optvissci/Fulltext/2012/09000/Guidelines_for_Predicting_Performance_with_Low.14.aspx). Perceived difficulty is also significantly influenced by psychological factors such as depression and adjustment to visual loss (https://iovs.arvojournals.org/article.aspx?articleid=2187559).

ID	Name	Responses
2	anonymous	In cases where other aspects of visual function such as low luminance VA, microperimetry, Reading indices indicate a high risk for progression to structural changes, they will acquire a greater role in patient monitoring
3	anonymous	AMD
4	anonymous	No clinical experience, only research experience, but surely it is well known that VA is a v. poor indicator of early disease.
5	anonymous	Patient's that have geographic atrophy may have 20/20 vision but very poor functional vision (inability to drive, read or track).
6	anonymous	This is often seen in patients with diabetic macular edema, AMD and particularly GA
7	anonymous	There are many times when macular findings and / or patient symptoms do not correlate well with Snellen VA. This can happen in many condition such as AMD, dystrophies, CSR, etc .
8	anonymous	Especially when pericentral loss. Also with ocular co morbidities.
9	anonymous	often case- even in diseases of outer retina like RP
10	anonymous	Snellen visual acuity underestimates the real world impact on visual performances for many conditions encountered in the clinic. Night vision issues, glare, light sensitivity, and poor contrast are not adequately recorded or tracked in routine clinical care.
11	anonymous	Visual acuity is insensitive to diseases that do not affect foveal vision
12	anonymous	Structural damage doesn’t always correlate with VA.
13	anonymous	I find that HIGH contrast acuity is preserved until later in AMD, Diabetic (vein occlusion) macula edema and other retinal maculopathies. I believe that this reflects the regional aspects of these diseases. Such regional aspect has been published by several groups.
14	anonymous	I'm no longer clinically active, but historically I have encountered many situations where this occurs.

ID	Name	Responses
15	anonymous	Same in glaucoma in terms of discs and fields. I'm not an AMD expert but do see cases of a 'mismatch' in retinal appearance/structure and vision symptoms and/or measures of visual function.
16	anonymous	It's not uncommon to have patients complain about their vision and then measure their VA using dark letters on a white, well lite background as 20/20 or close to 20/20.
17	anonymous	In inherited retinal disease, retinal dystrophies (for example retinitis pigmentosa) can be very advanced before visual acuity is affected (i.e. widespread loss of visual field). Also, there are a range of macular conditions where visual acuity might be preserved, but other aspects of vision, such as paracentral visual field, colour vision, contrast sensitivity, light and dark adaptation, are affected.
18	anonymous	Yes especially with geographic atrophy Have patients with extensive disease but excellent visual acuity.
19	anonymous	Drusen size and number do not always reflect a patients opinion of their vision.
20	anonymous	Real world visual acuity is dependent on whether patient has correct glasses, duration/ time that technician has taken to measure acuity, lighting etc and so can be very variable.
21	anonymous	Diabetic retinopathy/maculopathy are prime example; also some other diseases with macular oedema.
22	anonymous	This is very commonly seen with macular diseases like macular degeneration and diabetic retinopathy, where the disease might be advanced in the extrafoveal areas but the central retina is till spared and the visual acuity preserved. However, there is urgent need to initiate treatment in these eyes to prevent progression.
23	anonymous	E.g., patient with geographic atrophy who can't read but has a distance visual acuity of 6/9.
24	anonymous	high contrast acuity testing does not mirror the real world - I am often asked to comment on the largest arae of unmet need in ophthalmology and my standard answer is " we need a way to better measure vision 1"

ID	Name	Responses
25	anonymous	Many patients with macular or peripheral retinal disease have acuity scores which greatly overestimate their day to day visual function. Identification of small black letters or words on a black background in a well lit exam room is a poor representation of day to day function. Lack of dark adaption and/or loss of field either peripheral or paracentral may be handicapping in the rpesence of good acuity. 'He could see a penny at a mile but nothing more'
26	anonymous	Yes - any retinal disease where the fovea is spared can have good visual acuity but may have extreme visual field reduction.
27	anonymous	In early and intermediate AMD visual acuity is only weakly correlated with performance of tasks, PROs, and retinal imaging.
28	anonymous	I think this is a common problem with many endpoints we use in trials for new therapies for retinal conditions
29	anonymous	Yes absolutely. For example, patients often report difficulties with activities of daily living such as cooking and reading, despite attaining good visual acuity scores. Often visual acuity scores appear unaffected, even in advanced macular degeneration, until the fovea is affected. Another problem is that test retest variability with visual acuity measurements, reported to be higher in those with ocular disease, makes it more challenging to correlate with visual symptoms and/or disease severity.
30	anonymous	Diabetic macular oedema, Central serous chorioretinopathy
31	anonymous	Occasionally this is the case but often in complex cases who require further investigations such as neuroimaging.
32	anonymous	Typically measures of high-contrast VA are weakly related to structural measures and/or macular disease severity.
33	anonymous	I do not see these personally because I am not a clinician. However I know what I read and hear at meetings.

10.What do you think are the barriers to using functional tests other than visual acuity when detecting and monitoring retinal eye disease in individual patients? (e.g. uniformity in testing procedure, repeatability, time, need for specialised equipment, etc.)

ID	Name	Responses
1	anonymous	For CS specifically, a lot of the 'gold standard' measures are based on Pelli Robson, which is not a convenient chart to use (large, limited life span). Mars charts improve on this, by being smaller. An easy-to-calibrate and validated tablet / screen clinical CS tool would be valuable. Barriers to assessment of scotoma are the time consuming nature of macular visual field tests, and the lack of reliability of quicker tests like Amsler charts through 'filling in' leading to false negatives (https://bjo.bmj.com/content/91/3/391.short). PROMs are time consuming to administer, and a lot of them lack a rigorous background in validation / scoring / interpretation (https://journals.lww.com/optvissci/fulltext/2013/08000/quality_assessment_of_ophthalmic_questionnaires_.4.aspx).
2	anonymous	All of the above: uniformity in testing procedure, repeatability, time, need for specialised equipment
3	anonymous	uniformity in testing procedure, repeatability, time, need for specialised equipment
4	anonymous	Functional measures require attention to measurement techniques and quantitative detail with which most clinicians are unfamiliar. This is true of acuity as well as other functional measures. A major problem is variability of function within the normal population, especially if the testing situation and the testing methods are not as well controlled as they need to be. Longitudinal measurements on individuals are likely to be significantly more reliable and informative than single determinations and comparisons with (dubious) norms. Development of appropriate instrumentation and methodology and improved education in their use could greatly improve clinical assessment.
5	anonymous	Acquisition of functional testing equipment may be costly for the practitioner. Some practitioners are not familiar with test interpretation. Visual field testing is a difficult test for patients to take. The results are often not reliable.
6	anonymous	Poorly understood by clinicians and technicians, difficulties with explaining the test instructions to the patients, often time-consuming, may require additional costly special instrumentation with no additional RVUs. Finally subjectivity, of the test and sensitivity/specificity issues.
7	anonymous	Lack of availability of specialized tests, lack of uniformity, lack of accepted norms, time needed to perform testing, and lack of general understanding.
8	anonymous	training for nurses to use. Lack of evidence for utility
9	anonymous	repeatability, time, need for specialised equipment,

ID	Name	Responses
10	anonymous	Primary barriers include physician apathy, lack of understanding of available testing, EHR templates that aren't adequately designed to easily record and track other functional metrics, and lack of reimbursement.
11	anonymous	Tests are time consuming, difficult for patients to perform, need specialized equipment and trained administrators, lack standardization of stimuli and paradigms
12	anonymous	Time is the biggest factor. And lack of specificity for the macula.
13	anonymous	repeatability and threshold variability, need for specialised equipment although modern tablet technology can be used
14	anonymous	All of the above factors. Visual acuity is what practitioners "know" and it is very difficult to change routine practice. It is a cost effective, universally understood test so is easy to administer. Tests like contrast sensitivity, for example, are less well understood, do not have clear normative values (which are independent of the test being used), have little "screening" value in the absence of clear testing criteria and normative values, and take more time to implement. The "pain" of changing is often perceived as not worth the possible benefit. Visual acuity provides a clear (albeit deficient) and accepted standard for measuring function.
15	anonymous	The key question is evidence surely - nobody wants to do more tests unless they help the clinical management/decision making processes and that in turn these impact on patient outcomes.
16	anonymous	Perception of time required, difficulty or frustration for the patient, complexity.
17	anonymous	This differs a little by functional test. I agree with all of those barriers mentioned - largely time needed, reproducibility, and need for specialised equipment and expertise.
18	anonymous	Need for specialized expensive machines and poor reimbursement for these test.
19	anonymous	Such tests often have a significant learning effect which should be considered, the AMD patients at highest risk (intermediate drusen) are often late 60s/70s and struggle with response boxes and the attention required for a detailed test such as dark adapted microperimetry or dark adaptation. Control populations can also show huge variation despite having apparently healthy retinas.
20	anonymous	Time, specialised equipment
21	anonymous	time and effort; validity, space and distance; good quality lighting and ability to spend the time on the test.

ID	Name	Responses
22	anonymous	uniformity in testing procedure, repeatability, time, need for specialised equipment, patient compliance, training of staff.
23	anonymous	Main barrier is seamless integration with clinical pathways.
24	anonymous	several studies have shown structural changes are more sensitive/specific for recognising change eg EDNA study Increased subjectivity in vision testing by pt and technician is a barrier High quality VA testing is time consuming and relies on experienced personnel
25	anonymous	1) Lack of knowledge of test relevance: any additional test must provide information not offered by acuity alone, ie be poor in the face of good acuity or vice versa thereby building a multi dimensional quantification of the subjects vision. 2) Incremental test time 3) test accessibility 4) Test sensitivity
26	anonymous	Visual acuity is what drives treatment decisions currently. If we had treatments eg for inherited disease that required other functional measurements to assess response then other functional tests eg microperimetry would be introduced but currently they are not relevant to clinical practice and also not easy to use / reproducible.
27	anonymous	Functional tests by definition will be vulnerable to noise since by definition they are psychophysical, that is based on decisions and behaviors of patients. But there are methods for enhancing their simplicity. Also new devices employ fixation tracking to eliminate some noise. In the end it is important for regulators to know how interventions impact vision. Thus we have to have a way to measure vision. A final comment is that functional testing devices are expensive.
28	anonymous	Suitability of assessments. Measurement variability. Being able to do enough tests in a trial. Maybe consider home monitoring in trials
29	anonymous	There are many barriers to using functional tests, other than visual acuity, in a clinical setting. These include the availability of other tests and where available, their condition - for example, dirty contrast sensitivity charts. Often, tests need to be used with particular environmental conditions for example, certain levels of lighting/completely dark room which can be difficult to achieve in an open plan clinical area. Staff training and knowledge/ensuring that a trained individual is available to ensure that equipment is used correctly can be an obstacle to using tests other than visual acuity. Test times are important as this can limit the number of patients that can be seen in a clinic and can impact the running of the clinic. The cost of attaining additional tests can be an issue as some tests can be particularly expensive to purchase or run.
30	anonymous	A standard easily available test is not accessible to non-researchers. In clinic, we need tests which can be administered with minimal effort by minimally trained individuals. It may be an idea to train the patient to administer the test themselves.
31	anonymous	1. Time at busy clinics 2. equipment and space 3. Additional training required 4. Increases complexity of tests available and causes confusion and loss of efficiency unless preselected by clinician

ID	Name	Responses
32	anonymous	Barriers include: (a) Patient acceptance of novel tests: Patients are familiar with conventional visual acuity measures and there can be a significant learning effect with new tests), (b) Limited clinic time: This is limited and the need to undertake another functional test may not be possible, (c) Cost of new equipment: This is often a significant concern and includes costs of re-training staff as required, (d) Limited evidence base: While not a concern for all novel tests of function, there is often a paucity of evidence underpinning the application of novel tests in clinics (e.g., samples not reflective of clinical population being considered, etc.), (e) Comparison with historical data: When introducing a new test of function there is often concerns about how and if this may be compared with longitudinal data collected using conventional tests (e.g., ETDRS logMAR VA).
33	anonymous	Notably time & need for specialised equipment. Speaking from the perspective of being involved in the development of rod-mediated dark adaptation AMD, many people do not know where the rods are. Human retinal neuroscience/ neurophysiology doesn't seem to be part of the training curriculum or device design.

11. Contrast Sensitivity (CS) has been around as a functional test for many decades. What do you think are the reasons it has not become more common as a routine clinical test, or even in clinical trials of retinal disease?

ID	Name	Responses
1	anonymous	This is something I have noted for many years (https://onlinelibrary.wiley.com/doi/abs/10.1111/j.0275-5408.1998.tb00002.x))! I would suggest practicality (as outlined above) is one reason. Medical practitioners focussing on structure as opposed to function is another. Optometrists (and those more concerned with functional testing) possibly also need to make the case better for the value of CS - though heaven knows, I've tried in both my teaching and research!
2	anonymous	It has not shown good correlation with structural changes

ID	Name	Responses
3	anonymous	not sure - perhaps lack of familiarity with the test
4	anonymous	The methods of measurement that are currently available are too crude for much more than categorisation of low vision. CS provides little useful additional information in the florid stages of retinal disease with which clinicians are mainly concerned. Current methods do not provide the high resolution required for clinical trials. Methods of measurement with adequate resolution are perfectly possible but have not been implemented in clinical trial context.
5	anonymous	Doctors are unsure what to do with the information obtained.
6	anonymous	Mainly same reasons stated above. Specificity is one reason, contrast sensitivity loss may be secondary to other reasons such as cataracts. Patients have difficulty understanding the instructions.
7	anonymous	Slightly more time consuming, more difficult for patients to understand the testing, lack of standardized expectations, etc.
8	anonymous	Lack of widespread charts. Poor reliability.
9	anonymous	Not understood Lack of uniformly accepted tes
10	anonymous	Poor understanding of normative values, lack of reimbursement, and weak recommendations from professional organizations regarding clinical utility of CS testing.
11	anonymous	Too time consuming, lack of standardization of equipment and paradigms
12	anonymous	Ease of Snellen
13	anonymous	people do not realise its merit and how to apply it. It also presents too complicated testing paradigms and needs to be a low contrast acuity letter target for simplicity (like Pelli Robson)
14	anonymous	Lack of standardisation; lack of clear normative data; time constraints - it takes more chair time to explain and to conduct; no clear way to bill for the time spent conducting such tests. Also, visual acuity is enshrined in legislation, used for driving standards, used for legal blindness registers etc, so is institutionally enshrined as a core ophthalmic metric. There is also probably less information on the expected response to treatment when measuring contract sensitivity. It is also not clear what spatial frequencies should be tested. Are findings or treatment outcomes likely to be affected by the chosen frequency or frequencies tested?

ID	Name	Responses
15	anonymous	Because anything from the cornea to the cortex impacts on CS and it will never have sufficient specificity to AMD/macular disease and the population with these conditions are elderly with co-morbidity. To this you can add in problems of test-retest reliability and an absence of high quality diagnostic accuracy studies.
16	anonymous	Perception of time required, difficulty or frustration for the patient, complexity.
17	anonymous	It takes a little longer than visual acuity measurement, and there has probably not been enough hard evidence of the time taken for adding this test being justified in changing patient management. Ophthalmologists in training have little experience of CS testing and so do not see the additional value.
18	anonymous	Lack of education on the usefulness of this modality.
19	anonymous	Standardised lighting conditions are difficult to achieve in a clinical setting. I think the current set of interventions are very focused on structural outcomes- the point is to reduce/prevent fluid so the obvious outcome is a structural outcome that measures this. I remember CS playing a greater role when PDT was used as there was a clear disconnect between patient reported outcomes of their vision and limited changed on VA whereas there were often changes in CS that confirmed the patient reports. I don't that kind of disconnect is evident with anti-vegf treatments.
20	anonymous	Time taken to do test
21	anonymous	difficult to do reproducibly and takes a lot of time to do well.
22	anonymous	It takes a long time to complete under clinical trial conditions. Lighting conditions in clinic is variable and it is not possible to control environment in clinical conditions. Patient understanding of the relevance of test to treatment and therefore no patience to do the test.
23	anonymous	Not typically used as a primary endpoint in clinical trials; not sure if sufficient incremental value if needs to be performed in addition to standard VA measurement.
24	anonymous	Pelli robson testing does not test contrast at the levels most pts experience difficulties - see eduardo midena views on contrast sensitivity testing Standard CS testing is time consuming low luminance testing is easier and gaining in popularity but still to be better validated
25	anonymous	Contrast sensitivity' encompasses many different clinically measured tests. Do you men low contrast acuity, Pelli robson contrast sensitivity or grating CS, What do these add to the acuity score. Where do i get the chart? How do I use it? Can my tech/nurse/optom use it, What is a normal value for that test?

ID	Name	Responses
26	anonymous	Difficult to do - need standardised lighting conditions. Not clear what it adds over visual acuity measurments. Not accepted as an endpoint in clinical trials by regulators.
27	anonymous	Contrast sensitivity assays virtually the entire visual pathway from retina to cortex, and also is vulnerable to lens and corneal conditions. For retinal diseases such as AMD, it is preferred to have a functional test that reflects the actual retinal layers being impacted by AMD, such as outer retina, RPE, and the choriocapillaris. CS is indeed useful for understanding visibility problems in everyday life, however, as a clinical trial endpoint in AMD for example, it remains relatively normal until later stage intermediate AMD.
28	anonymous	Not very well designed tests. Not straightforward measuring CS on tablet of screen - but this is what is needed. Some neat ways to measure the CSF are available.
29	anonymous	The Pelli Robson CS chart is probably the most widely used test to measure CS in a clinical setting, but it can be difficult to illuminate it evenly and consistently. It also measures CS in one spatial frequency so could potentially miss deficits with certain diseases and test-retest variability may be an issue due to the coarse measurement scale. More comprehensive CS measurements take a long time and may require special equipment.
30	anonymous	Standards charts are not available and the results are not reproducible due to dependency on brightness of the surroundings.
31	anonymous	Time required - not feasible in busy clinics.
32	anonymous	Time limitations in clinic and issues with repeatability are likely limiting use of this in clinic. Other concerns with the test is that it only examines one spatial frequency channel, this perhaps not being the one most affected by the AMD disease process.
33	anonymous	This an opinion from a research area that does not depend on CS - I never felt that the neurophysiological basis of any of these tests were explained to the users.

12.Do you feel Contrast Sensitivity (CS) testing has the potential to significantly improve understanding of visual function in retinal disease patients?

ID	Name	Responses
1	anonymous	Yes

ID	Name	Responses
2	anonymous	It has the potential if performed under standardised testing conditions
3	anonymous	yes
4	anonymous	Yes.
5	anonymous	It may have the potential, however I feel there are better more reproducible tests available.
6	anonymous	Yes, if easier, faster ways to do it. It will be another data set
7	anonymous	Yes, it is much more sensitive than Snellen testing.
8	anonymous	Yes
9	anonymous	no
10	anonymous	Yes, in both clinical and research settings.
11	anonymous	Yes, contrast sensitivity is more sensitive to early presence of vision loss and gradual change in visual function
12	anonymous	Yes
13	anonymous	YES
14	anonymous	Yes. It can provide additional insights into understanding visual function in retinal disease, particularly if conducted across a range of spatial frequencies. This can be difficult to achieve in clinical practice.
15	anonymous	Yes - there's investigating retinal disease and then managing. I answered Q11 with a view on clinical testing but would see research into understanding retinal disease differently.
16	anonymous	Definitely. There is so much we can't measure with high contrast testing - it is not sensitive enough.
17	anonymous	Yes, I think it could, particularly in macular disease (including AMD, macular dystrophies, diabetic macular disease and others).

ID	Name	Responses
18	anonymous	Yes
19	anonymous	No
20	anonymous	Yes
21	anonymous	yes, it does
22	anonymous	The CS is relying on visual pathways which may be disrupted at any point rather than just be a retinal problem.
23	anonymous	Perhaps. But would be hard to place a big bet on it.
24	anonymous	has the potential but needs to be robust , repeatable and easy to administer
25	anonymous	Yes. Above is ironic.
26	anonymous	No - I'm not sure what it adds over visual acuity. Low luminance acuity seems more relevant eg in predicting progression of AMD.
27	anonymous	I'm not excited about it for the reasons stated above. Even in inherited retinal degenerations it is not all that useful.
28	anonymous	Yes - Especially a trial setting See here: https://pubmed.ncbi.nlm.nih.gov/35737401/
29	anonymous	Yes definitely. Several studies have demonstrated a strong association with self-reported measures of visual impairment and vision related quality of life questionnaires, more so than visual acuity. Additionally, CS has already demonstrated deficits earlier in AMD patients before visual acuity measurements are affected.
30	anonymous	Yes but above constraints need to be overcome.
31	anonymous	Definitely - would be very valuable
32	anonymous	Yes
33	anonymous	sure, if matched to the right condition.

13. Thinking of a **clinical care** setting: Regarding your identified area of expertise, which of the following additional tests of visual function do you use? Please rank them in order of importance using the arrows on the right hand side and placing the MOST important option at the TOP.

More Details

14.If you selected "Other" for question 13, please state below. Please skip this question if you did not select "Other".

ID	Name	Responses
1	anonymous	Reading function (max reading speed, critical or comfortable print size, reading acuity)

ID	Name	Responses
2	anonymous	Reading speed
3	anonymous	please note i am not sure if q 13 is a good question as in clinics, generally most clinicians only have access to visual acuity
4	anonymous	I do not have clinical experience and therefore cannot answer this question
5	anonymous	OCTA, Electrodiagnostics
6	anonymous	Not really relevant to me as I am no longer clinically active
7	anonymous	Electrophysiology
8	anonymous	ERG
9	anonymous	low luminance CS
10	anonymous	Don't use any of these tests routinely in AMD or general retinal clinics.
11	anonymous	Low luminance VA testing - not sure if you consider this CS testing
12	anonymous	Reading acuity.
13	anonymous	there are many other psychophysical tests, but none that appear to be promising in my opinion.
14	anonymous	Reading acuity
15	anonymous	Electrophysiology

15. Now thinking of a **research or clinical trial** setting: Regarding your identified area of expertise, which of the following additional tests of visual function do you use? Please rank them in order of importance using the arrows on the right hand side and placing the MOST important option at the TOP.

More Details

16. If you selected "Other" for question 15, please state below. Please skip this question if you did not select "Other".

ID	Name	Responses
1	anonymous	Reading function (max reading speed, critical or comfortable print size, reading acuity) and PROMs
2	anonymous	When other
3	anonymous	The most appropriate test for early AMD is probably retinal densitometry. No clinical instrument is currently available but a suitable instrument is certainly possible and this should be pursued.2
4	anonymous	OCTA, Electrodiagnostics
5	anonymous	I would also include temporal aspects of vision - CFF. I would also explore glare disability.
6	anonymous	Electroretinography
7	anonymous	ERG
8	anonymous	low luminance CS
9	anonymous	Low luminance, also Reading speed
10	anonymous	PROM QoL questionnaires.
11	anonymous	The Moorfields Acuity Chart
12	anonymous	Electrophysiology

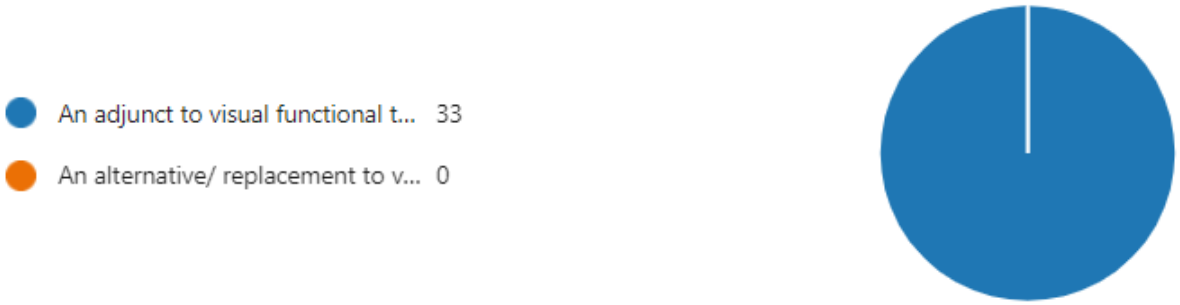
17. How important do you think Patient-Reported Outcome Measures (PROMs) will be in the future when assessing patients with retinal disease? Select one.

More Details

Essential	9
Very important	12
Moderately important	9
Fairly unimportant	3
Totally irrelevant	0

18. Are PROMs best used as (select one):

More Details



19. Please qualify/explain your response to question 18 above:

ID	Name	Responses
1	anonymous	Visual function testing assesses impairment. PROMS assess activity limitation, or the impact the impairment has on the person. Both are necessary to understand the patient's needs and impact of any interventions.
2	anonymous	BCVA a long standing and familiar testing process performed is more reliable, despite the high internal raryerb to
3	anonymous	not particularly sensitive in detecting clinical change in a clinical setting
4	anonymous	Outcome measures are important to the patient, but more research is needed to determiner the relationship of PROMs to more precisely quantifiable functional measures is required.
5	anonymous	Combining a patient's subjective response with an objective means of functional testing will provide a better overall summary of the patient's disease state

ID	Name	Responses
6	anonymous	Reliability and patient compliance/adherence can be a barrier
7	anonymous	I think both are important in assessing retinal disease.
8	anonymous	information from multiple sources will be most beneficial
9	anonymous	too much variability
10	anonymous	I think there will always be a desire to include visual functional testing.
11	anonymous	PROMs are extremely important for patient levels of concern and satisfaction, but lack sensitivity to gradual change and have poor test-retest.
12	anonymous	In office visual function testing will remain the standard
13	anonymous	I find many cases not aware of their vision change until much later in the course of the disease
14	anonymous	PROMs are useful, particularly in gaining insight into the patient perspective of their disease, treatment etc. However, the data is subjective and may not always provide the best data required when making clinical decisions. Having this information can be very useful in guiding decisions along with other functional data (which is also subjective but different in nature).
15	anonymous	The value of PROMS is overstated if these are not 'good' PROMS - VA is tried and tested and is a reasonable outcome measure but doesn't tell the whole story - PROMS could be a really important adjunct.
16	anonymous	While I think they should be very important since they provide a patient response, which is ultimately who we are serving, the FDA has not found PROM's to be of necessity, so I couldn't give it a "essential" rating.
17	anonymous	I think the direct, quantitative, objective data one can get from visual function tests cannot easily be replaced by PROMs.
18	anonymous	While VFTs are subjective PROMS are even more subjective so need to combine to get a more valid measure.
19	anonymous	PROMS reflect global vision where as visual tests obviously hone in on a specific aspect which may be particularly relevant to the disease at hand.

ID	Name	Responses
20	anonymous	There will be variability amongst patients and outcomes important to patients with PROMs and therefore visual function testing helps to gain an overall understanding of function.
21	anonymous	Patients might not appreciate the extent of the visual issues, especially if the onset has been slow and so the objective testing might help clarify what the patients see.
22	anonymous	In multiple studies there is poor correlation between low luminance deficit and low luminance scores. Therefore they can't be used interchangeably but as supportive evidence to fully understand the disease.
23	anonymous	Role for sophisticated visual function testing still unclear in retinal injections clinics. Therefore role of PROMs even less so.
24	anonymous	I dont know the PROM literature well enough but I suspect they still have some variability dependent on many factors and suspect they will be adjunctive
25	anonymous	PROMS relate to function binocularly which is driven by the currently better eye.
26	anonymous	PROMs are important for regulators.
27	anonymous	I think it is important in trials to ask for the patient's perspective which is what PROs do. If the ophthalmologist is convinced that the intervention was a success by functional or structural tests, but the patient does not think so, the intervention has basically failed. I'm not referring to patients with psychiatric disorders.
28	anonymous	See here https://pubmed.ncbi.nlm.nih.gov/30273622/
29	anonymous	Studies have demonstrated the importance of PROMS in clinical practice and research but since these are based on subjective responses, there are many variables which may bias results and therefore, I feel that they are used best in conjunction with visual functional testing. In addition, it would be difficult to quantify qualitative responses accurately in order to be able to use these alone in monitoring patients.
30	anonymous	PROMs are patient's impression of their visual function. This is not standard and not easily comparable with another.
31	anonymous	PROMS are very valuable especially in assessing outcome of clinical trials in degenerative conditions but still need quantitative measure for visual acuity even as a secondary endpoint.

ID	Name	Responses
32	anonymous	Functional tests only reflect one aspect of function and often do not describe the ease with which patients can function in daily life. PROMs will act to give a more complete view of patient function, this complementing measures of visual function.
33	anonymous	I keep hearing that the FDA does not consider them highly