Field Frequency

How many of you, I wonder, enjoy doing the field of vision test (perimetry) when you go for your glaucoma follow up appointments? I suspect that, at best, you tolerate the test and that most of you find it hard work, at least, that is the impression we get here at the IGA when talking to you on SightLine. There is no doubt that it is a difficult test that requires a lot of concentration and I'm sure that all of you have had the feeling of not knowing quite whether or not you saw a light and of not knowing whether or not to press the button!

Nevertheless, the field of vision test is one of the most important tests that is carried out in the management of glaucoma because it is the only test that measures the actual visual function across the field of vision. Therefore it is the only test that can establish whether or not the damage done by glaucoma to the field of vision is getting worse (progression) or staying the same (stable or 'in remission').

At a symposium sponsored by Allergan Pharmaceuticals during the Royal College of Ophthalmologists Conference on 20th May this year, a presentation was given by Mr Viswanathan who explained that when a person is first diagnosed with glaucoma it is very important to establish the rate of progression of the glaucomatous damage in order to assess whether or not it is likely to do enough damage to cause problems in that individual's lifetime. In order to carry out this assessment a series of several field of vision test results are needed and the number and frequency of the testing will define how quickly this can be done, as well as the sensitivity of the calculation.
This may mean that as many as six visual field examinations will be needed in the first two years following diagnosis, if a quick and sensitive series is considered necessary, although later, longer periods between tests will become the rule as these are then used to confirm a known situation rather than to define what is happening.
For these reasons the rest of this article is devoted to explaining what the printout tells the eye specialist and to helping you to give the best and most accurate response when you are undergoing the test.

The light sensitive layer that covers the back of the eye is called the retina and it is covered with special nerve cells, photoreceptors, that convert light into electrical impulses that travel along the optic nerve to the brain, thereby enabling the brain to form the picture we see. The central area of the retina called the macula is the most sensitive to light and gives the greatest detail (it is the part of the field of vision we use to read, watch television or recognise people's faces).
The more peripheral areas have fewer receptors and are therefore less sensitive to light, but they are important

because they allow us to see, albeit less clearly, objects out of the direct line of sight that make it easier and safer to get about. Glaucoma tends to attack the mid periphery of the field of vision first, which is one of the reasons that it can go unnoticed until it is moderately advanced.

The ideal visual field test would be easy for the patient and the health care professional alike and, of course, be 100% reliable. Unfortunately no such test, as yet, exists, but in recent years there have been considerable improvements in the software used in visual field testing.

We turn now to look at the test itself and, in particular, the printout that summarises the results for the doctor, because if you understand what the different parts of the printout show, this will aid an understanding of the test. The information that follows is therefore about the Humphrey perimeter because this is the most common instrument used in UK hospitals.

Starting at the top right of the print out, the information recorded here shows the date of the test, the time of the test and the age of the patient. (Fig 1) It is particularly important that the patient's age is entered correctly because the software takes account of a patient's age when carrying out the test (the retina gradually becomes less sensitive to light as we get older).

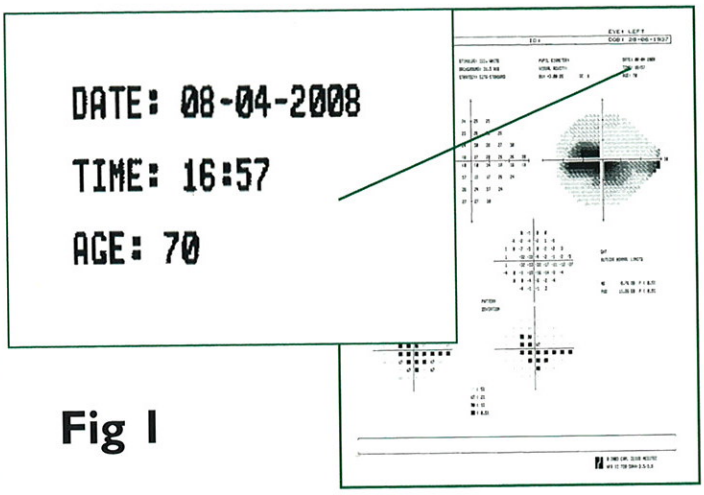


Fig 1

The next block of information records details about the individual patient with spaces for the pupil diameter and the visual acuity. (Fig 2) The visual acuity (how sharply the patient can see) is also important when carrying out the test because, in order for a patient to see the lights clearly, they must have an appropriate level of correction for near vision when carrying out the test.

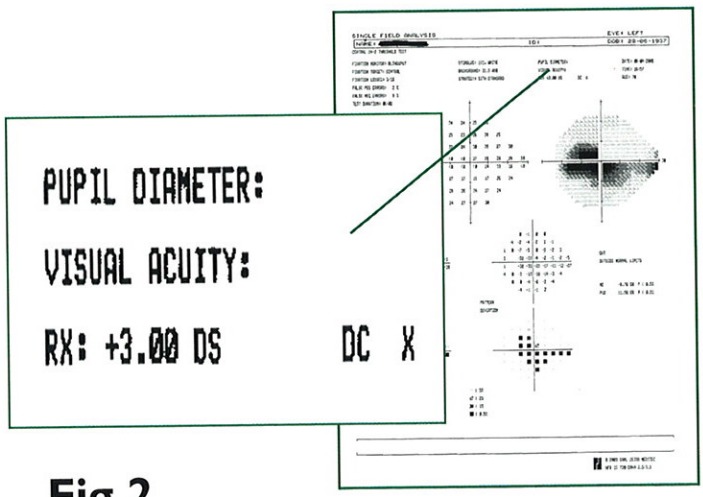


Fig 2

The next block of information is about the test itself with the three lines showing the type of test that has been taken. As we said earlier, there have been considerable improvements in the software that 'runs' the perimeters

but each different test strategy will give more or less information about different aspects of the visual field. It is therefore important to record this information for every test taken (Fig 3). In our example, the instrument was using SITA Standard, which is one of the programmes often used for glaucoma and usually takes about 10 minutes per eye.
The stimulus was white, as was the background, so this is conventional white on white perimetry.

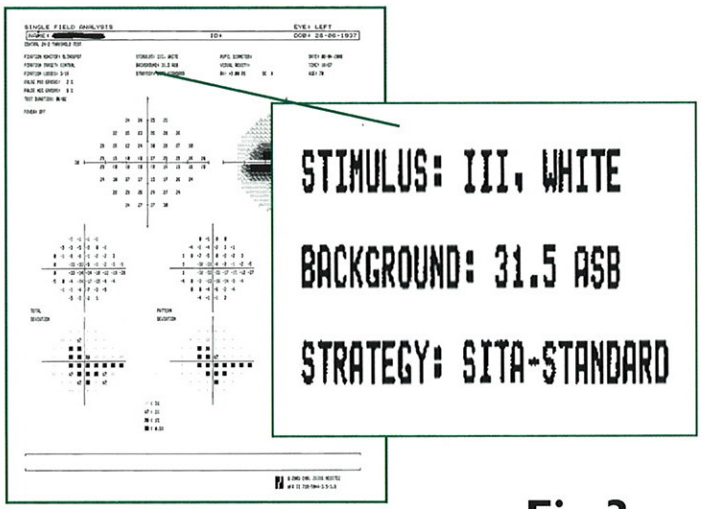


Fig 3

The block of information presented in the top left position (Fig 4) is the first that is based on the results of the test and they provide a guide for the ophthalmologist as to how much reliance he or she can place on the test results. The first three lines describe the test, in this case a central 24-2 threshold test with the ability of the patient to fix on the central point in the test being tested by flashing a light where the blind spot should be (If you see the flash, you weren't looking at the dot). It then goes on to provide three pieces of information about the test itself:

1. **Fixation losses:** Because the test is designed to measure any damage to the periphery of the visual field, it is very important that the patient has been able to keep their eye focussed on the central dot on the screen, i.e. keeping the eye still.This is a difficult and unnatural thing to have to do, because in normal life the eye is always moving, however for this test it is a vital element in the reliability of the test. In this example the patient lost fixation on the central dot three times out of the sixteen times that the instrument checked.

2. **False positive errors:** It is important that the patient only presses the button when they see a light because otherwise the test result will naturally be unreliable and will fail to give the important information needed to help manage glaucoma effectively. For this reason the instrument will check for false positive clicks by itself clicking and whirring (as it does throughout the test) without showing a light at all.

   Don't forget, when taking the test, always press the button when you see a light, but don't press when you haven't. The difficulty is that because the test is designed to measure areas of the visual field where the sensitivity is reduced, but where the patient can still

see, it will retest a given point several times with the light presented at different levels of brightness, some of which will be seen and some of which won't, so if you see a dim light – press the button.

3. **False negative errors:** As another measure of the reliability of the test, the instrument looks for false negative errors by retesting some of the points of the visual field. If a light was seen at a given sensitivity and subsequently it is not seen, this is a false negative error. However, particularly in glaucoma there are sometimes natural fluctuations at the edge of the area of visual field loss, so this measurement of reliability needs to be taken in context.

Lastly this block of information records how long the test took to complete. This can be important if the test was particularly long or if it was carried out late in the day as fatigue can also affect the result.

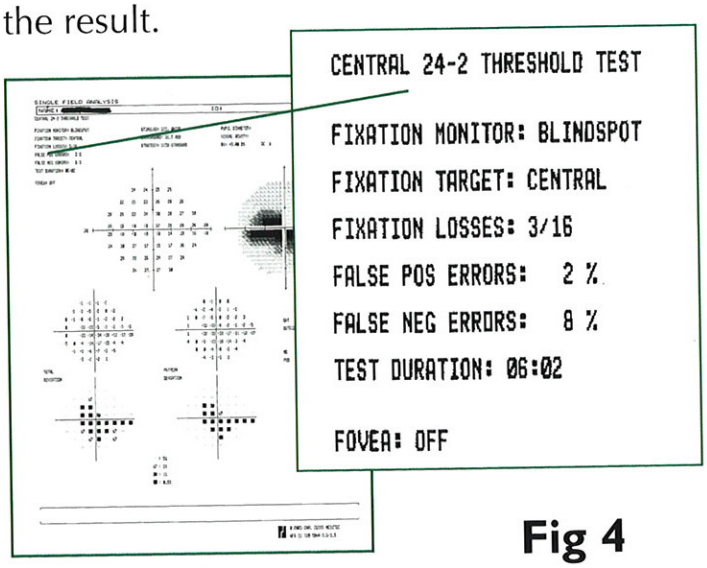


Fig 4

Moving on to the charts of the visual field, the top left hand chart records the intensity of the light needed to obtain a response from the patient (Fig 5). As was described above when considering false positive results, the instrument tests each point in the visual field several times in order to establish how brightly the light needs to be shown in order for it to be seen. This chart shows each of the tested points in the visual field and the number records the intensity required for a response with dimmer lights being shown as higher numbers or in other words, the higher the number the more sensitive the retina.

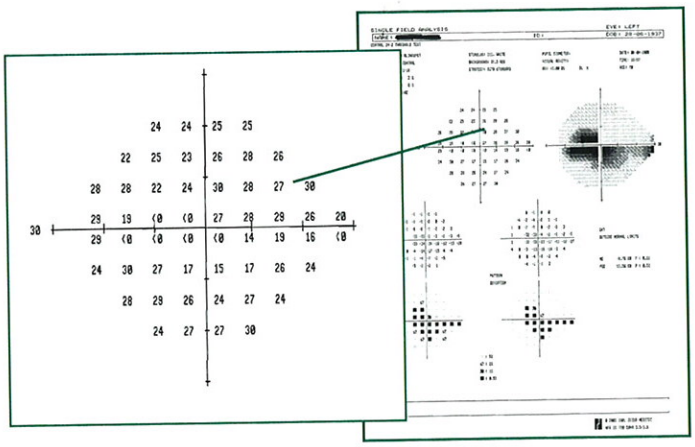
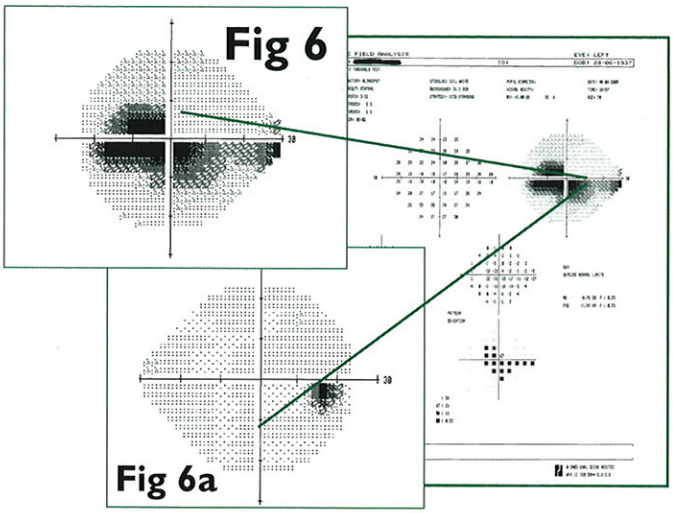


Fig 5

The chart on the right of the sensitivity chart is the one which most people understand intuitively (Fig6). It is the grey scale chart where damage to the visual field is presented as progressively darker greys up to black where the vision has been lost. The presentation is correlated with the patient's age so that a general reduction in sensitivity as is seen in most people of a given age is taken into account when producing

this result. This chart is also the one which highlights the natural blind spot as seen below (Fig 6a).



The charts produced on the bottom half of the chart are named 'Total Deviation' and 'Pattern Deviation'(Fig 7). These are important for the ophthalmologist who is reading the printout because there are many things that can cause changes in the visual field other than glaucoma, particularly a generalised reduction in sensitivity (e.g. cataracts) when compared with the glaucomatous types of visual field defect that tend to occur in specific areas and ways. These two charts allow the ophthalmologist to effectively 'filter out' the effects of these other conditions or factors thereby allowing him or her to see and understand any changes caused by the glaucoma alone.

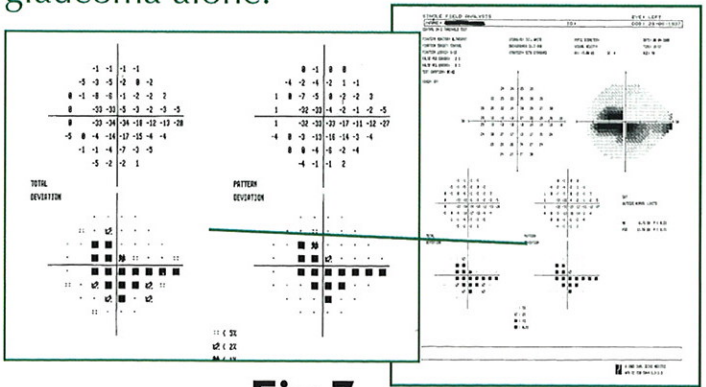
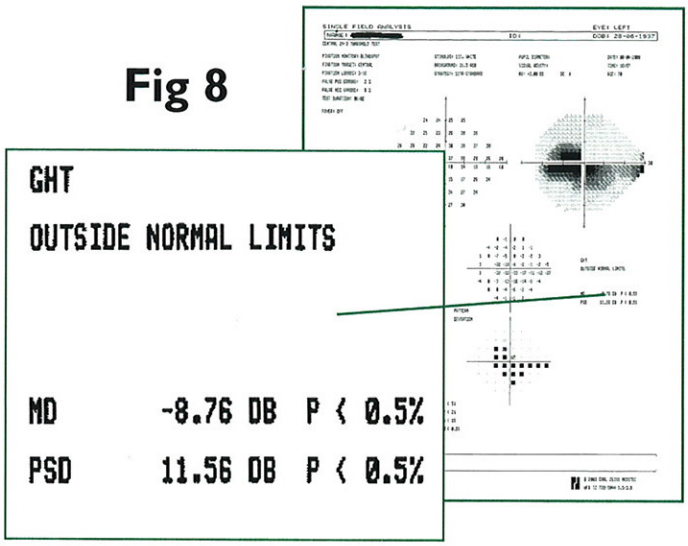
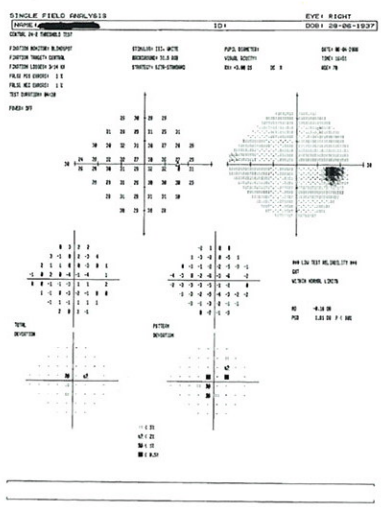


Fig 7

The last piece of information provided by the perimeter is the summary which is given in numerical form (with confidence intervals) and these can be tracked over time in order to see if a field is getting worse or remaining stable (Fig 8).



With all this information gathered as a result of you, the patient, pressing a button when you see a flash, how can you ensure that you give the best possible performance when being tested so that your ophthalmologist can correctly assess your visual field and work with you to manage your glaucoma successfully?



- **Understand the test:**- Talk to the person who is administering the test and make sure you know exactly what is expected of you and, most importantly, make sure that you know how to pause the test in case you have a distraction that will damage your concentration (an itch, needing to sneeze etc).

- **Make sure that you are as comfortable as possible:**- The position in which you sit is important because you will be sitting unnaturally still for what will seem like a very long time.

- **Try to relax:**- Because of the way in which the instrument checks and rechecks different points in the field of vision, there will be times when it seems as if it is a very long time between flashes – this is normal and nothing to worry about because it is checking for the threshold of vision and you are not expected to see every light (some will be very dim indeed).

- **Try to remain alert:**- A good night's sleep before a test makes a lot of difference when undergoing something that requires a lot of concentration. If you are tired or become fatigued during the test, it may be possible to pause the test (to look away and regain concentration) and by letting the operator know, any problems with the reliability of the result can be taken into account by your ophthalmologist.

- If you are being distracted by something going on around you, don't be afraid to speak up!

If you have any questions regarding visual field testing or any other aspect of glaucoma, please do not hesitate to contact SightLine on 01233 648170.

It's out of the bag!!

When you opened your Summer IGA News you will have noticed that it was delivered to you in different packaging.

The change was partly in response to a request from some members to retain privacy so that the contents were not on view, but also to be more environmentally friendly.

We would love to hear your thoughts and ideas, not just about the packaging but any aspect of the newsletter.