

## Common Eye Tests

### What are some common eye tests?

The clinic's doctors, optometrists, orthoptists and ophthalmic technicians conduct comprehensive eye examinations to evaluate your vision and the health of your eyes. This series of detailed examinations can take an hour or more to be completed, depending on the number and complexity of the tests required.

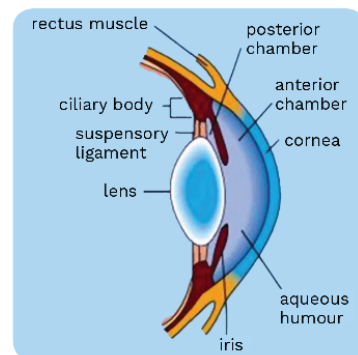
The tests can range from simple ones such as reading an eye chart to complex ones where colour dye injection is required to see the blood vessel flow in the eye.

### Anterior Segment Photography

The anterior segment of the eye consists of the eyelid, sclera, conjunctiva, iris, natural crystalline lens and cornea. Anterior Segment Photography captures these portions of the eye through a photographic slit-lamp biomicroscope.

The binocular slit-lamp examination provides an enlarged view of the detailed eye structures, thereby enabling diagnoses to be made for a variety of eye conditions.

The photographs taken are used to document the state of the eye at different consultation visits, which can be useful in keeping track of a disease's progress. Also, any medical intervention can be done when necessary.



*Anterior segment (adapted from Encyclopedia Britannica)*

### How is the test carried out?

You will be seated on a stool with your chin and forehead supported to steady the head.

Using the biomicroscope, the ophthalmologist or ophthalmic technician will then proceed to examine the eye. A fine strip of paper, strained with fluorescein which is a fluorescent dye, will be touching the inside of the eye; this stains the tear film on the eye surface to help with the examination. The dye is naturally rinsed out by the eye's tears.

You may sometimes need to have your pupils dilated. Some form of light sensitivity lasting for a few hours after this exam may be experienced. The dilating drops may also cause temporal increase in eye pressure, leading to nausea and pain in the eye. If you experience serious symptoms, please seek medical attention immediately.

No special preparation is required for an adult patient. However, some preparation may be required for children, depending on age, previous experiences, and level of trust.



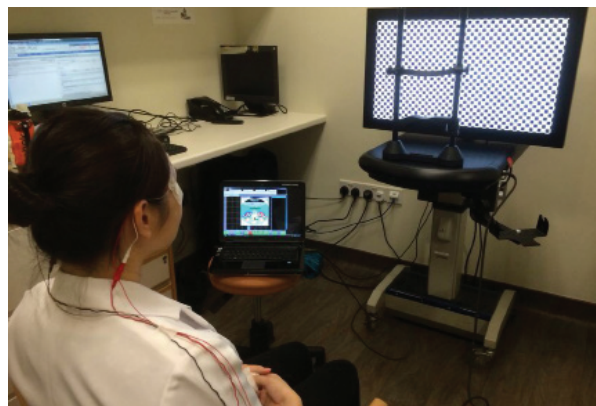
## Electroretinogram (ERG)

The eye has a complex optical system that is able to convert light collected from the surrounding environment to the brain to form images. The retina consists of light-sensing cells lining the inner surface of the eye which convert light into tiny electrical impulses. The impulses are then sent to various fibres of the optic nerve to the brain where they are then interpreted as images.

ERG measures the electrical responses of various cell types in the retina. It is like the electrocardiogram (ECG) for the eye, which allows the doctor to determine where and what is affecting your vision, and to find out if the retina is functioning well.

### How is the test carried out?

Before testing, a fine thin wire called an electrode will be placed on the surface of the eyeball, and temporarily attached to the forehead. There is no pain to the procedure. Topical anaesthesia and dilation of the pupils may be required. The test will take at least one to two hours to complete. Fasting is not required. You are however advised not to wear makeup or contact lens during this test. All electronic devices such as mobile phones should be switched off during the test.



Different ERG types may be ordered to investigate the various functions of the retina:

**Full-field ERG** checks the global retinal function. You are required to sit in a dark room for 20 minutes for dark adaptation, followed by a 10-minute light adaptation in a normal lit room. Flashes of lights of different densities will be shone to the eye during the tests. Dilatations of the pupils are required to perform this test.

**Multifocal ERG** records the local electrical responses from different regions of the retina. You are required to look at a television screen with reversing black and white hexagonal elements. Dilatations of the pupils are required for this test.

**Pattern ERG** measures the central retina function and also evaluates the retinal ganglion cell function. It involves looking at a television screen with a reversing black and white checkerboard. Dilatations of the pupils are not required for this test.

**EOG (Electro-Oculogram)** measures the function of the retinal pigment epithelium (RPE), and the interaction between the RPE and photoreceptors in the retina of the eye. It involves looking at a red light that moves from side to side. The test will be carried out in a dark room. Dilatations of the pupils are required for this test.

**VEP (Visual Evoked Potential)** assesses the signal sent from the eye to the brain. You are required to look at a screen with reversing black and white checkerboard, while a recording electrode is attached to the back of the head. Dilatations of the pupils are not required for this test.

## **Fundus Fluorescein Angiography**

This is a diagnostic procedure used to examine the circulation of the retina and choroid by injecting a fluorescent dye. As the dye passes through the blood vessels of the retina, specialised digital photographs are taken to display the blood vessels. Through the angiography the doctor can detect any abnormal blood vessels or leaking spots causing the eye problems.

### **How is the test carried out?**

After the visual acuity test is done, eye drops will be instilled to dilate the pupil. Blood pressure will also be measured. Questions regarding about medications and medical conditions will be asked and allergies to the yellow fluorescein dye will be tested.

A consent form is needed to carry out the test. In addition, you will also be given medicine to prevent nausea and gastric pain before the start of the test.

A small amount of yellow fluorescein dye is injected through a small needle/tube into your arm/hand's vein before the photograph is taken.

You may experience a reddish or bluish blur after the test due to the camera's flash and the eye drop. This blurred vision should subside within 4 to 6 hours after the procedure. The dye will cause your skin and urine to be darker, and possibly orange in color, for a day or two after the test. Drinking lots of water after the test will help to flush the dye out of your system.

## **Fundus Photography**

Fundus photography is the process of taking pictures of the inside or back of the eyeball. It is often done to document, monitor or diagnose eye diseases.

### **How is the test carried out?**

A specially-designed camera is used to take the photos of the back of the eye. You will be taken to a dark room and asked to sit in front of the camera with your chin on the chin rest and forehead against a headband. You will be asked to look at either an internal fixation light or external fixation light. It is necessary for you to stay focused on the fixation light while the technician takes a series of images. You should expect multiple flashing of lights while having your pictures of the eye taken. Please refrain from moving or blinking your eyes during this period.

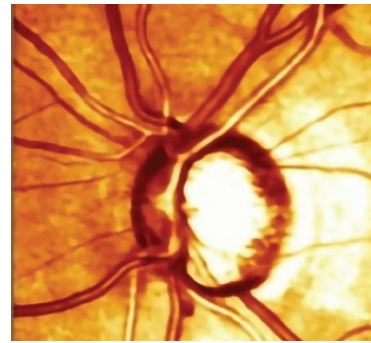
Usually there would be minimal discomfort. Some slight giddiness might be felt; and blurred vision with a patch of bluish or reddish glare should clear out on its own within 5 minutes after the completion of the test.

Dilatation is usually needed for this test to prevent the pupils of the eye from constricting after the flashing lights. Constriction of the eye will result in dark photos which would be difficult for doctors to view for diagnosis.

## Heidelberg Retina Tomograph (HRT)

The HRT couples a laser-scanning camera with specialised software to evaluate the optic nerve – allowing us to capture images of the sensitive nerve-fiber layer of the optic nerve with a three-dimensional cross-section view. In doing so, it allows us to assess or look out for any sign of damage to the optic nerve.

HRT is useful for monitoring progression in patients with glaucoma, especially in the early stages of disease where no visual field defects are apparent.



*Image of the Optic Nerve Head taken by a HRT machine*

There are no symptoms in the early stages of glaucoma. Patients with glaucoma have their vision conductive rim of the optic nerve (also called the nerve-fiber layer) gradually damaged, resulting in a reduction of visual information leaving the eye to the brain.

### How is the test carried out?

The HRT makes use of reflected light and converts the layered image into an enhanced color image. The exam is a painless non-invasive one and takes a few minutes using laser which doesn't harm the eye. Dilation of the eye is usually not necessary.

As the test requires a couple of seconds to perform, any movement (including moving the eye, blinking, or moving the head) will disrupt the laser's path, affecting the image quality.

## Humphrey Visual Field Test (HVF)

Monitoring the progression of any changes in the optic nerve of the eye is important. Once nerve damage and visual loss occur, it is permanent. HVF is one of the tests ordered for this purpose.

HVF checks your central and side visions, as well as the sensitivity of the eye. It is a useful test which monitors any damage of the nerve fibre to the back of the eye. Both eyes are tested individually.

### How is the test carried out?

An eye patch will first be placed on the non-examining eye. Your chin is rested on the chin rest with the forehead pressing forward. A buzzer is provided for you to respond to any sighting of white light appearing during the test.

White lights of different intensities – bright or dim, will be coming from different directions, appearing one at a time. The buzzer must be pressed immediately and released for the test to continue upon seeing the white light.

It is important for the patient to look straight ahead at all times during the test. No dilating eye drops is required to perform the test. Please inform the technician if you are wearing the contact lens before the start of the test.



Please also inform the technician if you wish to rest during the test. It is not advisable to rest or lean back from the machine without informing the technician as the test is still in progress, and you may miss some white light, thus making the results inaccurate.

## **Intraocular Lens (IOL) Power Calculation**

An IOL is a lens implanted in the eye used to treat cataracts or myopia. Pseudophakic IOLs are the most common IOLs used in cataract treatments.

To obtain the right IOL lens, you will need to have your personal intraocular lens power calculated. The following is required:

- Eye's axial length (AL)
- Corneal power (K)
- The anterior chamber constant: A-constant or another lens-related constant
- White to white

### **How is the test carried out?**

There are two ways that to achieve the calculation. The first method is through an IOL Master machine. You will be seated at a comfortable height, looking straight at a fixation target with your chin rested. It is a non-contact and non-invasive procedure.

The second way is by contact applanation biometry. This would require the eye to be put on local anaesthetic. You would need to focus at a target image while the ophthalmic technician places an ultrasound probe onto the centre of the cornea.

## **Optical Coherence Tomography (OCT)**

OCT is a non-invasive eye scan which can see in-depth images of the eye's internal structures. This is helpful in detecting any changes to the retina. These changes may not always be visible and sometimes no physical symptoms are felt.

With the help of an OCT scan, a detailed three-dimension image of the retinal and the surface below it is captured. This enables the doctors to see the cross-sectional layers of the retina and measure each layer to help in the early detection and diagnosis of any retinal diseases and conditions.

### **How is the test carried out?**

The procedure takes about 10 minutes and you will be seated to perform the test. You will be required to stare at a fixation light without blinking or moving your eyes. Scanning will take a few seconds.

Dilation of the pupils may be required. In the event that the patient is examined under dilated pupil, slight photophobia may be experienced.

## **Visante Anterior Segment Optical Coherence Tomography (ASOCT)**

The ASOCT is used to evaluate the narrow angle of the anterior segment ocular structures. Measurements will be taken for the anterior chamber depth, anterior chamber angle and diameter, which are useful in managing glaucoma patients. As the equipment can also provide high resolution corneal images, it is especially useful in documenting pre- and post-surgical patients for doctors to evaluate.

### **How is the test carried out?**

Visante is done in a dark room. It is advisable to have your contact lens removed before the test.

You will need to place your chin on the chin rest, and your forehead on the headband. During the test, you will need to see and follow the yellow flower in the machine and refrain from blinking or moving the eye.

The technician performing this test may need to hold your upper or lower eye lid to get a clearer image of superior and inferior of the angle.



## Alexandra Hospital

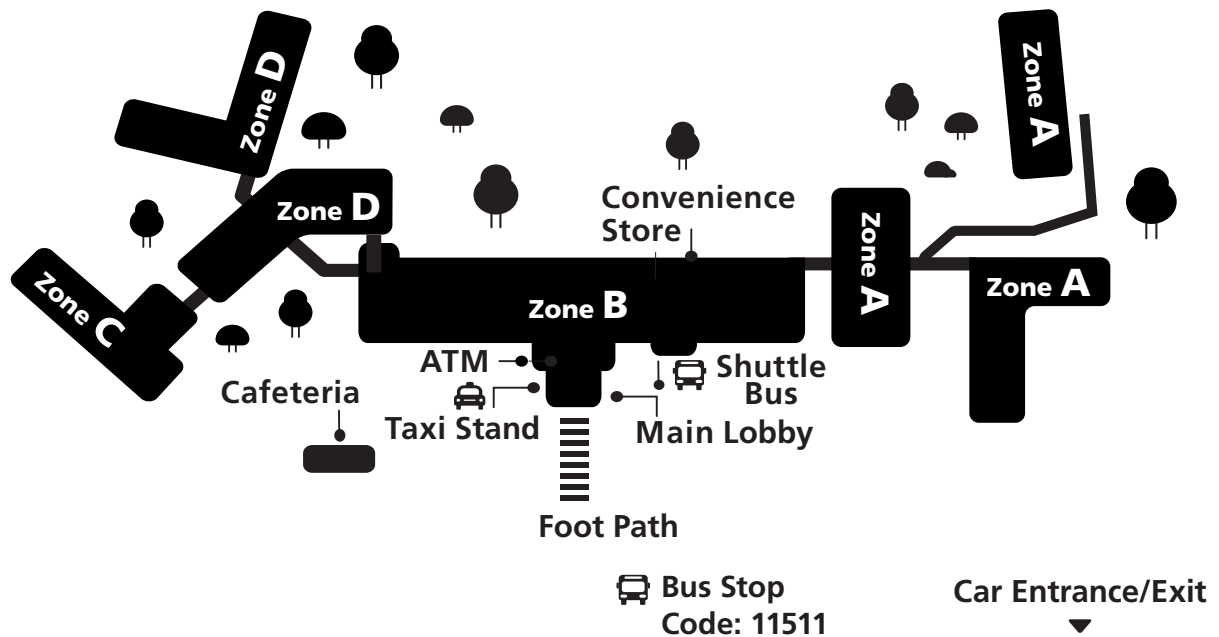
378 Alexandra Road, Singapore 159964

OneNUHS Hotline: (65) 6908 2222

OneNUHS General Enquiries: [contactus@nuhs.edu.sg](mailto:contactus@nuhs.edu.sg)

OneNUHS Appointments: [appointment@nuhs.edu.sg](mailto:appointment@nuhs.edu.sg)

[www.ah.com.sg](http://www.ah.com.sg)



<https://for.sg/9ce2eu>

Scan the QR code to see the full directory of facilities!

The information in this brochure is meant for educational purposes and should not be used as a substitute for medical diagnosis or treatment. Please seek your doctor's advice before starting any treatment, or if you have any questions related to your health, physical fitness or medical condition.

© 2023, Alexandra Hospital All rights reserved. No part of this publication may be reproduced or shared without prior permission from Alexandra Hospital.

Information is correct at time of printing Oct 2023 and subject to revision without prior notice.