

Eye Check

*A look at common
eye conditions*

SINGHEALTH
HEALTHY LIVING SERIES



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Foreword

90% of people suffering from Glaucoma are unaware of it.

80% of people with long-standing diabetes will develop Diabetic Retinopathy.

75% of teenagers in Singapore have myopia and are dependent on glasses.

These are statistics for some of the major eye conditions among adults and children in Singapore. However, each individual should take responsibility for his or her own health, by being aware of the risk factors and early signs and symptoms, going for proper screening, and most importantly by leading a healthy lifestyle.

Here at SingHealth, we are committed to giving you access to comprehensive and appropriate information, medical treatment and support to help you cope with a wide variety of eye

conditions. We have taken the initiative to compile this brochure for you, to empower you to take care of yourself. Knowing your risk factors and being able to detect signs and symptoms early helps in saving sight!

We offer a range of seamlessly integrated services, which includes a one-stop centre for screening and detection and treatment of eye disease. Our faculty of internationally-qualified doctors and dedicated healthcare professionals will ensure that you receive the most appropriate attention and care.

We want to be there for you in your time of need. You can count on us to provide the best possible level of eye care.

Prof Donald Tan
Medical Director
Singapore National Eye Centre

Causes & Symptoms of Common Eye Problems

Do you suffer from eye pain, excessive tearing, redness in your eyes, or have problems with your vision?

Knowing your symptoms is important as it can help you and your eye doctor find out if there is a problem. An eye examination can determine what is wrong so that your doctor can recommend the best treatment option for you.

Here are some common eye symptoms and their possible causes.

Is your vision blurry or distorted?

Long-term blurry or distorted vision can be due to a number of causes.

Most commonly, blurry vision, in particular the inability to clearly see objects that are either far away or up close, is a sign of a simple refractive error like short-sightedness (myopia), long-sightedness (hyperopia), astigmatism or presbyopia (*lao hua*). These conditions can be readily managed with vision correction aids such as spectacles, contact lenses or refractive surgery such as LASIK.

Progressive clouding of vision, when you see objects through a mist, can be a sign of cataracts. This condition, which commonly affects the elderly, is due to the

thickening and clouding of the lens within the eye. It is reversible with surgery.

Poor vision can also be caused by medical conditions such as diabetes mellitus, stroke and hypertension. Certain medications such as chloroquine, or hydroxychloroquine for rheumatoid arthritis or other soft tissue diseases may also cause vision blurring.

A more serious cause of blurry or distorted vision is age-related macular degeneration, which often affects the central vision. In age-related macular degeneration, objects in the centre of the field of view are distorted but the peripheral vision remains clear. This condition is often irreversible and can cause blindness if left untreated, so early diagnosis is important.

If you are suffering from cloudy vision, do see your eye doctor for early diagnosis and treatment.

Are you losing your peripheral vision?

If you are bumping into things or people beside you, or have difficulty seeing overtaking vehicles while

driving, you may be losing your peripheral or 'side' vision.

A common cause of loss of peripheral or 'side' vision is glaucoma, a condition where the eye pressure is usually too high for the eye. Glaucoma may cause an insidious loss of side vision, resulting in late diagnosis and advanced visual loss. Therefore, screening for glaucoma is advisable, especially for those who have a family history of glaucoma, or who are on steroid medications.

Are your eyes itchy or watery?

If you are suffering from prolonged itchiness and watering of the eyes, you could have an allergy to pollen, pet hair, or other allergenic substances in your environment. The condition can be uncomfortable, but does not usually result in significant vision loss even though your eye may feel irritated and tired.

Dry eyes can also be another cause of itching and tearing. Your eye doctor can determine the cause of your eye discomfort and advise treatment.

Do you suffer from eye pain?

Sharp pain in the eye may be caused by foreign bodies, cornea abrasion (break in the surface of the cornea) or even severe dry eye. Severe, dull pain, however, may indicate an acute attack of glaucoma; this is usually associated with vision loss and eye redness. Consult your doctor for an early diagnosis.

Do you see floaters in your field of vision?

Floater are dark, distinct spots that you may see in your field of vision. Floaters occur when the vitreous (the jelly-like content inside the eye) degenerates due to ageing or myopia. These vitreous debris cast shadows onto the field of vision that are seen as floaters.

Floater can be an indication of vitreous degeneration, or a more serious problem like diabetic retinopathy, a condition that causes blood vessels in the retina to weaken and burst. The resulting blood that seeps into the eye forms floaters.

Floater can also be caused by retinal tears or detachment, a serious condition when the retina of the eye detaches from the rest of the layers of the eye.

If you see floaters, see your eye doctor for early diagnosis and treatment.

Are you seeing flashes?

Flashes appear as arcs of light across the field of vision. Sometimes it may occur as flashes of light. Like floaters, flashes are eye symptoms that are commonly associated with vitreous detachment or more seriously, with retinal detachment. If you see flashes, see your eye doctor for early diagnosis and treatment.

Regular Eye Examination



An eye check is important for all – from the young to elderly.

Protect your eyes with regular eye exams

Eyesight is one of the most important senses we have. It is a complex and intricate process of gathering, focusing and translating light into images. As we get older, the eye becomes more susceptible to damage and disease. Being alert to changes in vision is important in picking up eye diseases.

Some eye diseases such as high eye pressure leading to glaucoma have no symptoms in their early stages, so you may not know you have a problem until the disease is in its later stage. This can make treatment more difficult and the problem harder to reverse. Therefore, regular eye exams are essential for early diagnosis and treatment of any problem. Early detection and treatment

can slow down or even reverse the progression of eye disease.

What happens during an eye examination?

An eye examination does not hurt. Your eye doctor will usually conduct a basic eye examination that will consist of an external check of your eyes, the eyelids and the surrounding areas. Parts of the eye, such as the conjunctiva, sclera, cornea and iris, will also be inspected for signs of disease.

A complete eye examination includes :

- Testing of vision (with or without corrective eyewear)
- Assessing the reflexes of your pupils
- Checking of eye muscle function
- Peripheral (side) vision testing
- Examining the front of the eye using an upright microscope (a slit lamp)
- Eye pressure tests
- Examining the back of the eye

How often should one go for an eye exam?

Babies (Age 3 and below)

Ensure that your child's eyes are screened during regular paediatric appointments. Some common childhood eye conditions to look out

for include strabismus (crossed eyes) and amblyopia (lazy eye). Screening is also performed to exclude rarer diseases such as congenital cataract and retinoblastoma (eye tumour).

Children and Teenagers (Age 3 to 19)

Ensure that your child has a thorough eye check every one to two years during routine health check-ups or when getting fitted for corrective eyewear, such as for myopia.

Young Adults (Age 20 to 39)

Have a comprehensive eye examination if you have a family history of eye disease or if you are suffering from an eye injury.

Adults and Seniors (Age 40 to 64)

As you get older, age-related eye conditions are more likely to occur. To monitor vision changes, you should get a baseline eye disease screening when you are 40 and ask the doctor to assess how often you need to return for follow-up screenings.

For Anyone with Risk Factors

If you have a risk factor for eye disease (are diabetic, have high blood pressure, have a family history of eye disease, or are taking prescription medications which may affect the eyes) you should see your ophthalmologist more frequently. Ask your eye doctor for the ideal interval between check-ups.

Age-Related Macular Degeneration

If haziness or blank spots appear in your central vision, or if you find that straight lines look a little wavy, see your eye doctor—it could be a sign of age-related macular degeneration, an eye condition that could lead to severe vision loss.

What is age-related macular degeneration (AMD)?

It is a chronic irreversible medical condition that results in loss of vision in the centre of the visual field (the macula) because of damage to the retina.

Age-related macular degeneration (AMD) is one of the leading causes of blindness in those over 50 years old. Smokers have a two to four times higher risk of developing AMD compared to non-smokers.*

If you are over 50 and smoke, have your eyes checked.

*Based on a 2009 study by the Singapore Eye Research Institute

The condition can make it difficult to read or recognise faces, although enough peripheral vision remains to allow you to continue with other daily activities. However, activities like driving and reading will be affected.

Causes

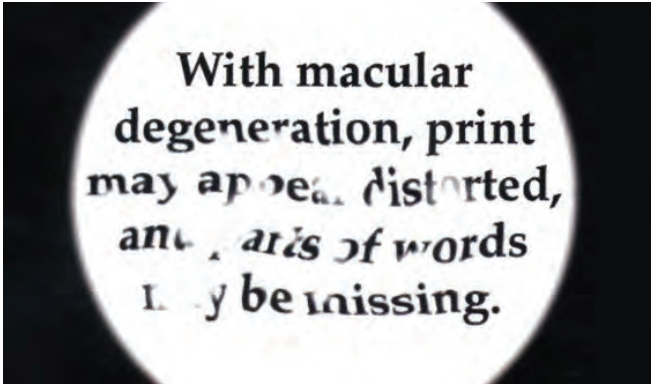
Age-related macular degeneration occurs in 'dry' and 'wet' forms. 90% of AMD patients suffer from the dry form. Dry AMD results in slow progressive loss of central vision. The condition develops as the light-sensitive cells in the macula slowly break down with age.

In wet AMD, abnormal blood vessel growth in the eye leads to the leaking of blood and proteins into the macula, leading to subsequent vision loss. The wet form commonly results in advance visual loss within a short period of time.

Symptoms

One or some of these symptoms may be experienced :

- Blurring of central vision (may be gradual or rapid in onset)
- Shadows or missing areas of vision
- Distorted vision e.g. a grid of straight lines appears wavy and parts of the grid appear blank



Vision impaired by AMD.

- Problems discerning colours, specifically dark colours from other dark colours and light colours from other light colours
- Slow recovery of visual function after exposure to bright light
- Loss of contrast sensitivity (ability to tell different levels of brightness apart)

Prevention

There are no proven preventive medications for AMD. The best way to prevent vision loss is to get a prompt

eye examination and diagnosis by your eye doctor. Early diagnosis improves the success of treatment.

You can monitor your vision daily by looking at an Amsler grid (Fig. 1). The Amsler grid is a diagnostic tool that can help to detect subtle changes in your vision. You should also stop smoking, eat a healthy balanced diet that includes leafy green vegetables, and protect your eyes from UV light with protective sunglasses or head gear with wide brims.

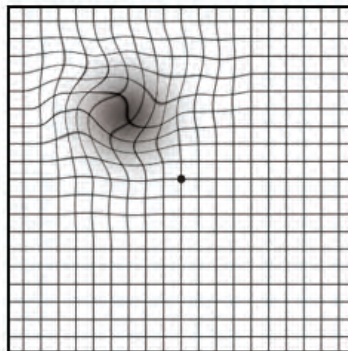
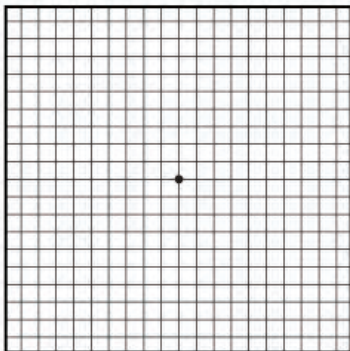


Fig 1a (left)
Amsler Chart. With one eye, focus on the central black dot. You should be able to see the surrounding grid lines clearly in the absence of AMD.

Fig 1b (right)
Vision impaired by AMD.



Normal vision.



Vision impaired by AMD.

Treatment

Treatment options for wet AMD :

- **Laser photocoagulation.** A surgical procedure involving the application of a hot laser.
- **Photodynamic therapy with verteporfin.** This method uses a non-thermal laser together with an intravenous drug to seal and halt or slow the progression of the condition.
- **Drugs.** Macugen and Lucentis are examples of drugs delivered into the eye through injections to block the growth of the abnormal blood vessels.

There is no treatment for dry AMD although magnifiers can help with reading.

Risk Factors

Your risk increases with :

- Age. A local community study by the Singapore Eye Research Institute in 1997 showed that one in four persons aged 60 and above in Singapore suffers from the condition.
- Family history
- Gender. Women are more likely to develop AMD.
- Smoking
- Obesity
- Cardiovascular diseases

Cataracts

Although cataracts do not cause irritation or pain, it is the most common cause of blindness in the world. Fortunately, it is treatable with safe, effective surgery.

What are cataracts?

A cataract is a condition in which the lens of your eye turns cloudy, preventing sufficient light from entering your eye, therefore reducing vision. Eventually, this deterioration in vision will interfere with your daily activities, such as reading or driving a car (particularly at night).

Most cataracts develop slowly and you may not notice it in the earlier stages of the condition. However, your vision will be affected as the clouding progresses.

Are cataracts dangerous?

Cataracts are not dangerous to eye health unless they become completely white. This condition, called an overripe or hypermature cataract, can cause raised eye pressure and present suddenly with redness and pain in the eye, as well as headaches. If a cataract causes inflammation and raised eye pressure, it will need to be removed.

Causes

Cataract formation is associated with ageing and is common in the elderly. In young people, it can be congenital, associated with inflammatory eye disease or due to injuries.

Other risk factors include prolonged UV light exposure, long-term use of certain medications and medical conditions such as diabetes.

Symptoms

The first sign that you may have a cataract is if you have blurred vision that cannot be corrected with the usual corrective visual aids such as glasses. You will experience the need for frequent change of glasses, colours appearing dull, poor vision in bright light, halos around lights, difficulty in reading, watching television or driving at night.

Signs and symptoms of cataracts include :

- Clouded, blurred or dim vision
- Difficulty seeing at night that worsens with time
- Sensitivity to light and glare
- Seeing halos around lights
- The need for bright light when reading and performing other tasks
- Fading or yellowing of colours
- Double vision in one eye

Risk Factors

Everyone is at risk because age is the greatest risk factor. Your risk of developing cataracts increases with :

- Age
- Diabetes
- Prior eye injury or inflammation
- Prior eye surgery
- Prolonged use of corticosteroid drugs
- Excessive exposure to UV light
- Smoking

Prevention

There is no scientifically proven prevention. However, these tips will help prevent cataracts :

- **Protect your eyes.** Protect your eyes from UV light by wearing sunglasses regularly.
- **Regular eye examination.** Regular eye examination is the key to early detection. Have your eyes checked by an eye care professional if you experience any eye problems.
- **If you are over 65, you should have your eyes examined by an eye care professional regularly.**
- **Maintain a healthy lifestyle.** You can also reduce your risk of developing cataracts by maintaining a healthy lifestyle – do not smoke and eat a balanced diet.

Treatment

Cataracts cannot be cured with medications.

Lifestyle adjustments such as changing your spectacle power, using a magnifying glass to read or



Clear vision – without cataract.



Blur vision – with cataract.

improving the lighting in your home can be adopted in the earlier stages of the condition.

Cataract surgery is required when the condition starts to interfere with your daily activities. It is a painless, safe and effective surgery. During the procedure, the clouded lens is removed and replaced with a clear lens implant.

The cataracts are rarely removed without the need to implant new lenses. In these cases, vision can be corrected with aids such as glasses or contact lenses.

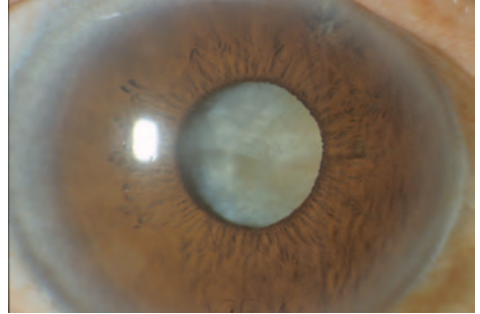
Cataract surgery is performed as a day surgery without general anaesthesia but with topical anaesthesia.

Safer healing in cataract surgery

Most cataract surgeries are performed using a technique called phacoemulsification which does away with the need for stitches. The procedure involves making a small incision of 1.8 to 3mm on the cornea. A vibrating instrument is then introduced into the eye through this incision. This process causes emulsification (i.e. softening) of the clouded lens, which is sucked out through the instrument. The capsule of the lens is left behind to receive the lens implant.



An IOL implant.



Eye with cataract.

Types of Intra-ocular Lenses

There are various types of intra-ocular lenses (IOL) available. Discuss with your doctor about the most suitable type of lenses for you.

1. Monofocal

- Provides good vision at a specific distance
- Reading glasses will most likely be required for reading

2. Advanced Monofocal

- Aspheric lenses – Provides sharper, better quality vision especially in poor lighting conditions e.g. driving at night when it is raining
- Toric lenses – Treats astigmatism, reducing the need for spectacles for distance vision

Monofocal lenses in both eyes

The full distance correction in both eyes will benefit those with an active sports/ outdoor lifestyle.

Monovision using monofocal lenses

The IOL power is chosen to provide :

- Good distance vision in one eye, and
- Good near vision in the other

This will allow most patients to be spectacle-independent for most activities. They may still need reading glasses when reading for prolonged periods of time. Not all patients are able to tolerate monovision lenses and depth of vision may be reduced.

3. Multifocal

- Provides good distance and near vision without glasses

Suitable for those who :

- Want reduced spectacle dependence
- Have minimal astigmatism
- Engage in activities with a significant amount of intermediate distance work
- Drive mostly in the daytime

For best results, these lenses should be used in both eyes.

Multifocal lenses offer :

- Greater convenience
- Near and intermediate vision is clear at a fixed distance from the eye (e.g. computer, housework)

After surgery, some people may notice :

- Difficulty reading small print in dim light
- Colours may appear less brilliant
- Halo vision at night (i.e. ring of light around street lamps or car headlights)

These symptoms are temporary in most cases and are less likely if both eyes have these lenses.

Multifocal Toric IOLs

These are also available today. These IOLs provide for near/intermediate and distance vision just as other multifocal IOLs with their attendant side effects, but in addition incorporate the astigmatism correction.

4. Accommodative

- Provides good distance and intermediate vision without glasses
- Near vision is limited and reading glasses are required for serious reading
- Depends on the eye's focusing muscle to move the lens to focus

Suitable for those who :

- Want reduced spectacle dependence
- Have minimal astigmatism
- Major activities include significant intermediate distance work
- Drive in both day and night time

For best results, this lens should be used in both eyes.

Accommodative lenses offer :

- Great convenience
- Good distance, intermediate and near vision

After surgery, some people may:

- Require reading glasses for extended reading
- Have halo and glare at night
- Require a laser procedure one year after surgery to clear vision in some cases

Your choice of lenses depends on your lifestyle. Keep in mind that they should improve and enhance your overall vision.

Childhood Myopia

In Singapore, the incidence of myopia in children is very high. Surveys indicate that myopia affects one in four 7 year olds, a third of 9 year olds, and half of 12 year olds.

What is childhood myopia (short-sightedness)?

Childhood myopia is a progressive form of short-sightedness (myopia) that occurs during a child's growing years and worsens throughout childhood.

The condition is easily corrected with corrective visual aids like glasses, and the condition usually stabilises when a child reaches his or her mid-teens.

Causes

Evidence indicates that progressive childhood myopia or short-sightedness is caused by a combination of genetic and environmental factors. We know that children of myopic parents are more likely to have myopia.

There is also evidence that environmental influences interacting with genes play a major role. Other habits such as long periods of detailed or close work and childhood illnesses may also influence the progression of myopia.

Another reason could be the intensity of near work, such as reading, studying and computer usage, that takes place in daily life.



Too much near work is associated with myopia.

Symptoms

School-age children may complain that they cannot see the whiteboard at school or the bus number of the oncoming bus at the bus stop.

Other signs of myopia include :

- Squinting while doing homework, reading or watching TV
- Rubbing of eyes
- Blinking
- Fatigue

Prevention / Treatment

Myopia cannot be reversed or cured, but it can be slowed or prevented :

Practising good eye care habits is one of the best ways to prevent myopia in your child. While near work (such as school work, working on computers or reading) is unavoidable, ensure that your child takes frequent breaks to rest his/her eyes.

Parents can encourage children to practise good eye care habits to prevent myopia from occurring or worsening.

Glasses can correct myopia.

The Singapore Eye Research Institute (SERI) has successfully conducted clinical trials* to investigate the progression of childhood myopia with the use of atropine eyedrops.

* (Atropine in the Treatment of Myopia (ATOM) Study)

Practise these good eye care habits :

- Have your child participate in more outdoor activities
- Hold any reading material 30 cm away from the face/eyes and always read while sitting upright
- Be seated at least two metres away when watching television
- Computer screens should be placed approximately 50 cm away from eyes and adjusted for minimal glare
- Lighting should be sufficient to illuminate the room when reading, using the computer or watching television without causing any glare



Enjoy the outdoors! Take frequent breaks from near work.

- Take a break to rest your eyes every 30 to 40 minutes. Look out of the window at distant objects to relax the eyes.

Yearly eye examinations are also important to detect any vision problems early. Corrective visual aids like glasses, when required, will help the eye to focus better.

Myopia cannot be prevented or improved by :

- Avoiding the use of spectacles
- Reducing the power of the glasses (i.e. undercorrection)
- Taking dietary supplements such as Vitamin A
- Eye exercises, acupressure or vision training

Contact Lenses

Contact lenses can be used as an alternative to spectacles and, with proper care, are a safe, effective and convenient way to correct refractive errors such as myopia (short-sightedness), hyperopia (long-sightedness), astigmatism and presbyopia (*lao hua*).



What are contact lenses and how do they work?

Contact lenses are thin, curved plastic discs designed to cover the cornea of the eye. They correct the way light enters the eye by improving the way it focuses on the retina. Surface tension allows contact lenses to cling onto the thin film of tears on the cornea.

Apart from vision correction, specially tinted contacts can be used to change the colour of the eyes for aesthetic purposes.

An advantage of contact lenses is that it provides for maximum peripheral vision, which is especially useful in sports and games. Contact lenses are also useful in correcting vision when the power of each eye differs greatly.

Most people who require vision correction can wear contact lenses. However, a small proportion with dry eyes, frequent eye infections or severe allergies may not be suitable for contact lenses.

Types of contact lenses

PMMA Lenses

PMMA lenses are rigid contacts that are made of PMMA plastic. The lenses do not allow oxygen to directly reach the cornea but as the lens moves when the eye blinks, tears bring dissolved oxygen to the cornea. They are very durable and long-lasting. They are no longer sold in the market.

Rigid Gas Permeable Lenses (Semi-hard contact lenses)

Rigid gas permeable lenses are newer types of rigid plastic lenses that allow oxygen to pass directly through the lens into the eye. These lenses though less durable than PMMA lenses are more comfortable. Some gas permeable lenses can be worn for an extended period of time.

Compared with soft lenses, semi-hard contact lenses take some getting used to but are, however, less prone to deposit build-up. They offer good visual quality with lower risk of contact lens-related complications such as eye infections.

Soft Contact Lenses

The materials in soft contact lens incorporate water which makes them soft and flexible, and allows oxygen to reach the cornea in varying amounts.

There are currently 2 types of soft lens materials : hydrogel and silicone hydrogel. Hydrogel lenses in general have lower oxygen permeability than

rigid gas permeable lenses. Silicone hydrogel lenses have higher oxygen permeability than hydrogel lenses and some are comparable to rigid gas permeable lenses in terms of oxygen permeability. In general, if you are wearing contact lenses for long hours, use silicone hydrogel lenses as these lenses are less likely to induce problems in the cornea due to hypoxia (lack of oxygen).

Soft contact lenses are among the most popular lenses in Singapore as they are very convenient, comfortable and offer a high level of convenience. Some types of soft contact lenses may be worn for longer periods of time compared to hard lenses but it is not advisable to wear these lenses overnight as the risk of developing infections of the cornea increase.

Disposable Soft Contact Lenses

Disposable soft lenses that can be discarded and replaced daily, weekly or fortnightly are gaining in popularity because of added convenience and safety. By changing the lenses frequently, the likelihood of allergic reactions and deposit formation is reduced.

Toric Contact Lenses

Toric lenses correct astigmatism. They are available in both rigid and soft materials.

Who should not wear contact lenses?

Most people who require vision correction can wear contact lenses. However, there are certain conditions that might prevent you from wearing contact lenses. These include dry eyes, frequent eye infections, severe allergies, working in a very dusty environment and inability to handle and care for the lenses.

How do I care for my contact lenses?

It is important to remember that contact lenses are medical devices that need to be properly fitted by an eye care practitioner who can assess your vision correction needs according to your lifestyle or other conditions. Your work environment, prescription drugs and any eye condition such as dry eyes or allergies affect the choice of lenses suitable for you.

As contact lenses are in constant contact with the eye, proper cleaning and disinfecting of lenses is very important. Infections of the eye can occur due to poor hygiene and lens care.

Some important contact lens care instructions :

- Always wash your hands before handling your contact lenses.
- Always clean and disinfect contact lenses properly after each use.
- Clean and air-dry the contact lens case everyday. Wash and boil your lens case once a week and replace your lens cases regularly. Do not store lens cases and lens solution in the bathroom.
- Follow exactly the lens care instructions of your eye care professional.
- Do not reuse your contact lens solution. Discard used solutions immediately.
- Do not store contact lenses in non-sterile fluids such as distilled water or tap water.
- Do not wear an over-aged or damaged contact lens.
- Arrange for periodic eye examination (at least six months to yearly) by an eye care professional.
- Avoid wearing lenses overnight (even for extended wear lenses) as this increases the risk of corneal infections.
- Do not wear contact lenses when swimming as this can increase the risk of lens contamination by harmful microorganisms.
- If you have eye-redness, discharge or blurring of vision, stop wearing your contact lenses and consult your eye care practitioner or doctor.

Cornea Diseases & Cornea Transplants

What is a cornea transplant?

A corneal transplant replaces a diseased or scarred cornea with a donor cornea. The procedure is often carried out when vision is affected because the cornea becomes cloudy, scarred or infected. These conditions prevent light from passing through the cornea and into the eye to reach the light-sensitive retina.

Unlike other forms of organ transplants, corneal transplants may be performed several times if previous attempts fail. However, the success rate of repeat transplants may be lower than a first-time graft and anti-rejection tablets may be needed to prevent rejection in these cases.

Who needs a cornea transplant?

A cornea transplant is an effective means of restoring vision in cases of corneal diseases, injuries, infections and age-related corneal degeneration.

Some of the common conditions leading to a need for a transplant are:

Keratitis

Cornea infection, or keratitis, is a common reason leading to the need for a transplant. The infection can

be bacterial, fungal or amoebic in nature. Serious corneal ulcers and corneal scarring which affect corneal transparency and vision will need cornea transplantation.

Keratoconus

Keratoconus is a disorder of the cornea that causes the cornea to become progressively thin. The thinned cornea will bulge forward and become cone-like, causing changes in the refractive power of the eye. It will especially increase astigmatism and lead to poor vision. In its early stages, the condition can be corrected with rigid contact lenses. If contact lens intolerance develops, a corneal transplant may be necessary.

Fuch's Dystrophy

In the early stages of the disease, there is blurry vision that gets progressively better as the day passes. But in its later stages, Fuch's dystrophy can cause swelling, distorted vision and pain. The condition affects corneal transparency and in severe cases, will require a corneal transplant to restore vision.

Lattice Dystrophy

This is the accumulation of abnormal

protein fibres in the middle layer of the cornea causing vision to become cloudy. If these protein deposits occur under the outermost layer of the cornea, corneal erosion can occur. Medical treatments such as eye drops or soft contact lens can help the condition but in severe cases, a corneal transplant may be needed.

How is a corneal transplant performed?

A cornea transplant is a microsurgical operation performed by a trained corneal transplant eye surgeon. Healthy donated corneal tissue is used to replace a diseased cornea to restore vision and eye health.

The operation involves removing the portion of the damaged or cloudy cornea. A clear and healthy donor cornea is then placed and sutured in place with very fine microsurgical nylon sutures. If a full thickness cornea transplant is performed, this procedure is also known as a Penetrating Keratoplasty (PK).

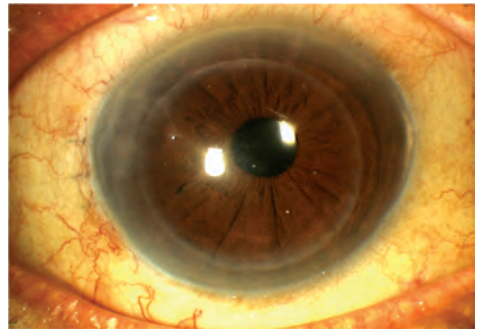
In certain cases when the cornea is not diseased throughout its whole thickness, only the diseased portion is removed and a partial thickness cornea transplant is performed. This procedure is known as **Lamellar Keratoplasty (LK)**.

Anterior Lamellar Keratoplasty (ALK) is performed only when the anterior (front) layers of the cornea

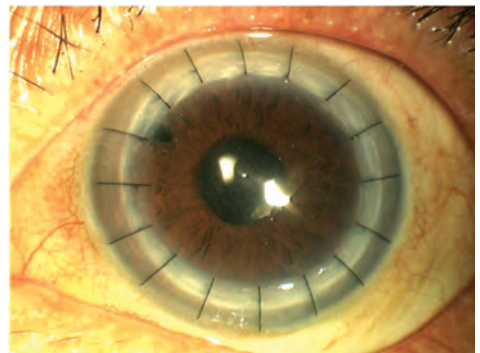
are removed. This is a technically more challenging procedure that preserves the deeper or posterior layers of the cornea.

When only the diseased posterior (back) layers of the cornea are replaced, the procedure is called **Endothelial Keratoplasty (EK or DSAEK)**.

The advantage of lamellar keratoplasty is that only the diseased portion of the cornea is removed so that the healthy normal layers of the cornea



Cornea transplant (without sutures) using DSAEK technique.



Conventional cornea transplant (with sutures).

are preserved. These procedures greatly reduce the risk of cornea graft rejection which is a significant cause of graft failure in corneal transplants.

Osteo-odonto Keratoprosthesis (OOKP) or 'Tooth-in-Eye' Surgery

Osteo-odonto Keratoprosthesis (OOKP) is another type of surgery that restores vision. It is an option for end-stage corneal blindness when conventional corneal transplant procedures are not suitable. Also known as 'tooth-in-eye' surgery. This surgery takes place in two stages.

The Singapore Eye Bank

The Singapore Eye Bank, in close collaboration with the SNEC Corneal Transplantation Program, secures a large number of donor corneas each year for transplants. The Singapore Eye Bank gets corneas from local donors in Singapore, as well as from internationally-accredited eye banks from the United States and the Philippines. As the Singapore Eye Bank is very successful in procuring corneal tissue today, it usually takes one to two weeks to receive a cornea. It also provides corneas for non-Singaporeans undergoing corneal transplants in Singapore.

Stage One: Osteo-odonto Keratoprosthesis (OOKP) or 'Tooth-in-Eye' Surgery

- A tooth – with its roots and part of the jaw intact – is removed from the patient.
- The tooth is fashioned into a cube with a hole drilled into its centre.
- An artificial plastic device called an optical cylinder is implanted in the tooth to focus light on the retina.
- The tooth structure is inserted into the patient's cheek to grow a new blood supply.
- While the tooth grows a new blood supply, the damaged layers of the patient's eyes are removed and the inner mucosal lining of the cheek is transplanted onto the surface of the eye to cover it.

Stage Two: Osteo-odonto Keratoprosthesis (OOKP) or 'Tooth-in-Eye' Surgery

- After about four months, the patient's covered eye is opened and the inner contents of the eye removed.
- A circular opening is made to receive the implant.
- The tooth structure in the patient's cheek is implanted within the eye.
- At the end of the procedure, light can pass through the plastic cylinder, and the patient will be able to see through this cylinder and enjoy good vision.

Diabetic Retinopathy

As diabetic retinopathy can have no symptoms initially, it is important to have your eyes checked annually if you are diabetic. Good vision can be maintained if retinopathy is detected and treated early before permanent damage has occurred.

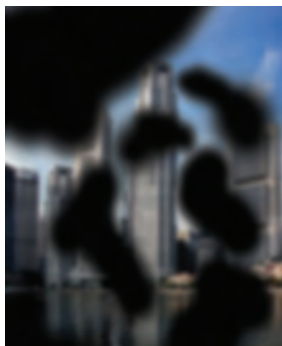
blood supply to the retina cells, bleeding inside the eye or scarring and detachment of the retina.

80% of people with long-standing diabetes will develop diabetic retinopathy. If you have diabetes, have your eyes checked yearly.

*Based on a 2001 study by Singapore Eye Research Institute.



Normal vision.



Vision impaired by diabetic retinopathy.

What is diabetic retinopathy?

The retina is the layer that lines the inside of the back of the eye. The function of the retina is very much like the film in a camera. It contains millions of light-sensing cells that detect the images we see.

Diabetes can cause damage to the retina, causing loss of vision due to swelling of the retina, insufficient

Causes

Diabetes damages the small blood vessels in the retina over time. The small blood vessels can leak, causing swelling of the retina.

They can also become blocked, causing the retina to react by trying to grow new blood vessels. These abnormal and fragile new vessels bleed

into the cavity of the eye. Scars can form from these new vessels which then pull on the retina and cause it to detach. All these can lead to severe and permanent vision loss.

Symptoms

Patients usually have no symptoms, i.e. vision is perfectly normal, in the early stages of diabetic retinopathy. Once vision is affected, the diabetic retinopathy is usually severe.

Symptoms of diabetic retinopathy include:

- Blurred vision
- Dark clouds in your field of vision due to bleeding inside the eye

Risk Factors

The risk of diabetic retinopathy increases with the duration of diabetes.

Important risk factors that worsen diabetic retinopathy include :

- Poor blood sugar level control
- High blood pressure
- High cholesterol
- Pregnancy
- Smoking
- Kidney failure

Prevention

If you have diabetes you should control your blood sugar level, blood pressure and cholesterol to reduce the risk of diabetic retinopathy.

Unfortunately, good glucose control does not wholly eliminate the risk of diabetic retinopathy. Coupled with the fact that diabetic retinopathy has no symptoms in the beginning, **it is very important for all diabetics to have their eyes checked every year.** This can be done by your doctor or by having a photograph of the retina taken.

Diagnosis

The doctor can make the diagnosis of diabetic retinopathy by examining the eyes with special instruments and

lenses. Taking photographs of the retina is a helpful way of detecting and assessing diabetic retinopathy.

Treatment

Laser treatment is required if the retinopathy becomes severe. Laser burns are used to treat swollen areas of the retina. They are also applied to areas of the retina damaged by poor blood supply to stop abnormal new blood vessels from growing. Laser treatments are usually carried out in an outpatient setting. Multiple sessions of treatment are usually necessary.

Other surgical procedures such as vitrectomy may be required in advanced cases where there is bleeding into the eye, scar tissue formation and retinal detachment. Surgery is the last resort to save the eye. Injections of medication into the eye to control swelling or new vessel growth are given in selected cases.

Regular eye exams are required after treatment as retinopathy is a long-term condition. The aim of treatment is to stabilise the retinopathy and prevent the worsening of vision over a period of time. Unfortunately, the damage that has already occurred can be permanent.

Droopy Eyelid (Ptosis)



Patient with Ptosis.

How do you know if you have droopy eyelids (Ptosis)

You may find it more and more difficult to keep your eyes open, or you may feel eye strain and eyebrow ache from the increased effort to raise the lids, or fatigue when reading. In severe cases, it may be necessary to tilt your head backward in order to see from under the eyelid. Your family and friends might also notice that you have a constantly 'tired' appearance.

Causes

Ptosis may be present at birth (congenital) or appear later in life (acquired).

Congenital ptosis is usually a result of maldevelopment of the levator muscle responsible for the lifting of the upper lid.

Acquired ptosis has several causes. Among them, the most common cause is the stretching of the levator muscle, due to the ageing process. This is called aponeurotic ptosis.

It is also not uncommon to develop this type of ptosis after eye surgery or after contact lens wear. Other causes of

ptosis include third cranial nerve palsy and neurological muscular disorders such as myasthenia and muscle dystrophies.

Treatment

The type of treatment available depends on the cause of the ptosis. Aponeurotic ptosis can frequently be repaired surgically.

Surgery is usually performed under local anaesthesia. The main goal of surgery is to elevate the upper eyelid to permit better vision. At the same time, the surgeon aims to achieve a reasonable amount of symmetry. Good to excellent results can be achieved although perfect symmetry may not always be obtained.

Congenital ptosis is different from acquired ptosis in that the surgeon has to deal with an abnormal muscle. When operating on an abnormal muscle, it is not always possible to achieve complete symmetry of both lid positions and function after surgery. Patients with congenital ptosis may still have a drooping lid on up-gaze and the white of the eye (sclera) will become visible on down-gaze. There may be inadequate lid closure during sleep.

Congenital ptosis is usually repaired in childhood if it is severe and obstructs vision. If mild, it can be repaired either in later childhood or early adulthood.

Eye Infections

Exposure to viral or bacterial infections can cause eyes to become red, swollen and watery. Knowing what to look out for and taking care of your eyes will help you to prevent much discomfort.

What are eye infections?

Eye infections are eye diseases caused by bacterial, viral or other microbiological agents that cause your eyes to become red and swollen.

Conjunctivitis (pink or red eye) is the most common eye infection. It is an inflammation of the conjunctiva which is the outer lining of the eyeball that extends to the inner surface of the eyelids. It is

usually due to an allergic reaction, or a viral or bacterial infection.

A sty is another common condition that occurs when an infection occurs in the hair follicle of your eyelashes. It normally looks like a small pus-filled boil or a pimple. If the infection of your eyelid is more severe, the condition is known as preseptal cellulitis, or an eyelid infection.

Keratitis is a serious eye infection of the cornea. It may develop very quickly and can lead to ulceration, scarring and loss of vision.



Causes

- Improper contact lens care is the most common cause of this condition
- Viruses
- Bacteria
- Allergies
- Chemical entering the eye
- Foreign objects in the eye
- Trauma to the eye

Symptoms

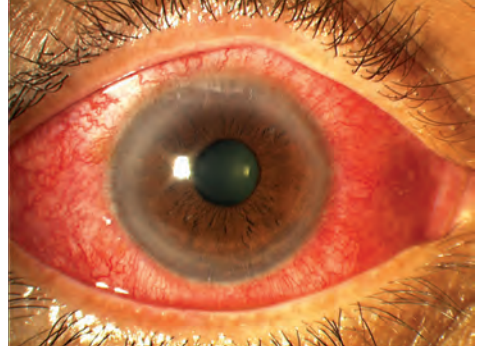
You may experience one or more of the following symptoms :

- Persistent itching
- Flaking of the eyelids
- Discomfort of the eyes
- Blurring of vision
- Watery eyes
- Eye discharge
- Eye pain
- Swelling of the eyes or eyelids, and the surrounding tissue

Prevention

Eye infections usually occur because of contact with viruses or bacteria. To prevent these harmful agents from entering your eye, follow the guidelines below :

- Wash your hands before and after touching your eyes or face.
- Avoid sharing eye make-up and change eye make-up every six months.
- If you have an existing eye infection, avoid using any eye make-up or wearing contact lenses until the infection clears up.
- Practise good contact lens care and never share contact lens equipment, containers, or solutions.



Eye with conjunctivitis.

- Do not share towels, linens, pillows, or handkerchiefs.
- Wear eye protection when in the sun, wind, heat, or cold to prevent eye irritation.
- Wear safety glasses when working with chemicals.
- Avoid exposing your eyes to contaminated water.

Treatment

You should see your eye doctor to determine the cause of your eye infection and get advice on the best course of treatment.

In some cases of conjunctivitis, non-steroidal anti-inflammatory medications and antihistamines may be prescribed. Some patients with persistent allergic conjunctivitis may also require topical steroid drops.

Eye infection cases need treatment with antibiotic eyedrops, especially when non-viral causes are involved. Cornea infections or ulcers may even require hospitalisation.

Floaters & Flashes

Occasionally, small dots, lines or 'cobwebs' may float into our vision. When this happens very often, and is accompanied by flashes of light in your vision, the condition may be more serious.

What are floaters and flashes and how do I know if I have them?

Floaters are flying lines or dots that you may sometimes see moving in your field of vision. You usually see floaters when you are looking at a plain bright background, such as a blue sky.



Floaters.

Flashes are illusions of flashing lights or lightning streaks. Flashes may appear on and off for several weeks or months.

Causes

Floaters are caused by tiny clumps of gel or cellular debris inside the vitreous (a jelly-like fluid) that fills the inside cavity of the eye. The floaters appear to be in front of the eye but they are actually floating in the vitreous fluid inside the eye. They

cast their shadows on the retina, the light-sensing inner layer of the eye. Moving your eyes up and down creates currents within the vitreous and moves the floaters away from your direct line of vision.

Floaters result from the normal ageing process when the vitreous fluid degenerates. Flashes also result from the normal ageing process and are usually not a cause for worry.

Floaters and flashes are only a matter for concern if the degenerated vitreous pulls away from the retina and tears it. This can cause bleeding in the eye, and may appear as new floaters. Severe retinal tearing may develop into a retinal detachment, causing vision loss. Therefore, it is important to see your eye doctor when you see a sudden onset of many new floaters or flashes.

Prevention

Floaters and flashes are caused by ageing and cannot be prevented. However, you should always maintain good eye health and have your eyes checked regularly.

Treatment

There is no treatment or cure for floaters or flashes. They usually diminish over time but will not disappear.

Glaucoma

Glaucoma is one of the leading causes of blindness in the world. It accounts for 5.1 million of the estimated 38 million blind in the world and is the leading cause of irreversible blindness worldwide. Glaucoma accounts for 40% of blindness in Singapore.

What is Glaucoma?

Glaucoma is a group of conditions that eventually leads to diminished vision. Known as the 'silent thief of sight', glaucoma can damage your vision so slowly that you do not notice the gradual loss until the disease is in its advanced state.

As the number of elderly in the world rapidly increases, glaucoma morbidity will rise, causing increased health care costs and economic burden. With almost 70 million cases of glaucoma worldwide, glaucoma will be the most common cause of irreversible blindness in the world.

Glaucoma is not curable, but blindness is preventable if glaucoma is diagnosed and treated early enough. While there are usually no warning signs, regular eye tests will detect the onset of the disease.

Causes

Glaucoma is usually caused by fluid pressure in the eyeball that is too high for the optic nerve to tolerate. The optic nerve carries visual impulses from your eye to the brain. This pressure build-up occurs because of an imbalance between the production and drainage of fluid within the eyeball.

There are different types of glaucoma.

Primary open-angle glaucoma

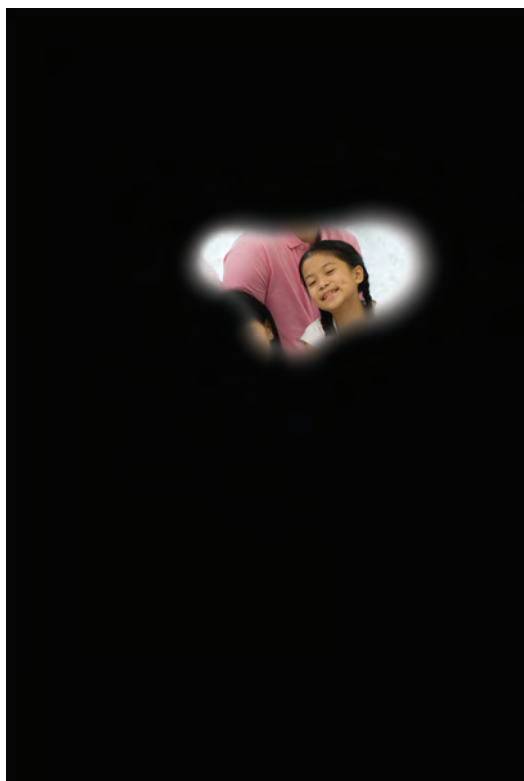
accounts for about half the cases. It affects the elderly and the middle-aged. This type of glaucoma progresses slowly and painlessly, so you may not notice that your vision is deteriorating. Peripheral and night vision will be affected before your central reading vision.

Glaucoma is the 'silent thief of sight', 90% of people suffering from the condition are unaware of it. Glaucoma has a strong genetic basis and family history is known to be a risk factor.

If you have a family member with glaucoma, we advise you to have your eyes checked.



Normal vision.



Impaired vision from glaucoma.

In Singapore, approximately 3% of people over the age of 50 have glaucoma. This percentage increases with age and is almost 10% for those over the age of 70. Closed-angle glaucoma accounts for about half this figure.*

Worldwide, over 90% of people suffering from glaucoma are unaware of it at the time of diagnosis as it can be largely asymptomatic; hence the name, 'silent thief of sight'.

*Based on a 2009 study by the Singapore Eye Research Institute

Acute angle-closure glaucoma

affects predominantly the elderly and middle-aged Chinese women. The onset of this form of glaucoma is sudden, with fluid pressure rising rapidly and drastically in the eye. This results in eye pain, redness, headache and nausea. Accompanying symptoms include blurred vision and visions of coloured rings around lights.

Chronic angle-closure glaucoma

progresses gradually and often goes unnoticed for a long time. It is caused by the progressive blockage of drainage channels in the eyeball resulting in the slow and prolonged rise in pressure.

Secondary glaucoma are commonly caused by the inflammation within the eyeball or when a cataract becomes advanced and swollen. Tumours, injuries and surgery may also cause secondary glaucoma.

Symptoms

As the disease can develop slowly, you may not be aware of the gradual loss of sight until very late in the disease when your vision is seriously affected.

Symptoms of primary open-angle glaucoma include :

- Gradual loss of peripheral vision, usually in both eyes
- Tunnel vision

Symptoms of acute angle-closure glaucoma include :

- Severe eye pain
- Nausea and vomiting (accompanying the severe eye pain)
- Sudden onset of visual disturbance, often in low light
- Blurred vision
- Halos around lights
- Reddening of the eye

Risk Factors

- Age. Your risk increases when you are over 60 years old.
- Chronic diseases. You are at increased risk if you have diabetes or high blood pressure
- Ethnicity. Asians are more susceptible to angle-closure glaucoma than Caucasians
- Eye injuries
- Family history
- Use of corticosteroids
- Inherently high pressure inside the eye
- Refractive error (short-sightedness or myopia is a risk factor for open-angle glaucoma as long-sightedness or hyperopia is for closed-angle glaucoma).

Prevention

Most risk factors of glaucoma cannot be prevented. However, you should always maintain good eye health.

- You should also have regular eye examinations if you are over the age of 20 and have a family history of glaucoma.
- If you are over 60 years old, you should have regular eye exams regardless of family history.

Early diagnosis and treatment can minimise or prevent damage to your optic nerve and limit vision loss. Left untreated, glaucoma may lead to total blindness.

Open-angle glaucoma cannot be prevented but if diagnosed and treated early, it is possible to prevent visual damage and blindness.

Closed-angle glaucoma, however, may be potentially preventable. In the early stages of the disease (when the eye has a closed-angle but has not developed glaucoma yet), a laser procedure called laser iridotomy offers a potential way of preventing blindness caused by closed-angle glaucoma.

Laser iridotomy involves using laser energy to create a hole in the iris (the brown part of the eye), causing the angle to become 'wider'. This treatment is potentially a low-risk, once-only treatment to prevent closed-angle glaucoma.

Treatment

Glaucoma cannot be cured, but in most cases it can be successfully controlled. Treatment depends on the type of glaucoma you are diagnosed with.

They include :

- **Eye drops**
- **Oral medications**
- **Laser surgery**
- **Filtering surgery.** If eye drops and laser surgery are not effective in controlling the pressure in your eye, filtering surgery is an alternative option. During the procedure, the doctor will create an opening in the white of the eye to remove a small piece of tissue. This will improve drainage of fluid and reduce pressure in your eye. The opening will be covered by the conjunctiva, a clear membrane, that heals over the wound.
- **Drainage implants.** This procedure involves the doctor inserting a tiny silicone tube into your eye to drain the excess fluid that is causing the pressure build-up in the eye. You will need to wear an eye patch for 24 hours and use eye drops for a few months after any surgery.

Lasik: Myths & Facts

It is one of the wonders of modern medicine and technology – the ability to improve vision and do away with spectacles or contact lenses. Whether for aesthetics or practical reasons, LASIK has gained popularity over recent years. But questions and myths over this procedure still abound. We lay to rest some of the top misconceptions.

MYTH: LASIK is done using a computer programme and can be performed just as well by any clinic so the main consideration is price.

FACT: There are many factors to consider other than price. These include the reputation of the centre and its audit system, the ability to ensure personalised reviews by the surgeons and the range of treatment options



Go to a centre with a wide range of options and experience.

offered. As with any surgery – and LASIK is considered surgery – a surgeon's skill and the level of care the centre offers is essential. The laser is only one of the tools that the surgeon uses to perform the procedure. The surgeon must also create and manipulate the corneal flap, a delicate surgical procedure that requires experience and skill.

Apart from the procedure itself, the success of LASIK also depends on the pre- and post-operative care. A reputable doctor will assess the suitability of the patient and the type of procedure required. As with all surgeries, complications are a factor and a good centre is prepared to offer close follow-up care to prevent and/or treat any such complications.

MYTH: Everyone is suitable for LASIK

FACT: Not everyone is suitable for LASIK, those with thin corneas relative to the degree of improvement they want to achieve are not suitable for LASIK. People in certain jobs may also find LASIK unsuitable. Generally only a small number of people (about 10% or less) may be unsuitable.

However, there are many other refractive surgery options available and a reputable centre will be able to give advice on these other procedures. Thus, it is advantageous to go to a centre with

a wide range of refractive surgery options and experience.

MYTH: LASIK cannot be individualised

FACT: LASIK can be tailored to an individual's eye and requirements. Newer technology also means that treatments can be even more customised to a patient's need and level of correction. Your surgeon will be able to advise on the most suitable treatment for you.

New LASIK programmes are also much more accurate and able to treat higher degree levels. In the past, the higher the degree a person had, the more cornea had to be removed, but LASIK technology now removes less tissue allowing for higher levels of vision correction.

It is important to choose a centre with a wide range of femtosecond and excimer laser machines to find the best match in technology to an individual's requirement. Some refractive intraocular implants are also now available to treat extremes of myopia not amenable to LASIK surgery.

MYTH: LASIK uses heat energy and people can smell the cornea being burnt.

FACT: The excimer is a 'cool' laser and does not use heat energy to remodel the cornea. However, there may still be an element of tissue vaporisation

which may result in some smells present during the treatment.

MYTH: LASIK is a new technology and no long-term studies have been done.

FACT: LASIK was first performed 20 years ago in 1989 by an ophthalmologist in Greece and then introduced to America in 1990. Since then, peer-reviewed publications have shown excellent safety, efficacy and stability results for eyes up to 10 years after LASIK, and millions of LASIK treatment worldwide have shown no unexpected long-term complications.

MYTH: It is not possible to target the LASIK laser accurately all the time as eyeballs will make involuntary movements and there is a risk of the laser zapping the wrong areas of the eye.

FACT: Most LASIK platforms have highly-advanced eye tracking devices that compensates for any minor eye movements during the procedure. These active tracking systems follow the patient's eye position at a speed of up to 4,000 times per second and redirects the laser pulses precisely.

MYTH: A person who has undergone LASIK cannot wear contact lens.

FACT: Most patients will not require the use of contact lenses after LASIK. If there is a need to, patients who had previously worn contact lenses comfortably prior to surgery, will generally be able to do

so again, especially soft contact lenses. As with initial lens use, it may take some time to get used to wearing lenses for extended periods of time.

MYTH: LASIK is permanent and the effects last forever

FACT: Yes, the results of LASIK are permanent and once your eyes are treated, vision rarely deteriorates to the original state. But your eyes can still change shape, especially in younger

patients in which myopia is not fully stable. Depending on the individual, some may need 'adjustments' to correct future problems like near-sightedness, far-sightedness or astigmatism.

A major advantage of LASIK is the ability to enhance the treatment many years later if there is change in refraction with time. Also, as you age, the need for reading glasses is quite common, and presbyopic reading correction may still be needed after the age of 40.

HOW LASIK WORKS

LASIK is a procedure in which the cornea – the transparent front part of the eye that lets in light – is sculpted to improve vision.

The eye works like a camera : the cornea acts as a lens, allowing light (and images) into the eyeball and onto the retina – which acts like a film – at the back of the eyeball. The shape of our corneas determines how 'focused' this image is. An out-of-shape cornea transmits an unfocused image on the retina and the brain perceives this image to be fuzzy. LASIK helps to perfect the shape of the cornea so that images can be sharply focused. The procedure can be used to correct near-sightedness, far-sightedness and astigmatism.

LASIK involves two steps, the surface of the cornea is first cut to create a

flap to access the middle section of the cornea. Then an excimer laser is used to shape the cornea to achieve perfect vision. Previously, only microkeratomes involving the use of a mechanical high-speed oscillating blade were available to make the flap. Now, 'bladeless LASIK', in which the flap is made with another type of laser (the femtosecond laser), is available.

The surgery takes about 15 minutes and does not require any general anaesthesia, just topical anaesthetic eyedrops. Patients usually see an improvement in vision immediately after the procedure and usually have close-to-normal vision by the next day. Normal activities can be resumed in just one or two days.

Retinal Detachment

Retinal detachment usually occurs suddenly and is a medical emergency. It is important to recognise the warning signs as early diagnosis and treatment can save your vision.

What is retinal detachment?

A retinal detachment occurs when the retina separates from the outer layers of the eye. The retina is the light-sensitive tissue lining the back wall of your eye. If not treated early, retinal detachment may lead to partial or complete permanent loss of vision.

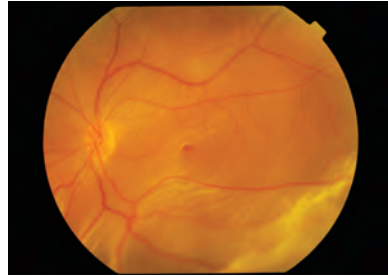
Causes

Retinal detachment occurs after a tear in the retina develops, causing fluid to pass through it and eventually separating the retina from the wall of the eye. Over time, the detachment may cause the retina to lose contact with the blood supply of the eye and stop functioning. This is when you lose your vision.

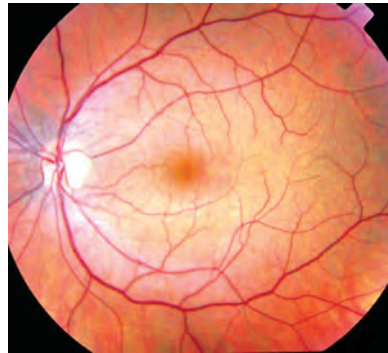
Symptoms

The initial symptoms are usually the sudden onset of new floaters and flashes.

A dark shadow then appears in a part of the visual field when the



Fundus (interior) of the eye showing a detached retina.



Healthy retina.

retina becomes detached. As the extent of detachment progresses, central vision will become affected.

Total loss of vision may be experienced when the entire retina is detached.

It is extremely important to see a doctor immediately when you notice the symptoms listed above. If too much time passes, the retinal detachment could advance to a late-stage of the disease and the chances of successfully repairing the retina through surgery

will be lower, resulting in permanent vision loss.

Prevention

If you are at risk for retinal detachment, you may want to consider avoiding activities where there is a risk of shock or pressure to the eyes, such as bungee jumping.

While there is no way to prevent retinal detachments, regular eye examinations can pick up problems early. You should also consult a doctor promptly when you notice any of the symptoms of retinal detachments.

With prompt treatment, a torn retina can be fixed before full retinal detachment occurs.

Risk Factors

Your risk increases if you :

- Are over 40 years old
- Have had retinal detachment in one eye previously
- Have myopia (short-sightedness)
- Have family history of the condition
- Have had surgery for cataracts
- Had sustained severe eye injury or trauma in the past

Treatment

Laser photocoagulation can seal retinal tears by using a laser light to burn the edges of the retinal tear. The

resultant scarring will adhere the retina to the underlying tissue permanently.

Freezing or cryopexy involves freezing the eye wall around the retinal tear. Like laser photocoagulation, the resulting scarring from the procedure will seal the retina to the underlying tissue. Cryopexy is employed for hard-to-reach retinal tears. After the procedure, your eye may be red and swollen for some time.

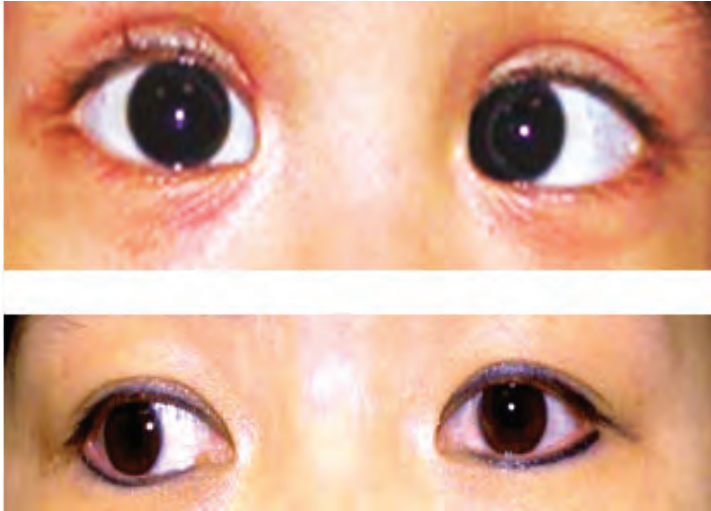
Surgical repair is necessary once a retinal detachment has occurred. There are 2 types of surgeries. A scleral buckle involves sealing the retinal tears with a silicone material which is placed around the sclera (the tough white protective tissue of the eyeball).

The second type of operation is a **vitrectomy**, for more complex cases of retinal detachments. A vitrectomy involves removing the vitreous (the jelly-like substance in the eye cavity) and filling the eye with a gas bubble to hold the retina in place, giving it time to heal.

Over 90% of all retinal detachments can be re-attached by modern surgical techniques.

Occasionally, more than one operation may be required. The degree of vision that returns six months after successful surgery will vary. Your eye doctor will be able to recommend the best course of treatment for you.

Strabismus (Squint)



Examples of squint eyes.

What is strabismus (squint)?

Strabismus is a condition where one eye looks straight while the other eye turns away from the straight position. The squinting eye can turn inwards (a convergent squint), or outwards (a divergent squint). A squint can also be vertical with one eye higher than the other.

When a child has a constant squint, he or she may develop amblyopia (lazy eye). The condition may also limit binocular vision or stereovision (3-dimensional vision).

Causes

Strabismus can be due to a disorder of the brain's co-ordination of the eyes,

a disorder of one or more of the muscles controlling the eye, or a disorder within the bony-orbit around the eye. Strabismus can also occur if vision in one eye is poor (e.g. due to lazy eye, cataract or other abnormalities within the eye). For this reason, it is important that parents bring their children for an eye examination if they have a squint.

Symptoms

Most often, parents will notice that the eyes do not appear to be working well together. Some children adopt an abnormal head position like tilting the head or turning the face to try to keep both eyes aligned.

Many Asian babies appear to have a convergent squint when a flat nose bridge coupled with folds of skin cover the inner part of the eyes. If a true squint is not present after a medical examination, it is called a pseudo-squint and no treatment is necessary.

Prevention

In most cases of strabismus in children, the cause is unknown. In more than half of these cases, the problem is present at birth or develops shortly after birth. Strabismus cannot be prevented, but it can be corrected with early intervention.

Treatment

If there is existing amblyopia (lazy eye), then this condition must be treated first. This can be achieved by

patching the good eye, so that the child is required to use the 'lazy' eye. When vision is normalised, the child will use each eye equally and the squint will alternate between the eyes.

For a young child with a constant squint, the condition can be corrected with surgery to realign the eyes and allow binocular and 3-dimensional vision to develop. For a child with intermittent squint, surgery is not as urgent as he or she is capable of binocular vision some of the time.

Some squints can be caused by uncorrected long-sightedness (hyperopia) or short-sightedness (myopia). Glasses can sometimes reduce or completely eliminate the squint and the need for surgery. It is important to seek early treatment for good outcomes.



Strabismus can be corrected with early intervention.

Amblyopia (Lazy Eye)

What is amblyopia (lazy eye)?

Amblyopia, commonly known as lazy eye, is a condition where an eye does not develop normal vision, resulting in poor vision that is not correctable with vision aids like glasses or contact lenses.

Causes

Lazy eye is caused by poor development of vision during early childhood. This is often the result of defective transmission of visual images to the brain during its developmental stages.

Anything that interferes with clear vision in either eye during the period between birth to eight years can cause the development of lazy eye because the brain starts to ignore the images seen by the amblyopic eye.

Some common causes are strabismus (squint), abnormally high spectacles power (e.g. astigmatism) short- or long-sightedness or childhood cataracts. Amblyopia (lazy eye) normally affects one eye, but if both eyes are similarly

deprived of clear visual images for sustained periods during childhood, this condition can occur in both eyes. Amblyopia needs to be corrected before the age of eight as after that age, the development of the part of the brain that processes vision is complete. Early diagnosis will increase the chances of successful treatment.

Symptoms

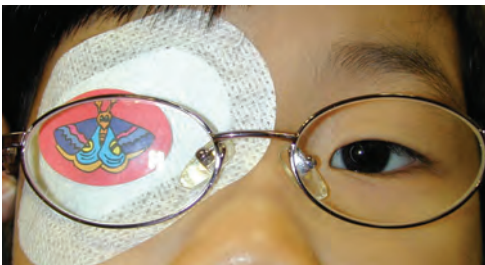
Often, you may not know your child has amblyopia till each eye is tested individually (e.g. during vision screening in school). Alternatively, a child may present with a squint (where one eye appears to be misaligned).

Therefore, you should send your child for an eye examination as early detection is important.

Treatment

To correct amblyopia, your child must be 'forced' to use the lazy eye. This is usually done by patching or covering the good eye for several hours a day, often for weeks or months. If spectacles are required, your child must wear them all the time.

Patching forces the brain to use the lazy eye, enabling it to develop normal vision. The younger the child when treatment starts, the faster the recovery. It is also important that your child be reviewed regularly to monitor the progress of treatment.



The good eye is patched to force the use of the lazy eye.

Thyroid Eye Disease

Bulging eyes, excessive tearing and pain, dryness, redness and discomfort in the eyes could signal thyroid disease.

What is Thyroid Eye Disease?

Thyroid eye disease (TED) is an eye condition related to thyroid disease. Thyroid hormones produced by the thyroid gland in the neck regulate metabolism in the body. People with excessive thyroid hormones (hyperthyroidism) can develop eye diseases.

Symptoms

They may have any of the following symptoms :

- Neck swelling from an enlarged thyroid gland (goitre)
- Heat intolerance
- Sweatiness
- Increase in appetite and loss of weight
- Tremors
- Palpitations
- Tiredness
- Anxiety, nervousness and bad temper

The most significant, but rare, complication of thyroid disease is loss of vision due to compression of the optic nerve by swollen tissues around the eye. Swelling of the orbital tissues can cause the eye to bulge outwards and limit the eye's ability to close the

eyelids, exposing the front surface of the eye and causing irritation and damage to the cornea. Patients can also suffer from double vision due to marked swelling and stiffening of eye muscles.

Causes

Thyroid eye disease is more common in women and although often associated with hyperthyroidism, may occur in patients with normal or low thyroid hormone levels. Although the exact cause is unclear, what is known is that the body produces antibodies against its own tissues in the orbit. This sets off a series of biochemical events that leads to swelling of the orbital soft tissues, specifically the eye muscles and orbital fat.

Symptoms

Patients with thyroid eye disease may complain of the following :

- A 'staring' appearance
- Protrusion of the eye
- Tearing
- Eye discomfort and gritty sensation
- Eye redness
- Puffy eyelids
- Double vision
- Squint
- Decreased vision

Treatments

Natural Course. It is common for thyroid eye disease to fluctuate

within the first one to two years of the disease. Beyond this time, the disease tends to stabilise. Medical therapy (immunosuppression and radiotherapy) are more effective in the active phase of the disease. Surgical treatment is usually reserved for patients in the inactive phase. It is important for you to be seen and treated by a doctor for the underlying thyroid disease throughout this period. Although thyroid eye disease tends to improve with good thyroid hormone control, this is not always the case, and consultation with an eye doctor is necessary.

Local Therapy. Tear substitutes and lubricants help to protect the surface of the eye from drying. Sleeping on extra pillows helps to reduce swelling around the eyes. Double vision can be troublesome if it affects straightforward and down-looking positions (as in reading). Special lenses called prisms may relieve this.

Immunosuppression. Your eye doctor will advise you on the treatment for thyroid disease. Steroids are used in selected cases. Taken orally, steroids can cause many side-effects when used over a long period of time. These include weight gain, gastric symptoms and bleeding, aggravation of diabetes and high blood pressure and decreased resistance to infection. Where possible, intravenous steroids are given instead. Steroid therapy may



Side view of patient.



Prominent eyes.

also be combined with the use of other immunosuppressive drugs.

Radiation. Radiation is an effective way of reducing the swelling of tissue around the eye and relieving compression of the optic nerve. The therapeutic dose used is low and is usually not associated with significant adverse effects.

Surgery

When vision is threatened, early lid or orbital surgery may be necessary. Otherwise surgery is usually reserved for inactive disease. Surgical rehabilitation is usually staged with orbital decompression surgery to reduce proptosis, followed by squint and eyelid surgeries to eliminate diplopia (double vision) and exposure respectively.

About Singapore National Eye Centre



Singapore National Eye Centre (SNEC) is the designated national centre within the public sector healthcare network. It spearheads and co-ordinates the provision of specialised ophthalmological services with emphasis on quality education and research.

Since its opening in 1990, SNEC has achieved rapid growth. Nine subspecialties in Cataract and Comprehensive Ophthalmology, Corneal and External Eye Disease, Glaucoma, Neuro-Ophthalmology, Ocular Inflammation and Immunology, Oculoplastic and Aesthetic Eyeplastic, Paediatric Ophthalmology and Strabismus, Refractive Surgery and Vitreo-Retina have been established to provide a full range of eye treatment from comprehensive to tertiary levels for the entire spectrum of eye conditions.

SNEC is actively involved in clinical trials and research into the causes and treatment of major eye conditions such as myopia and glaucoma. Thousands of ophthalmologists from neighbouring countries and beyond have participated in the Centre's teaching courses and international meetings. To advance ophthalmic

science and service, and to increase opportunities for professional interactions and collaboration, SNEC has also fostered strategic links with leading eye institutions around the world.

SNEC was accorded the Excellence for Singapore Award in 2003 for achieving excellence in the area of Ophthalmology, thrusting Singapore into international prominence.

In 2006, SNEC received the first Minister for Health Award for public health. Three clinician scientists from Singapore National Eye Centre and Singapore Eye Research Institute were awarded the prestigious President's Science Award in September 2009 for their outstanding contributions in translational, clinical and epidemiological corneal research.

In 2010, another clinician scientist from SNEC & SERI was again awarded a President's Science Award for his pioneering work on non-invasive eye scan which can detect an individual's risk of heart attack and diabetes.

In December 2009, SNEC attained Joint Commission International (JCI) accreditation, an international mark of endorsement for quality patient care and safety.



Clinical Outcomes

Cataract Surgery

Cataract extraction and intraocular lens implantation is the most common operation performed at the Singapore National Eye Centre (SNEC). More than 10,000 cataract procedures are performed in SNEC each year, by a team of 52 full-time ophthalmology specialists.

In a report on Cataract Surgery by the Ministry of Health of Singapore in 2006, 11,532 of the 16,310 cases of cataract surgeries performed at three participating centres in 2004 were done at SNEC.

Cataract surgeries performed by consultants at SNEC have a consistent overall visual success rate of 97 - 98%. This means 97-98% of all our cataract surgeries attain a Snellen visual acuity of 6/12 (internationally-accepted visual requirement for driving) or better. Our visual success rate compares favourably with those from international eye centres such as those in the US (93%) and the UK (92%). Cataract surgeries at SNEC performed by the phacoemulsification technique have a success rate of 99.5%.

Another important yardstick of success in cataract surgery is the rate of endophthalmitis, a sight-threatening microbial infection of the

content of the eye. At SNEC, we take great pains to reduce and eliminate the risks of endophthalmitis. As a result, our cataract operations enjoy a very low rate of post-operative endophthalmitis. Of our 99,655 cases of cataract operations over a 10-year period (2001-2010), the average endophthalmitis incidence rate was 0.027%, well below the international advisory of 0.1%.

Corneal Transplants

Corneal Surgery in General

The success rate for routine uncomplicated corneal transplants is about 91% in the first year. This rate of corneal graft survival matches the results of other renowned centres in the West. Success rates for Anterior Lamellar Keratoplasty and Endothelial Keratoplasty now range closer to 100% as less risk of rejection occurs in these new procedures.

However, complications can occur following a transplant. The more common complications that can occur include raised eye pressure, which can cause damage to the eye nerve (glaucoma), and corneal graft rejection. Most of the complications occur in the first year after transplantation, but most can still be

treated successfully if detected early. Our results for Asian Eyes are equivalent to that of the mainly Caucasian eyes in the West, and we are the only major database monitoring success in Asian eyes.

Lamellar Keratoplasty (LK)

In SNEC, nearly 75 cases of Lamellar Keratoplasty are performed yearly. As Anterior Lamellar Keratoplasty (ALK) retains the innermost corneal layer, it greatly reduces the risk of corneal graft rejection, a significant cause of corneal transplant failure, to almost zero.

Compared with the 20% overall risk of rejection after Penetrating Keratoplasty (PK), rejection risk following ALK is less than 1%. There is better long-term graft survival following ALK. Our results show that the overall one-year graft survival for ALK in SNEC is 94%.

In terms of recovery of vision, with the newer surgical techniques, we have been able to achieve equal if not better visual outcomes following ALK as compared with PK performed for similar indications.

Endothelial Keratoplasty (EK or DSAEK)

In SNEC, more than 100 cases of Endothelial Keratoplasty are performed yearly.

EK offers several advantages over a full-thickness procedure like PK in patients

who have selective damage to the inner layers of the cornea (endothelium):

1. **No suture-related problems.** As EK does not involve any sutures it does not have the risk of suture-related problems like suture-related abscess. There is also reduced astigmatism, resulting in better vision when compared with PK.
2. **Lower risk of graft rejection.** Early results have shown that the risk of rejection is much lower with EK. Compared with the 20% overall risk of rejection after PK, rejection risk following EK is just 7.6% in the first year. This is probably because far less donor tissue is transplanted, compared to conventional PK, where the whole cornea is transplanted.

In SNEC we have performed over 300 EK procedures and have had only three eyes with graft rejection (2%).
3. **Excellent graft survival.** There has been no failure to-date in the SNEC series. Graft survival appears to be better than conventional PK surgery. This may be related to the lower risk of graft rejection.
4. **Faster visual recovery.** The visual recovery is much faster following an EK procedure with reduced astigmatism compared with PK.

Retinal Surgeries

The SNEC surgical retina team treats common conditions such as retinal tears and detachments, advanced diabetic eye disease, vitreous haemorrhage, giant retinal tears, macular holes, macular puckers, vitreomacular traction, myopic foveoschisis, trauma, proliferative vitreoretinopathy.

The various surgical procedures which are done include lasers, pneumoretinopexy, scleral buckling and vitrectomies. The vitreoretinal operating theaters are equipped with equipment to perform scleral buckling surgery, vitrectomies and lensectomies.

The surgical volume averages about 1,000 each year. The three most commonly treated conditions are retinal detachments, diabetic retinopathy and disorders of the vitreomacular interface such as macular holes and puckers.

Our surgical success rate for retinal detachment is 97.5%.

Glaucoma

As the local and regional referral centre for secondary and tertiary management of glaucoma, the SNEC Glaucoma Service manages over 40,000 glaucoma attendances annually - including over 2,000 attendances from the region. Our glaucoma consultants manage paediatric and adult glaucomas with

more than 600 glaucoma surgeries performed every year.

We practise independent annual audits. It has calculated our surgical success rate at achieving an intraocular pressure of less than 21mmHg for primary glaucoma at one year. With trabeculectomy this is 97.3% to 99%. For combined cataract and trabeculectomy surgeries for primary glaucoma our success rate is 96.7% to 99.6%. The success rate for tube-shunt surgery for refractory and complex glaucoma cases is 89.3% to 93.3%.

Oculoplastic / Aesthetic Eyeplastic

This is a tertiary service that deals with a wide range of conditions including droopy lids, entropion and ectropion, blocked nasolacrimal ducts that cause tearing disorders, orbital fractures and tumours, and thyroid eye disease. We perform over 700 oculoplastic procedures annually. We recognise the increasing demand for aesthetic surgery to the eyelids and surrounding tissues. This includes blepharoplasty, endoscopic or small incision brow-lifts and mid-face lifts. Aesthetic eyeplastic procedures such as botox injections and filler treatments are increasingly combined and performed by oculoplastic surgeons as older individuals look for ways to rejuvenate their appearance. The Aesthetic Eyeplastic service was set up to cater to this demand.

Dacryocystorhinostomy (DCR)

Dacryocystorhinostomy (DCR) is a surgical procedure that restores the flow of tears into the nose in patients with blocked nasolacrimal ducts. It refers to the creation of a new drainage pathway between the naso-lacrimal sac and the nose and involves the removal of intervening bone. There are two methods of DCR:

- Externally, through a small incision on the side of the nasal bridge with direct visualisation of the naso-lacrimal sac and the nasal cavity
- Endoscopically, with a naso-endoscope to fashion an opening in the naso-lacrimal sac from within the nasal cavity.

Both external DCR and endoscopic DCR surgeries are performed at SNEC. Our success rate for both procedures ranges from 94 – 95%.

Entropion

Entropion refers to the abnormal in-turning of the eyelid with the resultant irritation of the cornea by the lashes. This can result in persistent red and teary eyes. Entropion occurs most commonly with ageing but can be due to scarring of the conjunctiva or inner lid margin.

Surgery is usually required to solve this problem. Improvement of the eyelid position relative to the eye will prevent the constant rubbing of the cornea and relieve the symptoms of redness and discomfort.

Our success rate for entropion surgery is 94.3%.



About SingHealth

Singapore Health Services (SingHealth) offers comprehensive multidisciplinary medical care across Singapore. The Group consists of 2 tertiary hospitals – Singapore General Hospital and KK Women’s and Children’s Hospital, 5 national specialty centres – for Cancer, Dental, Heart, Neuroscience, and Eye care – and a network of primary healthcare clinics.

With over 40 clinical specialties, its faculty of 1,000 internationally-qualified medical specialists is dedicated to providing integrated and quality care. Well-equipped with advanced diagnostic and treatment medical technology, patients enjoy the benefit of leading-edge treatments in a wide variety of medical procedures.

This publication is part of the SingHealth Healthy Living Series programme of initiatives to provide health information to the public. For information on more topics in the series and other health information, go to www.singhealth.com.sg

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