



# Refractive SURGERY GUIDE

Innovation, commitment and service are the fundamental elements of Adelaide Eye & Laser Centre (AE&LC).

The quest for excellence in eye care at AE&LC is achieved through the latest developments in technology and innovative surgical techniques. These developments have seen vision restored to levels not thought possible just a few years ago, offering improved lifestyles to patients.

As a privately owned practice, AE&LC is committed to complement the expertise offered by your family doctor and optometrist, providing optimal care and advice on the health needs of your eyes.

The information contained in the following pages has been prepared to introduce you to aspects of eye laser surgery including the risks, complications and side effects.

If you have any further queries, please do not hesitate to ask our staff. This way you can make a well informed decision about this highly specialized surgery and feel confident about taking the first step towards a clearer, brighter future.

In 1992, AE&LC was the first ophthalmic practice in South Australia to invest in the technology, equipment and expertise to introduce refractive laser surgical procedures.

AE&LC is a leader for refractive surgical procedures in SA. Over 25,000 procedures have been performed at this state of the art facility, which provides services to patients in ultimate comfort. Patients are provided with the highest calibre of cataract and refractive surgery in a fully accredited facility.

Laser refractive surgery (or laser vision correction) is a surgical procedure available to people who wish or need to reduce their dependency on optical aids.

Laser vision correction procedures change the shape of the cornea of the eye using laser to correct refractive errors.

These procedures are suitable for almost all forms of shortsightedness as well as most levels of longsightedness, and astigmatism.

The choice for laser vision correction is a lifestyle decision. Whether it is for practical, professional, sporting or leisure pursuits...it may open up a whole new world, allowing you to realise your true potential.

## Laser Vision Correction

People who wish to improve their unaided vision can now undergo one of three corrective procedures:-

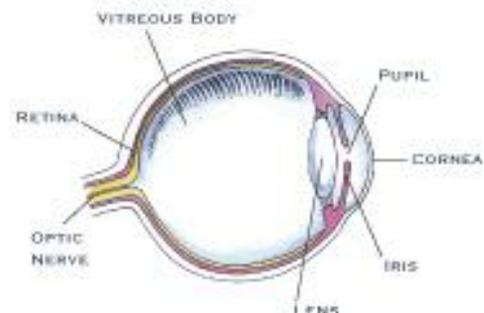
- Small incision lenticule extraction (SMILE<sup>®</sup>)
- Laser assisted in-situ keratomileusis (LASIK)
- Photo refractive keratectomy (PRK)

These procedures are commonly referred to as laser vision correction and they are performed at AE&LC as a day procedure.

Vision can be restored to near normal in a few days, continuing to improve over 3-6 months. These procedures are ideal for people who are not happy with or have difficulty wearing glasses or contact lenses to correct their vision, primarily at the distance. They are particularly beneficial for people who play sport and find contact lenses or glasses a hindrance, especially those involved in water or contact sports.

## How does the eye function?

Very simply, the eye works like a camera. The iris (coloured part) acts as the aperture of the camera to regulate the amount of light reaching the inside of the eye.



The cornea, together with the lens of the eye, bends the light rays and brings them to a point of focus on the retina. The retina acts like a photographic film, then transmits images to the brain via the optic nerve.

### Types of Refractive Error

There are four types of refractive error

- Myopia - shortsightedness
- Hypermetropia - longsightedness
- Astigmatism
- Presbyopia

The majority of people with myopia, astigmatism and hypermetropia can have their distance vision corrected by laser vision correction.

### Myopia

Myopia, or shortsightedness, occurs when the light entering the eye is excessively bent. This can happen when the eye is too long or the curvature of the cornea is too steep. The main means of focusing light in the eye comes from the front curve of the cornea, and if it is too steep for the length of the eye, objects near the eye can be seen clearly but distant objects become blurred.

### Hypermetropia

This is the opposite to myopia, and is also called longsightedness. With this condition the rays of light focus behind the eye because the eye is either too short or the cornea too flat. Depending on the degree of severity, people who are longsighted may have reduced near vision and distance vision, but have greatest difficulty with close work.

### Astigmatism

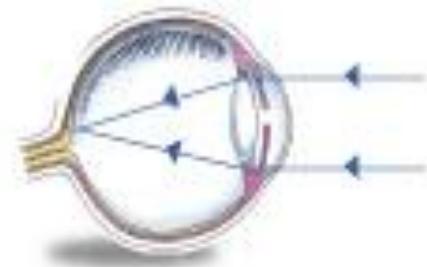
This occurs when the cornea is oval in shape. Astigmatism is usually combined with either myopia or hypermetropia and may affect both near vision and distance vision equally.

### Presbyopia

As people get older they experience increasing difficulty with near vision. This is due to loss of flexibility of the lens. It usually occurs after the age of 40 and reading glasses become necessary. Laser vision correction cannot reverse this process.

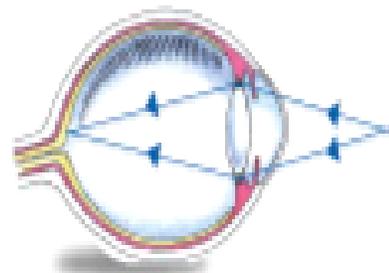
However, by leaving or inducing shortsightedness in one eye, laser vision correction can reduce some of the dependence on reading glasses. This is termed monovision and should be discussed with your usual eye care practitioner to determine suitability.

NORMAL EYE

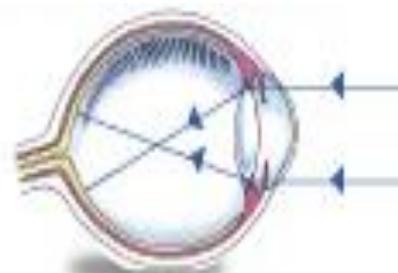


### TYPES OF REFRACTIVE ERROR

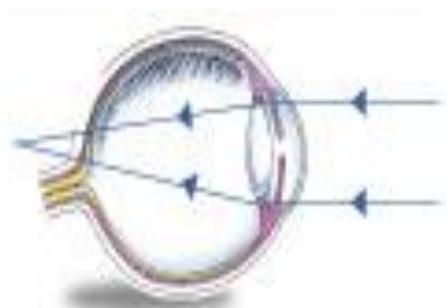
MYOPIA – NEAR VISION



MYOPIA – DISTANCE VISION



HYPERMETROPIA – DISTANCE VISION



## Correcting Refractive Errors

All refractive errors can be corrected by glasses or contact lenses but the use of these devices may restrict activities or produce discomfort. Surgical options are predominantly based around laser vision correction.

Occasionally, when only a small amount of astigmatism exists, arcuate incisions may be placed in the cornea. This procedure is termed an astigmatic keratotomy. Most commonly it is used to treat minor amounts of residual astigmatism after laser vision correction.

Refractive errors may also be treated by surgery inside the eye. This is reserved for high prescriptions outside the range of laser vision correction or when other factors exist that make laser vision correction unsuitable.

Intraocular surgery involves either the implantation of an artificial lens with or without removal of the natural lens. When the natural lens is retained the implant is termed a phakic lens. When the natural lens is removed and replaced this is a refractive lens exchange. A refractive lens exchange is identical to the surgery performed for cataract. AE&LC is able to provide advice on the relative merits of these surgical options after a detailed assessment has been made of your eyes and your visual requirements.

### How does the SMILE® Femtosecond Laser work?

The Femtosecond laser precisely separates the corneal tissues. Each spot creates a very small spot and the laser mirrors precisely align the spots to create the desired shape change for the treatment.

### How does the Excimer Laser work?

Computer-controlled laser spots are applied across the surface of the eye and, in seconds, vaporize microscopic layers of the cornea. The precise location of each pulse is controlled by the unique tracking system of the laser. This compensates for your small eye movements during the procedure.

With each pulse of the laser, an extremely precise amount of tissue is removed, reshaping the cornea. The cornea becomes flatter for myopic correction and steeper for hypermetropic correction.

For astigmatism, an oval-shaped correction is used. This change in shape of the cornea enables the rays of light to be correctly focused on the retina, making vision clearer.

## Guidelines for Laser surgery

To be suitable for laser vision correction the following criteria need to be fulfilled:

- Minimum age of 21 years; upper age limit of approximately 60 years of age
- Genuine need or wish to be more optically independent of glasses or contact lenses
- Stable glasses or contact lens prescription for at least twelve months prior to the procedure
- Lack of complicating disease or injuries to eyes
- Myopia up to 8 dioptres with astigmatism up to 6 dioptres (range extended in special circumstances)
- Hypermetropia up to 2.5 dioptres with astigmatism up to 1.5 dioptres.

## Clinical results of Excimer Laser Surgery

Laser vision correction has been performed in a clinical setting for about 30 years. Long-term studies have confirmed the safety and efficacy of the procedures from early lasers and modern lasers can be expected to produce superior results in the long term. Over 100 countries are currently using laser vision correction and world-wide millions of procedures are performed annually. Results from all countries are very similar and positive. The predictability of the surgery varies with each person. Our clinical staff will be happy to discuss this with you.

## Treatment

In SMILE®, which is a keyhole procedure, a small piece of tissue (called a lenticule) is created inside the cornea with the laser, and removed through a small incision. This means many of the layers of the cornea are unaffected and allows fast healing. In addition there are no flap related complications. Prior to the treatment anaesthetic eye drops are applied to the eye and an eyelid holder is used to prevent the eye from blinking during the procedure. Visual recovery in general is fast. Patients can normally return to work, shower, or apply makeup shortly after surgery. Driving and sports activities are possible within 24-48 hours.

LASIK is the world's most commonly performed surgery for correcting vision. With its wide treatment range and visual recovery speed, LASIK is backed by proven technology and results. With LASIK, a thin flap of corneal tissue is created in the outer layer of the cornea. This is folded back to expose the underlying corneal tissue, which is reshaped with an Excimer laser to correct the refractive error.

PRK (Photorefractive Keratectomy) - Surface Laser Ablation was the first type of laser eye surgery for vision correction. With PRK the recovery time is longer than that of LASIK or SMILE®, however it is still widely performed and offers a number of advantages over some other treatment options for some patients.

### What to expect

- Initially, a detailed clinical assessment for surgery is performed on a separate date to scheduled surgery. This ensures that there is sufficient time for you to consider the procedure carefully.
- The procedure is performed in AE&LC's day hospital facility by ophthalmologists who have specific training in laser vision correction. Your visit may take up to 2 hours.
- Many people elect to have both eyes treated on the day of surgery. This can be discussed further at any of the pre-operative visits with our clinical staff.
- The rate of visual recovery varies for each person. The initial vision may be blurred for a few days with steady improvement over a few weeks to months.
- You should be able to return to most activities within 2-5 days after SMILE® and LASIK and 5-10 days after PRK with stable vision being restored between 1-3 months.
- Results can vary according to the degree of the refractive error corrected. They are best explained together with the alternatives and possible complications during the preoperative assessment.
- Patients 40 years or over may still require glasses for reading and other near tasks, as would normally be the case at that age.

### Assessment

The initial consultation is available with our Optometrical and clinical staff to help you evaluate your options.

At this time all aspects of laser surgery will be discussed including the benefits, your suitability for treatment alternatives and possible side effects.

If you wish to proceed with surgery, appointments will be made with the surgeon for confirmation of suitability and medical consent discussion. Any final queries will be covered before proceeding with the surgery.

Our staff will advise you of all the necessary arrangements for the day of your surgery and ensure that they are in place.

Prior to your appointment for initial assessment, rigid contact lenses must not be worn for a minimum of 3 weeks. Soft lenses need only be left out for 5 days. Our clinical staff will confirm these arrangements with you.

### SMILE®

SMILE® carries no risk of flap problems as in LASIK and no surface healing response occurs as with PRK. The incidence of issues arising from lenticule creation sees a higher chance of abandoning the procedure until a later date higher with SMILE® due to the low suction applied.

### LASIK

LASIK has specific benefits in that scarring and corneal haze is extremely rare. Risks specific to LASIK include flap complications related to its creation which can occur in less than 0.2% of cases. This generally means deferring laser correction for 2-4 months.

It is possible to have displacement of the flap if the eye is rubbed in the initial post-op phase. This requires repositioning on a semi-urgent basis. Late growth of epithelial cells under the flap may very occasionally necessitate re-operation to remove these cells. This is termed epithelial ingrowth and is more likely after enhancement surgery. Rarely inflammation under the flap may delay recovery.

### PRK

PRK creates a healing response on the eye influenced by the surface epithelial cells. All eyes will show a degree of corneal haze from the healing response, which peaks at month 3, then resolves.

Excessive healing in the past could result in a surface scar. The very smooth laser treatments and very minimal use of Mitomycin-C has virtually eliminated such scarring.

### Enhancement Surgery

When there is a residual refractive error, the result may be enhanced by further surgery.

SMILE® enhancement surgery is not normally performed before 6 months.

LASIK enhancement surgery is usually performed between 3-4 months after the initial surgery.

PRK enhancement surgery is not normally performed before 6 months.

SMILE® cannot be repeated. Enhancement is usually performed by PRK, which is at no cost. Conversion of SMILE® to LASIK or LASIK after SMILE® does incur a small cost.

### Post-operative treatment

The post-operative course differs for SMILE®, LASIK, and PRK. All procedures require the use of antibiotic and steroid drops for periods that vary from eye to eye.

SMILE® patients experience 2-4 hours of irritation whilst the surface heals. You should avoid rubbing the eye for 2-5 days and wear a shield the first night. Recovery is rapid as the surface is undisturbed. Post-op visits are on Day 1 and at 4 weeks.

LASIK patients experience 4-6 hours of irritation and discomfort whilst the flap re-adheres. Over the first 72 hours, rubbing the eye can dislodge the flap. It is imperative that the eye be protected for this period at all times. Visual improvement is rapid as the mirror-like surface of the cornea is undisturbed. LASIK post-op visits are scheduled for day 1 and again after 4 weeks.

PRK patients experience irritation and discomfort similar to a mild flash burn for 2-3 days. Medication is used to alleviate this discomfort.

Once the epithelium has healed, the contact lens is removed and rapid improvement in vision will occur. Because the mirror-like surface of the cornea has been disturbed, visual recovery is slower than for LASIK.

PRK patients have reviews on days 1, 4 and 30, and between 3-6 months. All post-op appointments are important and failure to attend could jeopardise your results.

### Possible side effects

SMILE®, LASIK and PRK can have potential side effects which include but are not limited to:-

**Halo Effect.** Halo effects around lights at night are common in the first 1-2 weeks as the eye surface heals. In the past, halos were more bothersome due to limitations in the laser treatment patterns but the incidence has dramatically reduced with modern lasers. The most common reason for halos that persist is the presence of residual myopia requiring enhancement surgery.

**Corneal Haze.** This occurs as part of the normal healing process for PRK, but not SMILE® or LASIK, and is maximal at 3 months and gradually fades between 3-6 months. It is not normally noticed by the patient but can be detected under microscopic examination by an eye care practitioner. Minimal use of Mitomycin-C during PRK has virtually eliminated post PRK haze.

**Corneal Irregularity.** In the early stages (weeks 1-4) it is common to experience slight ghosting from surface irregularity. This resolves quickly and is rarely bothersome in the long-term.

**Overcorrection.** Occasionally, patients over-respond to the laser and are left overcorrected. This usually resolves in 2-3 months, however, if it becomes bothersome, overcorrection may require enhancement surgery.

**Undercorrection.** This results in persistence of residual refractive error after laser treatment. Often the degree of undercorrection is small, requiring no further treatment; however, larger degrees may require enhancement surgery.

**Regression.** This may occur in the first 6 months after laser surgery and is usually due to the corneal healing process.

**Progression.** Shortsighted eyes may undergo small changes in length or shape resulting in residual myopia. Longsighted eyes may exhibit late recurrence of refractive error due to unmasking of latent correction.

Regression and progression can be corrected with enhancement surgery once the prescription is stable.

**Infection.** All procedures carry an extremely low risk of infection. Infection of the cornea can result in a substantial delay in visual improvement and permanent visual loss.

**Dry Eye.** Disturbance to the eye surface and corneal nerves resulting from laser refractive surgery can interfere with tear production, blink rate and corneal sensitivity. This can lead to dry eye with visual instability in the early recovery stages. Eye drops are critical to rapid healing and managing dry eye symptoms. LASIK is slightly more likely to require additional treatment for dry eye than PRK, with SMILE® also having less dry eye symptoms than LASIK. The incidence of persistent dry eye has reduced significantly due to improvements in therapeutic management, but occasionally lubricant drops are required for a longer term.

## **AE&LC**

### **Adelaide's first in Laser Vision Correction.**

Since performing the first case of Excimer laser surgery in South Australia in February 1992, Adelaide Eye & Laser Centre has continued to develop a unique laser vision correction facility.

Adelaide Eye & Laser Centre continues to focus on treatment in a state of the art facility, adhering strictly to accreditation guidelines whilst keeping abreast of the latest advancements in laser vision correction together with other advances in refractive surgery.

Since 1992 Adelaide Eye & Laser Centre has performed over 25,000 procedures, helping the community to achieve a clearer, brighter future.

Did you know...

- The idea of refractive surgery has been around for over a hundred years, with first suggestions documented as early as 1898.
- Ophthalmologists began reshaping the cornea to correct refractive errors over 50 years ago, but it was not until the mid 1980's that an Excimer laser was first used to correct optical errors. The Excimer laser has an internationally documented reputation of accuracy and safety since 1987.
- The advent of LASIK has been one of the greatest advances in refractive surgery and has been performed internationally for many years. Dr Pallikaris performed the first LASIK procedure in clinical trials in 1991.

## **Frequently Asked Questions**

**Q. How much information is made available to you?**

A. Before surgery is recommended, you participate in a detailed informed consent process, where you will see technical staff and a clinical optometrist. Once assessed as suitable, another appointment is required with the surgeon to provide a detailed consent.

**Q. Is your surgeon using the most advanced technology available?**

A. The WaveLight EX500 laser, by Alcon, is highly regarded for its accuracy, active eye-tracking, small spot size, Gaussian profile, ability to constantly upgrade and customised treatment capabilities. It offers the ability to perform individual customised treatments.

SMILE<sup>®</sup> is performed entirely with the VisuMax laser by Zeiss. This laser performs the flap creation in LASIK.

**Q. Will I be charged for enhancements?**

A. If you require LASIK after SMILE<sup>®</sup>, a small charge will occur. PRK after SMILE<sup>®</sup> is at no charge.

**Q. How experienced is the surgeon and the AE&LC team?**

A. You will experience the benefits of a highly skilled, educated, close-knit team including our surgeon, clinical optometrists, registered nurses, technicians, administration and frontline staff who work together to attain a single goal – getting results for you! Continuing education and involvement with the optometric community ensures a continuum of care outside of the centre.

**Q. Is the facility accredited with a recognised body?**

A. Yes, as an independent day hospital facility.

## How to proceed

- Contact Adelaide Eye & Laser Centre to arrange a consultation with one of our clinical staff who will assess your suitability. Alternatively, you may wish to talk to your usual eye care practitioner.
- Advise the reception staff that you wish to be assessed for laser vision correction.
- In order to assess your suitability we require:-
  1. Date of birth
  2. Current glasses prescription when you call and bring it with you to your appointment
  3. Name
  4. Motivating factors for your lifestyle
  5. Email SMS contact to provide specific information.
- When ready to proceed with surgery, a detailed assessment will be made by the Centre's clinical staff. Do not wear your contact lenses for the specified time.
- Once a date is set, make sure you will be able to have sufficient time off work and that you will have assistance for the initial days after the procedure.
- We look forward to playing an integral part in helping restore your vision to normal... so you can start enjoying a clearer, brighter future.

For more information or to arrange your laser vision consultation, please contact Adelaide Eye & Laser Centre on

# 1300 366 564

or by filling out the online suitability calculator.

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Proudly supporting The Royal Society for the Blind.  
Adelaide Eye & Laser Centre contributes to this wonderful charity by making a generous quarterly donation.