want to see clearly without glasses nor contact lenses...

Vision Clinic
Brussels - Belgium
www.visionclinic.be
Location and roaddescription to vision clinic:

Vision Clinic is located Avenue Franklin Roosevelt, one of the most prestigious avenues in Brussels. Vision Clinic is part of the Nations Clinic, a private medical centre open for more than 30 years and regrouping more than 40 doctors.

Access is easy by car: Roosevelt avenue is one of Brussels’ most important access road, extension of Louise avenue in direction of south Brussels, a few minutes away only of the ring from the Pont de Groenendaël or the E411 and the Leonard crossroads (through the boulevard du Souverain), parking is easy. Road plan is to find at the back of this brochure.

Public transport is also available:
Tram 25 et 94 - stop Boondael and Boitsfort,
Bus 41 - stop Boondael,
Bus TEC 366 Court-Saint-Etienne - Rixensart – Ixelles, arrêt hippodrome,
Train: Boondael or Boitsfort stations a few hundreds meters away.

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You present a refraction error and wish to correct this defect with surgery.

The purpose of this brochure is to give you all necessary information in order to understand the working and the results of different existing surgery techniques.

Here you will find...

Detailed information about those different refractive surgery techniques (vision errors surgery) correcting myopia, hyperopia, astigmatism and presbyopia. Information is also available on our website: www.visionclinic.be.

Information about pre-operative tests you'll have to undergo in order to determine whether you are a potential good candidate for refractive surgery and, if so, to opt for the best technique for your personal case. Information about the used laser by Vision Clinic and the team of people who will take care of you.

We hope this brochure and the pre-operative consultation will help you take your decision with all necessary confidence. Don't hesitate to ask any questions coming up to you during the consultation with the surgeon.

Have a good read!
Near-sightedness or Myopia

The eyeball is too long. Light rays focus at a point in front of the retina. Far vision is blurry and near vision is clear. Some patients are convinced that myopia decreases or « balances » with time allowing them to read. Actually, after 45 years old, a small myopia presents an advantage: the patient will be able to read without glasses because his myopia will allow him to see near clearly without accommodation....

Far-sightedness or Hyperopia

The eyeball is too short. Light rays focus at a point behind the retina. Hyperopia is age-related. The young patient is able to accommodate (to change the curving and strength of the lens) in order to partially or totally compensate his hyperopia. As he ages, the ability to accommodate decreases and hyperopia appears. The patient gradually complains about increasing blurry near and far vision (early hyperopia). Strong stimulation of the accommodation can induce headaches.
Astigmatism

The eyeball presents abnormalities of the cornea curving. One can say that the eye is shaped like an oblong rugbyball instead of a spherical football. This abnormality induces blurry far and near vision with double vision of the image associated with headaches.

Presbyopia

Presbyopia is the age-related loss of clear close vision. To see objects nearby clearly, the eye has to accommodate with 3 Dioptres. The ability to focus decreases as people ages due to the loss of elasticity of the lens. Symptoms appear between the age of 45 (when the limit of 3 dioptries focusing necessary to see close clearly is reached) en 60 (when the eye isn’t able anymore to focus at all). The near-sighted patient will still be able to see close clearly without glasses.

Refractive surgery :

The classical correction methods (glasses, contact lenses) aim to change the traject of light rays and to clear an image by replacing those rays on the retina.

Different surgical techniques, under the name refractive surgery, can correct vision errors (myopia, hyperopia, astigmatism): radial keratotomy, Excimer laser (PRK, LASEK, LASIK, EpiLASIK), and intra-ocular lens implants. Refractive surgery has developed a lot these last years and can nowadays insure a final correction of most of vision errors with outstanding visual results (in terms of clearness and visual quality).

Other techniques such as cornea rings or laserthermokeratoplasty also exist. These are marginal techniques which won’t be overviewed in this document.
Personal motivations

The most commun motivations of patients are:
- The willingness not to depend anymore of one's optical correction (wet glasses in the rain, misted-up glasses, lost at home, difficulties in the swimming pool,...)
- Intolerance to contact lenses (allergia, dry eyes, ...)
- Professional motivations (police, flight, ...)

The purpose of refractive surgery is to make the patient independent of his optical correction. The aimed result can however never be garanteed as it depends of cicatrization aptitudes different from person to person.

The ophtalmologist has an information duty and a method obligation (use any technique in order to get the best results). He doesn't have a result obligation. Additional correction with glasses, contact lenses or resurgery can sometimes be necessary.

Surgery risks

Surgery risks are few (1%) but must always be considered. There are no surgeries without risks...
The other visual correction techniques also include risks which shoudn't be underestimated.
For instance : wearing contact lenses a whole year exposes the eye to the same infection risk as a surgery.
Pre-surgery consultation

The pre-surgery consultation is of essential importance when the patient has to ask a maximum of questions. Most candidates to refractive surgery have taken some information before consulting. The collected information is of variable quality and often needs a useful set up.

Different pre-surgery tests have to be undergone before choosing the best appropriate technique: determine the best optical correction, analyse the corneal shape and its strength (keratometry, corneal topography), the corneal thickness (pachymetry) and diameter, the pupil diameter, the ocular pressure (tonometry), the eye's length (echography, biometry), orthoptic exam (dominant eye, binocular vision, stereoscopy).

It's also important to make sure the error stays stable. If not, surgery should be delayed.

The wear of contact lenses can lead to wrong interpretations of the pre-surgery tests (lenses can change the corneal shape). Contact lenses users are therefore asked not to wear soft lenses during at least 24 hours or rigid lenses during at least a week before the tests. In some cases, the measurements aren’t reliable and a second test will be necessary after having extended the lensfree period.
Surgery techniques

Here is an overview of most common techniques performed in refractive surgery:

- Radial keratotomy
- Excimer laser
  - Refractive Photokeratectomy (PRK)
  - LASEK
  - EpilASIK
  - LASIK
  - FemtoLASIK
- Implants
- Eyelens surgery

Radial keratotomy:

**Principle:**
Deep incisions are performed from peripheral to central cornea using a diamond knife. Those incisions change the form and strength of the cornea that flattens.

**Indications:**
This technique is indicated for myopia up to 4-5 Diopters (radial incisions) and low astigmatisms (arciform incisions).

**Surgery Technique:**
This ambulatory surgery lasts 20 minutes and is painless. Anesthesia with eye drops.

**Conclusions:**
This kind of surgery which is used since 1976 was regularly performed in the 80's. The development of the Excimer lasers in the 90's has gradually contributed to limit the use of radial keratotomy to some rare indications. Nowadays however, this technique is in most cases to be avoided due to the weakening of the eyeball by the incisions, to the possibility of daily refraction fluctuations and to the impossibility of maintaining long-term correction stability (hypermetropisation risk).
Laser excimer:

**Principle:**
Excimer Laser surgery is used to change the cornea shape by performing a localised ablation. The change of the cornea curving corrects the refractive error.

The laser will flatten the myopia cornea, will give a bombing curve to the hyperopia cornea and will « round » the astigmatism cornea. Le laser va aplatir la cornée du myope, faire bomber la cornée de l’hypermétrope et « arrondir » la cornée de l’astigmate.

The excimer laser is used in different surgery techniques : PRK, LASEK, EpiLASIK, LASIK, FemtoLASIK. Those different techniques, according to their results, are nowadays efficient, predictable, liable surgery procedures which moreover offer long-term stable results.

**Commun Advantages:**
- No visual fluctuations;
- Accurate;
- Long-term stability of the results (no hypermetropisation);

**Commun disadvantages:**
The 4 techniques (PRK, LASEK, LASIK, EpiLASIK) can induce photophobia and night halos around light sources. This complication, which appears more frequently as the error to correct is important, decreases progressively with time. After every Excimer Laser treatment, the wear of sunglasses is needed for a whole year during any sun exposure. A long-lasting sun exposure can actually induce partially loss of correction (regression).

**Exclusion criteria for excimer laser treatment:**
- Some rheumatic and auto-immune diseases
- The presence of cataract or macular degeneration
- Untreated defects of retina edges
- Some corneal pathologies (keratoconus, very thin cornea,...)
Material:
The Excimer laser used by Vision Clinic is the very last generation Allegreto laser: the Wavelight Allegretto Eye Q 400 Hz.

This laser presents following features:
• He profiles the cornea with a small gaussian beam of 0.95 µm diameter which treats the cornea surface on an homogeneous, smooth and regular manner.
• He is the fastest treatment among recent lasers: he performs at a frequency of 400 Hz and is able to correct one dioptre every 2 seconds. This improves the results liability while avoiding drying the cornea during the surgery.
• He is equipped with an eye tracking system (eyetracker) controlling the position of the iris 400 times per second and allowing perfect positioning of each pulse during treatment.
• The treatment profile respects the “prolate” corneal shape and improves the post-operative visual quality (night vision and halos,...)
• He is advantageous for customised treatment according to the corneal shape (Q-Value or « wavefront optimized ») by aberrometry (aberrometer, A-CAT, « wavefront personnalisé ») or by topography (Topograph, Oculyser, T-CAT).
Résultats :
The Allegretto Laser has been homologated by the (Food and Drug Administration) in the USA after having obtained the best results during clinical trials.

He can treat:
• Myopia up to 12 Dioptres
• Hyperopia up to 6 Dioptres
• Astigmatism up to 6 Dioptres

On a visual point of view, 89% of the patients got a vision of 10/10 after surgery, 61% one of 12/10 and 25% one of 15/10. 86% of the patients got a refraction between 0,50 and -0,50 Diopters of the expected refraction and 93% one between +1 and -1 Diopter. These results allow a vision compatible with daily activities without glasses. Sometimes, glasses can still be necessary for different visually “demanding” activities (such as night drive). In the case of insufficient correction, a complementary treatment can be considered. Always keep in mind that the more the defect to be corrected is important, the more reliable the postoperative result; moreover, these statistics include patients treated up to 12 Diopters.

The most interesting results refer to postoperative visual quality and night vision. Patients evaluated their pre- and postoperative complaints on a scale from 0 to 10. The postoperative visual quality was in most case better than the preoperative one (3.2 against 4.1).
Customized treatments:

There are two kinds of customized treatments: by aberrometry and by topography.

**Customized treatments by aberrometry:**

Myopia, hyperopia and astigmatism represent 90% of all visual defects, the remaining 10% are “higher order optic aberrations”. These aberrations are responsible for incomplete visual quality although vision is 10/10.

The customized treatment enables to measure and treat these aberrations in order to improve postoperative vision. This technique has been derived from astronomy where it is used to get improved image quality of telescopes. The imperfect image is analyzed and changed to get the aberrations out of it and a clear image, free of any optic aberrations.

The customized treatment is interesting for those patients presenting lots of higher order optic aberrations. It can improve visual acuteness and postoperative visual quality, contrast and night vision. This kind of treatment also appears interesting for patients complaining about their visual quality after a refractive surgery.

**Customized treatments by topography:**

The customized treatment by topography is indicated to correct important errors of the corneal form such as irregular astigmatism, after a corneal graft, corneal infection or disease. It can also retreat patients suffering from corneal irregularities due to a previous refractive surgery (re-localization of the treatment, small optic zone).

*Wavefront guided treatments*  
*topography guided treatments*
History:
PRK is performed since the 80’s.

Indications:
- Myopia: up to 5 Diopters
- Hyperopia: up to 3 Diopters
- Astigmatism: up to 3 Dipter

Surgical Technique:
This surgery takes place ambulatory under local anaesthesia (with eye drops). The laser treatment is performed on the corneal surface after mechanical abrasion of the corneal epithelium which naturally rebuild itself after surgery. The treatment is painless and lasts 10 minutes. The operation time depends on the degree of the error to be corrected but is very short (2 seconds per diopter).

Post-operative Evolution:
The post-operative period remains painful for 2 or 3 days and it lasts 4 to 5 days before regaining a vision compatible with daily activities. The visual quality improves a lot during the first post-operative month. Small changes can still appear during the next 6 month.

Possible complications:
- Night halos and photophobia round light sources
- Postoperative infection (very rare: 0,1%)
- Decentration of the treatment
- Over or under correction

Conclusions:
PRK is a good surgical technique. The development of LASIK, LASEK and EpiLASIK has limited its indication as these new techniques offer better reliability and post-operative comfort.
LASEK – EpiLASIK:

History:
LASEK is performed since 1999. EpiLASIK since 2004. They are both improvements of the PRK technique.

Indications:
Indications are similar to PRK. These techniques are also to be considered when the cornea is too thin for a LASIK treatment or whenever the patients’ activities can submit him to possible ocular shocks (job, sport activities,...) which could eventually induce a late move of the LASIK flap.

Surgical Technique:
This surgery takes place ambulatory under local anaesthesia (with eye drops). The laser treatment is performed on the corneal surface after having lifted the epithelial flap (epithelium) with a diluted alcoholic solution (LASEK) or with an EpiKeratome (EpiLaASIK). The surgery is painless and lasts 15 minutes per eye. The operation time depends on the degree of the error to be corrected but is very short (2 seconds per diopter).

Post-operative Evolution:
The immediate post-operative comfort is variable: the pain can stay away or be very present. If this last is the case, it usually disappears within 24 to 48 hours. Similarly to PRK, it lasts 4 to 5 days before regaining a vision compatible with daily activities. The visual quality improves a lot during the first post-operative month. Small changes can still appear during the next 6 month.

Possible complications: Possible complications are similar to PRK

Conclusions:
LASEK and EpiLASIK are the most recent surface techniques. Compared to PRK, they improve the post-operative comfort and can treat nearly all ocular defects with outstanding results and an extremely low rate of complications. Daily activities can’t nevertheless be recovered before 4 or 5 days during which vision remains more or less blurry and the eye sensibility changing.
**History:**
LASIK is performed since 1990.

**Indications:**
- Myopia : up to 10 - 12 Diopters,
- Hyperopia : up to 5 Diopters,
- Astigmatism : up to 5 Diopters

**Surgical Technique:**
This surgery takes place ambulatory under local anaesthesia (with eye drops).
The laser treatment is applied in the corneal depth after having performed a corneal flap using a micro-keratome (LASIK) or a femtoseconde laser (FemtoLASIK, LASIK, “all laser”,...)
The surgery is painless and lasts 15 minutes per eye. The operation time depends on the degree of the error to be corrected but is very short (2 seconds per diopter).

**Post-operative Evolution:**
During the hours following the surgery, vision is a little blurry. There is no pain but itching can occur for a few hours. Usually, visual recovery compatible with daily activities happens the day after surgery.
Patients are asked not to rub their eyes during the first 3 weeks and to wear a translucide eye-cover at night in order to prevent any decentration of the corneal flap.
The visual quality improves a lot during the first post-operative month. Small changes can still appear during the next 3 month.
Possible complications:
Possible complications are similar to PRK. More possible complications are those related to the corneal flap (1 à 2%):
- Complications which can occur during the treatment and causing the delay of the surgery for 3 month after performing a new flap: decentrated flap, button hole (wrong flap performance), free cap (free flap).
- Post-operative complications inducing the lift of the flap: wrinkled flap, DLK (keratite, post-operative inflammation), epithelial ingrowth, ...

Conclusions:
LASIK is the one technique offering the fastest recovery and the best comfort. Usually, daily activities can be carried the day after surgery. The corneal flap however exposes the eye to some complications.

About FemtoLASIK ...
FemoLASIK is a LASIK where the flap isn’t performed with a micro-keratome but with a Femtoseconde laser. The concept of LASIK « all laser » or of corneal incision without any knife can look attractive. This technique presents however disadvantages as advantages.
The advantages include higher accuracy of the flap thickness, the ability to treat those cornea presenting an abnormal curvature and a lower complication degree for a non-experienced surgeon.
The disadvantages are: longer lasting surgery, slower visual recovery (oedema of the post-operative flap), higher rate of post-operative inflammation (idiopathic inflammation syndrome), higher level of complications such as diffuse lamellar keratitis (DLK) or epithelial ingrowth. Finally, the use of the Femtoseconde laser can induce tracking problems by the eyetracker of the excimer laser.
To conclude, a traditionnal LASIK using an advanced microkeratome remain a good therapeutic option. FemtoLASIK present advantages in specific indications (very thin cornea, abnormal curvature).
PRK, LASIK, LASEK, EpiLASIK, FemtoLASIK, ...
Which technique to choose?

- EpiLASIK is an improved PRK (less pain, faster visual recovery, less risks of corneal inflammation haze), EpiLASIK is therefore to be preferred to PRK.

- PRK, LASEK and EpiLASIK are surface treatments including a more or less painful post-operative period (2 to 3 days) and a relatively slow recovery (4 to 5 days).

- LASIK is a painless technique (feeling of foreign presence during 24 hours) and offers faster visual recovery but needs a corneal incision.

- PRK, LASEK, EpiLASIK and LASIK all give similar results for low or moderate myopia (up to 5-6 D) but the corneal flap during the LASIK procedures exposes the eye to potentially more serious risks.

- The complication rate induced by the flap during a LASIK is statistically evaluated at +/- 1%. In most of the cases, these complications aren’t serious and don’t have any incidence on the result.

- In the case of low myopia, the choice for LASIK will therefore be based on criteria of comfort and eventually of professional duties but including a little higher risk.

- LASIK, on the other hand, is indicated for myopia higher than 6 diopters because it prevents from the haze phenomenon (post-operative corneal inflammation reaction paired with the presence of a veil delaying visual recovery) and because it limits the regression risk. This is also the best technique to treat hyperopia (up to 5 diopters).

- Your ophthalmologist will help you choose the best indicated technique according to your situation and to the results of your ocular exam and your daily activities.
<table>
<thead>
<tr>
<th>PRK</th>
<th>Lasek Epilasik</th>
<th>Lasik FemtoLasik</th>
<th>IOL Phaque préirien ou précrystallien</th>
<th>Chirurgie du cristallin (phacoémuflsification)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indications</td>
<td>Myopie ≤ 5 – 6 D Astigmatisme ≤ 2 D Hypermétropie ≤ 2 D</td>
<td>Myopie ≤ 5 – 6 D Astigmatisme ≤ 2 D Hypermétropie ≤ 2 D</td>
<td>Myopie ≥ 10 - 12 D Astigmatisme ≤ 6 D Hypermétropie ≥ 5-6 D</td>
<td>Myopie, Hypermétropie, Astigmatisme et Presbytie Présence d’une cataracte et/ou d’une presbytie</td>
</tr>
<tr>
<td>Découpe dans la cornée</td>
<td>Non</td>
<td>Non</td>
<td>LASIK : oui avec la me FemtoLASIK : oui avec laser femtoseconde</td>
<td>Incision cornéenne 3 mm pour IOL pliable 6 mm pour IOL rigide</td>
</tr>
<tr>
<td>Fragilisation théorique du globe oculaire</td>
<td>Non</td>
<td>Non</td>
<td>Oui</td>
<td>Oui</td>
</tr>
<tr>
<td>Stabilité des résultats</td>
<td>excellente de +2 à -5 D</td>
<td>Excellente de +2 à -5 D</td>
<td>Excellente de +6 à -12 D</td>
<td>Excellente</td>
</tr>
<tr>
<td>Haze (cicatrice anormale) &amp; régression (perte d’une partie de la correction)</td>
<td>+ Myopie : &gt;5,5 D Hypermétropie &amp; Astigmatisme &gt; 2 D</td>
<td>+/- (très rare)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Retouche (en cas de sur ou sous correction)</td>
<td>Après 6 mois</td>
<td>Après 6 mois</td>
<td>Après 3 mois Traitement laser</td>
<td>Après 1 à 3 mois Traitement laser</td>
</tr>
<tr>
<td>Complications</td>
<td>Dues au laser : très rares Infection : 0,1%</td>
<td>Dues au laser : très rares Infection : 0,1%</td>
<td>Dues au laser : très rares Dus à la découpe : 1% Ectasie cornéenne, Infec-</td>
<td>Glaucome aigu, décompensation cornéenne, cataracte, infection (0,1%), etc...</td>
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<td></td>
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<td>tion : 0,05%</td>
<td>Décompensation cornéenne, rupture capsule, décollement de rétine, infection (0,1%), etc...</td>
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<tr>
<th>Incision cornéenne</th>
<th>3 mm pour IOL pliable 6 mm pour IOL rigide</th>
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</thead>
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Intra-ocular surgery:

Implants

History:
The most common known phakic implant is the Artisan one or Iris-Claw (implant attached to the iris). This implant is used since 1986 and since 2006, a foldable variant of it (Artiflex) allows to inject it into the eye through an incision of 3mm.

Indications:
This surgery is indicated for strong myopia (more than 10-12 diopters) and strong hyperopia (more than 5 diopters). More recently, lenses have also been developed for astigmatism treatment. This is the only possible technique for the treatment of more serious refractive errors. Combination with a laser treatment (excimer or lasik) is possible in order to get optimum result (so called « Bioptics »).

Surgical Technique:
This is a surgical treatment performed under general anaesthesia with placement of an intra-ocular lens in front of the iris (pre-iris implants: Artisan, Artiflex, Verysise, Cachet,...) or sometimes behind the iris (pre-lens implants: PRL, ICL,...)

Post-operative:
Visual recovery is fast (24 hours most of the time) and painless. Patients must undergo an annual exam to control the state of their lens and check if the cornea tolerates the presence of the implant (checking of the endothelial density).
Possible complications:
- This is an intra-ocular treatment
- In some case (large pupil), patients can complain about halos.
- Low risk of ocular hypertonia, of corneal decompensation, of cataract, of infection (0.1%) and intra-ocular inflammation.

When complications occur, the intra-ocular lens will be removed and the eye will, most of the time, recover its prior state. Whenever a cataract is present, a cataract surgery can be performed. With corneal decompensation occurring, a corneal graft is sometimes necessary. These complications are rare.

Conclusions:
Intra-ocular implants give outstanding results but need to be performed only when other techniques can’t be considered because these implants surgeries are intra-ocular treatments. Moreover, astigmatism is harder to correct with this technique.
History:
Eye lens surgery already exists for centuries. The actual technique, the phaco emulsification of the eye lens, is being performed since 1967. It can remove the natural lens through a small incision of 3 mm without a suture.

Indications:
This treatment corrects myopia and hyperopia but not astigmatism. It can be considered whenever a candidate to refractive surgery presents an emerging cataract (cataract appears generally sooner when myopia is strong). It can also be considered after the age of 50 (when the patient loses his accommodative capacity). Finally, this technique is recently proposed to patients urged to resolve their presbyopia problem (near vision problem appearing after the age of 45). Here, it goes about the PRELEX technique: PREsbyopic Lens EXchange. The natural lens is being replaced by an intra-ocular multifocal lens (Restor, Acri.LISA) or pseudo-accommodative which allows to see clearly close and far without glasses.

Technique:
This is a surgical treatment (similar to a cataract surgery). It is performed under local anaesthesia with eye drops and with replacement of the natural lens by an intra-ocular lens.

Post-operative Evolution:
Visual recovery is fast (24 hours most of the time) and painless. The monofocal implant assures clear far vision (glasses remain necessary for reading, the most preferable option for most cases) or close vision (glasses necessary for far vision).
The multifocal implant is to be compared with double lens glasses. It offers far and close vision without glasses but the intermediate vision (ex: computer) will remain imperfect.

The pseudo-accomodative implant gives variable results and often weak ones for close vision.

Possible complications:
- This is an intra-ocular surgery;
- The patient loses every accommodative capacity (far vision is perfect but reading remains impossible without glasses, except if the multifocal lens is placed at the end of the surgery);
- Multifocal implants offer good far and close vision. Vision remains blurry at intermediate distance (ex: computer).
- Multifocal implants can induce a decrease of contrast vision and halos around light sources.
- To be efficient, the multifocal implant has to be chosen in order to perfectly correct far vision. Although pre-operative tests are very accurate, a small error margin is still possible. If this is the case, the implant will have to be removed and replaced by another, or lasertreatment will have to be considered to correct the remaining defect.
- Some complications can occur: retina detachment, post-operative retina oedema, infection (0.1%), inflammation. These complications are rare.

Conclusions:
This technique is only to be performed in some specific cases and won’t be often proposed.