Which EK-technique will we be using in 10 years from now?

DMEK, Hemi-DMEK, Quarter-DMEK, Bare-DM, Descemetorhexis only, or endothelial cell stimulation, cell injection techniques or a combination thereof?

Unlike one or two decades ago, corneal surgeons and their patients have to wake up each morning to start their day with surfing the internet, just to be aware of any modifications in endothelial keratoplasty or any new surgical technique that may have surfaced overnight. And what to do with the information, that is, which technique to choose considering all associated (dis)advantages? Let’s have a look at the possibilities:

DMEK and its modifications

Ten years after NIIOS has introduced it, Descemet membrane endothelial keratoplasty (DMEK) (the transplantation of the 25 micron thick Descemet membrane with its endothelium to the posterior recipient cornea) may have become the gold standard for corneal endothelial disorders. In recent years, DMEK has been further modified to Hemi-DMEK and Quarter-DMEK (the transplantation of a partial Descemet membrane with its endothelium), and all of these techniques may give relatively quick and nearly complete visual rehabilitation within the first month(s). These approaches, however, require transferral of donor cells into the host eye, bearing a life-long risk of allograft rejection.

Bare Descemet transplantation and Descemetorhexis only

The risk of allograft rejection is avoided when only the diseased, central host Descemet membrane is selectively removed, without the use of a graft, or with the implantation of a donor Descemet membrane denuded of endothelial cells. Several groups have independently demonstrated that the cornea may clear within a few months after surgery, once the void has been filled in by peripheral recipient cells migrating towards the center. Avoiding donor tissue has major advantages, but so far recipient eyes vary in their response and long term outcomes may be uncertain, since cell migration in eyes with a DMEK graft detachment correlated with a higher risk of secondary graft failure.

Endothelial cell stimulation and cell injection techniques

Another route is the injection of cultivated donor cells into the recipient anterior chamber of the eye, with or without the use of eye drops to stimulate cell migration. Such an approach, if regulatory approved, would greatly simplify the surgical technique, but would not avoid allograft rejection.

Figure from Miron A, Spinozzi D, Bruinsma M, Lie J, Birbal R, Baydoun L, Oellerich S, Melles GRJ. Quarter-DMEK grafts show asymmetrical in-vitro endothelial cell migration. Submitted.

At NIIOS, cell migration patterns are analyzed to better understand EK outcomes: a cornea (a) shows differences between the center (b) and periphery (c) correlating with differences in migration patterns.
From left to right: Alina Miron, Romania; Abbas Ilyas, Netherlands; Daniele Spinozzi, Italy; Vasiliki Zygoura, Greece; Diana Santander Garcia, Spain; Renuka Birbal, Netherlands.

2018

- Miron A, Brunsima M, Ham L, Schaal S, Baydoun L, Dapena I, Oellerich S, Melles GRJ. In vivo endothelial cell density decline in the early postoperative phase after Descemet membrane endothelial keratoplasty (DMEK). Cornea. Accepted.
- Spinozzi D, Miron A, Brunsima M, Li JT, Dapena I, Oellerich S, Melles GRJ. Improving the success rate of human corneal endothelial cell cultures from single donor corneas with stabilization medium. Curr Eye Res. Accepted.

2017


It is hardly a secret anymore: when it really comes down to it, Americans need the Dutch to top it all off…

Dr. Melles received Helen Keller award in Baltimore

In 2017, Dr. Melles was granted the Helen Keller prize during an award ceremony in The American Visionary Museum in Baltimore. Due to an infection in childhood, Helen Keller became blind and deaf, but despite these major handicaps, she traveled the world, met all US Presidents of her time and wrote 14* books. A career that would have been impressive for anybody without these handicaps.

Her attitude towards life may still be truly inspirational for scientists, Dr. Melles argued: she did not allow her handicaps to limit her in her goals and showed us how effective ‘self-forgetfulness’ can be. Both of these mental disciplines usually are the foundation of NIIOS’ R&D strategy as well. Not to confine ourselves to textbook material that is endlessly repeated and presented as the irrevocable truth, but to question the consensus and to look beyond restrictions. Self-forgetfulness may expand on this, since it saves a lot of time and energy to not take one’s own opinion as a starting point, but unfiltered observations that allows for a different interpretation or rationale instead.

This approach has been very successful for NIIOS and when viewed from that perspective, it is sometimes difficult to grasp why the general society seems to do the exact opposite; instead of determining the natural flow, virtually all decisions are made to further establish authority, political ambitions, or short term fashionable goals. Then, if the system does not work, more and more red tape is introduced to postpone the eventual downfall, to paste the Titanic to the iceberg. Scientific research may frequently not be kept afloat in a similar way, to find that in the end nature can not be dictated and tends to take a course that was not anticipated upon.

* Source: www.helenkellerfoundation.com
Former NIIOS-fellow Jack Parker during his thesis defence in the historical ‘Senaatskamer’ of the ‘Academiegebouw’ in Leiden

Candidate and NIIOS-optometrist Korine van Dijk (middle) in het zweetkamertje (the sweat-room where each candidate puts his or her name on the wall) after her thesis defence at Leiden University

Candidate Jack Parker (middle), immediately preceding the ceremony, flanked by his paranymphs Korine van Dijk (left) and Renuka Birbal (right), who were using the opportunity as a trial-run for their own upcoming thesis defences.

NIIOS-USA Cornea evening held at the Embassy of the Kingdom of The Netherlands in Washington (preceding ASCRS)

Friday April 13, 2018; 7-11pm; 4200 Linnean Avenue NW, Washington DC 20008

Apart from local seminars, two times a year NIIOS organizes a ‘NIIOS Cornea Evening’ in Europe (preceding the ESCRS meeting) and in the United States (preceding the ASCRS). This year, the latter meeting will be held in Washington and owing to their involvement with the Helen Keller award ceremony, the Dutch Embassy offered NIIOS-USA to organize the Cornea Evening in their conference room. As usual, the latest topics in the field of corneal surgery are on the agenda: the further development of DMEK for cases with complex pathology, the latest tips and tricks for more efficient use of donor corneal tissue, the implementation of an algorithm to prevent corneal allograft rejection, and unexpected observations in Bowman layer transplantation performed for advanced keratoconus.

Invited speakers include: Dr. Ula Jurkunas, Dr. Kathryn Colby, Dr. Jonathan Lass, Dr. Mark Terry and Dr. Sadeer Hannush, and of course NIIOS staff members and fellows. Free entry tickets are available through info@niios.com or www.niios.com/CorneaEvening2018. Please apply before April 6, 2018, because for security reasons all visitors must be registered in advance.

Two NIIOS staff members receive PhD in Leiden

Professor Martine Jager promotor of theses on modern corneal transplantation techniques

For those familiar with NIIOS, both Dr. Jack Parker and Dr. Korine van Dijk are highly familiar faces. In the past months, both of them traveled to the ‘Academiegebouw’ (Academy Building, built in 1516) that has formed the heart of Leiden University since its founding in 1575. On July 4 2017, Jack defended his thesis entitled “Recent innovations in minimally invasive anterior and posterior lamellar keratoplasty” and on January 16 2018, Korine sat at the same table to defend her thesis “Clinical Outcomes of modern lamellar keratoplasty techniques”. Professor Jager (LUMC) acted as promotor for both ceremonies that were held in the historical ‘Senate Room’. Recently this room was criticized in the press because it is decorated only with wall portraits of male scientists, luckily however, this politically incorrect ambience was not found to disrupt the candidates’ performances during their thesis defences.

Two NIIOS staff members receive PhD in Leiden

Professor Martine Jager promotor of theses on modern corneal transplantation techniques

For those familiar with NIIOS, both Dr. Jack Parker and Dr. Korine van Dijk are highly familiar faces. In the past months, both of them traveled to the ‘Academiegebouw’ (Academy Building, built in 1516) that has formed the heart of Leiden University since its founding in 1575. On July 4 2017, Jack defended his thesis entitled “Recent innovations in minimally invasive anterior and posterior lamellar keratoplasty” and on January 16 2018, Korine sat at the same table to defend her thesis “Clinical Outcomes of modern lamellar keratoplasty techniques”. Professor Jager (LUMC) acted as promotor for both ceremonies that were held in the historical ‘Senate Room’. Recently this room was criticized in the press because it is decorated only with wall portraits of male scientists, luckily however, this politically incorrect ambience was not found to disrupt the candidates’ performances during their thesis defences.

Melles Research Fund thanks 2017 sponsors

R&D costs increase exponentially due to expanding research on NIIOS’ techniques

In 2017, MRF received € 213.265,= in donations for the NIIOS R&D program. If you are interested yourself in financially supporting MRF and NIIOS R&D, to enable the continued development of NIIOS’ surgical techniques, please contact Gertrude Kort via info@niios.com.
Beginner DMEK course are scheduled on a Tuesday & Wednesday. On Tuesdays, the course participants join live surgery sessions; on Wednesday, various techniques are practiced during educational wetlab sessions and patient demonstrations are given. Bowman layer wetlabs and Advanced DMEK courses are given on Thursday.

Further information and applications: dekort@niios.com
Level: Corneal fellows and surgeons

- Beginner DMEK surgical course: June 12/13, 2018
- Advanced DMEK surgical course: June 14, 2018
- Beginner DMEK surgical course: November 27/28, 2018
- Bowman layer surgical course: November 29, 2018

**Live-video streaming of DMEK surgeries performed in Rotterdam**

Sessions are scheduled on Thursdays from 9 am thru 4pm (+1h Greenwich Time). Participants receive live images of the surgical microscope and side tables, and can chat (verbally or by typing) with the surgical staff during surgery.

Further information and applications: info@niios.com
Level: Corneal fellows and surgeons

**Advanced keratoplasty wetlab courses in Rotterdam, The Netherlands**

Bowman layer transplantation for advanced keratoconus & Descemet membrane endothelial keratoplasty (DMEK)

Beginner DMEK course are scheduled on a Tuesday & Wednesday. On Tuesdays, the course participants join live surgery sessions; on Wednesday, various techniques are practiced during educational wetlab sessions and patient demonstrations are given. Bowman layer wetlabs and Advanced DMEK courses are given on Thursday.

Further information and applications: dekort@niios.com
Level: Corneal fellows and surgeons

- Beginner DMEK surgical course: June 12/13, 2018
- Advanced DMEK surgical course: June 14, 2018
- Beginner DMEK surgical course: November 27/28, 2018
- Bowman layer surgical course: November 29, 2018

**DMEK to Advanced DMEK to ‘Blind-DMEK’**

Indications for surgery are broadening with DMEK experience

Since its clinical introduction in 2006, Descemet membrane endothelial keratoplasty (DMEK) has become the preferred treatment for endothelial disorders like Fuchs endothelial corneal dystrophy and pseudophakic bullous keratopathy. In recent years, the concept has further evolved and with increasing experience, the technique may now allow for treatment of virtually all corneal endothelial pathology in the most complex of eyes. For example, eyes with end stage glaucoma, a shallow or nearly absent anterior chamber, an opaque cornea, aphakia and/or posterior segment surgery: a DMEK can usually be performed with surprisingly good visual outcomes while most long term complications associated with earlier keratoplasty techniques are circumvented. Proper counseling by referring ophthalmologists may become increasingly important, because too often a penetrating keratoplasty (PK) is still suggested using the debatable arguments that complex eyes have lower visual potential or that they are ineligible for DMEK. The opposite may be true because the risk of graft failure is higher with PK and each line of Snellen visual acuity weighs more in low potential eyes. A more thorough work-up may be considered because too often a secondary DMEK is then eventually performed ‘under’ a recent, failed PK.

Example of an eye eligible for ‘Blind-DMEK’. The patient was referred to Melles Cornea Clinic Rotterdam for bullous keratopathy following multiple intraocular procedures, including two glaucoma drainage device implantations for end stage glaucoma. For this group of eyes, a modified DMEK was performed ‘work around’ the pre-existing plastic tubes (arrows) to avoid graft damage during positioning of the graft and to use an alternative approach to pressurize the eye at termination of the surgery to achieve sufficient adherence of the donor tissue to the recipient posterior cornea.

**Example of an eye eligible for advanced DMEK.** The patient was referred to Melles Cornea Clinic Rotterdam for bullous keratopathy following multiple intraocular procedures, including two glaucoma drainage device implantations for end stage glaucoma. For this group of eyes, a modified DMEK was performed ‘work around’ the pre-existing plastic tubes (arrows) to avoid graft damage during positioning of the graft and to use an alternative approach to pressurize the eye at termination of the surgery to achieve sufficient adherence of the donor tissue to the recipient posterior cornea.

**Example of an eye eligible for ‘Blind-DMEK’.** The patient was referred to Melles Cornea Clinic Rotterdam for corneal decompensation after a bilateral Acanthamoeba infection. For this group of eyes with corneal opacification obscuring virtually all intraocular structures, a modified DMEK may be used that allows more indirect visualization of the graft with or without imaging techniques. Visual recovery in this group is most often delayed due to the condition of the host cornea: a DMEK usually clears within the first weeks; here the intraocular structures start to show at 1 month.

**EEBA 2019 in Rotterdam**

In 2019, Amnitrans Eye Bank again organizes the yearly meeting of the European Eye Bank Association for the 81 European eye banks and ophthalmologists involved in corneal transplantation

Register through eeba@niios.com

---

**EEBA 2019 in Rotterdam**

In 2019, Amnitrans Eye Bank again organizes the yearly meeting of the European Eye Bank Association for the 81 European eye banks and ophthalmologists involved in corneal transplantation

Register through eeba@niios.com

---

**EEBA 2019 in Rotterdam**

In 2019, Amnitrans Eye Bank again organizes the yearly meeting of the European Eye Bank Association for the 81 European eye banks and ophthalmologists involved in corneal transplantation

Register through eeba@niios.com

---

**EEBA 2019 in Rotterdam**

In 2019, Amnitrans Eye Bank again organizes the yearly meeting of the European Eye Bank Association for the 81 European eye banks and ophthalmologists involved in corneal transplantation

Register through eeba@niios.com

---

**EEBA 2019 in Rotterdam**

In 2019, Amnitrans Eye Bank again organizes the yearly meeting of the European Eye Bank Association for the 81 European eye banks and ophthalmologists involved in corneal transplantation

Register through eeba@niios.com

---

**EEBA 2019 in Rotterdam**

In 2019, Amnitrans Eye Bank again organizes the yearly meeting of the European Eye Bank Association for the 81 European eye banks and ophthalmologists involved in corneal transplantation

Register through eeba@niios.com

---