

# NIIOS Newsletter

Netherlands Institute for Innovative Ocular Surgery

Laan op Zuid 88  
3071 AA Rotterdam - The Netherlands  
Tel +31 10 297 4444 - Fax +31 10 297 4440  
[info@nijos.com](mailto:info@nijos.com) - [www.nijos.com](http://www.nijos.com)



**PAGE 2**  
**LIVE DMEK SURGERY IN HALLE AND MADRID**

**PAGE 2**  
**DR. MELLES AWARDED AT JOHNS HOPKINS UNIVERSITY**

**PAGE 3**  
**MORE EFFICIENT USE OF DONOR CORNEAL TISSUE WITH DMEK**

**PAGE 3**  
**GRAFT DETACHMENT RATE IN DMEK**

**PAGE 3**  
**EYE SURGERY WITHOUT THE NEED FOR AN OR**

**PAGE 4**  
**2009 NIIOS WETLABS**

**PAGE 4**  
**A DMEK PATIENT: THE FULL IN-SIGHT STORY**

## REFERRALS TO MELLES CORNEA CLINIC ROTTERDAM

For referrals to Melles Cornea Clinic Rotterdam, please use the referral form enclosed. The form can also be downloaded from [www.nijos.com](http://www.nijos.com). Please fax the referral form to **+31 10 297 4440** and one of our international secretaries will make further arrangements.

If you want to contact us by e-mail, please contact Ms Kim Herders at [herders@nijos.com](mailto:herders@nijos.com).

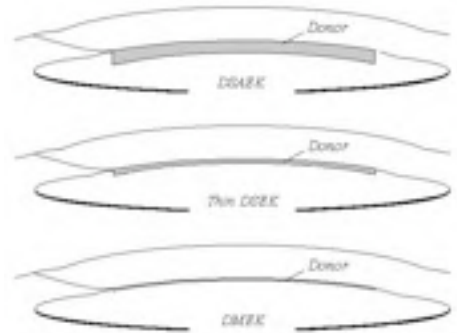
## Endothelial keratoplasty for Fuchs endothelial dystrophy **DSAEK, Thin DSEK or DMEK?**

In the 1990s, the NIIOS developed various techniques for endothelial keratoplasty (EK). The first patient was operated on with a deep lamellar endothelial keratoplasty (DLEK) procedure in 1998. After the introduction of the descemetorhexis at the American Academy of Ophthalmology in 2003, the EK-concept was adopted worldwide as Descemet stripping (automated) endothelial keratoplasty (DSEK/DSAEK). Although manual dissection of the donor tissue may give better visual outcomes, microkeratome pre-dissection of the tissue made the procedure better accessible, and DSEK/DSAEK may currently be the most widely performed EK procedure.

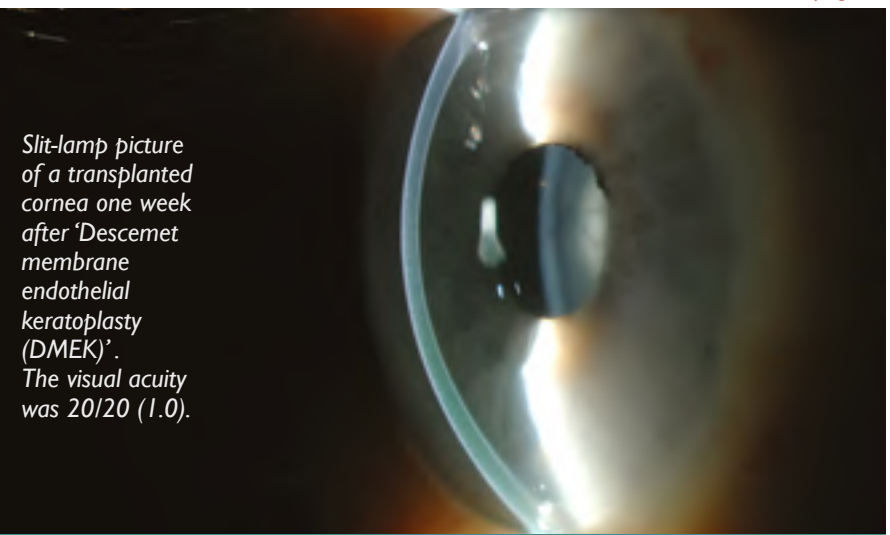
DSEK/DSAEK may be preferred over a conventional penetrating keratoplasty, because it provides better refractive stability and faster rehabilitation. However, DSEK/DSAEK may still face three major challenges. First, visual rehabilitation after DSEK/DSAEK is still relatively slow, while the final visual acuity may generally be limited to 20/40 (0.5). Second, DSAEK may be less accessible for a lot of corneal surgeons, due to high investments required for donor tissue preparation, such as a microkeratome, or because pre-cut tissue from an eye bank is relatively expensive. Third, current DSEK/DSAEK implantation techniques have been reported to cause more donor endothelial cell damage than in penetrating keratoplasty, potentially resulting in compromised transplant survival rates.

Theoretically, transplantation of an isolated donor Descemet membrane and its endothelium, currently referred to as Descemet membrane endothelial keratoplasty (DMEK), may be expected to give a faster and more complete visual rehabilitation, since it aims to restore the normal corneal anatomy by selective replacement of only the diseased corneal layers. Although the concept of DMEK was introduced by the NIIOS in 1998 and 2002, routine transplantation of donor Descemet membrane was considered feasible

**DMEK for Fuchs endothelial dystrophy:**  
**Within 1-3 months**  
**95% ≥20/40 (≥0.5)**  
**and 75% ≥20/25 (≥0.8)**



*Continued on page 2*



*Slit-lamp picture of a transplanted cornea one week after 'Descemet membrane endothelial keratoplasty (DMEK)'. The visual acuity was 20/20 (1.0).*



**TVE films first DMEK in Spain  
Live DMEK surgery in  
Halle and Madrid**

Each year, the NIIOS is visited by about hundred ophthalmologists and eyebank technicians. During two-day wetlab courses, live corneal transplant surgeries can be observed and more advanced lamellar keratoplasty techniques can be practised. At the same time, various new surgical concepts and/or procedures are 'peer reviewed', to determine their feasibility and/or to identify potential flaws. Thus, the surgical techniques developed by the NIIOS can continuously be improved upon.

If the opportunity arises, the NIIOS surgical team also performs corneal transplantations in foreign clinics. For peer ophthalmologists, starting with a new surgical procedure may be greatly facilitated by having been shown that the concept works in their own patients, operated on in an operation theatre they are familiar with.

In December 2008, the NIIOS team visited the Vissum clinic in Madrid to perform DMEK surgeries, and an impression was broadcasted by the national Spanish television. At the Halesches Symposium in Germany, in January 2009, DMEK surgery was performed in a live surgery session, during which meeting participants in the auditorium could participate through an interactive videolink.



Slit-lamp picture of a transplanted cornea one year after 'Descemet membrane endothelial keratoplasty (DMEK)'. Note that the cornea is completely clear and that the graft (with some pigment at the interface) can not be identified using biomicroscopy. The visual acuity was 20/20 (1.0) and the endothelial cell count measured  $\pm 2000$  cells/mm<sup>2</sup> (top).

*Continued from page 1*

only if preparation of the tissue could be performed in a specialized eyebank. For that reason, Amnitrans Eyebank Rotterdam was founded in 2004, to support advanced corneal transplantation procedures.

The clinical outcomes of DMEK may be the living proof of 'the thinner the graft, the better the visual performance of the transplanted cornea'. Compared to DSAEK ( $\pm 150 \mu\text{m}$ ), better visual acuities were already obtained with 'Thin DSEK' ( $\pm 50 \mu\text{m}$ ). In 2008, the visual outcomes of the first consecutive 100 DMEK-patients ( $\pm 20 \mu\text{m}$ ) were evaluated, showing seemingly unprecedented results. First, 75% of DMEK cases may reach a final visual acuity of 20/25 (0.8) or better. Second, the final visual acuity was commonly reached within 1-3 months. Not infrequently a DMEK eye obtained 20/20 (1.0) within the first week. Some eyes now reach 20/25 (0.8) on the first postoperative day, which could indicate that DMEK has potential to provide a visual rehabilitation similar to that after cataract surgery.

1. Ham L, Balachandran C, Verschoor CA, van der Wees J, Melles GRJ. Visual rehabilitation rate after isolated Descemet membrane transplantation: Descemet membrane endothelial keratoplasty. *Arch Ophthalmol.* 2009; 127:252-5.
2. Ham L, Dapena I, van Luijk C, van der Wees J, Melles GRJ. Descemet membrane endothelial keratoplasty (DMEK) for Fuchs endothelial dystrophy: review of the first 50 consecutive cases. *Eye.* 2009, in press.
3. Dapena I, Ham L, Melles GRJ. Endothelial keratoplasty. DSEK/DSAEK or DMEK: The thinner the better? *Curr Opin Ophthalmol.* 2009, in press.



**First Charles Tillett lecture  
Dr. Melles awarded at Johns Hopkins University**

In the 1950s, Dr. Charles Tillett already performed an endothelial keratoplasty (called posterior lamellar keratoplasty at the time). Underneath a partial stromal flap, he removed the recipient tissue by trephining the posterior corneal layers and then implanted a donor posterior disk. If the surgery would not have been complicated by an inadvertent pupillary block glaucoma, the history of endothelial keratoplasty might have run a completely different course.

*Dr. Charles Tillett personally presented the award at the meeting organized by prof. John Gottsch.*

With proper technique, 5% tissue loss in DMEK graft preparation

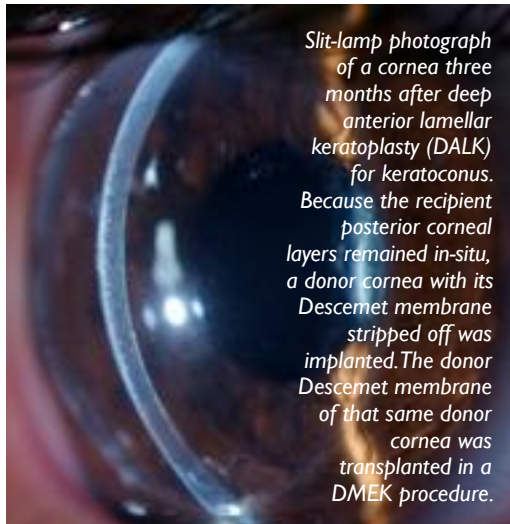
## More efficient use of donor corneal tissue with DMEK

The use of anterior and posterior lamellar keratoplasty procedures potentially provides the possibility of using a single donor cornea for more than one recipient. Because only the posterior corneal layers are transplanted in endothelial keratoplasty, the remaining anterior cornea could be available for any type of anterior lamellar keratoplasty. In the past years, Amnitrans Eyebank Rotterdam has been successfully using this approach to accommodate more surgeons with corneal tissue for transplantation, and as a result the overall discard rate of donor corneas in our eyebank has declined to 30%.

With the introduction of DMEK, isolated Descemet membrane with its endothelium can be stripped from a sclero-corneal rim, leaving the complete, intact stroma for different transplantation purposes. However, these thin DMEK grafts may be difficult to prepare, so that it seems important to evaluate tissue loss due to preparation error and/or damage. Various techniques for harvesting isolated Descemet grafts were extensively studied in our eyebank, before standardization of our current technique. In 2008, from a total of 73 consecutive Descemet grafts prepared using this technique, 4 grafts (5.5%) showed inadvertent tearing of the donor Descemet membrane.

In addition to using one donor cornea for two recipients, tissue availability may be further increased by the fact that isolated Descemet graft can be prepared from donor corneas ineligible for penetrating keratoplasty, for example because of a dense arcus senilis. If so, both 'double use' and a larger pool may contribute to a more efficient use of donor corneal tissue with DMEK.

I. Lie JT et al. Donor tissue preparation for Descemet membrane endothelial keratoplasty. J Cataract Refract Surg. 2008;34:1578-83.



*Slit-lamp photograph of a cornea three months after deep anterior lamellar keratoplasty (DALK) for keratoconus. Because the recipient posterior corneal layers remained in-situ, a donor cornea with its Descemet membrane stripped off was implanted. The donor Descemet membrane of that same donor cornea was transplanted in a DMEK procedure.*

## Fewer detachments in DMEK than DS(A)EK Graft detachment rate in DMEK

In endothelial keratoplasty, the main complication may be early graft detachment. In DSEK/DSAEK, graft thickness has been suggested as a risk factor for detachment. Isolated Descemet membrane transplantation in DMEK may therefore be prone to larger detachment rates. In 2008, we reviewed the number of detachments in the first 100 DMEK cases, divided in two groups of 50 consecutive cases, to evaluate the overall detachment rate, as well as the surgical learning curve. Graft detachment was defined as a lack of adherence between the Descemet graft and the recipient posterior stroma - most commonly observed clinically as a (partial) Descemet roll in the recipient anterior chamber - requiring secondary surgical intervention (a re-bubbling or re-graft).

In the first 100 consecutive DMEK patients, 15 (15%) showed a graft detachment. The detachment rate declined from 20% (10/50) in the first group (Cases 1-50), to 10% (5/50) in the second group (Cases 51-100). The first two detachments may have resulted from only a 30-minute air-fill of the anterior chamber at the end of the surgery, which was later extended to 45 to 60 minutes. Six (nearly) sequential detachments were attributed to changing from glass to plastic vials for intraoperative tissue processing; after switching back to glass vials, tissue adherence appeared again normal. Other reasons for detachment included upside-down positioning of the graft; intraoperative posterior vitreous pressure, and floppy iris syndrome.

Since 8 of the 15 detachments may be avoided through logistic adjustments, the extrapolated risk of future DMEK graft detachment, based on this first series of 100 consecutive DMEK cases, may be ≤ 7%.

## SurgiCube® iVi for intravitreal injections in the outpatient clinic Eye surgery without the need for an OR

A fully equipped operating theatre may not be required to safely perform intraocular surgery. In contrast to procedures in general surgery, the ophthalmic field is limited in size and approached from one direction. Hence, the NIIOS developed the SurgiCube, a unit that provides ophthalmic surgeons with a local sterile field, that proved 'cleaner' than a setting with a conventional downflow-plenum. The SurgiCube effectively eliminates various sources of contamination (eg. operating microscope, equipment, personnel as well as the patient himself) by using a different airflow direction.

Since the SurgiCube is a stand-alone unit, it allows better logistic flexibility and/or greater independence of a setting with operation theatres. In comparison to a conventional operating theatre, purchase and maintenance require a minimal investment, and overhead costs are low. Thus, the SurgiCube may provide a cost-effective and safe surgical environment with great flexibility.

In Europe, the SurgiCube gains popularity not only in private clinics but also in (academic) hospitals. For intravitreal injections, the 'junior' SurgiCube iVi was designed, saving expensive operating theatre time.

For additional information about the SurgiCube, please contact Ramón Hilberink, at +31 6 4161 1830 or via [www.hippocratechsurgical.com](http://www.hippocratechsurgical.com).

Please see [www.Youtube.com](http://www.Youtube.com): → 'SurgiCube'





**Two-day advanced keratoplasty instruction courses in Rotterdam 2009 NIOS wetlabs**

Deep anterior lamellar keratoplasty (DALK)

Descemet stripping endothelial keratoplasty (DSEK)

Descemet membrane endothelial keratoplasty (DMEK)

☞ DALK/DMEK: April 21/22, 2009

☞ DSEK/DMEK: June 9/10, 2009

☞ DSEK/DMEK: September 8/9, 2009

☞ DALK/DMEK: October 13/14, 2009

☞ DSEK/DMEK: November 17/18, 2009

Each course is scheduled on a Tuesday/ Wednesday. On Tuesdays, the course participants join live surgery sessions; on Wednesday, various techniques are practised during educational wetlab sessions.

Level:

Advanced - Corneal surgeons and senior eyebank technicians.

See [www.nios.com](http://www.nios.com) for application form and updates.

**NIOS Corneal fellows 2009**



Isabel Dapena



Kyros Moutsouris

**Fuchs endothelial dystrophy: A visual handicap often underestimated  
A DMEK patient: the full in-sight story**

**☞ How did the world appear to you before the operation?**

“Everything was grey and gloomy; dark trees, murky lakes, ominous skies. As if I had returned to the world of B&W television. I hardly saw colors anymore, only a milky fog hanging over the world in front of me. For years it restricted my daily activities, since I could hardly read. I used a large magnifier, but this proved incredibly tiring and strenuous. Sometimes my sight improved for a few days or so - that’s really vicious about Fuchs endothelial dystrophy, because it gives you false hope. At some point, I couldn’t read any street signs no more. I remember walking back from the pharmacist in Rotterdam to the Cornea Clinic and I had to count the blocks to find my way. But worst of it all was not being able to read: if you can’t read, you’re cut off from life.”

**☞ Why did you choose for treatment at the Cornea Clinic Rotterdam?**

“My ophthalmologist in Germany told me that there was no treatment but a penetrating keratoplasty. However, the complications of the surgery held me back. Together with my wife, I sat down at the computer searching the internet (myself with magnifying glasses) and we came across DMEK surgery. Only few ophthalmologists performed the procedure, so I made an appointment at the Cornea Clinic in Rotterdam. In particular the way Dr. Melles regards his patients appealed to me”.



Mr. H. Höhn

**☞ How was the actual surgery?**

“First my left eye was operated on. As soon as I could rely on that eye, my right eye was done as well. Both surgeries came along very well.”

**☞ How was the first day after?**

“Both times my eye teared dreadfully. The night after the first operation, I woke up at 5 am, lying in the 45° position, my left shoulder being completely wet with tears. Although I was not allowed to do so, I lifted the eyepad slightly to have a small peak - I could see some trees outside, everything was so clear! That moment really moved me emotionally. As if color television was reinvented!”

**☞ And the first week?**

“After the first surgery I was stunned how fast my sight improved. The result was really overwhelming. I couldn’t believe my eye! The second eye was different: the graft needed more time to start up. With my left eye my sight was 100% within the first month. The second eye was only 70% by then, and now, after three months, it is 90%.”

**☞ How was your further recovery?**

“My first eye recovered very well.” Laughing: “I talked a lot to the second eye encouraging it to show some action. On New Year’s Day it cleared at once, even though I hadn’t been drinking champagne! Obviously, the graft had decided to start working. Three weeks later my sight improved again and all the blurr suddenly disappeared.”

**☞ What is your impression of the Cornea Clinic Rotterdam?**

“I was impressed by the way Dr. Melles and his team interact with their patients, and about the pleasant and friendly atmosphere at the clinic. I really appreciated the personal approach very much. I didn’t feel like I was just a patient being sent from one medical doctor to another. Dr. Melles is doing pioneering work, is a leading authority worldwide, and innovative – exactly what the letter I in the name NIOS says. I think the institute is very well organized, while keeping a pleasant approach on a personal level.”