

NIOS *Final program & abstract book*

Netherlands Institute for Innovative Ocular Surgery

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XXIV Annual Meeting European Eye Bank Association

‘Lamellar Keratoplasty’

January 20/21, 2012, Rotterdam
The Netherlands

For more information, please go to website:
www.EEBA2012.eu



EEBA 2012 Final Scientific Program

Rotterdam Hall

Friday - January 20, 2012

13.00 - 15.00	Registration	
15.00 - 17.15	<p>Main Session I Target audience: Eye bank technicians and clinicians Tissue preparation for endothelial keratoplasty Chair: Duncker, Cursiefen, Ham</p> <p>15.00 Welcome</p> <p>15.05 - I.a Keynote presentation DSAEK preparation P. Rieck <i>Augenklinik CVK, Charité, Berlin, Germany</i></p> <p>15.20 - I.b First 150 pre-cut corneas for DSAEK prepared in the International Eye Bank of Prague M. Netuková, Y. Urbanová, I. Vospálková, J. Dušková, J. Mladek, D. Siveková, K. Liehneová, P. Kuchynka <i>Vinohrady Teaching Hospital, Charles University Prague; International Eye Bank of Prague, Czech Republic</i></p> <p>15.30 - I.c Recent activities of the Central Eye Bank of Iran (CEBI): Cryopreservation of donated whole globes for keratoplasty and preparation of pre-cut corneas for Descemet stripping automated endothelial keratoplasty (DSAEK) M.R. Kanavi, M.A. Javadi, T. Chamani, F. Javadi <i>Ophthalmic Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran & Central Eye Bank of Iran; Central Eye Bank of Iran, Tehran; Shahed University of Medical Sciences, Tehran, Iran</i></p> <p>15.40 - I.d Precut tissue: Quality controlled planparallel pre-cut grafts with a defined thickness $\leq 100 \mu\text{m}$ for posterior lamellar keratoplasty L. Blomberg, F. Will, H. Lubatschowski <i>DGFG Cornea Bank, Hannover; Rowiak GmbH, Hannover; Augenzentrum Hildesheim-Alfeld, Germany</i></p> <p>15.50 - I.e Long term experience with the AMADEUS II artificial anterior chamber (AAC II) for Descemet stripping automated endothelial keratoplasty A. Villarrubia, A. Porcuna, L. Delgado, M.M. Castillo, I. Porcuna, M.J. Cantais <i>Instituto de Oftalmología La Arruzafa, Córdoba, Spain</i></p>	<p>Main Session I - continued</p> <p>16.00 - I.f Keynote presentation Preparation of thin grafts and descemet grafts for endothelial keratoplasty M. Muraine <i>Hôpital Charles Nicolle, Rouen, France</i></p> <p>16.15 - I.g A single pass microkeratome preparation of ultra-thin DSAEK grafts in the eye bank - new technique presentation and early results E. Abdullayev, N. Desai, Ch. Sanchez Miller <i>International Sight Restoration Eye Bank, Tampa, USA</i></p> <p>16.25 - I.h Comparative study of endothelial cell death in femtosecond laser prepared DMAEK and microkeratome prepared DMAEK tissues J. Galloway, W. Chamberlain, J. Holiman, D. Davis-Boozer, C. Stoeger <i>Lions Vision Gift, Oregon Health & Science University, Portland, USA</i></p> <p>16.35 - I.i Split donor-cornea transplantation by combining DMEK and DALK: Strategies for standardization C. Cursiefen <i>Department of Ophthalmology, University of Cologne, Cologne, Germany</i></p> <p>16.45 - I.j Keynote presentation Standardized 'no-touch' donor tissue preparation for DALK and DMEK: Harvesting undamaged anterior and posterior transplants from the same donor cornea J.T. Lie, E. Groeneveld, J. van der Wees, M. Bruinsma, G.R.J. Melles <i>Amnitrans Eye Bank Rotterdam; Netherlands Institute for Innovative Ocular Surgery, Rotterdam, The Netherlands</i></p> <p>17.00 Discussion</p> <p>17.15 End</p>
17.15 - 18.30	Welcome Reception, Industrial Exhibition	
18.30 - 20.30	Walking Dinner	

EEBA 2012 Final Scientific Program

Saturday - January 21, 2012

Saturday - January 21, 2012		
		Diamond Room
8.30 - 9.30		Business Meeting (For all EEBA members)
Rotterdam Hall		
9.30 - 11.00	<p>Main Session II Target audience: Clinicians Clinical outcome of endothelial keratoplasty I <i>Chair: Neuhann, Durán, Oganesyán</i></p> <p>9.30 - II.a Quality of vision in patients with Fuchs' endothelial dystrophy, after Descemet stripping endothelial keratoplasty (DSEK) I.J.E. van der Meulen, S.V. Patel, R. Lapid-Gortzak, C.P. Nieuwendaal, J.W. McLaren, Th.J.T.P. van den Berg <i>Academic Medical Center, Amsterdam, The Netherlands; Mayo Clinic, Rochester, Minnesota, USA; Netherlands Institute of Neurosciences, Royal Netherlands Academy of Arts and Science (KNAW), Amsterdam, The Netherlands</i></p> <p>9.40 - II.b Personal experience with DSAEK and remarks on functional results G.I.W. Duncker <i>Augen-Laserzentrum, Halle, Germany</i></p> <p>9.50 - II.c (Rapid fire) Eye pressure after Descemet stripping endothelial keratoplasty (DSEK) C.P. Nieuwendaal, I.J.E. van der Meulen, R. Lapid-Gortzak <i>Department of Ophthalmology, Academic Medical Center, Amsterdam, The Netherlands</i></p> <p>9.55 - II.d (Rapid fire) Results of Descemet stripping endothelial keratoplasties (DSEK) performed in 2007 L. Nikolic, V. Jovanovic <i>Ophthalmology Clinic, Faculty of Medical Dentistry, Belgrade, Serbia</i></p> <p>10.00 - II.e (Rapid fire) The "sandwich graft": ALTK after a DSAEK for Fuchs dystrophy F. Majo, Z. Varga, M. Nicolas, L. Franscini <i>Jules-Gonin Eye Hospital, Lausanne, Switzerland</i></p>	<p>Main Session II - Continued</p> <p>10.05 - II.f Keynote presentation (Video) Clinical outcomes of DSEK, DMAEK and DMEK F.W. Price Jr., M.O. Price <i>Price Vision Group, Indianapolis, USA</i></p> <p>10.20 - II.g Learning curve in Descemet membrane endothelial keratoplasty (DMEK) I. Dapena, L. Ham, K. van Dijk, G.R.J. Melles <i>Melles Cornea Clinic, Rotterdam; Netherlands Institute for Innovative Ocular Surgery, Rotterdam, The Netherlands</i></p> <p>10.30 - II.h Descemet stripping automated endothelial keratoplasty – Is a thinner donor lamella a better one? I. Dekaris, M. Pauk, N. Drača, A. Pašalić, N. Gabrić <i>Eye Clinic Sijetlost, Zagreb, Croatia</i></p> <p>10.40 - II.i (Rapid fire) First series of Descemet membrane endothelial transfer (DMET) M. Dirisamer, R.-Y. Yeh, K. van Dijk, L. Ham, I. Dapena, G.R.J. Melles <i>Department of Ophthalmology, AKH, Linz, Austria; Amnitrans Eye Bank Rotterdam; Melles Cornea Clinic, Rotterdam; Netherlands Institute for Innovative Ocular Surgery, Rotterdam, The Netherlands</i></p> <p>10.45 Discussion</p> <p>11.00 End</p>
11.00 - 11.30	Coffee Break, Industrial Exhibition	

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	Rotterdam Hall	Diamond Room
Saturday - January 21, 2012		
11.30 - 13.00	<p>Main Session III Target audience: Eye bank technicians Donor selection & screening; corneal evaluation & storage <i>Chair: van der Wees, Toledo, Blomberg</i></p> <p>11.30 - III.a Validation of microbiological diagnostics of culture medium using BacTec I. Wilkemeyer, J. Schroeter, A. Pruß <i>University Tissue Bank, Institute of Transfusion Medicine, Charité-Universitätsmedizin Berlin, Germany</i></p> <p>11.40 - III.b Development of a test regime for quality testing of cultivation media and sera for donor corneas J. Schönfelder, Ch. Wetzel, M. Valtink, L. Knels, R.H.W. Funk, K. Engelmann <i>Fraunhofer Institute for Electron Beam and Plasma Technology, Dresden; Institute of Anatomy, Medical Faculty, TU Dresden; Dept. of Ophthalmology, Klinikum Chemnitz, Chemnitz, Germany</i></p> <p>11.50 - III.c Collaborative bacteriological and fungal control studies of corneal organ culture media: Results of 13 studies (2004-2011) N. Delesalle, J. Dubus, G. Huyghe, B. Boucher, J. Droulin, S. Benlian, F. Rapon, L. Fleury, L. Mouillot <i>The French Health Products Agency (Afsaps), The Laboratories and Controls Directorate, Unit Blood Products and Cellular Therapy and Microbiology, St-Denis, France</i></p> <p>12.00 - III.d (Rapid fire) Risk assessment in GMP-based eye banking I. Majore, U. Scheider, I. Wittmershaus, M. Börgel, L. Blomberg, A. Knipper <i>German Society for Tissue Transplantation, Hannover, Germany</i></p> <p>12.05 - III.e (Rapid fire) Does reduction of post-mortem time for corneal explantations have an influence on the rate of medium contaminations? A.K. Gruenert, K. Rosenbaum, G. Geerling, T.A. Fuchsluger <i>Eye Hospital and Lions Cornea Bank NRW, Heinrich Heine University, Düsseldorf, Germany</i></p> <p>12.10 - III.f (Rapid fire) Microbial growth inhibition during organ culture Ph. Maier, Ch. Schneider, A. Wittmer, I. Lienhart, Th. Reinhard <i>University Eye Hospital Freiburg, Institute for Medical Microbiology and Hygienics, University Hospital Freiburg, Germany</i></p>	<p>Parallel Session III Target audience: Clinicians Keratoplasty miscellaneous <i>Chair: Villarrubia, Salouti, Geerling</i></p> <p>11.30 - III.k Deep anterior lamellar keratoplasty for sterile corneal ulcers Á. Füst, L. Imre, M. Bausz, J. Németh <i>Semmelweis University, Department of Ophthalmology, Budapest, Hungary</i></p> <p>11.40 - III.L Medium term follow up of deep anterior lamellar keratoplasty (DALK) with the Melles' technique A. Villarrubia, M.J. Cantais, A. Porcuna, I. Porcuna, M.M. Castillo, L. Delgado <i>Instituto de Oftalmología La Arruzafa, Córdoba, Spain</i></p> <p>11.50 - III.m Long term results of deep anterior lamellar keratoplasty using Melles' technique in a large series of patients with keratoconus R. Salouti, M.H. Nowroozzadeh, M. Zamani, M. Ghoreyshi <i>Poostchi Eye Research, Shiraz University of Medical Science, Shiraz, Iran</i></p> <p>12.00 - III.n Deep lamellar endothelial keratoplasty (DLEK): Ten year follow-up of the first patient cohort worldwide K. van Dijk, I. Dapena, K. Moutsouris, L. Ham, C. Nieuwendaal, G.R.J. Melles <i>Amnitrans Eye Bank Rotterdam; Melles Cornea Clinic, Rotterdam; Netherlands Institute for Innovative Ocular Surgery, Rotterdam, The Netherlands</i></p> <p>12.10 - III.o Keynote presentation Deep anterior lamellar keratoplasty (DALK) versus penetrating keratoplasty (PK) J.H. Krumeich <i>Clinic Krumeich, Bochum, Germany</i></p> <p>12.25 - III.p Update for femtosecond laser-assisted corneal transplants T. Neuhann <i>AaM Augenklinik am Marienplatz, München, Germany</i></p>

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Saturday - January 21, 2012		
11.30 - 13.00	<p>Main Session III - Continued</p> <p>12.15 - III.g (Rapid fire) Reasons for disqualifying donor corneas for transplantation purposes in periods 1994-1999 and 2006-2011 at the Lublin Eye Bank B. Rymgayłto-Jankowska, G. Płaszczewska, M. Stępnia, M. Skowronek, Ł. Harcej, T. Żarnowski <i>Lublin Eye Bank, Poland; Ophthalmology and Eye Hospital, Medical University of Lublin, Poland</i></p> <p>12.20 - III.h (Rapid fire) European study on reliability assessment of endothelial cell count in eye banks: Official start G. Thuret, Z. He, N. Campolmi, B.M. Ha Thi, J-M. Dumollard, M. Peoc'h, A. Bernard, O. Griot, Ph. Gain <i>Corneal Graft Biology, Engineering and Imaging Laboratory, Federative Institute of Research in Sciences and Health Engineering, Faculty of Medicine, Jean Monnet University, Saint-Etienne; Department of Pathology, University Hospital of Saint-Etienne, France</i></p> <p>12.25 - III.i Pan-endothelial viability assessment with the triple HEC staining of organ culture precut DSAEK vs full thickness corneas. N. Campolmi, M. Muraine, D. Toubeau, Z. He, B.M. Ha Thi, J-M. Dumollard, M. Peoc'h, A. Bernard, S. Piselli, S. Acquart, S. Pereira, Ch. Theilliere, Ph. Gain, G. Thuret <i>Corneal Graft Biology, Engineering and Imaging Laboratory, Federative Institute of Research in Sciences and Health Engineering, Faculty of Medicine, Jean Monnet University, Saint-Etienne; Ophthalmology dept. and Eye Bank, University Hospital of Rouen; Eye Bank of Saint-Etienne, French Blood Centre, France</i></p> <p>12.35 - III.j Are polymegethism, pleomorphism, and 'poor swelling' valid discard parameters in immediate post-mortem evaluation of human donor corneal endothelium? M. Bruinsma, J.T. Lie, E. Groeneveld, J. van der Wees, G.R.J. Melles <i>Amnitrans Eye Bank Rotterdam; Netherlands Institute for Innovative Ocular Surgery, Rotterdam, The Netherlands</i></p> <p>12.45 Discussion</p> <p>13.00 End</p>	<p>Parallel Session III - Continued</p> <p>12.35 - III.q (Rapid fire) Evolution of endothelial cell density after corneal transplantation C. van Geyt, E. Delanghe, I. Claerhout, H. Beele <i>Tissue Bank; Department of Ophthalmology, Ghent University Hospital, Ghent, Belgium</i></p> <p>12.40 - III.r (Rapid fire) One-year follow-up study of endothelial cell density loss after penetrating keratoplasty N. Drača, M. Pauk, N. Miličić, I. Dekaris <i>Eye Clinic Sijetlost, Zagreb, Croatia</i></p> <p>12.45 - III.s (Rapid fire) Allograft rejection after Descemet membrane endothelial keratoplasty (DMEK) M. Naveiras, I. Dapena, L. Ham, J. van der Wees, G.R.J. Melles <i>Department of Ophthalmology, University of Oviedo, Spain; Melles Cornea Clinic, Rotterdam; Netherlands Institute for Innovative Ocular Surgery, Rotterdam, The Netherlands</i></p> <p>12.50 - III.t (Rapid fire) Graft rejection and graft failure after penetrating keratoplasty or DSAEK for Fuchs endothelial dystrophy J. Hjortdal, I. Bach Pedersen, S. Bak-Nielsen <i>Department of Ophthalmology, Aarhus University Hospital, Aarhus C, Denmark</i></p> <p>12.55 Discussion</p> <p>13.00 End</p>
13.00 - 14.30	Lunch, Patient demonstration, Poster sessions, Industrial Exhibition	

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	Rotterdam Hall	Diamond Room
Saturday - January 21, 2012		
14.30 - 16.15	<p>Main Session IV Target audience: Clinicians Clinical outcome of endothelial keratoplasty II <i>Chair: Priglinger, Vetter, Böhnke</i></p> <p>14.30 - IV.a Keynote presentation Standardized 'no-touch' technique for DMEK: Controlled donor tissue implantation, orientation, unrolling, centering, appositioning and fixation I. Dapena, K. Moutsouris, K. Droutsas, M. Dirisamer, M. Naveiras, L. Ham, K. van Dijk, G.R.J. Melles <i>Amnitrans Eye Bank Rotterdam; Melles Cornea Clinic, Rotterdam; Netherlands Institute for Innovative Ocular Surgery, Rotterdam, The Netherlands</i></p> <p>14.45 - IV.b Reproducibility of Descemet membrane endothelial keratoplasty (DMEK) using the standardized techniques of the Netherlands Institute for Innovative Ocular Surgery K. Droutsas, E. Giallourous, N. Kicova, E. Bari-Kacik, W. Sekundo <i>Marburg University Eye Clinic, Marburg, Germany</i></p> <p>14.55 - IV.c Clinical outcome of Descemet membrane endothelial keratoplasty (DMEK) O. Oganessian <i>The Helmholtz Research Institute of Eye Diseases, Moscow, Russia</i></p> <p>15.05 - IV.d Outcome in a first series of Descemet membrane endothelial keratoplasty (DMEK) S. Priglinger, M. Dirisamer <i>Department of Ophthalmology, AKH, Linz, Austria</i></p> <p>15.15 - IV.e (Rapid fire) Comparison of intraoperative visibility of two simultaneous DMEK transplant marking methods J.M.Vetter <i>Department of Ophthalmology, University Mainz, Germany</i></p> <p>15.20 - IV.f (Rapid fire) DMEK - Which side is which? P. Stodůlka <i>Gemini Eye Clinics, Zlin, Czech Republic</i></p>	<p>Parallel Session IV Target audience: Eye bank technicians Eye banking miscellaneous <i>Chair: Hjortdal, Majo, Fuchsluger</i></p> <p>14.30 - IV.L Donor cornea harvesting technique for Descemet's stripping endothelial keratoplasty J.A. Durán, A.E. Grau, M. García <i>Instituto de Oftalmología, Bilbao, Spain</i></p> <p>14.40 - IV.m Purinergic receptors expression in human and murine corneal endothelium T.A. Fuchsluger, M. Czugała, T. Funaki, S. Chauhan, R. Dana <i>Institute of Anatomy, University of Duisburg-Essen; Center of Ophthalmology, University of Duisburg-Essen, Germany; Schepens Eye Research Institute, Department of Ophthalmology, Harvard Medical School, Boston, USA; Department of Ophthalmology, Heinrich-Heine-University, Düsseldorf, Germany</i></p> <p>14.50 - IV.n A new tool for transfection of corneal endothelial cells: Calcium phosphate nanoparticles J. Hu, A. Kovtun, B. Singer, A. Tomaszewski, B. Seitz, M. Epple, K.P. Steuhl, S. Ergün, T.A. Fuchsluger <i>Institute of Anatomy, Essen University Hospital; Inorganic Chemistry, University Duisburg-Essen; Center of Ophthalmology, Essen University Hospital; University Eye Hospital, Homburg/Saar, Germany Department of Ophthalmology, Tongji Medical College, Huazhong University of Science and Technology, PR China; Department of Ophthalmology, Heinrich-Heine-University, Düsseldorf, Germany</i></p> <p>15.00 - IV.o Monitoring of endothelial cell density during simulation of DSAEK phases in vitro using THIN-C deswelling medium and two different glides for endothelium insertion A. Pocobelli, C. Amici, R. Donati, R. Leaci, D. Amato, J. D'Amato Tothova <i>Eye Bank of Rome, S. Giovanni Addolorata Hospital, Italy; R&D Alchimia Srl, Ponte San Nicolò, Italy; Dept. of Ophthalmology, University of Parma, Italy</i></p>

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	Rotterdam Hall	Diamond Room
Saturday - January 21, 2012		
14.30 - 16.15	<p>Main Session IV - Continued</p> <p>15.25 - IV.g Intraocular graft unfolding techniques in Descemet membrane endothelial keratoplasty (DMEK) V. Liarakos, I. Dapena, L. Ham, K. van Dijk, G.R.J. Melles <i>Melles Cornea Clinic, Rotterdam; Netherlands Institute for Innovative Ocular Surgery, Rotterdam, The Netherlands</i></p> <p>15.35 - IV.h Patterns of endothelialization and corneal clearance after Descemet membrane endothelial keratoplasty (DMEK) M. Dirisamer, I. Dapena, L. Ham, K. van Dijk, G.R.J. Melles <i>Department of Ophthalmology, AKH, Linz, Austria; Amnitrans Eye Bank Rotterdam; Melles Cornea Clinic, Rotterdam; Netherlands Institute for Innovative Ocular Surgery, Rotterdam, The Netherlands</i></p> <p>15.45 - IV.i (Rapid fire) Endothelial cell density after Descemet membrane endothelial keratoplasty (DMEK): 1-5 year follow-up L. Ham, J. Parker, M. Dirisamer, M. Naveiras, K. van Dijk, G.R.J. Melles <i>Amnitrans Eye Bank Rotterdam; Melles Cornea Clinic, Rotterdam; Netherlands Institute for Innovative Ocular Surgery, Rotterdam, The Netherlands</i></p> <p>15.50 - IV.j (Rapid fire) Descemet membrane endothelial keratoplasty in an eye with iris claw IOL P. Stodůlka <i>Gemini Eye Clinics, Zlin, Czech Republic</i></p> <p>15.55 - IV.k The use of a modified inserter to facilitate insertion of endothelium during DMEK M. Tappin, P. Georgoudis <i>The Royal Surrey Hospital; Guilford; St. Peters Hospital, Chertsey, United Kingdom</i></p> <p>16.05 Discussion</p> <p>16.15 End</p>	<p>Parallel Session IV - Continued</p> <p>15.10 - IV.p Thickness, endothelial cell density, and interface of microkeratome or femtosecond laser prepared human corneal tissue for DSAEK using de-swelling solution THIN-C J. Alvarez De Toledo, R. Quilendrin, C. Gatto, J. D'Amato Tothova <i>Centro de Oftalmología Barraquer, R&D Alchimia Srl, Ponte San Nicolò, Italy</i></p> <p>15.20 - IV.q Processing of human corneal endothelial cell sheets using tunable cell culture substrates J. Teichmann, M. Valtink, S. Gramm, M. Nitschke, C. Werner, R.H.W. Funk, K. Engelmann <i>Institute of Anatomy, Medical Faculty Carl Gustav Carus, Technische Universität Dresden; Leibniz Institute of Polymer Research Dresden, Max Bergmann Center of Biomaterials Dresden; Department of Ophthalmology, Klinikum Chemnitz gGmbH; CRTD/DFG-Center for Regenerative Therapies Dresden, Medical Faculty Carl Gustav Carus, Technische Universität Dresden, Germany</i></p> <p>15.30 - IV.r Donor tissue selection for anterior lamellar keratoplasty V.M. Borderie, O. Sandali, J. Bullet, A. Piquemal, C. De Sousa, A. Fialaire-Legendre <i>Cornea Bank, EFS - Ile-de-France, Paris, France</i></p> <p>15.40 - IV.s Isolated Bowman layer transplantation E. Groeneveld, I. Dapena, J. Lie, L. Ham, G.R.J. Melles <i>Amnitrans Eye Bank Rotterdam; Melles Cornea Clinic, Rotterdam; Netherlands Institute for Innovative Ocular Surgery, Rotterdam, The Netherlands</i></p> <p>15.50 Discussion</p> <p>16.00 End</p>
16.15 - 17.00	Closing Ceremony	

13.00 - 14.30

Poster Session

Chair: Netuková

Tissue preparation for endothelial keratoplasty

Poster 1

Endothelial keratoplasty with intact recipient's Descemet membrane in a rabbit eye

V. Jovanovic, L. Nikolic, M. Jankov

Faculty of Medical Dentistry, Belgrade, Serbia; LaserFocus Centre for Eye Microsurgery, Belgrade, Serbia

Poster 2

Use of one corneal graft for both Descemet stripping automated endothelial keratoplasty and coverage of glaucoma drainage device tube

O. Spierer, R. Rachmiel, M. Lazar, M. Alba, D. Varssano

Department of Ophthalmology, Tel Aviv Sourasky Medical Center; Sackler Faculty of Medicine, Tel-Aviv University, Tel-Aviv, Israel

Poster 3

Using corneas with keratotomy incisions as donor material for DMEK surgery

O. Oganessian, V.D. Danilova, M. Smetanina

The Moscow Helmholtz Research Institute of Eye Diseases, Moscow, Russia

Donor selection & screening; corneal evaluation & storage

Poster 4

Our experience with tissue coding systems

I. Grabska-Liberek, D. Polak, J. Szaflik

Warsaw Eye Bank, Warsaw, Poland

Poster 5

The effects of different preservation processes on the total protein and growth factor content in a new biological product developed from human amniotic membrane

A. Russo, P. Bonci, P. Bonci

Imola Eye Bank, Department of Ophthalmology, S. Maria della Scaletta Hospital, Imola, Italy

Poster 6

Corneal graft survival in association with donor death cause

T. Báčová, M. Sajdíková, K. Strakosova, V. Baca,

J. Vranova, Y. Urbanová, P. Kuchynka, M. Netuková

Dept. of Ophthalmology, International Eye Bank of Prague, Teaching Hospital Kralovske Vinohrady, Prague; Dept. of Anatomy, Third Faculty of Medicine of Charles University, Prague; Dept. of Medical Biophysics and Informatics, Charles University, Prague, Czech Republic

Poster Session - continued

Poster 7

The influence of certified and non-certified culture media on corneal endothelial parameters

K. Jirsova, I. Krabcova, J. Kortusova, D. Zlacka

Laboratory of the Biology and Pathology of the Eye, Institute of Inherited Metabolic Disorders and Ocular Tissue Bank, General Teaching Hospital and 1st Faculty of Medicine, Charles University, Prague; Cord Blood Center CZ, Prague, Czech Republic

Keratoplasty miscellaneous

Poster 8

Penetrating keratoplasty and 'iris-claw' lens - is it safe for endothelium?

A. Barišić, N. Gabrić, I. Dekaris, I. Mravičić, M. Antičić

Eye Clinic Svjetlost, Zagreb, Croatia

Poster 9

Management of post penetrating keratoplasty astigmatism

M. Pauk, A. Barišić, A. Pašalić, I. Dekaris

Eye Clinic Svjetlost, Zagreb, Croatia

Poster 10

Outcome of DMEK in phakic eyes

J. Parker, M. Dirisamer, M. Naveiras, W.H.W.Tse,

K. van Dijk, L.E. Frank, L. Ham, G.R.J. Melles

Melles Cornea Clinic, Rotterdam; Netherlands Institute for Innovative Ocular Surgery, Rotterdam, The Netherlands

Eye banking miscellaneous

Poster 11

A milestone in the history of medicine: Dr. Eduard Zirm and the first successful keratoplasty in 1905

S. Scholtz, G.U. Auffarth

International Vision Correction Research Centre (IVCRC), Dept. of Ophthalmology, University of Heidelberg, Germany

Poster 12

20 years of International Eye Bank of Prague

Y. Urbanová, M. Netuková, J. Šach, P. Kuchynka

International Eye Bank of Prague, Prague, Czech Republic

Poster 13

Cellular cytotoxicity of ophthalmic solutions with and without preservatives to human corneal endothelial cells

K. Huber-van der Velden, O. Knoll, A.K. Gruenert,

A. Farokh Ansari, F. Jahnel, K. Rosenbaum

University Düsseldorf, Germany

Friday - January 20, 2011 - Main Session I - 15.00 - 17.15

Tissue preparation for endothelial keratoplasty

15.05 - I.a Keynote presentation

DSAEK preparation

Peter Rieck

Augenlinik CVK, Charité, Berlin, Germany

Purpose. To compare different devices for DSAEK tissue preparation.

Methods. In a consecutive series of DSAEK tissue preparations, we compared the accuracy of three different approaches for cutting posterior corneal lamellae: Moria ALTK, Schwind Carriazo Pendular and Ziemer Femto LDV femtosecond laser. Experimental human corneas were used to determine the precision of cut depth and induced endothelial damage. In patients, we evaluated the course of post-operative visual acuity and the flap dislocation rate.

Results. In one-cut procedures, the accuracy of achieved cut depth was superior with the Schwind system compared to Moria's ALTK. Endothelial damage was comparable with both microkeratome after one cut, while the second cut with the Pendular induced significantly more endothelial damage. The femtosecond laser was used to cut tissue from the endothelial side with excellent reproducibility of cut depth and a surface smoothness that was far superior to that created with a cut from the epithelial side. Endothelial damage was low despite the contact of the laser head with the endothelial cells. Flap dislocation with very thin flaps (80 µm) created with the laser was, however, higher when compared to the microkeratome rate (5%). Transplanted thin flaps created with both Pendular or laser achieved a quicker visual recovery as well as better visual outcomes.

Conclusion. The devices tested were all suitable for DSAEK tissue preparation. The Pendular system was more precise in achieving the intended cut depth. To our surprise, it seems possible to use the femtosecond laser for a very precise cut from the endothelial side.

Financial disclosure: None.

15.20 - I.b

First 150 pre-cut corneas for DSAEK prepared in the International Eye Bank of Prague

M. Netuková (1,2), Y. Urbanová (2), I. Vospálková (2), J. Dušková (2), J. Mladek (2), D. Siveková (1,2), K. Liehneová, (1,2), P. Kuchynka (1,2)

(1) Department of Ophthalmology; (2) International Eye Bank of Prague, Vinohrady Teaching Hospital, Charles University, Czech Republic

Purpose. To evaluate the quality of the first 150 pre-cut tissues for DSAEK prepared in our eye bank, and to analyse possible complications during and after pre-cut cornea preparation.

Methods. Since September 2010, 150 pre-cut corneas were prepared using a 300 µm and 350 µm Moria microkeratome. Donor corneal tissues met high quality requirements; endothelial cell density was always at least 2500 cells/mm². Methods for preparation were adopted from the International Federation of Eye and Tissue Banks / Tissue Banks international guidelines. After preparation precise slit lamp and specular microscopy evaluations were performed.

Results. All corneas were successfully pre-cut, we experienced no tissue loss and/or any statistically significant endothelial cell loss after preparation. All pre-cut corneas fulfilled the quality demands and were released for transplantation. To date, seven ophthalmology centres in the Czech Republic are using pre-cut tissues prepared by us. A close cooperation is kept with the corneal surgeons, to improve the distributed tissue quality.

Conclusion. We believe that preparation of pre-cut corneas in our eye bank provides tissues of high quality and safety. We are now starting programs in our eye bank for new products including ultrathin DSAEK lamellas and tissues for DMEK to be offered to other clients. The aim of our work is to follow up-to-date trends in corneal surgery and to offer tissues of the highest quality.

Financial disclosure: None.

Friday - January 20, 2011 - Main Session I - 15.00 - 17.15

Tissue preparation for endothelial keratoplasty

15.30 - I.c

Recent activities of the Central Eye Bank of Iran (CEBI): Cryopreservation of donated whole globes for keratoplasty and preparation of pre-cut corneas for Descemet stripping automated endothelial keratoplasty (DSAEK)

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 (1) Ophthalmic Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran & Central Eye Bank of Iran; (2) Central Eye Bank of Iran, Tehran; (3) Shahed University of Medical Sciences, Tehran, Iran.

Purpose. To introduce the results of cryopreservation of donated whole globes for keratoplasty and of preparation of pre-cut corneas for Descemet stripping automated endothelial keratoplasty (DSAEK) during a 2-year period at the Central Eye Bank of Iran.

Methods. Between April 2009 and June 2011, the frequency of transplantation of cryopreserved surplus donated whole globes for keratoplasty, and those of pre-cut corneas prepared for DSAEK were specified.

Results. 422 (91.3%) out of 462 surplus cryopreserved donated whole globes were distributed for transplantation during the 26-month period: 420 for deep anterior lamellar keratoplasty (DALK) in keratoconic eyes and 2 for tectonic/patch grafts in cases with perforated infectious keratitis. No adverse reactions were reported for the transplanted cryopreserved corneas and none needed a re-graft. Out of 939 donated whole globes appropriate for DSAEK, 913 (97.2%) pre-cut corneas were successfully prepared. The method of preparation failed in 26 (2.8%) cases. The endothelial cell density of the pre-cut corneas ranged from 2506 to 4291 cells/mm². Causes of failure included inexperience of the eye bank technician, especially when the selected cornea had a low normal limit thickness.

Conclusion. Cryopreservation of surplus donated whole globes is a safe and easy method for long-term preservation of corneas for anterior lamellar keratoplasty techniques, and also for tectonic grafts. Pre-cut corneas prepared from donated whole globes for DSAEK are associated with a lower risk of tissue manipulation and endothelial cell loss.

Financial disclosure: None

15.40 - I.d

Precut tissue: Quality controlled planparallel pre-cut grafts with a defined thickness $\leq 100 \mu\text{m}$ for posterior lamellar keratoplasty

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 (1) DGFG Cornea Bank, Feodor-Lynen Str. 21, 30625 Hannover, (2) Rowiak GmbH, Hannover, (3) Augenzentrum Hildesheim-Alfeld

Purpose. To describe if quality control of pre-cut tissue is necessary to assess endothelial cell loss after lamellation / stripping.

Methods. With OCT guided femtosecond laser-assisted lamellar dissection (Corneasureon), we dissected organ cultured human corneal buttons under cleanroom conditions. Lamellar stromal dissections were made at an OCT-controlled depth of $\leq 100 \mu\text{m}$ pre-Descemet membrane, after which the buttons were returned into MEM/organ culture medium for further preservation. Endothelial cell count and vital staining were performed, as well as electron microscopy to evaluate the smoothness of the dissections.

Results. Endothelial cell survival after femtosecond laser dissection showed no significant difference from that in manually dissected (control) corneas. Electron microscopy showed that the OCT-guided approach allowed for ultrathin flaps $\leq 100 \mu\text{m}$, with individualized lamellar graft thickness. For a high quality femtosecond laser dissection, the epithelium must first be abraded and tissue must be stored for at least 12 hours in KII Medium before the dissection is performed.

Conclusion. OCT-guided femtosecond laser-assisted lamellar dissection allowed for ultrathin flaps $\leq 100 \mu\text{m}$, with individualized lamellar graft thickness, and a normal endothelial cell layer. The equipment can be set up in a clean room environment. More donor tissues may be eligible for transplantation. Quality control (EEBA criteria) of pre-cut tissue should be mandatory to improve lamellar graft survival.

Financial disclosure: None.

Friday - January 20, 2011 - Main Session I - 15.00 - 17.15

Tissue preparation for endothelial keratoplasty

15.50 - I.e

Long term experience with the AMADEUS II artificial anterior chamber (AAC II) for Descemet stripping automated endothelial keratoplasty

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Instituto de Oftalmología La Arruzafa, Córdoba, Spain

Purpose. To show the technical details, as well as 60 months of follow-up results, in 185 cases of DSAEK using the AAC II. This tool has been built to create a smooth donor stromal dissection plane and is equipped with 6 blade holders and 4 suction rings.

Method. We performed DSAEK with the AAC II in 185 cases with endothelial failure. 170 cases were performed with the 450 μm blade holder and 15 cases with the 500 μm blade holder. The maximum follow-up was 60 months.

Results. Mean donor thickness (OCT-Visante) was 151 μm (range 98-230 μm) in cases performed with the 450 μm blade holder, and 122 μm in cases with the 500 μm blade holder. We experienced four button holes. Interestingly, two cases with light scattering due to interface irregularity (both performed with a non-automated microkeratome) were treated successfully with the ACC II machine. A nomogram was made for using the 450 or 500 μm blade holder in relation with the thickness of the donor cornea and different translation speed.

Conclusion. The Amadeus AAC II is an effective and secure tool for preparing DSAEK grafts, and should be considered for use in an eye bank.

Financial disclosure: None.

16.00 - I.f **Keynote presentation****Preparation of thin grafts and descemetic grafts for endothelial keratoplasty**

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Purpose. Today, many techniques exist for endothelial keratoplasty, as the difficulty in preparing and manipulate a graft increases, to obtain and use a graft as thin as possible.

Methods. Various preparation techniques are recalled in video focusing on manual techniques, which allow for preparation of grafts less than 50 μm in thickness.

Results. Automatic methods are easier to perform by using microkeratomes or femtosecond lasers. They allow for preparation of endothelial grafts that are easier to manipulate in the anterior chamber. However, these grafts are commonly thicker than 50 μm , resulting in incomplete or delayed visual recovery. Manual preparation of grafts, allow the preparation of pure Descemet grafts that are so thin that they can not be visualized by OCT imaging postoperatively. Although their manipulation is more difficult, they allow for better a visual outcomes.

Conclusion. We suggest to choose a technique for endothelial graft preparation depending on the type of disease. Thus, when preoperative visibility is optimal and in case of high potential visual rehabilitation (e.g. in Fuchs' dystrophy) DMEK should be the technique of choice. However, when corneal edema is present and the visual potential is limited (e.g. bullous keratopathy), less demanding automated techniques may be used.

Financial disclosure: None.

Friday - January 20, 2011 - Main Session I - 15.00 - 17.15

Tissue preparation for endothelial keratoplasty

16.15 - I.g

A single pass microkeratome preparation of ultra-thin DSAEK grafts in the eye bank – New technique presentation and early results

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International Sight Restoration Eye Bank, Tampa, USA

Purpose. To introduce a new single pass microkeratome technique for the preparation of ultra-thin donor grafts for DSAEK.

Methods. A standard Moria microkeratome with Evolution 3E control unit, reusable artificial chambers, and heads 110, 250, 300, and 350 μm were utilized. Central pachymetry was measured with a Palm Scan AP2000 pachymeter (range 45–1000 μm). Endothelial cell condition and density were evaluated by standard eye bank slit- and specular microscopes before and after graft preparation. Surgical procedures were performed in the USA and abroad.

Intraoperative and early postoperative results were obtained.

Results. 28 ultra-thin donor grafts were prepared. No perforations or other complications occurred. There was no significant difference in endothelial cell density prior to the procedure (3093 ± 38 cells/ mm^2), and after the procedure (3064 ± 41 cells/ mm^2). The average central graft thickness was 81 μm (range 56–100 μm). The average cap diameter was 9.8 mm. Eleven ultra-thin grafts were transplanted in the USA without intraoperative and/or early postoperative complications. Sixteen grafts were transplanted outside the USA with one reported (6.2%) primary graft failure.

Conclusions. Our single pass microkeratome ultra-thin graft preparation is a safe technique and can be performed in eye banks with no increased risk of perforation. Use of standard Moria equipment eliminates the need for a procedure-fee increase. Prepared ultra-thin graft can survive long distance international shipping. Foreign patients can also benefit from this advanced procedure.

Financial disclosure: None.

16.25 - I.h

Comparative study of endothelial cell death in femtosecond laser prepared DMAEK and microkeratome prepared DMAEK tissues

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Purpose. To compare endothelial cell death between femtosecond laser-assisted DMAEK tissue and microkeratome prepared DMAEK grafts.

Methods. Human corneo-scleral rims with intact endothelium were selected for DMAEK preparation. Tissues were cut with either a femtosecond laser or a microkeratome. Next, injection of a large air bubble was attempted from the posterior side of the corneo-scleral rim for each of the tissues. Successful tissue preparation was defined as a central 6–6.5 mm big bubble without perforation or Descemet membrane rupture. A central 8.25 mm button was trephined from each of the successfully dissected tissues. Tissues were stained with Calcein AM. Images were obtained with an inverted light microscope, and evaluated using Photoshop. Endothelial cell death was determined by calculating the total number of pixels not stained over the total number of pixels. Cell death was compared between groups using independent samples t-test. Statistics were done with SPSS v.19.

Results. Femtosecond laser-prepared DMAEK grafts generated an average of 23% endothelial cell death (SD 8.8%, range 15–40%), while microkeratome DMAEK grafts showed an average of 27% (SD 6.9, range 16–36%). There was no statistical difference in cell loss between the two groups ($p = .311$).

Conclusion. Both femtosecond lasers and microkeratomes can be used to reliably produce DMAEK tissue in an eye bank setting without a significant difference in endothelial cell loss. Endothelial cell loss in both methods is higher than expected based on previous experience with DSAEK tissue. Further refinements could decrease the amount of damage, but these rates of cell loss may be acceptable for transplantation.

Financial disclosure: Abbott Medical Optics Inc. donated the procedures needed to complete this investigational study.

Friday - January 20, 2011 - Main Session I - 15.00 - 17.15

Tissue preparation for endothelial keratoplasty

16.40 - I.i (Rapid fire)

Split donor-cornea transplantation by combining DMEK and DALK: Strategies for standardization

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Dept. of Ophthalmology, University of Cologne, Cologne, Germany

Purpose. To discuss the feasibility of split cornea transplantation for 2 recipients by combining deep anterior lamellar keratoplasty (DALK) and Descemet membrane endothelial keratoplasty (DMEK).

Methods. Fifty consecutive eyes with anterior stromal disease suitable for DALK, and 50 eyes with endothelial disease suitable for DMEK, were scheduled for split cornea transplantation combining both procedures within 72 hours. Main outcome parameters included success of using a single donor cornea for 2 recipients, best spectacle-corrected visual acuity (BSCVA), and complication rates within 6 months follow-up.

Results. A single donor cornea could be used for 2 recipients in 47 cases (94%). In 3 eyes (6%), the DALK procedure had to be converted to penetrating keratoplasty requiring a full-thickness corneal graft. Six months after surgery, mean BSCVA was 20/36 in the 47 eyes that underwent successful DALK, 20/50 in the 3 eyes that underwent conversion from DALK to penetrating keratoplasty, and 20/29 in the 50 eyes that underwent DMEK. Postoperative complications after DALK included Descemet folds in 5 eyes (11%) and epitheliopathy in 3 eyes (6%). After DMEK, partial graft detachment occurred in 26 eyes (52%) and was managed successfully with intracameral air re-injection. All corneas remained clear up to 6 months after surgery. No intraocular infections occurred.

Conclusion. In our study, 97 grafts could be obtained from 50 donor corneas. Split use of donor corneal tissue for combined DALK and DMEK procedures in 2 recipients within 3 subsequent days is a feasible approach to reduce donor shortage in corneal transplantation in the future.

*Financial disclosure: None.*16.45 - I.j **Keynote presentation****Standardized 'no-touch' donor tissue preparation for DALK and DMEK: Harvesting undamaged anterior and posterior transplants from the same donor cornea**

J.T. Lie, E. Groeneveld, J. van der Wees, M. Bruinsma,

G.R.J. Melles

Amnitrans Eye Bank Rotterdam; Netherlands Institute for Innovative Ocular Surgery, Rotterdam, The Netherlands

Purpose. To describe a facilitating, standardized 'no-touch' harvesting technique for 'undamaged' anterior and posterior grafts for use in deep anterior lamellar keratoplasty (DALK) and Descemet membrane endothelial keratoplasty (DMEK).

Methods. Retrospective analysis of our standard method for harvesting technique (Technique I; n=31) versus a newly designed 'no-touch' technique (Technique II; n=31), in which a peripheral ring of trabecular meshwork tissue was left in-situ, and the Descemet-graft was trephined on an underlying soft contact lens. Endothelial cell density (ECD) before and after DM-stripping was used as the main outcome parameter.

Results. ECD did not differ within Techniques I and II, before versus after DM-stripping ($P=0.75$ and $P=0.54$, respectively), or between Techniques I and II ($P=0.61$). With the latter technique, anterior corneal grafts and posterior DM-grafts could be harvested with negligible damage to the endothelial cell layer or the posterior stromal bed. All 93 grafts (62 DM-grafts (Technique I and II) and 31 anterior corneal tissues (Technique II)) were found to be eligible for transplantation, and six months postoperatively all transplants were functional.

Conclusion. Our standardized 'no-touch' preparation technique may offer three advantages: (1) 'Undamaged' grafts for DALK and DMEK; (2) facilitated tissue handling during DM-stripping, and (3) up to 100% increase of grafts obtained from the same tissue pool.

Financial disclosure: Dr Melles is a consultant for D.O.R.C. International

Saturday - January 21, 2011 - Main Session II - 9.30 - 11.00

Clinical outcome of endothelial keratoplasty I

9.30 - II.a

Quality of vision in patients with Fuchs endothelial dystrophy, after Descemet stripping endothelial keratoplasty (DSEK)

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Purpose. To evaluate quality of vision, assessed as visual acuity and straylight, in patients with Fuchs endothelial dystrophy, and the change in quality of vision after Descemet stripping endothelial keratoplasty (DSEK).

Methods. Phakic and pseudophakic eyes with Fuchs dystrophy were examined at the Academic Medical Center, Amsterdam (99 eyes), and in a prospective study at Mayo Clinic, Rochester, Minnesota (48 eyes) before and at 1, 3, 6 and 12 months after DSEK. After DSEK, all eyes were pseudophakic. Main outcome measures were corrected distance visual acuity (CDVA), and intraocular straylight measured by using the C-Quant straylight meter.

Results. Patients with Fuchs dystrophy had decreased CDVA and increased straylight compared to normal eyes of age-matched subjects. Younger patients were affected more by increased straylight than by decreased CDVA. After DSEK, CDVA ($p < 0.001$) and straylight ($p < 0.001$) improved at all examinations as compared to preoperative measurements. Postoperative improvement in straylight was more predictable than that of CDVA, and was correlated with preoperative straylight. Eyes with preoperative straylight higher than 1.33 log(s) consistently improved after DSEK.

Conclusion. Visual quality is severely impaired in Fuchs dystrophy. Straylight and CDVA improve significantly after DSEK; the improvement is greater with worse preoperative function. Younger patients are affected more by straylight than by loss of visual acuity, and straylight improves more in younger than in older eyes after DSEK. Preoperative straylight is correlated with straylight improvement after DSEK, and could be a simple and useful clinical measurement for predicting postoperative improvement in quality of vision.

Financial disclosure: None

9.40 - II.b

Personal experience with DSAEK and remarks on functional results

Gernot I.W. Duncker
Augen-Laserzentrum, Halle, Germany

Purpose. To evaluate DSAEK surgeries regarding visual rehabilitation of patients with endothelial dystrophies and to give some personal tips to obtain optimal clinical results.

Methods. The first 10 personal cases were evaluated and an overview was made on the functional results of a larger series of DSAEK patients.

Results. DSAEK ensured quick visual rehabilitation and low induction of astigmatism. However, visual acuity seldomly reached more than 0.5.

Conclusion. Visual rehabilitation in patients with Fuchs dystrophy is limited to 0.5 with current DSAEK techniques.

Financial disclosure: None

Saturday - January 21, 2011 - Main Session II - 9.30 - 11.00

Clinical outcome of endothelial keratoplasty I

9.50 - II.c (Rapid fire)

Eye pressure after Descemet stripping endothelial keratoplasty (DSEK)

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Department of Ophthalmology, Academic Medical Center,
Amsterdam, The Netherlands.

Purpose. To assess the incidence of elevated intraocular eye pressure (IOP) after DSEK.

Methods. All DSEK patients (n=66) operated on between February 2001 (start of DSEK procedures in our hospital) and February 2010 were included in the study. Eye pressure data were retrospectively analyzed.

Results. Follow-up was 1–5 years. Mean pre-operative eye pressure was 12.4 mmHg (sd ± 4.3). Mean eye pressure at day 1 was 16.4 mm Hg (± 9.2). Mean eye pressure after 1 month, 6 months, 1 year, 3 years and 5 years were respectively 13.9 (± 5.3), 14.7 (± 5.6), 14.2 (± 5.4), 13.8 (± 3.7), 12.6 (± 3.5). Elevated IOP was observed in 5 patients (8%) at 1 day after DSEK, in 4 patients (6%) in the later postoperative period, and in 2 (3%) patients at 1 day as well as later in the postoperative period.

Conclusion. A rise in IOP after DSEK was frequently observed, so that it may be advocated to monitor the eye pressure in the short and long term after surgery.

Financial disclosure: None

9.55 - II.d (Rapid fire)

Results of Descemet stripping endothelial keratoplasties (DSEK) performed in 2007

L. Nikolic, V. Jovanovic
Ophthalmology Clinic, Faculty of Medical Dentistry, Belgrade, Serbia

Purpose: To evaluate the detachment rate, best corrected visual acuity (BCVA), central corneal thickness (CCT), and astigmatism after DSEK performed in 2007.

Methods: Eleven cases of DSEK were performed for pseudophakic bullous keratopathy. Three of these were special cases: (1) endothelial keratoplasty (EK) without Descemet stripping for a failed penetrating graft; (2) using one donor cornea for two patients (DSEK, and deep anterior lamellar keratoplasty (DALK)); (3) a triple procedure (DSEK, phacoemulsification, lens implantation).

Results: All grafts remained attached. 3/11 grafts decompensated. BCVA at one week was 0.5 (2/11), 0.3 (8/11), 0.05 (1/11 - age maculopathy); at 3 months: 0.6 (2/11), 0.4 (8/11), 0.05 (1/11); at one year: 0.6 (2/11), 0.4 (6/11), 0.05 (3/11 - decompensated); at three years: 0.8+ (2/11), 0.6 (6/11), 0.05 (3/11). CCT was 643-728 μm , and astigmatism ranged from 1.1-2.9 D. EK without Descemet stripping healed without a fibrous scar formation; the DSEK and DALK grafts obtained from the same donor cornea remained transparent, as did the EK graft in the triple procedure.

Conclusion: The zero detachment rate resulted from a prolonged air-fill of the anterior chamber, while mannitol was given intravenously. BCVA showed a fast recovery during the first three months, and a late improvement after corneal remodeling. EK can restore clarity in a failed penetrating graft because there is no fibrous scar formation at the interface. One donor cornea can be used for DALK and DSEK.

Financial disclosure: None

Saturday - January 21, 2011 - Main Session II - 9.30 - 11.00

Clinical outcome of endothelial keratoplasty I

10.00 - II.e (Rapid fire)

The “sandwich graft”: ALTK after a DSAEK for Fuchs dystrophy

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Purpose. Chronic corneal edema can lead to corneal haze that disappears after a DSAEK. Sometimes stromal opacities related to chronic corneal edema are still present after DSAEK and the vision outcome remains poor. We propose to perform an automated lamellar therapeutic keratoplasty (ALTK) to remove residual corneal opacities after a DSAEK.

Methods. Case report. A 63-year old male with Fuchs dystrophy underwent DSAEK with cataract extraction and IOL implantation. One year later, best corrected visual acuity remained poor (20/400) because of residual corneal opacity. To remove it, we performed a 250µm deep anterior lamellar graft with ALTK.

Results. The surgery was uneventful. The posterior graft did not slip during the surgery and endothelial cell count remained stable. The two interfaces were transparent. At 12 months follow-up, BCVA with a hard contact lens improved to 20/32.

Conclusion. DSAEK is an efficient technique to treat corneal edema in Fuchs dystrophy. Poor postoperative vision could be related to residual stromal corneal opacity. In this case, we performed an ALTK after a DSAEK, instead of a penetrating keratoplasty, to preserve the advantages of a lamellar graft (non penetrating surgery). We named this new technique, consisting of two lamellar corneal grafts sandwiching the recipient stroma: a “sandwich graft”.

Financial disclosure: None

10.05 - II.f **Keynote presentation****Clinical outcomes of DSEK, DMAEK and DMEK**

F.W. Price Jr., M.O. Price
Price Vision Group, Indianapolis, USA

Purpose. To compare outcomes with DSEK, DMAEK and DMEK

Methods. Outcomes in 400 DMEK, 120 DMAEK, and 1700 DSEK cases performed at the same center were compared. Each of these procedures involves replacement of dysfunctional host endothelium with healthy donor endothelium. DSEK includes a layer of posterior donor stromal tissue, while DMAEK has only a rim of stromal tissue, and DMEK includes no donor stromal tissue.

Results. Compared with DSEK, DMEK and DMAEK provided at least one line better mean best corrected visual acuity at 3, 6 and 12 months. Furthermore, the likelihood of experiencing an immunologic graft rejection episode was 12% within 2 years after DSEK, and much lower, less than 1% at 2 years, with DMEK. Mean endothelial cell loss at 6 months and 1 year was comparable for all three procedures. Each procedure required a period of several years to optimize the instrumentation and surgical technique. With newer methods, the rate of tissue loss in preparation is below 1% with DMEK and 0% with DSEK, and the rate of air re-injection is about 10% with DMEK and 3% with DSEK grafts provided in Optisol storage solution.

Conclusion. Compared with DSEK, DMEK provides clear advantages for patients in terms of improved best corrected visual acuity and reduced risk of immunologic graft rejection. The thinner DMEK tissue was initially more challenging to prepare and position within the eye, but with improved instrumentation and techniques, the rate of complications is similar to DSEK.

Financial disclosure: None

Saturday - January 21, 2011 - Main Session II - 9.30 - 11.00

Clinical outcome of endothelial keratoplasty I

10.20 - 11.g

Learning curve in Descemet membrane endothelial keratoplasty (DMEK)

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Melles Cornea Clinic, Rotterdam; Netherlands Institute for Innovative Ocular Surgery, Rotterdam, The Netherlands

Purpose. To evaluate the learning curve in Descemet membrane endothelial keratoplasty (DMEK) in the management of corneal endothelial disorders.

Methods. In a first group of 135 consecutive eyes a DMEK was performed. To determine the extent of a possible learning curve in DMEK surgery, the whole group was divided into three subgroups of 45 patients, to compare clinical outcomes at 1, 3 and 6 months after surgery.

Results. Among the three groups clinical outcomes were similar, with 73% of cases achieving a BCVA of $\geq 20/25$ (≥ 0.8) and an average ECD of 1747 ± 527 cells/mm² at 6 months. Graft detachment was the main complication and correlated with intraoperative vitreous pressure ($p < 0.01$). Detachment rate declined with experience: In the first 45 cases, a complete or partial graft detachment occurred in 20%, in the second group in 13.3%, and in the third group in 4.4%. Other complications were relatively infrequent.

Conclusion. The learning curve in DMEK did not correlate with clinical outcome (BCVA and ECD), but rather with the presence of a functional graft. However, the number of functional grafts (decline in graft detachment rate) increased with surgical experience.

Financial disclosure: Dr Melles is a consultant for D.O.R.C. International

10.30 - 11.h

Descemet stripping automated endothelial keratoplasty – Is a thinner donor lamella a better one?

I. Dekaris, M. Pauk, N. Drača, A. Pašalić, N. Gabrić
Eye Clinic S Svetlost, Zagreb, Croatia

Purpose. To evaluate the influence of lamellar thickness on visual recovery after Descemet stripping automated endothelial keratoplasty (DSAEK), and to compare the results with the results of conventional penetrating keratoplasty (PK).

Methods. A prospective case series of 20 eyes with pseudophakic bullous keratopathy (PBK) underwent DSAEK. Lamellar graft thickness was measured with anterior segment OCT at various time points after DSAEK. Eyes were divided into groups based on a 1st day postoperative endothelial lamella thickness: thin ($< 180 \mu\text{m}$), medium-thick ($180 - 250 \mu\text{m}$) and thick ($> 250 \mu\text{m}$). Outcome measurements were graft survival rate, best spectacle-corrected visual acuity (BSCVA), endothelial cell density (ECD) loss, and amount of astigmatism. Results in DSAEK eyes were compared to 20 PBK eyes which underwent PK in previous years.

Results. The median postoperative graft thickness of DSAEK eyes was $190 \mu\text{m}$. There was no significant difference in age, sex, or preoperative BSCVA between DSAEK groups. Postoperative follow-up was 18 months. Thin grafts showed better postoperative BSCVA both in visual acuity level of recovery rate, as compared with the medium-thick and thick grafts ($P < 0.001$). Only eyes with thin grafts obtained a BSCVA similar to PK eyes at 18 months. Median-thick grafts needed longer rehabilitation to obtain a BSCVA similar to thin grafts, while thick grafts never reached BSCVA of thin and PK grafts. All DSAEK eyes with a thin lamella, but only 50% of those with a medium-thick lamella, reached a BSCVA of ≥ 0.5 at 6 months.

Conclusion. A thin lamella after DSAEK ensures better and quicker visual rehabilitation. The thickness of lamella has no impact on ECD.

Financial disclosure: None

10.40 - II.i (Rapid fire)

First series of Descemet membrane endothelial transfer (DMET)

M. Dirisamer, R.-Y. Yeh, K. van Dijk, L. Ham, I. Dapena, G.R.J. Melles

Department of Ophthalmology, AKH, Linz, Austria; Amnitrans Eye Bank, Rotterdam, Melles Cornea Clinic, Rotterdam; Netherlands Institute for Innovative Ocular Surgery, Rotterdam, The Netherlands

Purpose: To describe corneal clearance after re-endothelialization of the recipient posterior stroma, through Descemet membrane endothelial transferral (DMET), i.e. a 'free-floating' donor Descemet-graft in the recipient anterior chamber after descemetorhexis, in managing corneal endothelial disorders.

Methods: Twelve eyes enrolled in our study, seven suffering from Fuchs endothelial dystrophy, and five had bullous keratopathy. The clinical outcome was monitored by biomicroscopy, optical coherence tomography, confocal microscopy, and endothelial cell density and pachymetry measurements.

Results: All eyes operated on for Fuchs endothelial dystrophy, showed corneal clearance, with pachymetry values returning to normal ($533 \pm 47 \mu\text{m}$), and re-endothelialization of the denuded recipient posterior stroma, with an average endothelial cell density of $797 (\pm 743)$ cells/mm² six months after surgery. In contrast, none of the bullous keratopathy eyes showed any improvement throughout the follow-up period.

Conclusion: DMET may be effective in the management of Fuchs endothelial dystrophy (primarily a Descemet membrane disorder), but not in bullous keratopathy (primarily an endothelial depletion). Apparently, the indication for surgery, i.e. a 'dystrophy' versus a 'depletion' of recipient endothelial cells, relates to the capacity of the cornea to clear, suggesting that the remaining rim of recipient endothelium (after descemetorhexis) is involved in the re-endothelialization of the recipient posterior stroma after DMET.

Financial disclosure: None

Saturday - January 21, 2011 - Main Session III - 11.30 - 13.00

Donor selection & screening; corneal evaluation & storage

11.30 - III.a

Validation of microbiological diagnostics of culture medium using BacTec

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 Universitätsmedizin Berlin, Germany

Purpose. Microbiological testing of organ culture medium is performed for the safety of the recipient of a donor cornea. Since the microbiological culture system utilized (BD Bactec Plus Aerobic/F, Anaerobic/F) is only validated by the manufacturer for blood and blood products, and because the cornea culture medium contains antibiotics, an additional validation for corneal culture media is required.

Methods. Two 10 ml samples of cornea culture media, one with dextran, and one without dextran, were inoculated into the blood culture bottles (BD Bactec Plus Aerobic / F, Anaerobic / F) and subsequently spiked with 10 to 100 bacteria or fungi (aerobic bacteria: *Staphylococcus aureus*, *Bacillus subtilis*, *Pseudomonas aeruginosa*, anaerobic bacteria: *Staphylococcus aureus*, *Clostridium sporogenes*, fungi: *Candida albicans*, *Aspergillus brasiliensis*) according to the European Pharmacopoeia Chapter 2.6.1. Through subculturing on blood agar plates or Sabouraud agar plates, the pure culture and the typical morphology of the colonies were examined.

Results. All positive and negative controls tested properly. All tested aerobically-grown bacteria, all anaerobically-grown bacteria and all fungi could be detected in both media. However, compared to the positive controls, their appearance was often delayed, and in two cases, *Bacillus subtilis* showed no growth.

Conclusion. The use of BacTec Plus blood culture bottles seems to be a reasonable method for microbiological testing of organ culture medium. Nevertheless, this test system has limitations, and shows a reduced sensitivity for organ culture medium, most likely due to antibiotic content.

Financial disclosure: None

11.40 - III.b

Development of a test regime for quality testing of cultivation media and sera for donor corneas

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 R.H.W. Funk (2), K. Engelmann (3)
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 Germany

Purpose. There is a loss of donor corneas of up to 40% during long term storage, due to a decrease in endothelial cell density. Therefore it is mandatory to keep a high quality of all used materials, e.g. storage devices and in particular corneal cultivation medium. The aim of the study was to develop a screening test to investigate the quality of media and sera in order to reduce endothelial cell loss during organ cultivation or transport.

Methods. The human corneal endothelial cell line HCEC-12 was cultured in different media supplemented with different sera, and a growth assay was performed. Metabolic activity of living cells was measured using the dye resazurin. Cell viability was determined by flow cytometry using vital staining with annexin V, YO-PRO and propidium iodide to detect viable, apoptotic or dead cells.

Results. The cultures showed differences in cell growth behavior, cell metabolism and cell viability for different media and sera. In general, the data of the three tests correlated with each other: In medium where cells had a higher growth rate, Resazurin dye conversion was high and the percentage of apoptotic and dead cells was low.

Conclusion. The test presented in this study is suitable for a routine screening of media and sera for tissue banks to prevent quality loss of tissues like the cornea due to insufficient nutrition or quality of supplementation of the storage media.

Financial disclosure: None

Saturday - January 21, 2011 - Main Session III - 11.30 - 13.00

Donor selection & screening; corneal evaluation & storage

11.50 - III.c

Collaborative bacteriological and fungal control studies of corneal organ culture media: Results of 13 studies (2004-2011)

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The French Health Products Agency (Afssaps), The Laboratories and Controls Directorate, Unit Blood Products and Cellular Therapy and Microbiology, St-Denis, France

Purpose: Since June 2004, Afssaps has organized 13 studies with the participation of all the French eye banks to evaluate the techniques used for microbiological control of cornea organ culture media, in order to harmonize them.

Methods: These collaborative studies consisted of sending cornea organ culture media contaminated with different germs in chosen concentrations. Contaminated media were checked by seeding. The eye banks analyzed the samples with their routine methods also used for grafts in parallel with AFSSAPS. Methods and results were compared.

Results: All eye banks participated each year. 52 samples with different contaminations were sent to each bank: 46 of these were contaminated (26 bacterial and 20 fungal contaminations); and 6 non-contaminated samples served as negative controls. This means 965 contaminated and 131 non-contaminated samples were sent off. 89% (859/965) of the samples of the contaminated media were found positive. The mean rate of contamination detection was 90% for the contaminated media analysed with conventional microbiological methods, and 93% with blood culture methods. Since 2004, the use of blood cultures and Sabouraud broth has increased, allowing much better quality in results.

Conclusion: The comparison of performances between conventional methods and blood cultures of French eye banks shows a disparity in the results and a difference in sensitivity. Time detection is lower for blood cultures. Concerning fungal contaminations, the use of specific fungi-media might increase detection. A visual inspection of cornea organ culture media after seeding is recommended to complete the analysis. The collaborative studies have increased the standardization of techniques. These results will allow an European harmonization for bacteriological and fungal control of cornea organ culture media.

Financial disclosure: None

12.00 - III.d (Rapid fire)

Risk Assessment in GMP-based Eye Banking

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Purpose. A main issue in corneal transplant processing is ensuring consistently high levels of tissue quality and safety. The objectives of this study were to determine the contamination rates of donor eyes before and after the enucleation process, to examine the pathogens and pathogen transfer to the environment during corneo-scleral disc preparation, and to develop a useful approach for microbial monitoring of corneo-scleral disc processing.

Methods. The microbial flora of eyes was investigated through swab approaches. GMP-compliant processing of corneo-scleral discs was done in a 'grade A area' with a 'grade B' background environment. Airborne microbial contaminations of the A area during processing were analyzed by settle and contact plates. Corneo-scleral discs were stored in MEM supplemented with 2% FBS, penicillin/streptomycin and amphotericin at 37°C in a closed culture system. At day 4 to 6, organ culture medium was checked for sterility via BACTEC Plus blood culture systems.

Results. This study demonstrated that (1) ~60% of eyes are microbially contaminated at the time of enucleation; (2) the treatment before donor eye procurement (PVP decontamination, gentamicin treatment) results in a 50% reduction in contamination rates; (3) second PVP treatment prior to corneo-scleral disc extraction and enrichment of culture medium with antibiotics/antimycotics allow to reduce contaminations to ~3%; (4) tissue processing in a GMP environment is safe.

Conclusion. Common decontamination approaches efficiently reduce the initial microbial contamination. Nevertheless, a continuous microbial monitoring is strongly recommended for a safe processing of corneal transplants.

Financial disclosure: None

Saturday - January 21, 2011 - Main Session III - 11.30 - 13.00

Donor selection & screening; corneal evaluation & storage

12.05 - III.e (Rapid fire)

Does reduction of post-mortem time for corneal explantations affect the rate of medium contaminations?

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 Eye Hospital and Lions Cornea Bank NRW, Heinrich Heine
 University, Düsseldorf, Germany

Purpose. To evaluate the dependency of culture medium contaminations of corneal grafts on the time from death to explantation.

Methods. Data were collected in the Lions Cornea Bank NRW over a period of 48 months. In the latter half of this period there was a reduction of post-mortem time due to the introduction of the 2006/17/EC EU-Directive which stipulates that blood samples for serologic testing have to be obtained within 24 hours post-mortem.

Results. From 2008 to 2009, 1272 corneal grafts with a post-mortem time of 30.05 ± 15.77 hours were organ cultured. 115 (9%) of these had to be discarded because of medium contamination. In 2010 and 2011, 892 corneal grafts with a post mortem time of 24.2 ± 12.4 hours were stored in organ culture. Medium contamination occurred in 65 (7.3%) of these. There is a statistically significant difference in the post-mortem time between the two groups (t-test). A statistical evaluation with the Chi-squared test did not reveal any statistically significant difference between both groups regarding the rate of medium contaminations

Conclusions. The post-mortem time until corneal explantation has no effect on the rate of medium contaminations of corneal grafts.

Financial disclosure: None

12.10 - III.f (Rapid fire)

Microbial growth inhibition during organ culture

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 Microbiology and Hygienics, University Hospital Freiburg

Purpose. Supplemented antimicrobial substances in organ culture media have been called into question claiming that they would conceal potential contaminations. Therefore, we tested the inhibition of microbial growth in organ culture.

Methods. Organ culture media with and without antimicrobial substances (penicillin, streptomycin, amphotericin B) were contaminated with *S. aureus*, *S. epidermidis* or *C. albicans* and the antimicrobial effects were checked over time by quantitative microbe detection. Furthermore, pig corneas were contaminated following corneoscleral excision and brought into organ culture. Quantitative microbial detection was subsequently performed at different time points.

Results. *S. aureus*, *S. epidermidis* and *C. albicans* did not grow in culture media with or without antimicrobial substances. The antibiotics showed a bactericidal effect for *S. aureus* to a dilution of 1:100 and for *S. epidermidis* to a dilution of 1:2. Amphotericin B did not show a fungicidal effect on *C. albicans*. In the experimental setting of organ culture using contaminated pig corneas neither *S. aureus* nor *S. epidermidis* nor *P. aeruginosa* could be detected after more than one day of organ culture.

Conclusion. The growth inhibiting effect of the culture media demonstrates that these media are poor in nutritional factors that support microbial growth. The bactericidal effects of the antibiotics show their importance in organ culture systems. Following contamination of pig corneas, microbial detection was only possible up to day one of organ culture. Future experiments shall deal with the missing fungicidal effect of amphotericin B and a validation of different sterility tests.

Financial disclosure: None

Saturday - January 21, 2011 - Main Session III - 11.30 - 13.00

Donor selection & screening; corneal evaluation & storage

12.15 - III.g (Rapid fire)

Reasons of disqualifying donor corneas for transplantation purposes in periods 1994-1999 and 2006-2011 at the Lublin Eye Bank

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Purpose. To compare the reasons for disqualifying donor corneas for transplantation between 1994-1999 and 2006-2011

Methods. In the Lublin Eye Bank, 2388 corneas were procured from 1307 donors between 1994 and 1999, and 1951 corneas from 1023 donors between 2006 and October 2011. Contraindications were checked according to the TBI and EEBA standards.

Results. In the first versus the second period, corneas were rejected because of donor and ocular contraindications: 21 (3.2%) versus 70 corneas (19.4%); low endothelial cell density and/or epithelial defects: 491 (74.5%) versus 56 corneas (15.4%); positive serology: 133 (20.1%) versus 214 corneas (59.4%); total unsuitable for transplantation 659 (27.7%) versus 360 corneas (18.5%).

Conclusions. Poor quality of the endothelium was the main reason for disqualifying corneas in the first period, changing to positive serology in the last period. New lamellar transplant techniques enabled more efficient use of tissue, by designating tissue for either anterior or posterior lamellar keratoplasty.

Financial disclosure: None

12.20 - III.h (Rapid fire)

European study on reliability assessment of endothelial cell counting methods in eye banks: Official start

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Purpose. To present the recent developments of this collaborative research program, now named "EuroKeratoTest".

Methods. The hospital clinical research project has been funded by the French Ministry of Health, allowing employment of a clinical research associate, to verify the collected data and to stimulate the latecomers, and to develop and maintain a specific website. The website consists of four main sections: (1) eye bank registration; (2) detailed questionnaire to gather data on routine practices for determining endothelial quality (to understand the results of the next session); (3) results of the endothelial cell densities of the first series of mosaics by each eye bank technician; (4) results of the second series (6 months later). Keratotests with 12 mosaics have been fabricated with technologies employed in micro-optics, from images of real human corneas.

Results. The website structure will be available and the first series of keratotests will be distributed to eye banks that volunteered to participate in this program. We will explain the methods of data interpretation and the way individual and global results will be presented. During 6 months, we will propose improvements to eye banks with the highest variability. Re-assessment will then be performed with a second keratotest.

Conclusion. Participation of the eye banks to this survey that use the new "keratotests technology" may improve our knowledge on the reliability of endothelial cell counting methods in European eye banks, in order to help standardize corneal graft quality assessment.

Financial disclosure: Grant from Interregional Hospital Clinical Research Project 2011, DIRC Rhône-Alpes.

Saturday - January 21, 2011 - Main Session III - 11.30 - 13.00

Donor selection & screening; corneal evaluation & storage

12.25 - III.i

Pan-endothelial viability assessment with the triple HEC staining of organ culture precut DSAEK vs full thickness corneas

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Purpose. To accurately assess the viable endothelial cell density (ECD) of posterior lamellar grafts, precut by eye bank technicians, and sent to a distant center.

Methods. Paired organ cultured (OC) corneas with an ECD >2200 cells/mm² at the standard assessment with the SambaCornea analyser, were randomly assigned as full-thickness grafts (Group I) or as precut posterior transplants for DSAEK (Group II), using a microkeratome (Moria, France). Both corneas were stored in CorneaMax (Eurobio, France) and deswelled in CorneaJet (5% Dextran T500) for 6 to 24 hours prior to pre-cutting. The paired cornea was deswelled simultaneously, but remained untreated. Then, both corneas were sent to the distant center in CorneaJet. The ECD and viability was assessed by using triple staining (Hoechst/Ethidium/Calcein (HEC)) and fluorescent image analysis of the entire posterior surface, as previously described (IOVS 2011.52:6018-2). Calculation of the area covered by living cells (H+/C+/E-) coupled with ECD in these areas allowed to determine the 'viable ECD', i.e. the useful cell pool. DSAEK and controls data were compared with non-parametric tests.

Results. In both groups, the viable ECD was lower than the standard ECD determined by the eye bank, because living cells never completely covered the entire posterior surface. Comparisons between both groups will be available in January 2012.

Conclusion. The HEC triple staining combined with image analysis, provides a unique accurate assessment of the endothelial quality by giving the "viable ECD". This laboratory technique allows for reliable assessment of the endothelial quality of precut tissues supplied to surgeons, for new developments in eye banking.

Financial disclosure: None

12.35 - III.j

Are polymegethism, pleomorphism, and 'poor swelling' valid discard parameters in immediate post-mortem evaluation of human donor corneal endothelium?

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Purpose. To study the validity of endothelial polymegethism, pleomorphism and 'poor swelling' as tissue discard parameters in the immediate post-mortem evaluation of human donor corneal endothelium.

Methods. We retrospectively evaluated the quality of the endothelium at first and second evaluations for all processed corneas exhibiting polymegethism, pleomorphism or 'poor swelling' in our eye bank over a five-year period.

Results. Out of 2008 eyes qualifying for our study, 422 (21%) corneas showed polymegethism, pleomorphism or 'poor swelling' at the first tissue evaluation immediately after preparation. In 363 (86%) of these corneas, a normal endothelial mosaic was observed at the second tissue evaluation after 7-21 days of organ culture, while only 59 (14%) still showed persistent polymegethism, pleomorphism or 'poor swelling' at that time point.

Conclusion. A recovery of normal endothelial cell mosaic as well as 'normal swelling' at the second evaluation, suggest that cellular contour parameters do not relate to tissue viability, but rather to a cellular-stress reaction. If so, the validity of endothelial cellular contour morphology as early parameters in assessing the suitability of a donor cornea for transplantation may be reconsidered.

Financial disclosure: None

Keratoplasty miscellaneous

11.30 - III.k

Deep anterior lamellar keratoplasty for sterile corneal ulcers

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Purpose. To present the results of the treatment of sterile ulcers with deep anterior lamellar keratoplasty.

Methods. Eighteen lamellar keratoplasties were performed on 14 eyes of 14 patients, because of impending perforation of a corneal ulcer. The grafts were provided from cornea lamellas issued during DSAEK surgery. 15 transplants (one cornea was used for two ulcers of one patient) came from stored lamellas - 2 lamellas were stored short term in Optisol solution, and 13 lamellas were stored long term in dried out state over silica gel. In two cases the lamella was used on the same day of dissection. The follow-up time was 18.6 ± 8.8 months.

Results. Nine transplants of 8 patients remained stable during the whole observation period. 9 lamellar grafts temporarily fulfilled its tectonic purpose, for 2 weeks to 5 months, then melted spontaneously because of the severe, poorly controlled autoimmune status. In these cases re-operation became necessary.

Conclusions. The readily available stored lamellar graft provides an immediate solution for cases of sterile corneal ulcers with perforation or impending perforation. In this way we gain at least some time to find a permanent treatment option.

Financial disclosure: None

11.40 - III.L

Medium term follow up of deep anterior lamellar keratoplasty (DALK) with the Melles' technique

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Purpose. To show the results and complications in 34 cases of deep anterior lamellar keratoplasty (DALK).

Methods. We performed DALK (Melles' technique) in 14 eyes at high risk of penetrating keratoplasty (PK) failure, 11 eyes with keratoconus, 6 eyes with post LASIK ectasia and 3 eyes with pellucid marginal degeneration. Best corrected visual acuity (BCVA), spherical and cylinder error and complications are described with a 1 to 5 year follow-up.

Results. BCVA was 0.45 (range HM-1.0) in cases of high risk of PK failure, and 0.71 (range 0.25-1.0) in eyes with ectatic disorder. In the latter group, 85% of eyes achieved a BCVA of 0.5. Medium refractive cylinder was 3.75 dioptres. Three epithelial rejection episodes were registered, all of them in eyes with pellucid marginal degeneration. Three high risk cases were retransplanted for different reasons.

Conclusions. DALK is a valid method to replace the cornea in any given case without endothelial damage, with outcomes similar to that of PK, as evaluated at mid term follow-up. Complications associated with DALK are more easily managed than if a PK was performed.

Financial disclosure: None

Keratoplasty miscellaneous

11.50 - III.m

Long term results of deep anterior lamellar keratoplasty using Melles' technique in a large series of patients with keratoconus

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Purpose. To evaluate the efficacy and report the results of deep anterior lamellar keratoplasty (DALK) using Melles technique in a large series of patients with keratoconus.

Methods. From 2002 till Oct. 2011, 660 eyes of 660 patients (420 male) with advanced keratoconus, low vision, and intolerance to contact lens wear were enrolled in this study. DALK was performed by one surgeon using the scleral tunnel technique (Melles' technique) and full-thickness donor tissue without Descemet membrane. Best-corrected visual acuity, refractive outcomes, Pentacam topographic changes, and complications were analyzed at 3, 6, 12 months, and 2, 3, 4, 5 years after surgery.

Results. Average LogMar best-corrected visual acuity was 0.315, 0.226, 0.178, 0.102, 0.089, 0.054, and 0.054 at 3, 6, 12 months, and 2, 3, 4, 5 years after surgery, respectively. Spherical equivalent refraction was -2.40, -2.69, -2.87, -2.58, -2.25, -1.65, and -2.10 diopters at 3, 6, 12 months, and 2, 3, 4, 5 years after surgery, respectively. The amount of astigmatism was -2.83, -3.38, -2.52, -2.87, -3.24, -2, and -3 diopters at 3, 6, 12 months, and 2, 3, 4, 5 years after surgery, respectively. keratometry averaged 58.48, 46.84, 46.46, 46.89, 45.48, 45.36, 45.32, and 45.47 diopters before surgery, at 3, 6, 12 months, and 2, 3, 4, 5 years after surgery, respectively. Intraoperative perforation of Descemet membrane occurred in three eyes (0.46%). The rate of stromal rejection and Urrets-Zavalía syndrome was 1.4% and 0.6%, respectively.

Conclusion. DALK using Melles' technique is a safe treatment for patients with keratoconus. In contrast to penetrating keratoplasty, there is minimal risk of endothelial rejection.

Financial disclosure: None

12.00 - III.n

Deep lamellar endothelial keratoplasty (DLEK): Ten year follow-up of the first patient cohort worldwide

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Purpose. To describe the 7-12 year follow-up of the first cohort of patients who underwent a deep lamellar endothelial keratoplasty (DLEK).

Methods. From a total of 22 consecutive eyes of 22 patients that underwent DLEK for Fuchs endothelial dystrophy or pseudophakic bullous keratopathy, 16 eyes were available for evaluation 7-12 years after surgery, using best spectacle-corrected visual acuity (BSCVA), biomicroscopy, endothelial cell density (ECD) measurements, pachymetry, topography, optical coherence tomography and confocal microscopy.

Results. At an average follow-up time of 10 years, all but three transplanted cornea were clear (84%). In eyes with a normal visual potential, all but two cases (78%) still had a BSCVA of 20/40 (0.5) or better (n=9). Spherical equivalent (SE) changed 0.1 (± 1.3) D and refractive astigmatism increased -1.3 (± 1.6) D (n=6). Pachymetry averaged 578 (± 72) μm (n=7) and endothelial cell density 590 (± 160) cells/ mm^2 (n=6).

Conclusion. Our study suggests that the concept of endothelial keratoplasty may prove safe and effective in the long term. ECD may show a decline similar to that after penetrating keratoplasty. Long term complications related to the graft may be virtually absent, while endothelial keratoplasty may provide a relatively stable visual function in time.

Financial disclosure: None

Keratoplasty miscellaneous

12.10 - III.o **Keynote presentation****Deep anterior lamellar keratoplasty (DALK) versus penetrating keratoplasty (PK)**

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Purpose. To evaluate if DALK is an equal or better alternative to PK in corneal disorders with healthy endothelium, results of DALK were analyzed regarding the BCVA, cylinder, endothelial cell counts and complications, both clinically and statistically.

Methods. A consecutive series on 504 DALK eyes was compared to a group of 1047 consecutive PK eyes regarding visual acuity, astigmatism, stability of refraction and endothelial cell counts. Surgeries were performed in one center by the same surgeon with the same type of trephine (Guided Trephine System, GTS) and special instrumentation for DALK (Geuder, Heidelberg). All transplants were 8 mm in diameter, and fixation was done with the double-running antitorque suture. All cases of DALK and PK were analysed first as two overall groups, then subgroups were broken down for keratoconus and endothelial cell counts. The subgroups comprised of 291 DALK and 128 PK eyes.

Results/Conclusion. BCVA was identical over the whole follow-up of 5 years for the overall groups of DALK and PK. Statistically significant differences could only be found for the first 3 months favouring DALK (Median 0.45 to 0.35, $p = 0.001$), whereas for both groups BCVA was without statistically significant differences from 6 months to 5 years. In the subgroups DALK versus PK in keratoconus, none of the medians from the 1st month to the 5th year were significantly different. Between the 1st and 2nd year a maximal BCVA of median 0.7 was reached. The analysis of the endothelial cell counts showed (both for the comparison of the overall groups and the subgroup keratoconus) highly significant differences favouring DALK at all time intervals.

Financial disclosure: None

12.25 - III.p

Update for femtosecond laser-assisted corneal transplants

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Purpose. To determine whether new non-circular wound designs - enabled by femtosecond laser cutting - are superior to a conventional, circular incision.

Methods. The circular incision was changed to a regular ten-edged incision corresponding to a decagonal. In addition, the rim of the incision was cut at a 60° angle (non-stepped), and the donor cornea was 0.2 mm oversized.

Results. The 'non-keratoconus group' showed fast healing without Descemet folds in 82% within 3-6 months. Corneal astigmatism was within $\leq 4D$ in all 20 cases. The 'keratoconus group' showed a similar healing pattern without folds, but four cases showed a corneal astigmatism between 4D and 6D (13.3%).

Conclusion. Circular mushroom, zig/zag or top-hat designs do more or less imitate the conventional 'golden standard' manual technique, but with a much higher technical equipment and cost. (Very similar to the current results in femtosecond laser-assisted cataract surgery). Advanced PK techniques must compete with the recently developed lamellar keratoplasty techniques like DSEK, DSAEK, DMEK, DALK. Only a paradigm change can help to change our surgical techniques and to produce better results.

Financial disclosure: None

Keratoplasty miscellaneous

12.35 - III.q (Rapid fire)

Evolution of endothelial cell density after corneal transplantation

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Purpose. The purpose was to evaluate the long term decline in endothelial cell density (ECD) after penetrating keratoplasty (PK).

Method. Data on ECD have been collected since 1997 at the Ghent University Hospital. Based on these data, a model of decline in ECD was designed, similar to the model of Armitage. The percentage (%) decline in ECD was compared in both models. Moreover, the % decline of ECD was analysed individually for the main indications for PK.

Results. The model based on the ECD of 427 patients of the Ghent University Hospital was similar to the model of the 393 patients of Armitage. The postoperative procentual decline in ECD was almost identical in both models at the end of year 1 (35% versus 34%) and identical 3 and 5 years after transplantation (53% and 59 % respectively). Although there is a different timing of the further follow-up in both studies, we can assume that these results are almost identical (68% after 11 years versus 67% after 10 years). The decline in ECD is more pronounced in the patient population with Fuchs dystrophy and bullous keratopathy. For all indications, the pre-operative ECD of the acceptor proves to be a determining factor. Due to the small numbers in the individual indication groups, no statistically significant differences could be observed.

Conclusion. The data from the Ghent University Hospital were fitted to the model of J. Armitage. There was a similar decline in post-PK endothelial cell density, illustrating the robustness of the model.

Financial disclosure: None

12.40 - III.r (Rapid fire)

One-year follow-up study of endothelial cell density loss after penetrating keratoplasty

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Purpose. High endothelial cell density (ECD) is essential for corneal graft clarity. We evaluated ECD loss in 120 eyes that underwent penetrating keratoplasty (PK) in the Eye Clinic Svjetlost, with a one year follow up period.

Methods. Patients were divided into 3 groups: for high (N=35), intermediate (N=31) and low risk (N=54) graft failure. Postoperative central endothelial density, coefficient of variation in cell area (polymegathism), percentage of hexagonal cells (pleomorphism), as well as corneal thickness in comparison to preoperative donor cell measurements, were determined at 1, 2, 3, 6, 9 and 12 months.

Results. There were no significant differences in the preoperative ECD values, storage time, donor age or surgical procedures between groups. At all time points, the intermediate group had the greatest statistically significant ECD loss as compared to the high and low risk groups. There were no significant differences between the high and low risk group. At 12 months post PK, the intermediate risk group had 28.4% ECD loss as compared to 24.1% in the high and 23.0% ECD loss in the low risk group.

Conclusion. Our study showed that corneal pathology is amongst others, a very important prognostic factor for ECD after PK. However, a longer follow up period is needed.

Financial disclosure: None

Saturday - January 21, 2011 - Parallel Session III - 11.30 - 13.00

Keratoplasty miscellaneous

12.45 - III.s (Rapid fire)

Allograft rejection after Descemet membrane endothelial keratoplasty (DMEK)

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 Melles Cornea Clinic, Rotterdam; Netherlands Institute for
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Purpose: To report the incidence of early allograft rejection after Descemet membrane endothelial keratoplasty (DMEK), i.e. transplantation of isolated Descemet membrane with its endothelium.

Methods: The first 200 DMEK cases operated on for Fuchs endothelial dystrophy or pseudophakic bullous keratopathy, with on average 36 (± 14) months of follow-up after 9.0-10.0 mm diameter DMEK graft implantation, enrolled in our study and were retrospectively analyzed. Postoperative examinations were performed at 1, 3, 6, 9 and 12 months, and at 6 months time intervals thereafter.

Results: Throughout the study period, three eyes (1.5%) showed signs of a cellular immune response to the Descemet graft. One patient presented 30 months after DMEK with discomfort, reduced visual acuity to counting fingers, corneal decompensation, and a Khodadoust line in the central cornea. No subjective complaints were experienced by the other patients, who both had discontinued their steroid medication prematurely at 4 and 9 months, respectively. Intensified topical corticoid therapy resulted in complete visual recovery in the first two cases within weeks, while the third required a regraft.

Conclusion: Both 'classic' and subclinical allograft rejection can occur after DMEK. Compared to earlier (endothelial) keratoplasty procedures, DMEK may be associated with a lower rejection rate of $\leq 1.5\%$, despite transplant diameters of ± 9.5 mm. The apparent immune tolerance in DMEK may result from either less 'up-regulation' or more 'down-regulation' of the immune system.

Financial disclosure: None

12.50 - III.t (Rapid fire)

Graft rejection and graft failure after penetrating keratoplasty or DSAEK for Fuchs endothelial dystrophy

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Purpose. Posterior lamellar keratoplasty has become the preferred technique for treatment of corneal endothelial disease. It is still unknown whether rejection episodes and graft failure due to surgical complications or rejection are more or less frequently observed after Descemet stripping automated endothelial keratoplasty (DSAEK), than after penetrating keratoplasty (PK). The purpose of the present study was to compare the incidence of rejection episodes and graft failure after PK versus DSAEK

Methods. A total of 202 eyes of 202 patients with Fuchs endothelial dystrophy, enrolled our study, of which 100 underwent DSAEK and 102 PK, in the period January 1, 2000 to December 31, 2010. Patient records were retrospectively reviewed, rejection episodes and graft failures were recorded, and Kaplan-Meier survival curves were computed.

Results. Most adverse events, rejection episodes, and failures, occurred in the first two years after surgery. During this period, one or more rejection episodes were noted in 18% of the PK and in 7% of the DSAEK eyes (NS). After 2-5 years, significantly more DSAEK grafts (8%) than PK grafts (none) had failed ($p < 0.05$). After 5 years, more PK treated than DSAEK-treated eyes had failed due to rejection (NS).

Conclusions. The frequency of graft rejection episodes appears to be similar after PK and DSAEK for primary endothelial disease. Early graft failure is more common after DSAEK than after PK, whereas graft failure due to previous rejection episodes is similar.

Financial disclosure: None

Saturday - January 21, 2011 - Main Session IV - 14.30 - 16.15

Clinical outcome of endothelial keratoplasty II

14.30 - IV.a **Keynote presentation****Standardized 'no touch' technique for Descemet membrane endothelial keratoplasty (DMEK): Controlled donor tissue implantation, orientation, unrolling, centering, appositioning and fixation**

I. Dapena, K. Moutsouris, K. Droutsas, M. Dirisamer, M. Naveiras, L. Ham, K. van Dijk, G.R.J. Melles
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Purpose. Isolated Descemet's membrane transplantation, i.e. Descemet membrane endothelial keratoplasty (DMEK), might provide the best and fastest visual rehabilitation of the endothelial keratoplasty techniques now available. To make the technique more accessible, we designed a standardized 'no touch' DMEK technique, feasible for corneal surgeons in any clinical setting.

Methods and Results. All essential steps of our standardized technique for 'no-touch' DMEK, including patient preparation, descemetorhexis, as well as DMEK-graft implantation, orientation, unrolling, centering, appositioning and fixation is described in detail. In the management of Fuchs endothelial dystrophy, the technique provided a best corrected visual acuity (BCVA) of $\geq 20/25$ (≥ 0.8) in $\frac{3}{4}$ of cases, and an endothelial cell density of about 1800-2000 cells/mm² at six months after surgery.

Conclusion. 'No-touch' DMEK may therefore be a safe and effective procedure for treatment of corneal endothelial disorders, making endothelial keratoplasty accessible to most corneal surgeons without requiring major investments, while providing an unprecedented visual rehabilitation rate and outcome.

Financial disclosure: Dr. Melles is a consultant for D.O.R.C. International

14.45 - IV.b

Reproducibility of Descemet membrane endothelial keratoplasty (DMEK) using the standardized techniques of the Netherlands Institute for Innovative Ocular Surgery

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Purpose. To describe the implementation of Descemet Membrane Endothelial Keratoplasty (DMEK) in a German University Eye Clinic without an own eye bank facility using the standardized techniques of the Netherlands Institute for Innovative Ocular Surgery (NIIOS).

Methods. Twenty-five DMEK-preparations were performed in the operating theatre under sterile conditions. The DMEK roll was transplanted either immediately or on the next day. In order to avoid graft wastage, in 10 cases the remaining stroma was used for deep anterior lamellar keratoplasty in eyes with stromal pathology and healthy endothelium.

Results. All 25 DMEK preparations were successful, and all grafts could be successfully transplanted. In 23 cases, graft diameter measured 9.0 to 9.5mm, whereas, in order to obtain a DMEK roll, a smaller diameter was chosen in two cases after a tear in the donor Descemet membrane due to strong paracentral adhesions between the membrane and stroma. Postoperatively, all 25 grafts were adherent (in 8 cases after one or two intracameral air injections) and functional, i.e. all corneas cleared. No secondary keratoplasty procedures were performed.

Conclusion. The standardized techniques of the NIIOS during our learning curve proved to be reproducible and effective. DMEK may therefore be feasible in clinical settings without an own cornea bank. Our results may encourage adaptation of DMEK by cornea specialists without their own eye bank facility.

Financial disclosure: None

Saturday - January 21, 2011 - Main Session IV - 14.30 - 16.15

Clinical outcome of endothelial keratoplasty II

14.55 - IV.c

Clinical outcome of Descemet membrane endothelial keratoplasty (DMEK)

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Purpose. To evaluate the clinical outcome of DMEK with our own modifications.

Methods. A total of 98 patients underwent DMEK from 2008 till 2010: 80 eyes had Fuchs endothelial dystrophy, and 18 surgeries were re-operations. 106 donor corneas were used. Fifty five percent of patients had pseudophakic endothelial dystrophy. The majority (65%) of the patients had a best corrected visual acuity of less than 0.1. More than 79% of patients had bullous changes and stromal edema of the cornea; 19% had neuroretinopathy, 6% had subepithelial fibrosis. Thus our data regarding frequency of Fuchs dystrophy and visual acuity before DMEK was totally different compared with the literature.

Results. 78 (98%) patients showed a recovery of corneal transparency throughout a follow up period of 17.2 months (range 10-28 months), and best corrected visual acuity improved from 0.07 till 0.7 at 6 months postoperative. Complete graft detachment occurred in 2%, and partial detachment in 22.5%. Primary graft failure was observed in 6%. The endothelial cell density declined on average 8.4% ($\pm 14.8\%$) at 1 month, 20.5% ($\pm 13.4\%$) at 6 months, 25.1% ($\pm 15.3\%$) at 1 year, and 33.2% $\pm 15.4\%$ at 2 years after DMEK.

Conclusion. Our own method of DMEK provides good functional results, a lower decline in endothelial cell density, and a lower rejection rate of donor tissue as compared with the literature.

Financial disclosure: None

15.05 - IV.d

Outcome in a first series of Descemet membrane endothelial keratoplasty (DMEK)

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Purpose. To evaluate the clinical outcome of a first series of cases undergoing Descemet membrane endothelial keratoplasty (DMEK).

Methods. The first 17 consecutive eyes that underwent DMEK at our institute, were evaluated. All eyes were pseudophakic, and were suffering from Fuchs endothelial dystrophy, PPBK or PK failure. Best corrected visual acuity (BCVA), endothelial cell density (ECD), and the complications were recorded at 1, 3 and 6 months after surgery.

Results. Four eyes showed a failure of the DMEK graft, that was managed with a secondary PK. Of the 13 DMEK eyes remaining, 77% (10 eyes) achieved a BCVA of $\geq 20/40$ (≥ 0.5), 62% (8 eyes) $\geq 20/25$ (0.8), 38% (5 eyes) $\geq 20/20$ (≥ 1.0), and 8% 1 eye $\geq 25/20$ (≥ 1.2), at the 1-6 months follow-up interval. ECD averaged 2948 (± 391) cells/mm² before, (n=13), and 1867 (± 875) cells/mm² (n=4), at 6 months after surgery. Complications included epithelial defects (46%), partial detachment (23%; 15% <30% detached; 8% $\geq 30\%$ detached), primary graft failure (8%), corneal edema (8%), hypotonia (8%), and subepithelial haze (8%).

Conclusion. Despite our learning curve, DMEK surgery seemed to result in quick and often complete visual recovery in most cases.

Financial disclosure: None

Saturday - January 21, 2011 - Main Session IV - 14.30 - 16.15

Clinical outcome of endothelial keratoplasty II

15.15 - IV.e (Rapid fire)

Comparison of intraoperative visibility of two simultaneous DMEK transplant marking methods

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Purpose. We compared intraoperative visibility of two Descemet stripping endothelial keratoplasty (DMEK) transplant marking methods, that were simultaneously applied.

Methods. Prior to seven DMEK surgeries, the Descemet membrane was stripped from the transplant and two kinds of marking methods were applied: The Erlangen method using three half-circle excisions in an asymmetric manner and the Mainz method using between 8 and 12 asymmetric triangle excisions, all applied at the edge of the DMEK transplant. Intraoperative video footage and postoperative slitlamp examination data (1-3 days after surgery) were analyzed for visibility of each marking method.

Results. The Erlangen markings were partially observed 0.43 ±0.5 times per DMEK surgery, but orientation of the transplant remained unclear in all cases. With the Mainz markings, the visibility was 3.43 ±1.7 times per DMEK procedure ($p < 0.001$) with instant 'understanding' of graft orientation in all cases. Postoperative visualization of orientation was also easier with the Mainz markings (2.43 ±0.8 times per follow-up) compared to the Erlangen markings (0.29 ±0.5 times per follow-up).

Conclusion. Our new DMEK graft marking method seems to be superior to the standard marking procedure during and after DMEK surgery. It might be helpful to prevent back to front orientation of the transplant, especially when surgeons are starting to learn the procedure.

Financial disclosure: None

15.20 - IV.f (Rapid fire)

DMEK - Which side is which?

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Purpose. To demonstrate how to distinguish the endothelial from the stromal side of the Descemet-endothelial transplant.

Methods. Video recordings were made during the separation of Descemet-endothelium from the donor stroma, and the edges of Descemet-endothelial transplant were marked by staining.

Results. Marked edges of the transplant facilitated the judgment of 'which side is which', to ensure proper positioning of the transplanted tissue.

Conclusion. Marking the edges of the transplant is recommended to facilitate proper tissue positioning during DMEK.

Financial disclosure: None

Saturday - January 21, 2011 - Main Session IV - 14.30 - 16.15

Clinical outcome of endothelial keratoplasty II

15.25 - IV.g

Intraocular graft unfolding techniques in Descemet membrane endothelial keratoplasty (DMEK)

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Purpose. To define and evaluate various Descemet-graft unfolding techniques in Descemet membrane endothelial keratoplasty (DMEK).

Methods. The surgical videos of 100 consecutive DMEK cases (100 patients) with at least six months of follow up were reviewed by a masked observer. Descemet-graft unfolding methods were categorized into four basic and three auxiliary techniques and their efficacy was evaluated using linear regression analysis. Best corrected visual acuity (BCVA), endothelial cell density and postoperative complications at six months were assessed.

Results. All DMEK surgeries could be completed using four Descemet-graft unfolding techniques: Technique I: standardized 'no-touch' graft unfolding using a 'double-roll', Technique II: carpet-unrolling while fixating one graft-edge ('Dirisamer technique'), Technique III: small air-bubble assisted unrolling ('Dapena maneuver'), and Technique IV: the 'single sliding cannula maneuver'. Additional maneuvers included: 'flushing': turning-over the graft when oriented upside-down; manual graft centration with a cannula; and 'bubble-bumping' to unfold peripheral 'inward folds'. In 73% of surgeries Technique I was used. In 44% a combination of techniques was used, and auxiliary techniques were used in 62%. None of the techniques correlated with the BCVA, endothelial cell density or postoperative complication rate.

Conclusions. DMEK may be further facilitated by using controlled techniques for unfolding the Descemet-graft inside the recipient anterior chamber, either as stand-alone techniques or used in various combinations.

Financial disclosure: Dr. Melles is a consultant for D.O.R.C. International

15.35 - IV.h

Patterns of endothelialization and corneal clearance after Descemet membrane endothelial keratoplasty (DMEK)

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Purpose: To describe various endothelial migration healing patterns after Descemet membrane endothelial keratoplasty (DMEK), to determine the contribution of the donor and host endothelium in the clearance of a transplanted cornea.

Methods: In a total of 150 consecutive eyes that underwent DMEK for Fuchs endothelial dystrophy, re-endothelialization patterns were studied. Of these eyes, 36 showed a 'stromal gap' between the 'descemetorhexis-edge' and the graft, or (partial) graft detachment.

Results: Complete corneal clearance was seen in 28/36 (78%) eyes with a stromal gap, or (partial) detachment, progressing from the periphery toward the center, and 27/34 (79%) of eyes with normal visual potential reached a visual acuity of $\geq 20/40$ (≥ 0.5) or better. In three eyes that had the Descemet graft implanted upside-down, a 'reversed corneal clearance pattern' was observed (ie persistent edema where the graft was attached) while the area overlying the detachment cleared.

Conclusion: Complete graft attachment may not be required for recovery of corneal clarity after DMEK, but the presence of donor endothelium in the recipient anterior chamber may be a prerequisite.

Financial disclosure: None

Saturday - January 21, 2011 - Main Session IV - 14.30 - 16.15

Clinical outcome of endothelial keratoplasty II

15.45 - IV.i (Rapid fire)

Endothelial cell density after Descemet membrane endothelial keratoplasty: 1-5 year follow-up

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*Melles Cornea Clinic, Rotterdam; Netherlands Institute for Innovative Ocular Surgery, Rotterdam, The Netherlands***Purpose:** To determine the rate of decline in endothelial cell density (ECD) for patients up to 5 years after Descemet membrane endothelial keratoplasty (DMEK).**Methods:** From a larger group of 300 consecutive patients, who underwent DMEK for Fuchs endothelial dystrophy or pseudophakic bullous keratopathy, ECD measurements were available in 250 eyes with 6 months follow-up; 204 also had 1 year follow-up; 101 had 2 years follow-up, 47 had 3 years follow-up, 13 had 4 years follow-up, and 2 patients had a 5 year follow-up.**Results:** The ECD averaged 2560 (± 200) cells/mm² before surgery, 1680 (± 510) cells/mm² at 6 months, 1600 (± 520) cells/mm² at 12 months, 1480 (± 510) cells/mm² at 24 months, 1410 (± 530) cells/mm² at 36 months, 1220 (± 470) cells/mm² at 48 months and 1080 (± 530) cells/mm² at 60 months after surgery. The ECD decreased significantly between the preoperative and 6 month postoperative measurement. Our findings support a 34% sharp decrease in ECD in the first 6 months after DMEK, followed by a slower decrease of about 8.5% per year sustained over 5 years.**Conclusion:** The rate of endothelial cell loss in patients up to 5 years after DMEK closely resembles the published reports for patients after alternate forms of endothelial keratoplasty. This, combined with evidence that $>3/4$ of patients achieve visual outcomes $\geq 20/25$ (≥ 0.8) at 6 months after surgery, may indicate that DMEK could become a preferred treatment method in corneal endothelial disease.*Financial disclosure: None*

15.50 - IV.j (Rapid fire)

Descemet membrane endothelial keratoplasty in an eye with iris claw IOL

P. Stodulka

*Gemini Eye Clinics, Zlin, Czech Republic***Purpose.** To evaluate the challenges of the presence of an iris claw lens in DMEK surgery, considering the relatively shallow anterior chamber in such cases.**Methods and Results.** Despite the narrow space between the cornea and the intraocular lens, the Descemet-endothelial graft could be manipulated well during DMEK surgery, resulting in a properly attached graft and subsequently clear cornea.**Conclusion.** DMEK can be successfully performed in the presence of anterior chamber iris claw intraocular lens.*Financial disclosure: None*

15.55 - IV.k

The use of a modified inserter to facilitate insertion of endothelium during DMEK

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Purpose. The insertion of a donor Descemet membrane (DM) during DMEK surgery is a difficult step to master. The unrolling of the DM inside the anterior chamber requires great skill and practice. We present an instrument designed to facilitate implantation during DMEK.

Methods and Results. The instrument is based on the design initially used to perform TENcell (True Endothelial cell) surgery, an early variant of DMEK. This instrument enabled the endothelium to be supported on a spatula covered in a viscoelastic which was placed in the anterior chamber. The endothelium was floated into position by an air bubble introduced through an air-port positioned in the centre of the spatula. The problem with this technique was the instrument required an 8mm incision to enter the anterior chamber.

The new instrument (Tappin's DMEK inserter) is narrower and can easily be inserted via a 5 mm incision. The instrument still relies on the principal of laying the endothelium on a viscoelastic layer. The layer is orientated with the endothelial surface lying on the viscoelastic. A gripping mechanism keeps the endothelium in place during insertion. An air-port is situated under the endothelium to facilitate floating of the endothelium into place by injecting an air bubble.

Conclusion. The Tappin's DMEK inserter may hold promise for use of endothelial implantation during DMEK.

Financial disclosure: None

14.30 - IV.L

Donor cornea harvesting technique for Descemet's stripping endothelial keratoplasty

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Purpose. To describe a new harvesting technique to obtain corneal grafts for posterior lamellar keratoplasty.

Methods. The donor cornea is placed in an artificial anterior chamber and its apex is marked with a pen. After pachymetry at the 8-9 mm corneal diameter, the femtosecond laser (IntraLase™) suction ring is docked to the applanation cone. Ring tunneling is performed with the following laser settings: outer diameter 9.0 mm; inner diameter 7.7 mm; depth 450-500 µm; ring energy 170 mJ. A custom-designed hook (outer diameter 8.3 mm; inner diameter 6.8 mm; a small hole near the tip, and an arch length of 320°) which has been threaded with a 6/0 nylon suture is then passed through the tunnel. Corneal delamination is achieved by applying traction to the suture. The delamination is enlarged towards the periphery with a spatula.

Results. We have studied the characteristics of the buttons in 12 eyes from 12 patients. In all cases, a homogeneous thin graft was obtained, without perforation or loss of the lamellar plane.

Conclusions. With this technique, we can reliably obtain grafts for posterior lamellar keratoplasty, with predictable thickness and shape characteristics.

Financial disclosure: None.

14.40 - IV.m

Purinergic receptors expression in human and murine corneal endothelium

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Purpose. Purinergic receptors P2RY [G protein-coupled receptors] and P2RX [ligand-gated ion channels] are both known to be activated in inflammation and apoptosis pathways. Since loss of corneal endothelial cells (EC) due to cell death is the major problem in numerous corneal conditions and also in tissue storage for corneal transplantation, modulation of purinergic receptors may provide an efficient way to increase EC survival. The aim of this study was to investigate expression levels of P2RY2 and P2RX7 receptors (P2R) in murine and human corneal endothelium, as well as the association to the purinergic receptor ligand ATP.

Methods. Expression levels of P2R were determined by qRealTime-PCR of untreated and Interleukin-1b-treated murine and human EC. EC apoptosis was also studied in response to ATP in a "cornea-in-a-cup" assay.

Results. In murine EC P2RX7, expression was significantly predominant compared to P2RY1 and P2RY2, while in human EC P2RY2 expression was greater than P2RX7. Exposure to ATP in increasing concentrations resulted in a steady increase of apoptosis. As indicators of EC stress, changes in cell size (polymegathism) and cell shape (loss of EC hexagonality, polymorphism) could be observed.

Conclusion. Our data describe distinct differences in P2R expression levels in murine versus human EC showing the limitations of using the mouse model in P2R EC research. As P2R seem to be evenly distributed over the entire concave surface of the EC monolayer, inhibiting P2Rs interaction with their ligands (e.g. extracellular ATP) may present an effective way to prevent EC apoptosis.

Financial disclosure: None

14.50 - IV.n

A new tool for transfection of corneal endothelial cells: Calcium phosphate nanoparticles

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Purpose. Calcium phosphate nanoparticles (CaP-NPs) are ideal tools for transfection thanks to their distinct biocompatibility. After transfection, the particles dissolve in calcium and phosphate, and it has been shown that intracellular Ca^{2+} - levels do not affect cell viability. The aim of this study was to compare the transfection efficiencies of different CaP-NPs in corneal endothelial cells.

Methods. Different CaP-NPs with pcDNA3-EGFP (triple-shell CaP/DNA/CaP/DNA in different preparations) and those coated by various dispersions of polyethylenimine (PEI) were prepared. Polyfect-pcDNA3-EGFP served as a positive control. Human and murine corneal endothelial cells (suspensions and donor tissue) were transfected with varying concentrations of CaP-NPs, for different transfection periods. The transfection efficiency was measured by EGFP-expression measured by quantitative flow cytometry and fluorescence microscopy. To evaluate a possible cell toxicity, apoptosis was studied by propidium iodide or TUNEL staining.

Results. Coating with PEI significantly increased the transfection efficiency of triple shell CaP-NPs. Thus, after transfection with triple shell CaP-NPs/PEI(0.5), up to 50% of corneal endothelial cells showed EGFP expression. However, the cell viability in cell suspensions decreased with increasing dispersion of PEI. As corneal endothelial cells are a cell type with minimal proliferative capacity, the EGFP expression in tissues remained considerably stable.

Conclusion. CaP-NPs are suitable tools for the transfection of corneal endothelial cells and may offer an alternative to viral transfection which is safe for patient use. Further studies are necessary to carefully evaluate the aspects of functional application and of biosafety.

Financial disclosure: None

15.00 - IV.o

Monitoring of endothelial cell density during simulation of DSAEK phases in vitro using THIN-C deswelling medium and two different glides for endothelium insertion

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Purpose. To monitor endothelial cell density (ECD) loss at different steps of a simulated DSAEK surgery, after use of THIN-C deswelling medium.

Methods. Human donor corneas were incubated in THIN-C (Alchimia) deswelling medium at 4°C for 4h or EUSOL-C (Alchimia) control medium. DSAEK surgery was simulated using a Moria microkeratome equipped with a 350 µm cutting head. After cutting, tissues were punched, positioned and transited through a "Tan endoglide" (I-Med Pharma.) or a new "Macaluso Thin DSAEK inserter" (Janach) suitable for a 3.5 mm tunnel, before endothelium insertion in porcine eyes. ECD was evaluated with trypan blue staining before microkeratome cutting, immediately after cutting, after glide transition, and after injection in the porcine eye. Tissue thickness was measured by Visante OCT (Carl Zeiss) equipped with an OCT adaptor (OBC, Miami) for in-vial measurement.

Results. Thin-C allowed us to obtain lamellar tissue with an average thickness of 126 µm, which was significantly thinner than control lamellar tissue (average thickness: 179 µm). Donor corneas showed an initial ECD of 2480 cells/mm² on average. After microkeratome cutting, a similar ECD loss of 140 cells/mm² was observed for THIN-C and control corneas. Simulation of transition through the glide and tissue insertion into the eye, induced similar ECD loss for both glides. THIN-C deswelled corneas showed markedly lower ECD loss during transit through the glide and insertion into the porcine eye.

Conclusion. THIN-C deswelling medium allows preparation of ultra-thin tissues for DSAEK, which can be introduced with two different diameter glides for transplant insertion without damaging the tissue.

Financial disclosure: Authors D. Amato and J. D'Amato Tothova are employed by ALCHIMIA.Srl that manufactures solutions THIN-C and EUSOL-C discussed in this abstract.

15.10 - IV,p

Thickness, endothelial cell density, and interface of microkeratome or femtosecond laser prepared human corneal tissue for DSAEK using de-swelling solution THIN-C

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Purpose. To monitor tissue thickness, endothelial cell density (ECD), and interface quality during DSAEK surgery after femtosecond laser (FS laser) versus microkeratome cutting using Thin-C deswelling medium.

Methods. Human corneas (n=20) were incubated in Thin-C (Alchimia) deswelling medium at 4°C for 4h or Optisol-GS (Bausch&Lomb). Tissues were cut using microkeratome (Moria) or FS Laser (Intralase) at 150 kHz. Tissue injection simulation was performed using NCI Fischer injector. ECD was determined using Konan KeratoAnalyzer before cutting, after cutting and after tissue injection. Central corneal thickness (CCT) was measured by Visante OCT (Carl Zeiss). The tissue interface was analysed for surface smoothness and collagen integrity using Scanning Electron Microscopy (Jeol JSM-6490).

Results. The average CCT of donor corneas was 665 µm. Thin-C permitted us to obtain lamellar tissue with an average thickness of 166 µm, which was significantly thinner than the control tissue with an average thickness of 213 µm. After the cut, anterior and posterior flaps did not show thickness variation for up to 48h. FS laser cutting induced significantly lower ECD loss in THIN-C treated corneas than in control corneas, indicating a possible endothelium protective effect of Thin-C. Microkeratome induced ECD loss was similar for THIN-C and control corneas. For all investigated conditions the tissue injection induced similar ECD loss. SEM analysis showed similar interface smoothness for both cutting methods. For THIN-C treated corneas, collagen protective effect was observed during FS laser cutting.

Conclusion. The use of THIN-C de-swelling medium permitted the preparation of thinner tissue for DSAEK and a reduction of endothelial and collagen damage as compared to FS laser cutting performed with standard medium.

Financial disclosure: Authors D. Amato Tothova and C. Gatto are employed by ALCHIMIA.Srl.

15.20 - IV,q

Processing of human corneal endothelial cell sheets using tunable cell culture substrates

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Purpose. To create a tool for enzyme-free harvest of cultured human corneal endothelial cell (HCEC) sheets using bio-functionalised, temperature-responsive polymer substrates.

Methods. HCEC were cultured on thin films of polyvinyl methylether (PVME, temperature-responsive component) blended with 1 wt% or 10 wt% of the alternating copolymer PVME-*alt*-maleic acid (PVME-MA, protein/peptide binding component). Blends were cross-linked by electron beam irradiation. Film thickness and degree of crosslinking were varied to tune the mechanical properties. Different amounts of MA units allowed for biomolecular functionalisation by covalent attachment of laminin/chondroitin-6-sulfate, collagen IV, fibronectin, or cyclic RGD peptide (cRGD). The ability of different polymer blends to support HCEC adhesion, proliferation and stimulated detachment was monitored by phase contrast microscopy in serum-containing medium.

Results. HCEC-12 behaviour depended on the interplay of mechanical characteristics (degree of crosslinking and dry film thickness), degree of biofunctionalisation, and type of bioactive molecule. Cells adhered better on surfaces with a high crosslinking degree (774 kGy), low dry film thickness (approx. 50 nm), and high PVME-MA content (10 wt%) (i.e. high protein/peptide coverage). In contrast, surfaces with a low degree of crosslinking (258 kGy), high dry film thickness (approx. 300 nm), and low PVME-MA content (1wt%) preferably supported detachment of HCEC upon temperature decrease. Pre-coating with laminin/chondroitin-6-sulfate permitted weakest initial cell adhesion and superior cell detachment compared to other protein/peptide coatings, while cRGD coating best supported cell adhesion but diminished cell detachment.

Conclusion. HCEC can be grown and harvested as sheets on temperature-responsive polymer surfaces. Tuning key polymer properties allows for the creation of a flexible system to control cell adhesion, monolayer formation and enzyme-free sheet detachment upon temperature reduction. Such engineered sheets may prospectively be transplanted on unsuitable donor corneas or in patients.

Financial disclosure: None

15.30 - IV.r

Donor tissue selection for anterior lamellar keratoplasty

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Purpose. To assess the influence of donor characteristics on the outcome of anterior lamellar keratoplasty, and to evaluate whether corneal donor tissue considered as unsuitable for penetrating or posterior lamellar keratoplasty due to poor endothelial condition may be safely used for anterior lamellar keratoplasty.

Methods. This study included 186 consecutive anterior lamellar keratoplasties performed between 2002 and 2011. Donor tissue characteristics were recorded. The main measures included visual acuity, slit-lamp examination, and specular microscopy. Relationships between donor tissue characteristics and graft survival, visual recovery, and post-operative endothelial cell loss were assessed.

Results. The average and extreme values of donor tissue characteristics were: donor age, 71.1 years (range 28-88); death-to-preservation time, 24.6 hours (range 5-48); organ culture time, 20.8 days (range 12-35); graft endothelial cell density before transplantation, 2003 cells/mm² (range 100-3300), and deswelling time, 2.0 days (range 1-4). The average follow-up time of patients was 41.1 ± 25.5 months. None of the donor characteristics significantly influenced graft survival or visual acuity. No significant correlation was found between donor characteristics and post-operative endothelial cell loss (early phase and late phase).

Conclusion. Donor tissue characteristics do not influence the results of anterior lamellar keratoplasty. Donor tissue with poor endothelial cell density (< 2000 cells/mm²) is suitable for anterior lamellar keratoplasty.

Financial disclosure: None

15.40 - IV.s

Bowman layer transplantation

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Purpose. To evaluate the outcome of Bowman layer transplantation for the management of anterior stromal opacities.

Methods. From whole donor globes, Bowman rolls were prepared without damaging the posterior layers of the cornea. Three patients with a subepithelial haze or opacity, or chemical burn underwent isolated Bowman layer transplantation, during which a stromal flap containing the opaque area was excised, and an unsutured donor Bowman layer was transplanted onto the stromal bed.

Results. All patients reached a visual acuity of 0.7 or better within months after transplantation, with the aid of a sclera-supported contact lens. The remaining posterior layers of the donor corneas were used for posterior lamellar keratoplasty surgeries in other patients.

Conclusion. Isolated Bowman layer transplantation is a potential new technique for the treatment of anterior stromal opacities and may offer advantages over conventional techniques, and may benefit donor tissue availability.

Financial disclosure: Dr. Melles is a consultant for D.O.R.C. / Dutch Ophthalmic USA.

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Poster presentations

Poster 1

Endothelial keratoplasty with intact recipient's Descemet membrane in a rabbit eye

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Purpose. To investigate corneal clarity, graft stability and the nature of wound healing after endothelial keratoplasty (EK) with intact Descemet membrane (DM).

Methods. Six white rabbits (weight 3–4 kg) with normal corneas underwent monocular EK without DM removal. At selected time points (day 7, 30 and 90) photographs were taken and the animals were euthanized. The corneas were excised and processed for histology. *Surgical procedure donor:* The donor graft was prepared by manual dissection. A 5 mm trephination was done. The button was placed endothelial side up on a spatula, and covered with viscoelastic substance. *Surgical procedure recipient:* A 6 mm corneal incision was made, and the previously prepared donor graft was inserted into the anterior chamber. Air was injected into the anterior chamber. After two hours, the air was partially replaced by balanced salt solution.

Results. At 7, 30 and 90 days after surgery all corneas remained transparent. Histology revealed that recipient endothelium was absent, and DM retained normal appearance. Stromal collagen lamellae were parallel with uniform distribution of keratocytes, both on recipient and donor side. Donor DM and endothelial cells were normal. Histology revealed good graft apposition.

Conclusion. EK without recipient DM stripping did not cause corneal transparency loss during the three months follow up. Good graft apposition and the lack of fibrous scar formation on either side of recipient DM suggest that it may not be necessary to remove the DM in every EK case.

Financial disclosure: None.

Poster 2

Use of one corneal graft for both Descemet stripping automated endothelial keratoplasty and coverage of a glaucoma drainage device tube

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Purpose. To describe the efficacy and safety of using a single corneal graft for two different ocular surgeries: Descemet stripping automated endothelial keratoplasty (DSAEK) in one patient, and coverage of a glaucoma drainage device tube in a second patient.

Methods. The records of 12 patients who underwent Ahmed glaucoma valve implantation using the anterior lamella of a donor cornea that had been previously used for DSAEK were reviewed.

Results. Nine eyes (75%) had superotemporal Ahmed valve implantation and 3 eyes (25%) had inferotemporal implantation. No intraoperative complications were encountered in any of these cases. During postoperative follow-up there were no corneal graft-related complications, such as graft rejection, wound dehiscence or tube exposure, nor were there any glaucoma drainage device-related complications, such as diplopia or conjunctival inflammatory reaction. Mean intraocular pressure (IOP) before surgery was 32.8 ± 9.3 mm Hg. The mean postoperative IOPs were 12.5 ± 3.2 ($P < 0.001$) at month 3, and 12.4 ± 4.7 ($P < 0.001$) at the final visit. The mean reduction in IOP was 51%. Mean follow-up time after surgery was 8.4 ± 6.1 months.

Conclusion. Short-term results show that the use of the anterior corneal graft cap for patching a tube is safe and effective. The double use of a corneal graft is economically worthwhile and especially useful in countries where there is shortage of donor corneal tissues.

Financial disclosure: None.

Friday / Saturday - January 20/21, 2011

Poster presentations

Poster 3

Using corneas with keratotomy incisions as donor material for DMEK surgery

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Purpose. To study the possibility of using eyes containing keratotomy incisions as donor materials for DMEK.

Methods. Two patients with pseudophakic bullous keratopathy underwent DMEK, using donor corneas with keratotomy incisions. Average endothelial cells density before DMEK was 2567 ± 156 cells/mm². Descemet membrane detachment was done using the Melles technique in one case and using our own method from the stromal side in the second case. Descemet membrane graft diameter was 8.75 mm.

Results. Dissection of the donor Descemet membrane as well as both surgeries were uneventful. The first case required re-bubbling two times, which seemed associated with endothelial failure at 3 months after surgery. The second case achieved a best corrected visual acuity of 0.7 at 24 months after DMEK, with an endothelial cells density of 1726 ± 134 cells/mm².

Conclusion. Obtaining DMEK grafts from corneas containing keratotomy incisions is technically possible. As such, donor tissue material - that would otherwise be discarded - may be used in DMEK.

Financial disclosure: None.

Poster 4

Our experience with tissue coding systems

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Purpose. To describe the opportunities provided by the GlaucoS database system and ISBT 128 Coding System.

Methods. Two database systems were compared. All data of donors collected from 1996–2011 in Warsaw Eye Bank were analyzed. In addition, efficiency tissue management from the donors to the recipients was compared.

Results. Both database showed good levels of accuracy and safety in their coding systems. Quality, safety and traceability of our tissues was improved by moving from one system to another.

Conclusion. ISBT 128 has provided an organized and consistent system of labeling eye tissues. This has enabled better monitoring and more efficient management, and has reduced entry errors.

Financial disclosure: None.

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Poster presentations

Poster 5

The effects of different preservation processes on the total protein and growth factor content in a new biological product developed from human amniotic membrane

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Purpose. To quantify the total protein and growth factor content in a tissue suspension obtained from processed human amniotic membrane (hAM).

Methods. hAM was collected, frozen, freeze dried, powdered and sterilized by γ -irradiation. At each step of the process, samples were characterized for the total protein amounts by a Bradford protein assay, and for the growth factor concentrations by ELISA testing of the tissue suspensions.

Results. Frozen-hAM samples showed higher release of total proteins and specific growth factors in the tissue suspension in comparison with freeze-dried hAM. We observed that even if the protein extraction is hindered once the tissue is dried, the powdering process allows a greater release in the tissue suspension of total proteins and growth factors after tissue re-solubilization in comparison with only the freeze-drying process (+91% for EGF, +16% for HGF, +11% for FGF, +16% for TGF- β 1), and a greater release of EGF (85%) in comparison with only the freezing process, because proteins readily dissolve in the solution.

Conclusion. We described a protocol to obtain a new sterile biological product from hAM tissue, with well-known effects of thermal, mechanical and physical processes on the total protein and growth factors contents.

Financial disclosure: None.

Poster 6

Corneal graft survival in association with donor death cause

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Purpose. The aim of our study was to evaluate a relationship between endothelial cells density and donor death cause.

Methods. Donor corneas obtained by our eye bank in 2008, 2009, and 2010 were analyzed with confocal microscopy to quantify endothelial cell counts. Causes of death, time from death to preservation, age and sex of donors were statistically evaluated.

Results. Endothelial cell counts decreased significantly in donors with sudden death, chronic ischemic changes associated with atherosclerosis, and tumorous dissemination in all three years. Young donors had more endothelial cells than older donors. No correlation between endothelial cell counts, and time of death to preservation, and sex of donors was found.

Conclusion. Cause of death and donor age appear to be factors determining endothelial cell counts, and thus transplant survival.

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Poster presentations

Poster 7

The influence of certified and non-certified culture media on corneal endothelial parameters

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Purpose. To compare the qualitative and quantitative endothelial parameters of human donor corneas stored in certified and non-certified organ culture (OC) media.

Methods. Twenty-four paired human corneas (Ocular Tissue Bank Prague) were stored in OC for 28 days at 31 °C in the following media: EMEM/EMEM with 5% dextran prepared by the bank staff, and commercial media based 93/42/EEC:TissueC/CarryC (Alchimia, Italy) and CorneaMax/CorneaJet (Eurobio, France). Comparisons of EMEM vs. Alchimia (group 1, G1) and EMEM vs. Eurobio (group 2, G2) were performed on paired corneas. The main quantitative and qualitative parameters were assessed, before storage (1st assessment), before transfer to deswelling medium (2nd assessment) and after 24 hours in deswelling medium (3rd assessment).

Results. The mean ECD in the 1st assessment for corneas in G1 was 2787 ±532 (EMEM) and 2742 ±531 (Alchimia) and in G2 2874 ±392 (EMEM) and 2883 ±444 (Eurobio) cells/mm². In the 3rd assessment, no statistically significant differences (p=0.44 for G1 and 0.33 for G2) in mean ECD were observed (2521 ±484 vs. 2552 ±442 cells/mm² in G1 and 2586 ±409 vs. 2661 ±380 cells/mm² in G2). There was a difference in % dead cells (0.61 vs. 1.86 in G1 and 0.26 vs. 0.6 in G2).

Conclusion. Both commercial media are comparable to standard EMEM in terms of the main qualitative and quantitative endothelial parameters. The relatively high percentage of dead cells in both commercial media, may be due to the slower reparative capacity of the corneal endothelium in OC, resulting in the presence of remnant dead cells.

Financial disclosure: None.

Poster 8

Penetrating keratoplasty and 'iris-claw' lens - is it safe for the endothelium?

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Purpose. Corneal endothelial cells have been observed after penetrating keratoplasty (PK). Implantation of new generation 'iris claw' phakic intraocular lens (IOL) has been shown to cause insignificant endothelial cell loss. In our prospective case series, we evaluated endothelial cell loss after PK and implantation of a posterior chamber intraocular lens (PCIOL) versus PK and implantation of an 'iris claw' lens (Verisyse).

Method. In the first group of 15 patients scheduled for PK, implantation of Verisyse was performed because of the absence of posterior capsule support. Four of these patients had an angle supported anterior chamber IOL, 7 patients were aphakic and 4 had posttraumatic cataract with ruptured posterior capsule. The second group of 20 patients had standard 'triple' procedure (PK + Phaco + PCIOL).

Results. BCVA of both groups prior the operation were hand movement in 21 patients, light perception in 9 patients, and 0.05 in 5 patients. After surgery, visual acuity improved in 31 out of 35 eyes (88.6%). Preoperative donor endothelial cell counts of the donor grafts averaged 2820 ±320 cells/mm². Postoperative endothelial cells loss in PK and Verisyse was 44% and 41% with the 'triple' procedure, at 12-18 months follow-up.

Conclusion. There was no significant difference in the endothelial cell loss between eyes with PK and Verisyse as compared to those with PK and implanted PCIOL.

Financial disclosure: None.

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Poster presentations

Poster 9

Management of post penetrating keratoplasty astigmatism

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Purpose. The leading complication after penetrating keratoplasty (PK) is high postoperative astigmatism ($> 4D$), that is commonly managed by rigid gas-permeable contact lenses fitting. When astigmatism cannot be corrected by optical means, excimer laser refractive surgery (LASIK) or (with concurrent cataract) implantation of a toric intraocular lens may be performed.

Method. Five patients with subsequent postoperative myopia and high astigmatism after PK underwent LASIK refractive surgery. Best-corrected visual acuity, uncorrected visual acuity, corneal topography and aberrations were recorded.

Results. Mean spherical equivalent was $-4.75D$ before and $-1.00D$ after surgery, and mean cylinder was respectively $-5.50D$ and $-1.25D$. Postoperative uncorrected visual acuity increased in all eyes. There was a statistically significant decrease in higher order spherical aberration postoperatively.

Conclusion. LASIK is an option in correcting refractive errors and aberrations after PK. Toric intraocular lens implantation is a novel approach for those patients which develop cataract after PK.

Financial disclosure: None.

Poster 10

Outcome of DMEK in phakic eyes.

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Purpose. To determine the clinical outcome of isolated Descemet membrane transplantation, i.e. Descemet membrane endothelial keratoplasty (DMEK), in phakic eyes.

Setting. Non-randomized, prospective clinical study, at a tertiary referral center.

Methods. From a larger group of consecutive 260 DMEK eyes that underwent DMEK for Fuchs endothelial dystrophy, 52 eyes were phakic. For the latter group, the best corrected visual acuity (BCVA), subjective and objective refractive data, endothelial cell density, and intra- and postoperative complications were documented at 1, 3 and 6 months.

Results. A total of 69% of phakic eyes reached a BCVA of $\geq 20/40$ (≥ 0.5) within one week, and 85% reached $\geq 20/25$ (≥ 0.8) at six months. Compared to an age-matched control group of pseudophakic eyes, phakic DMEK eyes showed a similar visual rehabilitation rate, final visual outcome, and endothelial cell densities of $1660 (\pm 470)$ cells/mm² at 6 months follow-up, as well as a minor hyperopic shift ($+0.74D$) and a similar graft detachment rate (4%). Visual outcomes of $\geq 20/13$ (≥ 1.5) were limited to phakic eyes, suggesting better optical quality with the crystalline lens in-situ. Temporary mechanical angle-closure glaucoma due to air bubble dislocation behind the iris was found to be the main complication (11.5%). Two eyes (4%) required phaco-emulsification after DMEK.

Conclusion. DMEK in phakic eyes may give excellent visual outcomes without an increased risk of complications. Visual acuities of $\geq 20/13$ (≥ 1.5) may indicate that near normal anatomical repair in DMEK is associated with near perfect optical quality of the transplanted cornea.

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Poster presentations

Poster 11

A milestone in the history of medicine: Dr. Eduard Zirm and the first successful keratoplasty in 1905

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Purpose. To honour the achievements of Dr. Eduard Zirm, who performed the first clinically successful transplantation of a human cornea, which was the first transplantation of human tissue as well.

Methods. Selective literature research of books and journal articles via PubMed, Google Scholar and Google.

Results. On December 7, 1905 Dr. Eduard Zirm (*1863, †1944) performed the world's first successful transplantation of a human cornea at the hospital of Olmütz (Moravia at the time, today Olomouc, Czech Republic). By using glass or animal corneal tissue, the history of corneal replacements had started already in 1798. In 1879 the first technically successful corneal transplantation took place, but the cornea went opaque within 20 hours. Zirm's transplant remained clear for more than one year.

Conclusions. Corneal disorders are still a major cause of blindness or severe visual impairment worldwide. By developing a novel method that led to the first successful corneal transplant, Zirm made an important contribution to the field of Ophthalmology. Ongoing research led to new techniques and devices used in modern keratoplasty, e.g. femto-second lasers, which may produce more accurate grafts and improved wound healing. Today's limitation is the availability of donor corneas. The Lions Club is supporting eye banks worldwide.

Financial disclosure: None.

Poster 12

20 years of International Eye Bank of PragueY. Urbanová, M. Netuková, J. Sach, P. Kuchynka
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Purpose. To present an overview of 20 years of activity at the International Eye Bank of Prague.

Method. We have retrospectively analyzed 20 years of activity at our eye bank, focusing on changes in tissue and donor evaluation, changes in product layout, important legislative amendments, and new product introduction.

Results. The International Eye Bank of Prague was founded in November 1991, and was the only eye bank in the Czech Republic for many years. Since its foundation, over 13.000 tissues have been distributed. Our eye bank also serves as a training center for the International Federation of Eye and Tissue Banks. Major changes occurred in past 5 years, due to new EU legislation, and new types of product demands.

Conclusion. We believe that the International Eye Bank of Prague offers tissues of the highest quality and safety. The aim of our future work is to follow upon trends in corneal surgery, and to fulfill the demands of corneal surgeons and their patients.

Financial disclosure: None.

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Poster presentations

Poster 13

Cellular cytotoxicity of ophthalmic solutions with and without preservatives to human corneal endothelial cells

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Purpose. To assess the cytotoxicity of dorzolamide with and without benzalkonium chloride in tissue cultures of human corneal endothelial cells.

Method. Corneal tissues with a post mortem time longer than 24 hours were used. Commercially available dorzolamide eye drops with and without benzalkonium chloride were tested in different dilutions (1/5; 1/10; 1/100; 1/1000 and 1/10 000). Endothelial cell survival was evaluated with a phase contrast microscope after 24 and 48 hours, and the cell count was calculated with RheinTec Software.

Results. Endothelial cell survival in corneas exposed to dorzolamide without preservatives was normal, but endothelial cells necrosis was observed 24 hours after exposure to dorzolamide with benzalkonium chloride.

Conclusion. Benzalkonium chloride in ophthalmic solutions may be cytotoxic for endothelial cells of human corneal grafts.

Financial disclosure: None.

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