10th KPro Study Group Meeting
Program & Abstracts

Date: April 22 (Fri) – 23 (Sat), 2016

Venue: Kyoto Hotel Okura

President: Masahiko Fukuda
(Department of Ophthalmology, Kindai University Faculty of Medicine)

Honorary President: Yoshikazu Shimomura
(Department of Ophthalmology, Kindai University Faculty of Medicine)
Welcome Message

Dear Colleague,

It is my great pleasure to welcome you to the 10th KPro Study Group meeting in Kyoto, Japan. I started KPro research in 2000 and established a MOOKP center in Japan in 2003. Since then, I have learned a lot from this Study Group, met many new colleagues and made many good friends in this forum. I had imagined that one day I would have the honour of organizing a KPro Study Group meeting in Japan. My dream has come true.

Kyoto has been chosen for this meeting for its fame as the old capital of Japan. It has a beautiful atmosphere and is probably the best place to experience Japanese culture. I may perhaps be biased as I was born in Kyoto.

The program is entitled “KPros Past, Present, and Future”. We should all learn from history in order to create innovations for the future. In addition to KPros, the program also encompasses ocular surface reconstruction, cultivated stem cells, and endothelial keratoplasty (DSAEK and DMEK). World renowned clinician scientists Professor Shigeru Kinoshita has been invited to deliver a special lecture on stem cells, and Professor Friedrich Kruse will be running a DMEK course. Furthermore, a number of prominent Japanese key corneal opinion leaders will deliver lectures and act as session chairs, helping to disseminate the essence of Japanese corneal expertise.

It is my sincere hope that many corneal specialists from around the world will congregate here in Kyoto to have good discussions which will lead a brave new KPro world.

Arigato Gozaimasu!!!

Sincerely,

Masahiko Fukuda MD, PhD
Department of Ophthalmology, Kindai University Faculty of Medicine
10th KPro Meeting President
Masahiko Fukuda

10th KPro Meeting Honorary President
Yoshikazu Shimomura

Program Advisor
Christopher Liu

Honorary President
Michael Roper-Hall, UK

Honorary Members
Joaquin Barraquer, Spain
Emmanuel Lacombe, France
Giancarlo Falcinelli, Italy
Claes Dohlman, USA

Secretary General
Jean-Marie Parel, USA

Secretary General Associates
Deborah Sweeney, Australia & Michael Belin, USA & Jose de la Cruz, USA

Secretary General Assistants
Mariela C Aguilar, USA & Alex Gonzalez, USA

Steering Committee
Jean-Marie Parel, USA (1990)
Eduardo Alfonso, USA (1990)
Giancarlo Falcinelli, Italy (1992)
Bernard Duchesne, Belgium (1999)
Guenther Grabner, Austria (2001)
Deborah Sweeney, Australia (2001)
Masahiko Fukuda, Japan (2008)
Konrad Hille, Germany (2008)
Donald Tan, Singapore (2008)
Michael W Belin, USA (2008)
James Chodosh (2010)
Christopher Liu, UK (2010)
Srinivas Rao, India (2010)
Jose De La Cruz (2012)
Virender Sangwan (2012)
Victor Perez (2012)

* Current members (starting year)
Venue

Kyoto Hotel Okura
Kawaramachi-Oike, Nakagyo-ku, Kyoto 604-8558 Japan

Access to the Venue

飛行機ご利用 /Flight Information

新幹線ご利用 /JR SHINKANSEN (Bullet Train)
From Kyoto Station to the Venue

- Kyoto Shiyakusho-mae Station of Subway Tozai Line is directly connected to B2
- From Kyoto Japan Railways Station via taxi: 15 minutes
- From Meishin Expressway, Kyoto Higashi Interchange: 20 minutes, Kyoto Minami Interchange: 30 minutes
- From Kansai International Airport via taxi: 1 hour 30 minutes
- From Itami Airport via taxi: 70 minutes
Registration

Registration desk hours

<table>
<thead>
<tr>
<th></th>
<th>Friday, April 22</th>
<th>Saturday, Friday 23</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kyoto Hotel Okura 4F Foyer</td>
<td>8:00 - 18:00</td>
<td>7:30 - 15:00</td>
</tr>
</tbody>
</table>

Registration desk hours

ONLY Japanese yen in cash is acceptable.

<table>
<thead>
<tr>
<th></th>
<th>On-site Registration</th>
<th>Gala Dinner on Apr. 22</th>
<th>Optional Tour on Apr. 22</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant</td>
<td>35,000JPY</td>
<td>Included in the registration fee</td>
<td>3,000JPY</td>
</tr>
<tr>
<td>Accompanying Person</td>
<td>-</td>
<td>5,000JPY</td>
<td>3,000JPY</td>
</tr>
</tbody>
</table>

Program and abstract book

Abstract book will be offered at the Registration Desk for free. (Registered participants only)

Cloakroom

<table>
<thead>
<tr>
<th></th>
<th>Friday, April 22</th>
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</thead>
<tbody>
<tr>
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<td>8:00 - 21:00</td>
<td>7:30 - 16:30</td>
</tr>
</tbody>
</table>

*Valuables cannot be checked in the cloakroom.

Luncheon seminar

Lunch is not included in the registration fee. Complimentary lunch is available on each day of the seminar.
Please note: Lunch is subject to availability.

WiFi service

There is a WiFi service available in the vicinity of the registration desk.
There are other places in the venue where WiFi can be used, details can be found at Information.

WiFi setting

SSID: kyotohotel-BH
Password: kyotobnq
(利用者 ID) UserID: 92732

1. Enter the SSID and the password to configure the wireless LAN.
2. Open the web browser, enter the UserID and press the "confirmation"(「確認」) button.
Please note: We are not responsible for any damages or trouble.

Social Program

Gala Dinner
Date: Friday, April 22, 19:00-
Venue: Kyoto Hotel Okura
Fee: included in the registration fee except for accompanying persons (¥5,000/person)
Optional Tour
Kyoto city tour
Date: Friday, April 22, 10:00 - 17:00
Price: ¥3,000/person (Lunch included)
*Booking is required at the registration desk

For Session Chairpersons and Speakers

For all session chairpersons
We ask that you strictly adhere to the time provided for presentations and Q&A to ensure smooth operation of the meeting. Please register at the Chairperson’s desk in each venue no later than 15 minutes before the session. Please notify the staff at the chairperson’s desk of your arrival when you take your place at the Next Chairperson Seat.

For speakers
◆ Oral presentation
  • We kindly ask you for your cooperation in keeping the schedule
  • Please bring your presentation on a PC, USB memory stick or CD in MS-Power Point and submit it in the PC Preview at least 1 hour prior to your session

PC Preview

<table>
<thead>
<tr>
<th>Location</th>
<th>Friday, April 22</th>
<th>Saturday, Friday 23</th>
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</thead>
<tbody>
<tr>
<td>Kyoto Hotel Okura 4F Foyer</td>
<td>8:00 - 18:00</td>
<td>7:30 - 15:00</td>
</tr>
</tbody>
</table>

• Speakers are requested to be seated in the next speaker’s seat no later than 15 minutes prior to their presentation
• Please strictly adhere to the times allocated for your presentation and discussion
  *Keynote Speakers: Presentation 20 minutes, Discussion 5 minutes
  *Other Speakers: Presentation 8 minutes, Discussion 4 minutes
• Remote presentation system is equipped in the session room. A mouse and a keyboard on the podium are available to operate the presentation

<Media>
• Only USB flash memory and CD are accepted. No MO, FD, or ZIP is accepted
• Presentations in data storage device must run on the Windows operating system
  Please prepare your presentation in power point 2007 or later versions
• Only fonts that are included in the basic installation of MS-Windows will be available. Use of other fonts not included in Windows can cause wrong layout / style of your presentation
  Suggested fonts: Times New Roman and Century
• Presentations in power point should be XGA (1024 x 768 resolution) setting. Higher resolution in setting can cause wrong layout
• Please check the compatibility of your data with the conference projection system in advance to ensure that your presentation, especially containing videos or animations, can be correctly displayed. Speakers
are fully responsible for the functionality of their presentations

<Own PC>

• The use of personal laptops has to be announced in advance to the technician (XP, or later version for Windows and OS8.6 or later version for Macintosh). Please bring an AC in case that the battery should run out

• On-site computer will be equipped with an analog VGA (mini D-SUB 15 pin) connector for data projection. A VGA cable will be available to use

• We recommend you to bring a copy of your presentation to the conference on a CD-ROM or USB media storage device

• Please turn off the sleep-mode and screen saver of your computer prior to your presentation. The computer must be kept powered-on and AC 100V power supplied throughout the session to avoid any trouble

• After checking your data, please bring your Computer to the session room at least 20 minutes before your presentation

• Following the conclusion of your session, a technician will return your computer at the operation desk. Please come to the operation desk promptly to collect it

♦ Poster

*Poster presenters are expected to be ready in front of poster panels and answering questions during the poster discussion

<Poster Discussion>

Friday, April 22, 15:10 - 15:40
Room: Kyoto Hotel Okura, Gyouin(4th Floor)

<Poster mounting and removal>

Mounting: Friday, April 22, 8:00 – 11:00
Removal: Saturday, April 23, 13:30 – 16:00

< Specifications>

• Pushpins should be attached to the poster board for you to use

• After removal time organizers are not responsible for returning posted material to the authors

• Poster board specification is 90cm wide and 160cm high. The secretariat prepares poster board, pins, and poster numbers. Each poster must be labeled at the top with the abstract title, the name of the author and the institution
### Time Table

#### Friday, April 22

<table>
<thead>
<tr>
<th>Time</th>
<th>4F Gyoun</th>
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<tbody>
<tr>
<td>8:00</td>
<td></td>
</tr>
<tr>
<td>9:00</td>
<td>Opening Remarks</td>
</tr>
</tbody>
</table>
| 9:30  | 1. Trials and tribulations  
Key note speaker: Konrad Hille  
Chairs: Konrad Hille, Masahiko Fukuda, Christopher Liu |
| 10:30 | 2. Providing a service  
Key note speaker: Christopher Liu  
Chairs: Yoshiko Takesue, Bernard Duchesne |
| 11:00 | Coffee Break |
| 11:30 | 3. The OOKP I  
Key note speaker: Giovanni Falcinelli  
Chairs: Christopher Liu, Giovanni Falcinelli |
| 12:00 | Lunch Seminar 1  
Organizer: Yoshikazu Shimomura  
Speakers: Masahiko Fukuda, Shigeto Shimmura [Santen Pharmaceutical Co., Ltd.] |
| 13:00 | 4. Special lecture: Ocular Surface Reconstruction by Prof. Shigeru Kinoshita  
Speaker: Shigeru Kinoshita  
Chair: Masahiko Fukuda |
| 14:00 | 5. Ocular surface reconstruction  
Key note speaker: Kohji Nishida  
Chairs: Shigeru Kinoshita, Jun Shimazaki |
| 15:00 | Poster  
Coffee Break |
| 16:00 | 6. The OOKP II  
Key note speaker: Geetha Iyer  
Chairs: Christopher Liu, Giovanni Falcinelli |
| 17:00 | 7. Dealing with complications  
Key note speaker: Maria Fideliz De La Paz  
Chairs: Soledad Cortina, Sayan Basu, Maria Fideliz de la Paz |
| 18:00 | Gala Dinner |

#### PC Preview

<table>
<thead>
<tr>
<th>Time</th>
<th>4F Foyer</th>
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<tbody>
<tr>
<td>8:00</td>
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<td>21:00</td>
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### Saturday, April 23

<table>
<thead>
<tr>
<th>Time</th>
<th>4F Gyoun</th>
<th>4F Foyer</th>
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</thead>
<tbody>
<tr>
<td>7:00</td>
<td>Morning Seminar</td>
<td>Registration</td>
</tr>
<tr>
<td></td>
<td>Chair: Yoshitsugu Inoue</td>
<td>PC Preview</td>
</tr>
<tr>
<td></td>
<td>Speakers: Satoru Yamagami, Noriko Koizumi</td>
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</tr>
<tr>
<td>8:00</td>
<td>Morning Seminar</td>
<td></td>
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<td></td>
<td>8. The Boston devices</td>
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</tr>
<tr>
<td></td>
<td>Key note speaker: James Chodosh</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chairs: James Chodosh, Shiro Amano</td>
<td></td>
</tr>
<tr>
<td>9:00</td>
<td>Coffee Break</td>
<td></td>
</tr>
<tr>
<td>10:00</td>
<td>9. Case presentation and future KPros</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Key note speaker: Geetha lyer</td>
<td></td>
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<tr>
<td></td>
<td>Chairs: Hiroshi Eguchi, Venkata Avadhanam, Geetha lyer</td>
<td></td>
</tr>
<tr>
<td>11:00</td>
<td>Lunch Seminar 2</td>
<td></td>
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<tr>
<td></td>
<td>Organizer: Christopher Liu, Masahiko Fukuda</td>
<td></td>
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<tr>
<td></td>
<td>Speakers: James Chodosh, Tsutomu Inatomi</td>
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<tr>
<td></td>
<td>[Senju Pharmaceutical Co., Ltd.]</td>
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<td></td>
<td>10. Endothelial keratoplasty (DSEAK vs DMEK)</td>
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<tr>
<td></td>
<td>Key note speaker (DSEAK): Akira Kobayashi</td>
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<tr>
<td></td>
<td>Key note speaker (DMEK): Friedrich E Kruse</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chairs: Jun Shimazaki, Satoru Yamagami</td>
<td></td>
</tr>
<tr>
<td>15:00</td>
<td>11. Special DMEK course by Prof. Friedrich Kruse</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Speaker: Friedrich E Kruse</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chair: Christopher Liu</td>
<td></td>
</tr>
<tr>
<td>16:00</td>
<td>Closing Remarks</td>
<td></td>
</tr>
</tbody>
</table>
# Program

## Friday, April 22

<table>
<thead>
<tr>
<th>Time</th>
<th>Nr.</th>
<th>Speaker</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>09:00-09:05</td>
<td></td>
<td>Opening Remarks</td>
<td></td>
</tr>
<tr>
<td>09:05</td>
<td>1-1 Key note</td>
<td>Konrad Hille</td>
<td>Trials and tribulations History of KPros The demise of Cardona, Choyce, Legeais and AlphaCor devices</td>
</tr>
<tr>
<td>09:30</td>
<td>1-2</td>
<td>Hiroshi Eguchi</td>
<td>The History of Research on Artificial Cornea in Japan</td>
</tr>
<tr>
<td>09:42</td>
<td>1-3</td>
<td>Konrad Hille</td>
<td>Medium and longterm results in Keratoprostheses with biological and Dacron? support</td>
</tr>
<tr>
<td>09:55</td>
<td>2-1 Key note</td>
<td>Christopher Liu</td>
<td>Providing a service</td>
</tr>
<tr>
<td>10:20-10:40</td>
<td></td>
<td>Coffee Break</td>
<td></td>
</tr>
<tr>
<td>10:40</td>
<td>3-1 Key note</td>
<td>Giovanni Falcinelli</td>
<td>The OOKP</td>
</tr>
<tr>
<td>11:05</td>
<td>3-2</td>
<td>Masahiko Fukuda</td>
<td>A case of severe facial thermal burn treated with MOOKP</td>
</tr>
<tr>
<td>11:17</td>
<td>3-3</td>
<td>Mohamed Bahgat Goweida</td>
<td>Starting Osteo-odonto-keratoprosthesis in Egypt</td>
</tr>
<tr>
<td>11:29</td>
<td>3-4</td>
<td>Maria Fideliz D. De La Paz</td>
<td>Osteo-odontokeratoprosthesis using living-related donors in cases of edentulua or immature dentition</td>
</tr>
<tr>
<td>11:41</td>
<td>3-5</td>
<td>Bhaskar Srinivasan</td>
<td>Type 2 Kpros in chemical injury</td>
</tr>
<tr>
<td>12:10</td>
<td>LS1</td>
<td>Masahiko Fukuda</td>
<td>Therapeutic Keratoplasty &amp; Histological study of keratomycosis</td>
</tr>
<tr>
<td>12:10</td>
<td>LS1</td>
<td>Shigeto Shimmura</td>
<td>Deep Anterior Lamellar Keratoplasty for challenging Cases</td>
</tr>
<tr>
<td>13:20</td>
<td>4</td>
<td>Shigeru Kinoshita</td>
<td>Translational Research Opens New Horizons for the Devastating Ocular Surface Diseases</td>
</tr>
<tr>
<td>14:00</td>
<td></td>
<td>Ocular surface reconstruction</td>
<td>Chairs: Shigeru Kinoshita, Jun Shimazaki</td>
</tr>
<tr>
<td>14:20</td>
<td>5-1 Key note</td>
<td>Kohji Nishida</td>
<td>Development of stem cell-based therapy for corneal diseases-from tissue stem cell to iPSCell</td>
</tr>
<tr>
<td>14:45</td>
<td>5-2</td>
<td>Chie Sotozono</td>
<td>Strategies for Visual Improvement in chronic SJS/TEN</td>
</tr>
<tr>
<td>14:57</td>
<td>5-3</td>
<td>Sayan Basu</td>
<td>SLET: The new revolution in limbal stem cell therapy</td>
</tr>
<tr>
<td>15:10-15:40</td>
<td>Poster</td>
<td>Coffee Break</td>
<td></td>
</tr>
<tr>
<td>15:40</td>
<td>6-1 Key note</td>
<td>Geetha Iyer</td>
<td>MOOKP – the indian experience over 13 years</td>
</tr>
<tr>
<td>16:05</td>
<td>6-2</td>
<td>Alfonso Vasquez Perez</td>
<td>Surgical management of aqueous leakage due to lamina resorption in OOKP</td>
</tr>
<tr>
<td>16:17</td>
<td>6-3</td>
<td>Venkata Avadhanam</td>
<td>Clinical and radiological assessment of Lamina</td>
</tr>
<tr>
<td>16:29</td>
<td>6-4</td>
<td>Venkata Avadhanam</td>
<td>Clinical dimensions of laminar resorption</td>
</tr>
<tr>
<td>16:41</td>
<td>6-5</td>
<td>Venkata Avadhanam</td>
<td>Results of biological keratoprostheses from the UK</td>
</tr>
<tr>
<td>16:55</td>
<td>7-1 Key note</td>
<td>Maria Fideliz de la Paz</td>
<td>Oculoplastic: Lid malposition and fornix reconstruction, mucous membrane alterations and overgrowth, cosmesis and orbital decompression Retinal detachment, VR surgery, Hypotony</td>
</tr>
</tbody>
</table>
Saturday, April 23

<table>
<thead>
<tr>
<th>Time</th>
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<th>Speaker</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>07:50</td>
<td>MS</td>
<td>Satoru Yamagami</td>
<td>Prevention and treatment of infection after corneal transplantation</td>
</tr>
<tr>
<td>08:55</td>
<td>8-1 Key note</td>
<td>James Chodosh</td>
<td>Boston Keratoprosthesis Type I: The Outer Limits</td>
</tr>
<tr>
<td>09:20</td>
<td>8-2</td>
<td>Carolina Aravena</td>
<td>Long-Term Outcomes of Boston type I Keratoprosthesis as Primary Penetrating Corneal Procedure</td>
</tr>
<tr>
<td>09:32</td>
<td>8-3</td>
<td>Emi Kashizuka</td>
<td>Interface Gap in Infectious Keratitis after Boston Keratoprosthesis Detected by Anterior Segment Optical Coherence Tomography</td>
</tr>
<tr>
<td>09:44</td>
<td>8-4</td>
<td>Arturo E. Grau</td>
<td>“Blind for second time” Psychological and social impact of blindness in patients with Boston Keratoprosthesis</td>
</tr>
<tr>
<td>10:56</td>
<td>8-5</td>
<td>Bhaskar Srinivasan</td>
<td>Type 1 Kpros in chemical injury</td>
</tr>
<tr>
<td>10:08</td>
<td>8-6</td>
<td>Andrea Cruzat</td>
<td>Tissue carriers for the Boston Keratoprosthesis</td>
</tr>
<tr>
<td>10:20</td>
<td>8-7</td>
<td>James Chodosh</td>
<td>Boston Keratoprosthesis Type I in Elderly Patients</td>
</tr>
<tr>
<td>10:50</td>
<td>9-1 Key note</td>
<td>Geetha Iyer</td>
<td>Choosing the right Kpro for patients not patient for Kpro in severe chemical injuries –</td>
</tr>
<tr>
<td>11:15</td>
<td>9-2</td>
<td>Hideaki Yokogawa</td>
<td>Staged procedure using temporary keratoprosthesis to repair severe ocular trauma: case report</td>
</tr>
<tr>
<td>11:27</td>
<td>9-3</td>
<td>Masaki Fukui</td>
<td>Novel Artificial Cornea KeraKlear Keratoprosthesis for 4 Cases with Severe Corneal Disorders</td>
</tr>
<tr>
<td>11:39</td>
<td>9-4</td>
<td>Hoffart Louis</td>
<td>Chondro-keratoprosthesis: an alternative to OOKP ?</td>
</tr>
<tr>
<td>11:51</td>
<td>9-5</td>
<td>Eleftherios I. Paschalgi</td>
<td>Micro pressure sensor integrated into the Boston keratoprosthesis</td>
</tr>
<tr>
<td>12:03</td>
<td>9-6</td>
<td>Venkat Avadhanam</td>
<td>Hydrogel skirt for synthetic OOKP lamina</td>
</tr>
<tr>
<td>12:15</td>
<td>9-7</td>
<td>Geetha Iyer</td>
<td>Trauma following MOOKP</td>
</tr>
<tr>
<td>12:27</td>
<td>9-8</td>
<td>Daishuke Shimizu</td>
<td>Evaluation of effectiveness of real-time PCR for clinical diagnosis of herpes simplex virus keratitis</td>
</tr>
<tr>
<td>12:50</td>
<td>LS2</td>
<td>James Chodosh</td>
<td>Building an Evidence Basis for Management of Ocular Stevens Johnson Syndrome/Toxic Epidermal Necrosis</td>
</tr>
<tr>
<td>12:50</td>
<td>LS2</td>
<td>Tsutomu Inatomi</td>
<td>Leading Advancements in the Clinical Management and Surgical Treatment of Stevens Johnson Syndrome</td>
</tr>
<tr>
<td>14:00</td>
<td>10-1 Key note</td>
<td>Akira Kobayashi</td>
<td>DSAEK</td>
</tr>
<tr>
<td>14:25</td>
<td>10-2 Key note</td>
<td>Friedrich E. Kruse</td>
<td>DMEK - the method of choice for endothelial replacement</td>
</tr>
<tr>
<td>14:50</td>
<td>10-3</td>
<td>Mohamed Bahgat Goweida</td>
<td>Descemet membrane endothelial keratoplasty: challenges in the first 100 cases in Egypt</td>
</tr>
<tr>
<td>15:05</td>
<td>11-1</td>
<td>Friedrich E. Kruse</td>
<td>DMEK - comprehensive course</td>
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<td>Corneal Venting Incisions In DMEK To Assist The Unfolding Of The Donor Graft</td>
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Trials and tribulations
Chairs: Konrad Hille, Masahiko Fukuda, Christopher Liu

1-1 Keynote

Title: Trials and tribulations
History of KPros
The demise of Cardona, Choyce, Legeais and AlphaCor devices

Author: Konrad Hille

Affiliation: Ortenauklinikum Offenburg, Germany

The first suggestion to replace an opaque cornea by alloplastic material was done by Pellier de Quengsy in 1789. Since then there had been many efforts searching for a permanent fixation of such an artificial cornea or Keratoprosthesis (KPro). Different designs of KPro were developed with an intra-stromal, trans-corneal (nut and bold) or epi-stromal fixation and in the last decade a lamellar approach. Many different materials had been used for the optic and the support. Out of the huge number of devices the focus will be on those more widely used and with a higher impact in particular the device of Cardona, Choyce, Pintucci, Legeais and AlphaCor.

In these devices the majority of reasons of failure is melting of corneal stroma in front of the prostheses (Cardona, Choyce, AlphaCor) and lack of "bio integration" (PMMA) or disintegration by change of a bio integrable surface (Legeais, Pintucci) followed by epithelial ingrowth and leakage of aqueous humor. Nevertheless the knowledge about success and pitfalls of those pioneers in KPro is important understanding the matter and developing better ideas for an artificial KPro.

Study supported by: None

Conflict of interest: None
Title: The History of Research on Artificial Cornea in Japan

Authors: Hiroshi Eguchi¹; Hiroshi Shiota²; Masahiko Fukuda³; Yoshikazu Shimomura³

Affiliations: ¹Department of Ophthalmology, Sakai Hospital, Kindai University, Japan; ²Department of Ophthalmology, Kaisei Hospital, Japan; ³Department of Ophthalmology; Kindai University, Japan

Objective: Little is known about the former history of artificial cornea in Japan. Since 2003, after OOKP, AlphCor, and Boston KPro were clinically introduced, several articles have been published.

Methods: We traced the history of research on artificial cornea in Japan from its origin with referring both the article reviewed by Dr. Chirila in Japanese Journal of Ophthalmology and articles published by Japanese researchers in Heisei era.

Results: Dr. Koshun Takahashi has been reported as the Japanese ophthalmologist who implanted artificial cornea into human eye at the first time in the Meiji era. Although various shapes of artificial cornea using several materials were developed in the 1980s, the research on artificial cornea in Japan became subsided because penetrating keratoplasty using human eye has spread. Since 2003, the research came to attract attention again after OOKP, AlphCor, and Boston KPro were clinically introduced. However, it looks remaining static in recent years.

Conclusions: The research on artificial cornea in Japan has accomplished certain results in the Heisei era by clinical introduction of three KPros. For its further development, problems that must overcome are existed.

Study supported by: None

Conflict of interest: None
Title: Medium and longterm results in Keratoprosthesis with biological and Dacron? support

Author: Konrad Hille

Affiliation: Ortenauklinikum Offenburg, Germany

Objective: To demonstrate the medium to longterm outcome of Keratoprotheses with biological and biocompatible support.

Methods: In the last 21 years we implanted 93 KPro, in 56 patients we prepared an Osteo-odonto-Keratoprosthesis (OOKP) supported by the own tooth and surrounding maxillar bone, in 30 a Tibia-Keratoprosthesis (TKPro) supported by a lamina of tibia corticalis and in 7 a Pintucci-KPro (PKPro) supported by a Dacron-shirt.

Results: The medium follow up was 7/6 years/months (max. 20/0, min 0/1) in OOKP, 4/11 (max. 12/10, min 0/7) in TKPro and 4/3 (max. 13/9, min 0/5) in PKPro respectively. OOKP-patients gained a visual acuity of ≥ 0,8 in 32%, ≥ 0,5 in 52%, ≥ 0,2 in 72% and significant improvement in 87%, in TKPro 6,9%, 28%, 70% and 76% and in PKPro 14%, 42%, 71% and 86% respectively. We found a significant deterioration of visual acuity more than 2 lines in OOKP in 24%, TKPro 23% and PKPro 85%. There was an anatomic loss in 4 OOKP (7%), 4 TKPro (13%) and 5 PKPro (71%). The Kaplan-Meier analysis shows an anatomical survival of 92% in OOKP up to 20 years, 83% in TKPro up to 12/10 (y/m) and 21% in PKPro up to 13/9 (y/m).

Conclusions: In KPro with biological support we can expect a satisfying medium and long term rehabilitation of vision much longer than in other KPros. Complications can be managed in most cases, only in a few they may lead to a loss of the prosthesis.

Study supported by: None

Conflict of interest: None
Providing a service
Chairs: Yoshiko Takesue, Bernard Duchesne

2-1 Keynote

Title: Providing a Service
Author: Christopher Liu
Affiliation: Sussex Eye Hospital, U.K.

The setting up of an artificial corneal service starts with learning how to perform the surgery, along with patient selection, and recognition and management of complications from the published literature and competent practise teachers who can remain mentors. A system of learning could be visiting at least one teaching centre, reviewing their patients and records, and commencing the service at hand with the support of the mentor. The novice should start with routine cases and not on patients with relative contraindications.

A multidisciplinary team needs to be assembled to include the lead surgeon, an assistant surgeon, oculoplastic, glaucoma and vitreoretinal surgeons, along with anaesthetists and radiologists. Theatre, ward, and outpatients should also have named trained nurses. A coordinator for the service is essential together with a clinical psychologist to help assess and support patients going through surgery or facing complications and threatened or actual repeat sight loss.

The institution should have a bed base, and ITU, GA facilities and physician colleagues who can help with complex health problems often associated with patients requiring an OOKP. Finances should be sorted out prior to rolling out of the service. Ideally, the service should be centrally funded as the majority of blind patients cannot afford to pay for complex life-long treatment.

The referral centre should also have the support of colleagues in the region or even nationwide depending on the size of the country.

The Sussex Eye Hospital in Brighton, England will be used as an example.
The OOKP

Chairs: Christopher Liu, Giovanni Falcinelli

3-1 Keynote

Title: The OOKP
Author: Giovanni Falcinelli
Affiliation: OPHTHALMOLOGIST, O.O.K.P. FOUNDATION, ROME, ITALY

MOOKP (MODIFIED OSTEO ODONTO KERATOPROSTHESIS) is the only Kpro which uses a biological haptic (an osteo dental lamina), taken from the patient with corneal blindness. In some cases (toothless patients or with very damaged teeth) it is not possible to obtain an osteo dental lamina suitable for MOOKP. In these rare cases we used an osteo dental lamina taken from an histocompatible blood relation, with good anatomical and functional results. As an alternative the lamina was made out from 2 joined teeth (incisors and/or molars). In a very exceptional case an impacted tooth was used. When none of these is possible, we prefer to perform a Boston Kpro.
Title: A case of severe facial thermal burn treated with MOOKP

Authors: Masahiko Fukuda; Keizo Watanabe; Koji Sugioka; Yoshikazu Shimomura; Suguru Hamada; Christopher Liu

Affiliations: 1Department of Ophthalmology, Kindai University Faculty of Medicine; 2Department of Oral Surgery, Kindai University Faculty of Medicine; 3Sussex Eye Hospital

Objective: We report a case of severe facial thermal burn treated with MOOKP.

Methods: The patient was 32-year-old male who suffered from severe facial and upper body thermal burn of grade 3 by a traffic accident in 2004 at age 23. He was treated extensively by skin grafting including the facial part. His right eye was totally covered by skin graft and left eye was confirmed under thick mucous tissues without any palpebral tissues. The corrected visual acuity was LP (OD) and HM (OS). We confirmed normal eye ball shape by ultrasound and good ERG and VEP response (OS). So, we performed MOOKP Stage 1 to his left eye on 12/8/2014 without any complications. On 3/9/2015, we performed MOOKP Stage 2. However, during the surgery, we found detachment of the optical cylinder and osteo-odonto lamina due to melting of the dentine tissue. We were able to manage this problem by debridement of the tissue around the optical cylinder and lamina hole followed by fixation by dental cement. We put the MOOKP lamina back to muscle tissues and planned the third surgery in two weeks. On 3/23/2015, we performed successfully MOOKP Stage 2 again. We found iris adhesion under the cornea and a few white mass particles were extracted. We then cut the proliferative membrane and also performed vitrectomy. The suturing of the MOOKP lamina to the cornea and sclera was done smoothly. However, the visual acuity did not recover from HM, because of optic nerve atrophy and retinal degeneration.

Conclusions: The ERG and VEP testing before surgery did not reflect well the visual prognosis of this case.
Title: Starting Osteo-odonto-keratoprosthesis in Egypt

Authors: Mohamed Bahgat Goweida; Islam Kassem

Affiliation: Faculty of Medicine, Alexandria University, Egypt

Objective: to assess the results of the first 3 cases of OOKP done in Egypt.

Methods: modified OOKP was done in 3 cases, assessment of visual and anatomical success was done 3 months after stage 2.

Results: Retention of the device in all cases after 3 months. Bone exposure in one case required reintervention, buccal mucous membrane necrosis after stage 1 in one cases requiring replacement. Improvement of vision in 2 cases reaching 0.2 and 0.3 after 3 months. one case did not show any improvement after surgery and lost the light perception after 3 months of surgery.

Conclusions: preliminary results showed that OOKP is valuable in restoring vision in patients with endstage corneal blindness

Conflict of interest: no financial interest
Title: **Osteo-odontokeratoprosthesis using living-related donors in cases of edentulia or immature dentition.**

Author: Maria Fideliz D. De La Paz

Affiliation: Centro de Oftalmología Barraquer and Institut Universitari Barraquer, Spain

Purpose: to report 3 cases of osteo-odontokeratoprosthesis using living-related donors in cases of compromised dental conditions.

Setting: Centro de Oftalmología Barraquer, Barcelona Spain

Methods: three cases are reported with a mean follow up time of 22 years (range: 10-29 years).

Results: three cases of severe alkali burns with extensive symblepharon and corneal neovascularization required OOKP. Ages were 41, 8 and 4.5 years old.

- The first case is an edentulous 41 year-old female with BCVA of 0.002 in her only eye. OOKP was performed using her twin sister’s canine. The implant remained in excellent conditions during 26 years, reaching BCVA of 0.9. Finally, late-onset glaucoma compromised her visual field.
- The second and third cases had immature dentition, and received an OOKP using their biological father’s canine teeth.
  - The 8 year-old boy reached BCVA of 0.7 and 0.85 in OD and OS, respectively, but both homografts were expelled after two years. Later, the patient’s own canine teeth were implanted in another OOKP in OU but had poor visual improvement. A total retinal detachment occurred in both eyes after 6 years.
  - The 4.5 year-old boy received an OOKP in OD twice, both were expelled in less than 2 years. Subsequent keratoprostheses using tibial bone in OD was performed but ended up in phthisis bulbi. In OS, the OOKP using tibia was expelled after 8 years, before developing glaucoma. BCVA was 0.45 and 0.2 in OD and OS, respectively, probably helping avoid profound amblyopia.

Conclusions: OOKP using living-related donors may be an alternative in edentulous cases or those with immature dentition. HLA-matched donors fare better than those that are not matched probably due to high immunological compatibility and low/absent immune rejection.

Study supported by: None

Conflict of interest: None
Title: TYPE 2 KPROS IN CHEMICAL INJURY

Author: Bhaskar Srinivasan

Affiliation: CMER-Dennis lam eye hospital china, China

AIM: To report the outcomes, anatomical and functional, of different types of type 2 Kpros for severe ocular chemical injuries.

Methods: Retrospective Chart Review of patients with ocular chemical injuries who underwent the MOOKP (36 eyes), Lucia Type 2 (12 eyes), Osteo Kpro (3 eyes) and the Boston Type 2 Kpro (1 eye) between April 2005 and December 2015 was done.

Results: BCVA > 6/60 was achieved in 30 (83.34%) and maintained in 26 (72.23%) eyes of the MOOKP over a mean follow up period of 57.63 months, in 7 (58.3%), 3 and 1 eyes following the other Kpros over a mean follow up of 23.4, 6 and 36 months respectively. Preexisting glaucoma was noted to be the most common co-morbidity in 14 (38.9%) eyes and 4 (33.3%) eyes; retroprosthetic membrane occurred in 1 eye (2.7%) and 8 (66.67%) eyes; endophthalmitis in 4 (11.11%) eyes and 1 (8.33%) eye; retinal detachment in 1 eye each; following the MOOKP and Lucia Type 2 Kpros respectively. Mucosal revisions were required in 8 (22.2%) and 6 (50%) eyes; and resorption of the lamina requiring replacement or removal was required in 5 (13.8%) eyes following MOOKP and periopic melt necessitating Kpro replacement was noted in 1 eye (8.3%) following the Lucia Type 2 Kpro. Repeated skin overgrowth requiring excision was noted in the Boston Type 2 Kpro. Sterile Vitritis occurred in 1 eye and RPM in 1 eye after the osteo kpro.

Conclusion: Eyes wherein the MOOKP was not implantable due to various reasons, the other type 2 Kpros were chosen based on the adnexal and other eligibility criteria. Longer term outcomes are required for the Kpros other than the MOOKP, though the ocular complications, in particular RPM, were noted to be high among eyes with the Lucia Type 2 Kpro.
Special Lecture: Ocular Surface Reconstruction
by Prof. Shigeru Kinoshita
Chair: Masahiko Fukuda

SHIGERU KINOSHITA MD, PhD
Professor and Chair
Department of Frontier Medical Science and Technology for Ophthalmology
Kyoto Prefectural University of Medicine,

1974 MD, Osaka University Medical School
1979 Research Fellow, Harvard Medical School and
Massachusetts Eye and Ear Infirmary.
1983 PhD, Osaka University (Thesis: Limbal epithelium in ocular surface wound healing)
1988 Associate Professor of Ophthalmology, Osaka University Medical School
1992 Professor and Chair of Ophthalmology, Kyoto Prefectural University of Medicine
2003 Adjunct Clinical Senior Scientist, The Schepens Eye Research Institute, Boston, USA
2008 Honorary Distinguished Professor, Cardiff University, Cardiff, United Kingdom
2011 Vice President, Kyoto Prefectural University of Medicine
2015 Professor and Chair of Frontier Medical Science and Technology for Ophthalmology,
Kyoto Prefectural University of Medicine

HONORS AND AWARDS
International
The Dohlman Lecture, 20th Boston Cornea Research, USA, 1997
Alcon Research Institute Award, USA, 1999
Achievement Award, American Academy of Ophthalmology, 2000
Daiwa-Edrian Prize, UK, 2004
David Easty Lecturer, UK, 2007
The Castroviejo Medal Lecturer, USA, 2008
ARVO Gold Fellow, USA, 2009
Claes H. Dohlman Conference Address, TFOS, Florence, 2010
Meibom Lecturer, Germany, 2010
The Doyne Memorial Lecturer, Oxford Ophthalmological Congress, UK, 2011
Elsemay Bjorn Lecture, Finland, 2011
Schepens Eye Research Institute Alumnus Awardee 2011, USA, 2011
Peter Herberg Lecture, IMCLC, WOC2012, Abu Dhabi, 2012
Richard Lindstrom Lecture, CLAO, ASCRS 2014
Charles D. Kelman Innovator Award, ASCRS 2015
Friedenwald Lecture, ARVO 2016 (to be scheduled)
Title: Translational Research Opens New Horizons for the Devastating Ocular Surface Diseases

Author: Shigeru Kinoshita

Affiliation: Department of Frontier Medical Science and Technology for Ophthalmology, Kyoto Prefectural University of Medicine, Kyoto, Japan

Abstract: There are several devastating ocular-surface-related disorders, such as Stevens-Johnson syndrome, chemical injury, and Fuchs endothelial corneal dystrophy, a severe corneal endothelial dysfunction, that are difficult to treat properly. Today, thanks to state-of-the-art regenerative medicine and the latest advancements in ocular surface biology, several types of transplantable cultivated mucosal epithelial sheets are now available for the reconstruction of a devastated ocular surface. One is the allogeneic/autologous corneal epithelial stem-cell sheet, and the other is the autologous oral mucosal epithelial sheet. Although ocular surface reconstruction using these sheets is sometimes accompanied by varying degrees of biological and/or immunological postoperative complications, studies have shown that in general, the ocular surface can be well restored.

A similar type of regenerative medicine can be applied for the treatment of corneal endothelial dysfunction. For example, a surgical modality similar to that of the Descemet’s Membrane Endothelial Keratoplasty procedure using a novel ‘cell-injection therapy’, involves the injection of cultured human corneal endothelial cells into the anterior chamber, has now shown promise in our clinical research. Another aspect of our cutting-edge translational research is focused on developing a novel medical treatment for early-phase corneal endothelial disease. To that end, the use of Rho-associated protein kinase (ROCK)-inhibitor eye drops has proved to be effective for treating partial endothelial dysfunction.

It is our great hope that ophthalmology-related translational research, such as that described above, will receive official governmental approval based on the accumulated data of the safety and efficacy aspects of the procedures, thus ultimately resulting in the worldwide prevention of blindness.
# Ocular surface reconstruction

Chairs: Shigeru Kinoshita, Jun Shimazaki

## 5-1 Keynote

<table>
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<th>Title:</th>
<th>Development of stem cell-based therapy for corneal diseases-from tissue stem cell to iPS cell</th>
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<tr>
<td>Author:</td>
<td>Kohji Nishida</td>
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<tr>
<td>Affiliation:</td>
<td>Department of Ophthalmology, Osaka University Medical School, Japan</td>
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Corneal epithelial stem cells are known to be localized to the basal layer of the limbal epithelium. This corneal stem cell concept has been first reported in 1980s, based on the findings that label-retaining cells are located in the limbal basal epithelium. Since then, several investigators reported the specific characteristics for corneal epithelial stem/progenitor cells, including high colony-forming potential, p63 positive and so on. We have recently demonstrated that corneal epithelial stem/progenitor cells can be enriched in integrin α6β1/CD71<sup>dim</sup> fraction by FACS.

Complete loss of corneal epithelial stem cells because of severe trauma eye disease leads to corneal vascularization and opacification with severe visual loss. For corneal reconstruction in patients with such limbal stem cell deficiencies, we previously developed a unique method using tissue-engineered epithelial cell sheets comprising only the patient's autologous oral mucosal epithelium. We are currently studying the potential of pluripotent stem cells for the treatment of corneal diseases. In this presentation, I will talk about the recent progress of stem cell therapy for corneal diseases.

Study supported by: None

Conflict of interest: None
Title: Strategies for Visual Improvement in chronic SJS/TEN

Authors: Chie Sotozono¹; Tsutomu Inatomi¹; Mayumi Ueta¹²; Takahiro Nakamura¹²; Shigeru Kinoshita¹²

Affiliations: ¹Department of Ophthalmology, Kyoto Prefectural University of Medicine, Kyoto, Japan; ²Department of Frontier Medical Science and Technology for Ophthalmology, Kyoto Prefectural University of Medicine, Kyoto, Japan

Objective: Vision loss resulting from Stevens-Johnson syndrome/Toxic Epidermal Necrolysis (SJS/TEN) is often extremely serious and last lifelong. The outcome of conventional corneal transplantation for SJS/TEN is poor. We reported the efficacy of Cultivated Oral Mucosal Epithelial Transplantation (COMET) for severe ocular surface diseases. As another treatment method, we developed a new type of rigid contact lens (CL) with a 13.0- or 14.0-mm diameter size, named “Limbal Rigid Contact Lens (Limbal CL)” We compared both treatment methods.

Methods: All 21 COMET operations for SJS/TEN performed between June 2002 and December 2008, and 53 eyes of 42 SJS/TEN cases enrolled clinical research for limbal CL were compared the efficacy for visual improvement.

Results: COMET significantly improved best collected visual acuity (BCVA) in patients with end-stage SJS/TEN. In more than 50% of the eyes, preoperative BCVA was under 20/2000, limited to counting fingers or hand motion. LogMAR improved from 2.35 to 1.93 at 24-weeks postoperative. In clinical research for limbal CL, BCVA was under 20/2000 in 11 eyes (21%) out of 53 eyes. LogMAR improved from 1.61 to 0.86 at 3-months post-fitting CL use. Nine cases used limbal CL after COMET, and obtained visual improvement.

Conclusions: SJS/TEN patients with ocular sequelae can obtain visual improvement by use of the Limbal CL alone, COMET alone, or the combination of both.

Study supported by: a Grant-in-Aid for Scientific Research from the Japanese Ministry of Health, Labor and Welfare, and Japan Agency for Medical Research and Development

Conflict of interest: None
Title: SLET: The new revolution in limbal stem cell therapy

Author: Sayan Basu

Affiliation: L V Prasad Eye Institute, India

Abstract: SLET or simple limbal epithelial transplantation is an effective, reliable and replicable technique for long-lasting corneal regeneration and vision restoration in eyes with limbal stem cell deficiency. This talk will briefly review the surgical technique, typical post-operative outcomes and success rates of SLET in different indications. The mechanism of corneal wound healing and stem cell restoration following SLET will also be described using ultra-high resolution optical coherence tomography imaging. Finally the reasons why SLET could be preferable to other techniques of limbal stem cell transplantation will be discussed.
Title: Clinical backgrounds of postoperative keratoplasty patients with spontaneous wound dehiscence of gaps after suture removal

Authors: Shota Fujii; Yoshiyuki Ichihashi; Tetsuya Kawakita; Shigeto Shimmura; Kazuo Tsubota

Affiliation: Department of Ophthalmology, Keio University School of Medicine, Japan

Objective: To report that spontaneous postkeratoplasty wound dehiscence or gaps caused by suture removal may occur years after penetrating and deep lamellar keratoplasty.

Methods: We retrospectively reviewed the medical records of 667 keratoplasty patients (890 eyes). This study included 8 eyes of 8 patients (3 men and 5 women) aged 64 to 86 years who suffered from spontaneous wound dehiscence or gaps caused by suture removal. We examined their clinical backgrounds such as surgical procedure, reason for suture removal, and time interval between keratoplasty and suture removal.

Results: The surgical procedures included 6 penetrating keratoplasties and 2 deep anterior lamellar keratoplasties. The most common reason for suture removal was high corneal astigmatism. Time interval between keratoplasty and suture removal was 15.9 ± 7.7 months (7-26 months). Three patients underwent suture removal from 6 months to 1 year after keratoplasty, 3 patients from 1 to 2 years, and 2 patients after more than 2 years.

Conclusions: Whenever postoperative keratoplasty suture is removed, it is important to consider that wound dehiscence or gaps may occur without incidence of trauma.

Study supported by: None

Conflict of interest: None
Title: Outcome of Keratoplasty at Ehime University

Authors: Atsushi Shiraishi¹; Yuri Sakane¹; Yuko Hara¹; Takashi Suzuki¹; Xiaodong Zheng¹; Yasuhito Hayashi¹; Toshihiko Uno²; Masahiko Yamaguchi³; Yuichi Ohashi¹

Affiliations: ¹Ehime University School of Medicine, Japan; ²Shirai Hospital, Japan; ³Ehime Prefectural Central Hospital, Japan

Objective: To review 11-year trends and outcomes of corneal transplantation at Ehime University Hospital.

Methods: Three hundred and thirty one eyes of 302 cases (129 men and 202 women aged 8 to 95 years, mean age: 69.1 ± 14.4 years) who underwent corneal transplantation in Ehime University Hospital from July 2003 to December 2014 were included in this study. Causative diseases, surgical procedures and complications were reviewed retrospectively.

Results: The causative diseases were bullous keratopathy (BK; 188 eyes 56.8%), corneal opacity (CO; 67 eyes 20.2%), keratoconus (KC; 20 eyes 6.0%), corneal dystrophy (CD; 19 eyes 5.7%), marginal ulcer (MU; 16 eyes 4.8%), corneal infection (CI; 11 eyes 3.3%), dermoid (DE; 5 eyes 1.5%), and limbal deficiency (LD; 5 eyes 1.5%). The surgical procedure performed were propenetrating keratoplasty (PKP) on 199 eyes (60.1%) for BK (120 eyes), CO (52 eyes), KC (14 eye), etc, endothelial transplantation (EK) on 68 eyes (20.6%) for BK, lamellar keratoplasty (LKP) on 58 eyes (17.5%) for CO (15 eyes), CD (14 eyes),MU (17 eye), KC (6 eye), etc, and limbal transplantation (LT) on 6 eyes (1.8%). Postoperative complications were detected in 98 cases (29.6%), including rejection (33 eyes), secondary glaucoma (17 eyes), corneal infection (16 eyes). The incidence of rejection and secondary glaucoma was detected most frequently in PKP group.

Conclusions: BK was the reading causative diseases requiring corneal transplantation. The trend of surgical procedure for BK has been changing from PKP to DSAEK. Further investigation will be necessary for the outcomes of surgical procedure for BK.
Title: Pseudoexfoliation Syndrome Endotheliopathy and its Prevalence in Bullous Keratopathy

Authors: Xiaodong Zheng; Atsushi Shiraishi; Yuichi Ohashi

Affiliation: Ehime University School of Medicine, Japan

Objective: To study the morphological changes of the cornea in pseudoexfoliation syndrome (PEX) and to report a national survey on its prevalence in bullous keratopathy that necessitate keratoplasty.

Methods: The first part of this study was a clinical setting to investigate the morphological changes of corneal cells and nerves in 20 patients (78.3 ± 8.5 yrs.) diagnosed with unilateral PEX. Gender and age-matched 20 normal subjects were also included as controls. In vivo confocal microscopy (IVCM) was used to examine the cell density and the density and tortuosity of the subbasal cell nerve plexus. The sensation of the cornea was measured using Cochet-Bonnet nylon thread esthesiometer. Findings were compared between the PEX eyes, their contralateral eyes and normal controls. The second part of this study was to convey a Japanese national survey on the etiology of bullous keratopathy (BK) that required keratoplasty from the year 2008 to 2011. Seven facilities of the Ministry of Health Study Group for Intractable Disease were included. The etiology of BK were retrospectively investigated and the trend was analyzed using Cochran-Armitage analysis.

Results: PEX eyes had significantly lower cell densities in the basal epithelium (P = 0.003), stroma (P = 0.007) and endothelium (P < 0.0001) than in the corresponding layers of normal eyes. PEX eyes also had lower subbasal nerve densities and greater tortuosity of the nerves. Corneal sensitivity was significantly decreased in PEX eyes, and this was significantly correlated with the decrease of basal epithelial cell and subbasal nerve (both P < 0.0001). PEX Fellow eyes had similar findings as PEX eyes. Intraocular surgery ranked first for the cause of BK, it followed by laser iridectomy. BK of unknown origin significantly increased from 8.8% to 14.4% (P = 0.036, Cochran-Armitage) during the three year investigated. PEX endotheliopathy accounted for 36.4% cases in 2008 and this number significantly increased to 58.8% in 2010 (P = 0.027).

Conclusions: PEX causes morphological changes in all corneal layers. PEX endotheliopathy is becoming an increasingly important etiology for BK of “unknown origin”

Conflict of interest: None
Title: Multilayered compressed collagen scaffolds as a novel carrier for the Boston KPro

Authors: M Gonzalez-Andrades\textsuperscript{1,2}; R Weerasena\textsuperscript{3}; NS Tan\textsuperscript{2}; CH Dohlman\textsuperscript{1}; RA Brown\textsuperscript{2}

Affiliations: \textsuperscript{1}Schepens Eye Research Institute and Massachusetts Eye and Ear, Department of Ophthalmology, Harvard Medical School, Boston, Massachusetts, USA; \textsuperscript{2}University College London, UCL Tissue Repair \& Engineering Centre, Stanmore Campus, London, UK

Objective: To generate a new Boston KPro carrier based on multilayered plastic compressed collagen scaffolds (MPCCS) with the purpose of substituting the human donor cornea as the actual carrier.

Methods: MPCCS composed of different number of layers of collagen (1 to 12 layers) were generated following the method previously described by Hadjipanayi et al., 2011. Briefly, collagen gels were prepared by sodium hydroxide neutralization of sterile Nutragen\textsuperscript{®} collagen solution mixed with culture medium. Gels were cast in 22 mm diameter circular molds of 380 mm\textsuperscript{2}. Different collagen solution volumes were added per mold: 1ml, 2ml or 3ml. Afterwards, the mixture was placed at 37\textdegree C in a temperature incubator for 25 min to promote fibrillogenesis. Then, the plastic compression was performed placing two discs of filter paper over the collagen gel, and over these discs, a tight roll of chromatography paper was placed on top to absorb fluid from the gel by an unconfined compression. Those collagen scaffolds composed by only one layer, were analyzed after that time. The multilayering collagen scaffolds composed by several collagen layers were composed adding new collagen solution to the scaffold obtained applying the same process described above, always using the same volume of collagen used in the first collagen layer obtained. MPCCS were histologically evaluated with Picro-Sirious red stain. The transparency and the blurriness of the MPCCS were measured analyzing photographic images of a standardized band pattern taken through the different samples, applying our previously described method (Gonzalez-Andrades et al., 2015). Afterwards, we evaluated the effect of compression and relaxation of the MPCCS using surface interface refractive positioning.

Results: Analysis of transmission and blurring coefficient clearly demonstrated that for the same total collagen content, a larger number of thinner layers significantly improved optical performance. Histology sections showed a well-developed lamella collagen structure where collagen layers were well integrated, one above the other. Compression and relaxation evaluation identified a degree of re-swelling following compression, which was greatest in thicker layers. Furthermore, where compression was repeated, the thin layers stopped re-swelling, suggesting that collagen fibril bonding had occurred to stabilize the packed density.

Conclusions: Compressed collagen multilayers not only produced structurally promising corneal constructs but, critically also showed that increasing numbers of thinner collagen layers improves optical performance. Thus, MPCCS could emerge as a promising Boston KPro carrier that addresses the need of human donor corneas.
Title: Keratitis in Boston keratoprosthesis grafts that were suspected of fungal infection

Authors: Yosai Mori; Takashi Ono; Ryohei Nejima; Keiichiro Minami; Kazunori Miyata

Affiliation: Miyata Eye Hospital, Japan

Objective: After 10 implantations of Boston keratoprosthesis (KPro), we observed 3 eyes with infectious keratitis for which anti-fungal regimens were effective.

Methods: Case 1: The right eye of a 57-year-old man under continuous administration of topical antibiotics and corticosteroids after KPro implantation. Slit-lamp examination 6 months postoperatively revealed thicker infiltration with fuzzy margins at the junction of KPro and donor graft. Scraping cytology of corneal lesion revealed Gram-positive cocci. Although treatment with topical and oral antibiotics was provided, therapeutic keratoplasty was performed due to rapid corneal liquefaction and endophthalmitis. Microscopic analysis of the excised graft demonstrated the presence of molds (filamentous fungi). Endophthalmitis was improved by treatment with topical and oral voriconazole (VRCZ). PCR analysis of the graft revealed the sequence of Aspergillus.

Cases 2 and 3: The right eye of an 85-year-old woman (Case 2) and the left eye of a 35-year-old man (Case 3) suffered from infectious keratitis at 24 months and 13 months postoperatively, respectively. Both cases also exhibited infiltrations at the same portions as Case 1. Microbiological study disclosed Propionibacterium acnes in Case 2 and Staphylococcus aureus in Case 3. Topical and oral VRCZ were administered together with topical moxifloxacin and vancomycin. Intrastromal injection of VRCZ was conducted in Case 3 after PCR was used to detect fungal 28s rDNA sequence in the tears of Case 3. The infectious keratitis of both cases were resolved without liquefactions.

Conclusions: Infectious keratitis in three eyes with KPro were attributed to fungal infection. The risk of fungal infection of the graft might be increased by continuous corticosteroid eye drops and contact lens wearing in the recipients after KPro. Fungal infection must be suspected when infiltration was observed around the junction of artificial cornea and donor graft.

Study supported by: None

Conflict of interest: None
Title: LONG TERM OCULAR COLONIZATION OF METHICILLIN RESISTENT STAPHYLOCOCCUS AUREUS IN PATIENTS WITH OCULAR SURFACE DISORDERS.

Authors: Hiroshi Tanaka; Mayumi Ueta; Tsutomu Inatomi; Shigeru Kinoshita; Chie Sotozono

Affiliation: Kyoto Prefectural University of Medicine, Japan

Objective: Methicillin-resistant Staphylococcus aureus (MRSA) is one of the typical resistant bacteria and occurs intractable ocular infections. Especially in ocular surface disorder (OSDs), we should know whether patients have MRSA colonization or not because MRSA colonization may lead inflammation and infection during the reconstructive surgery. The purpose is to investigate what kind of disorders has long term colonization of MRSA.

Methods: A database of the bacterial culture was retrospectively reviewed over 10 years between January 2000 and December 2009, we identified MRSA positive among consecutive 9845 culture specimens from inpatient and outpatient clinics of the department of ophthalmology, Kyoto Prefecture University of Medicine, in Japan. We investigated the profile of the diagnosis and the duration of MRSA detection.

Results: MRSA was detected from 208 eyes at least once and from 54 eyes for the long term, more than 6 months. Among 54 eyes with long-term detection of MRSA, 46 eyes were diagnosed as OSDs. In OSDs, 28 eyes (60.9%) were Stevens-Johnson syndrome, 13 eyes (28.3%) were ocular cicatricial pemphigoid, 4 eyes (8.7%) were graft versus host disease, 1 eye was related to atopic dermatitis. No MRSA was detected from patients with thermal and chemical burn.

Conclusions: Patients with severe OSDs, especially SJS, can be long-term carrier of MRSA. We should take care to prevent infection after corneal reconstructive surgery or keratoprosthesis for patients with these disorders.

Study supported by: None

Conflict of interest: None
Title: Attempt for better OOKP lamina preparation and novel wound management

Authors: Suguru Hamada¹; Masahiko Fukuda²; Akifumi Enomoto¹; Kazuhide Matsunaga¹; Takao Mukai¹; Takayuki Uchihashi¹; Hajime Tamitsu¹; Christopher Liu³; Jim Herold³; Yoshikazu Shimomura²

Affiliations: ¹Department of Oral and Maxillofacial Surgery, Kindai University Faculty of Medicine, Osaka, Japan; ²Department of Ophthalmology, Kindai University Faculty of Medicine, Osaka, Japan; ³Sussex Eye Hospital, Brighton, UK

Objective: To develop new devise for better OOKP lamina preparation and new manipulation methods for better wound healing.

Methods: We carried out 8 cases of OOKP stage 1 surgery and applied our improved method to later 6 cases. Our modifications are follows.

1. We used resin stick during processing canine tooth root by fixing the crown by cement to help better handling the OOKP lamina.
2. The cleft after removing canine tooth and alveolus was buried by Teruplug® (collagen-based material for extraction sockets) to help wound healing.
3. Prevention of trismus by the scar formation after taking buccal mucosa using Terudermis® (collagen-based artificial dermis) fixed by silicon stent.

Results: Resin stick fixation with canine crown worked more efficiently than forceps grasping during processing the tooth root. Teruplug provided good healing of alveolus and slight regeneration of alveolus. Terudermis also provided good healing of buccal mucosa and no disturbance of mouth opening.

Conclusions: Our attempts for lamina preparation and wound management at OOKP stage 1 surgery contributed the safety and stable results.

Conflict of interest: No potential COI to disclose.
The OOKP II
Chairs: Christopher Liu, Giovanni Falcinelli

6-1 Keynote

Title: MOOKP – THE INDIAN EXPERIENCE OVER 13 YEARS

Author: Geetha Iyer

Affiliation: Cornea services, Sankara Nethralaya, India

AIM: To report the outcomes, anatomical and functional, of the MOOKP, over a 13 year period in the two primary groups- namely SJS and chemical injuries.

Methods: Retrospective Chart Review of patients who underwent the MOOKP between March 2003 and December 2015 was done.

Results: MOOKP was performed in 94 eyes of 91 patients, of which 36 eyes belonged to the chemical injury group and 56 eyes to the SJS group. BCVA > 6/60 was achieved and maintained in 30(83.3%)and 26 (72.2%) eyes respectively in the chemical injury group; and in 54 (96.4%)and 36 (64.3%) eyes respectively in the SJS group. Anatomical success defined as retention of the lamina was noted in 26 (72.2%) and 33 (58.9%) eyes respectively in the chemical injury and SJS groups. Ocular complications including endophthalmitis in 4 (11.1%) and 6 (10.7%) eyes; RD in 1 (2.7%) and 2 (3.6%) eyes, preexisting glaucoma in 14 (38.8%) and 5 (8.9%) eyes and sterile Vitritis in 3 (8.33%) and 19 (33.9%) eyes, were noted in the chemical injury and SJS groups respectively. Kpro related complications including MMG revisions for lamina exposure in 9 (25%) and 17 (30.3%) eyes; and laminar resorption in 6 (16.6%) and 17 (30.35%) eyes were noted in the 2 groups respectively. The mean duration of follow-up was 60.45 months.

Conclusion: Functional visual success (>6/60) in 58.5% eyes and an anatomical success of 64.1% was noted in our series. Between the two groups, the incidence of laminar resorption was noted to be high among the SJS group and preexisting glaucoma was high among the chemical injury group. MOOKP is a viable option with good long term results for severe ocular surface disorders.
Title: Surgical management of aqueous leakage due to lamina resorption in OOKP.

Authors: Alfonso Vasquez Perez; Christopher Liu FRCOphth

Affiliations: Sussex Eye Hospital. Brighton and Sussex University Hospitals. NHS Foundation Trust. United Kingdom

Purpose: To present our experience in the management ocular hypotony and aqueous leakage due to lamina resorption in Osteo-Odonto-Kerato-Prosthesis.

Methods: We describe two surgical approaches for the management of hypotony due to aqueous leakage in a case of OOKP with lamina resorption.

Management: An OOKP patient with previous BCVA of 6/9 presented with ocular hypotony and choroidal folds due to spontaneous aqueous leaking around the acrylic cylinder. CT showed signs of resorption of the lamina. He underwent urgent surgical exploration and initially we performed a re-suturing of the lamina onto the sclera achieving a tight and stable position. His vision improved to 6/12 and initially there were no signs of leakage postoperatory. Unfortunately three months later he had recurrence of aqueous leakage with ocular hypotony and we decided to remove the lamina and a corneal graft was placed to cover the corneal gap. Detailed examination of the lamina revealed significant resorption, bone erosions and bone fracture.

Conclusion: Aqueous leaking in OOKP requires urgent surgical exploration. Re-suturing of the lamina could be initially effective however if significant resorption is evidenced, lamina removal is necessary in order to avoid further complications.
Title: Clinical and radiological assessment of Lamina

Authors: Venkata Avadhanam

Affiliations: Sussex Eye Hospital, Brighton, UK Brighton and Sussex Medical School, Brighton, UK

Purpose: Resorption of the lamina in osteo-odonto keratoprosthesis (OOKP) and Osteo (tibial) keratoprosthesis (OKP) can lead to serious complications like device failure, retinal detachment and endophthalmitis. These patients require life-long follow up to monitor the lamina for timely institution of prophylactic measures. Periodic clinical examination and serial imaging of the lamina with computerised tomography (CT) scanning are the standard methods to survey the lamina. This study aims to compare the efficacy of clinical and radiological methods in the detection of laminar resorption.

Methods: Forty-one patients from the UK cohort with either OOKP or OKP were evaluated. A total of 48 laminae were studied. Patients’ notes were systematically reviewed to identify the clinical signs and onset of laminar resorption during their follow-ups. All the CT scan images were evaluated to obtain objective 2D linear measurements and clinician’s subjective assessment. The degree of laminar resorption was graded as a progressive increment form 0 to 3 based on 2D measurements. Significant resorption was considered to be present if grade ≥1. Radiological findings were compared against the clinical findings temporally and spatially.

Results: At the time of writing, temporal detection of resorption could be compared in 25 laminae. With the 2D measurement grading scale: 3 laminae showed resorption on clinical detection alone (12%), 8 laminae showed resorption detected clinically later confirmed radiologically (32%), 8 laminae showed resorption detected first on CT scans (32%) and 3 laminae had shown resorption identified only on CT images (12%). Spatial location of resorption was evaluated in 22 laminae. In 6 laminae the site of resorption did not match between the CT and clinical findings (27%), in 10 laminae it was partially matched (45%) and in 6 cases it was fully matched (27%).

Conclusions: By the use of 2D measurement analysis, CT scanning can detect laminar resorption earlier than the clinical examination. CT scanning also has a better accuracy in the detection of laminar resorption.
Title: Clinical dimensions of laminar resorption

Authors: Venkata Avadhanam

Affiliations: Sussex Eye Hospital, Brighton, UK Brighton and Sussex Medical School, Brighton, UK

Purpose: To determine the incidence, aetiology, clinical features and outcomes of laminar resorption in osteo-odonto (OOKP) and osteo keratoprosthesis (OKP).

Methods: A retrospective review of the cases from UK national cohort of keratoprosthesis was conducted. A total of 64 patients, who underwent either OOKP or OKP, were identified. Patient data including: demography, diagnosis, surgical details and postoperative outcomes related to laminar resorption was collected and analysed.

Results: A total of 74 laminae were implanted into the eyes of 64 patients. Out of which 60 were OOKP autografts, 11 were OOKP allografts and 3 were tibial bone grafts. Stevens-Johnson syndrome (SJS) accounted for the majority of the indications for keratoprosthesis implantation (42%) followed by ocular surface inflammatory diseases (30%), ocular injuries (19%), congenital disorders (6%) and miscellaneous causes (3%). None of the allografts or tibial grafts survived for more than 5 years. Resorption was noted in 65% of the autografts. Resorption was most frequent in SJS (81%) cases. Four laminae were exchanged prophylactically due to resorption and two were explanted due to the complications of resorption.

Conclusions: Laminar resorption is a common complication of the OOKP and OKP. Allografts and tibial bone grafts are prone for severe resorption. In most of the OOKP autografts resorption is compatible with laminar survival.
Title: Results of biological keratoprotheses from the UK

Authors: Venkata Avadhanam

Affiliations: Sussex Eye Hospital, Brighton, UK
Brighton and Sussex Medical School, Brighton, UK

Biological keratoprotheses employ the skirts made of biological materials such as alveodental tissue complex and cortical bone of tibia. They usually contain a central core, which serves as an optical segment made of polymethylmethacrylate. A patch of buccal mucosal membrane normally provides as a biological covering for these devices. The advantage of the biological skirt materials is that they integrate well with the ocular tissues and there is a little chance for the device extrusion. However, they are subjected to biological influences such as healing, repair and regeneration. We will present the results of osteo-odonto and osteo keratoprotheses (OOKP and OKP) from the UK.
Dealing with complications
Chairs: Soledad Cortina, Sayan Basu, Maria Fideliz de la Paz

7-1 Keynote

Title: Oculoplastic: Lid malposition and fornix reconstruction, mucous membrane alterations and overgrowth, cosmesis and orbital decompression Retinal detachment, VR surgery, Hypotony

Authors: Maria Fideliz De la Paz; Victor Charoenrook; Gorka Martinez Grau; Jeroni Nadal; Jose Temprano

Affiliation: Centro Oftalmologico Barraquer and Institut Universitari Barraquer, Spain

Good lid apposition is crucial for the success of the Boston KPro Type 1 as poor lid malposition would lead to poor bandage contact lens fit and cause subsequent erosions on the cornea, leading to necrosis, and eventual extrusion. This is managed by the oculoplastic surgeon by doing anterior or posterior lamellar reconstruction, lateral tarsal strip or lateral tarsorrhaphy. Fornix reconstruction using oral mucosa is a good alternative to reconstruct the fornix whether using scissors or using the Castroviejo electro-keratome. Amniotic membrane is a poor material for this purpose as it gets reabsorbed after several weeks. Mucous membrane necrosis in cases of OOKP or Tibia KPro must be closely watched as it may lead to extrusion of the prosthesis. Management may be conservative using medical treatment or surgical using oral mucosa implant. Mucous membrane overgrowth in OOKP/ Tibia KPRo is prevented by performing a trephination of the overlying mucosa smaller than the diameter of the optical cylinder to assure a very tight fit. Should overgrowth occur, excision of overlying mucosa is performed, preferably with electric cautery cutting. Cosmesis with the Boston KPro Type 1 may be achieved using custom-made tinted bandage contact lens and as for OOKP, also a custom-made prosthetic shell is used. Orbital decompression surgery is performed by experienced surgeons only if there is compromise of the optic nerve. In our experience, if there is exophthalmos with extrusion of the OOKP/Tibia KPro, we consider transforming the prosthesis into a transpalpebral type. Retinal detachment and vitreo-retinal surgery are performed in a normal fashion in cases of Boston KPro Type 1. As for OOKP/Tibia KPro cases, a special lens (Nadal-Barraquer lens) is adapted on the ocular surface and optical cylinder using overlying high density viscoelastic to perform bimanual manoeuvres. Limitations include restricted view of the periphery due to the diameter of the optical cylinder both in Boston KPro Type 1 and OOKP/Tibia KPro. Hypotony is managed using aggressive potent topical steroids or intravitreal injection of depot steroids. In extreme cases, silicone oil is applied to prevent phthisis bulbi. Several videos are presented.

Study supported by: None

Conflic of interest: NO FINANCIAL INTERESTS TO DISCLOSE
Title: Post-operative Scleral Contact Lens Use to Stabilize the Ocular Surface in Cases of High Risk Type 1 Boston Keratoprosthesis

Authors: Sarah M Nehls; Amy Walker OD; Evan Warne MD

Affiliation: University of Wisconsin Dept of Ophthalmology & Visual Sciences, USA

Objective: Patients with a history of ocular surface scarring due to autoimmune disease are at high risk of corneal melting and possible extrusion of a Boston keratoprosthesis. Scleral contact lenses are often used therapeutically to provide ocular surface protection and lubrication in these autoimmune ocular surface diseases but the role of scleral contact lenses has not been described following Boston keratoprosthesis surgery.

Methods: Retrospective case review

Results: Three patients were identified as candidates for Boston keratoprosthesis surgery combined with planned post-operative scleral contact lens wear. All patients had a history of severe keratoconjunctivitis sicca and ocular surface scarring from Stevens-Johnson syndrome (case 1), ocular cicatricial pemphigoid (case 2) and graft versus host disease with a prior sterile corneal melt (case 3). The patients were assessed pre-operatively for the ability to successfully fit a scleral contact lens. Following the type 1 Boston keratoprosthesis surgery, two patients began full time use of scleral contact lens wear within the first postoperative month. Case 1 had a stable ocular surface using the scleral lens for 9 months and then underwent emergency glaucoma valve surgery. Corneal melting occurred within two months following this surgery due to conjunctival swelling and the inability to wear the scleral lens. The ocular surface stabilized following repeat type 1 Boston keratoprosthesis surgery with re-initiation of scleral contact lens use. Case 2 was stable with initiation of scleral contact lens wear within the first post-operative month. Case 3 was able to wear the scleral lens but preferred the use of a large diameter soft bandage contact lens with no complication of corneal melt.

Conclusions: Eyes undergoing Boston keratoprosthesis in the setting of high risk autoimmune ocular surface disease may be successfully managed in the post-operative period with scleral contact lens wear.

Study supported by: Research to Prevent Blindness

Conflict of interest: None
Title: Keratoprosthesis complications: the daily duty

Authors: Bernard Duchesne¹; Pierre Sohngen¹; Yves Gillon²; Gaël Xhauflaire³

Affiliations: ¹Department of Ophthalmology; ²Department of Oro-Facial surgery, University of Liège, Belgium

Abstract: To share our experience in managing complications during and/or following KPro surgeries. Over time, our complications rate remains stable. In order to manage such end-stage procedure, we have to be prepared to deal with complications such as glaucoma, valve implantation, bone exposure, buccal mucosa overgrowth, retroprosthetic membrane, chronic inflammation, macular edema, corneal melting, bone infection, corneal infection, retinal detachment, epithelial downgrowth, phtyisi bulbi, endophthalmitis and optical decentration. These are examples of the daily clinical challenge we have to face.

The complication rate is high after KPro surgery and is not correlated to a learning curve period. Pre-existing pathology/surgery and severity at presentation are two important factors. Dryness assessment to decide what type of KPro has to be used, early detection of glaucoma, close follow-up are some key points for the patient to maintain sight for a long period. If possible the follow-up has to be done by the surgeon’s team and not by a general ophthalmologist.

This drives us to decline several patients unable to attend their follow-up.

Study supported by: None

Conflict of interest (if any): None
Title: Baerveldt device implantation in OOKP

Authors: Alfonso Vasquez Perez; Christopher Liu

Affiliations: Sussex Eye Hospital, Brighton and Sussex University Hospitals, NHS Foundation Trust, United Kingdom

Purpose: To present our experience using the Barveldt glaucoma implant in a patient with OOKP and progressive glaucoma despite previous Ahmed valve implant.

Clinical case: Case report. A 47-year-old lady with previous OOKP had uncontrolled glaucoma despite systemic acetazolamide and previous Ahmed valve. She underwent an implantation of BAERVELDT® 250 mm² (BG103-250) in the infero nasal quadrant. To prevent early hypotony a tube ligature with 7/0 vycril was done in addition to a partial tube lumen occlusion using a 3/0 Supramid suture. Supramid suture was left in a superficial pocket in the buccal mucosa and six weeks later it was removed.

Results: The digital pressure of the eye improved to normal and oral acetazolamide was then discontinued.

Conclusion: Baerveldt glaucoma implant is an effective option in OOKP with uncontrolled glaucoma and could be considered as first line treatment as it has shown to have lower pressures reduction than Ahmed valve.
Title: Oculoplastic complications of OOKP and Tibial KPro

Authors: Venkata Avadhanam

Affiliations: Sussex Eye Hospital, Brighton, UK Brighton and Sussex Medical School, Brighton, UK

Purpose: To describe the clinical features and outcomes of oculoplastic complications in osteo-odonto (OOKP) and osteo keratoprosthesis (OKP).

Methods: A retrospective review of the cases from UK national cohort of keratoprosthesis was conducted. A total of 64 patients, who underwent either OOKP or OKP, were identified. Patient data including: demography, diagnosis, surgical details and postoperative outcomes related to oculoplastic complications was collected and analysed.

Results: Mucosal thinning and ulceration were the most common complications, seen in 45% of the cases after the stage-1 operation. Fourteen out of 30 patients required mucosal grafts and lid procedures to correct the mucosal and lid anomalies after the stage-1. Mucosal overgrowth was observed in 22 cases, out which, 4 had responded to conservative management. Mucosal ulceration was noted in 14 cases after the stage-2. Laminar tilting was observed in 3 cases. Majority of the ulcerations after the stage-1 (14 out of 30) responded to conservative treatment, where as only 4 out of 14 cases of ulceration after the stage-2 had responded to conservative treatment. Twenty-five cases had associated lid abnormalities out of which 15 required surgical corrections.

Conclusions: Mucosal complications are most common after both stages 1 and 2 of the OOKP (and OKP). Ulceration is the most common problem after the stage-1, where as mucosal overgrowth was the most common problem after the stage-2. A significant number of cases required surgical treatments for the oculoplastic complications.
Title: OUTCOMES OF MEANS TO ADDRESS LAMINAR RESORPTION IN MOOKP

Author: Geetha Iyer

Affiliation: Cornea services, Sankara Nethralaya, India

AIM: To report the technique and outcomes, of BMP and bone augmentation, as measures to address and prevent or delay, laminar resorption in MOOKP eyes.

Methods: Retrospective Chart Review of MOOKP patients who underwent the BMP (15 eyes) and bone augmentation (30 eyes) between April 2012 and Jan 2016 were included. BMP involves placement of the protein beneath the fibrovascular tissue covering the lamina. Bone augmentation involves bone grafting of the canine tooth prior to harvesting the lamina to increase the girth of the bone on the labial aspect, noted to be most prone to laminar resorption.

Results: Bone Morphogenic Protein (BMP): BMP was used in 4 and 11 eyes, with laminar resorption noted at a mean follow up of 153 (median 79) and 56.8 months, belonging to the chemical injury and SJS groups respectively. 7 eyes have remained stable over a follow up of 18-40 months, while 8 eyes required a reKpro procedure within 2-8 months following the BMP.

Bone Augmentation

This procedure has been performed in 30 patients of which 15 have undergone all stages of the MOOKP with a mean follow up of 16.73 months following Stage 2. Of these, 5 eyes required mucosal revision procedures immediately after Stage 2 for laminar exposure. The laminar dimensions were noted to be larger following bone augmentation. Of the remaining 15, 1 graft underwent necrosis due to exposure in the mouth, 1 had an infection in the subcutaneous pouch and 1 had a fracture of the tooth unrelated to the augmentation during tooth harvesting. For the latter 2, a second bone augmentation has been performed.

Conclusion: BMP helped stabilize the resorption in 46.67 % of eyes and therefore has a role in eyes with mild to moderate grades of laminar resorption. Bone Augmentation might have a role in preventing or delaying the onset of resorption in MOOKP eyes. However a long term follow up is required to establish the role of the same. Initial results however do appear to be promising.
Title: The use Bone-Morphogenetic-Protein to avoid loss of a biological support in KPro, first experience

Author: Konrad Hille

Affiliation: Ortenauklinikum Offenburg, Germany

Objective: In keratoprostheses (KPro) with biological support like Osteo-Odonto-Keratoprosthesis (OOKP) and Tibiabone-Keratoprosthesis (TKPro) there is a risk of bone absorption occasionally leading to a loss of the KPro. The Indian study group around Geetha Iyer suggested using a collagen sponge sucked with Bone-Morphogenetic-Protein (BMP) to rebuild the bone and to save the KPro.

Methods: We used BMP in 2 Patients: one OOKP and one TKPro with severe absorption of the bone. In the OOKP half of the dentine was exposed but still covered by a layer of mucosa. We removed the mucosa and covered the area by a sponge sucked with BMP, spongiosa of the patient and the vital mucosa again. In the TKPro we removed all of the mucosa, covered the rest of bone with a 15 mm wide ring of sponge sucked with BMP and covered this by a cortical bone lamina from the tibia with a central hole positioning the vital mucosa back on the implant.

Results: In the OOKP patient we did not found any significant growth of bone in computed tomography so that we will exchange the prosthesis in the near future. In the TKPro there was a generation of new bone in the gap between the old support and the new cortical lamina. Until now the prosthesis is stable.

Conclusions: BMP seems to be a promising tool in repairing a bone support in OOKP and TKPro. Covering the old lamina by a lamina of tibia-corticalis is a new idea and may be more successful than only covering the BMP-sponge by spongiosa to induce bone regeneration. Further investigations are needed.

Study supported by: None

Conflict of interest: None
The Boston devices
Chairs: James Chodosh, Shiro Amano

8-1 Keynote

Title: Boston Keratoprosthesis Type I: The Outer Limits

Author: James Chodosh

Affiliation: Massachusetts Eye and Ear - Harvard Medical School, Boston, Massachusetts, USA

The Boston keratoprosthesis type I was approved for marketing by the US Food & Drug Administration in 1992. Over 12,000 devices have been implanted since then. The device is used most commonly in patients with repeated corneal allograft rejections or in the setting of heavily vascularized corneal scars, when another (or first) corneal transplant is likely to fail. Such patients also experience the best long-term outcomes with a Boston keratoprosthesis type I. In contrast, cornea-blind eyes after severe chemical burn or in the setting of autoimmune disorders such as mucous membrane pemphigoid or Stevens-Johnson syndrome do less well, and these conditions remain relative contraindications to use of the device. However, patients blinded by these latter disorders are also those most likely to experience profound improvements to their quality of life when implantation of the device successfully restores vision. This presentation will review use of the Boston keratoprosthesis device in challenging medical conditions, along with modifications of the device to accommodate special circumstances affecting the cornea and ocular surface.

Study supported by: None

Conflict of interest: Dr. Chodosh is an employee of the Mass. Eye & Ear, a nonprofit institution which distributes the Boston keratoprosthesis.
Title: Long-Term Outcomes of Boston type I Keratoprosthesis as Primary Penetrating Corneal Procedure

Authors: Carolina Aravena; Tahir Kansu Bozkurt; Fei Yu; Anthony J. Aldave

Affiliation: The Jules Stein Eye Institute, UCLA, USA

Objective: Report the long-term outcomes of the Boston type I keratoprosthesis (Kpro) as the primary penetrating corneal procedure in patients with high risk of penetrating keratoplasty (PK) failure.

Methods: Retrospective review of all Kpro procedures performed by a single surgeon between 5/1/04 and 1/1/15. Postoperative outcomes (corrected distance visual acuity (CDVA), retention and complications) were compared between Kpro procedures performed in eyes as primary penetrating corneal procedure (no prior PK) and eyes with prior PK.

Results: 173 Kpro procedures were performed in 149 eyes of 139 patients; 31 of the procedures were performed in 24 eyes of 21 patients with no prior PK. The most common indications in eyes with no prior PK were significant corneal scarring and/or vascularization (10 eyes, 42%), Stevens-Johnson syndrome (4 eyes, 17%), chemical injury (4 eyes, 17%) and aniridia (3 eyes, 13%). Comparing eyes with no prior PK to eyes with prior PK, preoperative glaucoma was significantly less common (13% vs. 64%, p < 0.001) and the postoperative follow-up was similar (49.3±29.9 mo vs. 39.8±29.3 mo; p=0.13). There was no significant difference in the percentage of eyes in each group with CDVA =20/200 prior to Kpro implantation (no prior PK, 8%) or up to 7 years after surgery (no prior PK, range 69-100%). Retroprosthetic membrane (RPM) formation was significantly less common in eyes with no prior PK (29% vs. 52%; p=0.047). Persistent corneal epithelial defect (PED) formation was the only postoperative complications that was significantly more common in eyes with no prior PK (63% vs. 31%, p=0.005), although the associated secondary complications sterile corneal stromal necrosis (25% vs. 13%) and corneal infiltrate (25% vs. 11%) were twice as common in eyes with no prior PK. Despite this, there was no significant difference in the retention failure rates in the two groups (8.1 per 100 eye-year vs. 7.7 per 100 eye-year; p = 0.94).

Conclusions: Boston type I keratoprosthesis implantation as the primary penetrating corneal procedure results in a significant improvement in CDVA in the majority of eyes through 7 years after surgery. The incidence of the most common postoperative complication, RPM formation, was significantly lower in eyes with no prior PK, and there was no significant difference in the retention failure rate compared with eyes with prior PK.

Study supported by: None

Conflict of interest: None
Title: Interface Gap in Infectious Keratitis after Boston Keratoprosthesis Detected by Anterior Segment Optical Coherence Tomography

Authors: Emi Kashizuka; Takafumi Yamaguchi; Yumiko Hirayama; Yoshiyuki Satake; Jun Shimazaki

Affiliation: Department of Ophthalmology, Tokyo Dental College, Japan

Objective: Boston keratoprosthesis (Kpro) is an alternative device to improve vision in patients with multiple past graft failures from immunologic rejection. However, infectious keratitis (IK) is known to occur frequently in patients with Kpros. In this study, we report the incidence of interface gap in IK after Kpro, detected by anterior segment optical coherence tomography (AS-OCT).

Methods: IK occurred in 3 eyes out of 12 patients (25%) who underwent Kpro procedures in Tokyo Dental College from 2010 to 2015. We evaluated the AS-OCT findings, such as interface gap between Kpro and the graft cornea, and the incidence in these 3 eyes with IK, comparing with the 9 other eyes without IK.

Results: Sixty-six-year-old female (Case 1), 38-year-old female (Case 2), 82-year-old male (Case 3) developed IK at 28-month, 28-month, and 8-month after Kpro implantation. The slit-lamp examination showed similar characters in three cases; thick whitish infiltrates at the junction between Kpro and graft cornea with epithelial defects. The smear of three cases disclosed Candida albicans, MRSA, and Gram positive microorganism, respectively. In 2 eyes with MRSA and Gram positive microorganism, IK improved clinically with a rapid response to antibacterial therapy. One eye with Candida infection developed endophthalmitis despite the aggressive antifungal treatment and vitreoretinal surgery, leading to phthisis. Regarding the association of AS-OCT findings with the development of IK, a Kpro-cornea interface gap was detected in four patients (4/12 eyes; 33%). Lack of epithelial coverage over the Kpro edge was observed in 3 patients (3/12 eyes; 25%), and epithelial cysts in 8 patients (8/12 eyes; 67%). Five patients (5/12 eyes; 42%) including 3 eyes with IK had more than two of these findings, detected by AS-OCT.

Conclusions: The presence of a gap in the interface between Kpro and graft cornea, epithelial cyst or lack of epithelial coverage might be associated with the development of IK, detected by AS-OCT.

Study supported by: None

Conflict of interest: None
Title: “Blind for second time” Psychological and social impact of blindness in patients with Boston Keratoprosthesis.

Authors: Arturo E. Grau¹; Andrea Cruzat²; Daniela Khaliliyeh¹

Affiliations: ¹Department of Ophthalmology, Pontificia Universidad Catolica de Chile; ²Massachusetts Eye & Ear Infirmary, Department of Ophthalmology, Harvard Medical School

Objective: To assess the impact of becoming blind for the second time in patients that were bilaterally blind, underwent a keratoprosthesis implantation and suffered a complication losing sight again.

Methods: We studied patients who have been legally blind, then recovered their sight after a keratoprosthesis implantation, and then became blind again after a complication. We implemented questionnaires and interviewed the patients to measure different aspects of sight loss.

Results: We examined the social and emotional impact of sight loss on a sample of 4 blind KPro patients. Patients described their feelings, symptoms and fears. We also screened for suicidal thoughts and depression, and examined family interactions and social networks. The impact of sight loss revealed that patients may fall into a mild to severe depression after losing sight for the second time.

Conclusions: While the sample of this study is too small to result in any significant conclusion, the outcomes of the study raise an important question - whether it is better to perform a kerataprosthesi or not, in terms of the mental health and wellbeing of the patient. With a larger group of patients we may be able to perform a further analysis of the psychological impact of becoming blind for the second time and give recommendations for the integral management of these patients.

Conflict of interest: None
Title: TYPE 1 KPROS IN CHEMICAL INJURY

Author: Bhaskar Srinivasan

Affiliation: CMER-Dennis lam eye hospital china, China

AIM: To report the outcomes, anatomical and functional, of the type 1 Kpro in ocular chemical injuries.

Methods: Retrospective Chart Review of patients with ocular chemical injuries who underwent the Boston Type 1 Kpro ( 16 eyes) and the Lucia Type 1 Kpro ( 7 eyes ) between April 2008 and December 2015 was done.

Results: BCVA > 6/60 was achieved in 15 (93.75%) and 6 (85.7%)eyes; and maintained in 8 (50 %) and 5 (71.4%) eyes of the Boston and Lucia Type 1 Kpros over a mean follow up period of 31.43 and 16.42 months respectively. Preexisting glaucoma was noted to be the most common co-morbidity in 9(56.25%) and 3(42.85%) ( 1 denovo) eyes; retroprosthetic membrane occurred in 3 (18.75%) and nil eyes; endophthalmitis in 5 eyes (31.25%) ( 4 with an Ahmed Glaucoma valve implant)and 1 eye(14.3%)( with an AGV implant); following the Boston Type 1 and Lucia Type 1 Kpros respectively. Periopic melt was noted in 3(18.75%) and 2 (28.6%) eyes and a rekpro was performed in 7 (43.75%) and 2 (28.57%) eyes following the Boston Type 1 and Lucia Type 1 Kpro respectively.

Conclusion: The Lucia Type 1 Kpro with a titanium backplate is an economical, single axial length Kpro, similar otherwise to the Boston Type 1 Kpro. No RPM was noted in eyes with the Lucia Type 1 Kpro probably due to the titanium backplate. The other complications noted were similar to the Boston Type 1 Kpro. Endophthalmitis was noted to occur more frequently in eyes with the AGV and were all fungal in etiology.
Title: Tissue carriers for the Boston Keratoprosthesis

Authors: Andrea Cruzat; Miguel González; Dohlman Claes

Affiliation: Massachusetts Eye and Ear, Harvard Medical School, USA

Objective: The Boston keratoprosthesis (B-KPro), presently needs a corneal graft as a tissue carrier. Although corneal allograft tissue is readily available and affordable in developed countries with established eye banks, the worldwide need vastly exceeds supply. Therefore, a simple, safe, and inexpensive alternative to corneal allografts is desirable for the developing world. We review reasonable alternative options for B-KPro carriers such as corneal autografts, xenografts, non-corneal autologous tissues, and laboratory-made constructs. We are particularly interested in xenografts. We studied methods for reducing xenograft antigenicity by decellularization and for sterilization purposes. Preliminary results of modified pig corneas and transplantation into rabbits will also be presented.

Study supported by: Boston Keratoprosthesis, Mass Eye & Ear

Conflict of interest: None
Title: Boston Keratoprosthesis Type I in Elderly Patients
Authors: James Chodosh, MD, MPH; Gelareh Homayounfar, MD; Christina M. Grassi, MD; Ahmad Al-Moujahed, MD; Kathryn A. Colby, MD; PhD, Claes H. Dohlman, MD, PhD
Affiliation: Massachusetts Eye and Ear -Harvard Medical School, Boston, Massachusetts, USA

The Boston keratoprosthesis type I is an accepted alternative for cornea-blind patients when standard corneal transplantation is unlikely to succeed. Recipients can experience dramatic visual recovery but are also susceptible to complications. We sought to determine the outcomes and complications of Boston type I keratoprosthesis implanted in elderly patients. A retrospective case series was performed on patients at least 75 years old who received the Boston type I keratoprosthesis between January 1, 2007 and December 31, 2012. Preoperative diagnosis, interval visual acuity, keratoprosthesis retention, and postoperative complications were recorded for each patient. Over this time period, 44 Boston type I keratoprostheses were implanted in 44 eyes of 43 patients. The most common indication for surgery was corneal graft failure (n = 23; 52.3%) followed by corneal scar (n = 8; 18.2%), and limbal stem cell dysfunction (n = 8; 18.2%). All patients had preoperative visual acuity of ≤ 20/200. Thirty-six of 44 (82%) patients achieved visual acuity of 20/200 or better postoperatively, and 20 of those (55.6%) maintained 20/200 or better for 1 year after surgery. The median length of follow up was 825 days (range: 27 – 2193 days), and at the last follow-up visit, 20 of 44 (45.5%) had 20/200 or better vision. The median best-corrected visual acuity (logMAR) improved from 2.6 preoperatively to 1.0 at one year postoperative (p<.00001). Device retention at one year postoperative was 88.9%. The most common postoperative complications were retroprosthetic membrane formation in 20 patients (45.5%) and cystoid macular edema in six patients (13.6%). One patient developed keratitis and consecutive endophthalmitis two months after surgery and required enucleation. Boston type I keratoprosthesis is an effective modality in corneal blindness in elderly patients. Failure to restore or maintain ambulatory vision was typically due to non-corneal co-morbidities, often unrelated to the keratoprosthesis.

Support: None

Conflict of interest: Dr. Chodosh and Dr. Dohlman are employees of the Mass. Eye & Ear, a nonprofit institution which distributes the Boston keratoprosthesis.
Case presentation and future KPros
Chairs: Hiroshi Eguchi, Venkata Avadhanam, Geetha Iyer

9-1 Keynote

Title: CHOOSING THE RIGHT KPRO FOR PATIENTS NOT PATIENT FOR KPRO IN SEVERE CHEMICAL INJURIES –

Author: Geetha Iyer

Affiliation: Cornea services, Sankara Nethralaya, India

Aim: To report the choice, technique and outcomes of 4 different types of Kpros in 4 patients with severe chemical injuries.

Methods: 4 patients who underwent the Boston Type 2/ Lucia Type 2/ Lucia Type 1 and the osteo Kpro under challenging circumstances is reported.

Results: Patient 1: One eyed patient who presented with a self-sealed corneal perforation (AL-13 mm) a month after chemical injury, underwent the Lucia Type 1 Kpro after multiple surgeries for fornix reconstruction. He developed a retinal detachment on day 5, which was settled. Intraocular pressure was noted to be high 5 months later that required SOR and AGV subsequently. 2 years later, with BCVA of 6/24- he presented with a graft melt for which a lamellar patch graft was done and maintains anatomic and functional integrity 4 years since presentation.

Patient 2: One eyed patient with perceived globe movements (AL-20 MM ) beneath a skin graft underwent the Lucia Type 2 Kpro and maintains a vision of 6/36 at 2 years of followup with a need for mucosal revisions for overgrowth.

Patient 3: One eyed patient with a longstanding nasal RD with eyelid skin scarring, underwent RD surgery, Boston Type 2 Kpro, multiple skin revision surgeries, and maintains 6/24 at 3 year follow up with excision for skin overgrowth that occurs over 4-6 months.

Patient 4: Patient with an AL of 13 mm with RD, in whom retina was attached following placement of temporary Kpro in a 6 mm cornea. This was followed by mucosal graft/ osteo Kpro with recovery of vision to 6/60.

Conclusion: The outcome of difficult and challenging chemical injuries has been reported. The practical difficulties including administration of anesthesia, decision of the type of Kpro to be implanted and associated posterior segment complications has been described. However the good results obtained are encouraging to attempt such surgeries in these otherwise challenging situations.
Title: Staged procedure using temporary keratoprosthesis to repair severe ocular trauma: case report

Authors: Hideaki Yokogawa; Akira Kobayashi; Natsuko Mori; Tetsuhiko Okuda; Kazuhisa Sugiyama

Affiliation: Department of Ophthalmology, Kanazawa University Graduate School of Medical Science, Japan

Objective: To report staged procedure using Eckardt temporary keratoprosthesis (kpro) to repair severe ocular trauma.

Methods: A 54-year-old man was referred to us for multiple corneal lacerations and multiple intravitreous foreign bodies caused by chemical explosion accident. At first surgery, penetrating keratoplasty combined with pars plana vitrectomy was performed. The damaged recipient cornea was trephined, and kpro was sutured on the trephine opening. Good visualization of intraocular structure through kpro with closed-system enabled safe maneuver including foreign body extraction. Then, silicone oil was injected, and the kpro was exchanged by cryopreserved donor cornea. Two months after the first operation, penetrating keratoplasty combined with transscleral fixation of intraocular lens was performed. The silicone oil was removed through reopened cornea, and kpro was sutured. Intraocular lens was implanted with closed-system. Then, kpro was exchanged by fresh donor cornea. Final best corrected visual acuity was 20/130, although Baerveldt glaucoma tube implantation was required.

Conclusions: Staged procedure with use of kpro is useful to repair severe ocular trauma.

Conflict of interest: Hideaki Yokogawa, recipient: Alcon Japan Ltd.
Title: Novel Artificial Cornea KeraKlear Keratoprosthesis for 4 Cases with Severe Corneal Disorders

Authors: Masaki Fukui1,2,3; Takeshi Ide1; Yoshiyuki Ichihashi1,2; Emiko Miki1; Tetsuya Kawakita1,2; TerukiFukumoto1,4; Kazuo Tsubota1,2; Ikuko Toda1

Affiliations: 1Minamiaoyama Eye Clinic, Japan; 2National Hospital Organization Tokyo Medical Center, Japan; 3Department of Ophthalmology, Keio University School of Medicine, Japan; 4Kikugawa Eye Clinic, Japan

Objective: KeraKlear Keratoprosthesis (K3) is a foldable, non-penetrating artificial cornea that is inserted in the femtosecond laser (FSL)-created pocket. Herein, we report our early experience with K3 transplantations.

Methods: A 4-case series.
Case 1: A 53-year-old man with severe gelatinous drop-like dystrophy had undergone phototherapeutic keratectomy (PTK) twice. The thickness of his cornea was 337 μm. His best corrected visual acuity (BCVA) before K3 insertion was 20/320.
Case 2: An 18-year-old man had a progressive keratoconus and atopic dermatitis. The thickness of his cornea was 349 μm, and his preoperative BCVA was 20/200.
Case 3: A 48-year-old woman had a recurrent Avellino corneal dystrophy. She had lamellar keratoplasty and penetrating keratoplasty (PKP), and had undergone PTK three times. Her preoperative BCVA was 20/100.
Case 4: A 44-year-old man had a progressive keratoconus. He previously had intracorneal ring (ICR) insertion. We removed the ICRs 4 months before K3 surgery. His BCVA was 20/100.

Results: Case 1: K3 transplantation was performed in February 2014. Corneal perforation was observed when the pocket was made by using FSL. Subluxation of K3 was found at the third postoperative day, and K3 repositioning and anchoring suture were performed. His postoperative BCVA improved to 20/32.
Case 2: Transplantation was performed on April 12, 2014, without any intraoperative and postoperative complications. His BCVA improved to 20/40.
Case 3: The operation was performed in October 2014, without any intraoperative and postoperative complications. Her BCVA improved to 20/25.
Case 4: The operation in April 2015 went well. His immediate postoperative BCVA decreased to 20/200, and he had an intolerable pain. Two months after K3 insertion, PKP was performed. He did not have an intolerable pain, and his BCVA improved to 20/32.

Conclusions: Conventional corneal transplantations are associated with problems such as short supply of donor cornea, graft rejection, and procedural complexity. The new KeraKlear Keratoprosthesis may overcome these issues and can be applied clinically more various diseases. In this study, K3 was safe and showed quick improvement in visual acuity. K3 provides a novel concept of artificial corneal transplantation and can be used as an alternative to conventional donor cornea.

Study supported by: None

Conflict of interest: None
Title: Chondro-keratoprosthesis: an alternative to OOKP?

Authors: Hoffart Louis\textsuperscript{1,2,3}, Guyot Laurent\textsuperscript{1,2,4}

Affiliations: \textsuperscript{1}Aix-Marseille University, France; \textsuperscript{2}Assistance Publique Hopitaux de Marseille; \textsuperscript{3}Ophthalmology Department; \textsuperscript{4}Oral and Maxillofacial Surgery Department

Objective: To evaluate the use of cartilage as a potential graft material in order to explore a new approach toward osteo-odontal tissue replacement in keratoprosthesis surgery.

Methods: We describe a modification of the osteo-odonto-keratoprosthesis surgery that involves the use of autogenous auricular conchal cartilage graft (ACCG) in 2 patients. In stage 1, autogenous conchal cartilage was harvested via a posterior approach. Then, an optical polymethyl-methacrylate cylinder was embedded into a double-layered fragment of the conchal cartilage and secured by cyanoacrylate glue. The optical cylinder and cartilage complex were then implanted into the cheek. During the same procedure, the ocular surface was denuded and replaced with full-thickness buccal mucosa graft. The stage 2, performed 2 to 4 months later, involved retrieval of the complex and implantation into the cornea, after reflection of the buccal mucosal flap, corneal trephination, iris and lens removal, and anterior vitrectomy. Cartilage specimens were then processed for histological evaluation after retrieval.

Results: We report two cases of chondro-keratoprosthesis (CKPRO) who underwent surgery with a 6 months follow-up following a bilateral limbal stem cell deficiency associated with severe corneal changes. Both patients experienced multiple failed penetrating keratoplasty related to congenital aniridia (patient 1) and physical injury (patient 2) respectively. Vision was limited to light perception (LP) only in both cases. After retrieval of optical cylinder and cartilage complex, connective tissue served to bind the host cornea to the cartilage. A fragment was sent for histological studies that did not shown any infiltration or inflammation and the cartilage remained avascular. On patient 1, CKPRO was performed in the left eye and the vision was improved to 20/100 J6 during the follow-up. On patient 2, CKPRO was performed in the right eye and the postoperative visual acuity stay limited to LP related to preoperative retinal lesions. During the follow-up, any postoperative complication as extrusion, epithelial downgrowth, retrocorneal membrane or endophthalmitis was observed.

Conclusions: ACCG could be a good alternative to replace osteo-odontal graft in keratoprosthesis surgery especially in young patients with healthy teeth. ACCG has already been widely used for reconstructive surgery and provides safe and stable support to the optical cylinder. Hidden skin scar is the only consequence at the donor site. However, further comprehensive studies with larger sample size and long follow-up are required to elucidate any difference between these two techniques.

Study supported by: None

Conflict of interest: None
**Title:** Micro pressure sensor integrated into the Boston keratoprosthesis

**Authors:** Eleftherios I. Paschalis; James Chodosh; Claes H. Dohlman

**Affiliation:** MEEI / SERI, USA

**Objective:** Elevated intraocular pressure (IOP) leads to glaucoma, the most severe complication following Boston keratoprosthesis (BKPro) surgery. Standard tonometers are not suitable for KPro patients, and finger palpation is often inaccurate. We have developed a micro-opto-mechanical pressure system (MOMS) that is integrated into the optical stem of the BKPro device and can provide no-contact IOP measurements with high accuracy.

**Methods:** A miniaturized fiber optic pressure sensor (300 μm in diameter) based on MOMS technology was integrated into the periphery of the BKPro optical stem through a 305 μm hole made in the periphery of the stem. The optical fiber was laser cleaved into two parts to form a convex lens system, suitable for non-contact coupling of light. The coupling efficiency of the sensor and cleaved optical fiber was evaluated by computer controlled optical analyzer connected to the fiber and was assessed in regards to distance and angular misalignment in vitro. The reliability of the sensor was assessed in vitro for 9 months using continuous pressure measurements of two identical calibrated sensors in the same hydrostatic column.

**Results:** Measurements from the two sensors were performed continuously for 9 months with pressure ranging from -7.5 to +40 mmHg. The two sensors exhibited negligible differences in measuring pressure (difference < 0.8 mmHg) and excellent accuracy in measuring absolute pressure (accuracy ± 0.2 mmHg). Within the 9 months of evaluation, no pressure drift was noted by the two sensors. Non-contact measurements were performed using air or water interface between the two fiber ends. Optimal signal to noise ratio was achieved at a separation distance of 300 μm in air and 1000 μm in water and with angular misalignment up to 20 degrees. Once the fibers were coupled, a pressure measurement was achieved within 60 milliseconds.

**Conclusions:** Using optical MOMS technology we were able to design an ultra-miniaturized micro pressure sensor, suitable for integration into the BKPro stem. The fact that the sensor operates in the optical spectrum allows the scaling down of transducer dimensions and MOMS components, thereby minimizing drift and maximizing accuracy and detection resolution. The shaping of the fiber end to an integrated optical coupler allows non-contact measurements to be performed at the slit lamp. The implementation of this technology in KPro devices may provide an integrated all-in-one solution for IOP measurement, and improve detection and management of glaucoma.

**Study supported by:** None

**Conflict of interest:** None
Title: Hydrogel skirt for synthetic OOKP lamina

Authors: Venkat Avadhanam

Affiliation: Sussex Eye Hospital, Brighton, UK Brighton and Sussex Medical School, Brighton, UK

Purpose: To report the study of a hydrogel polymeric interpenetrating network (IPN) composite made of agarose and poly-ethylene glycol-diacrylate (PEGDA) as a substitute for osteo-odonton-keratoprosthesis(OOKP) lamina.

Methods: In an in-vitro study, a composite of agarose and PEGDA was prepared, which has a tuneable mechanical stiffness. These hydrogel materials were incorporation with hydroxyapatite (HA) coated poly(lactic-co-glycolic acid) (PLGA) microspheres to improve cellular response and mimic bone micro-environment as in OOKP lamina. Material characterisation was studied with: mechanical resistance to stress, swellability, and porosity assessment with scanning electron microscopy. Multiple IPN discs of varying concentration of its constituents (2 to 5% agarose, 10 to 40% PEGDA) were prepared and seeded with 3T3 fibroblasts and keratocytes. Cell growth studied with live-dead assays.

Results: High concentrations of the PEGDA and agarose provided higher mechanical strength. Additionally, IPNs containing 6000 molecular weight PEGDA and 5% agarose incorporated with HA coated microspheres (5-40IPN+HA) had a higher elastic modulus than the IPN containing 2% agarose with 40% PEGDA (2-40%IPN) and 5% agarose with 40% PEGDA (5-40%IPN). HA incorporation enhanced cell viability and migration into the material.

Conclusions: We successfully synthesized a promising IPN hydrogel material with a unique combination of high mechanical strength and cyto-compatibility. Tuneable mechanical strength and enhanced cell viability with HA rich microenvironment are the desirable attributes of this hybrid material system, when used as a potential skirt material in OOKP.
Title: TRAUMA FOLLOWING MOOKP

Author: Geetha Iyer

Affiliation: Cornea services, Sankara Nethralaya, India

Aim: To report the outcome in a case of trauma following the MOOKP procedure

Methods: An interventional case report

Results: A one eyed young lady of 38 years with SJS underwent an uneventful MOOKP procedure in 2006 with a visual recovery of 6/6. She maintained the same till 2011, when she used a chemical of unknown composition in the eye that led to mucosal necrosis and the same was attempted to be sutured elsewhere. She presented with a drop in vision to PL, severe hypotony and clinical features of a large area of mucosal necrosis inferiorly with corneal perforation beneath the lamina. An explorative surgery revealed an intact lamina which was placed in the contralateral subcutaneous pouch, a tectonic penetrating keratoplasty was performed, the superior intact mucosa was left as was and a total tarsorrhaphy was performed. 2 months later following subsidence of the choroidal detachment, a mucosal revision surgery was performed. A month later the lamina was placed back in the eye with a visual recovery of 6/6. Laminar exposure medially was addressed by a tarsoconjunctival flap. She maintained a vision of 6/6 till 2015, when following a trauma 2 months back she presented with an irreparable RD. Lamina was noted to be intact.

Conclusion: This case highlights the tenacity of the lamina, the need to present immediately following trauma and the possibility to restore anatomic and functional integrity if addressed appropriately. Though she maintained a vision of 6/6 over 9 years, the eye was lost to a 2nd untoward event.
Title: Evaluation of effectiveness of real-time PCR for clinical diagnosis of herpes simplex virus keratitis

Authors: Daisuke Shimizu; Dai Miyazaki; Inata Koudai; Ryu Uotani; Keiko Yakura; Tomoko Haruki; Yoshitsugu Inoue

Affiliation: Ophthalmology and Visual Science, Faculty of Medicine, Tottori University, Japan

Objective: To evaluate the effectiveness of measurement of HSV DNA amount by real-time PCR for clinical diagnosis of herpes simplex virus (HSV) keratitis.

Methods: Three hundred and fifty-one cases measured for HSV DNA copy numbers in corneal scrapings or tear fluids for the suspicion or exclusion of HSV keratitis, were retrospectively analyzed. Diagnostic efficacy of HSV DNA copy numbers, clinical findings of dendritic lesions, corneal ulcer and corneal infiltrates were evaluated by receiver operating characteristic (ROC) analyses.

Results: One hundred eyes were finally diagnosed as HSV keratitis (epithelial keratitis: 72 eyes, stromal keratitis 26 eyes, endothelial keratitis 2 eyes). In the HSV keratitis eyes, positive rate of PCR, dendritic lesions, corneal ulcer and disciform lesions was 66%, 30%, 56%, 24%, respectively. In the non-HSV keratitis eyes, the positive rate was 12% 5.2%, 57%, 1.2%, respectively. Area under the curve (AUC) was calculated to show diagnostic efficacy based on ROC analyses. The AUC for epithelial HSV keratitis calculated by using HSV DNA copy numbers obtained from corneal scrapings was 0.87 (dendritic lesions:0.72, corneal ulcer:0.56, disciform lesions:0.48). By using tear fluids, the AUC for the epithelial HSV keratitis was 0.74 (dendritic lesions:0.65, corneal ulcer:0.47, disciform lesions:0.47). In a similar way, the AUC for stromal HSV keratitis calculated by using HSV DNA copy numbers obtained from tear fluids was 0.58.

Conclusions: HSV DNA copy numbers obtained from corneal scrapings by real-time PCR method was highly efficacious to definitively diagnose epithelial HSV keratitis and more useful than clinical corneal findings.
Endothelial keratoplasty (DSAEK vs DMEK)
Chairs: Jun Shimazaki, Satoru Yamagami

10-1 Keynote

Title: DSAEK
Author: Akira Kobayashi
Affiliation: Department of Ophthalmology, Kanazawa University Hospital, Japan

Over the past decade, new surgical techniques have been reported for treatment of bullous keratopathy that replace only the dysfunctional posterior portion of the cornea through a scleral pocket incision. Most notably, these techniques completely eliminate surface corneal incisions or sutures, maintain much of the cornea's structural integrity and induce minimal refractive change, suggesting distinct advantages over standard penetrating keratoplasty. In 2006, preparation of donor tissue in endothelial keratoplasty has been made easier with the utilization of an automated microkeratome, and the addition of this component to the surgical procedure has been popularized as Descemet Stripping Automated Endothelial Keratoplasty (DSAEK).

In Japan, bullous keratopathies secondary to argon laser iridotomy are quite common. They have shallow anterior chamber with high vitreous pressure, which makes taco-folding donor insertion quite difficult; sometimes the donor endothelial lamella pops out after insertion, resulting in repeated graft folding and insertion. In 2006, we introduced donor pull-through technique, and developed double-glide technique using both Busin glide and IOL sheets glide. Also, to avoid another complications in DSAEK, several techniques using new devices and viscoelastics has been developed.

Now, we confirmed DSAEK is simple, reproducible, safe and effective procedure for most Asian patients with corneal endothelial dysfunction.

Study supported by: None
Conflict of interest: None
Title: DMEK - the method of choice for endothelial replacement

Author: Friedrich E. Kruse

Affiliation: Department of Ophthalmology, University Hospital Erlangen, Erlangen, Germany

Keratoplasty has been revolutionized by the introduction of lamellar techniques that allow for selective replacement of diseased corneal structures. In Europe about 40% of all grafts are performed for diseases of the corneal endothelium namely Fuchs endothelial dystrophy. Here Descemet stripping endothelial keratopasty (DSEK) has greatly improved both the speed of functional recovery as well as visual outcomes as compared to penetrating keratoplasty (PK).

Previously there was debate as to what techniques reach best outcomes: Descemet stripping automated endothelial keratoplasty (DSAEK) is a standardized method utilizing thin (150µ) grafts which can be supplied by eye banks (pre cut tissue) and inserted by inserted by devices (e.g. Busin glide, Tan Endoglide) which are commercially available. In contrast Descemet membrane endothelial keratoplasty (DMEK) is involves manual preparation of ultrathin (10µ) grafts and a highly demanding, non-standardized implantation procedure which lacks commercially available devices for insertion.

Several studies have clearly shown that DMEK renders better functional results than DSAEK which is not only due to restauration of the anatomy in the interface but also due to a superior quality of the posterior corneal surface with significantly less higher order aberrations.

Up to now the major limitation of DMEK is the lack of standardization as well as problems with graft adhesion. We have developed a series of steps which help to standardize both tissue preparation as well as tissue insertion and manipulation in the anterior chamber: These steps include standardized removal of the host DM, individualized assignment of grafts according to the patients anterior chamber depth and the bubble in the roll technique using a special cartridge for delivery of the transplant.

Major advantages of DMEK relate not only to superior visual function and fast visual recovery but also to a significantly reduced rate of immunological graft refection which is several log units below that of DSAEK and PK.
Title: Descemet membrane endothelial keratoplasty: challenges in the first 100 cases in Egypt

Author: Mohamed Bahgat Goweida

Affiliation: Faculty of Medicine, Alexandria University, Egypt

Objective: To evaluate the intraoperative complications and clinical outcome of Descemet membrane endothelial keratoplasty (DMEK) in eyes with endothelial diseases.

Methods: In 100 eyes with visually significant endothelial diseases, the diseased endothelium and Descemet's membrane (DM) was stripped and replaced by donor graft consisting of endothelium and DM. Intraoperative and postoperative complications were evaluated. Best spectacle corrected visual acuity (BSCVA), subjective and objective refraction, keratometric readings, endothelial cell density (ECD) and central corneal thickness (CCT) at 3 months were documented.

Results: 115 DMEK procedures were performed, re-injection of air in the anterior chamber was needed in 53 eyes and failure of the procedure was the result in 15 eyes requiring a repeat DMEK. Three months postoperatively all eyes showed a mean BSCVA of 0.36 ± 0.28 log MAR, a mean keratometric readings of 44.7 ± 1.7 D, a mean astigmatism of 2.16 ± 1.04 D, a mean ECD of 1881.71 ± 213.39 cells/mm² and a mean central corneal thickness (CCT) of 501 ± 27.62 μm.

Conclusions: Although many challenges exist when performing DMEK, this technique allows a quick and complete restoration of the visual potential in patients with corneal endothelial disorders.

Conflict of interest: no financial interest
Special DMEK Course by Prof. Friedrich E. Kruse
Chair: Christopher Liu

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1977 – 1984 Medical School in Berlin and Heidelberg,
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1984 – 1988 Residency at the Department of Ophthalmology, University of
Heidelberg, Medical School, Heidelberg – Germany.

1988 – 1990 Research Fellowship at the Bascom Palmer Eye Institute,
University of Miami, Miami/Florida – USA.

1992 Research and Instructor, Bascom Palmer Eye Institute,
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1993 Faculty Department of Ophthalmology, University of Heidelberg,
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1994 Assistant Professor Heidelberg Medical School

2001 Full Professor Heidelberg Medical School

2004 Chairman and Professor of Ophthalmology, Department of
Ophthalmology, Erlangen Medical School, University of
Erlangen-Nuremberg, Erlangen – Germany.

Research interests include ocular surface reconstruction, biology of limbal stem cells, cell biology of the
cornea, corneal enervation, advanced surgical procedures including stem cell surgery and lamellar corneal
surgery as well as the further development of corneal transplantation.

Fellow of the European Board of Ophthalmology, member of several distinguished editorial boards as well
program committees of international societies such as ARVO, SOE and WOC.

He has published numerous book chapters and well over 200 articles in peer-reviewed journals.

He serves on the Editorial Board of several peer-reviewed ophthalmology journals such as Investigative
Ophthalmology & Visual Science and The Ocular Surface.

He received several awards such as the Bowman Lecture from the Bowman Club in Great Britain, the
Norman Galloway Lecture from the University of Nottingham and the Tillet-Lecture von TBI (Tissue Banks
International) in Baltimore, USA

February 3rd, 2016
DMEK – comprehensive course

Friedrich E. Kruse

Department of Ophthalmology, University Hospital Erlangen, Erlangen, Germany

The course will provide a step by step approach to DMEK by first showing how to make grafts from corneo-scleral buttons by use of a standardized scuba technique with two forceps. Using cheap equipment like a razor blade, crescent knife as well as two tying forceps participants will be shown how to safely harvest Descemet membranes from donor buttons.

Next we will discuss the basic principle of surgical planning and graft selection in the light of various anatomical situations.

A standardized removal technique will be shown that minimizes graft detachment: the phenomenon of splitting Descemet membrane will be discussed including its significance in relation to graft detachment.

Graft insertion and manipulation will be discussed including a standardized injection technique with the bubble in the roll approach.

Tricks for unrolling and the use of both air and SF6 gas for attachment will be shown.
Title: Corneal Venting Incisions In DMEK To Assist The Unfolding Of The Donor Graft

Author: Christopher Liu

Affiliation: Sussex Eye Hospital, U.K.

Purpose: To present our clinical outcomes from a series of cases of DMEK in which we performed corneal venting incisions to assist and achieve a complete unfolding of the donor graft.

Methods: Retrospective case series. The study included 14 consecutive cases of DMEK in which we performed venting incisions outside the pupillary axis to facilitate a complete peripheral unfolding and attachment of the donor graft.

Results: The main indication for DMEK was Fuchs dystrophy (13 cases) and only one eye had bullous keratopathy secondary to previous ophthalmic surgery. In two eyes (14%) DMEK was performed in phakic eyes. The pre-operative BCVA was 6/18 or worse in more than 80% of the cases. 85% (12 cases) achieved BCVA of 6/9 or better and 71% (10 cases) achieved BCVA 6/6 or better. Three cases needed rebubbling for partial detachment and in one case endothelial keratoplasty had to be repeated due to primary graft failure. Complete peripheral unfolding of the graft was achieved in all patients with venting incisions.

Conclusions: Unfolding of the DMEK graft is a challenging step and has a significant impact in the final outcome. We present a surgical approach that facilitates a complete peripheral unfolding of the donor graft avoiding unnecessary manipulation.
Luncheon Seminar 1
Friday, April 22  12:10-13:10
4F Gyoun

Luncheon Seminar 1: Therapeutic Keratoplasty & Deep Anterior Lamellar Keratoplasty
10th KPro Study Group meeting

DATE  Friday, 22 April 2016  12:10 ~ 13:10
VENUE  Gyoun (4F Kyoto Hotel Okura)

Chairperson
Prof. Yoshikazu Shimomura
(Department of Ophthalmology Kindai University Faculty of Medicine)

Therapeutic Keratoplasty & Histological study of keratomycosis
Speaker
Dr. Masahiko Fukuda
(Department of Ophthalmology Kindai University Faculty of Medicine)

Deep Anterior Lamellar Keratoplasty for Challenging Cases
Speaker
Dr. Shigeto Shimmura
(Ophthalmology, Keio University School of Medicine)

Co-sponsor: Santen Pharmaceutical Co., Ltd
The management of Stevens-Johnson syndrome

Co-Organizer
Masahiko Fukuda, MD, PhD.
(Kindai University Faculty of Medicine, Japan)

Christopher Liu, DO, FRCOphth, FHKAM(Ophtha), CertLRS.
(Sussex Eye Hospital, U.K.)

Speaker 1
James Chodosh, MD, MPH.
(Massachusetts Eye and Ear Infirmary– Harvard Medical School, U.S.)
Building an Evidence Basis for Management of Ocular Stevens Johnson Syndrome/Toxic Epidermal Necrolysis.

Speaker 2
Tsutomu Inatomi, MD, PhD.
(Kyoto Prefectural University of Medicine, Japan)
Leading Advancements in the Clinical Management and Surgical Treatment of Stevens Johnson Syndrome.

Co-sponsor: Senju Pharmaceutical Co., Ltd
Management of Post-Keratoplasty Infection and Cytomegalovirus Corneal Endotheliitis

Tottori University Faculty of Medicine, Japan
Yoshitsugu Inoue, MD, PhD

Prevention and treatment of infection after corneal transplantation
Nihon University Itabashi Hospital, Japan
Satoru Yamagami, MD, PhD

Diagnosis and Treatment for Cytomegalovirus Corneal Endotheliitis
Doshisha University / Kyoto Prefectural University of Medicine
Noriko Koizumi, MD, PhD

Co-sponsored by 10th KPro Study Group Meeting & Alcon Japan Ltd.
最適な IOL 選択のための新しいパートナー

白内障手術のための質の高い検査をサポート

眼軸長 角膜トポ/角膜曲率 角膜径 瞳孔径

前房深遠 角膜厚 水晶体厚

7in1

new

ALADDIN
光学式眼軸長測定装置
世界初ROCK阻害点眼剤
眼圧下降の照準は主流出路へ

[効能・効果]
次の疾患で、他の眼内障治療薬が効果不十分な方々に使用できる場合
眼内障、高眼圧症

【効能・効果に関連する使用上の注意】
プロスタグランジン関連薬やβ遮断薬等の他の眼内障治療薬で効果不十分な方は副作用等で使用できない場合に本剤の使用を検討すること。

Rhoキナーゼ阻害薬-眼内障・高眼圧症治療剤-

グラナデック®点眼液0.4%
GLANATEC®ophthalmic solution 0.4%（リパーサル抗酸塩水和物点眼液）
処方箋調剤医薬品・注意－医師等の処方箋により使用すること

製造販売元
Kawato

販売元
幾和創薬株式会社

販売元
幾和株式会社

東京都中央区日本橋本町三丁目4-14
Transforming Lives Through Better Vision

As the global leader in eye care, Alcon is committed to helping enhance the quality of life by helping people see better. We offer the widest spectrum of surgical, pharmaceutical and vision care products in the industry. Our 25,000 associates partner with eye care professionals to take on the world’s most pressing eye care needs and deliver innovations that reinvent lives. The future of eye care starts with Alcon.

www.alcon.com

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新薬で人々のいのちと健康に貢献します。

私たちノバルティスファーマは、

分子標的薬や抗体医薬など最新の技術を生かして、

世界で140もの開発プロジェクトを進めています。

くすりを必要としている患者さんに、革新的な新薬を。

ノバルティスファーマの新薬は、これからも進化を続けます。

ノバルティスファーマ株式会社
http://www.novartis.co.jp/
カルテ保管の悩みを解消!!
～紙カルテの運用をそのままに電子化を実現～

01 受付
「本日のカルテ」を印刷する。

02 検査
過去のカルテはPC・iPadを参照しながら、「本日のカルテ」に検査結果を記入する。レフ・ノンコン等のレシートを貼り付ける。

診察
過去のカルテはPCを参照しながら、「本日のカルテ」に所見や処方等を記入する。

04 会計
「本日のカルテ」を見ながらレセコンで会計をする。

スキャン
会計が終わったカルテはまとめてスキャンし、電子保存する。

05 NEWコンセプトカルテシステム

カルテ発行時にQRコードを印字またはシールを貼りつけます。QRコードの情報をもとに、カルテを自動的に仕分けて保存します。

QRコードは（株）デンソーウェーブの登録商標です

眼科医療機器専門商社
リッツメディカル

本社営業部／愛知県豊川市伊奈町新屋 279 番地
TEL.0533-72-5210  FAX.0533-78-3120
URL http://www.ritz-med.co.jp/

【営業所】東京・品川・西東京・千葉・埼玉・茨城・横浜・厚木・山梨・松本・長野・静岡・浜松・名古屋・名古屋西・春日井
愛知・三重・京都・大阪北・大阪・奈良・和歌山・神戸・姫路・広島・高松・北九州・福岡・宮崎・熊本・鹿児島
治療強化にザララム

3. 相互作用

併用注意（併用使用に注意すること）

・ネプラリン、ビペリシン・ディスプルジョン・ファセット・エメール・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィッシャー・ジェイエーフィっ

●その他の使用上の注意等の詳細は添付文書をご参照ください。

ザララム配合点眼液 Xalacom Combination Eye Drops

ラタバスロスト・チモールマレイン酸塩配合

処方箋薬品：注意（医師の処方箋により使用すること）

製造販売：ファイザー株式会社

製造販売：ファイザー株式会社

2015年10月作成

**1** 151-J605 松山市常葉中央2-3-17

製造販売：ファイザー株式会社

製造販売：ファイザー株式会社

2015年10月作成
If I were you

It's not easy to make someone happy
Things you do that make us happy and things we do that make you happy
We would like to keep doing these things
For everyone's happiness is our priority,
We at Senju put ourselves in your shoes
every time we take the first step
Shaping the future of surgery
Santen specializes in the research, development, manufacturing and marketing of ophthalmic pharmaceuticals to protect and improve people’s eyesight and health. We have created innovative pharmaceuticals for all types of ophthalmic disorders and provide information tailored to clinical needs.

As a result, we lead Japan’s market for prescription ophthalmics. With marketing and development bases in Japan and other Asian countries, the United States and Europe, backed by first-rate R&D capabilities, we are committed to developing innovative medicines that contribute to the improvement of QOL (Quality of Life) of patients around the world.