SISTEMA SANITARIO REGIONALE





QUALE DONATORE PER QUALE TRAPIANTO: INFLUENZA DI ETA', GENERE E MALATTIE DEL DONATORE SUI TESSUTI OCULARI PREPARATI DALLA BANCA



22-24 Febbraio 2018, FIRENZE



INTRODUCTION

In recent years the surgical trends in keratoplasty have greatly changed: the needings of the prepared tissues in the eye bank have increased





How is the selection of tissues in the eye bank made?

How much do age and donor diseases affect this selection?

DONOR AGE AND GRAFT SURVIVAL IN PENETRATING KERATOPLASTY

The Cornea Donor Study (CDS) was designed primarly to evaluated the effect of donor age on graft survival and endothelial cell loss in penetrating keratoplasty for endothelial diseases



no difference in graft survival (86%)

group 1: donors 12-65 years old group 2: donors 66/75 years old

10-12 YEARS

Not-significant difference in graft survival

group 1: donors 12-65 years old **77%** group 2: donors 66/75 years old **71%**

However, there was a suggestion of an age effect at the extremes of the donor age range: 96% survival for 80 donors 12 to 33 years old 62% survival for 130 donors 72 to 75 years old

> Cornea Donor Study Investigator Group. The effect of donor age on corneal transplantation outcome: results of the cornea donor study. Ophthalmology. 2008; 115:620–6. [PubMed: 18387407]

Cornea Donor Study Group. The effect of donor age on penetrating keratoplasty survival after 10 years in the Cornea Donor Study. Ophthalmology. 2013; 120:2419–27. [PubMed: 24246825]

Cornea Donor Study Investigator Group. Endothelial cell density to predict endothelial graft failure after penetrating keratoplasty. Arch Ophthalmol. 2010; 128:63–9. [PubMed: 20065219]

DONOR AGE AND GRAFT SURVIVAL IN DEEP ANTERIOR LAMELLAR KERATOPLASTY







Avascolar corneal leucoma and corneal thinning after **Pseudomonas Aeruginosa keratitis**



BE CAREFUL

Stromal trasparency Gerontoxon Long storage time

DONOR AGE AND GRAFT SURVIVAL IN DSAEK

Descemet stripping automated endothelial keratoplasty using corneas from elderly donors

Satoru Nakatani¹ · Akira Murakami¹

Graefes Arch Clin Exp Ophthalmol (2016) 254:1135-1140 DOI 10.1007/s00417-016-3317-y



Donor age had no influence on postoperative endothelial cell loss or graft survival after DSAEK

The longer interval from death to preservation seemed to lower the quality of the donor cornea

It seems reasonable to use corneas from donors aged 80 years or older for DSAEK provided the selection criteria are fulfilled

Fig. 1 Relationship between donor age and endothelial cell loss at 2 years after surgery. There was no correlation between donor age and endothelial cell loss (r=0.10, P=0.37, Spearman's rank correlation coefficient analysis)

DONOR AGE AND QUALITY OF THE CUT IN DSAEK

In the advanced age the cornea loses elsticity due to a progressive increase of the disulfide bonds between the microfibrils of the stroma.

The cut of the deep corneal stroma with the microkeratome of an elderly donor is therefore more regular than a younger donor and the risk of perforation is lower.

Our experience.....



DONOR AGE AND SCUBA TECHNIQUE IN DMEK



Tissue from donors older than 65 years old peels faster, and this advantage is related to deposition of the posterior non-banded layer of DM



The grafts from donors younger than 50 years schould not be used in DMEK but reserved for DSAEK or PK

Cornea 2014;33:683-685



DONOR AGE AND DM STRIPPING

Cornea 2014;33:683–685 Donor Tissue Characteristics in Preparation of DMEK Grafts

Ian R. Gorovoy, MD,* Qi N. Cui, MD, PhD,* and Mark S. Gorovoy, MD⁺

The few grafts in this series from patients younger than 50 years old were most likely to develop tight spontaneous scrolls and predispose to subsequent detachments postoperatively.

Sometime there is difficulty in graft peeling for both eye of the same donor. This notion speaks about the inherent adhesive qualities of the individuals'DM, its intercellular connective matrix, or the adjacent corneal stroma that undoubtelly exist.

THE AUTORS SUGGEST THAT GRAFTS FROM DONORS YOUNGER THAN 50 YEARS SHOULD NOT BE USED IN DMEK, BUT INSTEAD BE RESERVED FOR DSAEK OR PK

DIABETIC DONORS HAD INCREASED RISK OF DESTRUCTION BY TEARING DURING THE PRE-STRIPPING PROCESS INCREASE IN THE ADHESIVE GLYCOPROTEINS IN THE INTERFACIAL MATRIX BETWEEN DM AND STROMA ??





ASSOCIATION BETWEEN DONOR AGE AND GRAFT DETACHMENT

Factors Associated with Early Graft Detachment in Primary Descemet Membrane Endothelial Keratoplasty Pia Leon, ^{1,2,3} Mohit Parekh, ^{4,5} Yoav Nahum, ^{6,7} Michael Mimouni, ⁸ Giuseppe



Pia Leon,^{1,2,3} Mohit Parekh,^{4,5} Yoav Nahum,^{6,7} Michael Mimouni,⁸ Giuseppe Giannaccare,^{2,3,9} Laura Sapigni,^{2,3} Alessandro Ruzza,⁴ and Massimo Busin.^{2,3,10}

Two groups:1) With post operative detachment of DM2) Without post operative detachment of DM

✓ 173 eyes

No differences in terms of donor age, gender or diseases between both groups

.....the combination of DMEK with cataract surgery , air fill < 75% of anterior chamber height a 2-3hours postoperatively were found to be risk factors for post operative graft detachment

ASSOCIATION BETWEEN GRAFT STORAGE AND GRAFT DETACHMENT

Association Between Graft Storage Time and Donor Age With Endothelial Cell Density and Graft Adherence After Descemet Membrane Endothelial Keratoplasty

Marina Rodriguez-Calvo de Mora, MD; Esther A. Groeneveld-van Beek, MSc; Laurence E. Frank, PhD; Jacqueline van der Wees, PhD; Silke Oeilerich, PhD; Marieke Bruinsma, PhD; Gerrit R. J. Melles, MD, PhD

MELLES Am J Ophthalmol 2015

Organ culture storage

SCUBA technique



higher donor age may be associated with a lower chance of graft detachment

donor storage time should be kept as short as possible to improve short-term ECDs

DONOR AGE AND PDEK











THE AIR DISSECTS DUA'S LAYER FROM DEEP STROMA

No correlation between pneumodissection and endothelial damage

(Agarwal A, et al Br J Ophthalmol 2014) (Altaan SL et al., Br J Ophthalmol 2015)

DONOR AGE AND PDEK

Pre-Descemet Endothelial Keratoplasty With Infant Donor Corneas: A Prospective Analysis

Ashvin Agarwal, MS,* Amar Agarwal, MS, FRCS, FRCOphth,* Priya Narang, MS,† Dhivya A. Kumar, MD,* and Soosan Jacob, DNB, FRCS*

(Cornea 2015;34:859-865)

The Descemet Membrane Endothelial Keratoplasry (DMEK) graft from young donors is more difficult to harvest and is also difficult to unfold inside the eye because younger donor tissue tends to curl up tightly.



It has been observed that it is surgically possible to dissect an approximately 35 microns graft from the donor corneas of both adults and infants with the help of air dissection

The presence of pre-descemetic-layer (DUA's Layer) to the DM- endotelium complex provides an extra splinting effect to the tissue leading to better maneuverability inside the anterior chamber

Scrolling Characteristics of Pre-Descemet Human Corneal Anatomy Redefined Endothelial Keratoplasty Tissue: An Ex Vivo Study A Novel Pre-Descemet's Layer (Dua's Layer) HARMINDER S. DUA, KAROLIEN TERMOTE, MOHAMED B, KENAWY, DALIA G, SAID, RAKESH IAYASWAL, MARIO NUBILE, LEONARDO MASTROPASQUA, AND SIMON HOLLAND Harminder S. Dua, MD, PhD,¹ Lana A. Faraj, MD, MSc,¹ Dalia G. Said, MD, FRCS,¹ Trevor Gray, MSc,² (Am J Ophthalmol 2016;166:84-90. James Lowe, MD, FRCPath Ophthalmology 2013; в DL Type-1 big bubbles (BBs). D DM anterior surface passage of air Type-2 BBs. posterior surface Dua's layer (DL) stromal bed of a type-1 big bubble

The posterior non-banded layer thickness correles with age, increasing from 2 to 10 microns on average between the ages of 10 and 80 years old. The increase in thickness could provide increased support for the EDM layer, reducing roll tightness The Effect of Chronic Pulmonary Disease and Mechanical Ventilation on Corneal Donor Endothelial Cell Density and Transplant Suitability

CRONIC OBSTRUCTIVE PULMONARY DISEASES (COPD)

JORDAN A. MARGO, MARTHA F. WHITING, CLAYTON H. BROWN, CAROLINE K. HOOVER, AND WUQAAS M. MUNIR

JO.com. Aug 31, 2017.

We know that....

Short term hypobaric hypoxia

can cause increase central corneal thickness in healthy adults

Contact lens- induced local corneal hypoxia can cause changes in cell morphology, including increased polymegatism, pleomorphism and reduced endothelial functional reserve

TABLE 4. Effect of Mechanical Ventilation on Endothelial Cell Count When Compared to Donors Without Mechanical Ventilation

Time on Mechanical Ventilation	Frequency	Percentage	Cell Count Reduction	P Value
Any ventilation	13 874	34.9%	-15.24 (± 5.4) cells/mm ²	*P < .01
Up to or equal to 1 day	7117	17.9%	+5.31 (± 6.91) cells/mm ²	P = .442
>1 day and ≤7 days	5025	19.7%	-33.91 (± 7.71) cells/mm ²	*P < .001
>7 days and ≤30 days	1732	4.37%	-46.35 (± 11.85) cells/mm ²	*P < .001
>30 days	131	0.33%	-101.39 (± 45.2) cells/mm ²	*P = .02

*Statistically significant difference.

Number of corneal donor eyes and cell count reduction for each category of days on mechanical ventilation prior to death.

that mechanical ventilation, and specifically duration of ventilation, may have statistically significant effects on ECD and transplant suitability. Donors on long-term ventilation were more likely to have corneas unfit for transplantation, as well as statistically significant endothelial cell loss. We further demonstrate that any mechanical ventilation leads to endothelial cell loss, but at what point this loss becomes clinically relevant remains unanswered. The Effect of Donor Diabetes History on Graft Failure and Endothelial Cell Density 10 Years after Penetrating Keratoplasty

Jonathan H. Lass, MD,¹ Tonya D. Riddlesworth, PhD,² Robin L. Gal, MSPH,² Craig Kollman, PhD,² Beth A. Benetz, MA,¹ Francis W. Price, Jr., MD,³ Alan Sugar, MD,⁴ Mark A. Terry, MD,⁵ Mark Soper,⁶ Roy W. Beck, MD, PhD,² for the Cornea Donor Study Research Group*

AMERICAN ACADEMY

OF OPHTHALMOLOGY The Eye M.D. Association

Endothelial Cell Density

We know that....

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.... the corneal endothelium is adversely affected biochemically, morphologically and functionally by diabetes mellitus

1)The accumulation of intracellular sorbitol and disruption oh Na+ handling affecting the endothelial pump 2)he oxidative stress in diabetes has been found to advance endothelial apoptosis 3)Corneas fron donors with ID diabetes and medical complications have lower mean ECD values compared with other donors



Graft Failure

The **10- year graft failure** rate was 23% in 199 cases receiving a cornea from a donor with diabetes versus 26% in the 891 cases receiving cornea from a donor without diabetes (P=0,60)

There was no overall effect of donor diabetes history after adjusting for donor age and baseline ECD (P=0,86) after 10 years follow-up

IN CONCLUSION....



DEATH TO PRESERVATION TIME

STORAGE TIME

CRONIC OBSTRUCTIVE PULMONARY DISEASES

DIABETES history?

DALK

Stromal transparency Gerontoxon AS-OCT thickness

ECD> 2500

Donor age > 50 years old SCUBA technique (stripping)

AGE OF DONOR IS NOT IMPORTANT PNEUMODISSECTION (Bubble type 1 for PDEK e type 2 for DMEK)



DSAEK

•Donor age > 50 years old

•ECD >2500 CELL

Large scleral ring

THANK YOU