Eye Banking Factors in the The Australian Corneal Graft Registry

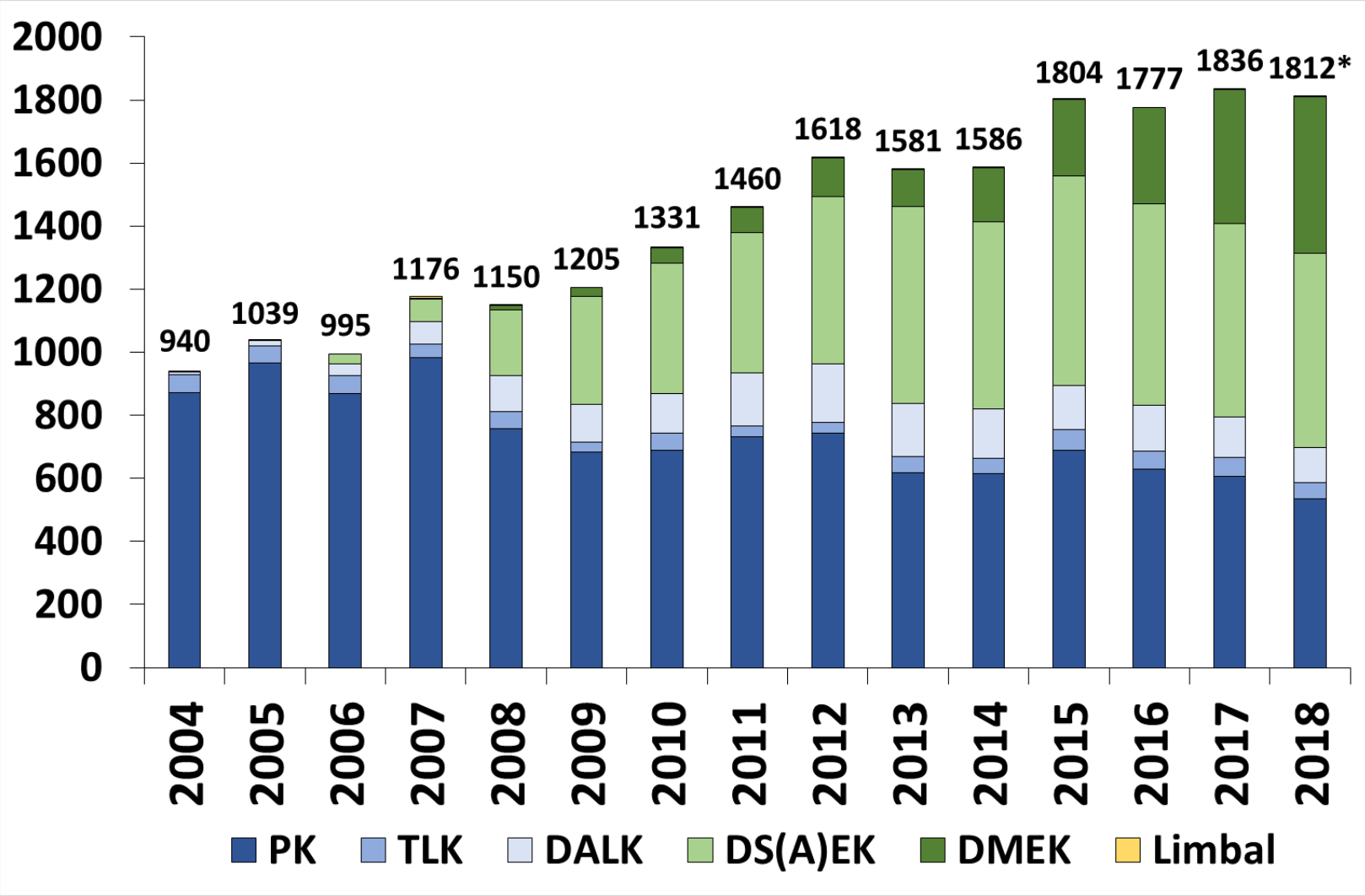
Presented by Miriam Keane, PhD

ACGR Executive Director

At the Eye Bank Association of Australia and New Zealand Meeting

March 5th 2019

Registered Graft Numbers



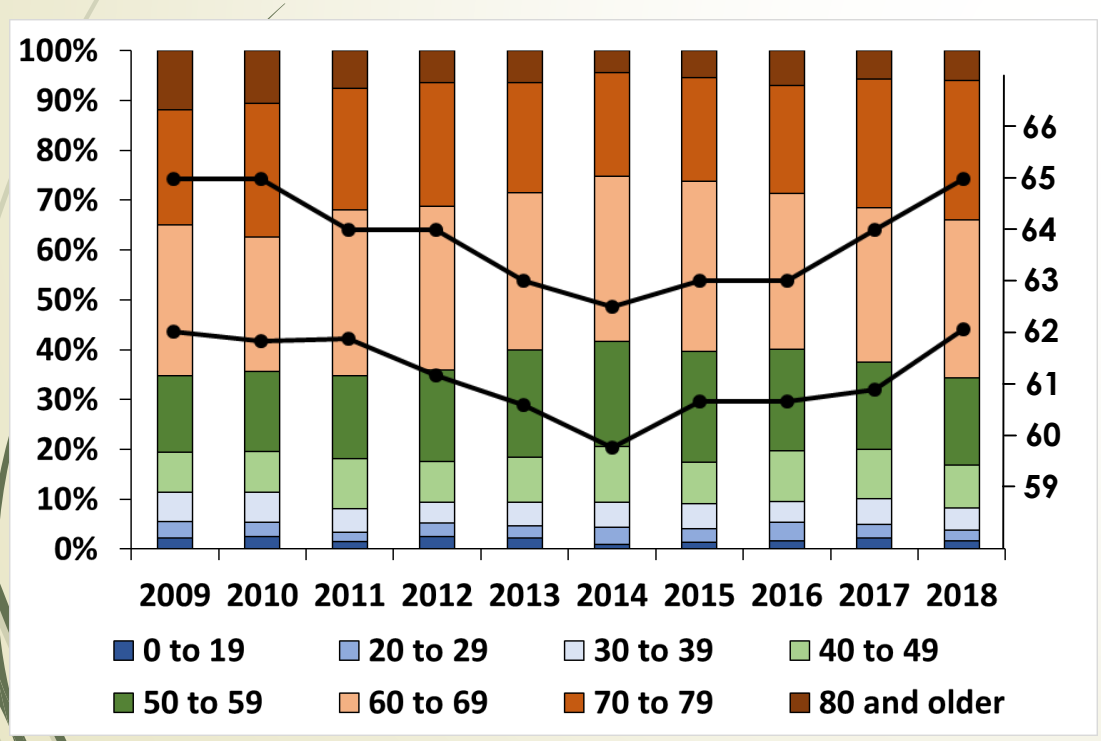
*As received by 15th February 2019

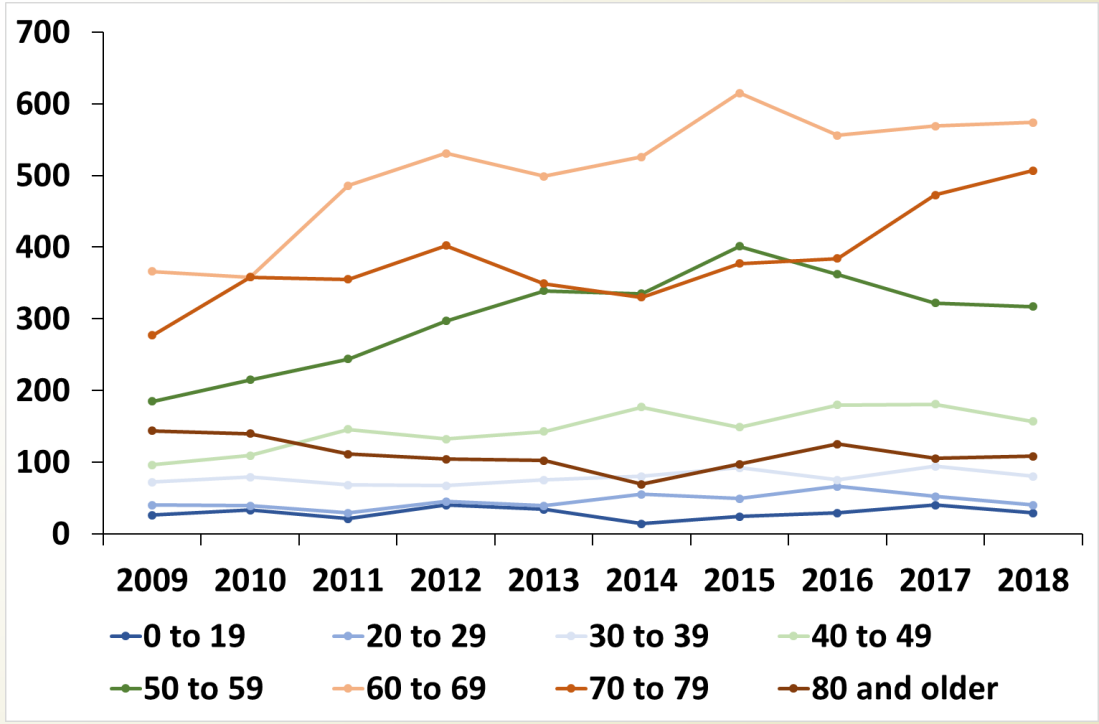
Have Donor Profiles Changed?

- **Donor sex**
  - **Consistently more males: 40% to 60% split**
- **Multi organ donors**
  - **12 to 16% per year: No clear pattern of increase or decrease**

Changes is Donor Profiles?

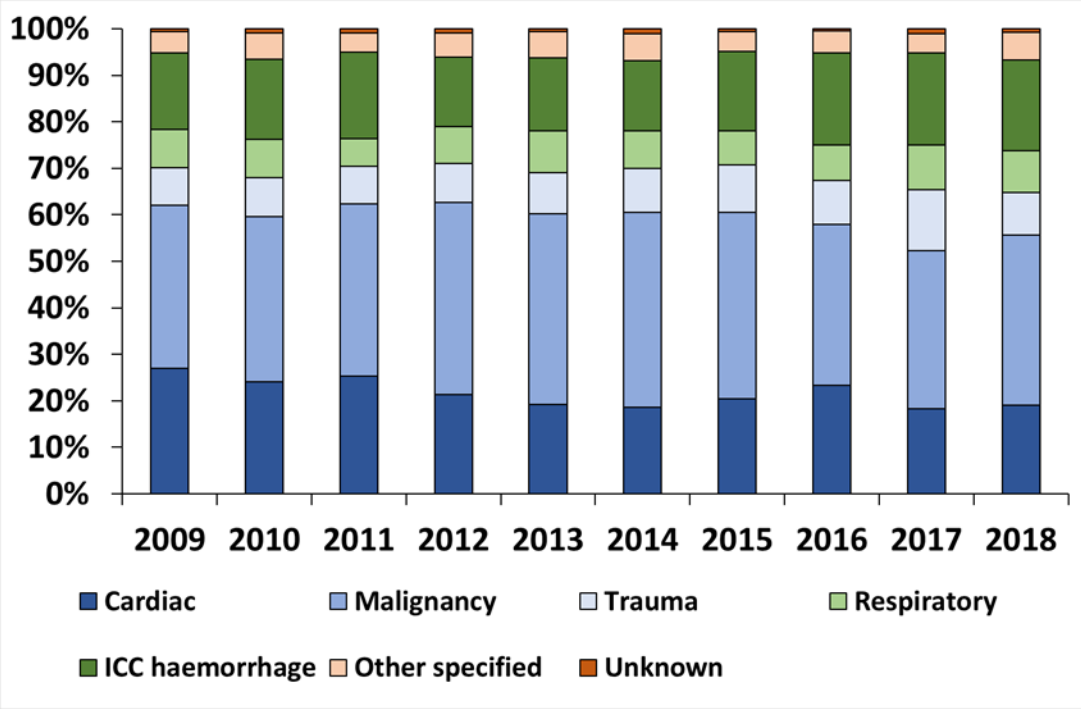
- Donor age groups
  - Mean and medians had dipped but increasing again
  - 1/5 under 50 years
  - Majority of donors (approximately 1/3) aged 60 to 69

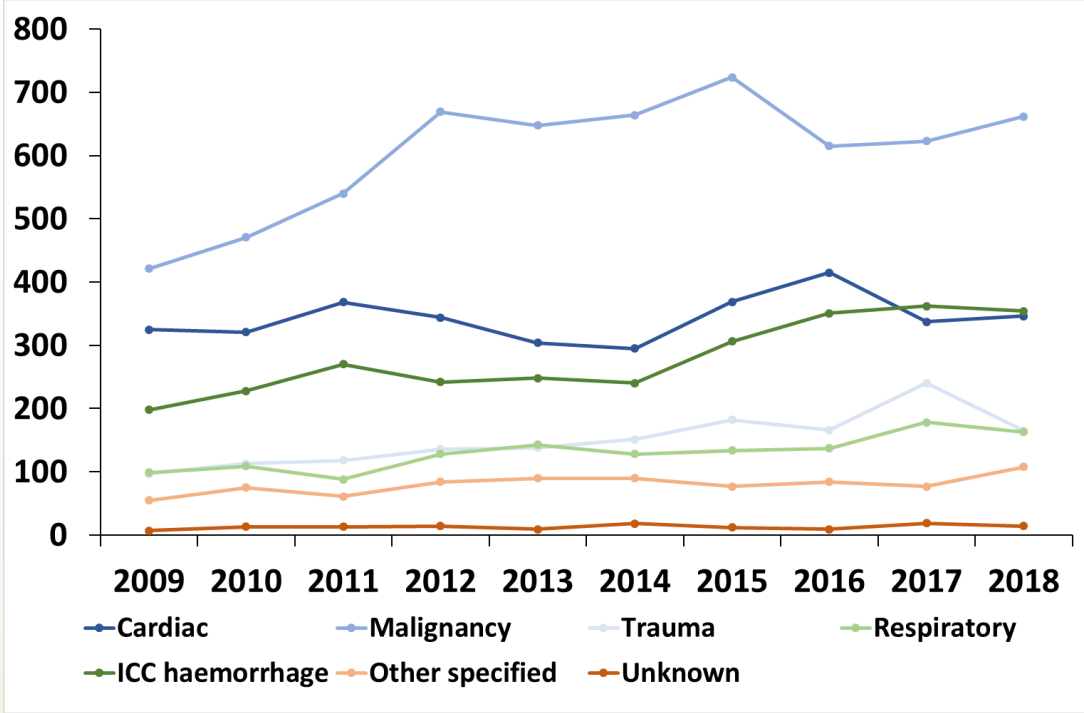




Changes is Donor Profiles?

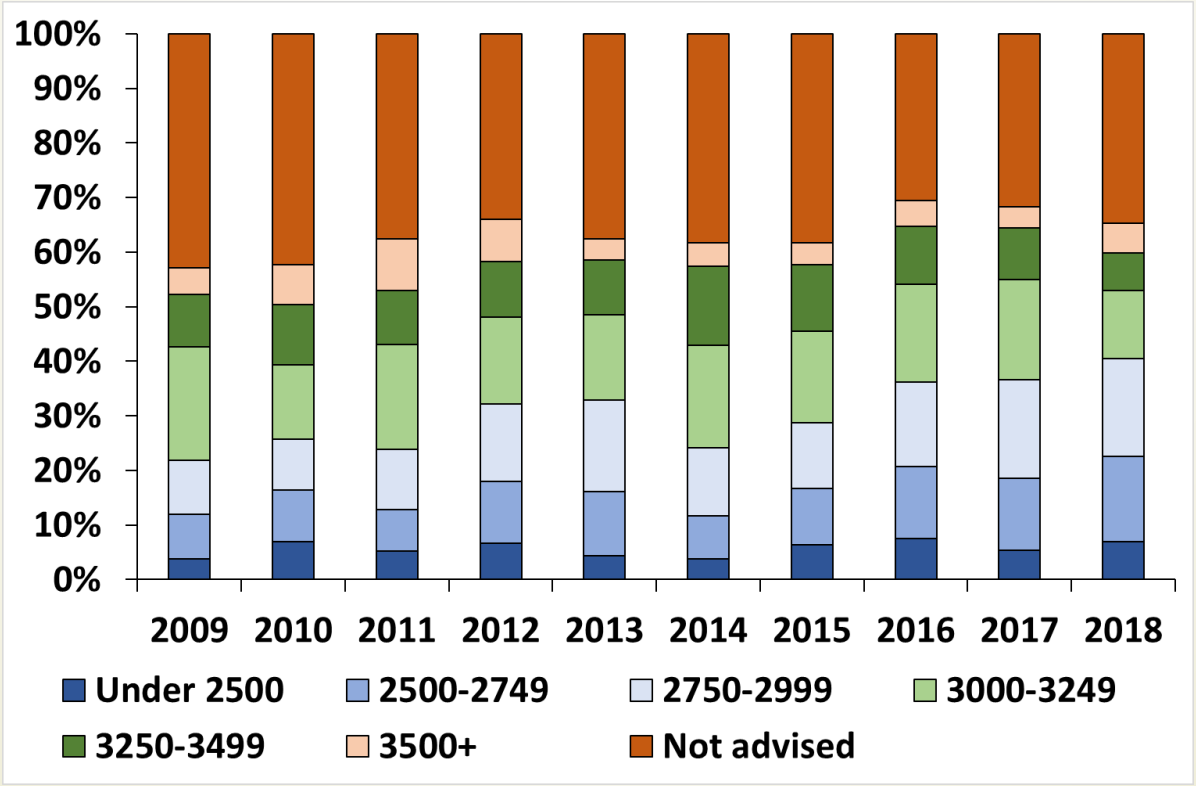
- Cause of donor death
  - Most common malignancy (just above 1/3)
  - Proportions have remained fairly consistent
  - Intracranial/cerebral haemorrhages/cardiac vying for 2nd spot





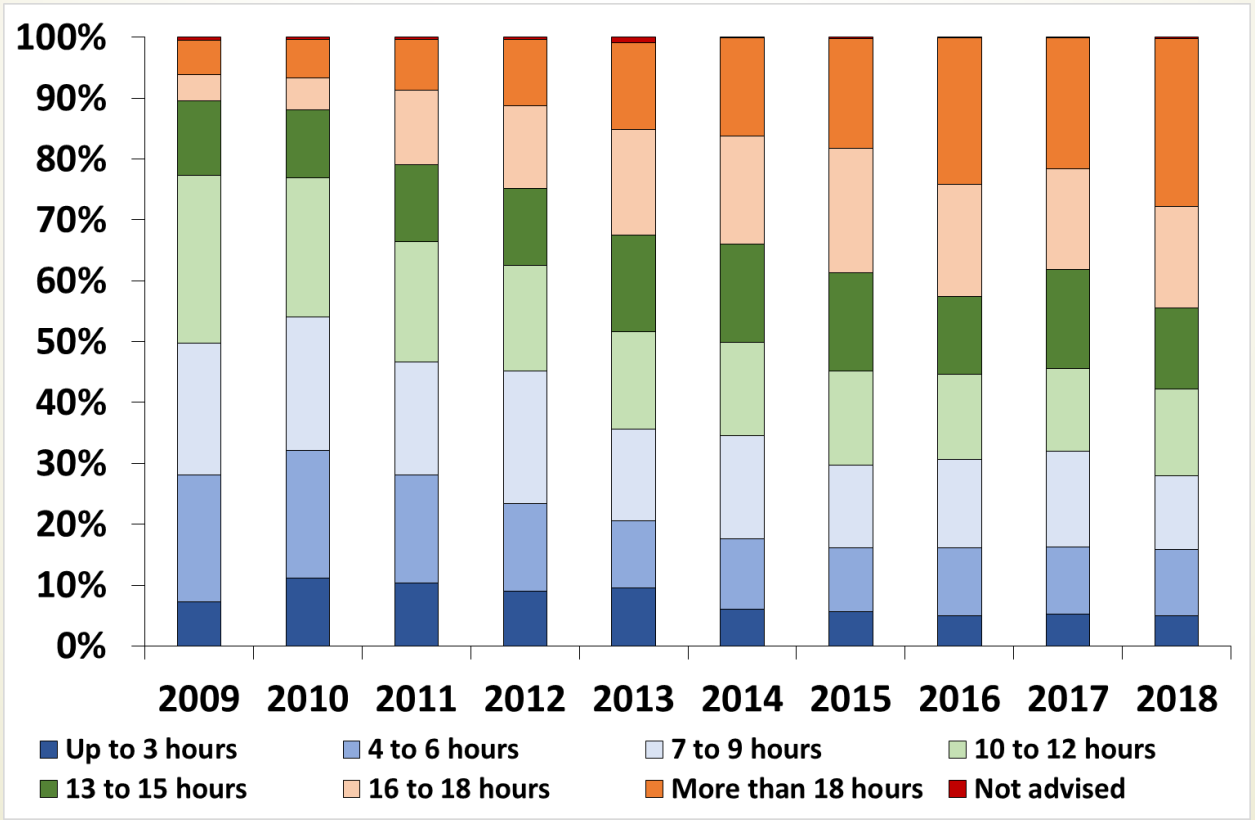
Endothelial Cell Counts

- 4 to 7% in the under 2500 cells/mm² category
- Increase in counts 2500 to 3000
- Mean/median cell count around 3000



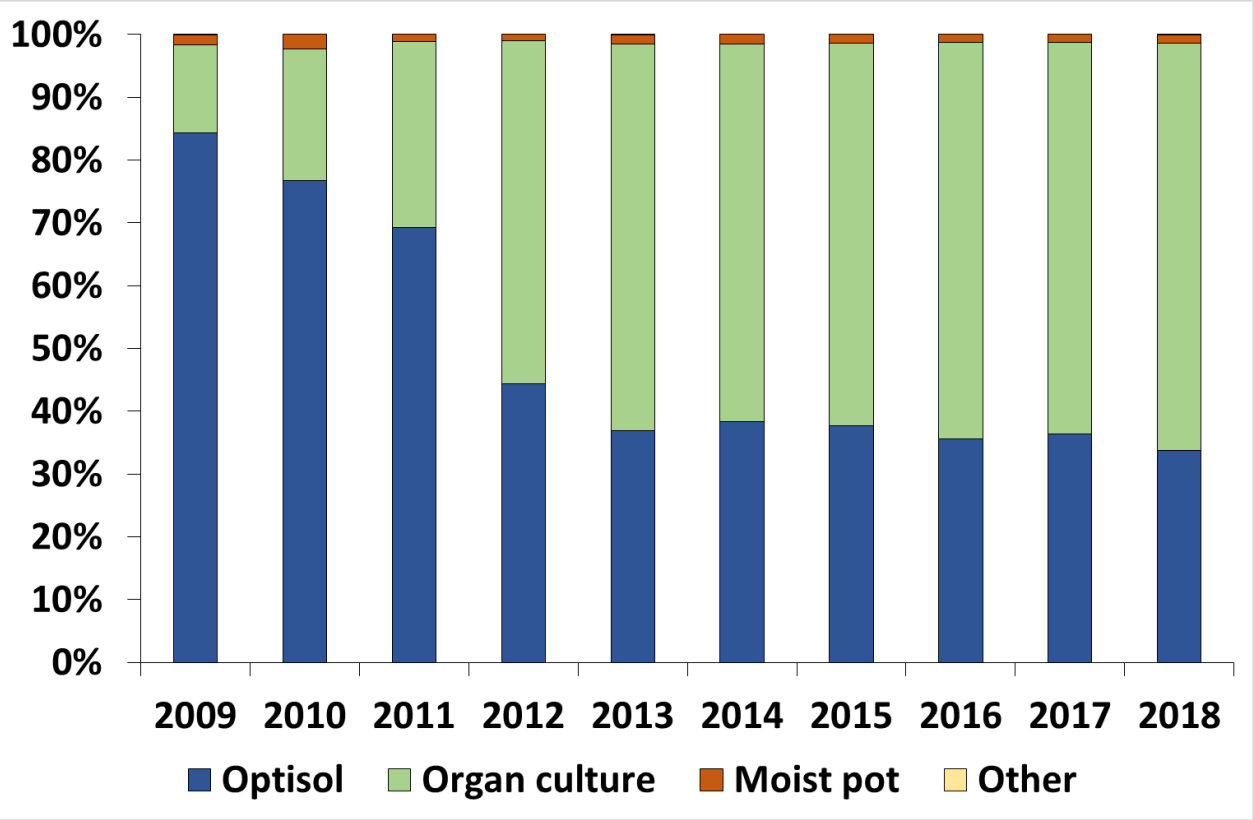
Changes is Eye Bank Procedures?

- Time from death to enucleation
  - Higher percentages in longer time groups
  - Mean and median both raised from 9/10 to 13/14 hours



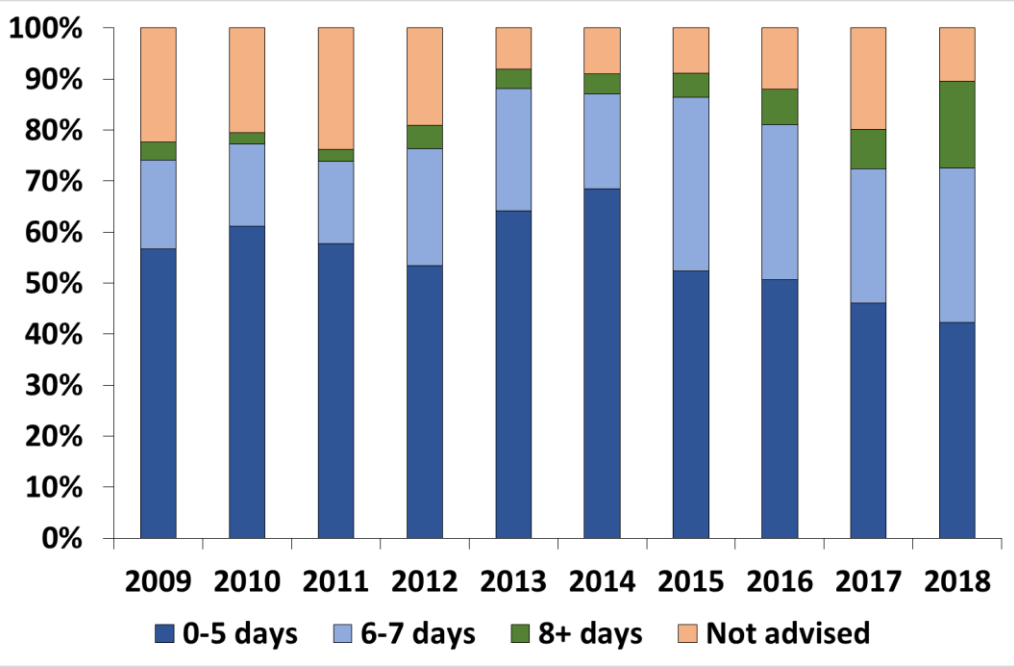
Changes is Eye Bank Procedures?

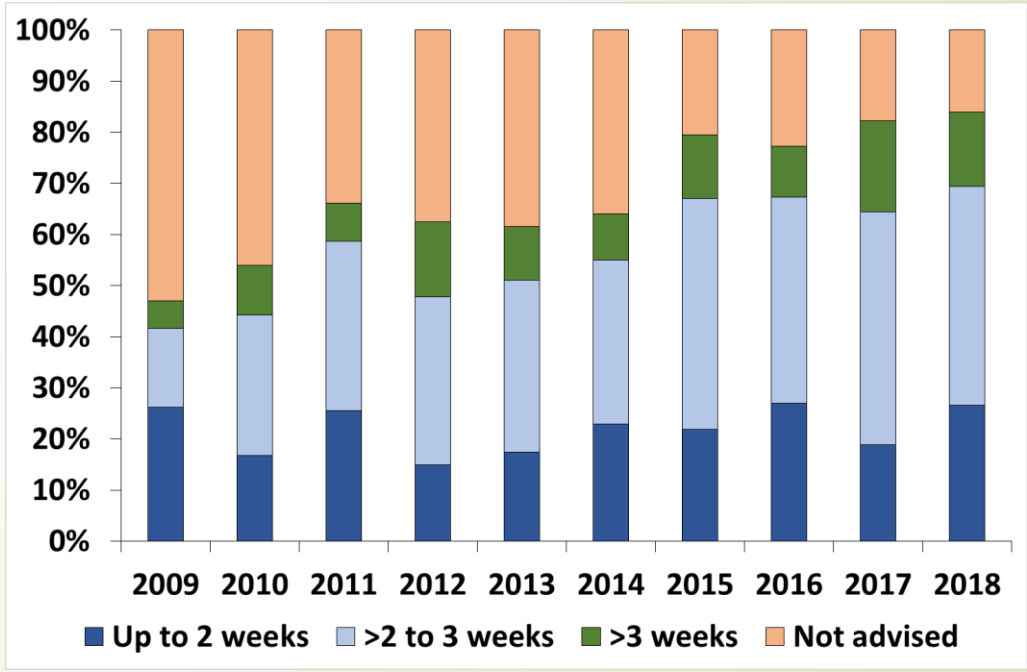
- Storage media
  - Shift to organ culture stabilised – future?
  - Still small numbers of moist pot



Changes is Eye Bank Procedures?

- Length of corneal storage
  - A lot fewer unadvised now
  - Optisol: Mean and median 3/4 days increased to 5/6 days
  - Organ culture: Mean and median 13/14 days increased to 16/17 days





But what does this mean for the outcomes of corneal grafts?

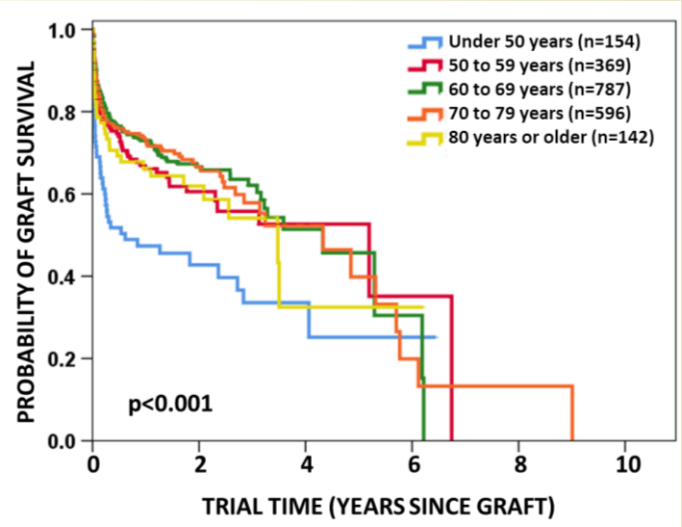
- Results from the 2018 report
  - New DMEK analyses

Effect on survival

- 2018 ACGR report
  - Endothelial cell count <2500 cells/mm² had significantly poorer survival for PK & DS(A)EK
    - Included in DS(A)EK multivariate, excluded from PK due to missing data
    - Still not significant for DMEK in latest analyses (p=0.815)
  - Time from death to enucleation not retained in any multivariate models
    - Still non significant for DMEK in latest analyses (p=0.906)
  - Donor age group

Donor Age group

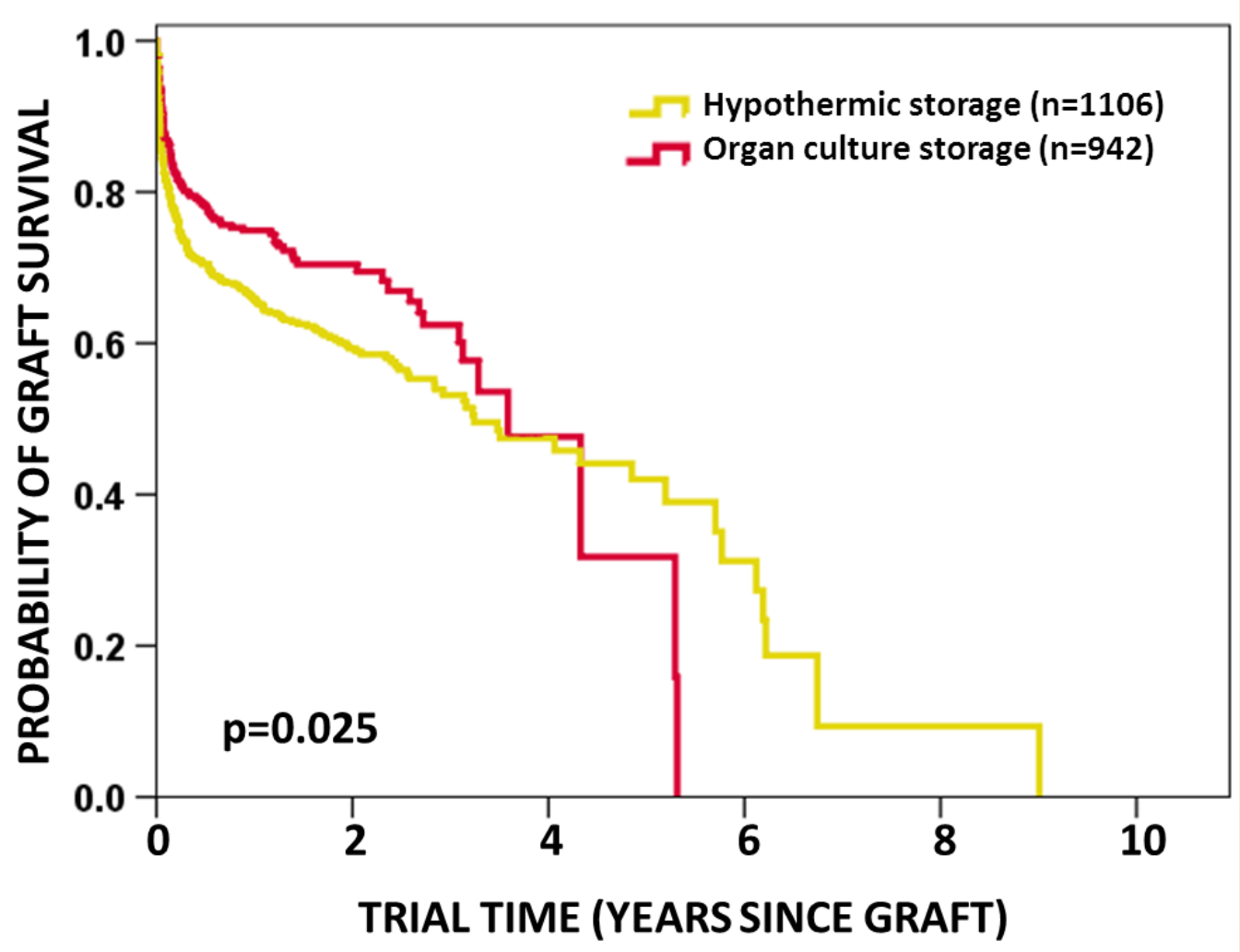
- PK results in 2018 report:
  - Under 50 years superior survival to each other 10 year age group (all p<0.001)
  - 50 to 59 years superior survival to 80 years and older (p=0.001)
- DS(A)EK results in 2018 report:
  - Under 40 years superior survival to 40 to 69 years (p=0.014)
  - Under 40 years superior survival to 70 years and older (p=0.001)
- New DMEK analysis reaffirms results of 2018 report:
  - Under 50 years poorer survival than 60 to 69 years (p=0.001)
  - Under 50 years poorer survival 70 to 79 years (p=0.001)
  - New: Under 50 years poorer survival 50 to 59 years (p=0.039)



Storage Media and Length of Storage

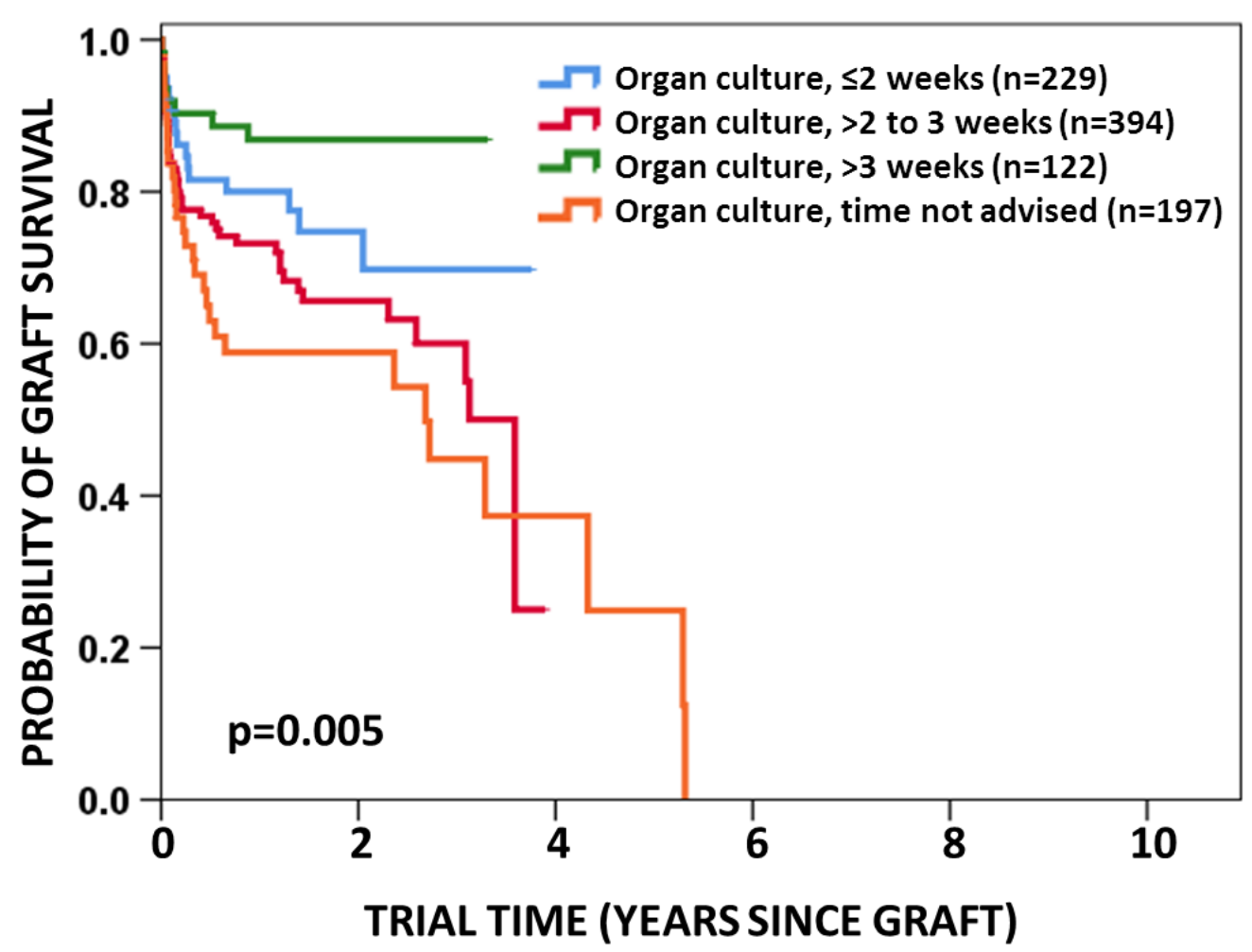
- 2018 Report
  - Storage type
    - Not retained in multivariate model for PK
    - Not significant after clustering by patient for DS(A)EK
    - Not significant for DMEK
  - Storage time in hypothermic media
    - Not retained in multivariate model for PK
    - Not significant for DS(A)EK or DMEK
  - Storage time for organ culture media
    - Not significant for PK, DS(A)EK or DMEK
- New DMEK analyses find differences

DMEK - Storage Media



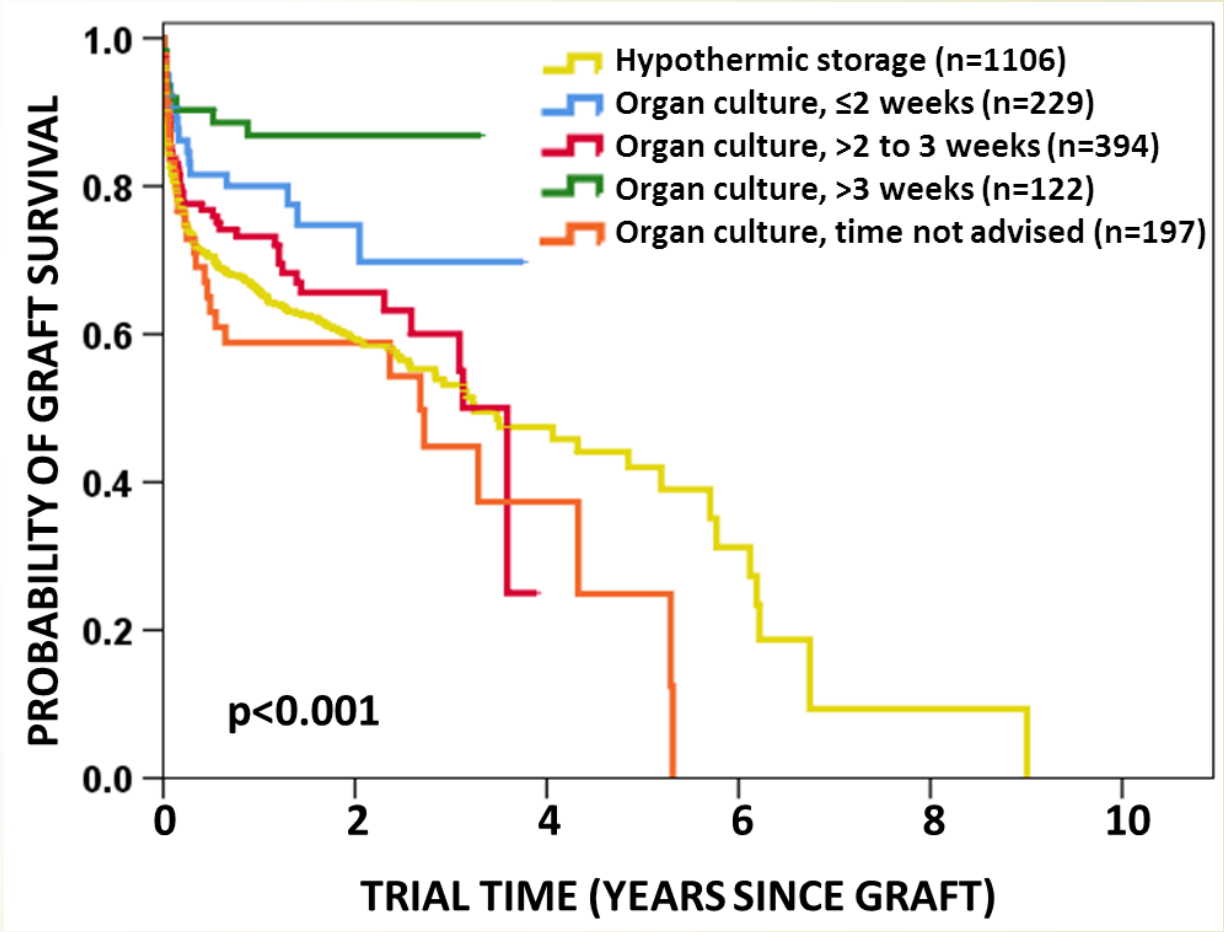
DMEK - Length of Storage

- Hypothermic storage: ≤5 days, 6/7 days, 8+ days, p=0.623



DMEK - Storage Media and Length of Storage

- Included in multivariate model, p=0.004
  - Once other factors were controlled for, Optisol (yellow line) had superior survival:
    - OC ≤ 2 weeks (blue line)
    - OC >2 to 3 weeks (red line)
    - OC time not advised (orange line)
  - No difference between Optisol (yellow line) and OC >3 weeks (green line)
  - OC>3 weeks (green line) had superior survival to OC>2 to 3 weeks (red line)

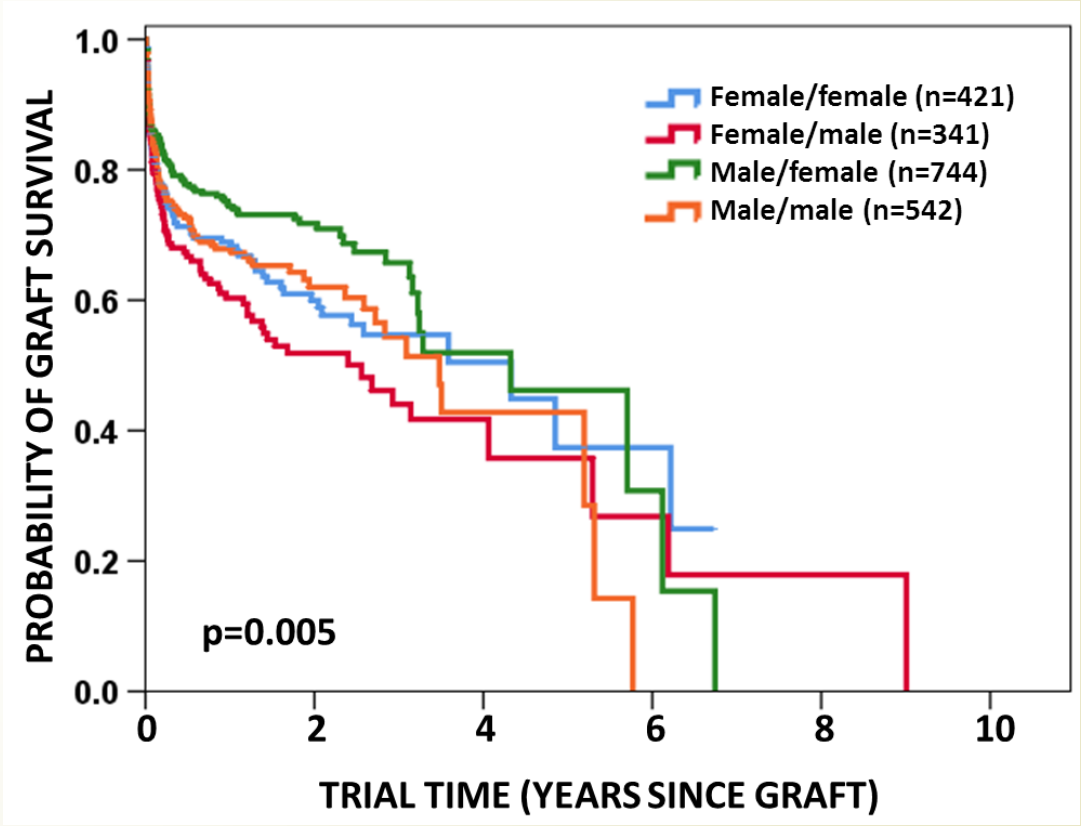


DMEK results update

- Included in multivariate model
  - Storage media and length of storage, p=0.004
  - Donor age group, p=0.006
  - Donor/recipient sex match/mismatch, p=0.009
  - Australian State where graft was performed, p<0.001
  - Recipient age group, p=0.002
  - Graft year, p=0.002
  - Graft size, p<0.001
  - Surgeon volume and level of follow-up, p<0.001

DMEK - Donor/Recipient Sex Match

- If H-Y antigen linked, you would expect poorer outcomes in male donor to female recipient (green line), particularly compared to female donor in female recipient (blue line)
- In multivariate model p=0.009
  - Female donor in male recipient (red line) had poorer survival than male donor in female recipient (green line), and male donor in male recipient (orange line)
  - No other comparisons were significant



Summary

- There have been some changes in donor profiles and eye bank procedures over the past 10 years, specifically:
  - An increase in time from death to enucleation
  - A shift to storage in organ culture
  - An increase in the time corneas are stored
- For the most part these factors do not appear to affect graft survival, except:
  - Storage time in organ culture for DMEK
- Donor recipient sex match also in DMEK multivariate model
  - Not related to H-Y antigen mismatch

Acknowledgments

- DonateLife – The Australian Government Organ and Tissue Authority
- Contributing surgeons, eye banks and follow-up practitioners

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Australian Corneal Graft Registry

Phone: 08 8204 5321

Email: miriam.keane@flinders.edu.au

Flinders UNIVERSITY
College of Medicine & Public Health