

The Australian Corneal Graft Registry 2019 Annual Report

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At the Australia and New Zealand Cornea Society Meeting

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Registered Grafts – 31st December 2019

**1985
onwards**

Introduced in  **2000**
2006
2007

	Registered
Total	38116 (100%)
PK	26101 (68%)
Patch	1589 (4%)
Limb	87 (<1%)
DALK	1825 (5%)
DS(A)EK	6144 (16%)
DMEK	2370 (6%)

Followed Grafts – 31st December 2019

**1985
onwards**

Introduced in  **2000**
2006
2007

	Registered	Followed
Total	38116 (100%)	81%
PK	26101 (68%)	85%
Patch	1589 (4%)	82%
Limb	87 (<1%)	78%
DALK	1825 (5%)	62%
DS(A)EK	6144 (16%)	76%
DMEK	2370 (6%)	57%

Failed Grafts – 31st December 2019

1985
onwards

Introduced in  2000
2006
2007

	Registered	Followed	Failed
Total	38116 (100%)	81%	22%
PK	26101 (68%)	85%	24%
Patch	1589 (4%)	82%	21%
Limbal	87 (<1%)	78%	35%
DALK	1825 (5%)	62%	8%
DS(A)EK	6144 (16%)	76%	19%
DMEK	2370 (6%)	57%	18%

Early/Primary Failures – 31st December 2019

1985
onwards

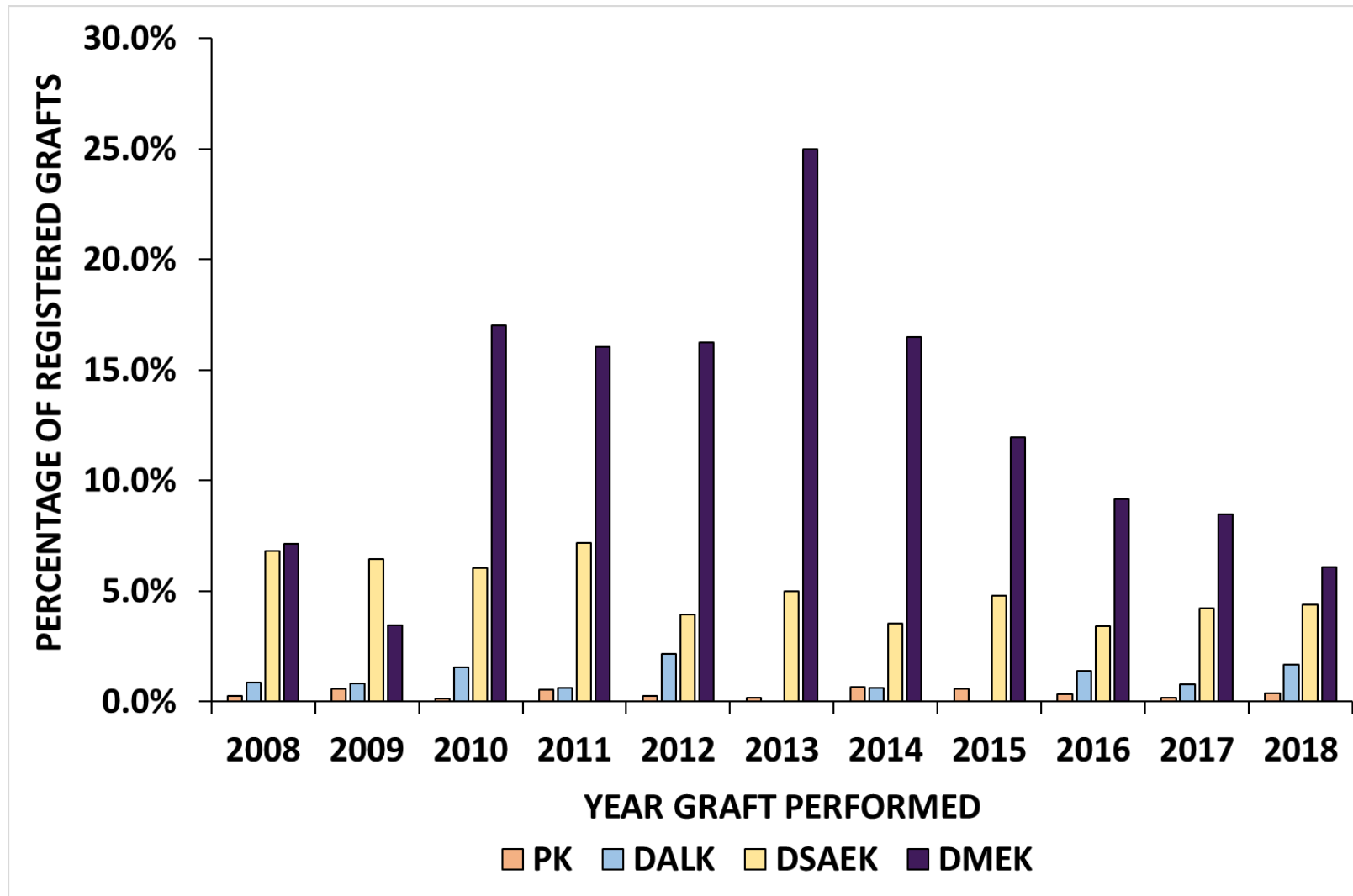
Introduced in  2000
2006
2007

	Registered	Followed	Failed	EGF*	PNF*
Total	38116	81%	22%	4%	2%
PK	26101 (68%)	85%	24%	2%	<1%
Patch	1589 (4%)	82%	21%	7%	1%
Limbal	87 (<1%)	78%	35%	6%	1%
DALK	1825 (5%)	62%	8%	2%	1%
DS(A)EK	6144 (16%)	76%	19%	5%	5%
DMEK	2370 (6%)	57%	18%	11%	10%

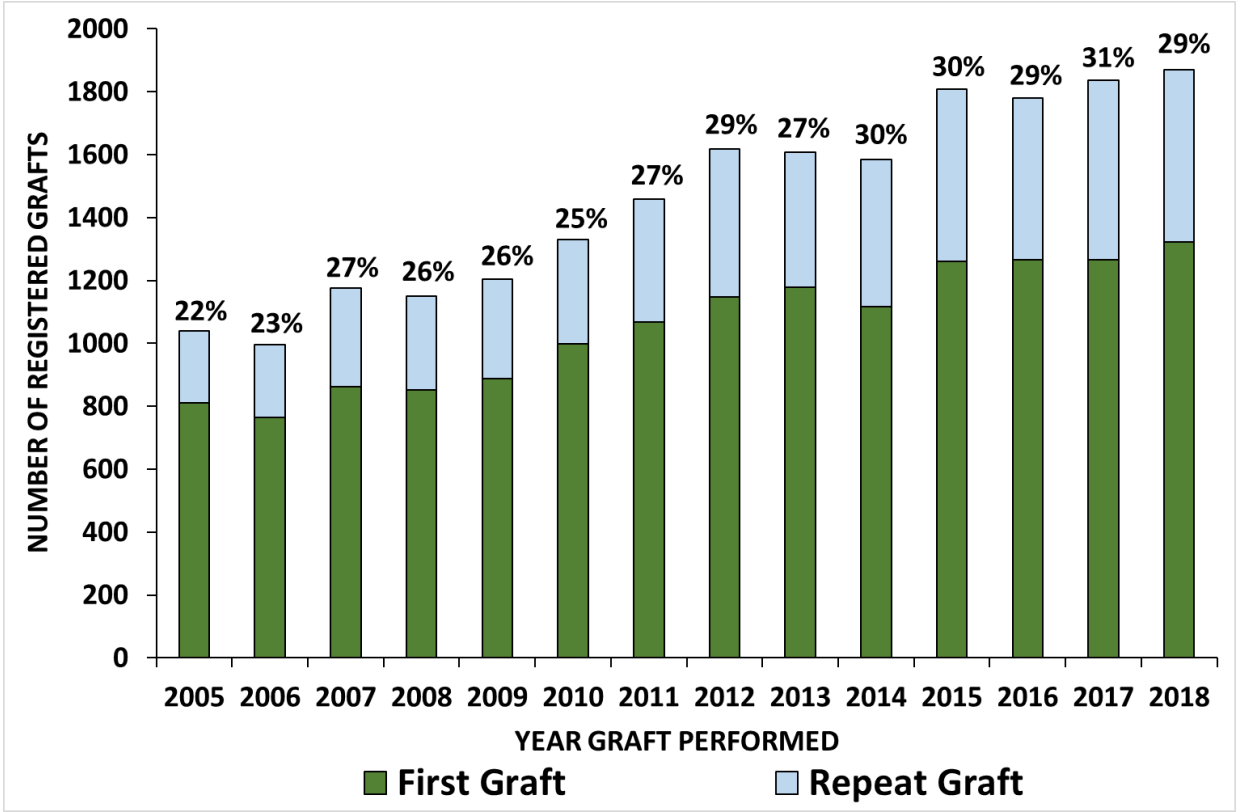
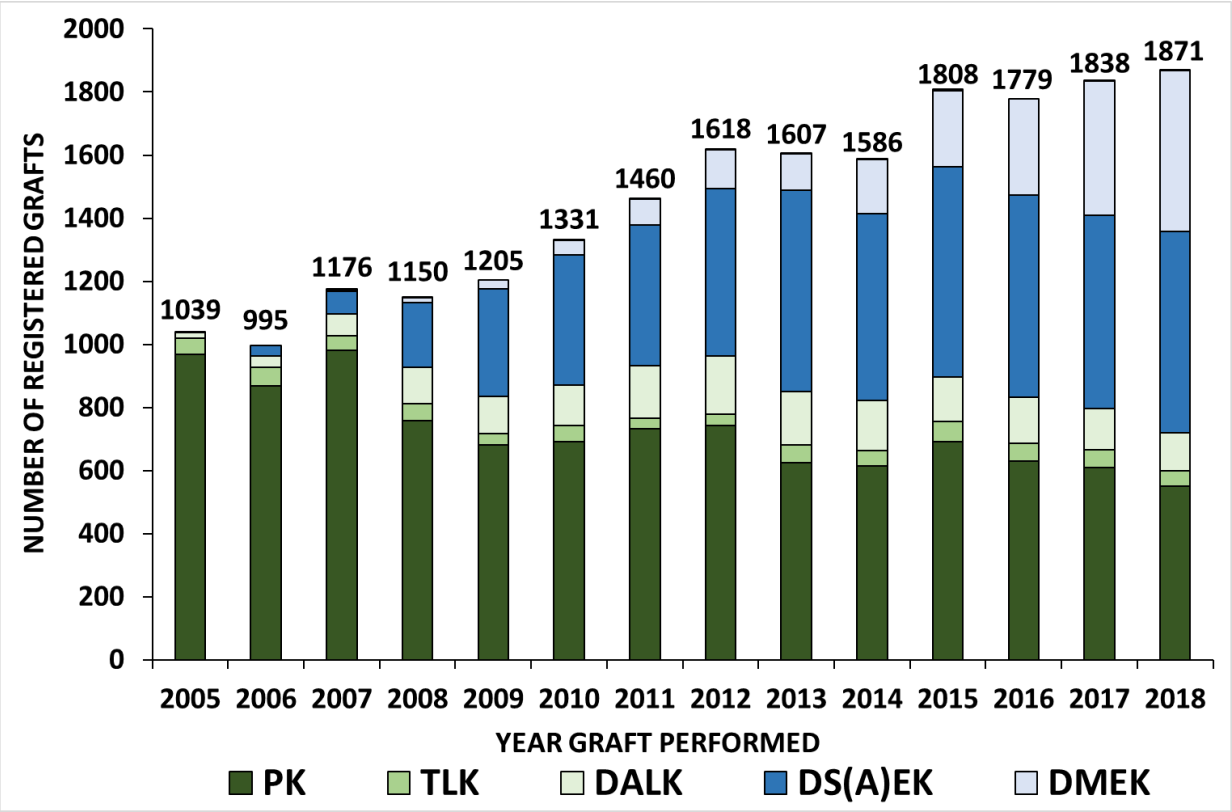
*EGF = Early graft failure, failed within 3 months of graft

PNF = Primary non-functioning graft, surgeon specified that graft never cleared/attached

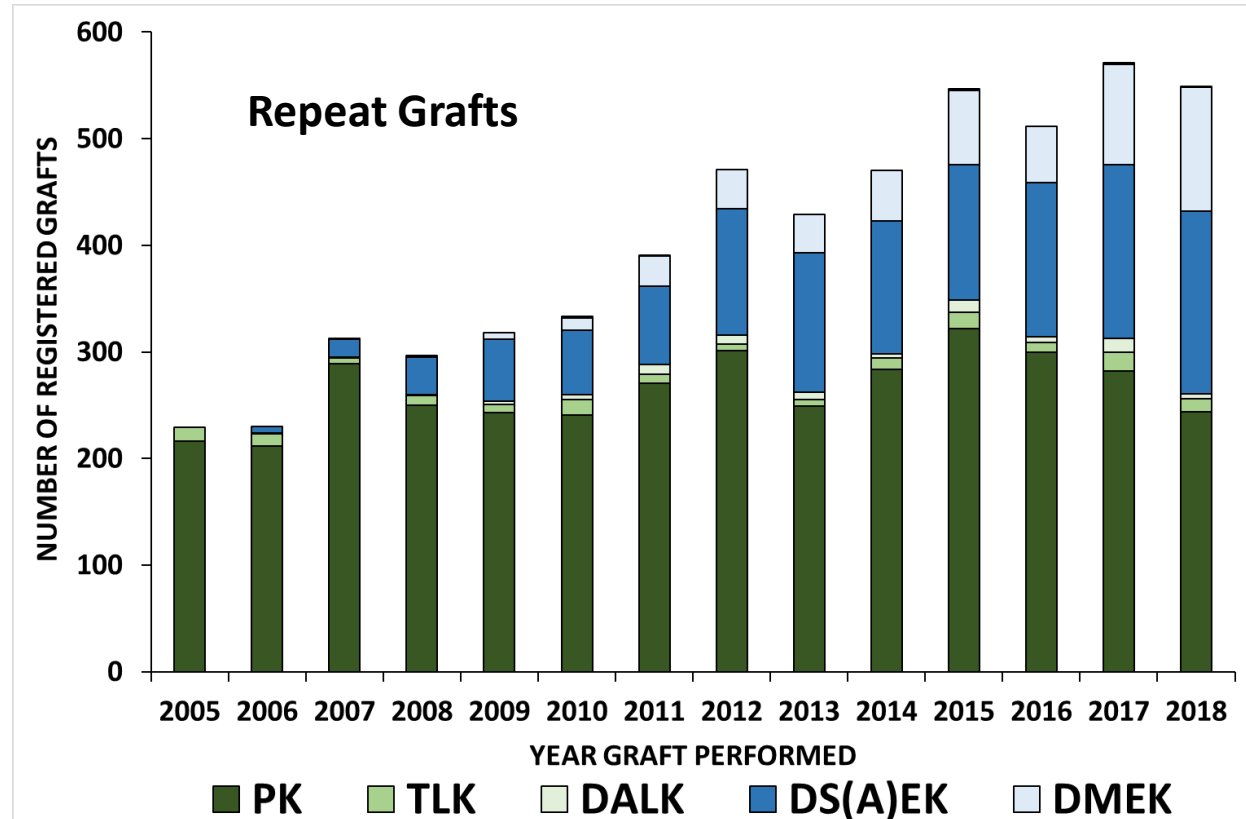
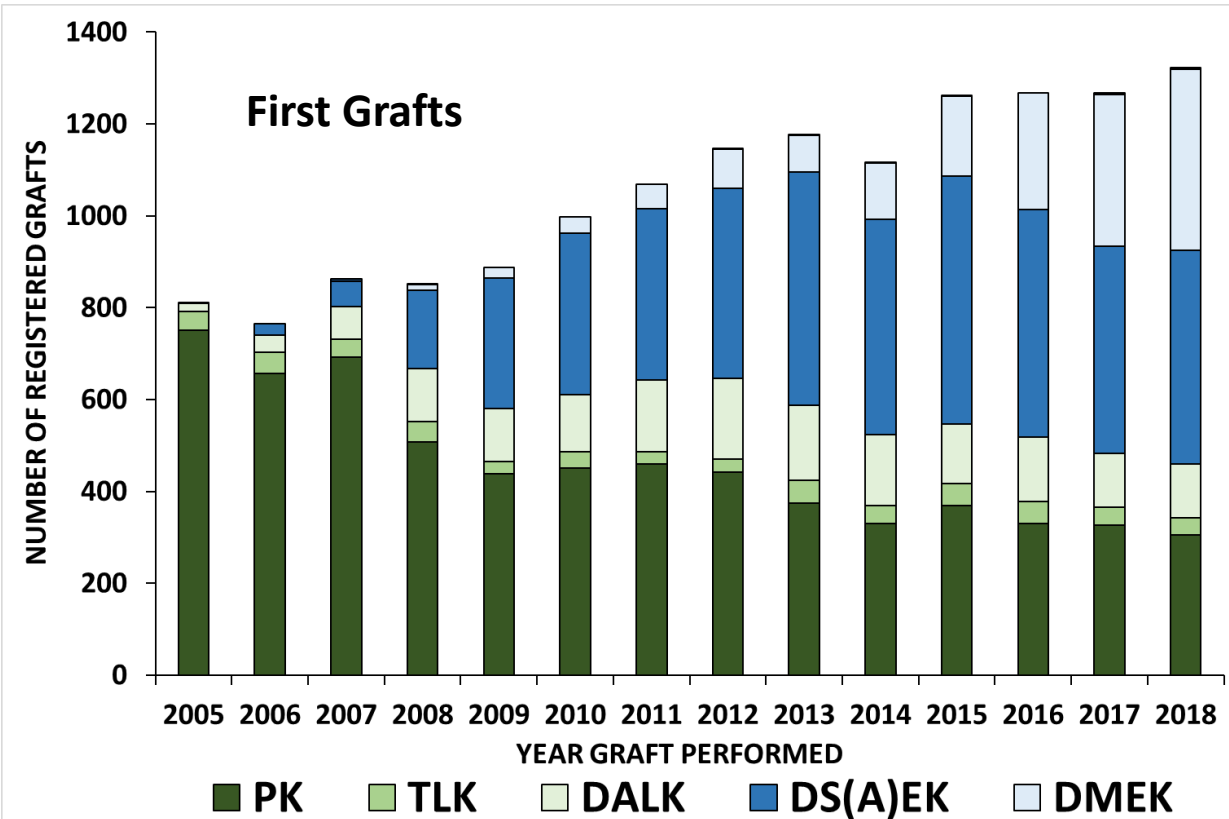
Primary Non-functioning Grafts (PNFG)



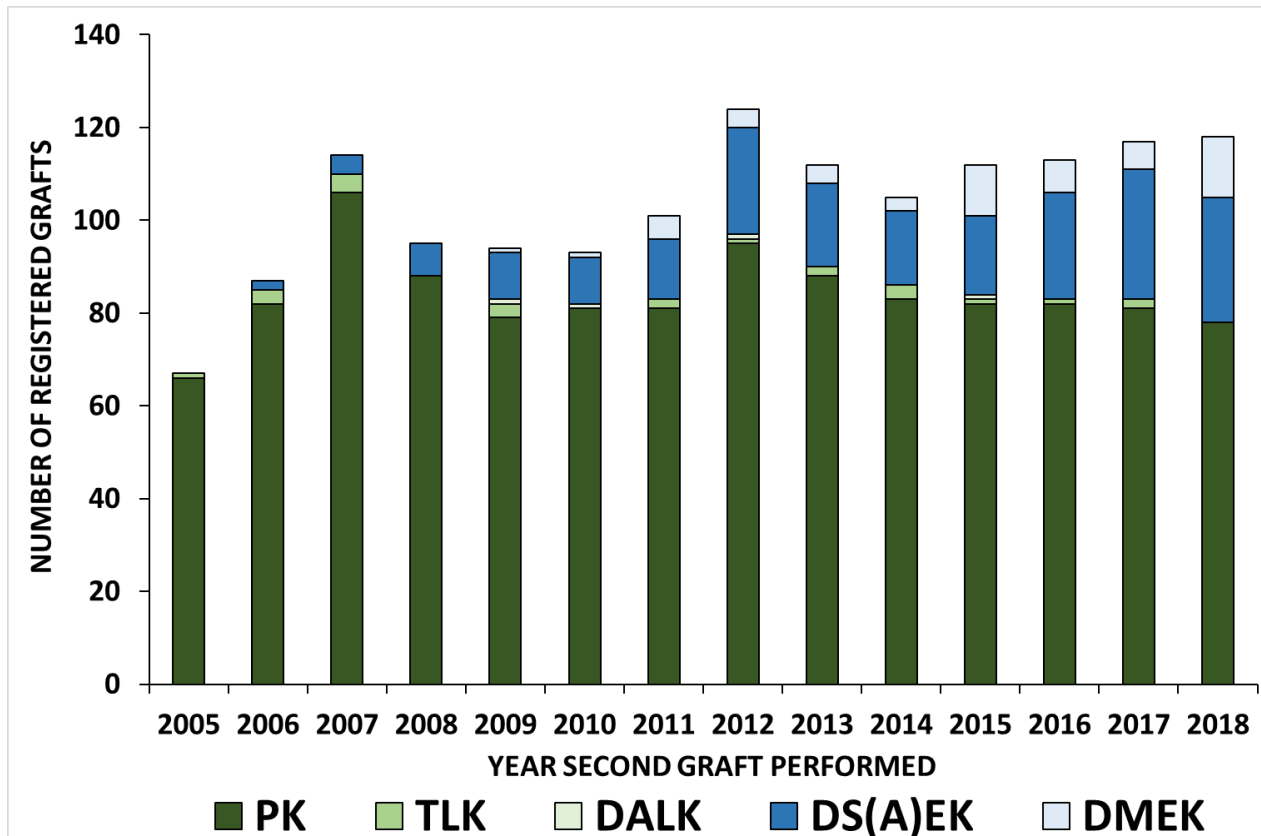
Number of Grafts Registered



First vs. Repeat Grafts by Graft Type



Second Graft Following Failure of First PK



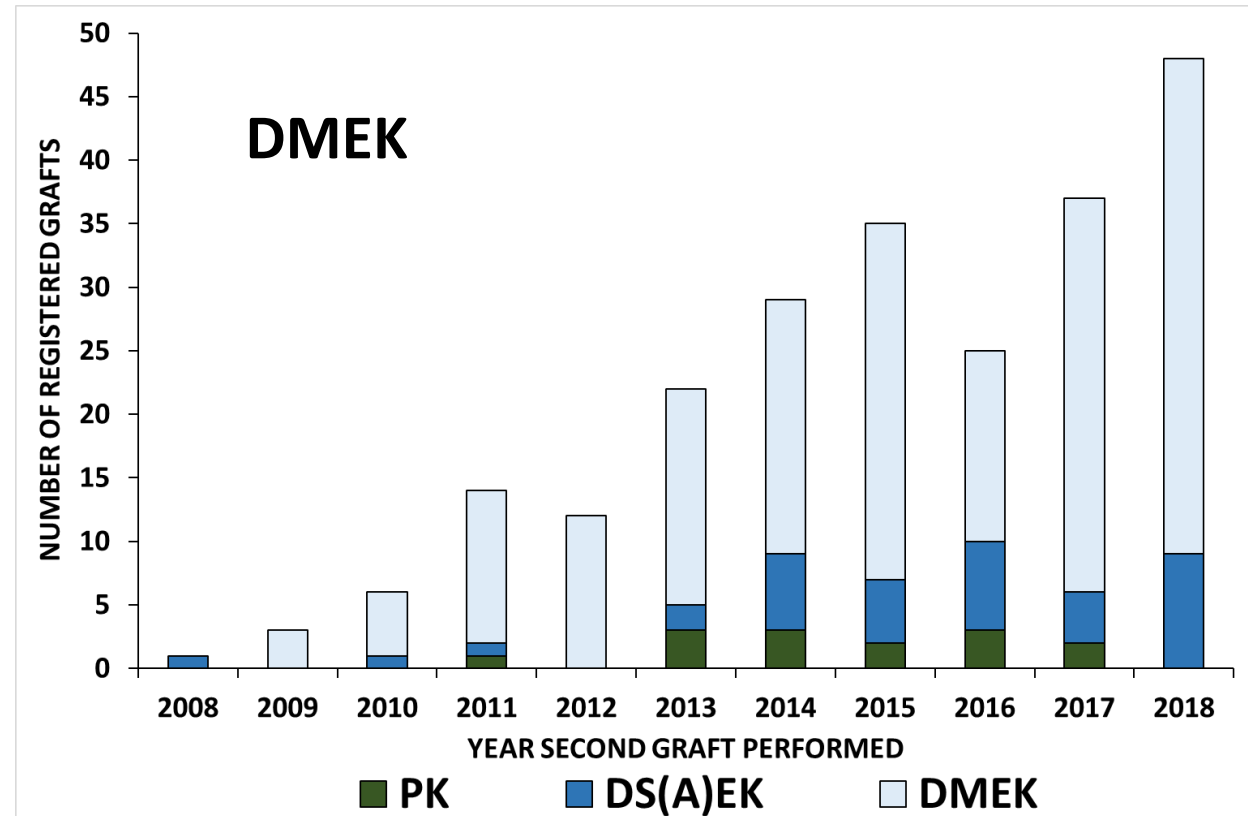
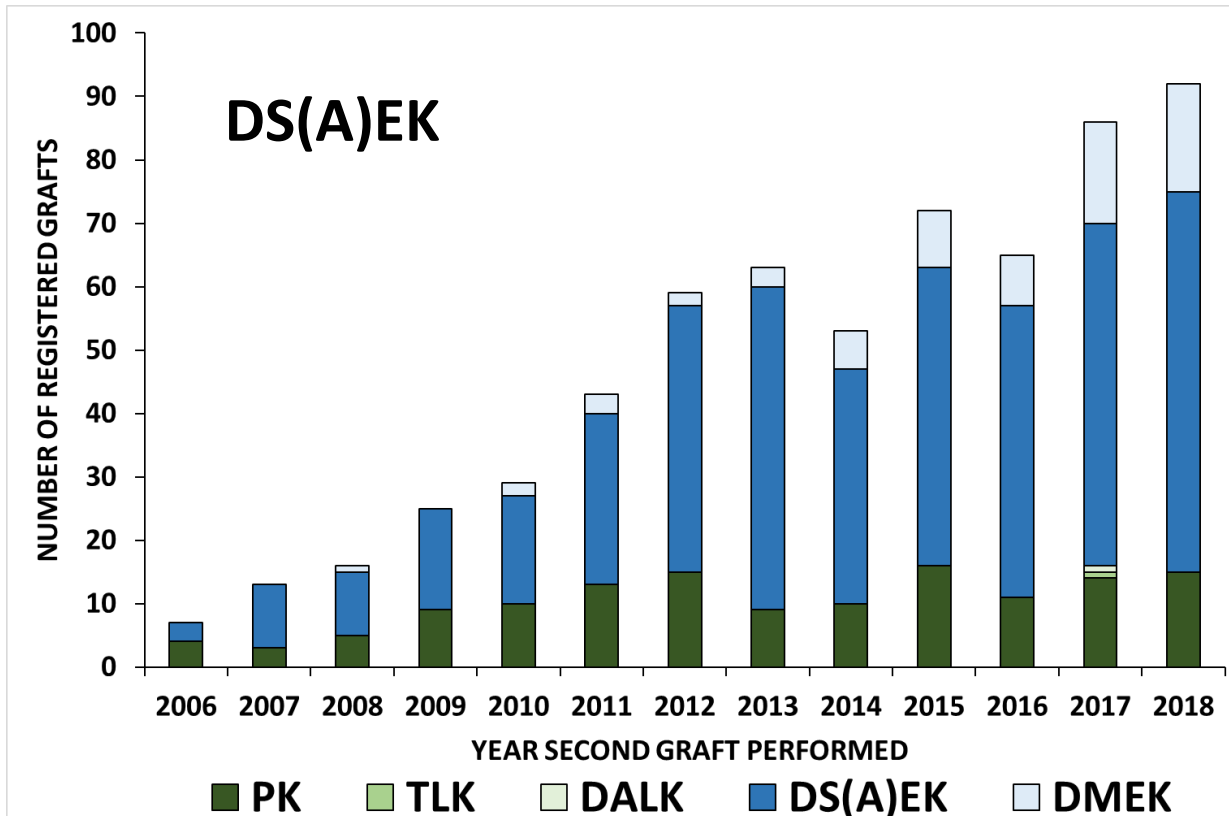
- Increased in second grafts per year
- 1/3 are EK

Reason for failure of first graft

	PK:PK	PK:DS(A)EK	PK:DMEK
Endothelial failure	24%	53%	61%
Rejection	22%	28%	30%
Other specified	40%*	7%	5%
Not specified	14%	12%	5%

*included: recurrent keratoconus/astigmatism (7%), non-herpetic infection (6%), ulcer (4%), scarring (3%), trauma (3%), herpetic infection (2%), glaucoma (2%), primary graft failure (2%), other (11%)

Second Graft Following Failure of First EK

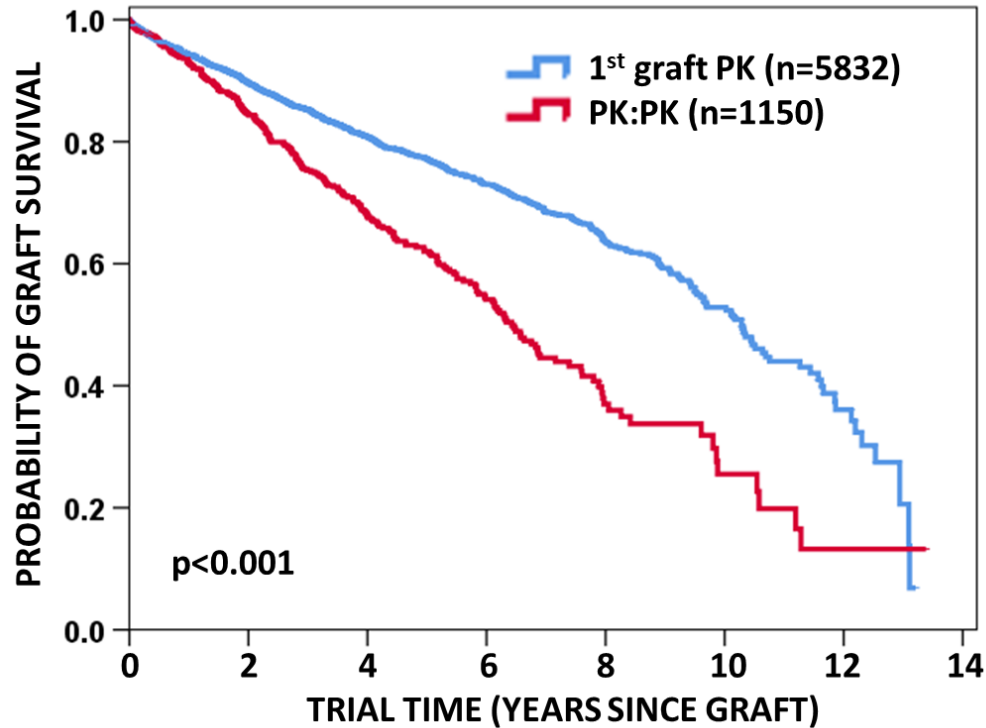


Differences in repeat graft survival depending on:

- **graft type**
- **survival length of first graft**

Second Graft following PK

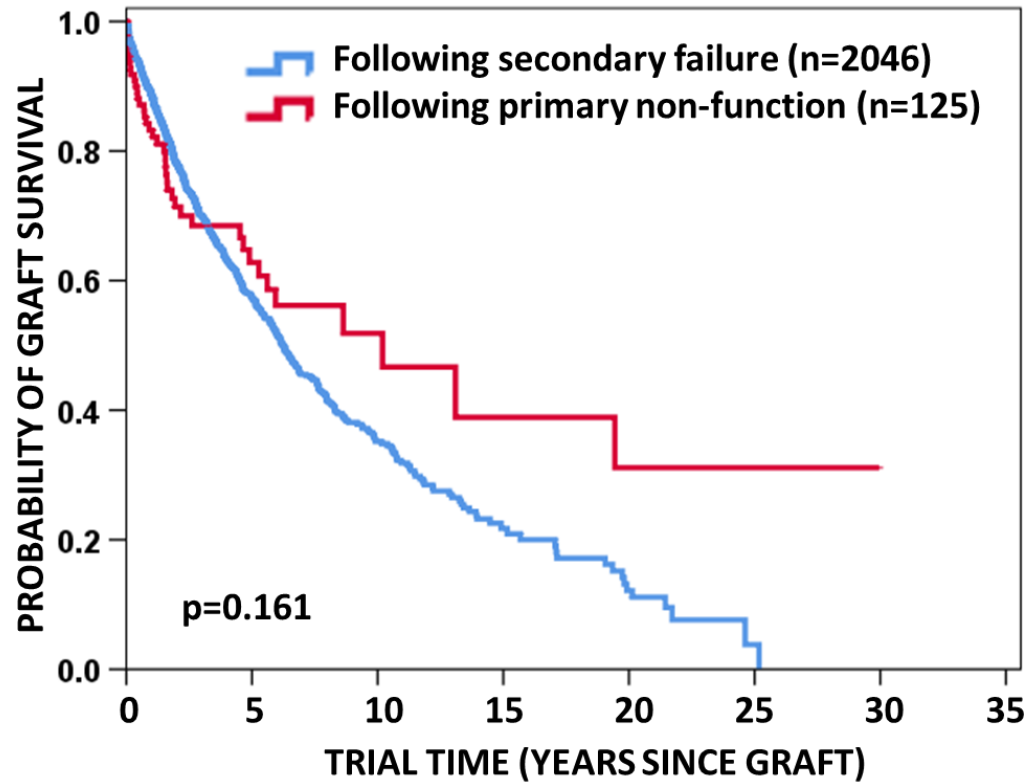
2006 onwards



- For all data since 1985
 - 19,200 first vs 2,171 second
 - $\text{Chi}^2 = 390.35, p < 0.001$
- Still the case for 2006 onwards
 - $\text{Chi}^2 = 75.09, p < 0.001$

	1 Year	2 Years	4 Years	6 Years	8 Years	10 Years	12 Years
PK	.94 (3596)	.90 (2640)	.81 (1454)	.73 (772)	.64 (329)	.53 (111)	.36 (25)
PK:PK	.93 (677)	.85 (506)	.68 (255)	.54 (124)	.37 (39)	.26 (10)	NA (1)

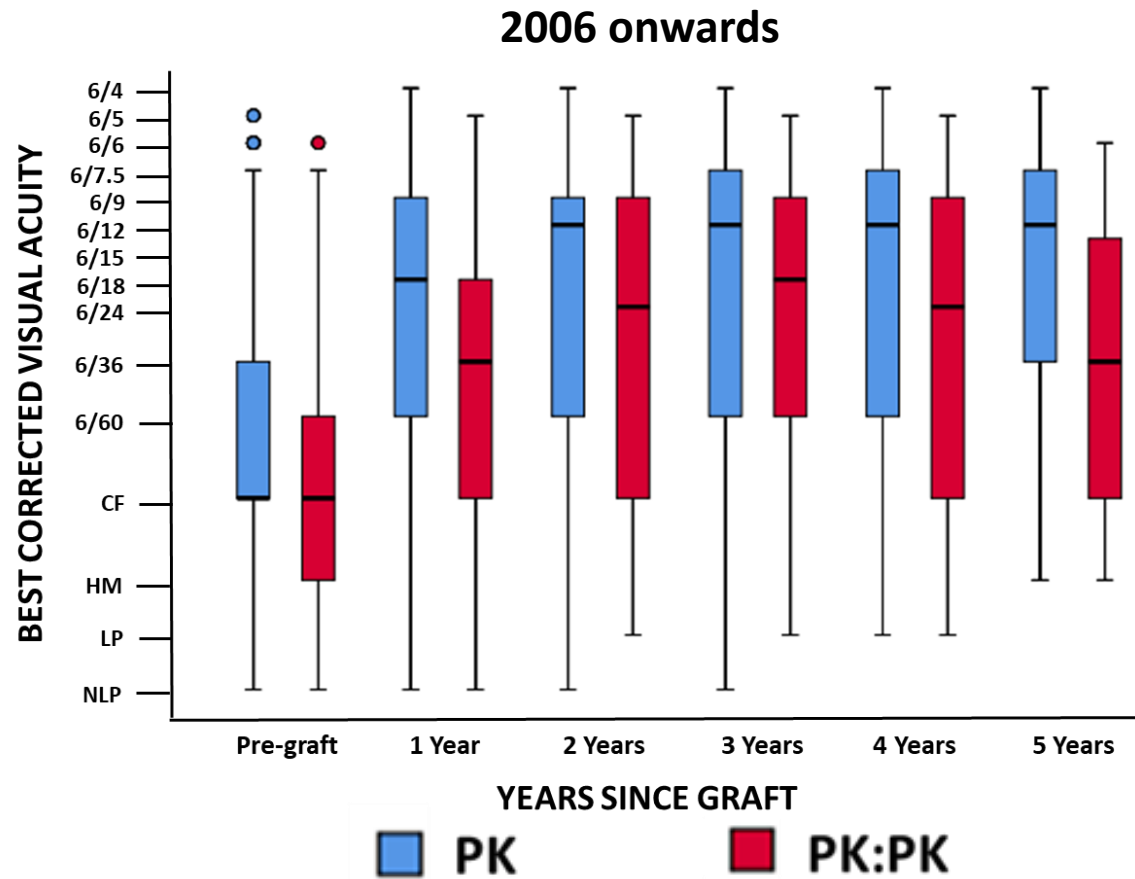
Second Graft following PK



- No significant difference in survival for PK:PK following PNFG
- Still the case for 2006 onwards

	1 Year	2 Years	4 Years	6 Years	8 Years	10 Years	15 Years	20 Years
PK:FG:PK	.89 (1263)	.78 (918)	.63 (512)	.52 (309)	.42 (172)	.35 (102)	.22 (27)	.12 (12)
PK:PNFG:PK	.83 (80)	.71 (53)	.69 (38)	.56 (23)	.56 (15)	.52 (10)	NA (5)	NA (4)

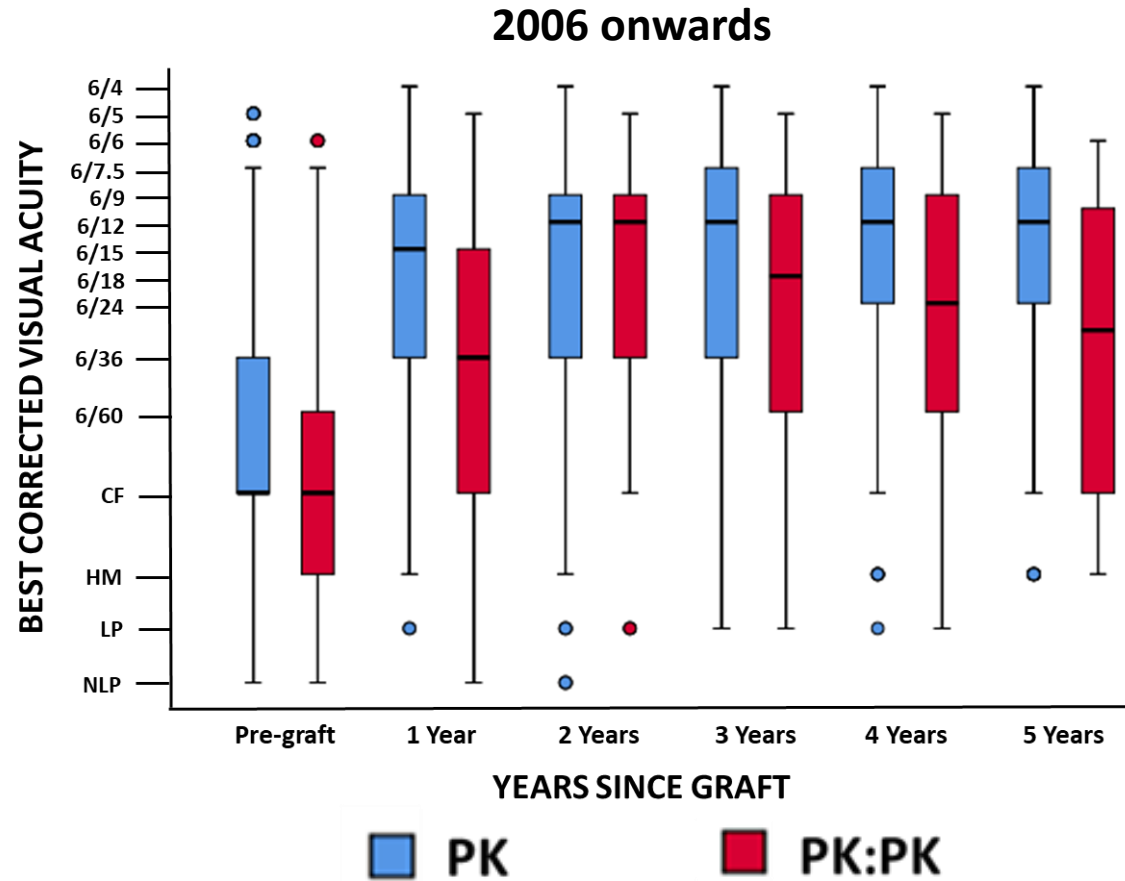
Visual outcomes - PK vs PK:PK



- Significant improvements
- First grafts reach 6/12 at 2 years and maintain
- Median BCVA worse following repeat grafts

	Registered	Pre-graft	1 Year	2 Years	3 Years	4 Years	5 Years
PK	5832	5509	463	426	258	181	153
PK:PK	1150	1070	96	69	42	40	24

Visual outcomes - PK vs PK:PK, surviving grafts

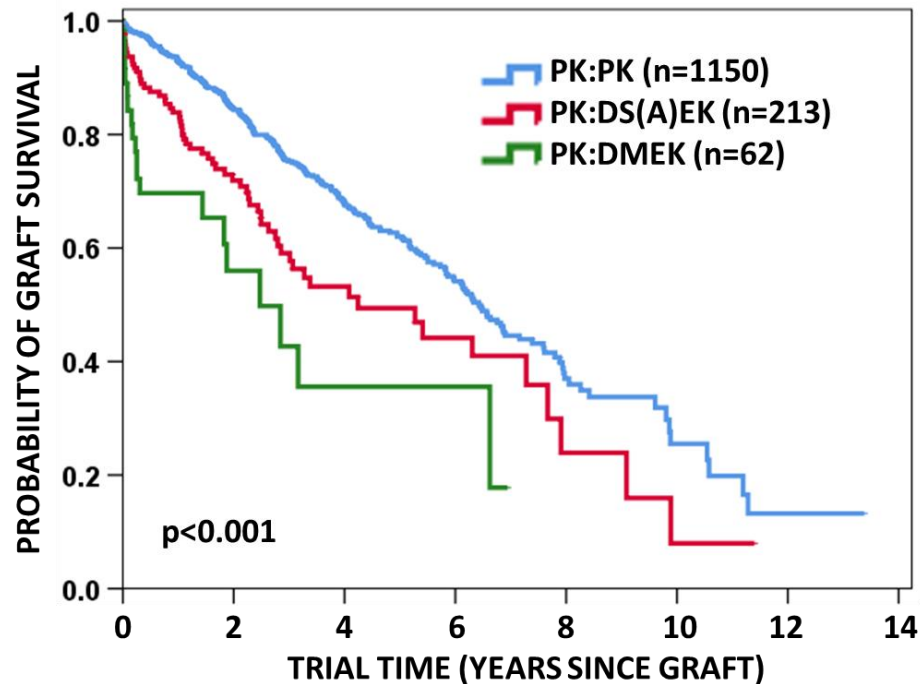


- Excluding failures tightens interquartile ranges
- At 2 years
 - Repeat grafts reach 6/12
 - Comparable BCVA
- Repeat BCVA drops off
- Remain better than pre-graft
- Worse than first grafts

	Registered	Pre-graft	1 Year	2 Years	3 Years	4 Years	5 Years
PK	5832	5509	463	426	258	181	153
PK:PK (surviving)	1150	1070	81	59	38	33	20

Type of Second Graft following PK

2006 onwards



	1 Year	2 Years	4 Years	6 Years	8 Years	10 Years
PK:PK	.93 (677)	.85 (506)	.68 (255)	.54 (125)	.37 (39)	.26 (10)
PK:DS(A)EK	.84 (106)	.72 (68)	.53 (30)	.44 (14)	NA (4)	NA (1)
PK:DMEK	.70 (23)	.56 (12)	NA(2)	NA (2)	NA	NA

Reasons for failure of **second** graft

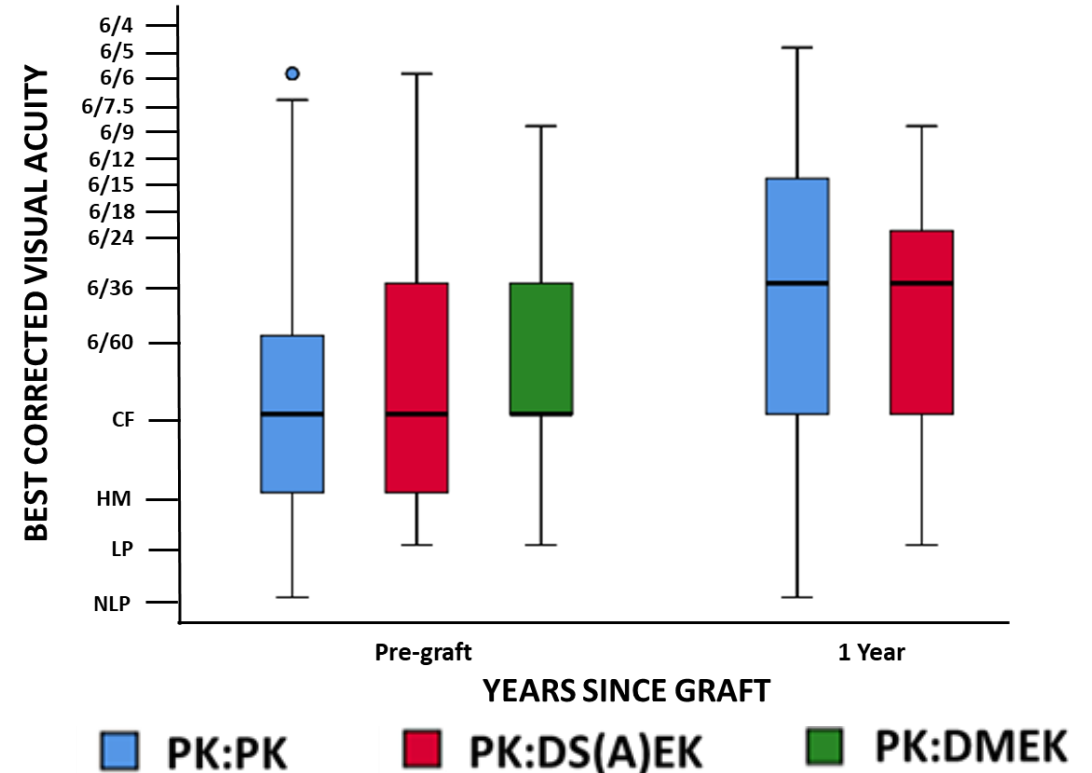
	PK:PK	PK:DS(A)EK	PK:DMEK
PNFG	1%	20%	39%
Endothelial failure	24%	30%	34%
Rejection	27%	18%	15%
Infection	7%	5%	2%
Corneal ulcer	5%	2%	0%
Trauma	2%	2%	0%
Glaucoma	2%	2%	0%
Corneal scar	2%	1%	0%
Other specified	10%	8%	5%
Not specified	19%	12%	5%
Total	513 (100%)	122 (100%)	41 (100%)

Excluding PNFG, PK vs.DS(A)EK $p=0.01$, PK vs. DMEK $p=0.138$, DS(A)EK vs DMEK $p=0.851$

Visual outcomes – Repeat following PK

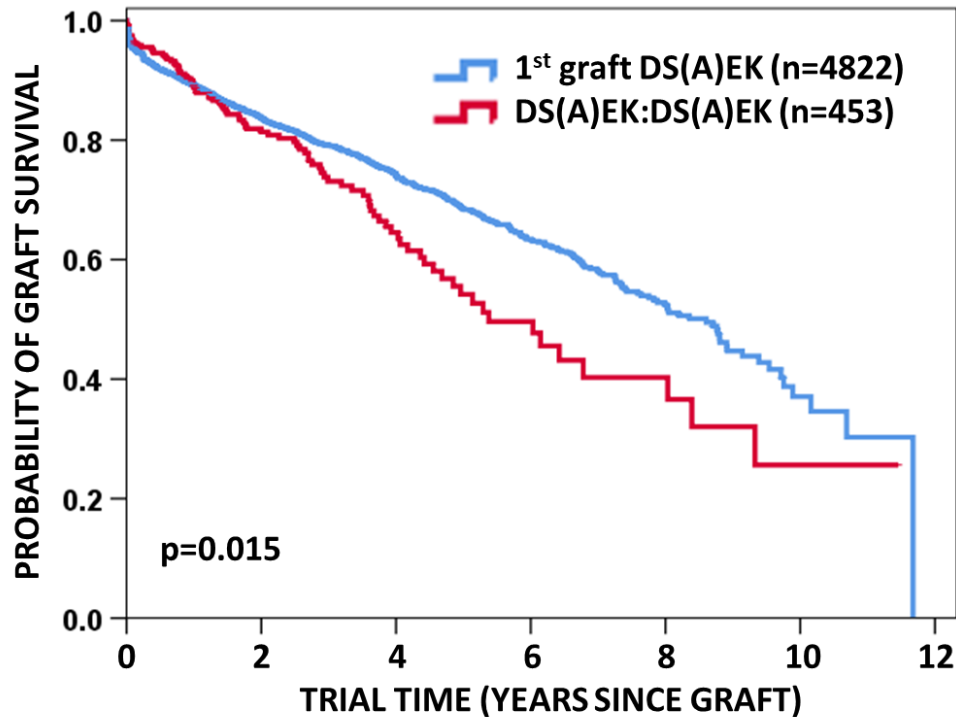
2006 onwards

- Surviving grafts only
- Median BCVA at 1 year 6/36
- Including failures at 1 year, DS(A)EK has BCVA of 6/60 (n=25), PK still 6/36 (n=96)

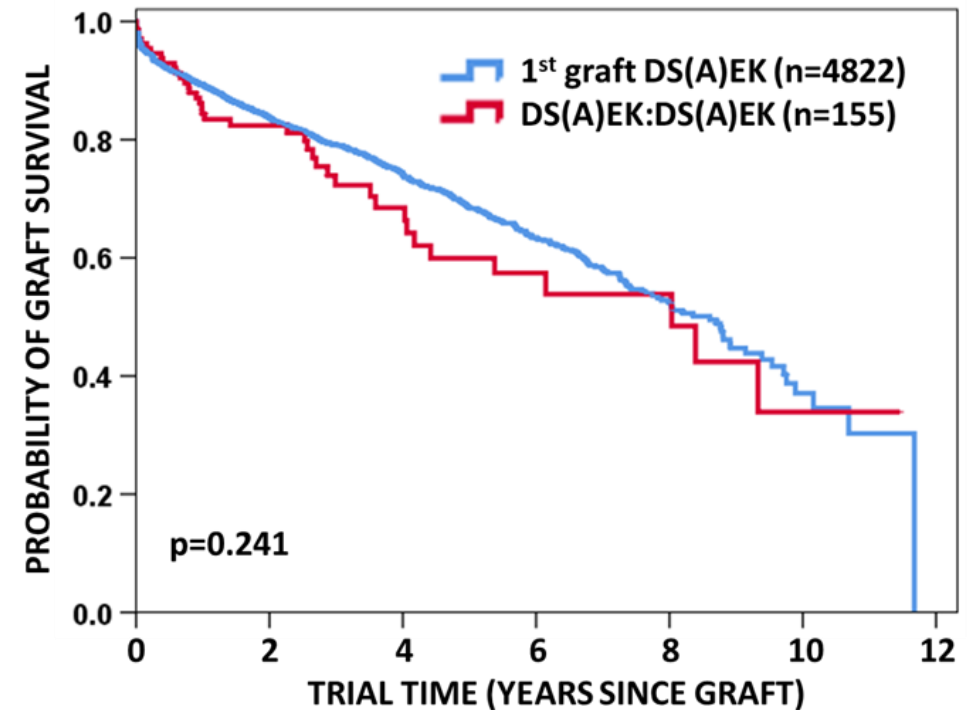


	Registered	Pre-graft	3 Months	6 Months	1 Year
PK:PK	1150	1070	13	19	81
PK:DS(A)EK	213	195	9	9	17
PK:DMEK	62	60	2	1	6

Second Grafts following DS(A)EK



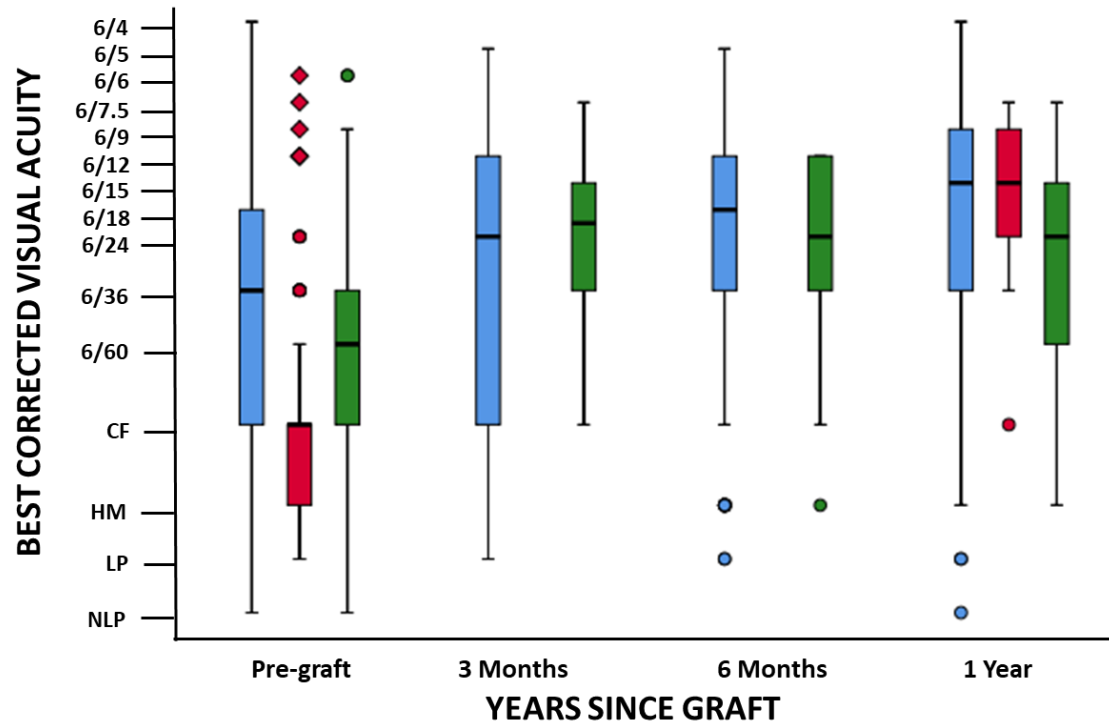
Following
PNFG
→



	3 Months	6 Months	1 Year	2 Years	4 Years	6 Years	8 Years	10 Years
DS(A)EK	.94 (3228)	.92 (3048)	.89 (2685)	.84 (1948)	.74 (890)	.63 (383)	.52 (124)	.37 (21)
DS(A)EK:DS(A)EK	.96 (295)	.95 (278)	.89 (224)	.81 (155)	.65 (65)	.50 (26)	.37 (10)	NA (1)
DS(A)EK:DS(A)EK (following PNFG)	.95 (115)	.93 (111)	.84 (94)	.82 (68)	.69 (33)	.57 (18)	.54 (10)	NA (1)
DS(A)EK:DS(A)EK (excluding PNFG)	.96 (180)	.96 (167)	.93 (130)	.80 (87)	.61 (32)	NA (8)	NA (1)	NA

Following non-PNFG (n=298): p=0.021

Visual outcomes – DS(A)EK

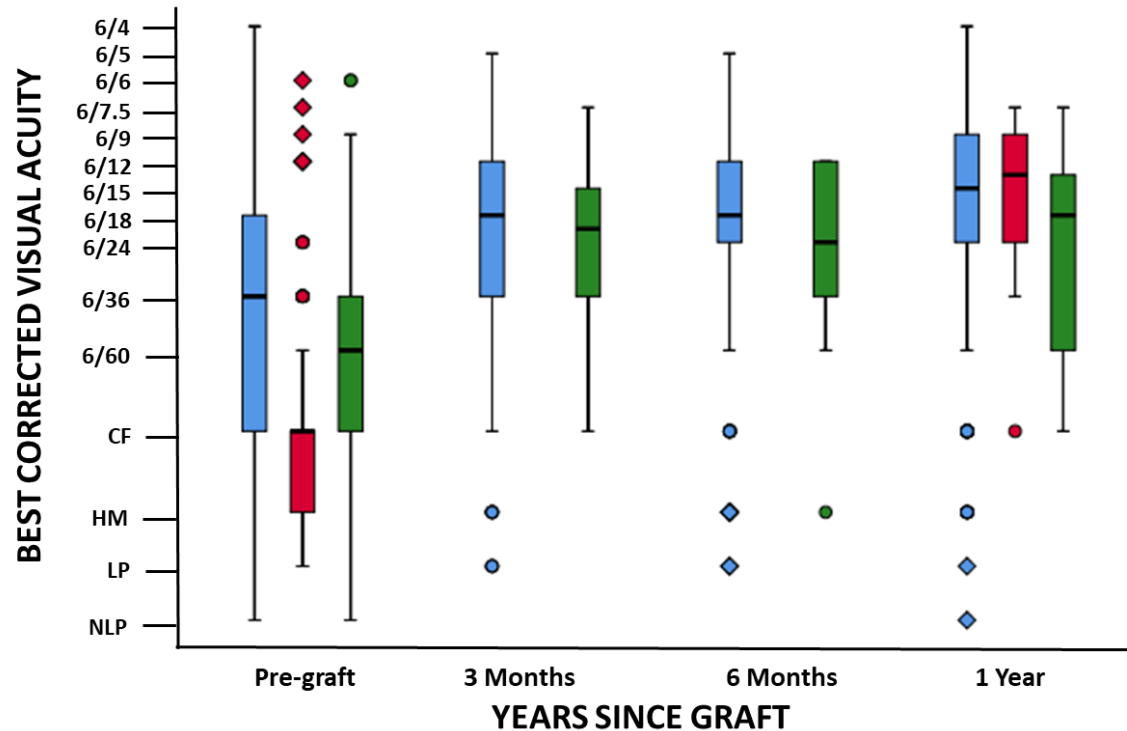


■ First DS(A)EK ■ DS(A)EK:PNFG:DS(A)EK ■ DS(A)EK:FG:DS(A)EK

- All grafts (surviving and failed)
- Pre-graft BCVA worse in repeat grafts
- Similar median BCVA (6/15) at 1 year post PNFG to first DS(A)EK
- Poorer median BCVA at 1 year following longer term initial survival

	Registered	Pre-graft	3 Months	6 Months	1 Year
First DS(A)EK	4822	4484	259	289	455
DS(A)EK:PNFG:DS(A)EK	155	144	4	8	21
DS(A)EK:FG:DS(A)EK	298	261	18	21	32

Visual outcomes – DS(A)EK

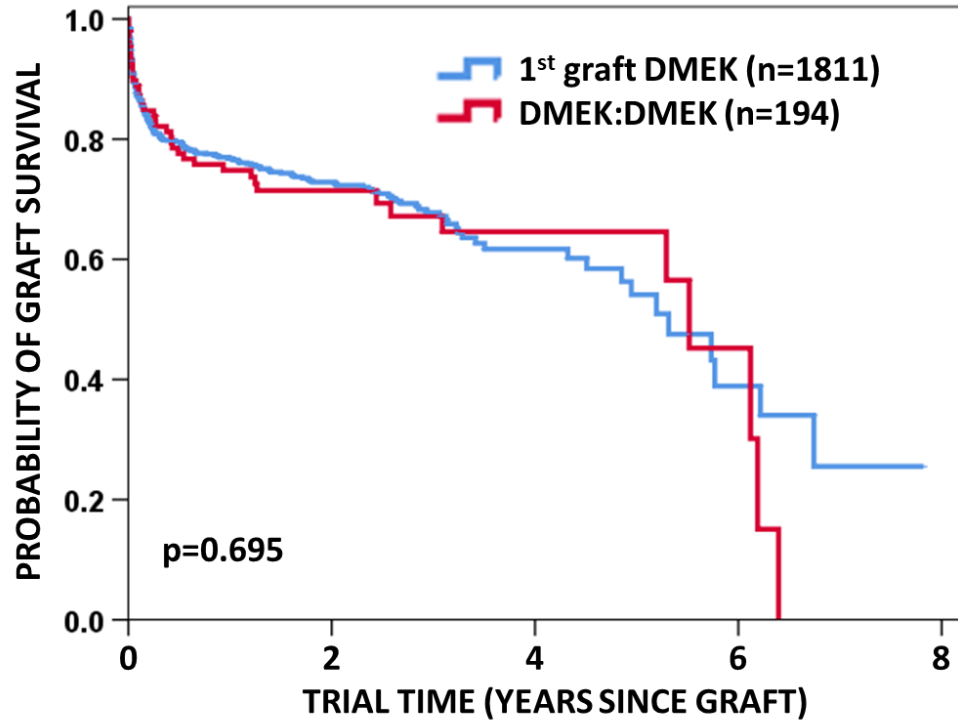


- Excluding failures
- Tighter interquartile ranges
- Improved median BCVA in repeats

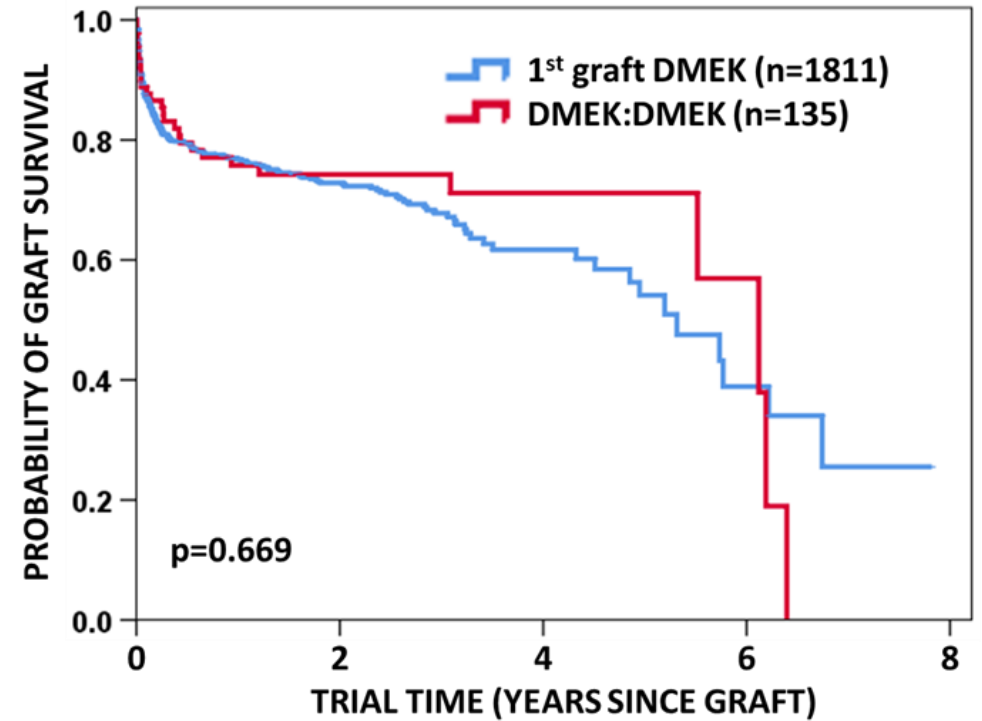
■ First DS(A)EK ■ DS(A)EK:PNFG:DS(A)EK ■ DS(A)EK:FG:DS(A)EK

	Registered	Pre-graft	3 Months	6 Months	1 Year
First DS(A)EK	4822	4484	190	250	419
DS(A)EK:PNFG:DS(A)EK	155	144	3	5	20
DS(A)EK:FG:DS(A)EK	298	261	18	20	28

Second Grafts following DMEK



Following
PNFG
→



	3 Months	6 Months	1 Year	2 Years	3 Years	4 Years	5 Years	6 Years
DMEK	.81 (724)	.80 (653)	.77 (527)	.73 (281)	.68 (120)	.62 (44)	.54 (24)	NA (9)
DMEK:DMEK	.84 (98)	.78 (86)	.75 (75)	.71 (44)	.67 (26)	.65 (18)	.65 (11)	NA (3)
DMEK:DMEK (following PNFG)	.85 (75)	.80 (66)	.76 (56)	.74 (37)	.74 (24)	.71 (16)	.71 (10)	NA (3)
DMEK:DMEK (excluding PNFG)	.79 (23)	.72 (20)	.72 (19)	NA (7)	NA (2)	NA (2)	NA (1)	NA

Following non-PNFG (n=59): p=0.084

Summary

- Rates of PNFG in DMEK continue to drop
- >50% of repeat grafts are EK
- Second PK exhibit poorer outcomes than first PK
- Outcomes of EK following first failed PK is poorer than repeat PK
- DS(A)EK:DS(A)EK have poorer outcome than first DS(A)EK
 - This is NOT the case where the first graft was a PNFG
- There is no significant difference for DMEK:DMEK versus DMEK

Take home message

For endothelial keratoplasty the **primary non-function** of a *first* graft does **not adversely affect** the outcomes of a *second* graft

Acknowledgments

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Contributing surgeons, eye banks and follow-up practitioners

Our team

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- Nora Coffey – Project Officer
- Vicky Jones – Administrative Officer
- Keryn Williams – Scientific Director
- Richard Mills – Medical Director



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2018 report: <http://hdl.handle.net/2328/37917>

