

# Cornea Activity

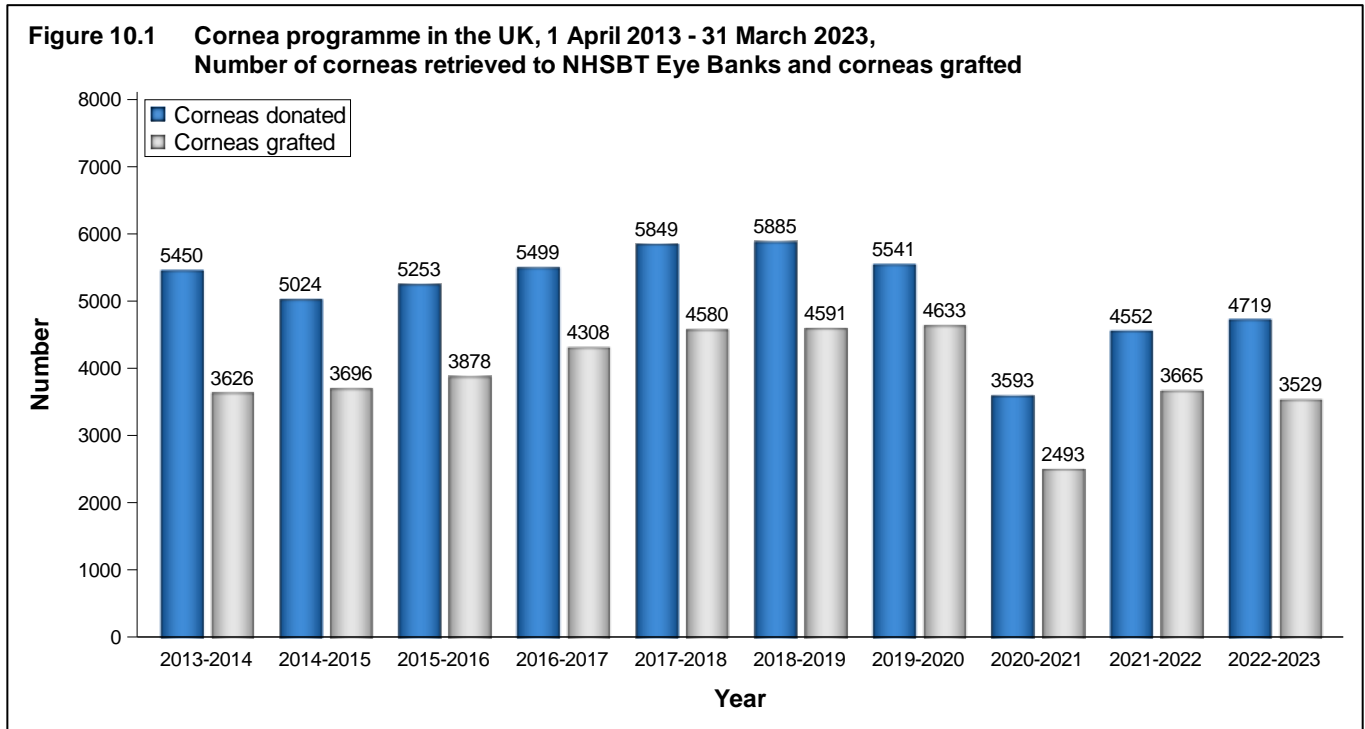
## Key messages

- 4,719 corneas were supplied to NHSBT Eye Banks
- Corneas were retrieved from 1,922 cornea-only donors and from 447 solid organ donors after brain death (55%) or after circulatory death (45%)
- The number of transplants declined by 4% to 3,529, although figures are an underestimate due to delays in reporting
- 9%, 36% and 16% of corneal transplants were for keratoconus, Fuchs endothelial dystrophy and pseudophakic bullous keratopathy patients, respectively
- Descemet membrane endothelial keratoplasty transplants are the most popular technique for corneal transplantation (35% of all transplants)
- 265 (5%) corneas were issued for non-clinical use to support research or training from corneas that were considered unsuitable for transplantation

## 10.1 Overview

As a result of the COVID-19 pandemic, the number of corneas transplanted (N=2,493) decreased by 46% in 2020-2021 compared with the previous year. In 2021-2022, corneal transplants rose to 3665, although in the last year, the number of transplants has declined by 4% to 3529. These figures are an underestimate due to delays in reporting the transplant outcome to NHSBT. The number of corneas donated in 2022-2023 was 4,719, representing an increase of 4% compared with the previous year as shown in **Figure 10.1**. Overall, corneal donation and transplantation figures have not fully recovered to pre-pandemic levels.

It should be noted that not all corneas donated or transplanted in the UK are reported to NHSBT and thus the donation data reported are not the full national data.



In 2022-2023, of 2,369 donors whose corneas were retrieved to NHSBT Eye Banks, 1,922 were cornea-only donors and 447 were cornea and solid organ donors: see **Table 10.1**. Compared to 2021-2022, the number of cornea-only donors increased by 7%, and the number of cornea and solid organ donors fell by 8%. In 2022-2023, corneas were retrieved from 246 organ donors after brain death and 201 organ donors after circulatory death.

**Table 10.1** also shows the number and rate per million population (pmp) of donors whose corneas were retrieved to NHSBT Eye Banks in 2022-2023, by country and NHS region. Information for 2021-2022 is shown for comparison. No adjustments have been made for potential demographic differences in populations.

In 2022-2023, the corneal donor rate increased across England, Scotland, Wales and Northern Ireland. England (34.3 pmp) had the highest corneal donor rate of countries in the UK (34.1 pmp). Across the NHS regions, the corneal donor rate ranged from 16.7 pmp to 69.9 pmp. This variation is largely attributed to the location of NHSBT Eye Retrieval Schemes, NHSBT Eye Banks and non-NHSBT Eye Banks (East Grinstead).

<b>Table 10.1 Corneal donation rates per million population (pmp) in the UK, 1 April 2022 - 31 March 2023 (2021 - 2022), by country/ NHS region for donors whose corneas were retrieved to NHSBT Eye Banks</b>								
<b>Country of residence/ NHS region</b>	<b>Cornea-only</b>		<b>Solid organ and cornea</b>		<b>TOTAL</b>		<b>TOTAL pmp</b>	
North East and Yorkshire	265	(232)	56	(62)	321	(294)	39.5	(36.2)
North West	295	(249)	53	(50)	348	(299)	46.9	(40.3)
Midlands	270	(256)	61	(78)	331	(334)	30.5	(30.8)
East of England	199	(213)	39	(48)	238	(261)	37.5	(41.1)
London	99	(97)	58	(85)	157	(182)	17.8	(20.7)
South East	78	(82)	77	(75)	155	(157)	16.7	(16.9)
South West	347	(368)	52	(47)	399	(415)	69.9	(72.7)
<b>England</b>	<b>1553</b>	<b>(1497)</b>	<b>396</b>	<b>(445)</b>	<b>1949</b>	<b>(1942)</b>	<b>34.5</b>	<b>(34.3)</b>
<b>Isle of Man</b>	<b>0</b>	<b>(0)</b>	<b>0</b>	<b>(0)</b>	<b>0</b>	<b>(0)</b>	<b>0.0</b>	<b>(0.0)</b>
<b>Channel Islands</b>	<b>0</b>	<b>(0)</b>	<b>0</b>	<b>(0)</b>	<b>0</b>	<b>(0)</b>	<b>0.0</b>	<b>(0.0)</b>
<b>Wales</b>	<b>66</b>	<b>(57)</b>	<b>18</b>	<b>(12)</b>	<b>84</b>	<b>(69)</b>	<b>27.0</b>	<b>(22.2)</b>
<b>Scotland</b>	<b>23</b>	<b>(38)</b>	<b>18</b>	<b>(20)</b>	<b>41</b>	<b>(58)</b>	<b>7.5</b>	<b>(10.6)</b>
<b>Northern Ireland</b>	<b>16</b>	<b>(16)</b>	<b>7</b>	<b>(10)</b>	<b>23</b>	<b>(26)</b>	<b>12.1</b>	<b>(13.7)</b>
<b>TOTAL<sup>1</sup></b>	<b>1922</b>	<b>(1796)</b>	<b>447</b>	<b>(488)</b>	<b>2369</b>	<b>(2284)</b>	<b>35.3</b>	<b>(34.1)</b>

<sup>1</sup> Includes UK donors where the hospital/hospice postcode was unspecified

## 10.2 NHSBT Eye Bank activity

NHSBT Eye Bank activity levels for Filton (Bristol) and David Lucas (in Liverpool) Eye Banks are shown in **Table 10.2**. In 2022-2023, a total of 4,719 corneas were retrieved to NHSBT, of which 3,649 (77%) were subsequently issued for transplantation. Filton Eye Bank (in Bristol) processed 57% of corneas retrieved in the last financial year.

Of 1070 corneas not issued for transplantation, 265 (25%) were issued for non-clinical use to support research or training. These corneas were primarily unsuitable for transplantation due to a low endothelial cell density or dead cells.

<b>Table 10.2 Corneas retrieved into NHSBT Eye Banks, by year 1 April 2022 - 31 March 2023 (2021-2022)</b>								
<b>Eye bank</b>	<b>Total retrieved</b>		<b>Number issued<sup>1</sup></b>		<b>% issued</b>		<b>Difference between number retrieved and issued</b>	
Filton	2656	(2680)	2063	(2115)	78	(79)	593	(565)
David Lucas	2063	(1872)	1586	(1468)	77	(78)	477	(404)
<b>Total</b>	<b>4719</b>	<b>(4552)</b>	<b>3649</b>	<b>(3583)</b>	<b>77</b>	<b>(79)</b>	<b>1070</b>	<b>(969)</b>

<sup>1</sup> Number issued of those retrieved in each year

## 10.3 Transplants

Corneal transplant activity in the UK by country of residence and NHS regions for the years 2021-2022 and 2022-2023 is detailed in **Table 10.3**. Corneas were supplied by NHSBT and non-NHSBT Eye Banks for corneal transplants in the UK. No adjustments have been made for potential demographic differences in populations.

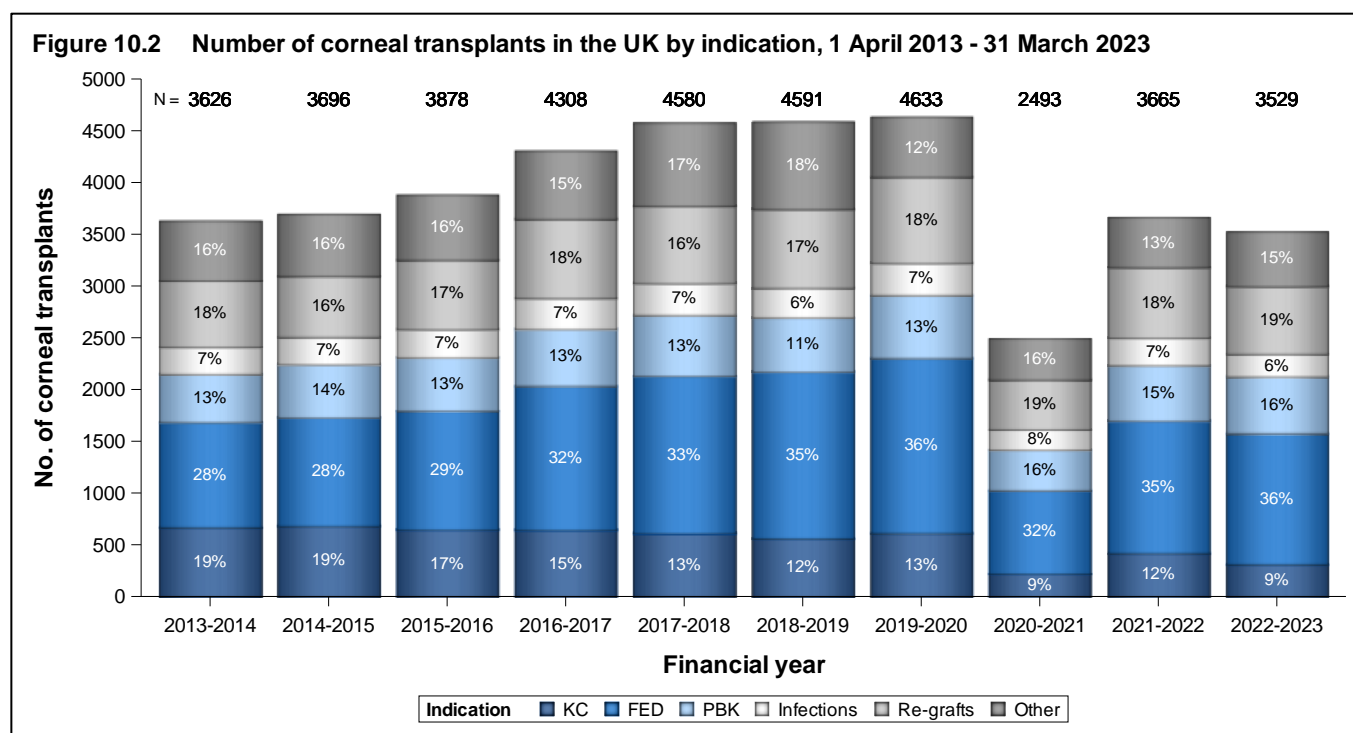
The overall transplant rate was 54.7 pmp in 2021-2022 which fell to 52.6 pmp in 2022-2023. Transplant rates increased in Scotland and Northern Ireland and fell in England and Wales. England had the highest transplant rate in the UK: 52.9 pmp, and this ranged from 43.5 pmp to 71.1 pmp across the NHS regions. In the last financial year, transplant rates for regions in England that increased were the South-West and North-East and Yorkshire.

**Table 10.3 Cornea transplants performed per million population (pmp) in the UK, 1 April 2021 - 31 March 2023, by country/NHS region**

Country of residence/ NHS region	Number of transplants (pmp)			
	2021-2022		2022-2023	
North East and Yorkshire	404	(49.7)	416	(51.2)
North West	412	(55.5)	347	(46.8)
Midlands	536	(49.4)	471	(43.5)
East of England	423	(66.6)	370	(58.3)
London	562	(63.9)	521	(59.2)
South East	555	(59.7)	462	(49.7)
South West	291	(51.0)	406	(71.1)
<b>England</b>	<b>3183</b>	<b>(56.3)</b>	<b>2993</b>	<b>(52.9)</b>
<b>Isle of Man</b>	<b>4</b>	<b>(50.0)</b>	<b>1</b>	<b>(12.5)</b>
<b>Channel Islands</b>	<b>6</b>	<b>(35.3)</b>	<b>7</b>	<b>(41.2)</b>
<b>Wales</b>	<b>138</b>	<b>(44.4)</b>	<b>133</b>	<b>(42.8)</b>
<b>Scotland</b>	<b>206</b>	<b>(37.6)</b>	<b>218</b>	<b>(39.8)</b>
<b>Northern Ireland</b>	<b>25</b>	<b>(13.2)</b>	<b>65</b>	<b>(34.2)</b>
<b>TOTAL<sup>1</sup></b>	<b>3665</b>	<b>(54.7)</b>	<b>3529</b>	<b>(52.6)</b>

<sup>1</sup> Includes UK recipients where the postcode was unspecified and non-UK residents

**Figure 10.2** shows the number of corneal transplants in the UK by indication for transplant from 1 April 2013 to 31 March 2023. For corneas transplanted in 2021-2022 and 2022-2023, a further breakdown by indication is shown in **Table 10.4**.



Generally, there's been a slight decline in transplantation activity across indications except for pseudophakic bullous keratopathy (PBK) and 'other' indications in 2022-2023. Keratoconus (KC) has seen the largest proportional fall in activity. The most common indication for transplantation is FED, representing 36% of corneal transplants in 2022-2023.

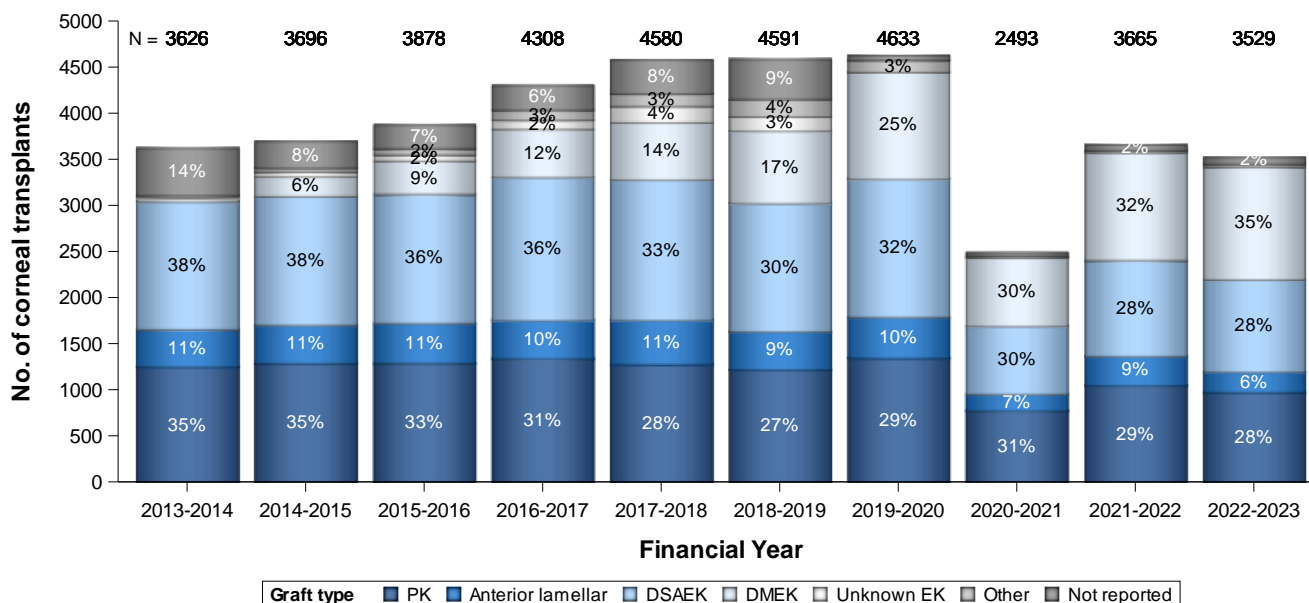
<b>Table 10.4 Corneal transplants in the UK by indication and financial year, 1 April 2021 - 31 March 2023</b>				
<b>Indication for transplant</b>	<b>2021 - 2022</b>		<b>2022 - 2023</b>	
	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>
<b>Keratoconus (KC)</b>	<b>423</b>	<b>11.5</b>	<b>317</b>	<b>9.0</b>
<b>Fuchs endothelial dystrophy (FED)</b>	<b>1281</b>	<b>35.0</b>	<b>1261</b>	<b>35.7</b>
<b>Pseudophakic bullous keratopathy (PBK)</b>	<b>533</b>	<b>14.5</b>	<b>552</b>	<b>15.6</b>
<b>Infections</b>	<b>269</b>	<b>7.3</b>	<b>220</b>	<b>6.2</b>
<b>Re-grafts</b>	<b>678</b>	<b>18.5</b>	<b>655</b>	<b>18.6</b>
<b>Other (listed below)</b>	<b>481</b>	<b>13.1</b>	<b>524</b>	<b>14.8</b>
Ectasias	19	0.5	22	0.6
Dystrophies	63	1.7	61	1.7
Previous ocular surgery	100	2.7	107	3.0
Injury	43	1.2	53	1.5
Ulcerative keratitis	40	1.1	42	1.2
Opacification	62	1.7	81	2.3
Miscellaneous	130	3.5	113	3.2
Not reported	24	0.7	45	1.3
<b>Total</b>	<b>3665</b>	<b>100.0</b>	<b>3529</b>	<b>100.0</b>

**Figure 10.3** shows the number of corneal transplants in the UK by graft type from 1 April 2013 to 31 March 2023. Over the last 10 years, the proportion of penetrating keratoplasty (PK) grafts has reduced by nearly a third. Descemet Membrane Endothelial Keratoplasty (DMEK) transplants are now the most popular technique for corneal transplantation.

Note that Endothelial Keratoplasty (EK) procedures were first specified on the Ocular Tissue Outcome and Transplant Record form reported to the UK Transplant Registry on 5 May 2010. The type of EK graft, Descemet Stripping Automated EK (DSAEK) and DMEK transplants, were first collected as free text on the form. This meant that all EK transplants were often reported as EK unknown. In April 2019, the form changed so that 'EK unknown' was no longer specified.

All unknown EK grafts prior to 2014 are assumed to be DSEK transplants as DMEK transplantation was not a routine form of transplantation at this time. Between January 2014 and April 2019, unknown EK graft types have been imputed such that grafts by surgeons that have never reported a DMEK transplant are assumed to be Descemet Stripping Automated EK (DSAEK) transplants and all transplants prior to the first reported DMEK are considered DSAEK transplants. A further breakdown by graft type for corneas transplanted in 2021-2022 and 2022-2023 is shown in **Table 10.5**.

**Figure 10.3 Number of corneal transplants in the UK by graft type, 1 April 2013 - 31 March 2023**



Between April 2013 to March 2019, unknown EK grafts have been imputed such that historic grafts and grafts by surgeons that have never reported a DMEK transplant are assumed to be DSAEK transplants

In 2022-2023, 28% of grafts were DSAEK and 35% were DMEK grafts. PK grafts are still a popular choice for corneal transplantation accounting for 28% of all transplants in 2022-2023. The proportion of anterior lamellar transplants has declined from 9% in 2021-2022 to 6% in 2022-2023.

**Table 10.5 Corneal transplants in the UK by graft type and financial year, 1 April 2021 - 31 March 2023**

Graft type	2021 - 2022		2022 - 2023	
	N	%	N	%
PK	1052	28.7	974	27.6
Anterior lamellar	321	8.8	227	6.4
DSAEK	1036	28.3	1003	28.4
DMEK	1167	31.8	1220	34.6
Other	28	0.8	32	0.9
Not reported	61	1.7	73	2.1
<b>All grafts</b>	<b>3665</b>	<b>100.0</b>	<b>3529</b>	<b>100.0</b>

## 10.4 Demographic characteristics

The age, sex and ethnicity of cornea donors and transplant recipients are shown in **Table 10.6**.

<b>Table 10.6 Demographic characteristics of donors whose corneas were retrieved to NHSBT Eye Banks and transplant recipients in the UK, 1 April 2022 - 31 March 2023</b>						
	Cornea-only donors		Solid organ and cornea donors		Transplant recipients	
	N	%	N	%	N	%
<b>Age group (years)</b>						
0 - 17	10	1	7	2	37	1
18 - 34	25	1	33	7	243	7
35 - 49	116	6	87	20	303	9
50 - 59	216	11	114	26	437	12
60 - 69	416	22	118	26	645	18
70-79	717	37	84	19	1050	30
80+	422	22	4	1	814	23
Mean (SD)	69	(13)	56	(14)	65	(17)
<b>Sex</b>						
Male	1122	58	253	57	1842	52
Female	800	42	194	43	1687	48
<b>Ethnicity</b>						
White	86	5	415	93	2662	75
Asian	5	0	14	3	267	8
Black	0	0	2	0	140	4
Other	1	0	4	1	22	1
Not reported	1830	95	11	3	431	12
<b>TOTAL</b>	<b>1922</b>	<b>100</b>	<b>447</b>	<b>100</b>	<b>3529</b>	<b>100</b>