



NATIONAL KIDNEY REGISTRY
FACILITATING LIVING DONOR TRANSPLANTS

Outcomes Report

Version 2.1

Published on 11/17/19 • Data Cutoff of 12/31/18

Overview

- The outcomes analysis was prepared by the Hopkins research team using the latest SRTR data and NKR registry data.
- Variances between the SRTR data and NKR data on critical data elements such as graft failure were researched and reconciled with the appropriate transplant centers.
- P Values <0.05 are considered statistically significant.

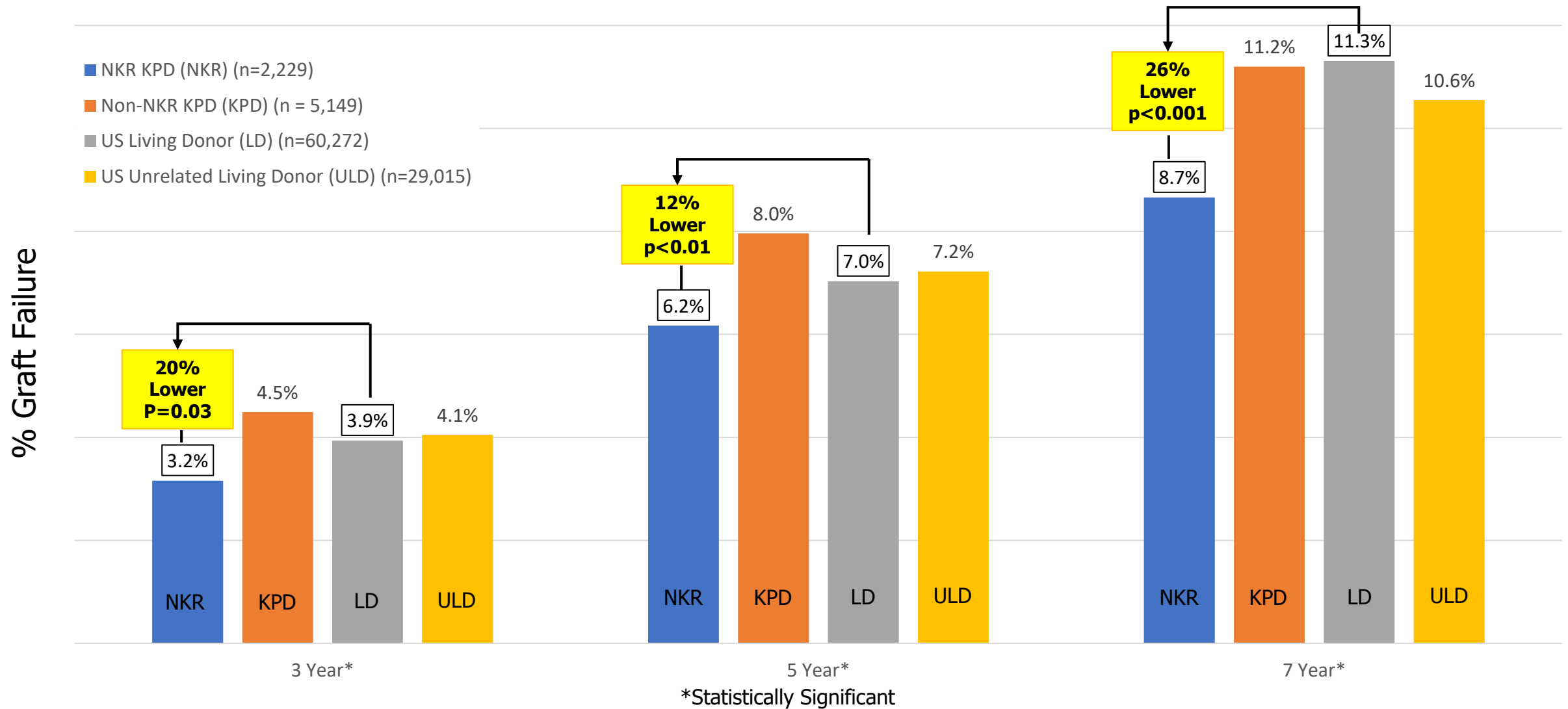


Table of Contents

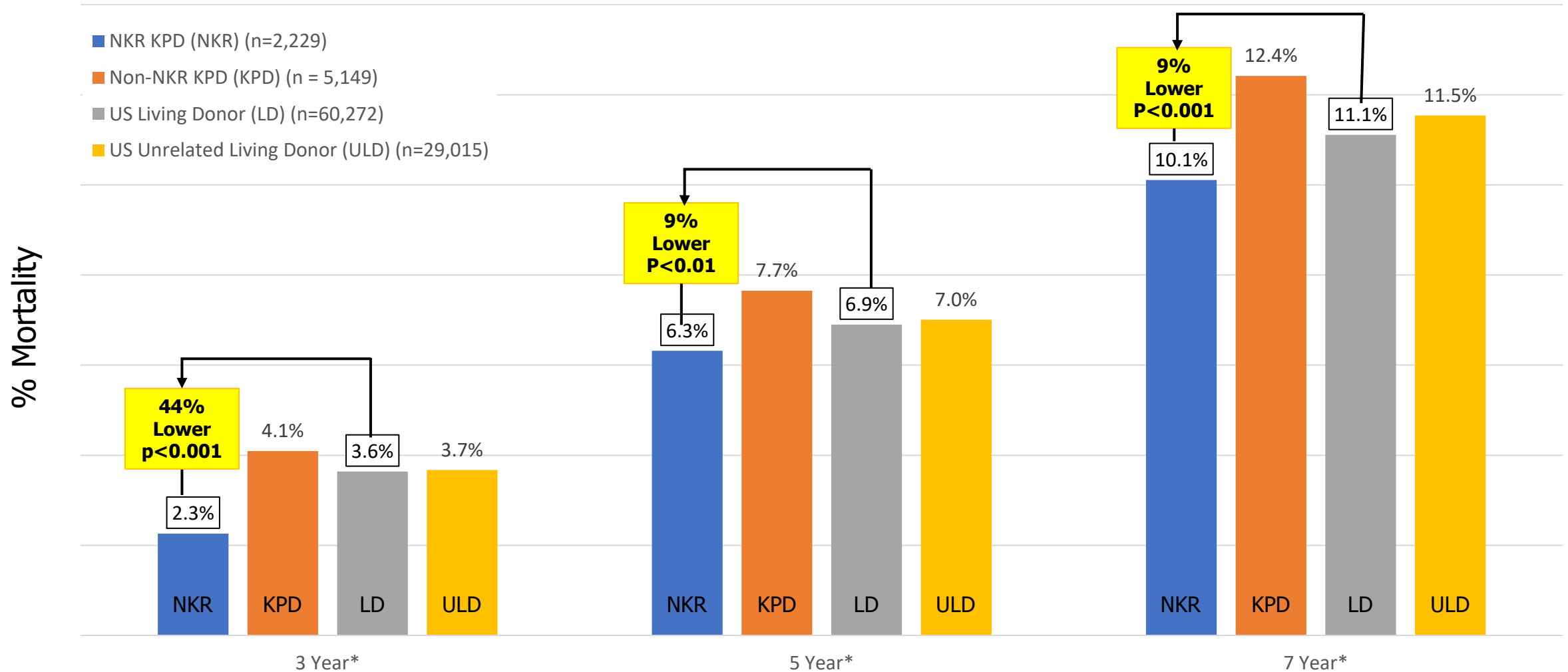
1. Outcomes
2. Case mix
3. Comparison to other KPD
4. Sensitized patient analysis
5. HLA matching analysis
6. Compatible pair analysis



Death Censored Graft Failure Comparisons



Patient Mortality Rate Comparisons



Outcomes

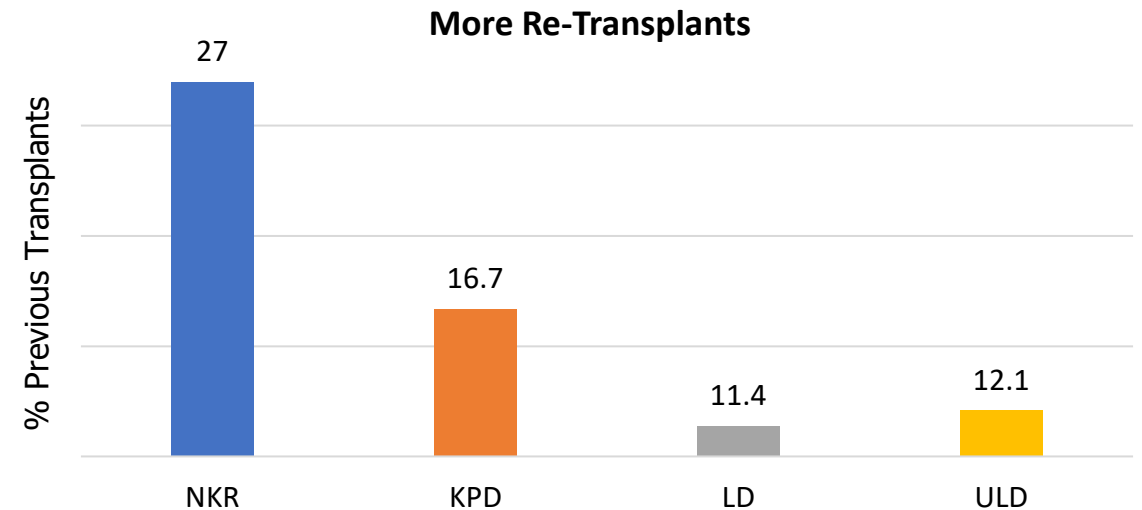
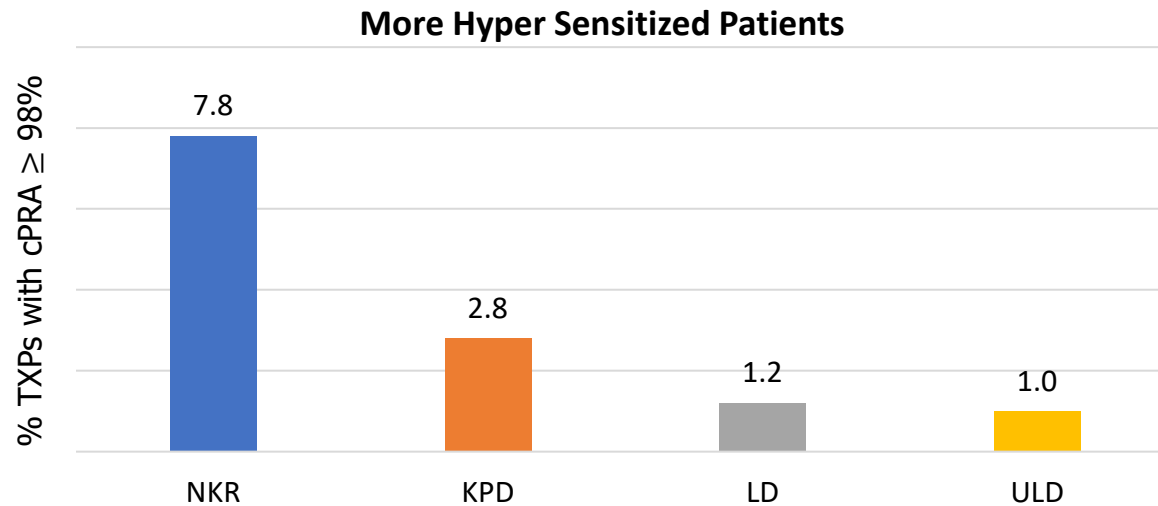
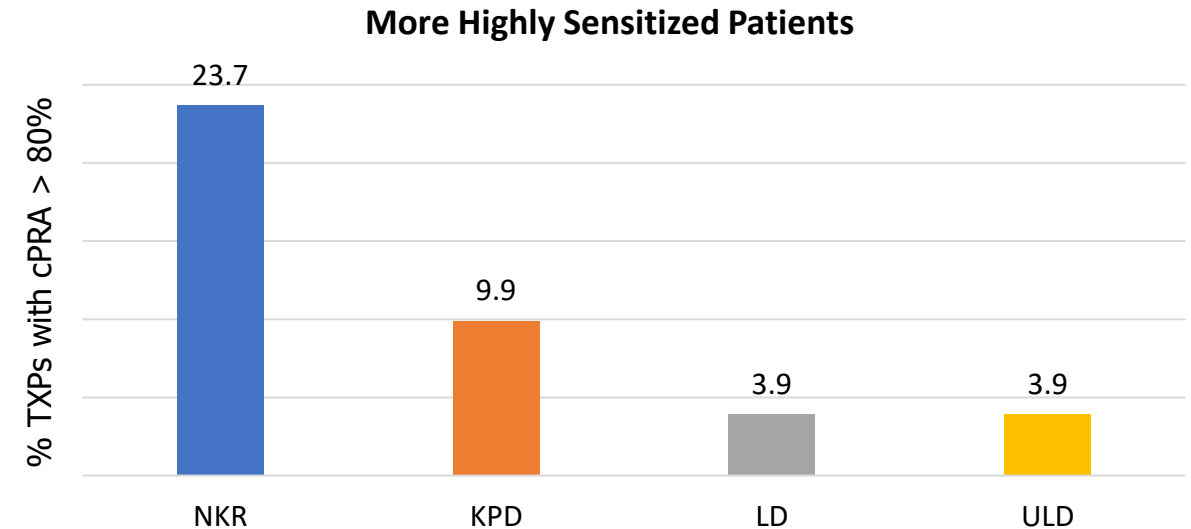
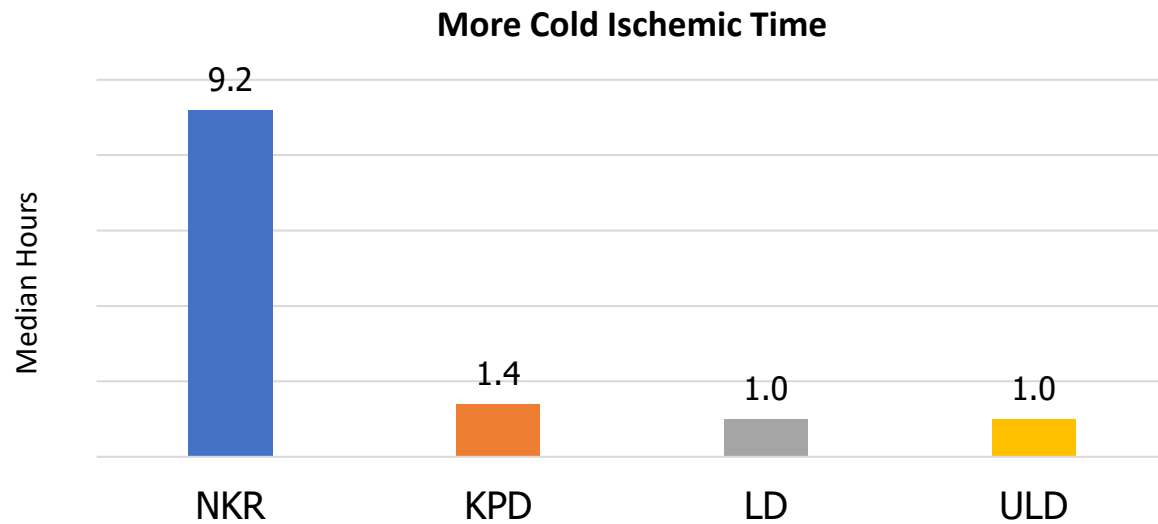
| Death Censored Graft Failure | (n) | 3 Year* | 5 Year* | 7 Year* |
|---------------------------------|--------|---------|---------|---------|
| NKR KPD(NKR) | 2,229 | 3.2% | 6.2% | 8.7% |
| Non-NKR KPD (KPD) | 5,149 | 4.5% | 8.0% | 11.2% |
| US Living Donor (LD) | 60,272 | 3.9% | 7.0% | 11.3% |
| US Unrelated Living Donor (ULD) | 29,015 | 4.1% | 7.2% | 10.6% |

| Patient Mortality | (n) | 3 Year* | 5 Year* | 7 Year* |
|---------------------------------|--------|---------|---------|---------|
| NKR KPD (NKR) | 2,229 | 2.3% | 6.3% | 10.1% |
| Non-NKR KPD (KPD) | 5,149 | 4.1% | 7.7% | 12.4% |
| US Living Donor (LD) | 60,272 | 3.6% | 6.9% | 11.1% |
| US Unrelated Living Donor (ULD) | 29,015 | 3.7% | 7.0% | 11.5% |

*Statistically Significant

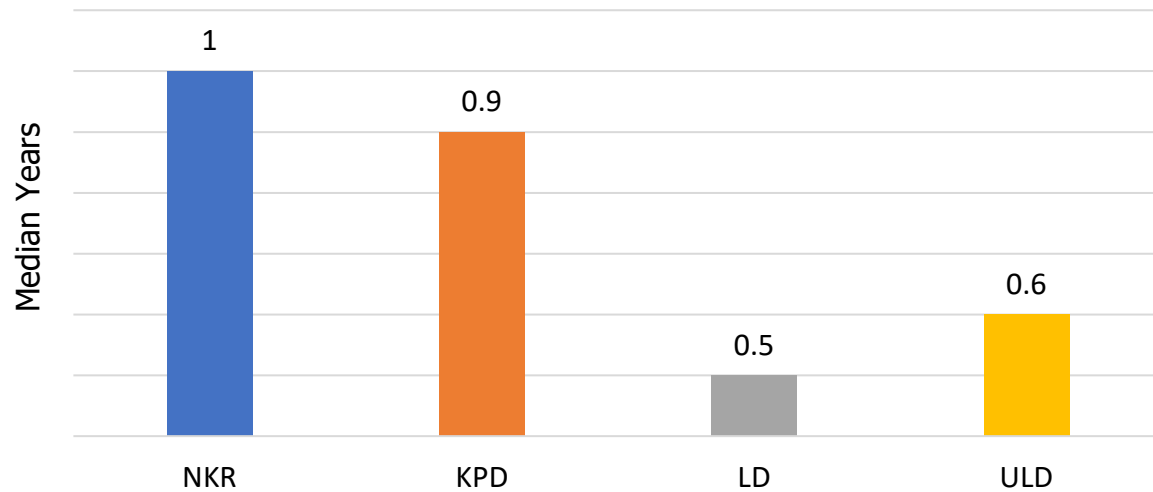


Case Mix: Better Outcomes in Spite of Harder Cases

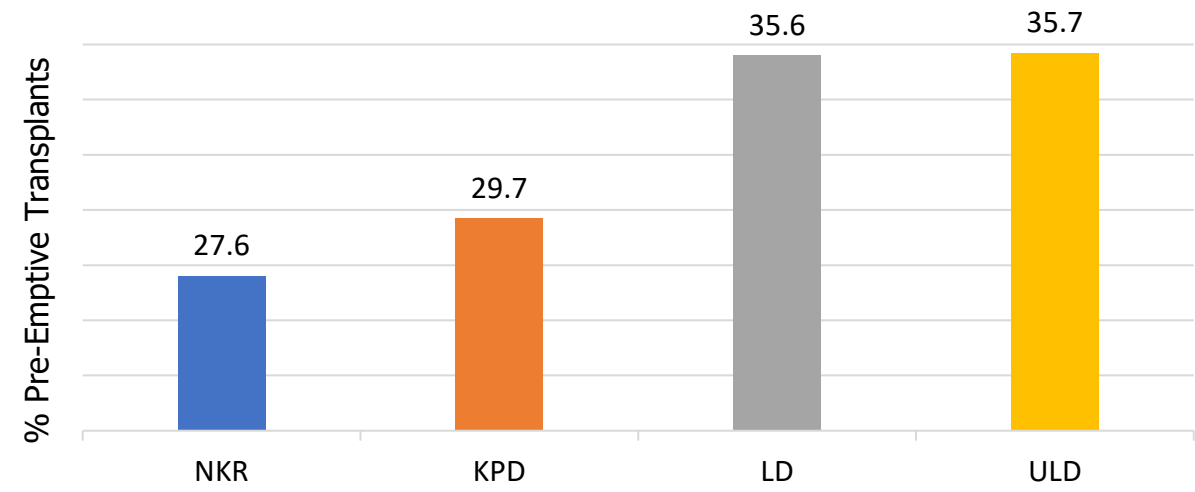


Case Mix: Better Outcomes in Spite of Harder Cases

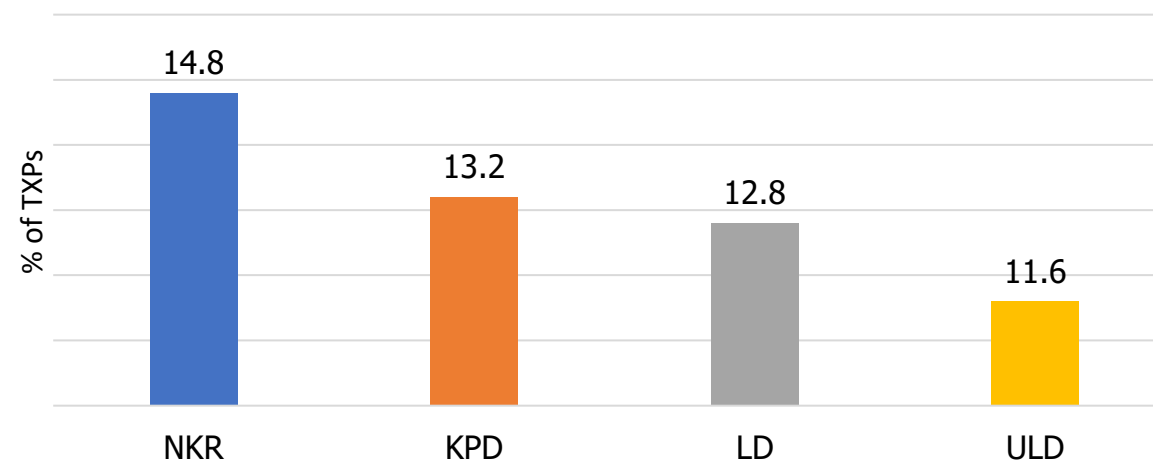
More Time on Dialysis



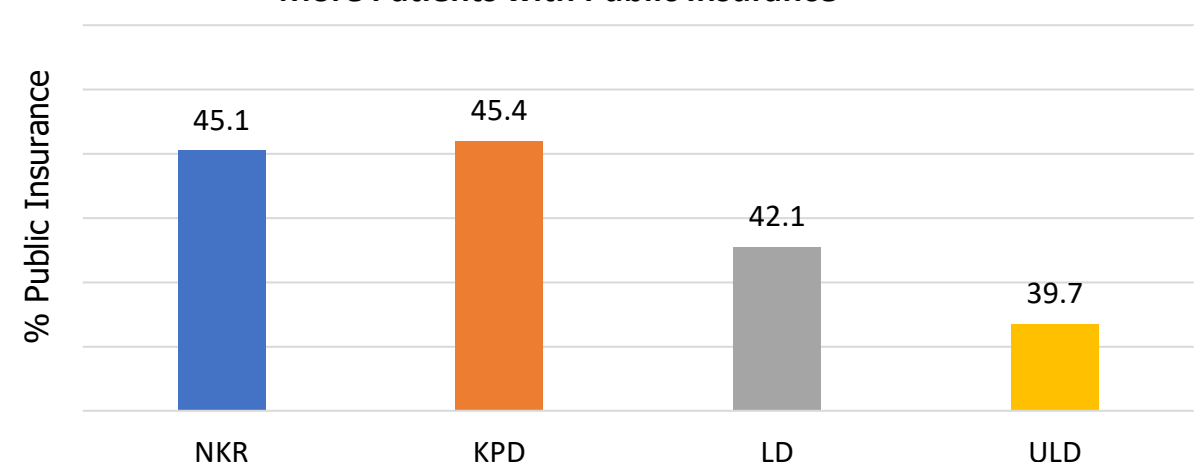
Fewer Pre-Emptive Transplants



More African American Patients



More Patients with Public Insurance

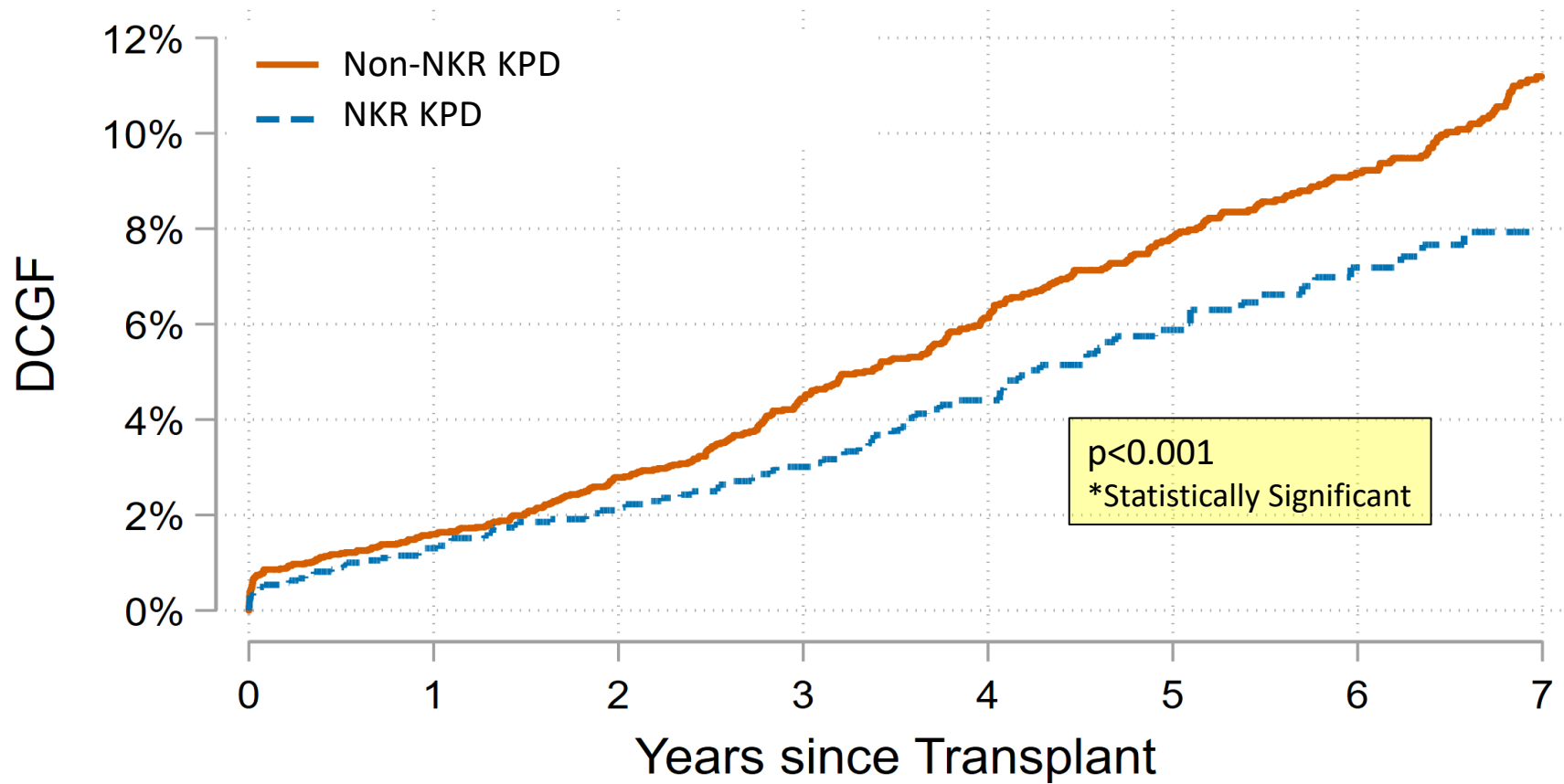


Case Mix: Better Outcomes in Spite of Harder Cases

| | NKR KPD | Non NKR KPD | US Living Donor | US Unrelated Living Donor |
|---------------------------------|---------|-------------|-----------------|---------------------------|
| Median (IQR) Cold Ischemia Time | 9.2 | 1.4 | 1.0 | 1.0 |
| % cPRA 80+ | 23.7% | 9.9% | 3.9% | 3.9% |
| % cPRA 98+ | 7.8% | 2.8% | 1.2% | 1.0% |
| % Previous Transplant | 27.0% | 16.7% | 11.4% | 12.1% |
| Median (IQR) Years on Dialysis | 1.0 | 0.9 | 0.5 | 0.6 |
| % Pre-emptive Transplant | 27.6% | 29.7% | 35.6% | 35.7% |
| % African-American | 14.8% | 13.2% | 12.8% | 11.6% |
| % Public Insurance | 45.1% | 45.4% | 42.1% | 39.7% |



NKR Outperforms Other KPD Transplants



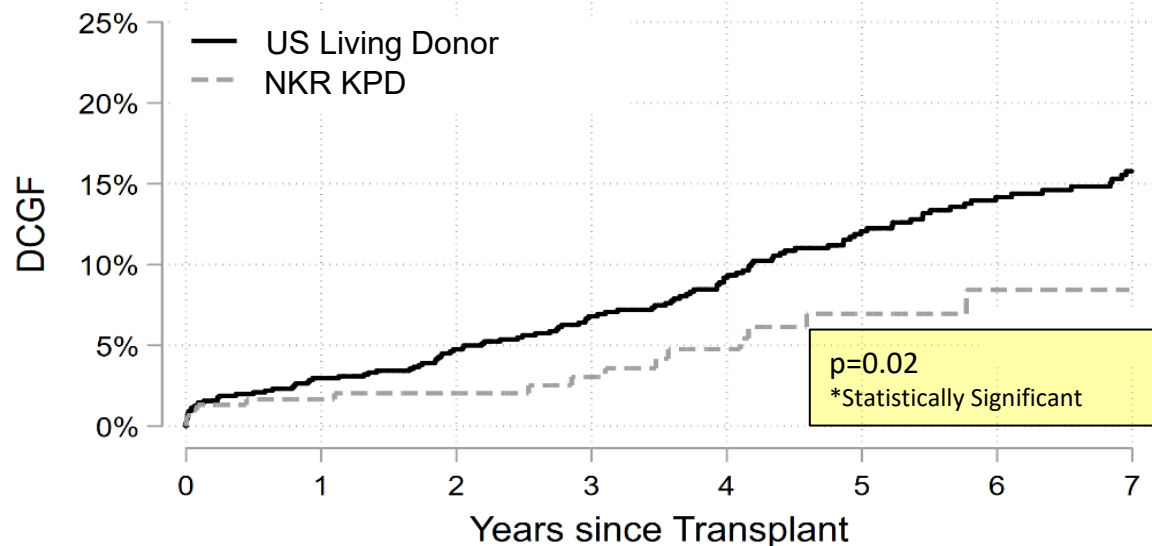
Number at risk

| | | | | | | | | |
|--------------|------|------|------|------|------|------|------|------|
| Other KPD LD | 5136 | 4579 | 4045 | 3402 | 2849 | 2342 | 1846 | 1339 |
| NKR LD | 2232 | 1880 | 1534 | 1225 | 942 | 702 | 456 | 278 |



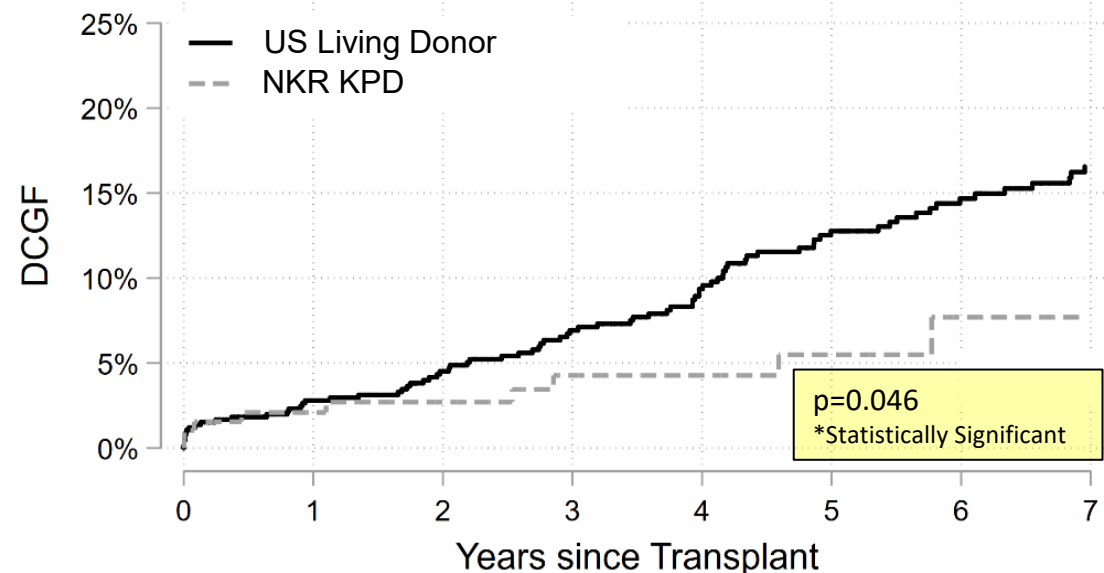
NKR Outperforms For Hyper Sensitized Transplants

Death-censored Graft Failure cPRA \geq 95 (NKR KPD vs US Living Donor)



| | | | | | | | | |
|----------------|-----|-----|-----|-----|-----|-----|-----|-----|
| Number at risk | | | | | | | | |
| SRTR LD | 958 | 867 | 784 | 700 | 618 | 498 | 413 | 352 |
| NKR LD | 305 | 260 | 215 | 182 | 146 | 99 | 52 | 31 |

Death-censored Graft Failure cPRA \geq 98 (NKR KPD vs US Living Donor)

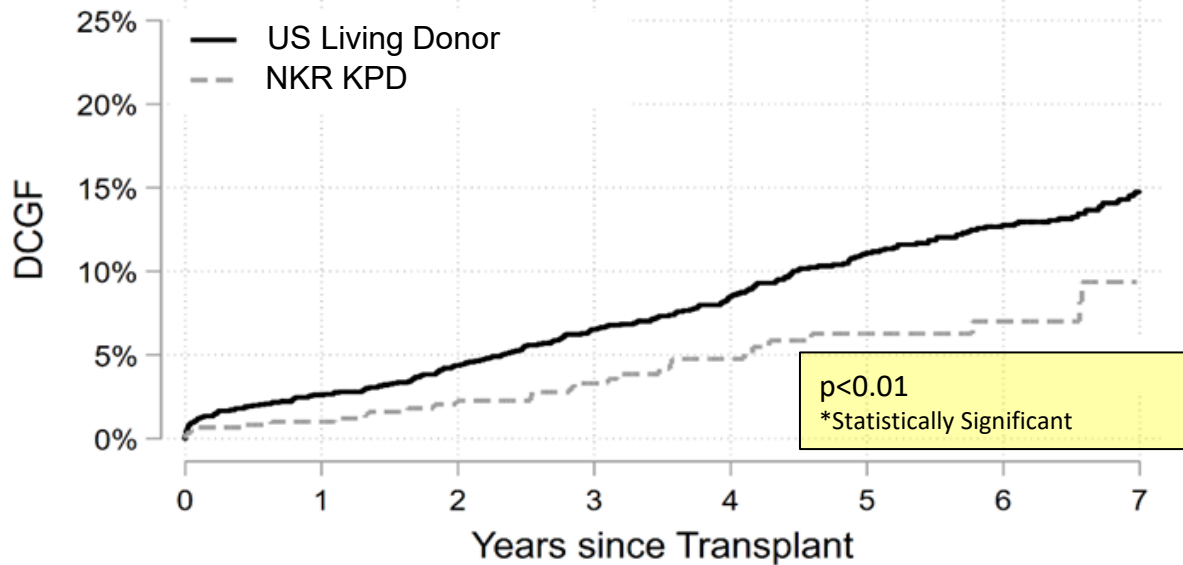


| | | | | | | | | |
|----------------|-----|-----|-----|-----|-----|-----|-----|-----|
| Number at risk | | | | | | | | |
| SRTR LD | 657 | 595 | 543 | 486 | 431 | 348 | 299 | 253 |
| NKR LD | 193 | 162 | 138 | 116 | 94 | 68 | 34 | 22 |



NKR Outperforms For Highly Sensitized Transplants

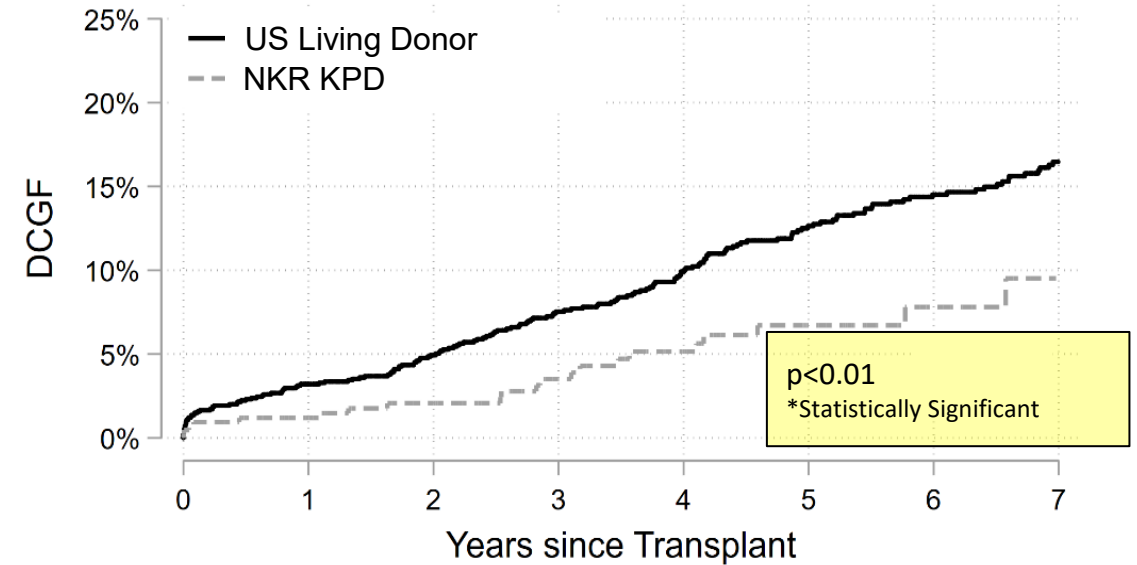
Death-censored Graft Failure cPRA \geq 80 (NKR KPD vs US Living Donor)



Number at risk

| | | | | | | | | |
|---------|------|------|------|------|------|------|-----|-----|
| SRTR LD | 2223 | 1987 | 1777 | 1547 | 1341 | 1108 | 932 | 770 |
| NKR LD | 606 | 518 | 426 | 355 | 278 | 205 | 110 | 65 |

Death-censored Graft Failure cPRA \geq 90 (NKR KPD vs US Living Donor)



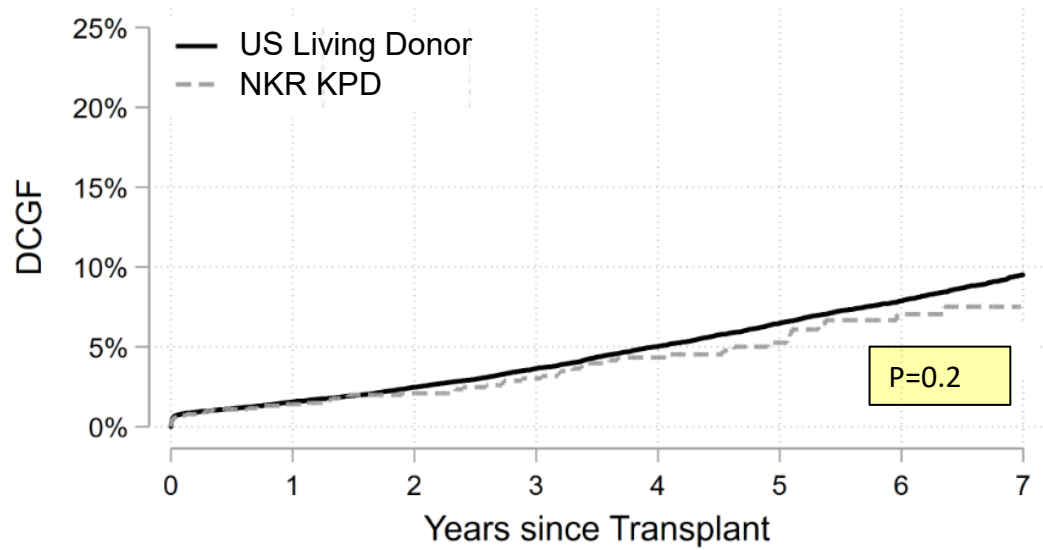
Number at risk

| | | | | | | | | |
|---------|------|------|------|-----|-----|-----|-----|-----|
| SRTR LD | 1396 | 1251 | 1118 | 983 | 859 | 698 | 583 | 487 |
| NKR LD | 423 | 360 | 300 | 254 | 201 | 143 | 73 | 43 |



Unsensitized & Lightly Sensitized Patients

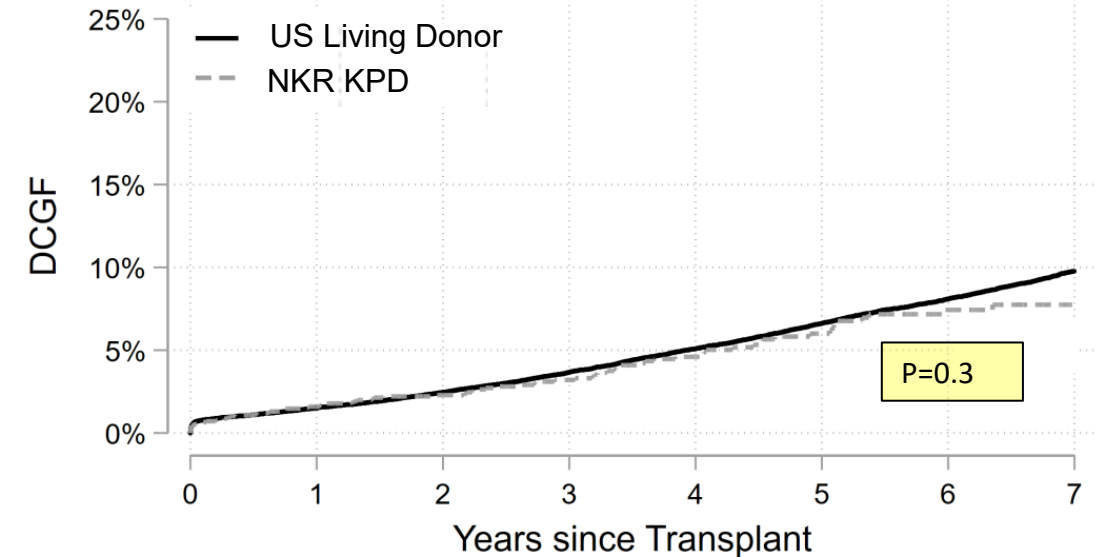
Death-censored Graft Failure cPRA = 0 (NKR KPD vs US Living Donor)



Number at risk

| | | | | | | | | |
|---------|-------|-------|-------|-------|-------|-------|-------|-------|
| SRTR LD | 39439 | 34868 | 30481 | 26163 | 21882 | 17898 | 14136 | 10578 |
| NKR LD | 1408 | 1127 | 857 | 646 | 480 | 360 | 241 | 138 |

Death-censored Graft Failure cPRA ≤ 50 (NKR KPD vs US Living Donor)



Number at risk

| | | | | | | | | |
|---------|-------|-------|-------|-------|-------|-------|-------|-------|
| SRTR LD | 49978 | 44261 | 38672 | 33267 | 27990 | 23123 | 18542 | 14215 |
| NKR LD | 1967 | 1565 | 1201 | 915 | 688 | 511 | 350 | 206 |

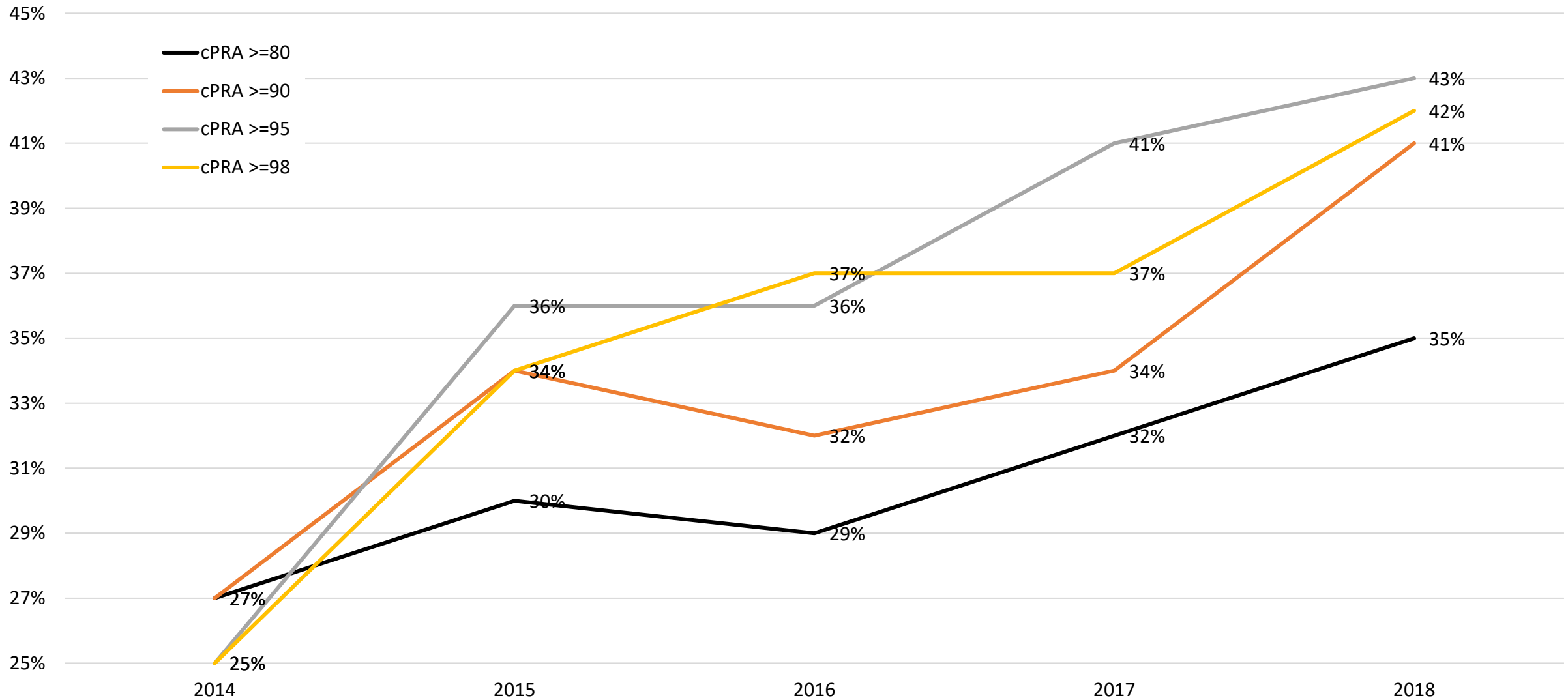


Sensitized Patient Outcome Data

| cPRA | Type | 1 Year | 3 Year | 5 Year | 7 Year | 7 Year Differential | NKR 7 Year Advantage |
|------|---------------------------|--------|--------|--------|--------|---------------------|----------------------|
| 0 | NKR KPD | 1.40% | 3.02% | 5.26% | 7.51% | - | - |
| | US Living Donor | 1.54% | 3.64% | 6.48% | 9.51% | 2.00% | 21% |
| | US Unrelated Living Donor | 1.67% | 3.75% | 6.65% | 9.59% | 2.08% | 22% |
| | Non-NKR KPD | 1.58% | 4.02% | 6.95% | 10.14% | 2.63% | 26% |
| < 50 | NKR KPD | 1.60% | 3.20% | 6.00% | 7.75% | - | - |
| | US Living Donor | 1.50% | 3.66% | 6.62% | 9.77% | 2.02% | 21% |
| | US Unrelated Living Donor | 1.60% | 3.77% | 6.81% | 9.86% | 2.11% | 21% |
| | Non-NKR KPD | 1.45% | 4.08% | 7.16% | 10.48% | 2.73% | 26% |
| ≥80 | NKR KPD | 1.01% | 3.30% | 6.28% | 9.37% | - | - |
| | US Living Donor | 2.61% | 6.54% | 11.11% | 14.75% | 5.38% | 36% |
| | US Unrelated Living Donor | 2.94% | 6.89% | 12.75% | 17.62% | 8.25% | 47% |
| | Non-NKR KPD | 2.66% | 7.75% | 13.64% | 17.41% | 8.04% | 46% |
| ≥90 | NKR KPD | 1.19% | 3.52% | 6.71% | 9.52% | - | - |
| | US Living Donor | 3.21% | 7.53% | 12.63% | 16.46% | 6.94% | 42% |
| | US Unrelated Living Donor | 3.83% | 8.10% | 14.52% | 20.29% | 10.77% | 53% |
| | Non-NKR KPD | 3.54% | 8.71% | 17.08% | 20.31% | 10.79% | 53% |
| ≥95 | NKR KPD | 1.65% | 3.04% | 6.95% | 8.43% | - | - |
| | US Living Donor | 2.97% | 6.80% | 12.06% | 15.78% | 7.35% | 47% |
| | US Unrelated Living Donor | 3.20% | 7.21% | 14.33% | 19.32% | 10.89% | 56% |
| | Non-NKR KPD | 3.62% | 8.38% | 15.68% | 17.83% | 9.40% | 53% |
| ≥98 | NKR KPD | 2.10% | 4.27% | 5.50% | 7.70% | - | - |
| | US Living Donor | 2.80% | 6.92% | 12.77% | 16.57% | 8.87% | 54% |
| | US Unrelated Living Donor | 2.65% | 7.16% | 15.81% | 20.96% | 13.26% | 63% |
| | Non-NKR KPD | 2.91% | 7.20% | 16.83% | 18.91% | 11.21% | 59% |



NKR's Share Of Highly Sensitized Living Donor Transplants



NKR's Share Of Highly Sensitized Living Donor Transplants

| cPRA | Type | 2014 | 2015 | 2016 | 2017 | 2018 | All |
|------|-----------------|------|------|------|------|------------|------|
| >=80 | US Living Donor | 285 | 276 | 241 | 245 | 268 | 1315 |
| | NKR KPD | 77 | 82 | 70 | 78 | 94 | 401 |
| | As % | 27% | 30% | 29% | 32% | 35% | 30% |
| >=90 | US Living Donor | 202 | 175 | 132 | 152 | 164 | 825 |
| | NKR KPD | 54 | 60 | 42 | 52 | 67 | 275 |
| | As % | 27% | 34% | 32% | 34% | 41% | 33% |
| >=95 | US Living Donor | 143 | 119 | 83 | 105 | 99 | 549 |
| | NKR KPD | 36 | 43 | 30 | 43 | 43 | 195 |
| | As % | 25% | 36% | 36% | 41% | 43% | 36% |
| >=98 | US Living Donor | 91 | 80 | 54 | 63 | 67 | 355 |
| | NKR KPD | 23 | 27 | 20 | 23 | 28 | 121 |
| | As % | 25% | 34% | 37% | 37% | 42% | 34% |



NKR Transplanted Patients with cPRA >99%

1/1/19 – 6/24/19

| # | R Center | D Center | Xplant Date | R ABO | NKR cPRA | Wait | R Age ATOT | HLA pts | HLA mm | Graft OK? |
|----|-------------|---------------|-------------|-------|----------|------|------------|---------|--------|-----------|
| 1 | SCarolina | Barnabas | 2/13/2019 | A | 100.0 | 2 | 45 | 25 | 5 | Yes |
| 2 | Madison | Madison | 5/15/2019 | A | 99.9 | 4 | 32 | 10 | 5 | Yes |
| 3 | Colorado | Rush | 2/28/2019 | O | 99.9 | 4 | 41 | 75 | 1 | Yes |
| 4 | Sentara | Hopkins | 4/9/2019 | B | 99.8 | 8 | 58 | 75 | 2 | Yes |
| 5 | Washington | Madison | 2/13/2019 | O | 99.8 | 77 | 72 | 75 | 2 | Yes |
| 6 | Tampa | Barnabas | 4/23/2019 | O | 99.7 | 48 | 51 | 35 | 4 | Yes |
| 7 | Georgetown | CCFlorida | 6/12/2019 | A | 99.7 | 1 | 60 | 50 | 3 | Yes |
| 8 | Emory | UMinn | 5/22/2019 | O | 99.5 | 7 | 8 | 45 | 3 | Yes |
| 9 | Cleveland | Piedmont | 4/10/2019 | A | 99.5 | 7 | 28 | 50 | 3 | Yes |
| 10 | Yale | Hopkins | 4/25/2019 | B | 99.4 | 22 | 62 | 60 | 3 | Yes |
| 11 | Georgetown | VirginiaMason | 5/29/2019 | A | 99.3 | 9 | 41 | 0 | 6 | Yes |
| 12 | StVincentIN | Cincinnati | 5/21/2019 | A | 99.3 | 6 | 58 | 50 | 3 | Yes |
| 13 | Emory | Emory | 5/22/2019 | A | 99.2 | 3 | 71 | 60 | 2 | Yes |
| 14 | Cornell | Indiana | 5/1/2019 | A | 99.2 | 1 | 32 | 85 | 1 | Yes |
| 15 | Georgetown | UCLA | 4/3/2019 | A | 99.1 | 3 | 63 | 40 | 4 | Yes |
| 16 | Sharp | Madison | 2/1/2019 | O | 99.1 | 38 | 23 | 50 | 3 | Yes |



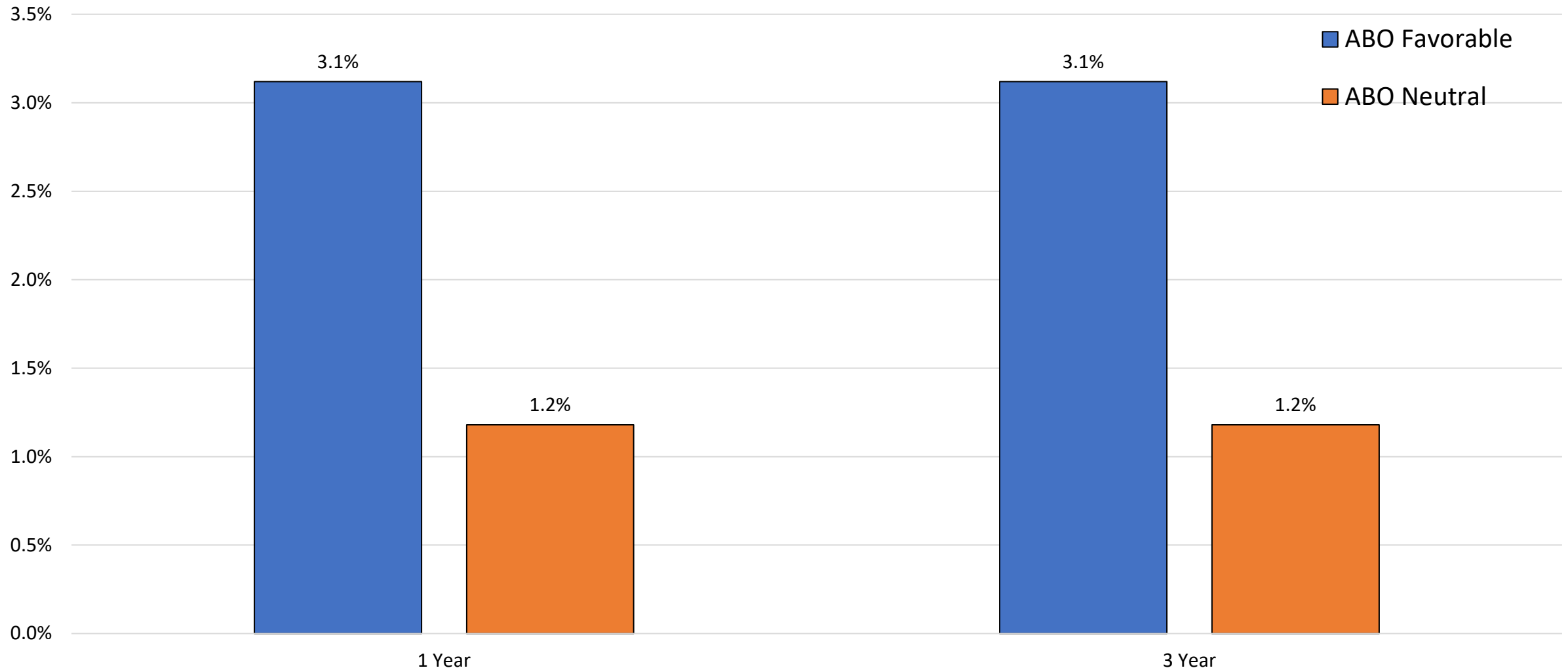
NKR Patients Waiting > 1 year

As of 6/21/19

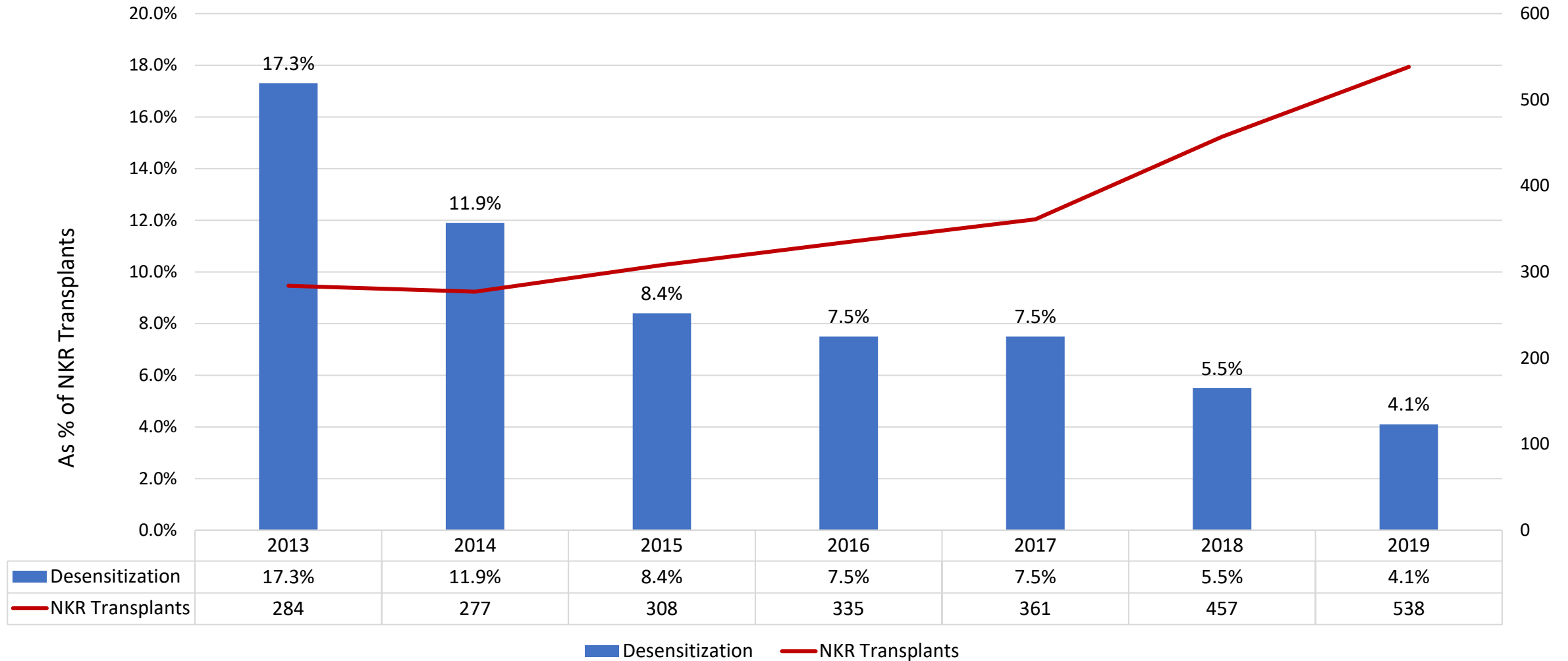
| # | Recip Ctr | RB | DB | cPRA4 | RA | DA | EWT | AWT | WTV | CLCa |
|----|-------------|----|--------|--------|----|----------|-----|-----|-----|--------|
| 1 | MayoMN | A | A1 | 100.00 | 55 | 49 | 60+ | 27 | 33 | -27940 |
| 2 | Emory | O | O | 100.00 | 60 | 49 | 60+ | 18 | 42 | -5640 |
| 3 | Piedmont | O* | O | 100.00 | 23 | 24 | 60+ | 17 | 43 | -1600 |
| 4 | Yale | O* | O O | 100.00 | 38 | 55 39 | 60+ | 15 | 45 | -240 |
| 5 | Yale | B | O A1 O | 99.98 | 40 | 48 38 37 | 60+ | 70 | -10 | -240 |
| 6 | Madison | O | O | 99.98 | 30 | 55 | 60+ | 19 | 41 | -5650 |
| 7 | Cincinnati | O | O | 99.96 | 67 | 50 | 60+ | 33 | 27 | 600 |
| 8 | MethodistTN | O | O | 99.96 | 23 | 57 | 60+ | 13 | 47 | 540 |
| 9 | Barnabas | B | B | 99.96 | 32 | 43 | 60+ | 13 | 47 | -4660 |
| 10 | UCSF | O | O | 99.94 | 50 | 49 | 60+ | 18 | 42 | -7700 |
| 11 | URMC | O | A1 | 99.92 | 47 | 46 | 60+ | 21 | 39 | -5520 |
| 12 | Madison | O | O | 99.90 | 48 | 36 | 44 | 28 | 16 | -5650 |
| 13 | Emory | O | O | 99.85 | 46 | 39 | 31 | 14 | 17 | -5640 |
| 14 | Emory | O | O O | 99.75 | 24 | 58 35 | 19 | 30 | -11 | -5640 |
| 15 | StLukesTX | O | O | 99.67 | 40 | 36 | 14 | 13 | 1 | -1180 |
| 16 | StLukesTX | O | A1 | 92.43 | 46 | 47 | 13 | 17 | -4 | -1180 |



Compatible Pairs Death Censored Graft Failure



NKR Desensitization Rates



www.kidneyregistry.org administrative database; transplants through 12/31/19



Better HLA Matches = Better Outcomes

NKR vs Unrelated LD TXPs

