

**SUPPLEMENTAL DIGITAL APPENDIX**

**Table S1.** Characteristics of patients in the study sample compared to kidney transplant recipients not included in the cohort.

<b>Baseline Characteristics</b>	<b>Study Cohort (N=67,362)</b>	<b>Kidney Transplant Recipients Not Included in Cohort (N=126,622)</b>
	%	%
Age, years		‡
18 to 64	77.9	85.2
≥65	22.1	14.9
Sex		†
Male	60.5	61.4
Female	39.6	38.7
Race		‡
White	45.8	55.4
African-American	30.0	22.3
Hispanic	17.9	14.1
Other	6.3	8.2
Employment status		‡
Working	17.7	37.0
Not working	73.8	53.4
Missing	8.5	9.6
Body mass index, kg/m <sup>2</sup>		‡
<18.5	2.3	2.4
18.5 to 24.9	29.6	30.3
25.0 to 29.9	32.7	32.7
≥30.0	33.7	31.8
Missing	1.8	2.8
Comorbid conditions		
Hypertension	32.5	35.9 ‡
Diabetes mellitus	36.5	34.0 ‡
Coronary artery disease	4.1	4.1
Cerebral vascular disease	0.7	0.7
Peripheral vascular disease	7.6	5.8 ‡
COPD	0.5	0.4 ‡
Hepatitis C positive	5.3	5.3
Cause of ESKD		‡
Hypertension	22.3	17.5
Diabetes mellitus	30.1	27.2
Glomerulonephritis	30.4	31.6
Polycystic kidney disease	7.8	11.7
Other	9.5	12.0

Duration of dialysis, months		‡
None (pre-emptive)	6.0	19.7
>0 to 24	17.6	31.6
25 to 60	36.5	24.0
>60	39.9	24.4
Missing	0.1	0.4
Most current PRA level (%)		‡
<10	68.9	71.5
10 to 79	17.1	14.4
≥80	10.6	7.8
Missing	3.5	6.3
HLA mismatches		‡
Zero A, B, DR	6.8	8.4
Zero DR	10.8	10.6
Other	82.4	81.0
Cold ischemia time, hours		‡
≤12	40.2	50.5
13 to 24	39.1	28.7
25 to 36	12.0	9.1
≥37	3.1	2.2
Missing	5.6	9.5
Previous organ transplant		‡
Yes	15.0	14.3
No	85.0	85.7
Donor Type		‡
Living donor	22.8	41.4
Deceased, KPDI <20	16.1	15.4
Deceased, KDPI 20 to 85	52.8	37.4
Deceased, KDPI >85	8.3	5.8
Transplant era		‡
2005 to 2008	28.1	34.7
2009 to 2012	38.4	29.7
2013 to 2016	33.5	35.6

P-values: \* p<0.05–0.002; † p=0.001–0.0001; ‡ p<0.0001

Data presented as column percentages (%).

“Other race” includes Asian, Native American, Pacific Islander, and multi-racial.

Abbreviations: ALEM, Alemtuzumab; AZA, azathioprine; COPD, chronic obstructive pulmonary disease; CsA, cyclosporine A; ESKD, end-stage kidney disease; HLA, human leukocyte antigen; IL2, Interleukin-2; KDPI, Kidney donor profile index; MPA, mycophenolic acid; mTORi, Mammalian target of rapamycin inhibitor; No Pred, no prednisone use post-transplant; Pred, prednisone use documented post-transplant; Tac, Tacrolimus; TMG, Thymoglobulin; Triple Therapy, Tac+MPA/AZA+Pred; PRA, panel reactive antibody.

**Table S2A. Distributions of early immunosuppression regimen use among kidney transplant recipients age 18-64 years according to other baseline patient, donor and transplant factors**

	<b>TMG/ALEM+ Triple Therapy (Reference) (N=24,656)</b>	<b>IL2rAb+Triple Therapy (N=7,705)</b>	<b>TMG/ALEM+ Tac+MPA/AZA, No Pred (N=10,070)</b>	<b>IL2rAb+ Tac+MPA/AZA, No Pred (N=938)</b>	<b>Tac, Tac+Pred (N=1,614)</b>	<b>mTORi-based (N=4,043)</b>	<b>CsA-based (N=3,471)</b>
	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>
<b>Sex</b>							
Male (n=31,591)	44.7	15.6	20.1	1.8	3.1	8.1	6.7
Female (n=20,906)	50.3	13.3	17.9	1.7	3.1	7.2	6.6
<b>Race</b>							
White (n=21,334)	42.3	15.7	20.0	2.2	3.6	8.8	7.4
African American (n=17,488)	54.4	11.9	17.6	1.0	2.7	7.3	5.1
Hispanic (n=10,377)	46.0	15.8	20.7	2.1	2.4	6.5	6.5
Other (n=3,298)	41.4	18.8	17.5	2.3	3.3	6.6	10.1
<b>Employment status</b>							
Working (n=10,202)	44.7	14.8	21.5	2.2	3.8	7.2	5.7
Not working (n=37,391)	47.7	14.9	18.5	1.7	2.9	8.0	6.4
<b>Body mass index, kg/m<sup>2</sup></b>							
<18.5 (n=1,350)	48.3	16.2	13.6	2.4	4.0	8.4	7.3
18.5 to 24.9 (n=15,939)	47.6	15.6	17.4	1.9	3.0	7.8	6.6
25.0 to 29.9 (n=16,401)	46.4	15.3	19.0	1.9	3.1	8.1	6.2
≥30.0 (n=17,875)	47.5	13.5	20.6	1.6	2.8	7.2	6.8
<b>Comorbid conditions</b>							
Hypertension (n=16,484)	46.4	13.9	19.4	1.8	3.1	8.7	6.9
Diabetes mellitus (n=17,617)	43.5	15.5	20.8	2.2	3.2	7.5	7.4
Coronary artery disease (n=1,907)	38.3	14.4	18.8	3.0	3.9	11.8	9.8
Cerebral vascular disease (n=343)	36.2	13.7	23.0	1.2	2.0	12.0	12.0
Peripheral vascular disease (n=3,650)	45.0	16.3	19.3	2.1	2.4	7.2	7.7
COPD (n=251)	34.3	11.6	19.5	4.8	4.0	13.6	12.4
Hepatitis C positive (n=3,053)	45.2	17.7	14.3	2.7	3.3	6.6	10.3
<b>Cause of ESKD</b>							
Hypertension (n=11,445)	49.5	13.3	19.3	1.2	2.7	8.1	5.8

Diabetes mellitus (n=14,455)	43.0	15.7	21.5	2.2	3.0	7.3	7.3
Glomerulonephritis (n=17,609)	49.6	14.3	17.5	1.7	3.0	7.4	6.6
Polycystic kidney disease (n=3,909)	43.9	14.0	22.0	1.6	3.5	9.0	6.0
Other (n=5,079)	46.1	16.5	16.1	2.2	4.0	7.9	7.1
Duration of dialysis, months							
None (pre-emptive) (n=1,702)	29.3	19.0	23.0	4.0	6.5	8.3	9.9
>0 to 24 (n=8,056)	36.3	19.3	21.0	3.0	3.8	9.0	7.7
25 to 60 (n=19,343)	44.4	15.0	21.3	1.7	3.2	8.1	6.3
>60 (n=23,382)	54.1	12.5	16.6	1.3	2.5	6.9	6.2
Most current PRA level (%)							
<10 (n=35,288)	40.9	17.3	21.6	2.1	3.3	7.9	7.0
10 to 79 (n=9,262)	57.0	10.6	15.6	1.1	2.9	7.2	5.7
≥80 (n=6,143)	71.1	5.7	10.6	0.5	2.1	5.3	4.8
HLA mismatches							
Zero A, B, DR (n=3,617)	42.0	16.9	16.9	4.6	3.2	7.6	8.9
Zero DR (n=5,679)	47.4	13.4	20.3	1.7	3.3	7.5	6.5
Other (n=43,201)	47.3	14.7	19.2	1.6	3.0	7.7	6.4
Cold ischemia time, hours							
≤12 (n=20,909)	44.4	17.4	18.3	2.2	3.0	8.2	6.6
13 to 24 (n=20,814)	50.6	13.5	17.9	1.4	3.0	7.5	6.3
25 to 36 (n=6,259)	50.5	11.7	20.5	1.1	3.0	6.8	6.4
≥37 (n=1,577)	46.2	7.5	31.6	0.6	3.0	6.6	4.4
Previous organ transplant							
Yes (n=9,010)	60.7	9.3	11.4	1.2	3.2	7.8	6.5
No (n=43,487)	44.1	15.8	20.8	1.9	3.1	7.7	6.6
Donor Type							
Living donor (n=11,556)	36.9	18.5	22.4	3.3	3.4	8.1	7.4
Deceased, KPDI <20 (n=9,285)	47.4	15.7	17.8	1.8	3.7	6.8	6.8
Deceased, KDPI 20 to 85 (n=28,357)	50.9	13.1	18.2	1.2	2.7	7.5	6.3
Deceased, KDPI >85 (n=3,299)	47.4	11.7	20.4	1.2	3.3	10.5	5.5
Transplant era							
2005 to 2008 (n=15,133)	35.4	15.2	19.0	2.6	4.6	12.1	11.2
2009 to 2012 (n=20,015)	47.5	14.8	20.2	1.9	2.9	6.8	5.9
2013 to 2016 (n=17,349)	56.4	14.0	18.2	1.0	2.0	4.9	3.5
Percentages are row percentages.							

Chisq test for comparison of distributions of ISx regimen across all traits  $P < 0.05$  for comparison of distributions of ISx regimen across all traits, due to large sample size

“Other race” includes Asian, Native American, Pacific Islander, and multi-racial.

Abbreviations: ALEM, alemtuzumab; AZA, azathioprine; COPD, chronic obstructive pulmonary disease; CsA, cyclosporine A; ESKD, end-stage kidney disease; HLA, human leukocyte antigen; IL2, interleukin-2; KDPI, kidney donor profile index; MPA, mycophenolic acid; mTORi, mammalian target of rapamycin inhibitor; No Pred, no prednisone use post-transplant; Pred, prednisone use documented post-transplant; Tac, tacrolimus; TMG, anti-thymocyte globulin; Triple Therapy, Tac+MPA/AZA+Pred; PRA, panel reactive antibody.

**Table S2B. Distributions of early immunosuppression regimen use among kidney transplant recipients age ≥ 65 years according to other baseline patient, donor and transplant factors**

	TMG/ALEM+ Triple Therapy (Reference) (N=5,478)	IL2rAb+Triple Therapy (N=3,131)	TMG/ALEM+ Tac+MPA/AZA, No Pred (N=2,985)	IL2rAb+ Tac+MPA/AZA, No Pred (N=615)	Tac, Tac+Pred (N=420)	mTORi-based (N=1,000)	CsA-based (N=1,236)
	%	%	%	%	%	%	%
<b>Sex</b>							
Male (n=9,132)	34.1	22.5	20.4	4.6	3.0	7.2	8.3
Female (n=5,733)	41.3	18.7	19.6	3.5	2.5	6.0	8.4
<b>Race</b>							
White (n=9,541)	33.5	22.8	20.3	4.7	3.0	6.9	8.8
African American (n=2,712)	46.9	15.8	19.1	2.9	2.6	7.2	5.5
Hispanic (n=1,701)	40.2	18.7	21.4	3.0	2.5	5.8	8.5
Other (n=911)	36.2	23.4	17.8	3.8	2.5	5.3	11.0
<b>Employment status</b>							
Working (n=1,721)	35.9	22.3	21.6	3.5	3.2	6.9	6.7
Not working (n=12,301)	37.3	20.9	19.8	4.3	2.7	6.7	8.2
<b>Body mass index, kg/m<sup>2</sup></b>							
<18.5 (n=194)	42.3	26.3	14.4	5.7	2.1	3.6	5.7
18.5 to 24.9 (n=3,974)	36.0	21.8	19.4	4.3	3.4	6.5	8.6
25.0 to 29.9 (n=5,650)	36.6	21.6	18.8	4.3	2.6	7.4	8.7
≥30.0 (n=4,793)	38.3	20.5	21.0	3.8	2.5	6.2	7.8
<b>Comorbid conditions</b>							
Hypertension (n=5,418)	34.9	22.4	19.9	4.4	2.6	7.5	8.4
Diabetes mellitus (n=6,998)	36.9	19.8	21.4	4.0	2.9	6.6	8.5
Coronary artery disease (n=850)	31.3	21.7	21.4	5.4	2.2	8.1	9.9
Cerebral vascular disease (n=124)	28.2	22.6	27.4	6.5	0.0	8.1	7.3
Peripheral vascular disease (n=1,455)	34.5	21.1	22.5	5.2	2.3	6.5	8.0
COPD (n=85)	31.8	21.2	27.1	4.7	1.2	4.7	9.4
Hepatitis C positive (n=495)	36.0	21.2	17.2	4.4	3.0	7.3	10.9
<b>Cause of ESKD</b>							
Hypertension (n=3,540)	37.3	21.3	19.0	4.3	2.5	7.8	7.8
Diabetes mellitus (n=5,829)	36.9	19.5	21.9	4.1	2.8	6.5	8.3

Glomerulonephritis (n=2,854)	38.2	21.4	18.7	4.0	3.3	6.5	7.9
Polycystic kidney disease (n=1,341)	36.4	21.9	20.1	3.5	3.1	6.4	8.7
Other (n=1,301)	33.0	25.9	17.8	4.8	2.6	5.5	10.5
Duration of dialysis, months							
None (pre-emptive) (n=2,316)	28.7	25.4	21.9	4.9	2.7	7.3	9.1
>0 to 24 (n=3,790)	32.6	24.1	19.6	5.2	3.3	7.0	8.2
25 to 60 (n=5,239)	37.2	19.8	21.2	3.9	2.8	7.1	8.0
>60 (n=3,498)	46.5	16.9	17.7	2.9	2.3	5.6	8.2
Most current PRA level (%)							
<10 (n=11,148)	32.8	22.8	21.5	4.6	2.8	6.9	8.6
10 to 79 (n=2,220)	47.4	17.5	16.0	2.8	2.5	5.9	7.9
≥80 (n=967)	64.9	7.6	13.9	0.6	2.6	4.7	5.8
HLA mismatches							
Zero A, B, DR (n=972)	32.1	21.3	18.4	7.4	3.8	7.8	9.2
Zero DR (n=1,601)	37.2	20.7	21.4	3.8	2.6	5.3	9.0
Other (n=12,292)	37.2	21.1	20.0	3.9	2.8	6.8	8.2
Cold ischemia time, hours							
≤12 (n=6,160)	34.5	24.3	19.0	4.5	3.0	6.9	7.8
13 to 24 (n=5,530)	40.2	20.2	18.8	3.6	2.6	6.3	8.4
25 to 36 (n=1,852)	41.1	17.3	20.8	2.8	2.7	7.7	7.7
≥37 (n=495)	33.9	9.1	36.4	3.0	2.4	8.7	6.5
Previous organ transplant							
Yes (n=1,121)	46.6	15.6	12.2	2.4	4.6	7.1	11.5
No (n=13,744)	36.1	21.5	20.7	4.3	2.7	6.7	8.1
Donor Type							
Living donor (n=3,774)	27.6	26.4	22.1	5.9	2.7	6.6	8.8
Deceased, KPDI <20 (n=1,583)	35.5	23.0	17.1	3.8	5.1	6.6	8.9
Deceased, KDPI 20 to 85 (n=7,189)	41.3	18.7	19.6	3.4	2.6	6.3	8.1
Deceased, KDPI >85 (n=2,319)	39.1	18.4	20.3	3.8	2.3	8.4	7.6
Transplant era							
2005 to 2008 (n=3,794)	27.7	16.6	22.2	5.1	4.7	10.1	13.7
2009 to 2012 (n=5,864)	37.2	21.3	21.2	4.6	2.6	5.6	7.6
2013 to 2016 (n=5,207)	43.2	24.0	17.3	3.0	1.7	5.6	5.2
Percentages are row percentages.							

Chisq test for comparison of distributions of ISx regimen across all traits P<0.05 for comparison of distributions of ISx regimen across all traits, due to large sample size

“Other race” includes Asian, Native American, Pacific Islander, and multi-racial.

Abbreviations: ALEM, alemtuzumab; AZA, azathioprine; COPD, chronic obstructive pulmonary disease; CsA, cyclosporine A; ESKD, end-stage kidney disease; HLA, human leukocyte antigen; IL2, interleukin-2; KDPI, kidney donor profile index; MPA, mycophenolic acid; mTORi, mammalian target of rapamycin inhibitor; No Pred, no prednisone use post-transplant; Pred, prednisone use documented post-transplant; Tac, tacrolimus; TMG, anti-thymocyte globulin; Triple Therapy, Tac+MPA/AZA+Pred; PRA, panel reactive antibody.

### SUPPLEMENTAL FIGURE LEGEND

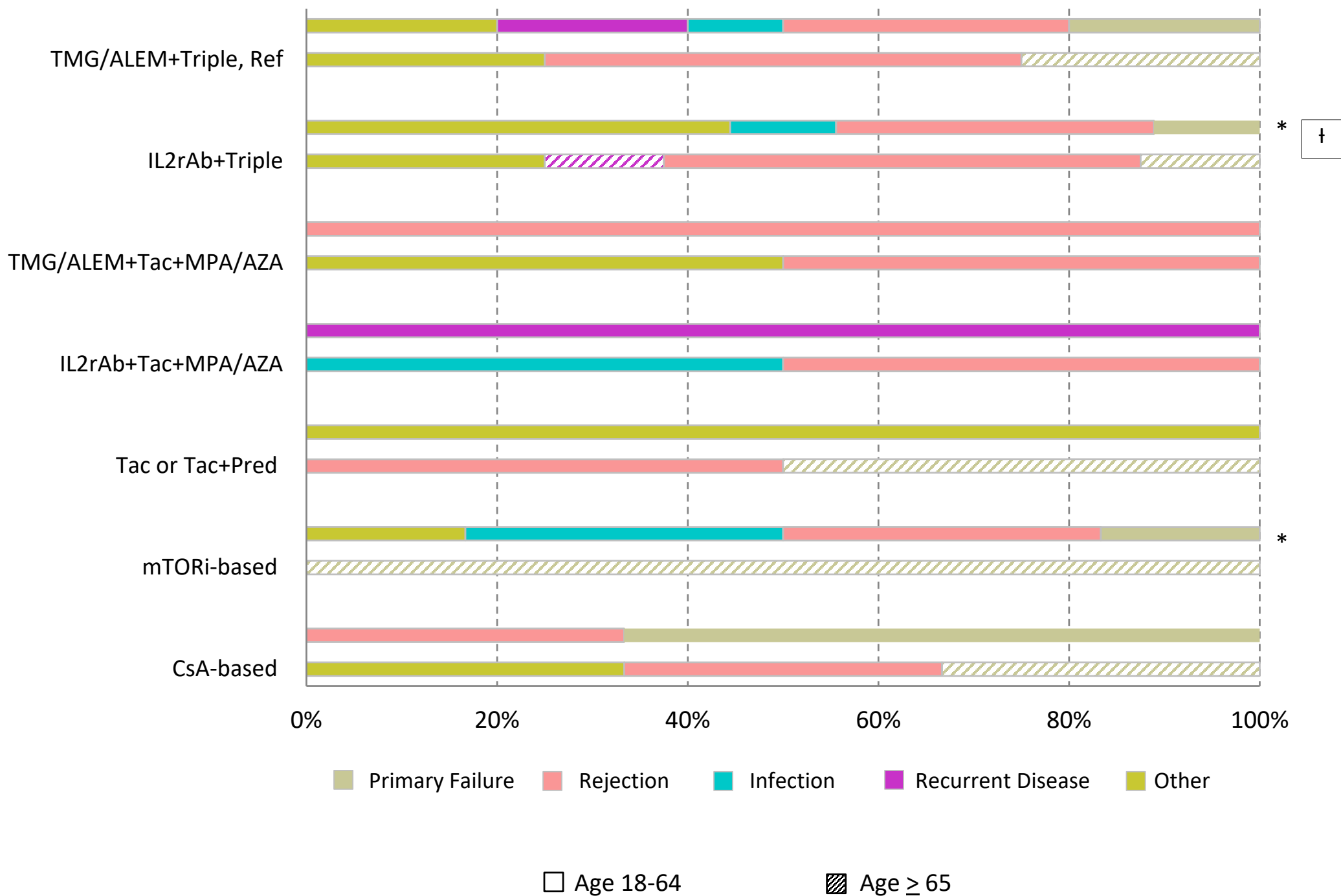
**Figure S1.** Distributions of cause graft failure (A) and death (B) according to ISx regimen and recipient age. \* P<0.05 for differences in cause within regimen.

† P<0.05 for difference in cause across age groups.



A.

## Cause of Graft Failure by ISx Regimen and Age



B.

# Cause of Death by ISx Regimen and Age

