

## Supplemental data

### Supplemental methods

Mononuclear cells were stained with fluorescent antibodies, acquired on a BD FACScan flow cytometer, and analyzed using FlowJo software. All cells were stained with CD3 PerCP (BD 347304; clone SK7) and CD56 APC (BD 341025; clone NCAM16.2). To identify the mature NK cells, FITC conjugated anti-KIR antibodies CD158a (BD 556062; clone HP3E4), CD158b (BD 559784; clone CH-L) and NKB1 (BD 555966; clone DX9) and PE conjugated antibody NKG2A (Beckman Coulter IM3291; clone Z199) were also added. Lymphocytes were identified by light scatter and NK cells were identified as CD56<sup>+</sup>CD3<sup>-</sup>. The NK cells were further gated into KIR<sup>+</sup>NKG2A<sup>+</sup>, KIR<sup>+</sup>NKG2A<sup>-</sup>, KIR<sup>-</sup>NKG2A<sup>+</sup> and KIR<sup>-</sup>NKG2A<sup>-</sup> quadrants. To identify T cell subsets, cells were stained with CD3 PerCP and CD56 APC, as above, along with CD4 FITC (BD 340133; clone SK3) and CD8 PE (BD 340046; clone SK1). T cells were identified as CD3<sup>-</sup>CD56<sup>+</sup> lymphocytes and further gated into CD4<sup>+</sup> and CD8<sup>+</sup> subsets.

**Table S1: Results of univariate regression**

Covariate	Regression coefficient	SE	95%CI		<i>P</i>
<b>CD4<sup>+</sup> T cells (% of lymphocytes)</b>					
Graft source (reference: PB)					
BM	-9.18	1.72	-12.57	-5.79	<.0001
<b>CD8<sup>+</sup> T cells (% of lymphocytes)</b>					
Graft source (reference: PB)					
BM	0.76	2.63	-4.41	5.94	0.77
<b>NK cells total (% of lymphocytes)</b>					
Graft source (reference: PB)					
BM	11.68	3.25	5.28	18.07	0.0004
<b>CD56<sup>bright</sup> NK cells (% of NK cells)<sup>1</sup></b>					
Graft source (reference: PB)					
BM	8.58	2.44	3.78	13.38	0.0005
<b>KIR<sup>+</sup>NKG2A<sup>-</sup> NK cells (% of NK cells)</b>					
Graft source (reference: PB)					
BM	-0.67	1.96	-4.52	3.19	0.73

<sup>1</sup>Because CD56<sup>bright</sup> NK cells (% of NK cells) and CD56<sup>dim</sup> NK cells (% of NK cells) add up to 100%, the regression models for the two are mathematically equivalent and only differ in the direction of the estimated regression coefficients of covariates. Therefore, only models for CD56<sup>bright</sup> NK cells are shown. BM: Bone marrow; CI: Confidence interval; NK: Natural killer; PB: Peripheral blood; SE: standard error

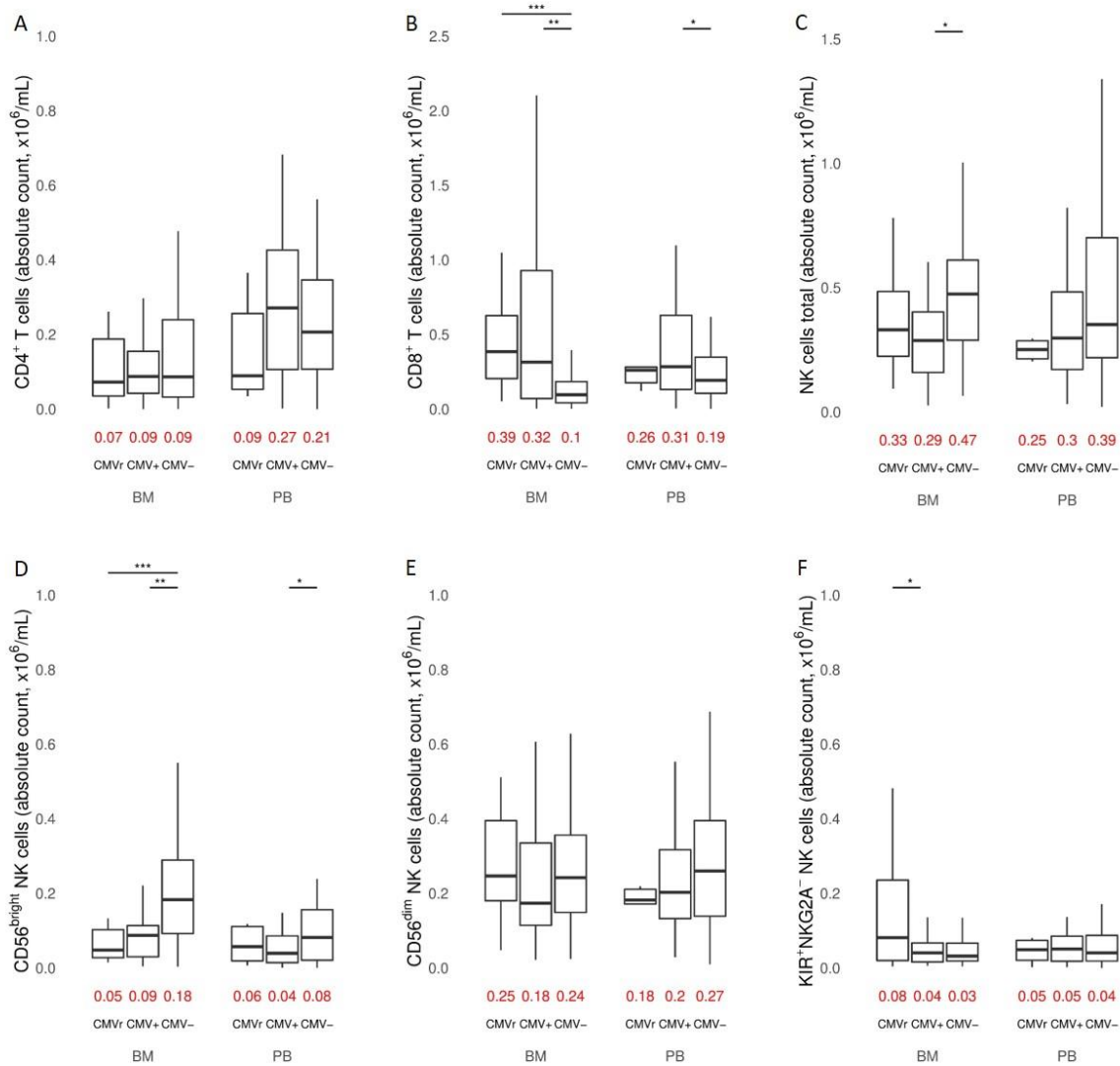
**Table S2: Results of multivariable regressions with graft source, CMV group, and their interaction, unadjusted or adjusted for grade II-IV acute GVHD by day 100**

Covariate	Regression coefficient	SE	95%CI		P
<b>CD4<sup>+</sup> T cells (% of lymphocytes)</b>					
Graft source (reference: PB) BM	-6.65	2.54	-11.65	-1.65	0.01
CMV group (reference: CMV-) CMVr	-3.63	4.99	-13.46	6.19	0.09
CMV+	-1.22	2.49	-6.12	3.67	0.47
Graft source x CMV group BM x CMVr	-3.38	6.13	-15.47	8.70	0.53
BM x CMV+	-4.02	3.64	-11.20	3.16	0.58
<b>CD4<sup>+</sup> T cells (% of lymphocytes), adjusted for grade II-IV aGVHD</b>					
Graft source (reference: PB) BM	-6.76	2.54	-11.76	-1.75	0.01
CMV group (reference: CMV-) CMVr	-3.86	5.00	-13.70	5.99	0.10
CMV+	-1.11	2.49	-6.02	3.79	0.44
Graft source x CMV group BM x CMVr	-3.07	6.15	-15.18	9.05	0.62
BM x CMV+	-3.97	3.65	-11.16	3.21	0.28
aGVHD grade II-IV (reference: No) Yes	1.41	1.73	-2.00	4.81	0.42
<b>CD8<sup>+</sup> T cells (% of lymphocytes)</b>					
Graft source (reference: PB) BM	-7.23	3.61	-14.34	-0.11	0.05
CMV group (reference: CMV-) CMVr	10.18	7.10	-3.81	24.16	<.0001
CMV+	8.17	3.54	1.21	15.14	0.15
Graft source x CMV group BM x CMVr	12.61	8.73	-4.59	29.80	0.02
BM x CMV+	12.55	5.18	2.33	22.76	0.04
<b>CD8<sup>+</sup> T cells (% of lymphocytes), adjusted for grade II-IV aGVHD</b>					
Graft source (reference: PB) BM	-6.89	3.60	-13.98	0.19	0.06
CMV group (reference: CMV-) CMVr	10.89	7.07	-3.04	24.82	<.0001
CMV+	7.82	3.52	0.88	14.77	0.12
Graft source x CMV group BM x CMVr	11.59	8.70	-5.56	28.73	0.03
BM x CMV+	12.39	5.16	2.23	22.56	0.05
aGVHD grade II-IV (reference: No) Yes	-4.53	2.45	-9.35	0.29	0.18
<b>NK cells total (% of lymphocytes)</b>					
Graft source (reference: PB) BM	16.61	4.72	7.31	25.91	0.0005

CMV group (reference: CMV-)					0.002
CMVr	-5.35	9.28	-23.64	12.93	0.56
CMV+	-8.24	4.63	-17.35	0.87	0.08
Graft source x CMV group					0.48
BM x CMVr	-10.19	11.34	-32.54	12.16	0.37
BM x CMV+	-7.10	6.78	-20.46	6.25	0.30
<b>NK cells total (% of lymphocytes), adjusted for grade II-IV aGVHD</b>					
Graft source (reference: PB)					
BM	15.97	4.66	6.78	25.16	0.0007
CMV group (reference: CMV-)					0.003
CMVr	-6.73	9.17	-24.79	11.34	0.46
CMV+	-7.57	4.57	-16.57	1.44	0.10
Graft source x CMV group					0.54
BM x CMVr	-8.04	11.22	-30.14	14.07	0.47
BM x CMV+	-6.81	6.69	-19.99	6.37	0.31
aGVHD grade II-IV (reference: No)					
Yes	8.68	3.17	2.44	14.92	0.01
<b>CD56<sup>bright</sup> NK cells (% of NK cells)<sup>1</sup></b>					
Graft source (reference: PB)					
BM	11.86	3.56	4.84	18.87	0.001
CMV group (reference: CMV-)					0.04
CMVr	-2.96	7.00	-16.75	10.83	0.67
CMV+	-3.60	3.49	-10.48	3.27	0.30
Graft source x CMV group					0.30
BM x CMVr	-13.29	8.56	-30.14	3.57	0.12
BM x CMV+	-2.06	5.11	-12.14	8.01	0.69
<b>N CD56<sup>bright</sup> NK cells (% of NK cells)<sup>1</sup>, adjusted for grade II-IV aGVHD</b>					
Graft source (reference: PB)					
BM	11.80	3.57	4.76	18.83	0.001
CMV group (reference: CMV-)					0.04
CMVr	-3.09	7.02	-16.93	10.75	0.66
CMV+	-3.54	3.50	-10.43	3.36	0.31
Graft source x CMV group					0.32
BM x CMVr	-13.08	8.59	-30.01	3.85	0.13
BM x CMV+	-2.04	5.12	-12.13	8.06	0.69
aGVHD grade II-IV (reference: No)					
Yes	0.84	2.43	-3.94	5.61	0.73
<b>KIR<sup>+</sup>NKG2A<sup>-</sup> NK cells (% of NK cells)</b>					
Graft source (reference: PB)					
BM	-2.90	2.72	-8.26	2.47	0.29
CMV group (reference: CMV-)					<.0001
CMVr	5.58	5.14	-4.55	15.70	0.28
CMV+	8.38	2.63	3.20	13.57	0.00
Graft source x CMV group					0.03
BM x CMVr	14.92	6.31	2.49	27.35	0.02
BM x CMV+	-2.01	3.88	-9.65	5.64	0.61
<b>KIR<sup>+</sup>NKG2A<sup>-</sup> NK cells (% of NK cells), adjusted for grade II-IV aGVHD</b>					

Graft source (reference: PB) BM	-2.37	2.71	-7.72	2.97	0.38
CMV group (reference: CMV-) CMVr	6.20	5.11	-3.87	16.26	0.23
CMV+	7.95	2.62	2.79	13.12	0.003
Graft source x CMV group BM x CMVr	13.72	6.28	1.34	26.11	0.03
BM x CMV+	-2.30	3.85	-9.89	5.29	0.55
aGVHD grade II-IV (reference: No) Yes	-3.86	1.83	-7.47	-0.26	0.04

<sup>1</sup>Because CD56<sup>bright</sup> NK cells (% of NK cells) and CD56<sup>dim</sup> NK cells (% of NK cells) add up to 100%, the regression models for the two are mathematically equivalent and only differ in the direction of the estimated regression coefficients of covariates. Therefore, only models for CD56<sup>bright</sup> NK cells are shown. aGVHD: acute graft-versus-host disease; BM: Bone marrow; CI: Confidence interval; CMV: Cytomegalovirus; CMVr, patients who reactivated CMV by day 100; CMV+, CMV-seropositive patients who did not reactivate CMV by day 100; CMV-, CMV-seronegative patients who did not reactivate CMV; NK: Natural killer; PB: Peripheral blood; SE: standard error



**Figure S1: Association of CMV reactivation with T- and NK-cell reconstitution at 100 days in unrelated donor allografts using bone marrow vs. peripheral blood as a graft source.** The absolute counts of (A) CD4<sup>+</sup> T cells, (B) CD8<sup>+</sup> T cells, and (C) total NK cells were determined based on a lymphocyte gate determined by forward and side scatter. The NK cells (CD56<sup>+</sup>/CD56<sup>-</sup> gate) were subsetted into (D) CD56<sup>bright</sup>, (E) CD56<sup>dim</sup>, and (F) KIR<sup>+</sup>NKG2A<sup>-</sup> NK cells in three groups based on CMV reactivation status and in bone marrow vs. peripheral blood groups, separately. Red numbers on the X-axis show medians. CMVr, patients who reactivated CMV by day 100; CMV+, CMV-seropositive patients who did not reactivate CMV by day 100; and CMV-, CMV-seronegative patients who did not reactivate CMV by day 100