Supplemental Files

Supplemental Methods

Assessment of immune reconstitution

Blood samples were obtained in the Department of Medicine III as part of pre-planned sample collection and processing, and then routinely analyzed by the accredited Institute of Laboratory Medicine of the LMU University Hospital (LMU Munich). Lymphocyte counts were determined by a Sysmex XN machine (Sysmex, Norderstedt, Germany). T cells were defined as CD45⁺CD3⁺, T helper cells were defined as CD45⁺CD3⁺CD4⁺CD8⁻, cytotoxic/suppressor T cells were defined as CD45⁺CD3⁺CD3⁺CD4⁻CD8⁺ and the CD4/CD8 ratio was determined as the ratio of T helper cells to cytotoxic T cells. B cells were defined as CD45⁺CD19⁺ and NK cells were defined as CD45⁺CD16/56⁺CD3⁻.

Supplemental Tables

Anti-infective prophylaxis				G-CSF support	IVIG support
Viral Bacterial Pneumocystis Fungal			Trig	ıger	
Aciclovir for at least 6 months and then until CD4+ T _H cell count >200/µL	None (only in case of neutropenic fever)	Trimethoprim/ Sulfamethoxazole (TMP/SMX) at least for 6 months and then until CD4+ T _H cell count >200/µL	Depending on patient risk factors (prior fungal infection, baseline cytopenia, prolonged corticosteroid application), mainly posaconazole, alternatively micafungin	ANC <500/µL after day 5 post-CAR-T (approximate definition, considerable interpatient variability*)	<4 g/L and severe or recurring infections (more strict indication in case of allergic reaction to IVIG exposure)

Suppl. Table S1. Overview of standard operating procedures concerning anti-infective prophylaxis strategies and regarding the initiation of G-CSF and IVIG support. *G-CSF support was initially deferred until the 2nd week post CAR-T due to concern of exacerbating immunotoxicity, which was then transitioned to an earlier G-CSF approach. Recently, patients received early G-CSF depending on their risk profile (according to CAR-HEMATOTOX score).

Days post CAR-T	0	7	14	21	30	90	180	360	540	720	900	1080
Cells												
White Blood cells	105	104	102	95	88	66	46	31	24	18	15	8
Platelet Count	105	104	102	95	88	66	46	31	24	18	15	8
Lymphocytes	105	104	102	95	88	66	46	31	24	18	15	8
T cells	105	104	102	95	88	66	46	31	24	18	15	8
CD4+ T helper cells	105	104	102	95	88	66	46	31	24	18	15	8
Cytotoxic CD8+ T cells	105	104	102	95	88	66	46	31	24	18	15	8
B cells	105	104	102	95	88	66	46	31	24	18	15	8
NK cells	105	104	102	95	88	66	46	31	24	18	15	8
Immunoglobulins												
lgG	105	104	102	95	88	66	46	31	24	18	15	8
IgA	105	104	102	95	88	66	46	31	24	18	15	8
lgM	105	104	102	95	88	66	46	31	24	18	15	8

Suppl. Table S2. Number at risk Patient number at risk at specific timepoints after CAR-T: weekly (first month [M]), monthly (M1-3), twice yearly (after M3).

	Non-responder 3M (n=48)	Responder 3M (n=57)	P value
Baseline characteristics		· · ·	
Ages, years (range)	60 (19-80)	66 (25-85)	0.02
Sex (female), n (% of total)	17 (35.4%)	23 (40.4%)	0.7
Performance status			
Median ECOG at lymphodepletion (range)	1 (1-2)	1 (0-1)	0.03
ECOG 0-1, n (%)	33 (68.75%)	50 (87.7%)	0.03
ECOG ≥ 2, n (%)	15 (31.25%)	7 (12-3%)	0.03
Therapy management			
Prior SCT, n (%)	12 (25%)	16 (28.1%)	0.8
Median lines of therapy before bridging (IQR)	3 (2-5)	3 (2-4)	0.1
Any bendamustine before CAR, n (% of total)	18 (37.5%)	26 (45.6%)	0.4
Bendamustine last 9 months before CAR, n (% of total)	8 (16.7%)	3 (5.2%)	0.1
Bendamustine for bridging or lymphodepletion, n (% of total)	8 (16.7%)	11 (19.3%)	0.8
Holding therapy, n (% of total)	24 (50%)	21 (36.8%)	0.2
Bridging therapy, n (% of total)	37 (77.1%)	38 (66.7%)	0.3
Pola-based bridging, n (% of total)	12 (25%)	15 (26.3%)	>0.999
Immunochemotherapy-based bridging, n (% of total)	35 (72.9%)	33 (57.9%)	0.2
Brain-to-time, days (IQR)	31 (19-48.8)	28 (10-48.5)	0.8
Vein-to-vein time, days (IQR)	40 (32-46)	37 (34-46.5)	0.9
Laboratory parameters parameters at time point pof lymph	odepletion (day -5 prior C	AR T-cell infusion)	
LDH, U/I (IQR)	382 (237.8-545.5)	216 (179.5-275)	<0.0001
GFR, ml/min (IQR)	90 (72.8-103.8)	78 (65.5-92.5)	0.03
CRP, mg/dl (IQR)	3.5 (1.2-5.3)	0.3 (0.1-1.03)	<0.0001
Ferritin, ng/ml (IQR)	1062 (266.3-2043)	292 (131.5-675)	0.0008
ANC, cells/µl (IQR)	1905 (837.5-3503)	2640 (1875-3760)	0.02
PLT, G/I (IQR)	152 (66.3-206.8)	175 (125-224)	0.2
Hemoglobin, g/dl (IQR)	8.9 (7.8-10.3)	10.9 (9.5-12.5)	<0.0001
CAR-HEMATOTOX Score			
CAR-HEMATOTOX Score Absolute (IQR)	3 (1-4)	1 (0-2)	<0.0001
CAR-HEMATOTOX Score Low (0-1), n (% of total)	13 (27.1%)	36 (63.2%)	0.004
CAR-HEMATOTOX Score High (>2), n (% of total)	35 (72.9%)	21 (36.8%)	0.004
Disease entity, n (% of total)			1
Non-transformed lymphoma (DLBCL, PMBCL, THRLBCL)	33 (68.8%)	25 (42.9%)	0.02
Transformed lymphoma	11 (22.9%)	21 (36.8%)	0.1
	4 (8 3%)	11 (10.3%)	0.2
	4 (0.3%)	11 (19.3%)	0.2
Infused CAR T-cell product			
CAR product, n (% of total)			
Axi-cel	26 (54.17%)	24 (42.11%)	0.2
Tisa-cel	17 (35.42%)	16 (28.07%)	0.5
Brexu-cel	3 (6.25%)	11 (19.3%)	0.08
Liso-cel	2 (4.17%)	6 (10.5%)	0.3
Co-stimulatory domain (ICD) of CAR product, n (% of total)			
CD28-based ICD	29 (61.7%)	35 (61.4%)	>0.999
41-BB-based ICD	18 (38.3%)	22 (38.6%)	>0.999
Immunotoxicity			
CRS, n (% of total)			
No CRS	6 (12.5%)	9 (15.8%)	0.8
CRS grade 1-2	37 (77.1%)	43 (75.4%)	>0.999
CRS grade ≥ 3	5 (10.4%)	5 (8.8%)	>0.999
	00 (50 00()	07 (47 40()	
	∠8 (58.3%)	21 (41.4%)	0.3
	12 (25)	∠1 (36.8%)	0.2
ICANS grade 2 3	8 (16./%)	9 (15.8%)	>0.999
Ioxicity management, n (% of total)	40 (00 00)	07 (04 00()	-0.07
	40 (83.3%)	37 (64.9%)	<0.05
	22 (45.8%)	5 (43.9%)	0.9
ICU admission necessary	7 (14.3%)	7 (12.3%)	0.8

Suppl. Table S3. Baseline patient characteristics for patients with response after 3 months

Patient baseline characteristics prior to CAR-T infusion for patients with no response (n=48) and response defined as complete or partial remission (n=57). All laboratory values were determined prior to lymphodepleting chemotherapy with a leniency time period of 3 days. ECOG: Eastern Cooperative Oncology Group. PS: performance status. IQR: interquartile range. LD: lymphodepletion chemotherapy. CI: confidence interval. If a measurement wasn't available for all patients, the denominator is indicated in the table. Statistical significance between groups was explored by Mann-Whitney test for continuous variables and Fisher's exact test for comparison of percentages.

Baseline characteristics (1497) (1494) Ass. (sex) (angle) (455 5-68 5) (5 677) 0.2 Ass. (sex) (angle) (455 5-68 5) (5 677) 0.3 Performance Stabs 0.3 0.3 0.3 Median ECOG at lymphodepletion (range) 11(1-2) 1 (0-1) 0.4 Theraps management 1 12(28.8%) 5 (11.4%) 0.03 ECOG 0.1, (%) 14 (75.4%) 14 (75.4%) 0.13 0.25 Ary bendmustine before bridging (IQR) 3 (24.4) 2.5 (24.4) 0.25 Ary bendmustine before CAR, (% of total) 20 (35.1%) 23 (62.5%) 0.1 Bendamustine is domothe before CAR, (% of total) 43 (75.4%) 16 (60.4%) 0.0001 Bolding therapy, 16% of ball 14 (24.5%) 24 (27.2%) 0.5 Branchowein time, days (IQR) 29 (19.5-4%) 24 (27.4%) 0.4 Unito vien time, days (IQR) 23 (23.44.5) 24 (27.45.8) 0.2 Branchowein time, days (IQR) 29 (19.5-4%) 24 (27.45.8) 0.4 Device vien time, days (IQR) <		NR 6M	R 6M	P value
ages, years (range) 64 (55-68 5) 65 (57-72) 0.2 Sex (fmaile), 15 (24 total) 18 (34.6%) 19 (43.2%) 0.3 Performance status 0.3 Performance status 0.3 0.3 ECOG 0.2, n. (%) 17 (28.8%) 5 (11.4%) 0.03 Therapy management 11 (72.8,8%) 5 (11.4%) 0.03 Prot SCT, n. (%) 14 (75.4%) 14 (31.8%) 0.5 Median ines of therapy before bridging (IQR) 3 (2.4) 2.5 (2.4) 0.25 May be distancian before CAR, n (% of total) 20 (35.1%) 23 (4.6%) 0.1 Bendamustine last 9 months before CAR, n (% of total) 43 (75.4%) 21 (6.2%) 0.6 Holding therapy, n (% of total) 43 (75.4%) 29 (6.9%) 0.4 Pole-based bridging, n (% of total) 41 (74.4%) 22 (2.7.3%) 0.4 Pole-based bridging, n (% of total) 41 (74.4%) 22 (2.7.3%) 0.4 Pole-based bridging, n (% of total) 41 (74.4%) 24 (6.4%) 0.4 Pole-based bridging, n (% of total) 41 (74.6%) 24 (2.7.3%)	Baseline characteristics	(n=57)*	(n=44)*	
Sax (Emails): n.(% of total) 18 (31,8%) 19 (45,2%) 0.3 Performance EXDs 11 (1-2) 1 (0-1) 0.04 ECOG 0-1, n(%) 40 (70,2%) 39 (86,%) 0.03 ECOG 2-2, n. (%) 17 (20,8%) 5 (11.4%) 0.03 Therapy management	Ages years (range)	64 (55 5-68 5)	65 (57-72)	0.2
Performance status 12 (1-22) 12 (1-21) 12 (1-21) 12 (1-21) Bedian ECOG st hymphodepletion (range) 11 (1-22) 1 (0-1) 0.04 ECOG s 2, n (%) 17 (28,%) 39 (86,6%) 0.03 Therapy management	Sex (female) n (% of total)	18 (31 6%)	19 (43 2%)	0.3
Indefan ECOG 1 (1-2) 1 (1-2) 1 (1-2) 1 (1-2) 1 (1-2) 1 (1-2) 1 (1-2) 1 (1-2) 1 (1-2) 0.03 ECOG 2 2, n (%) 17 (28.8%) 5 (11.4%) 0.03 0.03 Therapy management 14 (75.4%) 14 (31.8%) 0.5 0.03 Bendamustine before CAR, n (% of total) 2 (15.1%) 2 3 (52.3%) 0.1 Bendamustine before CAR, n (% of total) 9 (15.8%) 2 (4.6%) 0.1 Bendamustine before CAR, n (% of total) 4 (37.4%) 16 (36.4%) 0.0001 Bidding therapy, n (% of total) 4 (37.4%) 29 (65.9%) 0.4 Dela-based bridging, n (% of total) 4 (17.9%) 24 (45.4%) 0.2 Dela-based bridging, n (% of total) 4 (17.9%) 24 (45.4%) 0.2 Lori, Un (GR) 8 (206.53) 0.4 2 CRP, mignin (GR) 24 (10.5.49) 20 (40.5.5) 0.4 Vein-to-vein time, days (IOR) 24 (10.5.49) 0.0 (4.02.4) 4.0 Lori, Un (GR) 8 (206.53.3) 12 (11.6.19.69) <	Performance status	10 (011070)		0.0
	Median ECOG at lymphodepletion (range)	1 (1-2)	1 (0-1)	0.04
ECOG 22, n (%) 17 (28.%) 5 (11.4%) 0.03 Priors 2CT, n (%) 14 (75.4%) 14 (31.8%) 0.5 Median lines of thrapy before hridging (UR) 3 (2.41) 2.5 (2.4) 0.25 Any bendamustine before CAR, n (% of total) 20 (35.1%) 2.2 (82.3%) 0.1 Bendamustine last months before CAR, n (% of total) 9 (15.8%) 9 (20.5%) 0.6 Holding therapy, n (% of total) 4175.4%) 16 (38.4%) 0.0001 Bridging herapy, n (% of total) 14 (17.4%) 12 (63.4%) 0.0001 Bridding therapy, n (% of total) 14 (17.4%) 12 (63.4%) 0.0001 Bridding therapy, n (% of total) 14 (17.4%) 24 (64.6%) 0.09 Brint-ovein time, days (OR) 29 (132.44.5) 39 (5.34.49.8) 0.2 Laboratory parameters at time point of lymphodepletion (day / 5 prior CAR, Teoli Infusion) 0.0001 0.0001 CFR, m/min (OR) 58 (206-533) 214 (183-27.5) 0.0006 CFR, m/gid (ICR) 77 (28.5%) 0.04 0.22 Low U/ (OR) 58 (206-530) 175 (127.8-328.5) 0.0006 <td>ECOG 0-1. n (%)</td> <td>40 (70.2%)</td> <td>39 (88.6%)</td> <td>0.03</td>	ECOG 0-1. n (%)	40 (70.2%)	39 (88.6%)	0.03
Therapy management 14 (75,4%) 14 (13,8%) 0.5 Prior SCT. (%) 14 (75,4%) 14 (13,8%) 0.5 Median lines of therapy before bridging (10R) 3 (2-4) 2.5 (2-3%) 0.1 Bendamustine before CAR, n (% of total) 9 (15,8%) 9 (20,5%) 0.6 Bendamustine before CAR, n (% of total) 9 (15,8%) 9 (20,5%) 0.6 Holding therapy, n (% of total) 14 (75,4%) 16 (26,8%) 0.00011 Bendamustine for bridging on (% of total) 14 (71,9%) 12 (27,3%) 0.8 Immunchemotherapy-based bridging, n (% of total) 21 (17,19%) 24 (26,46,8%) 0.09 Immunchemotherapy-based bridging, n (% of total) 12 (72,3%) 0.8 0.4 Laboratory parameters at time point of lymphodepletion (dw - 5 prior CAR T-cell Infusion) 0.006 0.4 Laboratory parameters at time point of lymphodepletion (dw - 5 prior CAR T-cell Infusion) 0.006 0.006 LPL of (UR) 167 (25,530) 0.006 0.006 0.006 PL of (UR) 167 (05,53260) 0.006 0.006 0.006 0.007 LPL of (UR)	$ECOG \ge 2$, n (%)	17 (29.8%)	5 (11.4%)	0.03
Prior SCT, n (%) 14 (75.4%) 14 (75.4%) 0.5 Median lines of threapy before hridging (UGR) 3 (2:4) 2.5 (2:4) 0.25 Any bendamustine before CAR, n (% of total) 20 (35.1%) 23 (62.3%) 0.1 Bendamustine last months before CAR, n (% of total) 9 (15.8%) 24 (4.6%) 0.1 Bendamustine before CAR, n (% of total) 9 (15.8%) 9 (20.5%) 0.6 Holding therapy, n (% of total) 43 (75.4%) 16 (36.4%) 0.0001 Bridging therapy, n (% of total) 14 (17.4%) 12 (63.4%) 0.009 Brain-to-vein time, days (OR) 29 (19.5.4%) 28 (20.45.5) 0.4 Lober up parameters at time point of lymphodepletion (ary, 5 prior CAR, Tcell Infusion) 0.2 Laboratory parameters at time point of lymphodepletion (ary, 5 prior CAR, Tcell Infusion) 0.004 CRP, mg/dl (UGR) 24 (06.4.9) 0.4 (0.2.1) <0.0006	Therapy management			
Median lines of therapy before bridging (IQR) $3(24)$ $2.5(2.4)$ 0.25 Any bendamustine before CAR, n (% of total) $9(15.8\%)$ $23(52.3\%)$ 0.1 Bendamustine before CAR, n (% of total) $9(15.8\%)$ $24(54.\%)$ 0.6 Bendamustine for bridging on ymphodeghetion, n (% of total) $43(75.4\%)$ $16(36.4\%)$ 0.0001 Holding herapy, n (% of total) $43(75.4\%)$ $12(27.3\%)$ 0.6 Immunochemotherapy-based bridging, n (% of total) $41(71.9\%)$ $24(54.6\%)$ 0.09 Brain-based bridging, n (% of total) $41(71.9\%)$ $24(54.6\%)$ 0.4 Wein-bavein time, days (IOR) $29(32.44.5)$ $93.5(34.42.8)$ 0.2 Laboratory parameters at time point of lymphodeghetion (day - 5 prior CAR T-cell infusion) IDH, UI (IOR) $775(221.5,109.0)$ 0.4 CRP. mg/dl (IQR) 1970(650-3360) 2730 (198.538.6) 0.06 ANC, calls/ul (IQR) 1970 (650-3360) 2730 (198.538.6) 0.006 Ling (IQR) 1970 (650-3360) 2730 (198.538.6) 0.006 ANC, calls/ul (IQR) 105 (682-264.5) 174.1 0.006	Prior SCT. n (%)	14 (75.4%)	14 (31.8%)	0.5
Any bendamustine before CAR, n (% of total) 20 (35 1%) 23 (52 3%) 0.1 Bendamustine for bridging or hymphodepletion, n (% of total) 9 (15 8%) 9 (20 8%) 0.6 Holding therapy, n (% of total) 43 (75 4%) 16 (38 4%) 0.0001 Bendamustine for bridging, n (% of total) 43 (75 4%) 16 (38 4%) 0.0 Pole-based bridging, n (% of total) 43 (75 4%) 12 (27 3%) 0.3 Immurochemotherapy-based bridging, n (% of total) 41 (71 9%) 24 (54 6%) 0.09 Brain-to-vein time, days (IQR) 28 (120 4.5) 0.4 0.2 Laboratory parameters at time point of lymphodepletion (day -5 prior CAR T-cell influsion) 135 (24 4.9.3) 0.2 Laboratory parameters at time point of lymphodepletion (fay -5 prior CAR T-cell influsion) 0.0008 CRP. mgdi (IQR) 0.4 (02-1) <0.0001	Median lines of therapy before bridging (IQR)	3 (2-4)	2.5 (2-4)	0.25
Bendamustine last 9 months before CAR, n (% of total) 9 (15.8%) 2 (4.6%) 0.1 Bendamustine for bridging or (% of total) 9 (15.8%) 9 (20.5%) 0.6 Holding therapy, n (% of total) 43 (75.4%) 16 (36.4%) 0.0001 Bridging therapy, n (% of total) 43 (75.4%) 16 (36.4%) 0.4 Dehabased Dridging, n (% of total) 41 (71.9%) 24 (54.6%) 0.0 Immunchemotherapy-based bridging n (% of total) 41 (71.9%) 24 (54.6%) 0.0 Earn-Lo-vein time, days (IQR) 29 (19.5-44) 28 (20.45.5) 0.4 Laboratory parameters at time point of lymphodopletion (dw 9 for CAR T-cell infusion) 0.2 Laboratory parameters at time point of lymphodopletion (dw 9 for CAR T-cell infusion) LDH, U/I (IQR) 356 (206-533) 214 (183-267.5) 0.0006 CRP, mg/dl (IQR) 1970 (950-3360) 2750 (1985-3850) 0.006 PLT, GH (IQR) 1970 (950-3360) 2750 (1985-3850) 0.006 PLT, GH (IQR) 19 (195-3360) 2760 (198-3850) 0.0001 CAR+HEMATOTOX Score Local (OR) 3 (1-4) 1 (0-2) <6.0001	Any bendamustine before CAR. n (% of total)	20 (35.1%)	23 (52.3%)	0.1
Bendamustine for bridging or lymphodepletion, n (% of total) 9 (12.5%) 9 (20.5%) 0.6 Holding heray, n (% of total) 43 (75.4%) 12 (25.3%) 0.4 Path-based bridging, n (% of total) 43 (75.4%) 12 (27.3%) 0.8 Immunochemotharapy-Lassed bridging, n (% of total) 41 (71.9%) 24 (54.5%) 0.4 Wainto-wain time, days (IQR) 39 (32-44.5) 39 (32-44.5) 0.4 Unin-to-wain time, days (IQR) 39 (32-44.5) 39 (32-44.5) 0.4 Laboratory parameters at time point of lymphodepletion (day -5 prior CAR T-cell infusion) Laboratory parameters at time point of lymphodepletion (day -5 prior CAR T-cell infusion) 0.4 (0.2-1) <0.0001	Bendamustine last 9 months before CAR. n (% of total)	9 (15.8%)	2 (4.6%)	0.1
Holding therapy, n (% of total) 43 (75,4%) 16 (36,4%) 0.0001 Bridging therapy, n (% of total) 43 (75,4%) 29 (65,9%) 0.4 Pole-based bridging, n (% of total) 14 (71,9%) 24 (54,9%) 0.9 Brain-to-vein time, days (IQR) 29 (19,5-49) 28 (20-45,5) 0.4 Vein-to-vein time, days (IQR) 29 (19,5-49) 28 (20-45,5) 0.4 Laboratory parameters at time point of lymphodepietion (day -5 prior CAR T-cell Infusion) 1.041, U/(10R) 386 (206-533) 214 (183,267,5) 0.0008 GFR, nullmin (IQR) 24 (0,64,9) 0.4 (2,21,28,0 0.04 CRP, mg/d1 (IQR) 1.76 (221,5196) 300 (118,8-227,8) 0.04 CRP, mg/d1 (IQR) 176 (221,5196) 300 (118,8-227,8) 0.066 PLT, GH (10R) 197 (50,3360) 2750 (128,225,5) 0.1 Hemoglobin, g/d1 (IQR) 9,1 (8,1-10,6) 10,9 (9,5-12,4) 0.0001 CAR+HEMATOTOX Score CAR+HEMATOTOX Score Absolute (IQR) 3 (1-4) 1.0-2) <0.0001	Bendamustine for bridging or lymphodepletion, n (% of total)	9 (15.8%)	9 (20.5%)	0.6
Bridging therapy, n (% of total) 43 (75.4%) 29 (65.9%) 0.4 Pola-based bridging, n (% of total) 14 (24.6%) 12 (27.3%) 0.8 Immunochemotherapy-based bridging, n (% of total) 41 (71.9%) 24 (54.6%) 0.09 Brain-to-vein time, days (IQR) 29 (19.5.49) 28 (20.4.5) 0.4 Vent-ov-ein time, days (IQR) 29 (19.5.49) 28 (20.4.5) 0.4 Laboratory parameters at time point of lymphodepletion (day 5 prior CAR T-cell infusion) 1 1 0.2 Laboratory parameters at time point of lymphodepletion (day 5 prior CAR T-cell infusion) 0.0001 0.2 CRP, mjdl (IQR) 24 (0.6.4.9) 0.4 (0.2.1) <0.0001	Holding therapy, n (% of total)	43 (75.4%)	16 (36.4%)	0.0001
Pela-based bridging, n (% of total) 14 (24.6%) 12 (27.3%) 0.8 Immunochemotherapy-based bridging, n (% of total) 41 (71.9%) 24 (54.6%) 0.09 Brain-to-vein time, days (IQR) 29 (19.5-49) 28 (20-45.5) 0.4 Vein-to-vein time, days (IQR) 39 (52.44.5) 39.5 (34.49.8) 0.2 Laboratory parameters at time point of lymphodepletion (day 5 prior CAR T-cell invision) 0.006 0.008 CRP, mg/dl (IQR) 88 (70.5-102) 77.5 (63.3-22.8) 0.04 CRP, mg/dl (IQR) 1770 (250-3360) 2750 (1955-3850) 0.006 ANC, cells/µ (IOR) 1970 (950-3360) 2750 (1955-33850) 0.006 PLT, GH (IOR) 1970 (950-3360) 2750 (1955-33850) 0.006 CAR+HEMATOTOX Score Absolute (IQR) 3 (1-4) 1 (0-2) <0.0001	Bridging therapy, n (% of total)	43 (75.4%)	29 (65.9%)	0.4
Immunochemotherapy-based bridging, n (% of total) 41 (71.9%) 24 (64.6%) 0.09 Brain-to-viein time, days (IQR) 39 (32-44.5) 39.5 (34-49.8) 0.2 Laboratory parameters at time point of lymphodepletion (day -5 prior CAR T-cell Infusion) 0.0008 0.0008 Laboratory parameters at time point of lymphodepletion (day -5 prior CAR T-cell Infusion) 0.0008 0.0008 CRP, mg/dl (IQR) 386 (206-533) 214 (183-267.5) 0.0008 GFR, ml/min (IQR) 88 (70.5-102) 77.5 (63.3-92.8) 0.044 CRP, mg/dl (IQR) 178 (221.5-1996) 30.0 (18.8-727.8) 0.0066 PLT, G/I (IQR) 150 (83-204.5) 179.5 (127.8-225.5) 0.1 Hemoglobin, g/dl (IQR) 9.1 (8.1-10.6) 10.9 (9.5-12.4) 0.0001 CAR-HEMATOTOX Score Absolute (IQR) 3 (1-4) 1 (0-2) <0.0001	Pola-based bridging, n (% of total)	14 (24.6%)	12 (27.3%)	0.8
Brain-to-vein time, days (IQR) 29 (19.5-49) 28 (20-45.5) 0.4 Vein-to-vein time, days (IQR) 39 (32-44.5) 39.5 (34-49.8) 0.2 Laboratory parameters at time point of lymphodepletion (day -5 prior CAR T-cell infusion) 0.0008 LDH, U/I (IQR) 386 (206-533) 214 (183-267.5) 0.0008 GFR, mi/min (IQR) 2.4 (0.6-4.9) 0.4 (103-267.5) 0.0001 Ferritin, ng/mi (IQR) 7.75 (63.3-92.8) 0.004 0.62 ANC, cells/µi (IQR) 1970 (950-3360) 2750 (1965-3350) 0.006 PLT, GAI (IQR) 1970 (950-3360) 2750 (1965-3350) 0.006 CAR-HEMATOTOX Score 0.0001 0.0001 0.0001 0.0001 CAR-HEMATOTOX Score Absolute (IQR) 3 (1-4) 1 (0-2) <0.0001	Immunochemotherapy-based bridging, n (% of total)	41 (71.9%)	24 (54.6%)	0.09
Veln-Oveln time, days (IQR) 39 (32-44.5) 39.5 (34-49.8) 0.2 Laboratory parameters at time point of lymphodepletion (day -5 prior CAR T-cell infusion) 0.0008 0.0008 CRP, mg/dl (IQR) 386 (206-533) 214 (183-267.5) 0.0008 GFR, ml/min (IQR) 88 (70.5-102) 77.5 (83.3-92.8) 0.044 CRP, mg/dl (IQR) 2.4 (0.6-4.9) 0.4 (0.2-1) <0.0061	Brain-to-vein time, days (IQR)	29 (19.5-49)	28 (20-45.5)	0.4
Laboratory parameters at time point of lymphodepletion (day -5 prior CAR T-cell infusion)	Vein-to-vein time, days (IQR)	39 (32-44.5)	39.5 (34-49.8)	0.2
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Laboratory parameters at time point of lymphodepletion (day -5 prior CAR T-cell infusion	on)	
GFR. ml/min (IQR) 88 (70.5-102) 77.5 (63.3-92.8) 0.04 CRP, mg/d1 (IQR) 2.4 (0.6.4.9) 0.4 (0.2-1) <0.0001	LDH, U/I (IQR)	358 (206-533)	214 (183-267.5)	0.0008
$\begin{array}{c crr}{CRP, mg/dl (IQR)} & 2.4 (0.64.9) & 0.4 (0.2-1) & c0.0001 \\ \hline Ferritin, ng/ml (IQR) & 778 (221.5-1996) & 300 (118.8-727.8) & 0.006 \\ \hline ANC, cells/µl (IQR) & 197 (221.5-1996) & 2750 (1965-3850) & 0.006 \\ \hline ANC, cells/µl (IQR) & 150 (83-204.5) & 179.5 (127.8-225.5) & 0.1 \\ \hline Hemoglobin, g/dl (IQR) & 9.1 (8.1-10.6) & 10.9 (9.5-12.4) & 0.0001 \\ \hline CAR-HEMATOTOX Score Absolute (IQR) & 1 (16.1-10.6) & 10.9 (9.5-12.4) & 0.0001 \\ \hline CAR-HEMATOTOX Score Low (0-1), n (% of total) & 17 (29.8%) & 30 (68.2%) & 0.0001 \\ \hline CAR-HEMATOTOX Score High (-2), n (% of total) & 40 (70.2%) & 14 (31.8%) & 0.0001 \\ \hline Disease ently, n (% of total) & 17 (29.8%) & 30 (68.2%) & 0.0001 \\ \hline Disease ently, n (% of total) & 13 (22.8%) & 17 (38.6%) & 0.009 \\ \hline (DLBCL, PMBCL, THRLBCL) & 13 (22.8%) & 18 (40.9%) & 0.08 \\ (trFL, trHL, trMZL, trCLL, trMALT) & 13 (22.8%) & 15 (34.1%) & 0.3 \\ \hline MCL & 6 (10.5\%) & 9 (20.5\%) & 0.3 \\ \hline Infused CAR T-cell product \\ \hline CAR product, n (% of total) & 31 (54.4\%) & 15 (34.1\%) & 0.8 \\ \hline Brexu-cel & 18 (31.6\%) & 15 (34.1\%) & 0.8 \\ \hline Brexu-cel & 5 (8.8\%) & 9 (20.5\%) & 0.15 \\ \hline Liso-cel & 21 (36.3\%) & 6 (13.6\%) & 0.2 \\ \hline CO-stimulatory domain (ICD) of CAR product, n (% of total) & - \\ \hline CRS, n (% of total) & - \\ \hline CRS, n (% of total) & - \\ \hline No CRS & 7 (12.3\%) & 8 (18.2\%) & 0.4 \\ \hline Immunotoxicity & - \\ \hline CRS, n (% of total) & - \\ \hline No CRS & 7 (12.3\%) & 16 (36.4\%) & 0.3 \\ \hline ICANS grade 2.3 & 9 (15.5\%) & 7 (15.9\%) & 0.3 \\ \hline ICANS grade 2.3 & 9 (15.5\%) & 7 (15.9\%) & 0.3 \\ \hline CARS prade 2.3 & 9 (15.5\%) & 7 (15.9\%) & 0.3 \\ \hline CARS prade 2.3 & 9 (15.5\%) & 7 (15.9\%) & 0.4 \\ \hline Received tocilizumab & 48 (84.2\%) & 36 (81.8\%) & 0.8 \\ \hline Received tocilizumab & 48 (84.2\%) & 36 (81.8\%) & 0.8 \\ \hline Received tocilizumab & 48 (84.2\%) & 36 (81.8\%) & 0.8 \\ \hline Received doxing the score & 25 (43.9\%) & 16 (40.9\%) & 0.8 \\ \hline Received doxing the score & 25 (43.9\%) & 16 (40.9\%) & 0.8 \\ \hline Received tocilizumab & 48 (84.2\%) & 36 (81.8\%) & 0.8 \\ \hline Received tocilizumab & 48 (84.2\%) & 36 (81.8\%) & 0.8 \\ \hline Received doxing thason necessary & 9 (15.$	GFR, ml/min (IQR)	88 (70.5-102)	77.5 (63.3-92.8)	0.04
Ferritin, ng/mt (IQR) 778 (2215-1996) 300 (118.6-727.8) 0.006 ANC, cells/µl (IQR) 1970 (950-3360) 2750 (1965-3850) 0.006 PLT, G/I (IQR) 9.1 (8.1-10.6) 10.9 (9.5-12.4) 0.0001 CAR-HEMATOTOX Score 0.0001 0.0001 0.0001 CAR-HEMATOTOX Score Absolute (IQR) 3 (1-4) 1 (0-2) <0.0001	CRP, mg/dl (IQR)	2.4 (0.6-4.9)	0.4 (0.2-1)	<0.0001
ANC, cells/µl (IQR) 1970 (950-3360) 2750 (1965-3850) 0.006 PLT, G/I (IQR) 150 (83-204.5) 179.5 (127.8-225.5) 0.1 Hemoglobin, g/dl (IQR) 9.1 (8.1-10.6) 10.9 (9.5-12.4) 0.0001 CAR-HEMATOTOX Score	Ferritin. na/ml (IQR)	778 (221.5-1996)	300 (118.8-727.8)	0.006
PLT, G/I (IQR) 150 (83-204.5) 179.5 (127.8-225.5) 0.1 Hemoglobin, g/dl (IQR) 9.1 (8.1-10.6) 10.9 (9.5-12.4) 0.0001 CAR-HEMATOTOX Score	ANC, cells/ul (IQR)	1970 (950-3360)	2750 (1965-3850)	0.006
Hemoglobin. g/dl (IQR) 9.1 (8.1-10.6) 10.9 (9.5-12.4) 0.0001 CAR-HEMATOTOX Score	PLT. G/I (IQR)	150 (83-204.5)	179.5 (127.8-225.5)	0.1
CAR.HEMATOTOX Score CAR.HEMATOTOX Score Absolute (IQR) 3 (1-4) 1 (0-2) <0.0001 CAR.HEMATOTOX Score Low (0-1), n (% of total) 17 (29.8%) 30 (68.2%) 0.0001 CAR.HEMATOTOX Score Low (0-1), n (% of total) 40 (70.2%) 14 (31.8%) 0.0001 CAR.HEMATOTOX Score Low (0-1), n (% of total) 40 (70.2%) 14 (31.8%) 0.0001 Disease entity, n (% of total) 0.00 17 (38.6%) 0.009 (DLBCL, PMECL, THRLBCL) 38 (66.7%) 17 (38.6%) 0.009 (trEL, tHL, tMZL, trCLL, trMALT) 13 (22.8%) 18 (40.9%) 0.08 MCL 6 (10.5%) 9 (20.5%) 0.3 Infused CAR T-cell product CAR product, n (% of total) Axi-cel 31 (54.4%) 15 (34.1%) 0.8 Brexu-cel 18 (31.6%) 9 (20.5%) 0.15 1iso-cel 3 (63.2%) 0.4 (54.5%) 0.4 CD28-based ICD 21 (36.8%) 20 (45.45%) 0.4 1HaB-based ICD 13 (56.3%) 0.4 CRS, n (% of total) No CRS 7 (12.3%) 8 (18.2%) 0.4 CD28-based	Hemoglobin, g/dl (IQR)	9.1 (8.1-10.6)	10.9 (9.5-12.4)	0.0001
CAR-HEMATOTOX Score Absolute (IQR) 3 (1-4) 1 (0-2) <0.0001 CAR-HEMATOTOX Score Low (0-1), n (% of total) 17 (29.8%) 30 (68.2%) 0.0001 CAR-HEMATOTOX Score High (>2), n (% of total) 40 (70.2%) 14 (31.8%) 0.0001 Disease entity, n (% of total) 40 (70.2%) 14 (31.8%) 0.0001 Disease entity, n (% of total) 38 (66.7%) 17 (38.6%) 0.009 Non-transformed lymphoma (IrEL, trHL, trMZL, trCLL, trMALT) 13 (22.8%) 18 (40.9%) 0.08 MCL 6 (10.5%) 9 (20.5%) 0.3 0.3 Infused CAR T-cell product 6 (10.5%) 15 (34.1%) <0.05	CAR-HEMATOTOX Score			•
$\begin{array}{c c} CAR+HEMATOTOX Score Low (0-1), n (\% of total) 17 (29.8\%) 30 (68.2\%) 0.0001 \\ CAR+HEMATOTOX Score High (>2), n (\% of total) 40 (70.2\%) 14 (31.8\%) 0.0001 \\ \hline Disease entity, n (\% of total) \\ \hline Non-transformed lymphoma 38 (66.7\%) 17 (38.6\%) 0.009 \\ (DLBCL, PMBCL, THRLBCL) 1 13 (22.8\%) 18 (40.9\%) 0.08 \\ (trFL, trHL, trMZL, trCLL, trMALT) 6 (10.5\%) 9 (20.5\%) 0.3 \\ \hline Infused CAR T-cell product \\ CAR product, n (\% of total) \\ \hline Axi-cel 1 8 (31.6\%) 15 (34.1\%) 0.8 \\ \hline Brexu-cel 1 8 (31.6\%) 9 (20.5\%) 0.15 \\ \hline Liso-cel 2 8 (5.3\%) 6 (13.6\%) 0.2 \\ \hline Co-stimulatory domain (iCD) of CAR product, n (\% of total) \\ \hline CD28-based ICD 1 0 CAR product, n (\% of total) \\ \hline CRS, n (\% of total) \\ \hline CRS, n (\% of total) \\ \hline CRS, n (\% of total) \\ \hline No CRS 2 7 (12.3\%) 6 (10.5\%) 20 (45.45\%) 0.4 \\ \hline CRS grade 1-2 44 (77.2\%) 8 (18.2\%) 0.4 \\ \hline CRS, n (\% of total) \\ \hline No ICANS 3 3 (57.9\%) 21 (47.7\%) 0.3 \\ \hline ICANS grade 1-2 15 (26.3\%) 16 (38.6\%) 0.2 \\ \hline Coxeting and total 1 \\ \hline CARS grade 1-2 15 (26.3\%) 16 (36.4\%) 0.3 \\ \hline CARS grade 1-2 15 (26.3\%) 16 (36.4\%) 0.3 \\ \hline CARS grade 1-2 15 (26.3\%) 16 (36.4\%) 0.3 \\ \hline CARS grade 1-2 15 (26.3\%) 16 (36.4\%) 0.3 \\ \hline CARS grade 1-2 15 (26.3\%) 16 (36.4\%) 0.3 \\ \hline CARS grade 2 3 9 (15.8\%) 7 (15.9\%) 0.4 \\ \hline CRS grade 2 3 9 (15.8\%) 7 (15.9\%) 0.3 \\ \hline CARS grade 1-2 15 (26.3\%) 16 (36.4\%) 0.3 \\ \hline CARS grade 1-2 15 (26.3\%) 16 (36.4\%) 0.3 \\ \hline CARS grade 2 3 9 (15.8\%) 7 (15.9\%) 0.65 \\ \hline CRS grade 2 3 9 (15.8\%) 7 (15.9\%) 0.68 \\ \hline CRS grade 2 3 9 (15.8\%) 7 (15.9\%) 0.68 \\ \hline CRS grade 2 3 9 (15.8\%) 7 (15.9\%) 0.68 \\ \hline CRS grade 2 3 9 (15.8\%) 7 (15.9\%) 0.68 \\ \hline CRS grade 2 3 9 (15.8\%) 7 (15.9\%) 0.68 \\ \hline CARS grade 1-2 15 (26.3\%) 16 (36.4\%) 0.3 \\ \hline CANS grade 1-2 15 (26.3\%) 16 (36.4\%) 0.3 \\ \hline CANS grade 1-2 15 (26.3\%) 16 (36.4\%) 0.3 \\ \hline CANS grade 1-2 15 (26.3\%) 16 (36.4\%) 0.3 \\ \hline CANS grade 2 3 9 (15.8\%) 7 (15.9\%) 0.68 \\ \hline CRS grade 2 3 9 (15.8\%) 7 (15.9\%) 0.68 \\ \hline CRS grade 1-2 15 (26.3\%) 16 (36.4\%) 0.8 \\ \hline Cat drive that basene 1 25 (43.9\%) 18 (40.9\%) 0.8 \\ \hline Cat drive that basene 1 25 (53.9\%) 18 (40.9\%) 0.8 \\ \hline Ca $	CAR-HEMATOTOX Score Absolute (IQR)	3 (1-4)	1 (0-2)	<0.0001
CAR-HEMATOTOX Score High (>2), n (% of total) 40 (70.2%) 14 (31.8%) 0.0001 Disease entity, n (% of total) Non-transformed lymphoma (DLBCL, PMBCL, THRLBCL) 38 (66.7%) 17 (38.6%) 0.009 Transformed lymphoma (trFL, tHL, tMZL, trCLL, trMALT) 13 (22.8%) 18 (40.9%) 0.08 MCL 6 (10.5%) 9 (20.5%) 0.3 Infused CAR T-cell product 24 (54.1%) 15 (34.1%) 0.8 CAR product, n (% of total) 3 (56.3%) 9 (20.5%) 0.15 Liso-cel 31 (54.4%) 15 (34.1%) 0.8 Brexu-cel 5 (8.8%) 9 (20.5%) 0.15 Liso-cel 5 (8.8%) 9 (20.5%) 0.15 Liso-cel 2 (5.3%) 6 (13.6%) 0.2 CO-stimulatory domain (ICD) of CAR product, n (% of total) 24 (54.55%) 0.4 Immunotoxicity 24 (54.55%) 0.4 18 CRS, n (% of total) 7 (12.3%) 8 (18.2%) 0.4 No CAS 7 (12.3%) 8 (18.2%) 0.4 CRS grade 1-2 4 (77.2%) 32 (72.7%) 0	CAR-HEMATOTOX Score Low (0-1), n (% of total)	17 (29.8%)	30 (68.2%)	0.0001
Disease entity, n (% of total) Description Non-transformed lymphoma 38 (66.7%) 17 (38.6%) 0.009 (DLBCL, PMBCL, THRLBCL) 13 (22.8%) 18 (40.9%) 0.08 (trFL, trHL, trMZL, trCLL, trMALT) 6 (10.5%) 9 (20.5%) 0.3 Infused CAR T-cell product 6 (10.5%) 9 (20.5%) 0.3 CAR product, n (% of total) Axi-cel 15 (34.1%) <0.05	CAR-HEMATOTOX Score High (>2), n (% of total)	40 (70.2%)	14 (31.8%)	0.0001
Non-transformed lymphoma (DLBCL, PMBCL, THRLBCL) 38 (66.7%) 17 (38.6%) 0.009 Transformed lymphoma (trFL, trHL, trMZL, trCLL, trMALT) 13 (22.8%) 18 (40.9%) 0.08 MCL 6 (10.5%) 9 (20.5%) 0.3 Infused CAR T-cell product 6 (10.5%) 9 (20.5%) 0.3 Axi-cel 31 (54.4%) 15 (34.1%) <0.05	Disease entity, n (% of total)			
	Non-transformed lymphoma	38 (66.7%)	17 (38.6%)	0.009
Transformed lymphoma (trFL, trHL, trMZL, trCLL, trMALT) 13 (22.8%) 18 (40.9%) 0.08 MCL 6 (10.5%) 9 (20.5%) 0.3 Infused CAR T-cell product 6 (10.5%) 9 (20.5%) 0.3 CAR product, n (% of total)	(DLBCL, PMBCL, THRLBCL)			
	Transformed lymphoma	13 (22.8%)	18 (40.9%)	0.08
MCL 6 (10.5%) 9 (20.5%) 0.3 Infused CAR T-cell product CAR product, n (% of total) $Axi-cel$ 31 (54.4%) 15 (34.1%) <0.05	(trFL, trHL, trMZL, trCLL, trMALT)			
Infused CAR T-cell product Infused CAR T-cell product, n (% of total) Axi-cel 31 (54.4%) 15 (34.1%) <0.05	MCL	6 (10.5%)	9 (20.5%)	0.3
CAR product, n (% of total) Axi-cel 31 (54.4%) 15 (34.1%) <0.05 Tisa-cel 18 (31.6%) 15 (34.1%) 0.8 Brexu-cel 5 (8.8%) 9 (20.5%) 0.15 Liso-cel 3 (5.3%) 6 (13.6%) 0.2 Co-stimulatory domain (ICD) of CAR product, n (% of total) CD28-based ICD 36 (63.2%) 24 (54.55%) 0.4 Immunotoxicity CRS, n (% of total) No CRS 7 (12.3%) 8 (18.2%) 0.4 No CRS 7 (12.3%) 8 (18.2%) 0.4 CRS, n (% of total) No CRS 7 (12.3%) 8 (18.2%) 0.4 CRS, n (% of total) No CRS 7 (12.3%) 8 (18.2%) 0.4 CRS, n (% of total) No RS 7 (12.3%) 8 (18.2%) 0.4 CRS, n (% of total) No ICANS 33 (57.9%) 21 (47.7%) 0.3 ICANS grade ≥ 3 9 (15.8%) 7 (15.9%) >0.99999 <td colspan="2</td> <td>Infused CAR T-cell product</td> <td></td> <td></td> <td></td>	Infused CAR T-cell product			
Axi-cel 31 (54.4%) 15 (34.1%) <0.05 Tisa-cel 18 (31.6%) 15 (34.1%) 0.8 Brexu-cel 5 (8.8%) 9 (20.5%) 0.15 Liso-cel 3 (5.3%) 6 (13.6%) 0.2 Co-stimulatory domain (ICD) of CAR product, n (% of total) 0.4 0.4 CD28-based ICD 21 (36.8%) 20 (45.45%) 0.4 41-BB-based ICD 21 (36.8%) 20 (45.45%) 0.4 Immunotoxicity CRS, n (% of total) 0.4 0.4 No CRS 7 (12.3%) 8 (18.2%) 0.4 CRS grade 1-2 44 (77.2%) 32 (72.7%) 0.65 CRS grade 1-2 44 (77.2%) 32 (72.7%) 0.65 CRS grade 2 3 6 (10.5%) 4 (9.1%) >0.9999 ICANS, n (% of total) No ICANS 33 (57.9%) 21 (47.7%) 0.3 No ICANS 33 (57.9%) 21 (47.7%) 0.3 0.3 ICANS grade 1-2 15 (26.3%) 16 (36.4%) 0.3 ICANS grade 1-2 9 (15.8%) 7 (15.9%) >0.9999 ICANS grade 1-2 0.9 (15.8%) 0.6 (81.	CAR product, n (% of total)			
Tisa-cel 18 (31.6%) 15 (34.1%) 0.8 Brexu-cel 5 (8.8%) 9 (20.5%) 0.15 Liso-cel 3 (5.3%) 6 (13.6%) 0.2 Co-stimulatory domain (ICD) of CAR product, n (% of total) 0 0 CD28-based ICD 36 (63.2%) 24 (54.55%) 0.4 41-BB-based ICD 21 (36.8%) 20 (45.45%) 0.4 Immunotoxicity CRS, n (% of total) 0.4 0 No CRS 7 (12.3%) 8 (18.2%) 0.4 CRS grade 1-2 44 (77.2%) 32 (72.7%) 0.65 CRS grade 1-2 44 (77.2%) 32 (72.7%) 0.65 ICANS, n (% of total) No ICANS 33 (57.9%) 21 (47.7%) 0.3 No ICANS 33 (57.9%) 21 (47.7%) 0.3 0.3 ICANS grade 1-2 15 (26.3%) 16 (36.4%) 0.3 ICANS grade 2 3 9 (15.8%) 7 (15.9%) >0.9999 Toxicity management, n (% of total) T 0.8 0.8 Received tocilizumab 48 (84.2%) 36 (81.8%) 0.8 Received docilizumab 48 (84.2%)	Axi-cel	31 (54.4%)	15 (34.1%)	<0.05
Brexu-cel 5 (8.8%) 9 (20.5%) 0.15 Liso-cel 3 (5.3%) 6 (13.6%) 0.2 Co-stimulatory domain (ICD) of CAR product, n (% of total) 0.4 CD28-based ICD 36 (63.2%) 24 (54.55%) 0.4 41-BB-based ICD 21 (36.8%) 20 (45.45%) 0.4 Immunotoxicity 0.4 0.4 CRS, n (% of total) 0.4 0.4 No CRS 7 (12.3%) 8 (18.2%) 0.4 CRS grade 1-2 44 (77.2%) 32 (72.7%) 0.65 CRS grade 2 3 6 (10.5%) 4 (9.1%) >0.99999 ICANS, n (% of total) >0.99999 ICANS (9.4%) 0.3 No ICANS 33 (57.9%) 21 (47.7%) 0.3 0.3 ICANS grade 1-2 15 (26.3%) 16 (36.4%) 0.3 ICANS grade 2 3 9 (15.8%) 7 (15.9%) >0.99999 Toxicity management, n (% of total) >0.99999 Received tocilizumab 48 (84.2%) 36 (81.8%)<	Tisa-cel	18 (31.6%)	15 (34.1%)	0.8
Liso-cel 3 (5.3%) 6 (13.6%) 0.2 Co-stimulatory domain (ICD) of CAR product, n (% of total) CD28-based ICD 36 (63.2%) 24 (54.55%) 0.4 41-BB-based ICD 21 (36.8%) 20 (45.45%) 0.4 Immunotoxicity 20 (45.45%) 0.4 0.4 CRS, n (% of total) No CRS 7 (12.3%) 8 (18.2%) 0.4 CRS grade 1-2 44 (77.2%) 32 (72.7%) 0.65 CRS grade ≥ 3 6 (10.5%) 4 (9.1%) >0.99999 ICANS, n (% of total) No ICANS 33 (57.9%) 21 (47.7%) 0.3 ICANS grade 1-2 15 (26.3%) 16 (36.4%) 0.3 ICANS grade ≥ 3 9 (15.8%) 7 (15.9%) >0.9999 Toxicity management, n (% of total) T 15 (26.3%) 16 (36.4%) 0.3 Received tocilizumab 48 (84.2%) 36 (81.8%) 0.8 0.8 ICANS grade ≥ 3 9 (15.8%) 18 (40.9%) 0.8 0.8 ICANS grade ≥ 3 9 (15.8%) 36 (81.8%) 0.8	Brexu-cel	5 (8.8%)	9 (20.5%)	0.15
Co-stimulatory domain (ICD) of CAR product, n (% of total) CD28-based ICD $36 (63.2\%)$ $24 (54.55\%)$ 0.4 41-BB-based ICD $21 (36.8\%)$ $20 (45.45\%)$ 0.4 Immunotoxicity $20 (45.45\%)$ 0.4 CRS, n (% of total) No CRS $7 (12.3\%)$ $8 (18.2\%)$ 0.4 CRS grade 1-2 $44 (77.2\%)$ $32 (72.7\%)$ 0.65 CRS grade 2 3 $6 (10.5\%)$ $4 (9.1\%)$ >0.9999 ICANS, n (% of total) No ICANS $33 (57.9\%)$ $21 (47.7\%)$ 0.3 ICANS grade 1-2 $15 (26.3\%)$ $16 (36.4\%)$ 0.3 ICANS grade 2 3 $9 (15.8\%)$ $7 (15.9\%)$ >0.9999 Toxicity management, n (% of total) No No No Received tocilizumab $48 (84.2\%)$ $36 (81.8\%)$ 0.8 Received dexamethasone $25 (43.9\%)$ $18 (40.9\%)$ 0.8 ICU admission necessary $9 (15.8\%)$ $5 (11.4\%)$ 0.6	Liso-cel	3 (5.3%)	6 (13.6%)	0.2
CD28-based ICD 36 (63.2%) 24 (54.55%) 0.4 41-BB-based ICD 21 (36.8%) 20 (45.45%) 0.4 Immunotoxicity 20 (45.45%) 0.4 CRS, n (% of total) No CRS 7 (12.3%) 8 (18.2%) 0.4 CRS grade 1-2 44 (77.2%) 32 (72.7%) 0.65 CRS grade ≥ 3 6 (10.5%) 4 (9.1%) >0.9999 ICANS, n (% of total) No ICANS 33 (57.9%) 21 (47.7%) 0.3 ICANS grade 1-2 15 (26.3%) 16 (36.4%) 0.3 ICANS grade ≥ 3 9 (15.8%) 7 (15.9%) >0.9999 Toxicity management, n (% of total) Toxicity management, n (% of total) 0.8 Received tocilizumab 48 (84.2%) 36 (81.8%) 0.8 ICU admission necessary 9 (15.8%) 18 (40.9%) 0.6	Co-stimulatory domain (ICD) of CAR product, n (% of total)	1		
41-BB-based ICD 21 (36.8%) 20 (45.45%) 0.4 Immunotoxicity $CRS, n (\% of total)$ $CRS, n (\% of total)$ 0.4 No CRS 7 (12.3%) 8 (18.2%) 0.4 CRS grade 1-2 44 (77.2%) 32 (72.7%) 0.65 CRS grade ≥ 3 6 (10.5%) 4 (9.1%) >0.9999 ICANS, n (% of total) No ICANS 33 (57.9%) 21 (47.7%) 0.3 ICANS grade 1-2 15 (26.3%) 16 (36.4%) 0.3 ICANS grade ≥ 3 9 (15.8%) 7 (15.9%) >0.9999 Toxicity management, n (% of total) Toxicity management, n (% of total) No Received tocilizumab 48 (84.2%) 36 (81.8%) 0.8 ICU admission necessary 9 (15.8%) 5 (11.4%) 0.6	CD28-based ICD	36 (63.2%)	24 (54.55%)	0.4
Immunotoxicity CRS, n (% of total) No CRS 7 (12.3%) 8 (18.2%) 0.4 CRS grade 1-2 44 (77.2%) 32 (72.7%) 0.65 CRS grade ≥ 3 6 (10.5%) 4 (9.1%) >0.9999 ICANS, n (% of total)	41-BB-based ICD	21 (36.8%)	20 (45.45%)	0.4
CRS, n (% of total) No CRS 7 (12.3%) 8 (18.2%) 0.4 CRS grade 1-2 44 (77.2%) 32 (72.7%) 0.65 CRS grade ≥ 3 6 (10.5%) 4 (9.1%) >0.9999 ICANS, n (% of total) No ICANS 33 (57.9%) 21 (47.7%) 0.3 ICANS grade 1-2 15 (26.3%) 16 (36.4%) 0.3 ICANS grade ≥ 3 9 (15.8%) 7 (15.9%) >0.9999 Toxicity management, n (% of total) T No.8 8 (84.2%) 36 (81.8%) 0.8 Received tocilizumab 48 (84.2%) 18 (40.9%) 0.8 0.8 ICU admission necessary 9 (15.8%) 5 (11.4%) 0.6	Immunotoxicity			
No CRS 7 (12.3%) 8 (18.2%) 0.4 CRS grade 1-2 44 (77.2%) 32 (72.7%) 0.65 CRS grade ≥ 3 6 (10.5%) 4 (9.1%) >0.9999 ICANS, n (% of total) 7 10.5%) 21 (47.7%) 0.3 ICANS grade 1-2 15 (26.3%) 16 (36.4%) 0.3 ICANS grade ≥ 3 9 (15.8%) 7 (15.9%) >0.9999 Toxicity management, n (% of total) 7 0.3 0.8 Received tocilizumab 48 (84.2%) 36 (81.8%) 0.8 ICU admission necessary 9 (15.8%) 5 (11.4%) 0.6	CRS, n (% of total)			
CRS grade 1-2 44 (77.2%) 32 (72.7%) 0.65 CRS grade ≥ 3 6 (10.5%) 4 (9.1%) >0.9999 ICANS, n (% of total) $33 (57.9\%)$ 21 (47.7%) 0.3 No ICANS 33 (57.9%) 21 (47.7%) 0.3 ICANS grade 1-2 15 (26.3%) 16 (36.4%) 0.3 ICANS grade ≥ 3 9 (15.8%) 7 (15.9%) >0.9999 Toxicity management, n (% of total) 7 7 86 (84.2%) 36 (81.8%) 0.8 Received tocilizumab 48 (84.2%) 36 (81.8%) 0.8 $1000000000000000000000000000000000000$	No CRS	7 (12.3%)	8 (18.2%)	0.4
CRS grade ≥ 3 6 (10.5%) 4 (9.1%) >0.9999 ICANS, n (% of total) V V V V No ICANS 33 (57.9%) 21 (47.7%) 0.3 ICANS grade 1-2 15 (26.3%) 16 (36.4%) 0.3 ICANS grade ≥ 3 9 (15.8%) 7 (15.9%) >0.9999 Toxicity management, n (% of total) V V V Received tocilizumab 48 (84.2%) 36 (81.8%) 0.8 Received dexamethasone 25 (43.9%) 18 (40.9%) 0.8 ICU admission necessary 9 (15.8%) 5 (11.4%) 0.6	CRS grade 1-2	44 (77.2%)	32 (72.7%)	0.65
ICANS, n (% of total) ICANS, n (% of total) No ICANS 33 (57.9%) 21 (47.7%) 0.3 ICANS grade 1-2 15 (26.3%) 16 (36.4%) 0.3 ICANS grade ≥ 3 9 (15.8%) 7 (15.9%) >0.9999 Toxicity management, n (% of total) 7 7 8 Received tocilizumab 48 (84.2%) 36 (81.8%) 0.8 Received dexamethasone 25 (43.9%) 18 (40.9%) 0.8 ICU admission necessary 9 (15.8%) 5 (11.4%) 0.6	CRS grade ≥ 3	6 (10.5%)	4 (9.1%)	>0.9999
No ICANS 33 (57.9%) 21 (47.7%) 0.3 ICANS grade 1-2 15 (26.3%) 16 (36.4%) 0.3 ICANS grade ≥ 3 9 (15.8%) 7 (15.9%) >0.9999 Toxicity management, n (% of total) 7 86 (84.2%) 36 (81.8%) 0.8 Received tocilizumab 48 (84.2%) 36 (81.8%) 0.8 0.8 ICU admission necessary 9 (15.8%) 5 (11.4%) 0.6	ICANS, n (% of total)			
ICANS grade 1-2 15 (26.3%) 16 (36.4%) 0.3 ICANS grade ≥ 3 9 (15.8%) 7 (15.9%) >0.9999 Toxicity management, n (% of total) 86 (84.2%) 36 (81.8%) 0.8 Received tocilizumab 48 (84.2%) 36 (81.8%) 0.8 ICU admission necessary 9 (15.8%) 5 (11.4%) 0.6	No ICANS	33 (57.9%)	21 (47.7%)	0.3
ICANS grade ≥ 3 9 (15.8%) 7 (15.9%) >0.9999 Toxicity management, n (% of total) >0.9099 Received tocilizumab 48 (84.2%) 36 (81.8%) 0.8 0.8 Received dexamethasone 25 (43.9%) 18 (40.9%) 0.8 ICU admission necessary 9 (15.8%) 5 (11.4%) 0.6	ICANS grade 1-2	15 (26.3%)	16 (36.4%)	0.3
Toxicity management, n (% of total) Received tocilizumab 48 (84.2%) 36 (81.8%) 0.8 Received dexamethasone 25 (43.9%) 18 (40.9%) 0.8 ICU admission necessary 9 (15.8%) 5 (11.4%) 0.6	ICANS grade ≥ 3	9 (15.8%)	7 (15.9%)	>0.9999
Received tocilizumab 48 (84.2%) 36 (81.8%) 0.8 Received dexamethasone 25 (43.9%) 18 (40.9%) 0.8 ICU admission necessary 9 (15.8%) 5 (11.4%) 0.6	Toxicity management, n (% of total)			
Received dexamethasone 25 (43.9%) 18 (40.9%) 0.8 ICU admission necessary 9 (15.8%) 5 (11.4%) 0.6	Received tocilizumab	48 (84.2%)	36 (81.8%)	0.8
ICU admission necessary 9 (15.8%) 5 (11.4%) 0.6	Received dexamethasone	25 (43.9%)	18 (40.9%)	0.8
	ICU admission necessary	9 (15.8%)	5 (11.4%)	0.6

* 4 Patients status pending for 180 days

Suppl. Table S4. Baseline patient characteristics for patients with response after 6 months

Patient baseline characteristics prior to CAR-T infusion for patients with no response (n=57) and response defined as complete or partial remission (n=44) after 6 months. All laboratory values were determined prior to lymphodepleting chemotherapy with a leniency time period of 3 days. ECOG: Eastern Cooperative Oncology Group. PS: performance status. IQR: interquartile range. LD: lymphodepletion chemotherapy. CI: confidence interval. If a measurement wasn't available for all patients, the denominator is indicated in the table. Statistical significance between groups was explored by Mann-Whitney test for continuous variables and Fisher's exact test for comparison of percentages.

	Responder 3M	Responder 3M	P value
Descline characteristics	No recovery (n=9)	Any recovery (n=48)	
Ages veges (range)	64 (36 80)	66 (25 85)	0.7
Ages, years (range) Sey (female) n (% of total)	2 (22 2%)	21 (43.8%)	0.7
Performance status	2 (22.270)	21 (43.078)	0.5
Median ECOG at lymphodepletion (range)	1 (0-1)	1 (0 3-1)	0.7
ECOG 0-1, n (%)	8 (88.9%)	42 (87.5%)	>0.9999
$ECOG \ge 2$, n (%)	1 (11.1%)	6 (12.5%)	
Therapy management			•
Prior SCT, n (%)	3 (33.3%)	13 (27.1%)	0.7
Median lines of therapy before bridging (IQR)	4 (1.5-4)	2.5 (2-4)	0.45
Any bendamustine before CAR, n (% of total)	4 (44.4%)	22 (45.8%)	>0.9999
Bendamustine last 9 months before CAR, n (% of total)	1 (11.1%)	2 (4.2%)	0.4
Bendamustine for bridging or lymphodepletion, n (% of total)	1 (11.1%)	10 (20.8%)	0.7
Holding therapy, n (% of total)	6 (66.7%)	15 (31.3%)	0.06
Bridging therapy, n (% of total)	8 (88.9%)	30 (62.5%)	0.25
Pola-based bridging, n (% of total)	1 (11.1%)	14 (29.2%)	0.4
Immunochemotherapy-based bridging, n (% of total)	8 (88.9%)	25 (52.1%)	0.065
Brain-to-vein time, days (IQR)	35 (16.5-56)	28 (20-47.8)	0.6
Vein-to-vein time, days (IQR)	<u>35 (28.5-42)</u>	37 (34-47)	0.3
Laboratory parameters parameters at time point of lymphod	lepletion (day -5 prior CA	AR I-cell infusion)	0.04
LDH, U/I (IQR)	162 (135-236)	228.5 (192-278)	0.01
	91 (75.5-98)	77 (64.3-91.5)	0.15
CRP, IIIg/dl (IQR)	0.3 (0.2-3.3)	200 (119 9 622 9)	0.0
	240 (159.5-1509)	2605 (1785-3820)	0.0
PLT G/L (IOR)	112 (91 5-224 5)	176 (134-225 3)	0.7
Hemoglobin g/dl (IOR)	10.9 (9.7-12.1)	10 7 (9 4-12 5)	0.2
CAR-HEMATOTOX Score	10.0 (0.1 12.1)	10.1 (0.1 12.0)	0.0
CAR-HEMATOTOX Score Absolute (IQR)	1 (0-2.5)	1 (0-2)	0.8
CAR-HEMATOTOX Score Low (0-1), n (% of total)	5 (55.6%)	31 (64.6%)	0.7
CAR-HEMATOTOX Score High (>2), n (% of total)	4 (44.4%)	17 (35.4%)	0.7
Disease entity, n (% of total)			
Non-transformed lymphoma	3 (66.7%)	22 (45.8%)	0.7
(DLBCL, PMBCL, THRLBCL)			
Transformed lymphoma	3 (66.7%)	18 (37.5%)	>0.9999
(trFL, trHL, trMZL, trCLL, trMALT)			
MCL	3 (66.7%)	8 (16.7%)	0.4
Infused CAR T-cell product		-	
CAR product, n (% of total)			
Axi-cel	4 (44.4%)	20 (41.7%)	>0.9999
Tisa-cel	1 (11.1%)	15 (31.3%)	0.4
Brexu-cel	3 (33.3%)	8 (16.7%)	0.4
Liso-cel	1 (11.1%)	5 (10.4%)	>0.9999
Co-stimulatory domain (ICD) of CAR product, n (% of total)			
CD28-based ICD	7 (77.8%)	28 (58.3%)	0.5
41-BB-based ICD	2 (22.2%)	20 (41.7%)	0.5
Immunotoxicity			
CRS, n (% of total)		7 (11 00()	
No CRS	2 (22.2%)	7 (14.6%)	0.6
CRS grade 1-2	4 (44.4%)	3 (78.2%)	0.04
CRS yraue < S	Z (ZZ.Z%)	3 (0.3%)	0.2
	3 (33 3%)	24 (50%)	0.5
ICANS grade 1-2	3(33.3%)	24(50%) 17(35.4%)	0.5
ICANS grade > 3	2 (22 2%)	7 (14 6%)	0.6
Toxicity management n (% of total)	L (LL.L /0)	7 (17.070)	0.0
Received tocilizumab	7 (77 8%)	41 (85.4%)	0.6
Received devamethasone	A (AA A%)	21 (43.8%)	>0.00
ICU admission necessary	3 (33.3%)	4 (8.3%)	0.07
Too dambalan noocaaly	0 (00.070)	1 (0.070)	0.07

Suppl. Table S5. Baseline patient characteristics for 3 months responder with no or any recovery Patient baseline characteristics prior to CAR-T infusion for responder after 3 months (n=57) with no recovery (n=9) and any recovery (n=48). All laboratory values were determined prior to lymphodepleting chemotherapy with a leniency time period of 3 days. ECOG: Eastern Cooperative Oncology Group. PS: performance status. IQR: interquartile range. LD: lymphodepletion chemotherapy. CI: confidence interval. If a measurement wasn't available for all patients, the denominator is indicated in the table. Statistical significance between groups was explored by Mann-Whitney test for continuous variables and Fisher's exact test for comparison of percentages.

	Responder 3M	Responder 3M	P value
Baseline characteristics	Foor IX, 0-1 citteria (II=57)	High IR, 2-3 citteria (II-20)	
Ages years (range)	66 (25-83)	65 5 (46-85)	0.5
Sev (female) n (% of total)	14 (37.8%)	9 (45%)	0.5
Performance status	14 (07:070)	3 (4070)	0.0
Median ECOG at lymphodepletion (range)	1 (1-1)	1 (0-1 75)	0.9
ECOG 0-1, n (%)	35 (94.6%)	15 (74%)	0.08
$ECOG \ge 2$, n (%)	2 (5.4%)	5 (25%)	0.08
Therapy management	= (,.)		
Prior SCT, n (%)	11 (29.7%)	5 (25%)	0.8
Median lines of therapy before bridging (IQR)	3 (2-4)	3 (2-4.75)	0.4
Any bendamustine before CAR, n (% of total)	15 (40.5%)	11 (55%)	0.4
Bendamustine last 9 months before CAR, n (% of total)	3 (8.1%)	0 (0%)	0.5
Bendamustine for bridging or lymphodepletion, n (% of total)	6 (16.2%)	5 (25%)	0.5
Holding therapy, n (% of total)	15 (40.5%)	6 (30%)	0.6
Bridging therapy, n (% of total)	27 (73%)	11 (55%)	0.2
Pola-based bridging, n (% of total)	10 (27%)	5 (25%)	>0.9999
Immunochemotherapy-based bridging, n (% of total)	24 (64.9%)	9 (45%)	0.2
Brain-to-vein time, days (IQR)	28 (20-49)	27.5 (21-39.8)	0.8
Vein-to-vein time, days (IQR)	40 (33.5-46.5)	36 (34-47.3)	0.7
Laboratory parameters parameters at time point of lympho	odepletion (day -5 prior CAR T	-cell infusion)	
LDH, U/I (IQR)	223 (176.5-277)	214 (183.5-260)	0.9
GFR, ml/min (IQR)	82 (68.5-95.5)	68.5 (63.3-86)	0.09
CRP, mg/dl (IQR)	0.3 (0.15-0.85)	0.5 (0.1-1.18)	0.4
Ferritin, ng/ml (IQR)	292 (138.5-675)	304.5 (118.8-679.3)	0.7
ANC, cells/µl (IQR)	2570 (2085-3675)	2750 (1763-3905)	0.9
PLT, G/I (IQR)	169 (129.5-224.5)	180 (94.3-225.3)	0.98
Hemoglobin, g/dl (IQR)	10.9 (9-12.5)	10.7 (9.6-12.60)	0.7
CAR-HEMATOTOX Score			
CAR-HEMATOTOX Score Absolute (IQR)	1 (0-2)	1 (0-2)	0.7
CAR-HEMATOTOX Score Low (0-1), n (% of total)	23 (62.2%)	13 (65%)	0.8
CAR-HEMATOTOX Score High (>2), n (% of total)	14 (37.8%)	7 (35%)	0.8
Disease entity, n (% of total)		- ()	
Non-transformed lymphoma	16 (94.1%)	9 (45%)	0.02
(DLBCL, PMBCL, THRLBCL)	40 (07 70()	0 (40%)	0.4
	13 (27.7%)	8 (40%)	0.4
	8 (21 69/)	2 (159/)	0.7
MOL	8 (21.0%)	3 (13%)	0.7
Infused CAR T-cell product			
CAB product n (% of total)			
	17 (46%)	7 (35%)	0.6
	11 (40,0)	7 (6676)	0.0
Tisa-cel	7 (18.9%)	9 (45%)	0.06
Brexu-cel	8 (21.6%)	3 (27.3%)	0.7
	5 (13.5%)	1 (5%)	0.4
Co-stimulatory domain (ICD) of CAR product, h (% of total)	05 (07 00()	40 (500()	
CD28-based ICD	25 (67.6%)	10 (50%)	0.3
41-BB-based ICD	12 (32.4%)	10 (50%)	0.3
	7 (10.00/)	2 (10%)	0.5
NO URS	7 (18.9%)	2(10%)	0.5
CRS grade > 2	20 (70.3%)	1 (00%)	0.4
CANS = n (% of total)	4(10.0%)	T (J 70)	0.7
	20 (54 1%	7 (35%)	0.3
ICANS grade 1-2	11 (20 7%)	10 (50%)	0.3
ICANS grade > 3	6 (16 2%)	3 (15%)	>0.2
Toxicity management n (% of total)	0(10.270)	5(15/0)	-0.3333
Received tocilizumab	30 (81 1%)	18 (90%)	0.5
Possived devemethasone	17 (46%)	8 (40%)	0.0
	6 (16 2%)	1 (5%)	0.0
ICO aumission necessary	0(10.2%)	1 (3%)	0.4

Suppl. Table S6. Baseline patient characteristics for 3 months responders with poor (0-1 IR criteria) or high (2-3 IR criteria) recovery Patient baseline characteristics prior to CAR-T infusion for responder after 3 months (n=57) with poor

Patient baseline characteristics prior to CAR-T infusion for responder after 3 months (n=57) with poor (0-1 IR criteria) (n=37) or high (2-3 IR criteria) (n=20) recovery. All laboratory values were determined prior to lymphodepleting chemotherapy with a leniency time period of 3 days. ECOG: Eastern Cooperative Oncology Group. PS: performance status. IQR: interquartile range. LD: lymphodepletion chemotherapy. Cl: confidence interval. If a measurement wasn't available for all patients, the denominator is indicated in the table. Statistical significance between groups was explored by Mann-Whitney test for continuous variables and Fisher's exact test for comparison of percentages.

	Responder 3M	Responder 3M	P value
Descling allow statistics	B cell aplasia (n=46)	B cell recovery (n=11)	
	65 (57 72)	67 (62 76)	0.0
Ages, years (range)	00(37-72)	07 (03-70)	0.2
Berformance status	20 (43.3%)	2 (20%)	0.3
Median ECOG at lymphodepletion (range)	1 (0 75-1)	1 (0-1)	0.7
ECOG 0-1 n (%)	41 (89 1%)	9 (81.8%)	0.6
$ECOG \ge 2 n (\%)$	5 (10.9%)	2 (18 2%)	0.6
Therapy management	0 (1010 /0)	2 (1012)0)	0.0
Prior SCT. n (%)	14 (30.4%)	2 (18.2%)	0.7
Median lines of therapy before bridging (IQR)	3 (2-4)	2 (2-4)	0.6
Any bendamustine before CAR, n (% of total)	22 (47.8%)	4 (364.4%)	0.7
Bendamustine last 9 months before CAR, n (% of total)	3 (6.5%)	0 (0%)	>0.9999
Bendamustine for bridging or lymphodepletion, n (% of total)	9 (19.6%)	2 (18.2%)	>0.9999
Holding therapy, n (% of total)	18 (39.1%)	3 (27.3%)	0.7
Bridging therapy, n (% of total)	34 (73.9%)	4 (36.4%)	0.03
Pola-based bridging, n (% of total)	29 (63%)	1 (9.1%)	0.002
Immunochemotherapy-based bridging, n (% of total)	29 (63%)	11 (100%)	0.02
Brain-to-vein time, days (IQR)	28 (20-49)	28 (20-36)	0.8
Vein-to-vein time, days (IQR)	37.5 (34-47)	33 (29-40)	0.06
Laboratory parameters at time point of lymphodepletion (da	y -5 prior CAR T-cell infus	ion)	
LDH, U/I (IQR)	211.5 (180.5-275)	228 (164-410)	0.9
GFR, ml/min (IQR)	78.5 (63.8-93.3)	74 (67-90)	0.8
CRP, mg/dl (IQR)	0.3 (0.1-0.9)	0.2 (0.2-1.1)	0.4
Ferritin, ng/ml (IQR)	300 (128.5-717.3)	261 (130-387)	0.5
ANC, cells/µl (IQR)	2605 (1958-3663)	2650 (1770-3920)	0.9
PLI, G/I (IQR)	169 (115-227.3)	180 (162-220)	0.5
	10.7 (9.3-12.1)	12.3 (10.1-13.5)	0.2
	1 (0 2)	1 (0.2)	0.4
CAR-HEMATOTOX Score Low $(0,1)$, p (% of total)	28 (60.9%)	8 (72 7%)	0.4
CAR-HEMATOTOX Score High (>2) n (% of total)	18 (39 1%)	3 (27.3%)	0.7
Disease entity n (% of total)	10 (00.170)	0 (21.070)	0.1
Non-transformed lymphoma	20 (43.5%)	5 (45.5%)	>0.9999
(DLBCL, PMBCL, THRLBCL)	(,	- (,)	
Transformed lymphoma	18 (39.1%)	3 (27.3%)	0.7
(trFL, trHL, trMZL, trCLL, trMALT)		· · · ·	
MCL	8 (17.4%)	3 (27.3%)	0.4
Infused CAR T-cell product			
CAR product, n (% of total)			
Axi-cel	17 (37%)	7 (63.6%)	0.2
Tisa-cel	16 (34.8%)	0 (0%)	0.02
Brexu-cel	8 (17.4%)	3 (27.3%)	0.4
Liso-cel	5 (10.9%)	1 (9.1%)	>0.9999
Co-stimulatory domain (ICD) of CAR product, n (% of total)	05 (54 (50))		
CD28-based ICD	25 (54.45%)	10 (90.9%)	0.04
41-BB-based ICD	21 (45.65%)	1 (9.1%)	0.04
	0(17.40)	1 (0.19/)	07
NU CRS	0(17.4%)	1 (9.1%)	0.7
CRS grade > 3	5 (10.0%)	0 (0%)	0.5
ICANS n (% of total)	5 (10.870)	0 (070)	0.0
No ICANS	23 (50%)	3 (27 3%)	0.2
ICANS grade 1-2	16 (34.8%)	4 (36 4%)	>0.2
ICANS grade > 3	7 (15 2%)	2 (18 2%)	>0.0000
Toxicity management n (% of total)	1 (10.2 /0)	2 (10.2 /0)	-0.0000
Received tocilizumab	38 (82 6%)	20 (90 9%)	0.7
Received devamethasone	18 (39 1%)	7 (63.6%)	0.2
ICI admission necessary	6 (13%)	1 (9 1%)	>0.9999
100 aumiosium neuessary	0(10/0)	1 (3.170)	- 0.3333

Suppl. Table S7. Baseline patient characteristics for 3 months responders with B-cell aplasia

Patient baseline characteristics prior to CAR-T infusion for responder after 3 months (n=57) with B cell aplasia (n=46) or B cell recovery (n=11). All laboratory values were determined prior to lymphodepleting chemotherapy with a leniency time period of 3 days. ECOG: Eastern Cooperative Oncology Group. PS: performance status. IQR: interquartile range. LD: lymphodepletion chemotherapy. CI: confidence interval. If a measurement wasn't available for all patients, the denominator is indicated in the table. Statistical significance between groups was explored by Mann-Whitney test for continuous variables and Fisher's exact test for comparison of percentages.

	CD28-based ICD (n=44)	41BB-based ICD (n=28)	P value
Laboratory parameters at progression			•
Leucocytes, G/I (IQR)	3.3 (1.4-5.8)	3.6 (1.6-6.4)	0.6
Thrombocytes, G/I (IQR)	70 (36-129)	96 (24-183)	0.4
Neutrophiles, G/I (IQR)	1.7 (0.6-3.8)	2.1 (0.7-3.7)	0.6
Hemoglobin, g/dl (IQR)	9.9 (8.1-11.5)	8.6 (7.6-11.2)	0.1
LDH, U/I (IQR)	291 (210-470)	292.5 (246-601.5)	0.4
Lymphocyte subpopulations at progre	ession		
Lymphocytes, cells/µl (IQR)	510 (242-878)	451 (270-1201)	0.9
T cells, cells/µl (IQR)	303 (124-629)	339 (124-607)	0.8
T helper cells, cells/µl (IQR)	85 (46-190)	200 (64-239)	<0.05
Cytotoxic T cells, cells/µl (IQR)	133 (51-427)	135 (67-278)	0.95
CD4/CD8 ratio (IQR)	0.7 (0.3-1.2)	1 (0.6-2.1)	0.03
B cells, cells/µl (IQR)	0 (0-0)	0 (0-0)	0.7
NK cells, cells/µl (IQR)	117 (57-193)	116 (29-194)	0.8

Suppl. Table S8. Laboratory parameters and immune cell counts at time of progression for CD28based versus 41BB-based CAR T-cell products.

Laboratory parameters and immune cell counts at time point of progression or relapse for patients treated with CD28-based or 41BB-based CAR T-cell products. P-values determined by Mann-Whitney test. P-values determined by Mann-Whitney test.

	Non-transformed lymphoma (n=42)	Transformed lymphoma (n=20)	MCL (n=10)	P value one-way ANOVA			
Laboratory parameters at progression							
Leucocytes, G/I (IQR)	3.2 (1.3-5.4)	3.2 (2.1-6.1)	7 (2.5-14)	0.003			
Thrombocytes, G/I (IQR)	71.5 (17.5-136)	138.5 (41.3-189.8)	51 (23.3-94)	0.07			
Neutrophiles, G/I (IQR)	1.5 (0.6-3.6)	1.9 (0.9-3.4)	1.9 (0.2-4.2)	0.99			
Hemoglobin, g/dl (IQR)	9.2 (7.8-11.4)	10.8 (9.1-13.1)	8.6 (7.6-10.8)	0.1			
LDH, U/I (IQR)	336 (242-613)	279 (220-441.8)	246 (179.8-536.5)	0.4			
Lymphocyte subpopulations at prog	ression						
Lymphocytes, cells/µl (IQR)	371 (180-700)	701 (344.5-1352)	2751 (894.5-10324)	<0.0001			
T cells, cells/µl (IQR)	195 (95-453)	498.5 (252.8-984.3)	697.5 (342.5-817.8)	0.02			
T helper cells, cells/µl (IQR)	68 (33-200)	147 (88.8-236.5)	172 (96.3-496.5)	0.03			
Cytotoxic T cells, cells/µl (IQR)	94 (53-287)	251 (57.8-666.3)	349.5 (94.5-557.5)	0.03			
CD4/CD8 ratio (IQR)	0.9 (0.3-1.5)	0.9 (0.4-2.2)	0.6 (0.2-1.5)	0.99			
B cells, cells/µl (IQR)	0 (0-0)	0 (0-23.3)	0 (0-9618)	<0.0001			
NK cells, cells/µl (IQR)	84 (25-144)	158.5 (75-210)	212 (140.3-329)	0.04			

Suppl. Table S9. Laboratory parameters and immune cell counts at time of progression across the different B-NHL entities.

Laboratory parameters and immune cell counts at time of progression or relapse for patients treated with CD19 CAR T-cells with non-transformed lymphoma (DLBCL, PMBCL, THRLBCL), transformed lymphoma (trFL, trHL, trMZL, trCLL, trMALT) or mantle cell lymphoma (MCL). P-values determined by ordinary one-way ANOVA.

Supplemental Figures



Suppl. Figure S1. Consort diagram of patient cohort

CAR-T treatment for a disease entity other than r/r B-NHL (n=21), treatment the <30 days before data cut off (n=3), or insufficient data (n=2) represented the key exclusion criteria, resulting in a final study population of 105 B-NHL patients, including 90 large B-cell lymphoma (LBCL) patients and 15 mantle cell lymphoma (MCL) patients



Suppl. Figure S2. Neutrophil recovery phenotypes and early/late immune effector cell-associated hematotoxicity severity

(A) Median duration of ANC < 500/ μ l in days. Results are presented as median ± 95% CI. (B) Neutrophil recovery phenotype of all patients. (C) early late ICAHT of all patients. ICAHT was graded according to EHA/EBMT consensus guidelines (Rejeski et al, Blood 2023).



Suppl. Figure S3. Immune cell counts following CD19 CAR T-cell therapy.

Number of (A) leukocytes, (B) thrombocytes, (C) lymphocytes, (D) NK cells, (É) IgG, IgA and IgM levels were determined before conditioning chemotherapy and at the indicated time points after CD19 CAR T-cell infusion. Results are presented as mean \pm standard error of the mean (SEM). The corresponding numbers at risk are provided in supplemental table 1.



Suppl. Figure S4. Lymphocyte and immunoglobulin recovery following CD19 CAR T-cell therapy analyzed by disease entity.

(A-C) Number of T cells, (D) number of B cells, (E) number of NK cells, (F) IgG and (G) IgA levels were determined before conditioning chemotherapy and at the indicated time points after CD19 CAR T-cell infusion and analyzed for patients diagnosed with non-transformed lymphoma [green], transformed lymphoma [blue] or mantle cell lymphoma (MCL) [violet]. Results are presented as mean \pm standard error of the mean (SEM). For comparison of three groups a 2-way ANOVA. P-values are shows as * p < 0.05, ** p < 0.01, *** p < 0.001 or **** p < 0.0001.



Suppl. Figure S5. Lymphocyte and immunoglobulin recovery following CD19 CAR T-cell therapy analyzed by serum LDH levels.

(A-C) Number of T cells, (D) number of B cells, (E) number of NK cells, (F) IgG and (G) IgA levels were determined before conditioning chemotherapy and at the indicated time points after CD19 CAR T-cell infusion and analyzed for patients with LDH \leq upper limit of normal (ULN) [green] or LDH > ULN [brown]. Results are presented as mean ± standard error of the mean (SEM). For comparison of two groups Wilcoxon test was used. P-values are shows as * p < 0.05, ** p < 0.01, *** p < 0.001 or **** p < 0.0001.



Suppl. Figure S6. Lymphocyte and immunoglobulin recovery following CD19 CAR T-cell therapy analyzed by prior therapy lines.

(A-C) Number of T cells, (D) number of B cells, (E) number of NK cells, (F) IgG and (G) IgA levels were determined before conditioning chemotherapy and at the indicated time points after CD19 CAR T-cell infusion and analyzed for patients treated with 0-3 therapy lines prior CAR-T [bright red] or 4-8 therapy lines prior to CAR-T [dark red]. Results are presented as mean ± standard error of the mean (SEM). For comparison of two groups Wilcoxon test was used. P-values are shows as * p < 0.05, ** p < 0.01, *** p < 0.001 or **** p < 0.0001.



Suppl. Figure S7. Lymphocyte and immunoglobulin recovery following CD19 CAR T-cell therapy analyzed by CAR-HEMATOTOX (HT) score.

(A-C) Number of T cells, (D) number of B cells, (E) number of NK cells, (F) IgG and (G) IgA levels were determined before conditioning chemotherapy and at the indicated time points after CD19 CAR T-cell infusion and analyzed for patients showing a low HT score [yellow] or a high HT scope [dark blue]. Results are presented as mean \pm standard error of the mean (SEM). For comparison of two groups Wilcoxon test was used. P-values are shows as * p < 0.05, ** p < 0.01, *** p < 0.001 or **** p < 0.0001.



Suppl. Figure S8. Lymphocyte and immunoglobulin recovery following CD19 CAR T-cell therapy analyzed by the co-stimulatory domain of the applied CAR T-cell product.

(A-C) Number of T cells, (D) number of B cells, (E) number of NK cells, (F) IgG and (G) IgA levels were determined before conditioning chemotherapy and at the indicated time points after CD19 CAR T-cell infusion and analyzed for patients having been treated with a CD28ICz-based CAR T-cell product [orange] or a 41BBICz-based CAR T-cell product [turquoise]. Results are presented as mean ± standard error of the mean (SEM). For comparison of two groups Wilcoxon test was used. P-values are shows as * p < 0.05, ** p < 0.01, *** p < 0.001 or **** p < 0.0001.



Suppl. Figure S9. Lymphocyte and immunoglobulin recovery following CD19 CAR T-cell therapy analyzed by CRS severity.

(A-C) Number of T cells, (D) number of B cells, (E) number of NK cells, (F) IgG and (G) IgA levels were determined before conditioning chemotherapy and at the indicated time points after CD19 CAR T-cell infusion and analyzed for patients having CRS grade 0-1 [bright green] or ICANS grade \geq 2 [violet]. Results are presented as mean ± standard error of the mean (SEM). For comparison of two groups Wilcoxon test was used. P-values are shows as * p < 0.05, ** p < 0.01, *** p < 0.001 or **** p < 0.0001.



Suppl. Figure S10. Lymphocyte and immunoglobulin recovery following CD19 CAR T-cell therapy analyzed by ICANS severity.

(A-C) Number of T cells, (D) number of B cells, (E) number of NK cells, (F) IgG and (G) IgA levels were determined before conditioning chemotherapy and at the indicated time points after CD19 CAR T-cell infusion and analyzed for patients having ICANS grade 0-1 [bright green] or ICANS grade \geq 2 [violet]. Results are presented as mean ± standard error of the mean (SEM). For comparison of two groups Wilcoxon test was used. P-values are shows as * p < 0.05, ** p < 0.01, *** p < 0.001 or **** p < 0.0001.



Suppl. Figure S11. Lymphocyte and immunoglobulin recovery following CD19 CAR T-cell therapy analyzed by CAR T-cell product.

(A-C) Number of T cells, (D) number of B cells, (E) number of NK cells, (F) IgG and (G) IgA levels were determined before conditioning chemotherapy and at the indicated time points after CD19 CAR T-cell infusion and analyzed for patients treated with different CAR T-cell products: Axi-cel [red], Tisa-cel [blue], Brexu-cel [green] and Liso-cel [yellow]. Results are presented as mean \pm standard error of the mean (SEM). For comparison of the different groups a 1-way ANOVA was used. P-values are shows as * p < 0.05, ** p < 0.01, *** p < 0.001 or **** p < 0.0001.

Suppl. Figure S12



Suppl. Figure S12. Competing risk of disease relapse and NRM in the context of immune reconstitution

Cumulative incidence of immune reconstitution (IR) in the context of the competing risks of relapse and non-relapse mortality (NRM). The IR group was subdivided into patients without progressive disease (black) and patients with subsequent progression (yellow). The "no IR" group could be further divided into patients having a non-relapse mortality (blue) or relapse (green) events. Because patients were censored for these events in the primary analysis, they occurred before IR by definition. The remaining patients were in active follow-up without IR (purple).



Suppl. Figure S13. Infectious events.

(A) Infections were defined on the basis of microbiologic/histopathologic data (dark green) or as a clinical syndrome of infection on the basis of radiologic evidence or clinical signs (grey). (B) For the microbiologically defined infection, the infection class was further subdivided into bacterial (green), viral (red), or fungal (yellow). (C) Breakdown of the specifically identified pathogen for the bacterial (green), viral (red) and fungal (yellow) infection categories.







Suppl. Figure S15. IR and clinical response following CD19 CAR T-cell therapy (A) Progression free survival (PFS) and (B) overall survival were compared for patients with recovery of 3,2,1, or 0 IR criteria. (C+E) Progression free survival (PFS) and (D+F) overall survival of all B-cell Non-Hodgkin's Lymphoma (B-NHL) patients by landmark analysis at 90 days after CAR T-cell infusion. Patients with recovery of 3,2,1, or 0 IR criteria (C+D) and with poor recovery (0-1 criteria) or high recovery (2-3 criteria) (E+F) were compared. P-values determined by log rank method; hazard ratios (HR) determined using a univariate Cox proportional hazards model.





Suppl. Figure S16. Landmark analysis at 180 days post CAR-T for IR and clinical response. (A+C+E) Progression free survival (PFS) and (B+D+F) overall survival of all B-cell Non-Hodgkin's Lymphoma (B-NHL) patients by landmark analysis at 180 days after CAR T-cell infusion. Patients with any IR recovery or no recovery (A+B), with recovery of 3,2,1, or 0 IR criteria (C+D) and with poor recovery (0-1 criteria) or high recovery (2-3 criteria) (E+F) were compared. P-values determined by log rank method; hazard ratios (HR) determined using a univariate Cox proportional hazards model.



Suppl. Figure S17. B-cell aplasia and clinical response following CD19 CAR T-cell therapy. (A+C+E) Progression free survival (PFS) and (B+D+F) overall survival of all B-cell Non-Hodgkin's Lymphoma (B-NHL) patients for all patients (A-B), by landmark analysis at 30 days (C-D) and by landmark analysis at 180 days (E-F) after CAR T-cell infusion. Patients with B-cell recovery (any detectable B-cell counts) versus B-cell aplasia were compared. P-values determined by log rank method; hazard ratios (HR) determined using a univariate Cox proportional hazards model.

Suppl. Figure S17



Suppl. Figure S18. Relationship between B-cell recovery and the cumulative probability of early infectious complications.

Relative distribution of infection grades for all infection subtypes (left) and severe infections (right) comparing patients with B cell aplasia versus B cell recovery (e.g., any detectable B-cell counts). Hazard ratios (HR) and p-values were determined using a univariate Cox proportional hazards model.



Suppl. Figure S19. NK cell counts after CAR T-cell therapy.

(A) Time of NK cell nadir for all patients, (B) lowest NK cell counts and (C) NK cells 6 months (6M), 12 months (12M), 18 months (18M) and 24 months (24M) after CAR T-cell therapy of all patients. (D) Time of NK cell nadir, (E) lowest NK cell counts and (C) NK cells at 6 months (6M) post CAR-T compared for patients with response (R) and no response (NR) 3 months after CAR-T. Mann-Whitney test was used to compare between two groups. P-values are shown as * p < 0.05, ** p < 0.01, *** p < 0.001 or **** p < 0.0001.