**Supplementary Table 1. Baseline characteristics of the enrolled patients.**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Patient No. | Sex | Age | Diagnosis/cytogenetics | Previous therapy | Relapse times | WBC count in PB (×109) | BM leukemia cells | Extramedullary involvement |
| **Before FC** | **After FC** |
| 1 | M | 51 | c-ALL | Chemotherapy | 1 | 5.3 | 66% | 45% | None |
| 2 | F | 29 | c-ALL | Chemotherapy | 6 | 3.9 | 65% | 73% | Previous CNSL |
| 3 | M | 31 | p-ALL(CML BP)/Abl T315I | Chemotherapy | Never CR | 1.3 | 62% | 15% | Previous CNSL and testis relapse |
| 4 | M | 52 | Ph(+)p-ALL/Abl D276G, F317I | Allo-HSCT | 4 | 7.1 | 82% | 68% | None |
| 5 | F | 43 | Ph(+) c-ALL | Chemotherapy | 3 | 5.9 | 3% | 10.6% | Previous CNSL |
| 6 | M | 32 | c-All | Allo-HSCT | 2 | 5.2 | 8% | 1.83% | None |
| 7 | F | 26 | p-ALL | Allo-HSCT | 1 | 8.4 | 54.7% | 29% | None |
| 8 | F | 39 | c-ALL | Chemotherapy | 2 | 5.6 | 82% | 77% | None |
| 9 | M | 57 | c-ALL | Allo-HSCT | 1 | 7.3 | 9% | 12.7% | None |
| 10 | F | 50 | p-ALL | Chemotherapy | 2 | 53 | 83% | 40% | None |
| 11 | M | 53 | c-ALL(CML BP)/Abl E355G | Allo-HSCT | 1 | 4.3 | 8% | 1.55% | Previous CNSL |
| 12 | M | 7 | Ph(+)c-ALL/Abl T315I | Chemotherapy | 3 | 40 | 77% | 62.5% | None |
| 13 | M | 20 | p-ALL | Allo-HSCT | 2 | 12.5 | 83% | 76% | Previous testis relapse  |
| 14 | M | 27 | c-ALL | Allo-HSCT | 1 | 6.3 | <0.01% | <0.01% | Current testis relapse  |
| 15 | F | 17 | c-ALL/46,XY,DEL(9)(p12) | Chemotherapy | 1 | 4.2 | 53% | 58% | None |

FC=fludarabine- and cyclophosphamide-based lymphodepletion; F=female; M=male; c-ALL=common B cell acute lymphocytic leukemia; p-ALL=pre-B cell acute lymphocytic leukemia; CML BP=chronic myeloid leukemia blast phase; Allo-HSCT=allogeneic hematopoietic stem cell transplantation; CR=complete remission; CNSL=central nervous system leukemia

**Supplementary Table 2. Specific CD19+ cell lysis rate of CART19s in 15 patients**

|  |  |
| --- | --- |
| Patient No. |  E:T ratio |
|  **3:1** | **10:1** |
| 1 |

|  |
| --- |
| 58.90% |

 | 86.07% |
| 2 | 81.98% | 87.79% |
| 3 | 70.29% | 79.92% |
| 4 | 91.03% | 94.57% |
| 5 | 89.91% | 94.59% |
| 6 | 91.86% | 91.40% |
| 7 | 74.77% | 90.54% |
| 8 | 84.76% | 91.43% |
| 9 | 70.91% | 86.36% |
| 10 | 88.54% | 90.45% |
| 11 | ND | 62.43% |
| 12 | ND | 76.99% |
| 13 | 90.55% | 95.02% |
| 14 | 81.55% | 90.48% |
| 15 | 86.79% | 87.42% |

 E:T ratio=effector T cells:target T cells

ND=not determined

**Supplementary Table 3. Toxicities, management and outcomes in other specific organs**

|  |  |  |
| --- | --- | --- |
| **Adverse events** |  **Toxicity grade** | **Management;****outcomes** |
| **Grade 2** | **Grade 3** | **Grade 4** |
| ***Hematological system*** |  |  |  |  |
| Neutrophil count decreased |  0 |  0 | 9/13 (69.2%) | Plasma, platelet, red blood cells and fibrinogen supplementation, filgrastim; Remission |
| Lymphocyte count decreased |  0 |  0 | 9/13(69.2%) |
| Platelet count decreased |  0 |  0 | 9/13 (69.2%) |
| Anemia | 4/13(30.8%) | 5/13 (38.5%) |  0 |
| APTT prolonged | 1/15 (6.7%) | 4/15 (26.7%) |  0 |
| Fibrinogen decreased | 2/15 (13.3%) | 2/15 (13.3%) | 5/15 (33.3%) |
| ***Liver function*** |  |  |  |  |
| Hypoalbuminemia | 5/15 (33.3%) | 2/13 (13.3%) |  0 | Liver protection, albumin supplementation, eliminating jaundice; Remission |
| Aspartate aminotransferase increased | 3/15 (20.0%) |  0 |  0 |
| Alanine aminotransferaseincreased | 4/15 (26.7%) |  0 |  0 |
| Blood bilirubin increased | 3/15 (20.0%) | 1/15 (6.7%) |  0 |
| ***Renal function*** |  |  |  |  |
| Acute kidney injury | 1/15 (13.3%) | 0 | 0 | Diuresis; Remission |
| Creatinine increased | 1/15 (13.3%) |  0 |  0 |  |
| ***Cardiovascular function*** |  |  |  |  |
| Hypotension | 2/15 (13.3%) | 3/15 (20.0%) |  0 | Symptomatic and supportive treatment, Anti-CRS treatment; Remission |
| Hypertension |  0 | 1/15 (6.7%) |  0 |
| Ventricular arrhythmia | 2(15) (13.3%) |  0 |  0 |
| ***Respiratory function*** |  |  |  |  |
| Pulmonary edema | 3 (20.0%) | 2 (13.3%) | 0 | Respiratory failure and grade 4 hypoxia was related to infection; Died. Anti-CRS (others); Remission |
| Hypoxia | 3 (20.0%) | 2 (13.3%) | 1 (6.7%) |
| Respiratory failure | - | - | 1 (6.7%) |
| Pleural effusion | 1 (6.7%) | 1 (6.7%) |  0 |
| ***Gastrointestinal function*** |  |  |  |  |
| Vomit | 4/15 (26.7%) | 2/15 (13.3%) |  0 | Supportive treatment; Remission |
| Diarrhea | 3/15 (20.0%) |  0 |  0 |  |
| ***Skin***  |  |  |  |  |
| Social circumstances- Other, specify (GVHD) |  0 | 2/15 (13.3%) |  0 | Immunosuppressive agents; Remission |

APTT=activated partial thromboplastin time; CRS=cytokine release syndrome; GVHD=graft versus host disease