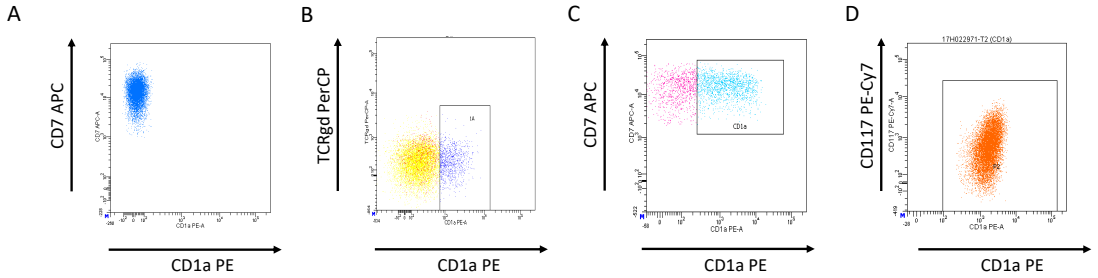
Supplementary Methods

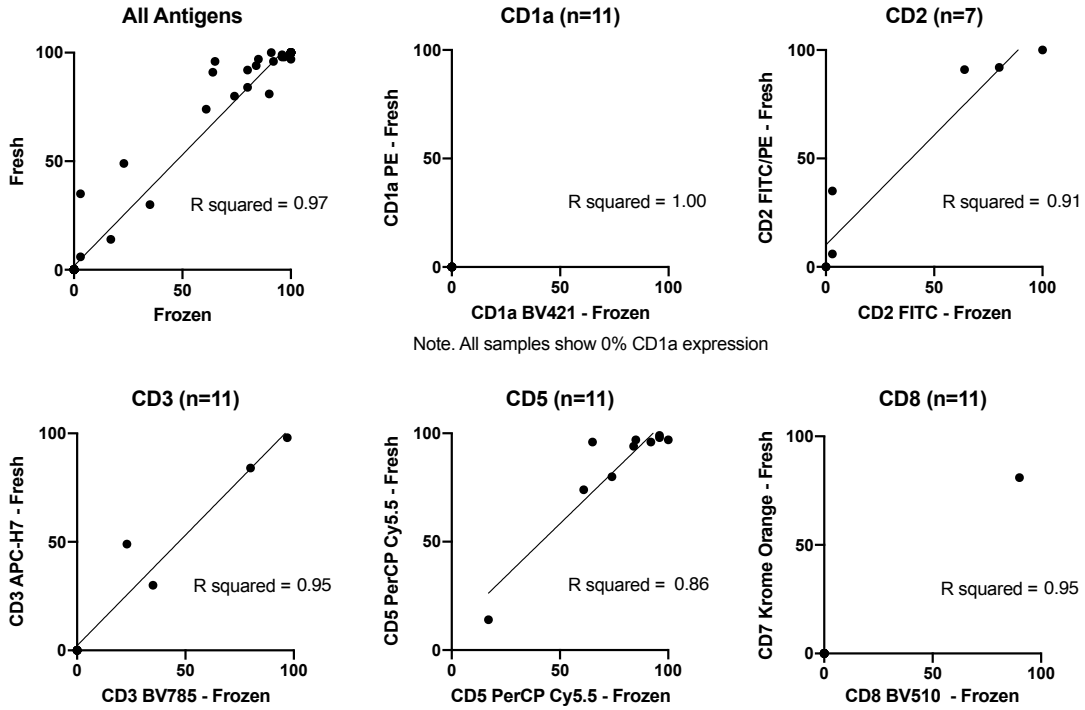
Samples were analysed at three centers, largely divided by age. Samples for 55 patients, aged 1-12 years were analyzed at Great Ormond Street Hospital (GOSH), samples for 43 patients, aged 13-75 years were analyzed at University College London Hospital (UCLH) and samples for 18 patients, aged 2-17 years were analyzed at the University College London Cancer Institute (UCLCI). Samples analyzed at GOSH and UCLH were analyzed fresh for diagnostic purposes. All samples analyzed at UCLCI came from the Blood Cancer UK Childhood Leukaemia CellBank and were provided as viable cells frozen in liquid nitrogen. These samples were thawed according to standard lab practices in a 37C water bath, followed by immediate washing in RPMI cell media containing 10% fetal calf serum. To confirm concordance of results between centers and between fresh and frozen samples, 11 samples were analyzed both at two different centers and using a fresh and a frozen aliquot. Results demonstrated excellent concordance as shown in supplementary figure 2. In addition, while we acknowledge that the intensity of antigen expression may vary between fluorochromes, we have reported positivity rather than intensity, which showed good correlation between different antibodies used (Supplementary Figure 2).

Samples were analyzed using standard diagnostic flow cytometry methods at each institution. Samples were washed and suspended in flow buffer and stained with antibodies for 20 minutes. Following washing, samples were resuspended and analyzed on a multiparameter flow analyzer. Negative controls included isotype controls and gating on negative populations.

At University College London Hospitals, samples were stained using CD1a FITC, CD2 APC, CD3 PBE, CD4 APC, CD5 APC-A700, CD7 PE, CD8 PB and CD38 APC-A700 (All Beckman Coulter), run on a Navios Flow Cytometer equipped with Navios Software and analyzed using Kaluza Version 2 (Beckman Coulter). At Great Ormond Street Hospital for Children, samples were stained with CD1a PE, CD2 FITC/PE, sCD3 APC-H7, CD4 FITC, CD5 PerCP Cy5.5, CD38 FITC (All BD Bioscience), CD2 PerCpCy 5.5 (Pharmagen), CD7 APC (Invitrogen), CD8 Krome Orange (Beckman Coulter), run on a BD FACSCanto II or BD LSRFortessa X-20 flow cytometer with analysis using BD FACSDiva software (BD Biosciences). Samples from the Blood Cancer UK Childhood Leukaemia CellBank were processed at the University College London Cancer Institute. Samples were stained with CD1a BV421, CD2 FITC, CD3 BV785, CD4 FITC, CD5 PerCp 5.5, CD8 BV510 (All Biolegend) and CD7 APC (Thermo Fisher Scientific), run on a BD Fortessa X-20 flow cytometer and analyzed using FlowJo version 10 (BD Biosciences).



Supplementary Figure 1. CD1a expression in T-ALL
Representative flow cytometry plots demonstrating A) Negative, B) Partial Low and C) Diffuse and D) Full intermediate expression of CD1a in T-ALL.



Supplementary Figure 2. Concordance of antigen expression level in fresh and frozen samples Plots show antigen expression levels between fresh and frozen aliquots of the same sample analysed at two different centers.

Supplementary Table 1. Clinical Details

PatientID	Presentation/Relapse	Centre	Age at Diagnosis
1	Presentation	UCLCI	10
1	Relapse	UCLCI	10
2	Presentation	UCH	75
3	Presentation	GOSH	6
3	Relapse	GOSH	6
4	Presentation	GOSH	7
4	Relapse	GOSH	7
4	Relapse	GOSH	7
5	Presentation	GOSH	2
6	Presentation	GOSH	8
7	Presentation	GOSH	8
8	Presentation	GOSH	10
9	Presentation	GOSH	5
10	Presentation	GOSH	11
11	Presentation	GOSH	8
12	Presentation	GOSH	8
13	Presentation	GOSH	1
13	Relapse	GOSH	1
14	Presentation	GOSH	2
15	Presentation	GOSH	8
16	Presentation	GOSH	6
17	Presentation	GOSH	3
18	Presentation	GOSH	7
19	Presentation	GOSH	1
19	Relapse	GOSH	1
19	Relapse	GOSH	1
20	Presentation	GOSH	6
21	Presentation	GOSH	7
22	Presentation	GOSH	5
23	Presentation	GOSH	1
24	Presentation	GOSH	3
24	Relapse	GOSH	3
25	Presentation	GOSH	6
26	Presentation	GOSH	8
27	Presentation	GOSH	2
28	Presentation	GOSH	7
28	Relapse	GOSH	7
29	Presentation	GOSH	5
30	Presentation	GOSH	7
31	Presentation	GOSH	9
31	Relapse	GOSH	9
32	Presentation	GOSH	10
33	Presentation	GOSH	10
34	Presentation	GOSH	12
34	Relapse	GOSH	12
35	Presentation	GOSH	4
36	Presentation	GOSH	8
37	Presentation	GOSH	4
38	Presentation	GOSH	8
39	Presentation	GOSH	9
39	Relapse	GOSH	9
40	Presentation	GOSH	1
41	Presentation	GOSH	11
42	Presentation	GOSH	3
43	Presentation	GOSH	5
43	Relapse	GOSH	5
44	Presentation	GOSH	5
45	Presentation	GOSH	8
46	Presentation	GOSH	10
47	Presentation	GOSH	10
48	Presentation	GOSH	6
49	Presentation	GOSH	10
50	Presentation	GOSH	5
51	Presentation	GOSH	6
52	Presentation	GOSH	11
53	Presentation	GOSH	4
54	Presentation	GOSH	11
55	Presentation	GOSH	2
55	Refractory	GOSH	2
56	Presentation	UCH	15
57	Presentation	UCH	18
58	Presentation	UCH	36
59	Presentation	UCH	33

60	Presentation	UCH	23
61	Presentation	UCH	25
62	Presentation	UCH	38
63	Presentation	UCH	25
63	Refractory	UCH	23
64	Presentation	UCH	23
65	Presentation	UCH	25
65	Refractory	UCH	25
66	Presentation	UCH	35
66	Refractory	UCH	22
67	Presentation	UCH	14
68	Presentation	UCH	18
69	Presentation	UCH	24
70	Presentation	UCH	13
70	Relapse	UCH	13
70	Relapse	UCH	31
71	Presentation	UCH	20
72	Presentation	UCH	43
73	Presentation	UCH	60
74	Presentation	UCH	38
74	Refractory	UCH	38
75	Presentation	UCH	68
76	Presentation	UCH	14
77	Presentation	UCH	16
78	Presentation	UCH	18
79	Presentation	UCH	19
80	Presentation	UCH	45
81	Presentation	UCH	32
81	Relapse	UCH	32
81	Relapse	UCH	32
82	Presentation	UCH	26
83	Presentation	UCH	21
84	Presentation	UCH	28
85	Presentation	UCH	21
85	Relapse	UCH	26
86	Presentation	UCH	36
87	Presentation	UCH	16
88	Presentation	UCH	20
89	Presentation	UCH	40
89	Refractory	UCH	25
90	Presentation	UCH	14
91	Presentation	UCH	14
91	Relapse	UCH	14
92	Presentation	UCH	15
92	Relapse	UCH	15
92	Relapse	UCH	15
93	Presentation	UCH	69
93	Relapse	UCH	69
94	Presentation	UCH	13
95	Presentation	UCH	25
96	Presentation	UCH	40
97	Presentation	UCH	47
98	Presentation	GOSH	5
99	Presentation	GOSH	8
99	Relapse	GOSH	10
100	Presentation	UCLCI	11
100	Relapse	UCLCI	11
101	Presentation	UCLCI	17
102	Presentation	UCLCI	9
103	Relapse	UCLCI	9
103	Presentation	UCLCI	2
104	Presentation	UCLCI	14
105	Presentation	UCLCI	5
106	Presentation	UCLCI	10
107	Presentation	UCLCI	13
108	Presentation	UCLCI	11
109	Presentation	UCLCI	14
110	Presentation	UCLCI	2
111	Presentation	UCLCI	15
112	Presentation	UCLCI	12
113	Relapse	UCLCI	16
114	Relapse	UCLCI	6
115	Relapse	UCLCI	7