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Supplemental Information

BCKDK modification enhances the anticancer efficacy of CAR-T cells by reprogramming branched chain amino acid metabolism

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Supplemental Material

Table S1 the concentrations of metabolites and inhibitors

	Concentration	MW	Formula	References
Leucine	50 μM	131.17	$C_6H_{13}NO_2$	1-3
Iosleucine	50 μM	131.17	$C_6H_{13}NO_2$	4
Valine	50 μM	117.15	$C_5H_{11}NO_2$	5
BT2	50 μM	247.1	$C_9H_4Cl_2O_2S$	6
BCH	100 μM	155.19	C8H13NO2	7
V9302	10 μM	538.68	C34H38N2O4	8
JPH203	5 μM	472.32	C23H19Cl2N3O4	9

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Table S2. Datasets for metabolomics analysis

Sample	Bckdk_OE_CART_1	Bckdk_OE_CART_2	Bckdk_OE_CART_3	CART_1	CART_2	CART_3	Bckdk_KO_CART_1	Bckdk_KO_CART_2	Bckdk_KO_CART_3
Gruop	Bckdk_OE_CART	Bckdk_OE_CART	Bckdk_OE_CART	CART	CART	CART	Bckdk_KO_CART	Bckdk_KO_CART	Bckdk_KO_CART
2_keto_isovalerate	4093	13510	20140	12270	9646	4599	2348	14983	7635
2_ketoisocaproate	527741	365442	204496	122931	114215	249335	139109	135300	217805
3_Hydroxy_Pyrroline_Carboxylate	24136	12613	69454	53448	21735	6530	5687	9144	12973
3_methyl_2_oxopentanoate	106563	130130	185873	44737	74158	51445	26214	29686	14275
4_Amino_butyraldehyde	2927	3669	2863	1612	2405	1505	973	859	1439
Alanine	1600106	1171768	1792471	4442578	5213740	1125576	656742	166557	545255
Aminobutryic_acid	9713	5583	9181	21820	18853	12146	5396	7109	8600
Arginine	119918	146077	1107532	1065531	835512	106906	56539	40648	51785
Argininosuccinate	11175	13095	18290	8253	6486	9241	5014	6786	6548
Asparagine	765160	905343	1126281	2308087	1600376	1237315	210935	189429	160866
Asparate	447138	536867	709771	5938401	583988	1162024	2143724	213650	275043
Carnosine	51214	37933	45712	81668	71171	108840	9259	6926	11373
Citrate	310	1682	729	4242	773	13241	2513	2238	1979
Citrulline	40466	34733	41349	88945	69674	70894	22881	21252	21810
Creatinine	3630	663	3572	2821	3454	6939	3868	853	3314
Cystathionine	43620	46836	44862	33570	30237	34138	4637	17029	14536
Cysteine	2703	1740	3122	7774	6291	10025	1498	458	625
Cystine	3882	2427	1800	2321	6832	1491	567	1243	583
Ethanolamine	4394	4065	5333	3284	4491	2409	2541	1336	332
Fumarate	533372	333079	472489	634480	641047	870134	134580	253035	250448
Glutamate	12885011	20108919	16490585	7291063	5624385	5516692	8424968	7980211	7928470

Glutamine	15165051	20287965	28552113	99899669	100914543	88121393	64704676	68645706	73340465
Glycine	3761	3158	8706	7186	3279	3043	1309	762	4399
Glyoxylate	2967	1150	1572	3910	1997	3593	4435	439	2070
Guanine	2978	2998	8972	3608	1603	6554	756	976	1171
Histidine	1774726	2157686	1852008	6997196	6239402	5117271	246973	283423	361913
Homocystine	637	5058	976	1838	1334	1410	1012	1383	1251
Hydroxylysine	1493	404	616	3878	1327	371	2249	612	1836
Indole	286	242	138	586	678	665	273	234	95
Isoleucine	1424886	1002924	1531933	841661	699141	704233	151188	142454	286614
Lactate	1500	1314	2084	517	1248	227	371	145	227
Leucine	2035183	1358424	2827868	1005679	1204579	1167622	323317	358875	403759
Lysine	3123	279	1251	1603	3353	1871	1035	576	956
Malate	72512	24833	25297	71908	27319	23421	75213	13581	4591
Methionine	21907	144275	49468	136591	88666	331743	49380	61853	134782
Ornithine	136610	93108	91492	691582	221449	276700	141477	27658	107397
Phenylalanine	170147	170510	232366	78325	174378	588101	248480	219760	446170
Proline	34100768	37693277	39360733	16582537	18541617	1058442	6350716	5878622	6584499
Pyruvate	6110	1177	3781	2359	2301	4036	1786	186	623
Sarcosine	1240164	1356958	1428437	4330780	3813938	2992482	1735847	2831756	1173559
Spermidine	2208	3642	690	955	1569	240	420	624	712
Spermine	3903	1588	8370	2735	2466	1113	1938	2649	741
Succinate	5720	24452	13644	2639	5507	13229	5036	1293	5519
Taurine	3069032	272864	3475404	2271978	1762637	1848679	1060629	1302384	991703
Threonine	62	1192	1826	235	211	1146	188	459	239
Tryptophan	26575	45058	27759	10617	24298	29875	1890	12729	3942

Tyrosine	58469	64557	265332	106502	146892	148178	68647	3774	55225
Valine	489710	528147	470219	343401	215836	263498	118152	70920	122465

Table S3 The variable importance in projection from Partial Least Squares - Discriminant Analysis

	Comp. 1	Comp. 2	Comp. 3	Comp. 4	Comp. 5	Comp. 6	Comp. 7	Comp. 8
Histidine	2.0739	1.9123	1.8918	1.8889	1.8882	1.8881	1.8881	1.8881
Citrulline	1.9945	1.8293	1.807	1.8047	1.804	1.8039	1.8039	1.8039
Cysteine	1.9239	1.7653	1.7452	1.7425	1.742	1.7419	1.7419	1.7419
Asparagine	1.9206	1.7593	1.7395	1.7369	1.7363	1.7362	1.7362	1.7362
Carnosine	1.8912	1.7316	1.7104	1.7079	1.7073	1.7072	1.7072	1.7072
Alanine	1.6451	1.5064	1.4883	1.49	1.4895	1.4894	1.4894	1.4894
Fumarate	1.5441	1.4142	1.3969	1.3964	1.3959	1.3958	1.3958	1.3958
Aminobutryic_acid	1.4828	1.3748	1.36	1.358	1.3581	1.358	1.358	1.358
Arginine	1.4283	1.308	1.2977	1.2983	1.298	1.2979	1.2979	1.2979
Ornithine	1.409	1.2966	1.2936	1.2916	1.2913	1.2913	1.2913	1.2913
Indole	1.3737	1.3035	1.2906	1.29	1.2896	1.2897	1.2897	1.2897
Cystine	1.1541	1.0632	1.0614	1.0604	1.06	1.0601	1.0601	1.0601
Glutamate	1.065	1.2384	1.2239	1.2233	1.2228	1.2228	1.2228	1.2228
Phenylalanine	1.0529	0.99218	0.98319	0.98199	0.98413	0.98406	0.98406	0.98406
Tyrosine	1.0516	0.98708	0.97536	0.97963	0.98043	0.98039	0.98039	0.98039
Isoleucine	1.0296	1.0486	1.0378	1.0363	1.0359	1.0359	1.0359	1.0359
Pyruvate	0.99457	1.0315	1.0362	1.0347	1.0346	1.0345	1.0345	1.0345
Guanine	0.93564	0.92336	0.91204	0.91541	0.91509	0.91508	0.91508	0.91508
Tryptophan	0.92439	0.86051	0.8771	0.87777	0.87755	0.87752	0.87752	0.87752
Cystathionine	0.89789	0.86523	0.87229	0.87337	0.87319	0.87316	0.87316	0.87316
Leucine	0.85114	0.93847	0.92893	0.92768	0.92739	0.92732	0.92732	0.92732
Ethanolamine	0.79318	0.8247	0.81451	0.81368	0.81347	0.81386	0.81387	0.81387

Sarcosine	0.78375	0.95965	0.94858	0.95095	0.95083	0.95101	0.95101	0.95101
Asparate	0.73087	0.66954	0.70352	0.70487	0.70517	0.70519	0.7052	0.7052
Valine	0.70023	0.85463	0.84473	0.84416	0.84386	0.84387	0.84387	0.84387
Lysine	0.67831	0.66293	0.70334	0.70405	0.70394	0.70399	0.70399	0.70399
Glycine	0.67196	0.73063	0.7218	0.72178	0.72174	0.72226	0.72226	0.72226
2_ketoisocaproate	0.63761	0.91498	0.90578	0.90834	0.90806	0.90809	0.90809	0.90809
Hydroxylysine	0.62231	0.61463	0.66201	0.66263	0.66479	0.66491	0.66491	0.66491
3_methyl_2_oxopentanoate	0.52116	0.71191	0.71238	0.7116	0.71151	0.71162	0.71162	0.71162
3_Hydroxy_Pyrroline_Carboxylate	0.43686	0.5711	0.56611	0.56554	0.56832	0.56834	0.56834	0.56834
Methionine	0.43202	0.67036	0.67623	0.67673	0.67724	0.67764	0.67764	0.67764
Lactate	0.37364	0.68754	0.68582	0.68931	0.68917	0.68918	0.68918	0.68918
Malate	0.33951	0.53771	0.58931	0.59293	0.59309	0.59322	0.59322	0.59322
Homocystine	0.32692	0.31926	0.41704	0.41918	0.41904	0.41924	0.41924	0.41924
Argininosuccinate	0.30353	0.74568	0.73845	0.74239	0.74212	0.74208	0.74208	0.74208
Glyoxylate	0.28887	0.42114	0.53613	0.5354	0.53548	0.53568	0.53567	0.53567
2_keto_isovalerate	0.26806	0.24758	0.40188	0.40216	0.40368	0.40365	0.40365	0.40365
Spermine	0.2552	0.68126	0.6756	0.67593	0.67613	0.67651	0.67652	0.67652
Proline	0.25504	0.62188	0.62795	0.62975	0.63039	0.63034	0.63034	0.63034
Creatinine	0.22804	0.35	0.47511	0.47527	0.47702	0.47699	0.47699	0.47699
Spermidine	0.2183	0.45162	0.4839	0.48474	0.4851	0.48507	0.48509	0.48509
Taurine	0.16904	0.44501	0.52132	0.52267	0.52288	0.52296	0.52296	0.52296
4_Amino_butyraldehyde	0.16326	0.6166	0.62519	0.62498	0.62499	0.62496	0.62496	0.62496
Glutamine	0.15097	0.69511	0.6905	0.68992	0.68978	0.68973	0.68973	0.68973
Succinate	0.12722	0.4147	0.42358	0.42386	0.4289	0.42893	0.42893	0.42893
Threonine	0.076865	0.074334	0.22316	0.23102	0.23437	0.23436	0.23441	0.23441

Citrate	0.022241	0.4503	0.45307	0.47105	0.47102	0.47126	0.47127	0.47126

Table S4. Figure 1C raw data

			Control					Valine		
E:T(1:1)	70.98	73.78	81.89	79.99	72.44	82.74	90.73	82.27	84.08	80.37
E:T(1:2)	30.24	50.91	45.73	46	35.18	68.93	62.47	62.07	60.17	54.67
E:T(1:4)	28.01	33.74	25.71	24.58	28.47	37.71	50.23	49.6	36.32	38.12
E:T(1:10)	18.27	25.62	13.83	17.07	10.14	29.23	31.2	40.11	27.38	27.76
			Control					Isoleucine		
E:T(1:1)	70.39	72.89	69.99	77.15	72.87	89.88	80.61	74.97	86.94	82.47
E:T(1:2)	49.24	55.28	40.96	48.32	52.55	53.53	67.16	55.41	61.11	66.95
E:T(1:4)	27.87	23.58	37.43	33.68	29.94	45.18	44.31	44.69	37.89	48.7
E:T(1:10)	20.24	15.2	15.2	16.43	9.99	22.4	23.34	25.22	24.6	37.88
			Control					Leucine		
E:T(1:1)	72.82	72.86	74.05	73.82	70.72	85.38	83.36	87.1	87	88.83
E:T(1:2)	36.54	48.47	43.22	44.75	39.34	78.24	77.63	69.96	76.41	80.77
E:T(1:4)	30.42	30	23.5	22.92	29.9	54.94	55.79	60.57	58.16	62.55
E:T(1:10)	23.98	20.18	14.88	16.95	15.62	48.27	45.9	39.55	45.13	48.01
			Control					BT2		
E:T(1:1)	72.9	72.4	77.24	76.49	72.73	53.68	55.69	53.73	67.25	55.37
E:T(1:2)	45.41	47.93	44.58	43.72	60.46	36.07	26.39	48.87	31.18	34.41
E:T(1:4)	31.27	30.82	41.69	23.54	29.89	19.54	8.29	17.58	8.82	27.01
E:T(1:10)	23.84	22.56	14.28	16.44	18.78	13.19	10.45	10.68	11.15	11.99
			Control					BCH		
E:T(1:1)	74.43	73.75	81.37	79.2	76.7	54.88	45.56	54.95	47.99	59.25
E:T(1:2)	43.69	53.36	46.77	49.02	47.98	40.92	42.11	32.02	36.3	48.9
E:T(1:4)	39.49	33.76	27.08	27.01	34.58	20.86	17.16	19.12	20.49	19.03
E:T(1:10)	25.92	23.2	17.05	19.57	18.16	9.51	8.39	10.01	6.2	6.52
			Control					V9302		
E:T(1:1)	73.87	76.52	82.66	82.13	76.15	49.94	52.57	50.46	54.54	64.8
E:T(1:2)	53.33	52.84	46.59	51.79	47.53	38.1	46.97	38.65	42.12	37.29
E:T(1:4)	37.43	31.45	36.94	39.53	34.76	26.4	26.62	16.67	15.38	20.23
E:T(1:10)	18.5	26.8	17.06	24.95	24.61	11.3	6.03	12.55	8.2	14.05
			Control					JPH203		
E:T(1:1)	76.28	76.01	80.77	75.16	73.29	54.45	52.74	54.57	46.51	50.42
E:T(1:2)	60.93	49.33	52.93	50.85	51.65	38.83	36.16	43.63	42.79	44.97
E:T(1:4)	35.43	30.93	28.11	33.13	36.36	32.21	26.34	22.87	17.57	27.16
E:T(1:10)	22.41	22.82	17.46	14.94	17.82	18.56	7.96	13.5	2.51	16.55

Table S5. Figure 1E raw data

	E:T(1:1)	E:T(1:2)	E:T(1:4)	E:T(1:10)
Control	0.49	14.6	33.5	61.5
	0.34	14.9	31.8	62.4
	0.36	15.7	32.6	61.7
Leucine	0.27	5.06	22.5	48.9
	0.24	5.27	21.6	49.7
	0.18	6.04	23.2	50.4
Isoleucine	0.32	7.82	26.6	50.8
	0.37	7.56	26.4	51.3
	0.34	7.31	25.3	50.2
Valine	0.27	10.8	26.7	58.6
	0.34	11.25	27.6	56.7
	0.36	10.94	28.5	57.3
BT2	0.74	22.7	28.5	75.7
	0.88	22.9	29.4	76.4
	0.82	23.7	28.9	77.8
BCH	0.68	18.9	30.6	70.2
	0.72	17.8	31.7	70.5
	0.75	18.3	30.4	73.5
V9302	0.76	24.7	30.5	82.8
	0.79	24.9	30.7	89.7
	0.82	25.7	31.5	90.2
JPH203	0.86	19.2	27.9	83.5
	0.89	21.3	26.7	84.2
	0.94	19.7	29.3	84.9

Table S6. Figure 1F raw data

	E:T(1:1)	E:T(1:2)	E:T(1:4)	E:T(1:10)
Control	65.2	48	19.3	10.4
	64.2	44.7	19.2	9.58
	64.9	45.7	13.8	10.1
Leucine	69.5	41.9	27	18.2
	68.4	41.3	27.4	18.6
	70.3	42.4	28.6	17.4
Isoleucine	75.5	44.6	28.9	19.4
	73.8	43.7	27.6	19.7
	72.9	45.1	28.8	18.6
Valine	73.1	41.6	26.5	7.35
	72.8	42.7	27.4	7.16
	74.9	41.9	26.9	6.89
BT2	55.8	39.6	13.8	4.69
	53.7	40.5	13.4	5.17
	55.2	39.1	14.9	5.49
BCH	72.5	42.6	17.3	9.57
	71.6	41.8	17.2	8.97
	70.2	43.6	16.4	9.64
V9302	63.3	38.9	15.5	6.19
	61.4	39.2	14.8	6.87
	60.7	37.4	15.9	6.28
JPH203	68.8	46	17.7	5.11
	64.9	41.7	17.9	4.38
	66.7	45.2	17.3	5.07

Table S7. Figure 2B raw data

TNF-alpha							
Control	Leucine	Isoleucine	Valine	BT2	BCH	V9302	JPH203
14.7	18.7	16.5	17	10.4	11.2	10.9	12.3
14.8	19.2	15.9	16.5	9.87	11.7	10.4	12.6
14.1	18.3	15.5	16.1	10.1	11.1	9.8	10.7
IFN-gamma							
Control	Leucine	Isoleucine	Valine	BT2	BCH	V9302	JPH203
10.7	15.5	12.2	14.6	7.73	9.73	9.11	8.23
10.1	15.6	12.8	14.2	7.16	9.57	9.34	8.19
9.87	14.9	12.4	13.8	7.46	9.42	8.94	7.94

Table S8. Figure 2E raw data

CSFE+							
Control	Leucine	Isoleucine	Valine	BT2	BCH	V9302	JPH203
51.5	89.4	73.8	77.1	33.5	43.4	40.3	30.6
52.4	87.9	76.4	76.5	34.2	44.3	40.9	32.7
50.7	90.3	75.2	76.9	33.8	44.9	41.2	32.9

Table S9. Figure 2G raw data

2-NBDG							
Control	Leucine	Isoleucine	Valine	BT2	BCH	V9302	JPH203
62.2	83.6	81.5	87.9	55.7	47.2	44.6	55.8
60.4	82.9	80.2	89.4	54.8	46.8	45.1	54.8
61.7	84.7	81.4	86.4	58.7	45.9	44.3	53.7

Table S10. Figure 3B raw data

Mock T	CAR-T	BCKDK-KO CAR-T	BCKDK-OE CAR-T
0	93.4	94.8	96.3
0	93.1	93.6	95.7
0	92.7	94.5	96.8

Table S11. Figure 3C raw data

Mock T	CAR-T	BCKDK-KO CAR-T	BCKDK-OE CAR-T
0.97	1.06	0.72	2.32
0.92	1.09	0.76	2.16
1.08	1.04	0.71	2.17

Table S12. Figure 3F raw data

CAR-T	BCKDK-KO CAR-T	BCKDK-OE CAR-T
80.5	66.7	89
81.2	65.9	89.2
80.3	66.8	87.3

Table S13. Figure 3G raw data

CAR-T	BCKDK-KO CAR-T	BCKDK-OE CAR-T
61.8	47.9	73.9
62.3	48.3	73.1
61.1	47.1	72.7

Table S14. Figure 3H raw data

	E:T(1:1)	E:T(1:2)	E:T(1:4)	E:T(1:10)
CAR-T	88.55	73.75	47.24	29.69
	87.38	74.6	41.88	30.32
	90.11	73.33	46.52	28.21
	87.79	74.24	48.55	29.34
	89.43	73.11	49.23	29.43
BCKDK-KO CAR-T	81.2	69.92	36.03	17.17
	79.41	71.41	31.46	16.6
	81.24	66.4	30.46	7.18
	80.77	62.29	35.94	4.76
	76.63	70.05	37.86	10.65
BCKDK-OE CAR-T	91.22	86.02	51.16	38.05
	93.49	82.89	53.49	47.49
	94.9	78.76	53.03	45.09
	92.98	81.62	54.75	36.33
	94.3	80.8	53.97	43.56

Table S15. Figure 3I raw data

IFN-gamma+ cells(%)		
CAR-T	BCKDK-KO CAR-T	BCKDK-OE CAR-T
15.6	9.14	22.1
15.1	9.67	20.8
14.8	9.27	21.7

TNF-alpha+ cells(%)		
CAR-T	BCKDK-KO CAR-T	BCKDK-OE CAR-T
12.4	4.59	15.8
11.7	5.17	15.7
12.6	4.97	13.7

Table S16. Figure 4B raw data

NALM6-GL cells (%)									
	CAR-T			BCKDK-KO CAR-T			BCKDK-OE CAR-T		
E:T(1:1)	18.4	18.6	19.2	24.2	23.1	24.2	3.7	3.48	4.07
E:T(1:2)	24.2	24.9	25.1	30.4	30.8	29.6	15.1	14.7	15.8
E:T(1:4)	32.7	32.3	33.4	46.4	47.3	47.1	30.5	30.1	31.4
E:T(1:10)	80.9	80.2	81.3	84.2	85.4	85.1	78.1	78	77.6
CAR-T cells (%)									
	CAR-T			BCKDK-KO CAR-T			BCKDK-OE CAR-T		
E:T(1:1)	64.4	65.1	66.3	56	54.6	53.8	85.8	82.6	80.9
E:T(1:2)	50.3	51.2	53.4	53.2	51.2	54.3	56	57.2	54.7
E:T(1:4)	37.3	37.4	38.2	17.4	14.8	15.7	44.1	43.5	42.9
E:T(1:10)	6.25	6.59	6.74	1.74	1.27	1.56	7.79	8.54	7.94

Table S17. Figure 4D raw data

NALM6 apoptosis		
CAR-T	BCKDK-KO CAR-T	BCKDK-OE CAR-T
62.8	8.84	86.2
61.4	8.94	84.3
60.3	9.37	85.7
CAR-T apoptosis		
CAR-T	BCKDK-KO CAR-T	BCKDK-OE CAR-T
33.2	46.8	27.9
35.4	46.1	27.2
32.9	45.3	26.5

Table S18. Figure 4F raw data

PD-1+ cells （%）		
CAR-T	BCKDK-KO CAR-T	BCKDK-OE CAR-T
25.6	30.6	6.34
24.8	30.1	6.48
25.7	28.9	7.12
LAG-3-1+ cells （%）		
CAR-T	BCKDK-KO CAR-T	BCKDK-OE CAR-T
4.66	6.21	2.59
4.6	6.48	2.67
4.52	6.57	2.41

Table S19. Figure 5D raw data

p-mTOR/mTOR		
CAR-T	BCKDK-KO CAR-T	BCKDK-OE CAR-T
0.94	0.39	1.26
0.97	0.42	1.29
1.08	0.47	1.34
p-p70s6k/p70s6k		
CAR-T	BCKDK-KO CAR-T	BCKDK-OE CAR-T
1.04	0.43	1.55
0.93	0.49	1.51
1.02	0.38	1.59
p-4EBP1/4EBP1		
CAR-T	BCKDK-KO CAR-T	BCKDK-OE CAR-T
0.97	0.87	1.98
1.07	0.83	2.11
0.96	0.79	2.16

Table S20. Figure 5F raw data

	CAR-T			BCKDK-KO CAR-T			BCKDK-OE CAR-T		
Tscm	7.47	7.89	7.68	1.97	1.78	2.02	16.3	17.5	16.4
Tcm	22	20.93	19.75	23.7	21.41	23.39	27.7	27.76	27.11
Tem	64.9	65.4	67.2	67.3	69.8	68.1	50.1	48.5	50.48
Temra	5.71	5.78	5.37	6.97	7.01	6.49	5.92	6.24	6.01

Table S21. Figure 6B raw data

DPI	Mock T	CAR-T	BCKDK-KO CAR-T	BCKDK-OE CAR-T
18	1			
20			1	
21	1			
23			1	
24	1			
25	1		1	
26	1			
27			1	
28		1		
29	1		1	
29	1			
30		1		
31				1
32			1	
34	1			
35		1		
35			1	
36	1			
38		1		
39				
40			1	
41		1		1
42	1			
43			1	1
44		1		
46		1		
47		1	1	1
49				
50		1		1
51				1
53		1		
56				1
59				0
59				0
59				0

Table S22. Figure 6D raw data

NALM6-GL cells （%）			
Mock T	CAR-T	BCKDK-KO CAR-T	BCKDK-OE CAR-T
4.57	0.42	0.61	0.27
4.72	0.39	0.72	0.21
4.49	0.46	0.84	0.24
4.38	0.57	0.67	0.16
4.89	0.46	0.82	0.24
CAR-T cells （%）			
Mock T	CAR-T	BCKDK-KO CAR-T	BCKDK-OE CAR-T
0	3.01	1.55	5.54
0	3.24	1.72	5.48
0	2.98	1.49	5.96
0	3.27	1.67	5.72
0	3.06	1.48	5.39

Table S23. Figure 6E raw data

Serum IFN-γ(pg/mL)			
Mock T	CAR-T	BCKDK-KO CAR-T	BCKDK-OE CAR-T
24.3	63.45	42.36	143.4
20.56	64.25	38.59	127.66
27.45	60.28	36.87	131.24
19.46	58.79	39.57	147.82
23.54	63.57	44.69	136.48
Serum TNF-α(pg/mL)			
Mock T	CAR-T	BCKDK-KO CAR-T	BCKDK-OE CAR-T
14.35	27.89	19.54	37.58
13.05	26.89	18.59	42.56
15.24	30.25	20.35	41.28
11.68	27.84	20.64	39.57
12.64	26.54	19.76	39.46

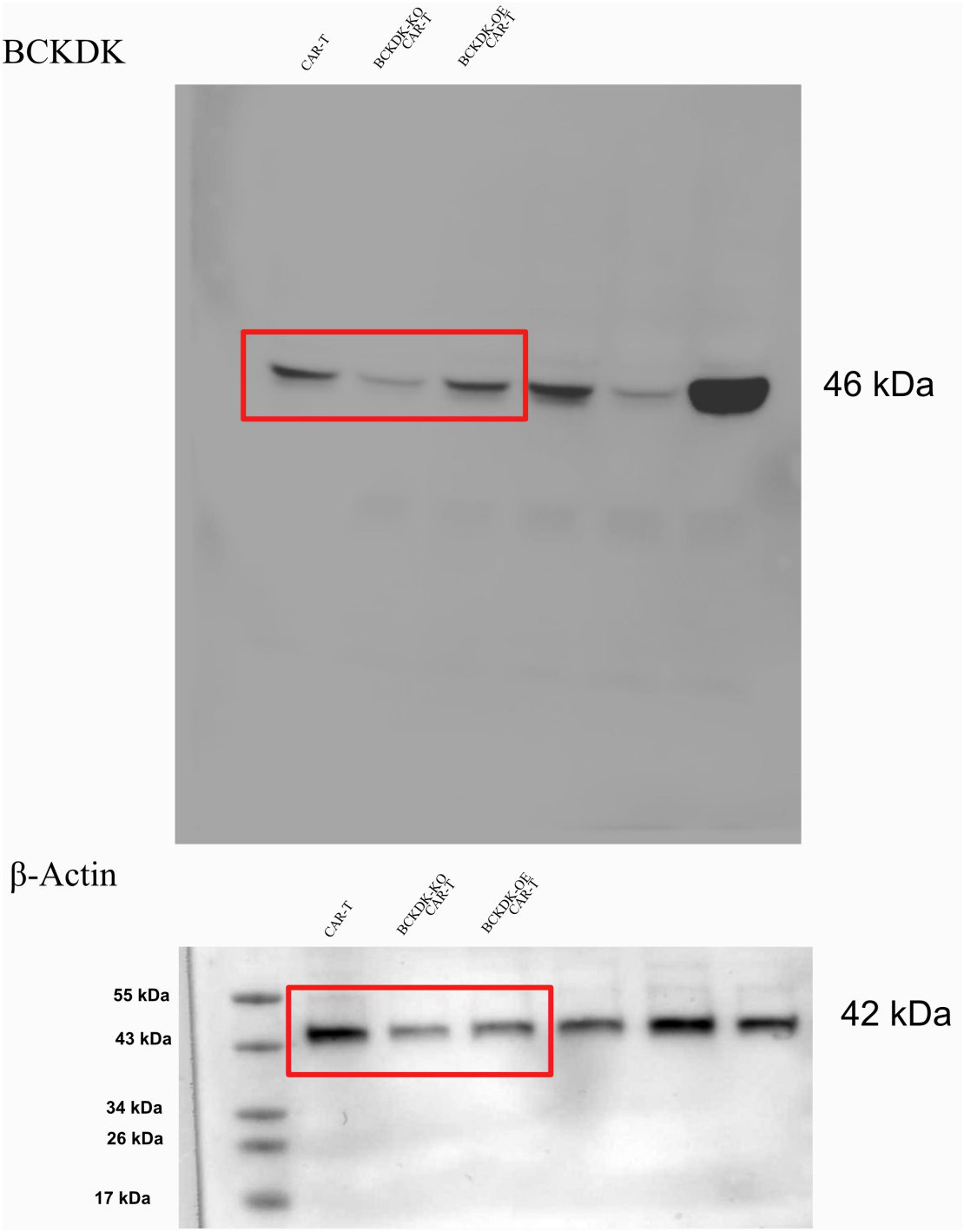

Figure S1 The original, unaltered images of Figure 3E

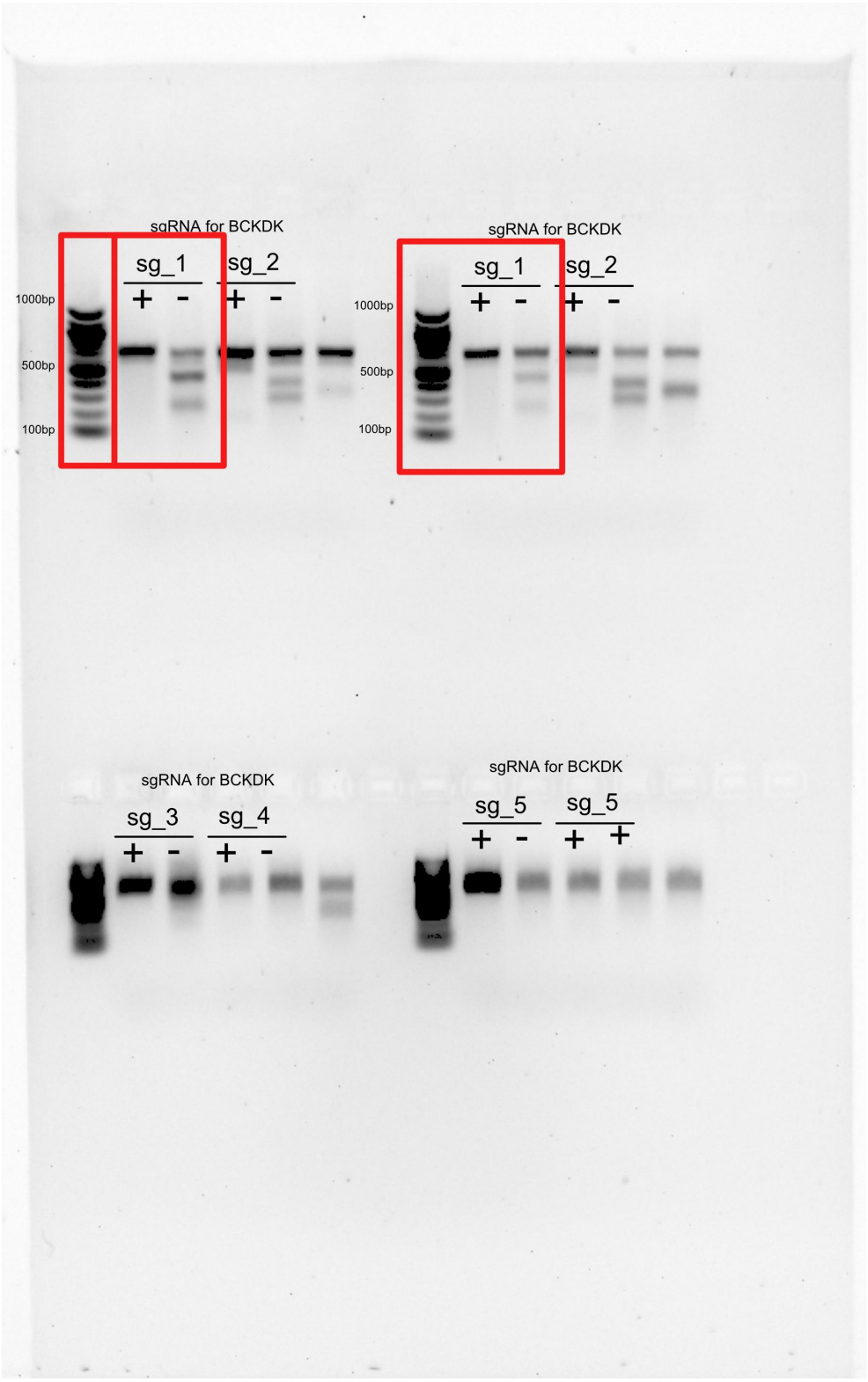

Figure S2 The original, unaltered images of Figure 3F

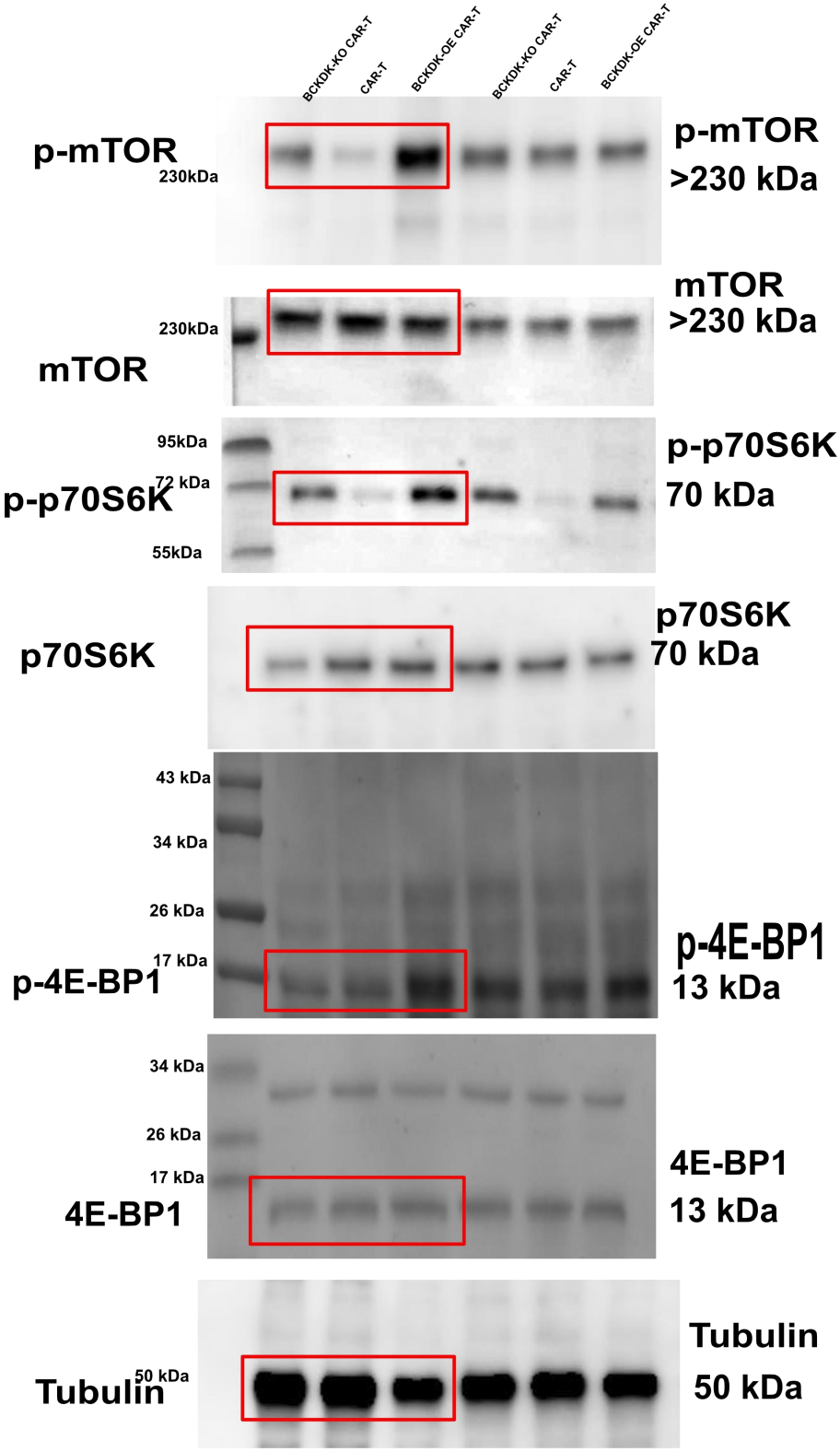

Figure S3 The original, unaltered images of Figure 5D