

SUPPLEMENTAL TABLE 1

Table 1

Supplementary Table 1: Experimental evidence for regulatory connections in the T-cell gene regulatory network. Confidence levels for regulatory interaction are given as follows: 1 – Evidence in non-T cells only; 2 – Evidence from gene perturbation in T-cell progenitors alone, or from cis-regulatory analysis in T-cell progenitors alone; 3 – Evidence from gene perturbation in T-cell progenitors and cis-regulatory analysis. P – post-transcriptional regulatory interaction. FL – fetal liver, BM – bone marrow. Cited references are given in the main text.

Source	Sign	Target	Level	Experiment	Cell Type	Reference
Bcl11b	+	CD3e	2	Bcl11b over-expression + <i>in vitro</i> T-cell culture + mRNA analysis	Bcl11b ^{-/-} FL Lin-Sca1+Kit ⁺ (LSK)	[28]
Bcl11b	-	CEBPa	2	Bcl11b over-expression + <i>in vitro</i> T-cell culture + mRNA analysis	Bcl11b ^{-/-} FL Lin-Sca1+Kit ⁺ (LSK)	[28]
Bcl11b	-	Id2	1	mRNA expression profiling Chip-seq using Bcl11b antibody	Bcl11b ^{-/-} double positive thymocytes	[52]
Bcl11b	-	Kit	2	Bcl11b over-expression + <i>in vitro</i> T-cell culture + surface expression analysis using flow cytometry	Bcl11b ^{-/-} FL Lin-Sca1+Kit ⁺ (LSK)	[28]
Bcl11b	+	pTa	2	Bcl11b over-expression + <i>in vitro</i> T-cell culture + mRNA analysis	FL Lin-Sca1+Kit ⁺ (LSK) cells	[28]
Bcl11b	-	PU.1	2	Bcl11b over-expression + <i>in vitro</i> T-cell culture + mRNA analysis	FL Lin-Sca1+Kit ⁺ (LSK) cells	[28]
Deltex	-	Notch signaling	P	Deltex over-expression + Notch reporter measurements	Jurkat T-cell line	[53]
E protein activity	-	Gata3	2	<i>In vitro</i> T-cell culture + mRNA expression analysis mRNA expression analysis	HEB ^{-/-} Rag1 ^{-/-} DN3 cells E47 ^{bm/bm} thymocytes (bm – DNA-binding site mutation)	[35] [54]
E protein activity	+	Gata3	1	Analysis of Gata3 cis-regulatory element (WT/mutated E-protein binding site)	Jurkat T-cell line	[55]
E protein activity	+	Gfi1	2	E47 over-expression + mRNA expression analysis	1F9 E2A ^{-/-} T-cell lymphoma line	[58]
E protein activity	+	Gfi1b	2	E47 over-expression + mRNA expression analysis / ChIP analysis using E2A antibody E47 over-expression + mRNA expression analysis	E2A ^{-/-} T-cell lymphoma E2A ^{-/-} Lin- BM cells (cultured)	[56] [57]
E protein activity	+	HEBAIt	2	Heb over-expression + mRNA expression analysis	P2C2 immature T-cell line	[59]
E protein activity	+	Hes1	2	E47 over-expression + mRNA expression analysis	E2A ^{-/-} Lin- BM cells (cultured)	[57]
E protein activity	+	IL-7R α	2	mRNA expression profiling E47 over-expression + mRNA expression analysis	E2A ^{-/-} Lin-Sca1+Kit ⁺ Flt3 ^{hi} (LMPP) E2A ^{-/-} Lin- BM cells (cultured)	[60] [57]
E protein activity	+	Lat	2	E47 over-expression + mRNA expression analysis	E2A ^{-/-} Lin- BM cells (cultured)	[57]
E protein activity	+	Notch1	3	mRNA expression profiling ChIP analysis using E2A antibody E47 over-expression + Notch1 promoter activity measurements	E2A ^{-/-} Lin-Sca1+Kit ⁺ Flt3 ^{hi} (LMPP) Rag2 ^{-/-} DN3 thymocytes NIH-3T3 cell line	[60] [61]
E protein activity	+	Notch3	2	E47 over-expression + mRNA expression analysis	E2A ^{-/-} Lin- BM cells (cultured)	[57]
E protein activity	+	pTa	3	E47 over-expression + mRNA expression analysis	E2A ^{-/-} Lin- BM cells (cultured)	[57]
E protein activity	+	Rag-1	2	mRNA expression profiling	E2A ^{-/-} Lin-Sca1+Kit ⁺ Flt3 ^{hi}	[60]

					(LMPP)	
Scl/Lyl1/E	+	Id3	1	Lyl1 over-expression + mRNA expression analysis	human AML cells	[62]
Scl/Lyl1/E	+	Hhex	1	Analysis of Hhex enhancer containing Scl sites	416B progenitor cell line	[63]
Scl/Lyl1/E	+	Kit	1	Chip-Seq using Scl antibody on putative enhancer	HPC-7 progenitor cell line	[64]
Scl/Lyl1/E	+	Kit	1	mRNA expression analysis	immature B-cells (B220+) from wildtype/SCL transgenic mice	[65]
Scl/Lyl1/E	-	pTa	2	mRNA expression analysis Scl over-expression + pT α enhancer activity analysis	Scl-Lmo1 transgenic mice AD10.1 immature T-cell line	[66]
Scl/Lyl1/E	+	Runx1	1	Scl over-expression + mRNA expression profiling ChIP analysis using Scl antibody	SCL-/- yolk sac cell line yolk sac / FL	[67]
Scl/Lyl1/E	+	Runx3	1	Scl over-expression + mRNA expression profiling ChIP analysis using Scl antibody	SCL-/- yolk sac cell line yolk sac / FL	[67]
Ets1	+	TCR β	2	Ets1 over-expression + analysis of TCR β enhancer activity	p19 cell line	[68]
Gata3	-	CEBPa	2	Gata3 over-expression + mRNA expression analysis	Bcl2-transgenic thymocytes	[69]
Gata3	+	Cpa3	3	Gata3 over-expression + mRNA expression analysis	Bcl2-transgenic thymocytes	[69]
Gata3	+	Deltex	1	Gata3 over-expression + mRNA expression analysis	adult DN1 thymocytes	[70]
Gata3	+	Gfi1b	2	Gata3 over-expression + mRNA expression analysis	Bcl2-transgenic thymocytes	[69]
Gata3	-	IL-7R α	2	Gata3 over-expression + mRNA expression analysis	Bcl2-transgenic thymocytes	[69]
Gata3	+	Kit	2	Gata3 over-expression + mRNA expression analysis	Bcl2-transgenic thymocytes	[69]
Gata3	-	Lef1	2	Gata3 over-expression + mRNA expression analysis	Bcl2-transgenic thymocytes	[69]
Gata3	+	Notch3	2	Gata3 over-expression + mRNA expression analysis	Bcl2-transgenic thymocytes	[69]
Gata3	-	pTa	2	Gata3 over-expression + mRNA expression analysis	Bcl2-transgenic thymocytes	[69]
Gata3	-	PU.1	2	Gata3 over-expression + mRNA expression analysis	Bcl2-transgenic thymocytes	[69]
Gata3	-	Rag-1	2	Gata3 over-expression + mRNA expression analysis	Bcl2-transgenic thymocytes	[69]
Gata3	+	Scl/Tal1	2	Gata3 over-expression + mRNA expression analysis	Bcl2-transgenic thymocytes	[69]
Gata3	-	TCF-1	2	Gata3 over-expression + mRNA expression analysis	Bcl2-transgenic thymocytes	[69]
Gata3	+	TCR β	2	Measurement of TCR β enhancer activity (wildtype/mutated GATA binding site)	p5424 T-cell line	[71]
Gfi1	+	Lmo2	1	Gfi1 knockdown + <i>in situ</i> RNA hybridization	Zebrafish embryos	[72]
Gfi1	-	PU.1	3	mRNA expression analysis; ChIP analysis using Gfi1 antibody	Gfi1-/- Lin-Sca1+Kit+ (LSK) cells	[42]
Gfi1	-	PU.1	3	Gfi1 over-expression/knockdown + <i>in situ</i> RNA hybridization	Zebrafish embryos	[72]
Gfi1	+	Rag-1	1	Gfi1 knockdown + <i>in situ</i> RNA hybridization	Zebrafish embryos	[72]
Gfi1	+	Scl/Tal1	1	Gfi1 knockdown + <i>in situ</i> RNA hybridization	Zebrafish embryos	[72]
Gfi1b	+	Bcl11b	1	Gfi1b knockdown + mRNA expression profiling	K562 myeloid leukemic line	[73]
Gfi1b	-	Gata3	2	Gfi1b over-expression + mRNA expression analysis	E2A-/- T-cell lymphoma	[56]

Gfi1b	-	Gfi1	2	Gfi1b over-expression + mRNA expression analysis mRNA expression analysis	E2A ^{-/-} T-cell lymphoma Gfi1b transgenic thymocytes	[56] [74]
Ikaros	-	Gfi1	2	Analysis of Gfi1-GFP reporter expression by flow cytometry	Ikaros ^{-/-} Lin-Sca1+Kit ⁺ (LSK) cells with Gfi1-GFP reporter	[42]
Ikaros	-	PU.1	2	mRNA expression analysis	Ikaros ^{-/-} Lin-Sca1+Kit ⁺ (LSK) cells	[42]
Ikaros	-	Runx1	2	mRNA expression analysis	Ikaros ^{-/-} adult DN thymocytes	[75]
IL-7R/Stat	-	Bcl11b	2	<i>In vitro</i> T-cell culture + IL7 drop + mRNA expression analysis	FL Lin-Sca1+Kit ⁺ (LSK) cells	[28]
IL-7R/Stat	+	CEBPa	2	<i>In vitro</i> T-cell culture + IL7 drop + mRNA expression analysis	FL Lin-Sca1+Kit ⁺ (LSK) cells	[28]
IL-7R/Stat	+	Ebf1	1	constitutive IL7 signaling activation + mRNA expression analysis	IL-7R α ^{-/-} pre-pro B-cells	[76]
IL-7R/Stat	+	GATA3	1	Flow cytometry with intracellular staining using GATA3 antibody ChIP with Stat5 antibody	Stat5 ^{-/-} Th2 cells (n.b. cells were stimulated with IL-2 and IL-33)	[113]
IL-7R/Stat	+	Kit	2	<i>In vitro</i> T-cell culture + IL7 drop + mRNA expression analysis	FL Lin-Sca1+Kit ⁺ (LSK) cells	[28]
IL-7R/Stat	-	Lck	2	<i>In vitro</i> T-cell culture + IL7 drop + analysis of Lck reporter	FL Lin-Sca1+Kit ⁺ (LSK) cells	[28]
IL-7R/Stat	-	Lef1	2	IL-7 stimulation + mRNA expression analysis	IL-7R α transgenic immature thymocytes	[77]
IL-7R/Stat	-	pTa	2	<i>In vitro</i> T-cell culture + IL7 drop + mRNA expression analysis	FL Lin-Sca1+Kit ⁺ (LSK) cells	[28]
IL-7R/Stat	+	PU.1	2	<i>In vitro</i> T-cell culture + IL7 drop + mRNA expression analysis	FL Lin-Sca1+Kit ⁺ (LSK) cells	[28]
IL-7R/Stat	-	TCF-1	2	<i>In vitro</i> T-cell culture + IL7 drop + mRNA expression analysis IL-7 stimulation + mRNA expression analysis	FL Lin-Sca1+Kit ⁺ (LSK) cells IL-7R α transgenic immature thymocytes	[28] [77]
Lmo2	+	E2A/Scl	P	EMSA assay using Lmo2 and Tal1 antibody	Lmo transgenic immature T-cell line	[78]
Lmo2	+	Hhex	2	mRNA expression analysis	Lmo transgenic DN3 leukemic cells	[79]
Lmo2	+	Kit	2	mRNA expression analysis	Lmo transgenic DN3 leukemic cells	[79]
Lmo2	+	Lyl1	2	mRNA expression analysis	Lmo transgenic DN3 leukemic cells	[79]
Myb	+	Gata3	1	dominant negative Myb over-expression + mRNA expression analysis	E16 cell line	[80]
Notch signaling	+	Bcl11b	3	<i>In vitro</i> culture (+/-DL1) + mRNA expression analysis ChIP analysis using CSL antibody	Thy1 ⁺ fetal thymocytes adult thymocytes	[81] [44]
Notch signaling	+	CD25	2	<i>In vitro</i> culture (+/-DL1) + surface expression analysis using flow cytometry surface expression analysis using flow cytometry	FL Lin-Kit ⁺ cells DN3 thymocytes with inhibitor of Notch signaling (DNMAML)	[15] [82]
Notch signaling	+	CD3e	2	<i>In vitro</i> culture (+/-DL1) + mRNA expression analysis	Bcl2-transgenic thymocytes	[69]
Notch signaling	+	CD3g	2	<i>In vitro</i> culture (+/-DL1) + mRNA expression analysis	Bcl2-transgenic thymocytes	[69]
Notch signaling	-	CEBPa		<i>In vitro</i> culture (+/-DL1) + mRNA expression analysis	Thy1 ⁺ fetal thymocytes	[81]
Notch signaling	+	Deltex	3	<i>In vitro</i> culture (+/-DL1) + mRNA expression analysis <i>In vitro</i> culture (+/-DL1) + mRNA expression analysis <i>In vitro</i> culture (+/-DL1) + mRNA expression analysis	FL Lin-Kit ⁺ cells Thy1 ⁺ fetal thymocytes Bcl2-transgenic thymocytes	[15] [81] [69] many earlier

						references
Notch signaling	+	E2A (weak)	2	<i>In vitro</i> culture (+/-DL1) + mRNA expression analysis	Bcl2-transgenic thymocytes	[69]
Notch signaling	-	Ebf1	2	<i>In vitro</i> culture (+/-DL1) + mRNA expression analysis	FL Lin-Kit+ cells	[15]
Notch signaling	+	Gata3	2	<i>In vitro</i> culture (+/-DL1) + mRNA expression analysis (connection absent in humans)	FL Lin-Kit+ cells	[15] [114, 115]
Notch signaling	+	Gfi1b	2	<i>In vitro</i> culture (+/-DL1) + mRNA expression analysis	Bcl2-transgenic thymocytes	[69]
Notch signaling	+	HEBAIt	2	<i>In vitro</i> culture (+/-DL1) + mRNA expression analysis	Thy1+ fetal thymocytes	[81]
Notch signaling	+	Hes1	2	<i>In vitro</i> culture (+/-DL1) + mRNA expression analysis	FL Lin-Kit+ cells	[15] many earlier references
Notch signaling	-	Id3	2	<i>In vitro</i> culture (+/-DL1) + mRNA expression analysis <i>In vitro</i> culture (+/-DL1) + mRNA expression analysis	Thy1+ fetal thymocytes Bcl2-transgenic thymocytes	[81] [69]
Notch signaling	+	IL-7R α	3	Notch ICN over-expression + <i>in vitro</i> culture + surface expression analysis by flow Notch ICN over-expression + analysis of IL-7R α promoter activity	DN1 thymocytes 293T and Jurkat cell lines	[83]
Notch signaling	+	Lat	2	<i>In vitro</i> culture (+/-DL1) + mRNA expression analysis	Bcl2-transgenic thymocytes	[69]
Notch signaling	+	Lck	2	<i>In vitro</i> culture (+/-DL1) + mRNA expression analysis	Bcl2-transgenic thymocytes	[69]
Notch signaling	+	Lef1	2	<i>In vitro</i> culture (+/-DL1) + mRNA expression analysis	Bcl2-transgenic thymocytes	[69]
Notch signaling	+	Notch1	2	<i>In vitro</i> culture (+/-DL1) + mRNA expression analysis ChIP using CSL antibody Analysis of Notch 1 reporter construct	Bcl2-transgenic thymocytes Rag2-/- thymocytes NIH-3T3 cell line	[69] [61]
Notch signaling	+	Notch3	2	<i>In vitro</i> culture (+/-DL1) + mRNA expression analysis	Bcl2-transgenic thymocytes	[69]
Notch signaling	+	Nrarp	2	Notch IC over-expression + mRNA expression analysis Notch IC over-expression + analysis of Nrarp promoter activity	AKR1010 T-cell line 293T cells	[84] [85]
Notch signaling	+	pTa	3	Notch ICD over-expression + analysis of pT α enhancer activity <i>In vitro</i> culture (+/-DL1) + mRNA expression analysis <i>In vitro</i> culture (+/-DL1) + mRNA expression analysis	293 cell line Thy1+ fetal thymocytes Bcl2-transgenic thymocytes	[86] [81] [69]
Notch signaling	+	Rag-1	2	<i>In vitro</i> culture (+/-DL1) + mRNA expression analysis	Bcl2-transgenic thymocytes	[69]
Notch signaling	+	Runx1	3	<i>In vitro</i> culture (+/-DL1) + mRNA expression analysis <i>In vitro</i> culture (+/-DL1) + mRNA expression analysis Notch1 over-expression + mRNA expression analysis	Thy1+ fetal thymocytes Bcl2-transgenic thymocytes NIH-3T3 cell line	[81] [69] [87]
Notch signaling	+	TCF-1	2	<i>In vitro</i> culture (+/-DL1) + mRNA expression analysis	FL Lin-Kit+CD27+ progenitors Lin-cKit+Sca1+ (LSK) cells	[100] [45]
Nrarp	-	Notch signaling	P	Nrarp over-expression + mRNA expression analysis of Notch responsive genes	AKR1010 T-cell line	[88]
PU.1	+	Bcl11a	2	PU.1 over-expression + mRNA expression analysis	Thy1+ fetal thymocytes	[81]
PU.1	-	Bcl11b	2	PU.1 over-expression + mRNA expression analysis	Thy1+ fetal thymocytes	[81]
PU.1	-	CD3e	2	PU.1 over-expression + mRNA	Thy1+ fetal	[81]

				expression analysis	thymocytes	
PU.1	-	CD3g	2	PU.1 over-expression + mRNA expression analysis	Thy1+ fetal thymocytes	[81]
PU.1	-	E2A	2	PU.1 over-expression + mRNA expression analysis	Thy1+ fetal thymocytes	[81]
PU.1	-	Ets1	2	PU.1 over-expression + mRNA expression analysis	Thy1+ fetal thymocytes	[81]
PU.1	-	Gata3 activity	P	ChIP using Gata3 antibody	PU.1-/- CD4+ T-cells	[89]
PU.1	-	Gfi1	2	PU.1 over-expression + mRNA expression analysis	Thy1+ fetal thymocytes	[81]
PU.1	-	HEB	2	PU.1 over-expression + mRNA expression analysis	Thy1+ fetal thymocytes	[81]
PU.1	-	HEBAIt	2	PU.1 over-expression + mRNA expression analysis	Thy1+ fetal thymocytes	[81]
PU.1	-	Hes1	2	PU.1 over-expression + mRNA expression analysis	Thy1+ fetal thymocytes	[81]
PU.1	+	Id2	2	PU.1 over-expression + mRNA expression analysis	Thy1+ fetal thymocytes	[81]
PU.1	-	Id3	2	PU.1 over-expression + mRNA expression analysis	Thy1+ fetal thymocytes	[81]
PU.1	-	Ikaros	2	PU.1 over-expression + mRNA expression analysis	Thy1+ fetal thymocytes	[81]
PU.1	+	IL-7R α	2	mRNA expression analysis ChIP using PU.1 antibody	FL PU.1-/- FL cells FL-derived pro-B cells	[90]
PU.1	-	IL-7R α	2	PU.1 over-expression + mRNA expression analysis	Thy1+ fetal thymocytes	[81]
PU.1	-	Kit	2	PU.1 over-expression + surface expression analysis by flow cytometry	Thy1+ fetal thymocytes	[81]
PU.1	-	Lat	2	PU.1 over-expression + mRNA expression analysis	Thy1+ fetal thymocytes	[81]
PU.1	-	Lck	2	PU.1 over-expression + mRNA expression analysis	Thy1+ fetal thymocytes	[81]
PU.1	+	Lmo2	1	PU.1 over-expression + Lmo2 promoter activity measurements ChIP using PU.1 antibody	293T cell line 416B myeloid cell line	[91]
PU.1	+	Lyl1	1	ChIP using PU.1 antibody Lyl1 promoter activity measurements (WT/mutated PU.1 site)	416B myeloid cell line	[92]
PU.1	-	Myb	2	PU.1 over-expression + mRNA expression analysis	Thy1+ fetal thymocytes	[81]
PU.1	+	PU.1	1	transfection with PU.1 regulatory element construct (+/- mutation to PU.1 binding site) + analysis of reporter expression / ChIP using PU.1 antibody	416B myeloid cell line	[93]
PU.1	-	Rag-1	2	PU.1 over-expression + mRNA expression analysis	Thy1+ fetal thymocytes	[81]
PU.1	-	Runx3	1	PU.1 over-expression + mRNA expression analysis	Thy1+ fetal thymocytes	[81]
PU.1	-	TCF-1	2	PU.1 over-expression + mRNA expression analysis	Thy1+ fetal thymocytes	[81]
PU.1	-	Zap70	2	PU.1 over-expression + mRNA expression analysis	Thy1+ fetal thymocytes	[81]
Runx1	-	PU.1	3	mRNA expression analysis Runx1/Runx1 dominant negative over-expression + analysis of PU.1 cis-regulatory element	Runx1-/- DN2, DN3 thymocytes P2C2 immature T-cell line + Raw264 myeloid cell line	[109] [94]
Runx1	-	Rag-1	2	Analysis of Rag1-GFP reporter expression by flow cytometry (wildtype/mutated Runx1 site)	Rag1 GFP-reporter transgenic DN thymocytes	[95]
Runx1	+	TCR β	1	Runx1 over-expression + analysis of TCR β enhancer activity	p19 cell line	[68]
TCF-1	-	PU.1	1	Analysis of PU.1 cis-regulatory element (WT/mutated Tcf site)	EL4 T-cell line	[96]

TCF-1	+	Lef1	2	Wnt pathway activation, ChiP using TCF antibody TCF-1 over-expression + mRNA expression analysis	DLD1 cancer cell line Lin-cKit+Sca1+ (LSK) cells	[102] [45]
TCF-1	+	TCF-1	3	TCF-1 over-expression + mRNA expression analysis ChIP analysis using TCF-1 antibody	Lin-cKit+Sca1+ (LSK) cells	[45]
TCF-1	+	Bcl11b	3	TCF-1 over-expression + mRNA expression analysis ChIP analysis using TCF-1 antibody	Lin-cKit+Sca1+ (LSK) cells	[45]
TCF-1	+	GATA3	3	TCF-1 over-expression + mRNA expression analysis ChIP analysis using TCF-1 antibody GATA3	Lin-cKit+Sca1+ (LSK) cells TCF-/- Th2 cells	[45] [116]
TCF-1	+	CD25	3	TCF-1 over-expression + mRNA expression analysis ChIP analysis using TCF-1 antibody	Lin-cKit+Sca1+ (LSK) cells	[45]