Table 1 Combined T- and B-cell immunodeficiencies

	Disease	Circulating T cells	Circulating B cells	Serum Immunoglobulins	Associated features	Inheritance	Genetic defects/presumed pathogenesis	OMIM	HGNC symbol	HGNC ID(s)	ENSEMBL ID
1.	**T- B+NK- SCID**										
A	**γc deficiency**	Markedly decreased	Normal or increased	Decreased	Markedly decreased NK cells	XL	Defect in γ chain of receptors (IL2RG) for IL-2, IL-4, IL-7, IL-9, IL-15, and IL-21	300400	*IL2RG*	6010	ENSG00000147168
B	**JAK3 deficiency**	Markedly decreased	Normal or increased	Decreased	Markedly decreased NK cells	AR	Defect in JAK3 signaling kinase	600173	*JAK3*	6193	ENSG00000105639
C	**IL-7Rα deficiency**	Markedly decreased	Normal or increased	Decreased	Normal NK cells	AR	Defect in IL-7 receptor α chain	146661	*IL7R*	6024	ENSG00000168685
D	**CD45 deficiency**	Markedly decreased	Normal	Decreased	Normal γ/δ T cells	AR	Defect in CD45	151460	*PTPRC*	9666	ENSG00000081237
E	**CD3δ/CD3ε deficiency**	Markedly Decreased	Normal	Decreased	Normal NK cells	AR	Defect in CD3δ or CD3ε chains of T-cell antigen receptor	186790, 186830	*CD3D*, *CD3E*	1673, 1674	ENSG00000167286 ENSG00000198851
F	Coronin-1A deficiency	Markedly Decreased	Normal	Decreased	Detectable thymus	AR	Defective thymic egress of T cells and defective T cell locomotion	605000	*CORO1A*	2252	ENSG00000102879
2.	**T−B−NK+ SCID**										
A	**RAG 1/RAG2 deficiency**	Markedly decreased	Markedly decreased	Decreased	Defective VDJ recombination	AR	Complete defect of recombinase activating gene (RAG) 1 or 2	601457	*RAG1*	9831	ENSG00000166349
									RAG2	9832	ENSG00000175097
B	**Artemis deficiency**	Markedly decreased	Markedly decreased	Decreased	Defective VDJ recombination, radiation sensitivity	AR	Defect in Artemis DNA recombinase-repair protein. Defect DNA double strand breaks repair.	602450	*DCLRE1C*	17642	ENSG00000152457
C	DNA-PKcs deficiency	Markedly decreased	Markedly decreased	Decreased	(Widelystudied *scid* mouse defect)	AR	DefectiveVDJrecombination; defectinDNA-PKcs recombinase repairprotein	600899	*PRKDC*	9413	ENSG00000253729
D	**DNA ligase IV**	Decreased	Decreased	Decreased	Microcephaly, facial dystrophy, Defective VDJ recombination, radiation sensitivity	AR	DNA ligase IV defect, impaired nonhomologous end joining. Defect DNA double strand breaks repair.	601837	*LIG4*	6601	ENSG00000174405
E	**Cernunnous-XLF-NHEJ1**	Decreased	Decreased	Decreased	Microcephaly, facial dystrophy, Defective VDJ recombination, radiation sensitivity	AR	Impaired nonhomologous end joining, *NHEJ1* defect Defect DNA double strand breaks repair.	611291	*NHEJ1*	25737	ENSG00000187736
3.	**Omenn syndrome T(+)B-NK+ SCID**	Present; restricted heterogeneity	Normal or decreased	Decreased, except increased IgE	Erythroderma, eosinophilia, adenopathy, hepatosplenomegaly	AR	Missense mutations allowing residual activity, usually in RAG1 or RAG2 genes but also in Artemis, Cernunnous XLF, Ligase IV, IL-7Rα , and RMRP genes	603554			
4.	**Adenosine deaminase deficiency (ADA)**	Absent from birth (null mutations) or progressive decrease	Absent from birth or progressive decrease	Progressive decrease	Costochondral junction flaring Decreased NK cells	AR	Absent ADA, increased lymphotoxic metabolites (dATP, S-adenosyl homocysteine)	102700	*ADA*	186	ENSG00000196839
5.	**Purine nucleoside phosphorylase deficiency**	Progressive decrease	Normal	Normal or decreased	Autoimmune haemolytic anemia, neurologic impairment	AR	Absent PNP, T-cell, and neurologic defects from increased toxic metabolites (eg, dGTP)	164050	*PNP*	7892	ENSG00000198805
6.	**Reticular dysgenesis**	Markedly decreased	Decreased or normal	Decreased	Granulocytopenia, thrombocytopenia Deafness	AR	Defective maturation of T, B, and myeloid cells (stem cell defect) Neutropenia	103020	*AK2*	362	ENSG00000004455
7.	**IKAROS deficiency***	Normal, but impaired lymphocyte proliferation	Absent	Presumably decreased	Anemia, neutropenia, thrombocytopenia	AD *de novo*	Mutation in *IKAROS*, a hematopoietic specific zinc-finger protein and a central regulator of lymphoid differentiation	603023	*IKZF1*	13176	ENSG00000185811
8.	**Winged helix deficiency (nude)**	Markedly decreased	Normal	Decreased	Alopecia, abnormal thymic epithelium (resembles nude mouse)	AR	Defects in forkhead box N1 transcription factor encoded by FOXN1, the gene mutated in nude mice	600838	*FOXN1*	12765	ENSG00000109101
9.	**ORAI-1**	Normal levels, defect function	Normal	Normal, no response to vaccines	Ectodermal dysplasia, nonprogressive myopathia.	AR	Defect in calcium release-activated calcium channel function	610277	*ORAI1*	25896	ENSG00000182500
10.	**STIM-1 deficiency**	Normal number,but defective TCR-mediated activation	Normal	Normal	Autoimmunity, anhydrotic ectodermic dysplasia, non-progressive myopathy	AR	Defect in STIM-1, a stromal interaction molecule Ca++sensor	605921	*STIM1*	11386	ENSG00000167323
11.	**MHC class II deficiency**	Normal number, decreased CD4 cells	Normal	Normal or decreased		AR	Mutation in transcription factors for MHC class II proteins (C2TA, RFX5, RFXAP, RFXANK genes)	209920	*CIITA*	7067	ENSG00000179583
									RFX5	9986	ENSG00000143390
									RFXAP	9988	ENSG00000133111
									RFXANK	9987	ENSG00000064490
12.	**Lymphocyte specific tyrosine kinase**	Lymphopenia, decreased CD4	Normal	Decreased	SCID-like phenotype	AR	Skipping of exon 7 in Lck transcript (in one SCID patient). Lck associates with CD4, and Lck is involved in T cell development (β chain rearrangement) and positive selection	153390	*LCK*	6524	ENSG00000182866
13.	**Trichothiodystrophy**	Decreased CD4 cells	Normal	Normal	Brittle hair, ichtyosis, mental retardation	AR	Defect nucleotide excision repair of DNA single strand breaks. (*ERCC2/XPD* linked to immunodeficiency, Other TTD genes are: *ERCC3/XPB, TTD-A, TTDN1/ C7ORF11)*	601675	*ERCC2*	3434	ENSG00000104884
									ERCC3	3435	ENSG00000163161
									GTF2H5	21157	ENSG00000185068
								609188	*MPLKIP*	16002	ENSG00000168303
14.	**CD3γ deficiency**	Normal (reduced TCR expression)	Normal	Normal		AR	Defect in CD3γ	186740	*CD3G*	1675	ENSG00000160654
15.	**CD8 deficiency**	Absent CD8, normal CD4 cells	Normal	Normal		AR	Defects of CD8 α chain	186910	*CD8A*	1706	ENSG00000153563
16.	**ZAP-70 deficiency**	Decreased CD8, normal CD4 cells	Normal	Normal	Skin rash	AR	Defects in ZAP-70 signaling kinase	176947	*ZAP70*	12858	ENSG00000115085
17.	**TAP-1/2 deficiency**	Decreased CD8, normal CD4	Normal	Normal	Vasculitis	AR	Mutations in TAP1 or TAP2 gene giving MHC classI deficiency	604571	*TAP1*	43	ENSG00000224748
									TAP2	44	ENSG00000**228582**
									TAPBP	11566	ENSG00000206208
18.	**CD40 ligand deficiency Hyper IgM syndrome 1**	Normal	IgM and IgD B memory cells present, but others absent	IgM increased or normal, other isotypes decreased	Neutropenia, thrombocytopenia, hemolytic anemia, opportunistic infections, sclerosing cholangitis caused by cryptosporidiosis	XL	Defects in CD40 ligand (CD40L), defective B- and dendritic cell signalling	300386	*CD40LG*	11935	ENSG00000102245
19.	**CD40 deficiency Hyper IgM syndrome 3**	Normal	IgM and IgD B cells present, other isotypes absent	IgM increased or normal, other isotypes decreased	Neutropenia, gastrointestinal and liver disease, opportunistic infections	AR	Defects in CD40, defective B- and dendritic cell signalling	109535	*CD40*	11919	ENSG00000101017
20.	**ITK deficiency***	Modestly decreased	Normal	Normal or decreased		AR	Defects in *ITK*, EBV associated lymphoproliferation	613011	*ITK*	6171	ENSG00000113263
21.	**MAGT1 deficiency**	Decreased CD4 cells	Normal	Normal	EBV infection, lymphoma; viral infections, respiratory and GI infections	XL	Mutationsin *MAGT1*, impaired Mg++ flux leadingto impaired TCRsignaling	300715	*MAGT1*	28880	ENSG00000102158
22.	**DOCK8 deficiency**	Decreased	Decreased	Low IgM, increased IgE	Low NK cells, hypereosinophilia, recurrent infections; severe atopy, extensive cutaneous viral, and bacterial (staph.) infections, susceptibility to cancer	AR	Defect in *DOCK*8	243700	*DOCK8*	19191	ENSG00000107099

SCID, Severe combined immunodeficiency; *XL*, X-linked inheritance; *JAK*, Janus-associated kinase; *IL-7Rα*, IL-7 receptor α; *AR*, autosomal recessive inheritance; *NK*, natural killer cells; XLF, XRCC4 like factor; NER, Nucleotide excision repair of single strand breaks in DNA; *dATP*, deoxyadenosine triphosphate; *dGTP*, deoxyguanosine diphosphate; *ZAP-70*, Zeta-associated protein of 70 kd; *TAP*, transporter associated with antigen processing.

*Atypical cases of severe combined immunodeficiency might present with T cells because of hypomorphic mutations or somatic mutations in T-cell precursors, or alloimmune T cells from the mother in Omenn syndrome.