Disruption of thrombocyte and T lymphocyte development by a mutation in *ARPC1B*

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A

B

C

TRB

TRG
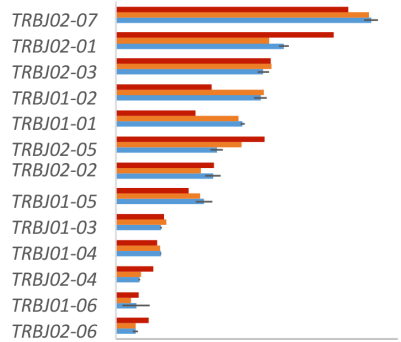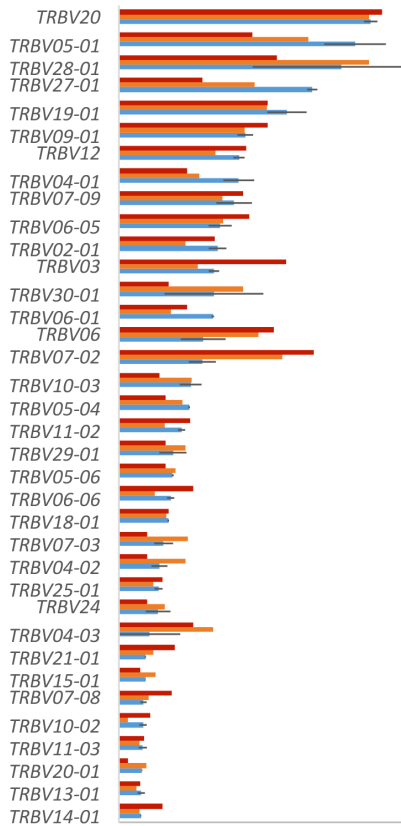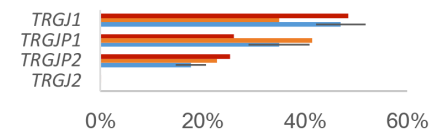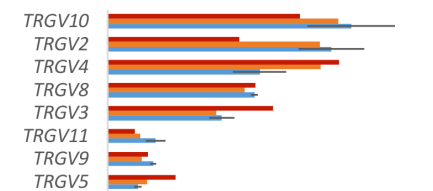
IGH
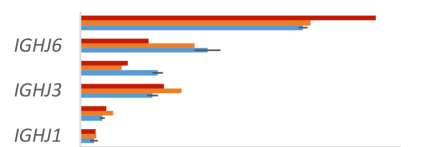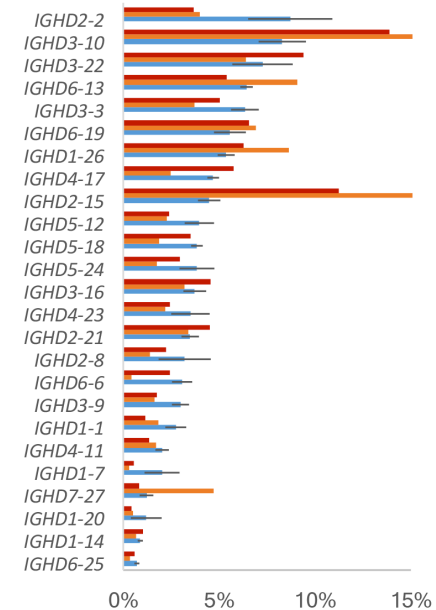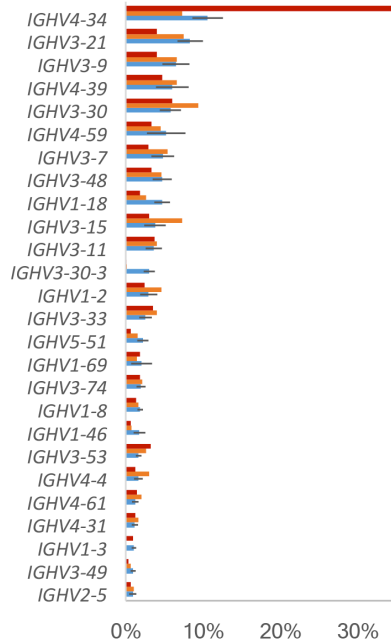
pt 1　　pt 2　　C (n=2, 4)

**Supplementary Figure 1. Differential *VDJ* gene usage relative to the number of unique sequences in the patients' *TRB*, *TRG* and *IGH* repertoires.** The frequencies of gene usages based on unique sequences for the patients for *TRBV* and *TRBJ* genes (A), *TRGV* and *TRGJ* genes (B) and *IGHV*, *IGHD* and *IGHJ* genes (C), are compared to the frequencies (average ± SEM) of gene usage of two controls in *TRB* repertoire and four controls in *TRG* and *IGH* repertoires.

A

_human	MAYHSFLVEPISCHAWNKDRTQIAICPNNHEVHIYEKSGAKWTKVHELKEHNGQVTGIDW	60
_mouse	MAYHSFLVEPISCHAWNKDRTQIAICPNNHEVHIYEKSGAKWNKVHELKEHNGQVTGIDW	60
_zebrafish	MAYHSFLLEPISCHAWNKDRTQIALCPNNHEVHIYNKAGNNWNKIHVLKEHNGQVTGIDW	60
	*******:**************:*********:*:* :*.*:* *************	
_human	APESNRIVTCGTDRNAYVWTLKGRTWKPTLVILRINRAARCVRWAPNENKFAVGSGSRVI	120
_mouse	APESNRIVTCGTDRNAYVWTLKGRTWKPTLVILRINRAARCVRWAPNENKFAVGSGSRVI	120
_zebrafish	APESNRIVTCGTDRNAYVWTLKGDAWKPTLVILRINRAARCVKWSPKENKFAVGSGSRLI	120
	*********************** :***************:*:*:*********** :*	
_human	SICYFEQENDWWVCKHIKKPIRSTVLSLDWHPNNVLLAAGSCDFKCRIFSAYIKEVEERP	180
_mouse	SICYFEQENDWWVCKHIKKPIRSTVLSLDWHPNNVLLAAGSCDFKCRIFSAYIKEVEERP	180
_zebrafish	SVCYFEQDNDWWVCKHIKKPIRSTILCLDWHPNNVLLAAGSCDFKCRIFSAYIKEVEEKP	180
	*:****:*************** :*.********************************:*	
_human	APTPWGSKMPFGELMFESSSSCGWVHGVCFSASGSRVAWVSHDSTVCLADADKKMAVATL	240
_mouse	APTPWGSKMPFGELMFESSSSCGWVHGVCFSASGSRVAWVSHDSTVCLVDADKKMAVATL	240
_zebrafish	APTAWGSKMPFGEVMFESTGTSGWVHGVCFSDSGNRVAWASHDSTVAVAEGGKTAVCTSL	240
	.*****:*****:.:.:.********* **.****.******.:.:..*. . ::*	
_human	ASETLPLLALTFITDNSLVAAGHDCFPVLFTYDAAAGMLSFGGRLDVPKQSSQRGLTARE	300
_mouse	ASETLPLLAVTFITENSLVAAGHDCFPVLFTYDNAAVTLSFGGRLDVPKQSSQRGMTARE	300
_zebrafish	TSETLPLLCVTFITENSLVAAGHDCYPVLFVYDSNNAALSFGGKLDVPKQSAQKGMTARE	300
	:*******.:****:*********:.****.** ***** *******:*:*:******	
_human	RFQNLDKKASSEGGTAAGAGLDSLHKNSVSQISVLSGGKAKCSQFCTTGMDGGMSIWDVK	360
_mouse	RFQNLDKKASSEGGAATGAGLDSLHKNSVSQISVLSGGKAKCSQFCTTGMDGGMSIWDVK	360
_zebrafish	RFQNLDKKATTE---SKEAVLESLHKNSISQISLLDGGKAKCSKFCTTGMDGGMTIWDVK	357
	*********::* : * *:******:****:*.*******:************.*****	
_human	SLESALKDLKIK	372
_mouse	SLESALKDLKIK	372
_zebrafish	TLESAMKDLKIV	369
	:****:*****	

B

C

WISH analysis of *arpc1b* expression

26 hpf

AGM

Myeloid Cells

PBI

D

WISH analysis of *arpc1a* expression

26 hpf

Supplementary Figure 2. WISH analysis of *arpc1b* and *arpc1a* expression in zebrafish hematopoietic system.

A, Amino acid sequence alignments of human, mouse and zebrafish *arpc1b*. * beneath the sequences indicates identity. *B,* Syntenic relationship between zebrafish *arpc1b* (on Dre.3) and human *ARPC1B* (on Hsa.7). Red arrows indicate that the *arpc1b* gene in zebrafish and the *ARPC1B* gene in humans are flanked by other syntenic orthologs. *C-D,* WISH analysis on 26hpf zebrafish embryo for *arpc1b* **(C)** and *arpc1a* **(D)**. Lateral view with head to the left. Insets depict the blood cells in yolk (black arrows), AGM and PBI regions (bold black arrows). *Aprc1a* WISH exhibits staining in head and trunk areas but unlike that of *arpc1b,* it does not stain hematopoietic cells.
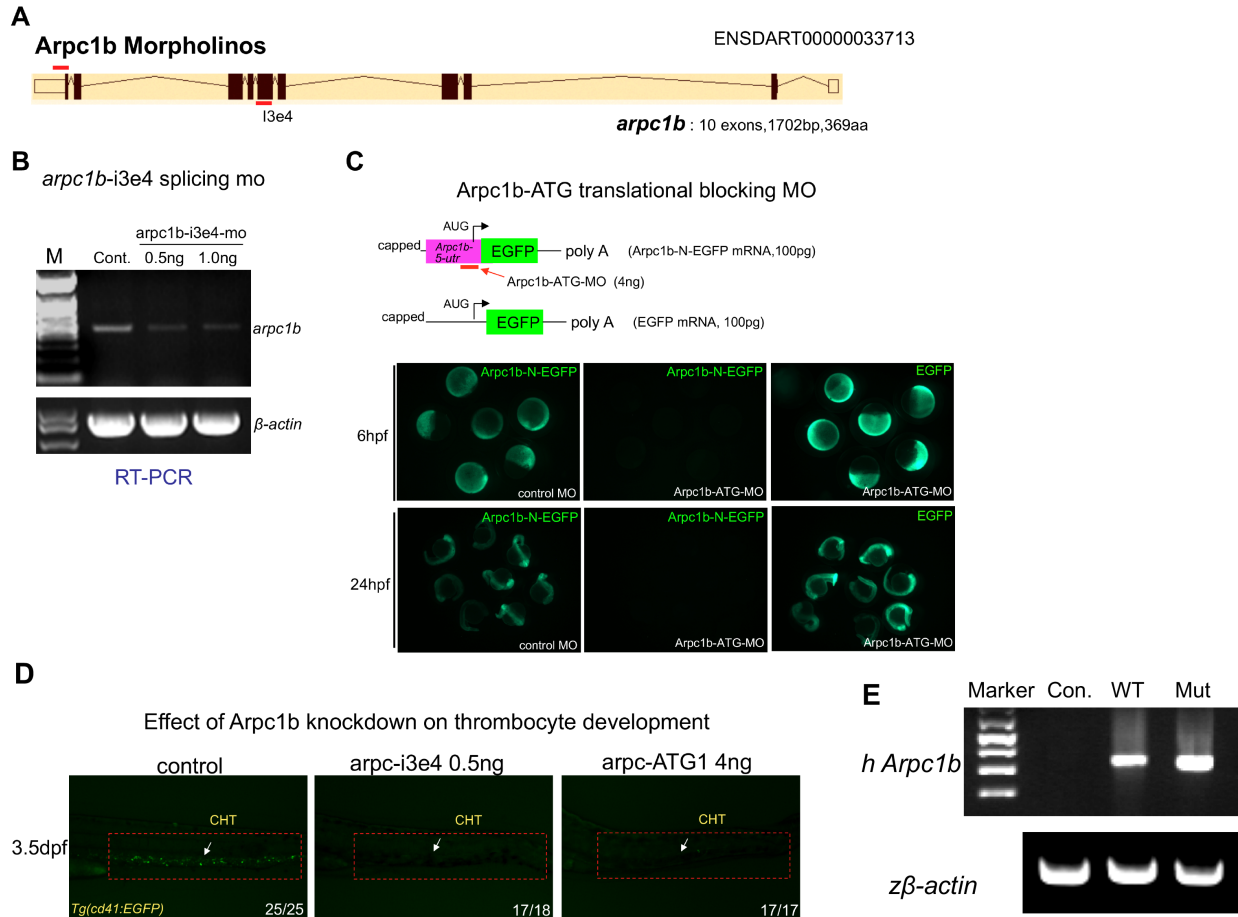
Supplementary Figure 3. Validation of *arpc1b* knockdown in zebrafish embryo.

A. Genomic structure of zebrafish *arpc1b* locus. Red lines mark the targeting sites of translation-blocking or splicing site MO. *B.* RT-PCR examination of endogenous *arpc1b* expression in control and *arpc1b* splice site MO injected embryos. *β-actin* serves as the internal loading control. *C.* EGFP reporter assay for functional validation of *arpc1b* ATG (translation-blocking) MO. *D.* Thrombocyte development was disrupted after *arpc1b* knockdown in 3.5dpf *Tg(cd41:EGFP)* transgenic embryos (red rectangles and white arrows). The embryos were photographed by lateral views. The numbers on the images refer to the fraction of embryos with the depicted phenotype. CHT: caudal hematopoietic tissue. *E.* The presence of the intact and mutant human *ARPC1B* mRNA employed to rescue development was verified by RT-PCR analysis at 3.5dpf.

Supplementary Table 1. Summary of the *V(D)J* gene usages in the total and unique sequences of TCR and BCR repertoires from patients and controls.

										TRB-Total
Total	**Controls (mean; n = 2)**	**SEM**	**2xSEM**	**Mean - 2xSEM**	**Mean + 2xSEM**	**pt1**	**pt2**	**pt1**	**pt2**	**Total**
TRBV05-05	0.51%	0.02%	0.04%	0.47%	0.54%	1.11%	0.46%	+	-	*TRBV05-05*
TRBV06-04	0.54%	0.08%	0.15%	0.38%	0.69%	0.71%	0.65%	+		*TRBV06-04*
TRBV12-05	0.66%	0.08%	0.15%	0.50%	0.81%	0.63%	0.45%		-	*TRBV12-05*
TRBV07-06	0.68%	0.05%	0.10%	0.57%	0.78%	0.79%	0.63%	+		*TRBV07-06*
TRBV13-01	0.69%	0.11%	0.22%	0.47%	0.91%	0.55%	0.49%			*TRBV13-01*
TRBV14-01	0.71%	0.04%	0.08%	0.63%	0.79%	1.11%	0.66%	+		*TRBV14-01*
TRBV11-03	0.72%	0.13%	0.26%	0.46%	0.98%	0.63%	0.63%			*TRBV11-03*
TRBV10-01	0.73%	0.02%	0.04%	0.68%	0.77%	0.24%	0.67%	-	-	*TRBV10-01*
TRBV10-02	0.75%	0.13%	0.26%	0.50%	1.01%	0.95%	0.27%		-	*TRBV10-02*
TRBV20-01	0.75%	0.02%	0.05%	0.71%	0.80%	0.24%	0.86%	-	+	*TRBV20-01*
TRBV07-08	0.81%	0.04%	0.08%	0.73%	0.88%	1.50%	0.85%	+		*TRBV07-08*
TRBV15-01	0.81%	0.02%	0.03%	0.78%	0.85%	0.55%	1.10%	-	+	*TRBV15-01*
TRBV21-01	0.85%	0.02%	0.04%	0.81%	0.89%	1.50%	1.21%	+	+	*TRBV21-01*
TRBV04-03	0.91%	0.90%	1.81%	-0.89%	2.72%	1.97%	2.85%		+	*TRBV04-03*
TRBV24	1.19%	0.37%	0.74%	0.45%	1.93%	0.87%	1.39%			*TRBV24*
TRBV25-01	1.27%	0.15%	0.31%	0.96%	1.58%	2.13%	1.08%	+		*TRBV25-01*
TRBV04-02	1.34%	0.22%	0.43%	0.91%	1.78%	0.87%	2.35%		+	*TRBV04-02*
TRBV07-03	1.54%	0.38%	0.76%	0.78%	2.30%	0.79%	2.29%			*TRBV07-03*
TRBV18-01	1.61%	0.03%	0.06%	1.55%	1.67%	1.58%	1.63%			*TRBV18-01*
TRBV29-01	1.63%	0.42%	0.84%	0.79%	2.47%	1.34%	1.98%			*TRBV29-01*
TRBV05-06	1.63%	0.01%	0.03%	1.60%	1.66%	1.50%	1.70%	-	+	*TRBV05-06*
TRBV06-06	1.64%	0.12%	0.23%	1.40%	1.87%	2.05%	1.08%	+	-	*TRBV06-06*
TRBV11-02	2.07%	0.07%	0.15%	1.93%	2.22%	2.21%	1.42%	+	-	*TRBV11-02*
TRBV05-04	2.27%	0.01%	0.02%	2.25%	2.29%	1.34%	2.06%	-	-	*TRBV05-04*
TRBV10-03	2.30%	0.36%	0.71%	1.59%	3.01%	1.11%	2.24%			*TRBV10-03*
TRBV06	2.45%	0.63%	1.27%	1.18%	3.72%	4.82%	4.09%	+	+	*TRBV06*
TRBV07-02	2.56%	0.41%	0.81%	1.75%	3.38%	7.58%	4.83%	+	+	*TRBV07-02*
TRBV06-01	2.88%	0.05%	0.09%	2.79%	2.98%	2.76%	1.59%	-	-	*TRBV06-01*
TRBV30-01	2.98%	1.55%	3.10%	-0.13%	6.08%	1.58%	4.28%			*TRBV30-01*
TRBV06-05	3.10%	0.42%	0.83%	2.27%	3.93%	4.11%	3.23%	+		*TRBV06-05*
TRBV03	3.17%	0.18%	0.37%	2.80%	3.54%	5.13%	2.66%	+	-	*TRBV03*
TRBV02-01	3.27%	0.19%	0.37%	2.90%	3.65%	3.63%	2.23%		-	*TRBV02-01*
TRBV12	3.70%	0.18%	0.37%	3.33%	4.07%	3.71%	3.28%		-	*TRBV12*
TRBV07-09	3.86%	0.70%	1.41%	2.45%	5.27%	4.66%	3.42%			*TRBV07-09*
TRBV04-01	3.93%	0.62%	1.25%	2.68%	5.17%	1.74%	2.67%	-	-	*TRBV04-01*
TRBV09-01	4.01%	0.24%	0.48%	3.53%	4.49%	4.42%	4.05%			*TRBV09-01*
TRBV19-01	5.68%	0.64%	1.28%	4.40%	6.96%	4.27%	5.09%	-		*TRBV19-01*
TRBV27-01	6.03%	0.32%	0.64%	5.39%	6.67%	2.29%	4.26%	-	-	*TRBV27-01*
TRBV28-01	7.08%	2.84%	5.68%	1.40%	12.76%	4.98%	7.83%			*TRBV28-01*
TRBV05-01	7.44%	0.91%	1.81%	5.63%	9.25%	4.34%	5.66%	-		*TRBV05-01*
TRBV20	7.59%	0.06%	0.13%	7.46%	7.72%	7.74%	7.69%	+		*TRBV20*
Total	**Controls (mean; n=2)**	**SEM**	**2xSEM**	**Mean - 2xSEM**	**Mean + 2xSEM**	**pt1**	**pt2**	**pt1**	**pt2**	**Total**
TRBJ02-06	1.40%	0.18%	0.35%	1.05%	1.76%	2.45%	1.42%	+		*TRBJ02-06*
TRBJ02-04	1.68%	0.07%	0.14%	1.54%	1.82%	2.69%	1.72%	+		*TRBJ02-04*
TRBJ01-06	1.87%	1.40%	2.80%	-0.93%	4.67%	1.42%	0.99%			*TRBJ01-06*
TRBJ01-04	3.37%	0.05%	0.10%	3.27%	3.47%	3.24%	3.85%		+	*TRBJ01-04*
TRBJ01-03	3.42%	0.07%	0.15%	3.28%	3.57%	3.48%	3.73%		+	*TRBJ01-03*
TRBJ02-05	7.25%	0.42%	0.85%	6.41%	8.10%	11.69%	8.76%	+	+	*TRBJ02-05*
TRBJ02-02	7.26%	0.57%	1.14%	6.12%	8.39%	7.74%	6.65%			*TRBJ02-02*
TRBJ01-05	7.44%	0.64%	1.29%	6.15%	8.73%	8.14%	8.44%			*TRBJ01-05*
TRBJ01-01	10.27%	0.19%	0.37%	9.90%	10.64%	7.58%	12.74%		+	*TRBJ01-01*
TRBJ02-03	10.61%	0.25%	0.50%	10.10%	11.11%	11.53%	10.72%	+		*TRBJ02-03*
TRBJ02-01	12.14%	0.42%	0.85%	11.29%	12.98%	15.56%	10.73%	+	-	*TRBJ02-01*
TRBJ01-02	12.80%	0.24%	0.48%	12.31%	13.28%	8.14%	11.62%	-	-	*TRBJ01-02*
TRBJ02-07	20.47%	0.36%	0.72%	19.75%	21.18%	16.35%	18.60%	-	-	*TRBJ02-07*
										TRG-Total
Total	**Controls (mean; n=4)**	**SEM**	**2xSEM**	**Mean - 2xSEM**	**Mean + 2xSEM**	**pt1**	**pt2**	**pt1**	**pt2**	**Total**
TRGV5	2.05%	0.3%	0.57%	1.47%	2.62%	4.64%	2.56%	+		*TRGV5*
TRGV9	3.03%	0.5%	0.95%	2.08%	3.98%	2.72%	1.55%		-	*TRGV9*
TRGV11	6.28%	0.2%	0.46%	5.82%	6.74%	3.16%	4.16%	-	-	*TRGV11*
TRGV3	8.81%	0.9%	1.71%	7.10%	10.51%	12.38%	8.46%	+		*TRGV3*
TRGV4	14.05%	2.1%	4.21%	9.84%	18.26%	29.98%	21.29%	+	+	*TRGV4*
TRGV8	14.54%	0.5%	1.02%	13.52%	15.56%	14.18%	14.57%			*TRGV8*
TRGV2	19.26%	1.5%	2.96%	16.30%	22.22%	10.34%	17.32%	-		*TRGV2*
TRGV10	31.89%	0.7%	1.36%	30.53%	33.24%	22.25%	30.08%	-	-	*TRGV10*

				IGH-Total						
Total	Controls (mean; n=4)	SEM	2xSEM	Mean - 2xSEM	Mean + 2xSEM	pt1	pt2	pt1	pt2	Total
IGHV3-13	0.42%	0.13%	0.27%	0.15%	0.68%	0.62%	1.59%		+	IGHV3-13
IGHV2-70	0.50%	0.16%	0.32%	0.18%	0.82%	0.23%	0.09%		-	IGHV2-70
IGHV3-43	0.50%	0.21%	0.42%	0.09%	0.92%	1.15%	0.36%	+		IGHV3-43
IGHV4-30-2	0.63%	0.18%	0.36%	0.26%	0.99%	0.00%	0.63%	-		IGHV4-30-2
IGHV1-24	0.79%	0.06%	0.12%	0.67%	0.91%	0.75%	0.51%		-	IGHV1-24
IGHV3-66	0.84%	0.19%	0.37%	0.47%	1.21%	1.56%	0.00%	+	-	IGHV3-66
IGHV3-64	0.85%	0.20%	0.40%	0.44%	1.25%	0.00%	0.03%	-	-	IGHV3-64
IGHV4-31	0.97%	0.31%	0.63%	0.34%	1.59%	1.03%	0.78%			IGHV4-31
IGHV6-1	0.97%	0.34%	0.68%	0.30%	1.65%	0.46%	0.57%			IGHV6-1
IGHV2-5	1.14%	0.29%	0.59%	0.55%	1.73%	0.53%	0.45%	-	-	IGHV2-5
IGHV3-53	1.28%	0.24%	0.47%	0.80%	1.75%	3.35%	3.02%	+	+	IGHV3-53
IGHV3-74	1.44%	0.33%	0.66%	0.78%	2.11%	1.96%	2.37%		+	IGHV3-74
IGHV1-3	1.47%	0.36%	0.71%	0.76%	2.19%	0.93%	0.00%		-	IGHV1-3
IGHV1-8	1.80%	0.47%	0.94%	0.86%	2.75%	1.46%	1.32%			IGHV1-8
IGHV4-4	1.88%	0.32%	0.63%	1.24%	2.51%	1.09%	3.14%		+	IGHV4-4
IGHV3-15	1.98%	0.73%	1.46%	0.52%	3.44%	3.19%	8.19%		+	IGHV3-15
IGHV5-51	2.06%	0.32%	0.65%	1.41%	2.70%	0.55%	1.10%	-	-	IGHV5-51
IGHV1-46	2.24%	0.51%	1.03%	1.21%	3.27%	0.48%	0.46%	-	-	IGHV1-46
IGHV3-30-3	2.57%	1.12%	2.24%	0.33%	4.81%	0.00%	0.01%	-	-	IGHV3-30-3
IGHV3-11	2.70%	0.55%	1.09%	1.61%	3.79%	4.25%	4.31%	+	+	IGHV3-11
IGHV3-7	2.78%	0.66%	1.32%	1.46%	4.11%	3.00%	6.48%		+	IGHV3-7
IGHV3-33	2.89%	0.92%	1.85%	1.04%	4.73%	3.80%	4.17%			IGHV3-33
IGHV3-48	3.23%	0.58%	1.17%	2.06%	4.40%	3.29%	5.46%		+	IGHV3-48
IGHV3-9	3.38%	0.98%	1.96%	1.42%	5.33%	3.75%	6.79%		+	IGHV3-9
IGHV1-2	3.58%	0.90%	1.79%	1.79%	5.37%	2.15%	4.02%			IGHV1-2
IGHV4-61	4.35%	1.14%	2.27%	2.08%	6.62%	1.37%	1.89%	-	-	IGHV4-61
IGHV4-39	4.63%	0.79%	1.58%	3.05%	6.21%	5.19%	6.12%			IGHV4-39
IGHV3-21	5.02%	1.21%	2.42%	2.60%	7.44%	3.97%	8.12%		+	IGHV3-21
IGHV1-18	6.05%	1.14%	2.28%	3.77%	8.33%	1.71%	2.29%	-	-	IGHV1-18
IGHV3-23	6.19%	1.65%	3.30%	2.89%	9.48%	1.37%	0.21%	-	-	IGHV3-23
IGHV1-69	6.67%	1.74%	3.48%	3.19%	10.16%	1.69%	0.86%	-	-	IGHV1-69
IGHV3-30	7.27%	1.54%	3.08%	4.19%	10.35%	6.15%	10.39%		+	IGHV3-30
IGHV4-34	7.78%	1.58%	3.16%	4.62%	10.94%	32.89%	6.86%	+		IGHV4-34
IGHV4-59	7.95%	1.58%	3.15%	4.80%	11.10%	2.87%	4.00%	-	-	IGHV4-59
Total	Controls (mean; n=4)	SEM	2xSEM	Mean - 2xSEM	Mean + 2xSEM	pt1	pt2	pt1	pt2	Total
IGHD6-25	0.54%	0.18%	0.36%	0.18%	0.90%	0.53%	0.37%			IGHD6-25
IGHD1-14	0.86%	0.06%	0.12%	0.74%	0.98%	1.07%	0.87%	+		IGHD1-14
IGHD7-27	1.05%	1.44%	2.88%	-1.83%	3.93%	1.01%	5.50%		+	IGHD7-27
IGHD1-20	1.05%	0.70%	1.40%	-0.35%	2.45%	0.45%	0.48%			IGHD1-20
IGHD4-11	1.61%	0.54%	1.08%	0.53%	2.68%	1.31%	1.65%			IGHD4-11
IGHD1-7	1.76%	0.74%	1.49%	0.28%	3.25%	0.55%	0.21%		-	IGHD1-7
IGHD1-1	2.24%	0.95%	1.90%	0.33%	4.14%	1.09%	2.38%			IGHD1-1
IGHD2-8	2.53%	0.37%	0.73%	1.80%	3.26%	2.36%	1.51%		-	IGHD2-8
IGHD3-9	2.60%	0.85%	1.71%	0.89%	4.31%	1.85%	1.73%			IGHD3-9
IGHD3-16	3.06%	0.16%	0.32%	2.73%	3.38%	4.21%	3.14%	+		IGHD3-16
IGHD6-6	3.11%	0.95%	1.91%	1.20%	5.02%	2.76%	0.46%		-	IGHD6-6
IGHD4-23	3.42%	0.42%	0.84%	2.58%	4.26%	2.37%	2.13%	-	-	IGHD4-23
IGHD5-24	4.02%	0.48%	0.97%	3.06%	4.99%	2.86%	1.89%	-	-	IGHD5-24
IGHD2-15	4.09%	0.46%	0.91%	3.18%	5.01%	10.55%	14.07%	+	+	IGHD2-15
IGHD5-18	4.41%	0.36%	0.72%	3.69%	5.13%	3.74%	2.04%		-	IGHD5-18
IGHD5-12	4.44%	0.45%	0.91%	3.53%	5.34%	2.61%	2.30%	-	-	IGHD5-12
IGHD2-21	4.53%	0.03%	0.06%	4.47%	4.59%	4.24%	4.47%	-		IGHD2-21
IGHD4-17	5.26%	0.75%	1.50%	3.76%	6.76%	6.21%	2.44%		-	IGHD4-17
IGHD1-26	6.25%	0.58%	1.15%	5.10%	7.41%	6.29%	8.94%		+	IGHD1-26
IGHD3-3	6.33%	1.23%	2.46%	3.87%	8.79%	4.56%	3.35%		-	IGHD3-3
IGHD6-19	6.54%	0.76%	1.52%	5.02%	8.06%	6.66%	7.57%			IGHD6-19
IGHD6-13	6.96%	0.77%	1.54%	5.42%	8.50%	5.88%	9.45%		+	IGHD6-13
IGHD2-2	7.52%	0.06%	0.12%	7.40%	7.65%	3.30%	3.73%	-	-	IGHD2-2
IGHD3-22	8.20%	0.67%	1.35%	6.86%	9.55%	8.84%	5.96%		-	IGHD3-22
IGHD3-10	8.21%	0.20%	0.40%	7.82%	8.61%	14.47%	13.95%	+	+	IGHD3-10
Total	Controls (mean; n=4)	SEM	2xSEM	Mean - 2xSEM	Mean + 2xSEM	pt1	pt2	pt1	pt2	Total
IGHJ1	1.84%	0.26%	0.53%	1.31%	2.37%	3.01%	3.02%	+	+	IGHJ1
IGHJ2	2.77%	0.29%	0.57%	2.20%	3.34%	4.21%	5.84%	+	+	IGHJ2
IGHJ3	11.32%	0.66%	1.32%	10.00%	12.64%	14.60%	17.68%	+	+	IGHJ3
IGHJ5	11.79%	1.75%	3.51%	8.29%	15.30%	8.99%	7.23%	-	-	IGHJ5

Unique	Controls (mean; n = 2)	SEM	2xSEM	Mean - 2xSEM	Mean + 2xSEM	pt1	pt2	pt1	pt2	Unique
IGHJ6	20.63%	0.37%	0.73%	19.90%	21.37%	10.63%	18.19%	-	-	IGHJ6
IGHJ4	51.64%	1.59%	3.17%	48.46%	54.81%	58.56%	48.01%	+	-	IGHJ4

TRB-Unique										
Unique	Controls (mean; n = 2)	SEM	2xSEM	Mean - 2xSEM	Mean + 2xSEM	pt1	pt2	pt1	pt2	Unique
TRBV14-01	0.69%	0.01%	0.03%	0.67%	0.72%	1.37%	0.65%	+		TRBV14-01
TRBV13-01	0.71%	0.12%	0.23%	0.47%	0.94%	0.69%	0.56%			TRBV13-01
TRBV20-01	0.73%	0.01%	0.02%	0.71%	0.75%	0.29%	0.87%	-	+	TRBV20-01
TRBV11-03	0.76%	0.13%	0.26%	0.50%	1.02%	0.79%	0.66%			TRBV11-03
TRBV10-02	0.76%	0.12%	0.23%	0.53%	1.00%	0.98%	0.29%		-	TRBV10-02
TRBV07-08	0.78%	0.10%	0.20%	0.58%	0.98%	1.67%	0.94%	+		TRBV07-08
TRBV15-01	0.84%	0.00%	0.00%	0.83%	0.84%	0.69%	1.15%	-	+	TRBV15-01
TRBV21-01	0.84%	0.02%	0.04%	0.80%	0.88%	1.77%	1.08%	+	+	TRBV21-01
TRBV04-03	0.98%	0.97%	1.93%	-0.96%	2.91%	2.36%	2.99%		+	TRBV04-03
TRBV24	1.24%	0.39%	0.78%	0.46%	2.02%	0.88%	1.45%			TRBV24
TRBV25-01	1.25%	0.13%	0.25%	1.00%	1.51%	1.37%	1.10%			TRBV25-01
TRBV04-02	1.29%	0.25%	0.50%	0.78%	1.79%	0.88%	2.11%		+	TRBV04-02
TRBV07-03	1.42%	0.30%	0.60%	0.82%	2.02%	0.88%	2.19%		+	TRBV07-03
TRBV18-01	1.56%	0.02%	0.05%	1.52%	1.61%	1.57%	1.51%		-	TRBV18-01
TRBV06-06	1.64%	0.11%	0.23%	1.41%	1.87%	2.36%	1.15%	+	-	TRBV06-06
TRBV05-06	1.71%	0.03%	0.06%	1.64%	1.77%	1.47%	1.79%	-	+	TRBV05-06
TRBV29-01	1.71%	0.43%	0.86%	0.85%	2.57%	1.47%	2.11%			TRBV29-01
TRBV11-02	1.99%	0.11%	0.23%	1.76%	2.21%	2.26%	1.45%	+	-	TRBV11-02
TRBV05-04	2.22%	0.03%	0.05%	2.17%	2.28%	1.47%	2.02%	-	-	TRBV05-04
TRBV10-03	2.27%	0.35%	0.69%	1.58%	2.96%	1.28%	2.30%	-		TRBV10-03
TRBV07-02	2.64%	0.43%	0.86%	1.78%	3.50%	6.18%	5.16%	+	+	TRBV07-02
TRBV06	2.67%	0.71%	1.42%	1.25%	4.09%	4.91%	4.42%	+	+	TRBV06
TRBV06-01	2.98%	0.04%	0.08%	2.90%	3.05%	2.16%	1.65%	-	-	TRBV06-01
TRBV30-01	3.01%	1.57%	3.13%	-0.12%	6.14%	1.57%	3.93%			TRBV30-01
TRBV03	3.01%	0.17%	0.33%	2.68%	3.34%	5.30%	2.49%	+	-	TRBV03
TRBV02-01	3.12%	0.28%	0.56%	2.56%	3.68%	3.04%	2.12%		-	TRBV02-01
TRBV06-05	3.21%	0.37%	0.73%	2.48%	3.94%	4.12%	3.29%	+		TRBV06-05
TRBV07-09	3.65%	0.56%	1.13%	2.52%	4.78%	3.93%	3.29%			TRBV07-09
TRBV04-01	3.80%	0.49%	0.98%	2.82%	4.77%	2.16%	2.55%	-	-	TRBV04-01
TRBV12	3.80%	0.18%	0.35%	3.45%	4.16%	4.02%	3.06%		-	TRBV12
TRBV09-01	4.00%	0.25%	0.49%	3.51%	4.50%	4.71%	3.99%	+		TRBV09-01
TRBV19-01	5.32%	0.62%	1.25%	4.08%	6.57%	4.71%	4.68%			TRBV19-01
TRBV27-01	6.13%	0.16%	0.32%	5.81%	6.45%	2.65%	4.30%	-	-	TRBV27-01
TRBV28-01	7.06%	2.82%	5.63%	1.42%	12.69%	5.00%	7.93%			TRBV28-01
TRBV05-01	7.48%	0.98%	1.95%	5.53%	9.43%	4.22%	5.99%	-		TRBV05-01
TRBV20	7.98%	0.21%	0.42%	7.56%	8.40%	8.34%	7.93%			TRBV20
Unique	Controls (mean; n=2)	SEM	2xSEM	Mean - 2xSEM	Mean + 2xSEM	pt1	pt2	pt1	pt2	Unique
TRBJ02-06	1.52%	0.20%	0.40%	1.12%	1.91%	2.55%	1.55%	+		TRBJ02-06
TRBJ01-06	1.58%	1.06%	2.13%	-0.55%	3.71%	1.77%	1.16%			TRBJ01-06
TRBJ02-04	1.83%	0.06%	0.12%	1.71%	1.95%	2.94%	1.99%	+	+	TRBJ02-04
TRBJ01-04	3.51%	0.03%	0.07%	3.44%	3.58%	3.24%	3.47%	-		TRBJ01-04
TRBJ01-03	3.52%	0.07%	0.13%	3.38%	3.65%	3.73%	3.94%	+	+	TRBJ01-03
TRBJ01-05	6.88%	0.64%	1.29%	5.60%	8.17%	5.69%	6.55%			TRBJ01-05
TRBJ02-02	7.57%	0.60%	1.20%	6.37%	8.78%	7.65%	6.60%			TRBJ02-02
TRBJ02-05	7.86%	0.49%	0.97%	6.89%	8.84%	11.58%	9.80%	+	+	TRBJ02-05
TRBJ01-01	9.89%	0.16%	0.32%	9.57%	10.21%	6.18%	9.57%	-		TRBJ01-01
TRBJ01-02	11.28%	0.50%	0.99%	10.29%	12.27%	7.46%	11.52%	-		TRBJ01-02
TRBJ02-03	11.50%	0.45%	0.90%	10.60%	12.40%	12.07%	12.13%			TRBJ02-03
TRBJ02-01	13.11%	0.38%	0.76%	12.35%	13.87%	16.98%	11.95%	+	-	TRBJ02-01
TRBJ02-07	19.91%	0.54%	1.08%	18.83%	20.99%	18.16%	19.73%	-		TRBJ02-07

TRG-Unique										
Unique	Controls (mean; n=4)	SEM	2xSEM	Mean - 2xSEM	Mean + 2xSEM	pt1	pt2	pt1	pt2	Unique
TRGV5	3.00%	0.37%	0.74%	2.26%	3.74%	6.78%	3.89%	+	+	TRGV5
TRGV9	4.52%	0.29%	0.58%	3.94%	5.11%	3.97%	3.40%		-	TRGV9
TRGV11	4.77%	0.97%	1.95%	2.82%	6.72%	2.68%	3.25%	-		TRGV11
TRGV3	11.34%	1.25%	2.50%	8.85%	13.84%	16.39%	10.75%	+		TRGV3
TRGV8	14.57%	0.34%	0.68%	13.89%	15.26%	14.68%	13.58%			TRGV8
TRGV4	15.09%	2.64%	5.28%	9.81%	20.37%	22.96%	21.16%	+	+	TRGV4
TRGV2	22.22%	3.26%	6.53%	15.70%	28.75%	13.05%	21.04%	-		TRGV2
TRGV10	24.19%	4.35%	8.69%	15.50%	32.88%	19.11%	22.90%			TRGV10

IGH-Unique										
Unique	Controls (mean; n=4)	SEM	2xSEM	Mean - 2xSEM	Mean + 2xSEM	pt1	pt2	pt1	pt2	Unique
IGHV3-66	0.35%	0.16%	0.32%	0.03%	0.68%	1.34%	0.00%	+	-	IGHV3-66

Unique	Controls (mean; n=4)	SEM	2xSEM	Mean - 2xSEM	Mean + 2xSEM	pt1	pt2	pt1	pt2	Unique
IGHV3-72	0.36%	0.15%	0.30%	0.06%	0.65%	0.58%	0.30%			IGHV3-72
IGHV1-58	0.45%	0.20%	0.40%	0.05%	0.85%	0.30%	0.37%			IGHV1-58
IGHV3-64	0.50%	0.20%	0.39%	0.10%	0.89%	0.01%	0.06%	-	-	IGHV3-64
IGHV2-70	0.52%	0.27%	0.55%	-0.02%	1.07%	0.40%	0.16%			IGHV2-70
IGHV6-1	0.55%	0.23%	0.46%	0.09%	1.01%	0.36%	0.65%			IGHV6-1
IGHV3-73	0.56%	0.07%	0.15%	0.41%	0.71%	0.72%	1.17%	+	+	IGHV3-73
IGHV1-24	0.74%	0.24%	0.48%	0.27%	1.22%	0.67%	0.65%			IGHV1-24
IGHV3-43	0.75%	0.24%	0.48%	0.27%	1.23%	0.97%	0.35%			IGHV3-43
IGHV3-13	0.79%	0.40%	0.81%	-0.02%	1.59%	0.62%	1.30%			IGHV3-13
IGHV2-5	0.91%	0.46%	0.92%	-0.01%	1.83%	0.62%	1.05%			IGHV2-5
IGHV3-49	0.96%	0.33%	0.65%	0.31%	1.61%	0.39%	0.68%			IGHV3-49
IGHV1-3	1.06%	0.29%	0.58%	0.48%	1.64%	0.90%	0.00%		-	IGHV1-3
IGHV4-31	1.19%	0.41%	0.82%	0.37%	2.00%	1.27%	1.62%			IGHV4-31
IGHV4-61	1.23%	0.42%	0.85%	0.38%	2.08%	1.47%	2.03%			IGHV4-61
IGHV4-4	1.64%	0.56%	1.12%	0.52%	2.76%	1.23%	3.07%		+	IGHV4-4
IGHV3-53	1.67%	0.36%	0.73%	0.94%	2.40%	3.24%	2.64%	+	+	IGHV3-53
IGHV1-46	1.78%	0.76%	1.51%	0.27%	3.30%	0.60%	0.72%			IGHV1-46
IGHV1-8	1.88%	0.36%	0.71%	1.16%	2.59%	1.36%	1.62%			IGHV1-8
IGHV3-74	1.98%	0.58%	1.16%	0.82%	3.14%	1.80%	2.14%			IGHV3-74
IGHV1-69	2.05%	1.35%	2.70%	-0.65%	4.75%	1.83%	1.48%			IGHV1-69
IGHV5-51	2.22%	0.72%	1.44%	0.78%	3.66%	0.63%	1.59%	-		IGHV5-51
IGHV3-33	2.56%	0.81%	1.63%	0.94%	4.19%	3.52%	4.05%			IGHV3-33
IGHV1-2	2.98%	1.11%	2.22%	0.76%	5.20%	2.43%	4.65%			IGHV1-2
IGHV3-30-3	3.05%	0.72%	1.43%	1.61%	4.48%	0.07%	0.10%	-	-	IGHV3-30-3
IGHV3-11	3.63%	1.05%	2.10%	1.53%	5.73%	3.72%	4.05%			IGHV3-11
IGHV3-15	3.78%	1.39%	2.77%	1.01%	6.56%	3.05%	7.29%		+	IGHV3-15
IGHV1-18	4.71%	1.01%	2.02%	2.69%	6.74%	1.86%	2.61%	-	-	IGHV1-18
IGHV3-48	4.72%	1.23%	2.47%	2.25%	7.19%	3.31%	4.63%			IGHV3-48
IGHV3-7	4.79%	1.47%	2.94%	1.86%	7.73%	2.98%	5.43%			IGHV3-7
IGHV4-59	5.24%	2.49%	4.98%	0.26%	10.22%	3.34%	4.47%			IGHV4-59
IGHV3-30	5.78%	1.37%	2.73%	3.05%	8.51%	6.03%	9.36%		+	IGHV3-30
IGHV4-39	6.03%	2.11%	4.22%	1.81%	10.25%	4.74%	6.61%			IGHV4-39
IGHV3-9	6.50%	1.75%	3.49%	3.00%	9.99%	3.97%	6.62%			IGHV3-9
IGHV3-21	8.34%	1.65%	3.29%	5.05%	11.63%	4.03%	7.47%	-		IGHV3-21
IGHV4-34	10.60%	1.97%	3.95%	6.65%	14.55%	34.38%	7.29%	+		IGHV4-34
Unique	Controls (mean; n=4)	SEM	2xSEM	Mean - 2xSEM	Mean + 2xSEM	pt1	pt2	pt1	pt2	Unique
IGHD6-25	0.71%	0.13%	0.26%	0.45%	0.97%	0.60%	0.34%		-	IGHD6-25
IGHD1-14	0.89%	0.13%	0.27%	0.62%	1.16%	1.03%	0.68%			IGHD1-14
IGHD1-20	1.20%	0.80%	1.61%	-0.41%	2.81%	0.44%	0.49%			IGHD1-20
IGHD7-27	1.21%	0.36%	0.71%	0.50%	1.92%	0.84%	4.71%		+	IGHD7-27
IGHD1-7	2.02%	0.91%	1.82%	0.20%	3.85%	0.55%	0.31%			IGHD1-7
IGHD4-11	2.03%	0.35%	0.70%	1.33%	2.73%	1.34%	1.70%			IGHD4-11
IGHD1-1	2.74%	0.55%	1.09%	1.65%	3.83%	1.14%	1.83%	-		IGHD1-1
IGHD3-9	2.99%	0.44%	0.89%	2.10%	3.88%	1.75%	1.64%	-	-	IGHD3-9
IGHD6-6	3.07%	0.53%	1.05%	2.02%	4.12%	2.41%	0.42%		-	IGHD6-6
IGHD2-8	3.20%	1.36%	2.72%	0.49%	5.92%	2.22%	1.40%			IGHD2-8
IGHD2-21	3.49%	0.45%	0.91%	2.58%	4.40%	4.51%	3.41%	+		IGHD2-21
IGHD4-23	3.50%	1.00%	2.00%	1.50%	5.51%	2.43%	2.18%			IGHD4-23
IGHD3-16	3.73%	0.59%	1.19%	2.54%	4.92%	4.54%	3.20%			IGHD3-16
IGHD5-24	3.84%	0.91%	1.82%	2.03%	5.66%	2.94%	1.75%		-	IGHD5-24
IGHD5-18	3.84%	0.30%	0.60%	3.24%	4.45%	3.50%	1.87%		-	IGHD5-18
IGHD5-12	3.97%	0.76%	1.53%	2.44%	5.50%	2.40%	2.27%	-	-	IGHD5-12
IGHD2-15	4.48%	0.58%	1.17%	3.31%	5.65%	11.24%	15.12%	+	+	IGHD2-15
IGHD4-17	4.69%	0.30%	0.61%	4.08%	5.30%	5.74%	2.47%	+	-	IGHD4-17
IGHD1-26	5.37%	0.44%	0.88%	4.48%	6.25%	6.29%	8.64%	+	+	IGHD1-26
IGHD6-19	5.56%	0.83%	1.66%	3.90%	7.22%	6.57%	6.91%			IGHD6-19
IGHD3-3	6.34%	0.72%	1.44%	4.90%	7.79%	5.02%	3.71%		-	IGHD3-3
IGHD6-13	6.43%	0.33%	0.65%	5.78%	7.08%	5.38%	9.07%		+	IGHD6-13
IGHD3-22	7.26%	1.57%	3.15%	4.11%	10.41%	9.40%	6.40%			IGHD3-22
IGHD3-10	8.29%	1.23%	2.47%	5.83%	10.76%	13.87%	15.15%	+	+	IGHD3-10
IGHD2-2	8.71%	2.19%	4.39%	4.32%	13.10%	3.66%	3.98%	-	-	IGHD2-2
Unique	Controls (mean; n=4)	SEM	2xSEM	Mean - 2xSEM	Mean + 2xSEM	pt1	pt2	pt1	pt2	Unique
IGHJ1	2.53%	0.72%	1.44%	1.10%	3.97%	2.84%	2.92%			IGHJ1
IGHJ2	4.08%	0.48%	0.96%	3.12%	5.04%	4.78%	6.20%		+	IGHJ2
IGHJ3	13.49%	1.01%	2.02%	11.47%	15.50%	15.68%	18.86%	+	+	IGHJ3
IGHJ5	14.44%	0.99%	1.97%	12.46%	16.41%	8.81%	7.69%	-	-	IGHJ5
IGHJ6	23.78%	2.43%	4.86%	18.92%	28.64%	12.69%	21.31%	-		IGHJ6

IGHJ4		41.67%	0.83%	1.66%	40.01%	43.33%	55.21%	43.01%	+		IGHJ4

Supplementary Table 1. Summary of the _V(D)J_ gene usages in the Total and Uniquesequences of T and B cell receptor repertoires from patients and controls.

The gene usages frequencies of the patients, and mean and two Standard Errors (SE) below or above the mean of the gene frequencies for the healthy controls (Mean ± 2 x SE) are summarized and compared for the total and unique sequences of the T and B cell receptor repertoires. For each gene that are utilized either more or less than two SE above the mean of the controls were noted with either "+" or "-" sign, respectively. The gene names (on the far right column) was colored in: green for genes that are higher in both patients; red for the genes that are higher in patient 1; and orange for the genes that are higher in patient 2.