Infrequent "chronic lymphocytic leukemia-specific" immunoglobulin stereotypes in aged individuals with or without low-count monoclonal B-cell lymphocytosis

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Supplementary Methods

Study group

All samples of the present study were obtained from a cohort of individuals with LC-MBL from Val Borbera, a rural valley in Northern Italy, followed up over a period of >10 years. All LC-MBL clones persisted over this period of follow-up, however without significant size variations (data not shown). We did not observe any case of progression to HC-MBL or CLL during the follow-up period. Blood collection for the present study was performed over a period spanning between 2012 and 2014. The diagnosis of LC-MBL was performed using an established flow cytometry protocol, where up to 500,000 events were acquired for each sample according to the gating strategy described previously.[1] MBL cells were sorted in 12 cases: in 4/12 cases, paired normal B cell samples were also available. In the remaining 11 cases, peripheral blood mononuclear cells (PBMC) were the starting material as the sorting for MBL cells either failed or yielded very low cell numbers: in 4/11 cases, sorted normal B cell samples were also available. Blood samples from 6 individuals without MBL were collected as controls; naïve and memory B cells were sorted in 6 and 5 cases, respectively. Henceforth, the category of individuals without B cell expansions will be referred to as healthy. The median age was 75 years for individuals with "CLL-like" LC-MBL and 72 years for the age-matched, healthy individuals. The research protocol was approved by the Ethics Committee of the San Raffaele Scientific Institute; all study participants gave written informed consent in accordance with the Declaration of Helsinki.

Sample preparation, FACS analysis and sorting

In the case of individuals with LC-MBL, samples were stained with anti-CD19, anti-CD5 and anti-CD20 antibodies and "CLL-like" LC-MBL populations[2] ($CD19^+CD5^+CD20^{dim}$)[1] as well as normal B cells ($CD19^+CD20^+CD5^-$) were flow-sorted. In the case of samples from

healthy individuals, the staining was performed with anti-IgD and anti-CD27 antibodies and the naïve (IgD^+CD27^-) and memory (IgD^-CD27^+) B cell populations were sorted. PBMC were isolated by density gradient centrifugation.

PCR amplification of IGHV-IGHD-IGHJ gene rearrangements, library preparation and high-throughput sequencing

Total RNA was extracted and 1 µg was used for cDNA synthesis with the SuperScript II RT kit (Invitrogen Life technologies, MA, USA). PCR amplification of IGHV-IGHD-IGHJ gene rearrangements was performed with a novel protocol, developed by the Euroclonality-NGS Consortium (https://www.euroclonalityngs.org/usr/pub/pub.php) (manuscript in preparation). Primer sequences will be provided upon request. PCR products were purified with the QIAGEN DNA purification kit (QIAGEN, Germany). The TruSeq DNA LT Sample Preparation Kit (Illumina, CA, USA) was used for the preparation of sequencing libraries. Purity and size estimation of the libraries was performed on an Agilent Bioanalyzer using the Agilent High Sensitivity DNA kit (Agilent Technologies, CA, USA). The dsDNA HS Assay Kit was used for library quantification on a Qubit 3.0 fluorometer (ThermoFisher Scientific, MA, USA). Paired-end sequencing was performed using the MiSeq Reagent Kit v3 (2x300bp) on the MiSeq Benchtop Sequencer (Illumina, CA, USA).

Bioinformatics analysis

Raw IGHV-IGHD-IGHJ gene rearrangement sequences were filtered using the Illumina signal-processing software. Sequence assignment to samples was performed based on the incorporated Illumina indexes and adapter sequences were trimmed. Subsequently, data filtering was performed through the application of an in-house, purpose-built

bioinformatics algorithm, based on the following criteria: (i) length and sequencing quality of raw reads; (ii) quality of the variable heavy complementarity determining region 3 (VH CDR3); (iii) length and overall quality of the final, full-length sequences. Filtered-in sequences were analyzed with the use of IMGT/HighV-QUEST.[3] Raw NGS data are available at the European Nucleotide Archive (ENA) under the identifier PRJEB29674.

Metadata analysis

Metadata was processed by an in-house bioinformatics analytical toolbox that performs detailed analysis, including: (i) BcR IG clonotype computation, (ii) clonality assessment, (iii) BcR IG gene repertoire extraction and (iv) somatic hypermutation (SHM) analysis. Only productive, in-frame IGHV-IGHD-IGHJ gene rearrangements were analyzed. Clonotypes were computed as unique pairs of IGHV genes and VH CDR3 amino acid sequences within a given sample. Single-sequence clonotypes were characterized as singletons and those represented by ≥2 sequences as expanded.

Clonality assessment

BcR IG clonotypes were considered for clonality assessment. First, the relative frequency of each clonotype/sample was calculated. As a next step, we sought to identify clonal expansions that would be represented at a meaningful frequency, hence potentially more relevant. Instead of choosing an arbitrary cutoff, we performed data-driven statistical analysis based on the frequency distribution of clonotypes from all samples (see Statistical analysis section). This led to the identification of 0.92% as a discerning frequency above which a given clonotype would be considered abundant. Clonality

assessment in each sample category was performed through calculating the average value of the cumulative frequencies of abundant clonotypes.

Identification of "CLL-specific" stereotyped BcR IG gene rearrangements

The dataset of abundant BcR IG clonotypeswas scanned for the presence of clonotypes highly homologous to those of CLL ("CLL-specific"). To this end, we cross-checked all abundant BcR IG clonotypes of the present study across the IMGT/CLL-DB (http://www.imgt.org/CLLDBInterface/query), a database containing 30,221 Sanger-sequenced clonotypic IGHV-IGHD-IGHJ gene rearrangement sequences from patients with CLL using an established, purpose-built bioinformatics method.[4]

IGHV gene repertoire analysis

The analysis of the IGHV gene repertoire was performed at the clonotype level. The following sample categories were included in the analysis: (i) MBL cell samples and (ii) normal B cells from individuals with LC-MBL, as well as (iii) normal B cells from healthy individuals without LC-MBL (grouped naïve and memory cell samples from each healthy individual).

Statistical analysis

Descriptive statistics for qualitative variables included counts and frequency distributions. For quantitative variables, statistical measures included the mean, median, and min-max values. The significance of bivariate/multivariate relationships between variables was assessed using the unpaired t-test, and the non-parametric Kruskal-Wallis and Mann-Whitney tests. The definition of the most appropriate threshold representing

the discerning value between abundant and low-frequent clonotypes, was performed using a method based on analysis with receiver operating characteristic (ROC) curves. For all comparisons a significance level of a=0.05 was set. All statistical analyses were performed with SPSS V-22 and R V-3.4.3.

References

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Supplemental Tables

Supplemental Table 1. Basic characteristics for individuals with LC-MBL and healthy individuals without clonal B cell expansions from the present study.

Sample ID	Sample category	Sex	Age	Light chain	CLL clone, cells/µl	Cytogenetic aberrations
MBL-1 bMBL-1	MBL cells, LC-MBL Normal B cells, LC-MBL	F	77	Kappa	7.3	n/d
MBL-2	MBL cells, LC-MBL	M	81	Kappa	0.7	n/d
MBL-3 bMBL-3	MBL cells, LC-MBL Normal B cells, LC-MBL	M	70	Kappa	221	normal
MBL-4	MBL cells, LC-MBL	F	70	Lambda	0.4	del(13q), del(17p)
MBL-5	MBL cells, LC-MBL	F	75	Kappa	5.3	n/d
MBL-6	MBL cells, LC-MBL	M	58	Lambda	265	del(13q)
MBL-7	MBL cells, LC-MBL	F	75	Kappa	96.7	del(13q)
MBL-8	MBL cells, LC-MBL	F	75	Kappa	0.5	n/d
MBL-9	MBL cells, LC-MBL	M	77	Lambda	6.3	n/d
MBL-10 bMBL-10	MBL cells, LC-MBL Normal B cells, LC-MBL	M	84	Kappa	6.6	n/d
MBL-11	MBL cells, LC-MBL	M	89	Kappa	189.8	normal
MBL-12 bMBL-12	MBL cells, LC-MBL Normal B cells, LC-MBL	F	71	Kappa	1.5	normal
mcMBL-13 bMBL-13	PBMC, LC-MBL Normal B cells, LC-MBL	M	71	Lambda	-	n/d
mcMBL-14 bMBL-14	PBMC, LC-MBL Normal B cells, LC-MBL	F	71	Kappa	-	del(13q)
mcMBL-15	PBMC, LC-MBL	M	85	Kappa	-	n/d
mcMBL-16	PBMC, LC-MBL	M	75	Kappa	-	n/d
mcMBL-17 bMBL-17	PBMC, LC-MBL Normal B cells, LC-MBL	M	74	Kappa	-	n/d
mcMBL-18	PBMC, LC-MBL	M	77	Kappa	-	n/d
mcMBL-19	PBMC, LC-MBL	M	73	Kappa	-	n/d

bMBL-19	Normal B cells, LC-MBL					
mcMBL-20	PBMC, LC-MBL	F	68	Kappa	-	n/d
mcMBL-21	PBMC, LC-MBL	M	75	Kappa	-	n/d
mcMBL-22	PBMC, LC-MBL	M	67	Kappa	-	del(13q), del(17p)
mcMBL-23	PBMC, LC-MBL	M	69	polyclonal	-	n/d
naB-1	Naïve B cells, Healthy	M	71	-	-	
meB-1	Memory B cells, Healthy					
naB-2	Naïve B cells, Healthy	F	68	-	-	
meB-2	Memory B cells, Healthy					
naB-3	Naïve B cells, Healthy	M	74	-	-	
meB-3	Memory B cells, Healthy					
naB-4	Naïve B cells, Healthy	M	72	-	-	
meB-4	Memory B cells, Healthy					
naB-5	Naïve B cells, Healthy	F	76	-	-	
meB-5	Memory B cells, Healthy					
naB-6	Naïve B cells, Healthy	F	69	-	-	

n/d: not determined

Supplemental Table 2. Basic information in regard to the number of BcR IG raw and filtered sequences and clonotypes for each individual sample category.

	MBL cells, LC-MBL		PBMC, LC-MBL		Normal B cells, LC-MBL		Naïve B cells, Healthy		Memory B cells, Healthy	
	total number	average per category	total number	average per category	total number	average per category	total number	average per category	total number	average per category
Total raw reads	4542318	378527	5353773	486707	3212762	401595	2565597	427600	2061525	412305
Filtered-in reads	4151863	345989	4342415	394765	2634174	329272	2042235	226915	1974080	394816
Filtered-out reads	390455	32538	1011358	91942	578588	72324	523362	58151	87445	17489
Unique clonotypes	25649	2137	70894	6445	222012	27752	169578	28263	103890	20778
Expanded clonotypes (>1 read)	9014	751	29587	2690	88366	11046	67358	11226	43750	8750
Singletons	16635	1386	41307	3755	133646	16706	102220	17037	60140	12028

Supplemental Table 3. List of abundant clonotypes (individual frequency of >0.92%) from each sample of the study cohort.

Sample ID	Sample Category	IGHV gene	SHM status, %	IGHD gene	IGHJ gene	CDR3 sequence	CDR3 length	Frequency, %
MBL-1	MBL cells, LC-MBL	IGHV1-3	90,28	IGHD5-18	IGHJ3	ARGIRVGYDYGYDVFDI	17	86.28
MBL-1	MBL cells, LC-MBL	IGHV4-59	96,49	IGHD2-2	IGHJ4	ARVANAVAGLGYFDY	15	1.57
MBL-1	MBL cells, LC-MBL	IGHV3-30	96,75	IGHD2-21	IGHJ4	AKKEGVYCRGGGCYYFDY	18	0.92
MBL-2	MBL cells, LC-MBL	IGHV3-30	93,4	IGHD2-2	IGHJ4	AKDHGSTSWYYLDY	14	69.10
MBL-2	MBL cells, LC-MBL	IGHV4-30-4	97,25	IGHD5-12	IGHJ4	VSIRGYDTN	9	5.02
MBL-2	MBL cells, LC-MBL	IGHV3-30	96,53	IGHD3-3	IGHJ3	VGESIIGGDAFDL	13	5.01
MBL-2	MBL cells, LC-MBL	IGHV1-8	92,36	IGHD3-22	IGHJ5	ARMDKKENDGSDWFDP	16	2.68
MBL-2	MBL cells, LC-MBL	IGHV1-8	96,18	IGHD6-13	IGHJ4	ARGLADNTDY	10	2.49
MBL-2	MBL cells, LC-MBL	IGHV3-7	93,42	IGHD6-19	IGHJ4	VRVIAVAGTLGYFDQ	15	0.96
MBL-3	MBL cells, LC-MBL	IGHV1-8	95,83	IGHD6-13	IGHJ4	ARGLADNTDY	10	97.55
MBL-4	MBL cells, LC-MBL	IGHV4-34	97,54	IGHD3-3	IGHJ4	AGAVEWLLWSRNRYYFDY	18	90.50
MBL-4	MBL cells, LC-MBL	IGHV3-66	96,14	IGHD2-2	IGHJ6	ARDSHFGAVPGAEGRYSYYGMDV	23	1.75
MBL-5	MBL cells, LC-MBL	IGHV3-7	89,24	IGHD6-19	IGHJ4	ACGGGWLVDS	10	12.53
MBL-5	MBL cells, LC-MBL	IGHV1-18	95,83	IGHD1-14	IGHJ4	ARDRSNKDY	9	1.84
MBL-6	MBL cells, LC-MBL	IGHV5-51	93,06	IGHD4-17	IGHJ4	ARQWVSTAITALPDY	15	93.76
MBL-7	MBL cells, LC-MBL	IGHV2-5	93,47	IGHD2-2	IGHJ5	ANRRQYNTNWDAGWFDP	17	97.15
MBL-8	MBL cells, LC-MBL	IGHV3-15	96,94	IGHD5-18	IGHJ6	TTAPRWIQVRGSYYYMDV	18	97.54
MBL-9	MBL cells, LC-MBL	IGHV3-15	96,94	IGHD6-19	IGHJ4	TIREGNGWYIY	11	42.47
MBL-9	MBL cells, LC-MBL	IGHV3-7	96,88	IGHD3-22	IGHJ4	ATPPYYDSSGNYPPDY	16	2.04
MBL-10	MBL cells, LC-MBL	IGHV1-8	96,53	IGHD3-9	IGHJ4	ARRLPGREVTQLDY	14	35.40
MBL-10	MBL cells, LC-MBL	IGHV3-7	96,53	IGHD6-6	IGHJ4	AVAPYSSSSSQRY	13	22.58
MBL-10	MBL cells, LC-MBL	IGHV3-7	97,22	IGHD2-2	IGHJ6	ATPPYCDTSCPATDV	15	11.24
MBL-10	MBL cells, LC-MBL	IGHV4-34	96,49	IGHD6-13	IGHJ6	ARGGYSVTSLKYGMDV	16	5.36
MBL-10	MBL cells, LC-MBL	IGHV3-7	96,88	IGHD2-2	IGHJ4	AGDCTSTTCFFDF	13	4.43
MBL-10	MBL cells, LC-MBL	IGHV4-59	91,58	IGHD3-22	IGHJ4	ARFTYDSGGHYLQY	14	4.36

MBL-10	MBL cells, LC-MBL	IGHV3-53	97,19	IGHD1-1	IGHJ5	ARVSGWRIS	9	1.70
MBL-10	MBL cells, LC-MBL	IGHV3-74	95,49		IGHJ6	ARGNYYGMDV	10	1.39
MBL-10	MBL cells, LC-MBL	IGHV3-53	97,54	IGHD6-19	IGHJ4	VRVRGWSHY	9	1.28
MBL-10	MBL cells, LC-MBL	IGHV3-7	97,22	IGHD6-13	IGHJ6	VRDRGDDTSSTLYGMDV	17	1.21
MBL-10	MBL cells, LC-MBL	IGHV1-18	97,57	IGHD6-6	IGHJ4	ARGEYYFDY	9	1.10
MBL-11	MBL cells, LC-MBL	IGHV1-18	89,58	IGHD4-11	IGHJ6	ARGTRVTTSPYYYYMDV	17	97.86
MBL-11	MBL cells, LC-MBL	IGHV1-18	89,93	IGHD4-11	IGHJ6	ARGTRVTTSPYYYMDV	16	1.07
MBL-12	MBL cells, LC-MBL	IGHV1-2	93,75	IGHD4-23	IGHJ4	AREDYGGNF	9	17.78
MBL-12	MBL cells, LC-MBL	IGHV3-13	96,49	IGHD6-13	IGHJ4	ARSYTTSWPTFDY	13	3.60
MBL-12	MBL cells, LC-MBL	IGHV3-53	99,65	IGHD3-10	IGHJ4	ARIVGAFIT	9	3.07
MBL-12	MBL cells, LC-MBL	IGHV3-72	87,76	IGHD1-1	IGHJ4	VRENWYRFDY	10	2.18
MBL-12	MBL cells, LC-MBL	IGHV3-30	94,79	IGHD2-15	IGHJ6	AKDLQTADTDYYYGMDV	17	2.14
MBL-12	MBL cells, LC-MBL	IGHV4-4	99,3	IGHD3-3	IGHJ6	ARDRQIFGVVIEDYGMDV	18	1.93
MBL-12	MBL cells, LC-MBL	IGHV4-59	91,93	IGHD6-19	IGHJ4	ATKVGPRDWNPADY	14	1.84
MBL-12	MBL cells, LC-MBL	IGHV4-4	100	IGHD2-2	IGHJ6	ARVVGGGMDV	10	1.76
MBL-12	MBL cells, LC-MBL	IGHV3-23	94,1	IGHD2-2	IGHJ5	AKDRSPCGTLNCAKPGDY	18	1.70
MBL-12	MBL cells, LC-MBL	IGHV3-33	93,75	IGHD3-22	IGHJ6	ARDFYYNNMDRAADV	15	1.64
MBL-12	MBL cells, LC-MBL	IGHV4-34	96,49	IGHD2-2	IGHJ4	ARGGGYCSSTSCYHDY	16	1.57
MBL-12	MBL cells, LC-MBL	IGHV3-30-3	100	IGHD6-19	IGHJ4	ARDPPLHSSGWYEVGYFDY	19	1.47
MBL-12	MBL cells, LC-MBL	IGHV3-48	95,83	IGHD3-22	IGHJ4	ASLTYYYDSSGYRAFDC	17	1.45
MBL-12	MBL cells, LC-MBL	IGHV3-30-3	99,65	IGHD1-26	IGHJ4	AREGEVGATVATDY	14	1.45
MBL-12	MBL cells, LC-MBL	IGHV4-4	94,39	IGHD7-27	IGHJ4	ATDPPGTGNYFDF	13	1.45
MBL-12	MBL cells, LC-MBL	IGHV4-34	100	IGHD5-12	IGHJ3	AREGAYSGYVAAAFDI	16	1.44
MBL-12	MBL cells, LC-MBL	IGHV3-23	94,79	IGHD6-13	IGHJ4	AKLIAAGDRPQDY	13	1.43
MBL-12	MBL cells, LC-MBL	IGHV3-30	100	IGHD6-19	IGHJ4	AKDWSGCLDY	10	1.42
MBL-12	MBL cells, LC-MBL	IGHV4-30-4	89,69	IGHD5-12	IGHJ5	SRVEDVDIAYFDP	13	1.38
MBL-12	MBL cells, LC-MBL	IGHV3-11	98,61	IGHD3-9	IGHJ4	AKHLAGDILTGYYRGFDY	18	1.37
MBL-12	MBL cells, LC-MBL	IGHV3-23	97,57	IGHD1-26	IGHJ4	AAHEGGDSGSYNFDH	15	1.37

MBL-12	MBL cells, LC-MBL	IGHV3-9	99,31	IGHD5-24	IGHJ6	AKDIGMAITYYGMDV	15	1.31
MBL-12	MBL cells, LC-MBL	IGHV4-31	96,91	IGHD5-18	IGHJ4	AFTRGYTYGSFDS	13	1.26
MBL-12	MBL cells, LC-MBL	IGHV3-33	95,14	IGHD3-9	IGHJ4	ARSPSAFGTRVLMDY	15	1.25
MBL-12	MBL cells, LC-MBL	IGHV4-59	94,04	IGHD3-10	IGHJ6	ARDQDGWGPLVGLDV	15	1.23
MBL-12	MBL cells, LC-MBL	IGHV3-30-3	96,18	IGHD6-6	IGHJ1	ARDNSSAQWFQH	12	1.23
MBL-12	MBL cells, LC-MBL	IGHV3-30	97,57	IGHD3-22	IGHJ3	ARDLSVSVVVITIDPLDI	18	1.22
MBL-12	MBL cells, LC-MBL	IGHV3-11	100	IGHD5-12	IGHJ5	AREESQGRGYGGYEEGWV	18	1.22
MBL-12	MBL cells, LC-MBL	IGHV3-30	99,65	IGHD6-19	IGHJ6	AKITVAGQYHYYYYTMDV	18	1.20
MBL-12	MBL cells, LC-MBL	IGHV4-34	93,68	IGHD3-16	IGHJ5	ARGRVRLLRPARGGHWFDP	19	1.20
MBL-12	MBL cells, LC-MBL	IGHV3-11	99,31	IGHD2-21	IGHJ4	ARDFYCGGDCYALDF	15	1.19
MBL-12	MBL cells, LC-MBL	IGHV4-31	100	IGHD2-2	IGHJ4	ASACSSTSCGENY	13	1.12
MBL-12	MBL cells, LC-MBL	IGHV1-8	98,96	IGHD3-3	IGHJ5	ARGFWSGYYLEGWFDP	16	1.08
MBL-12	MBL cells, LC-MBL	IGHV3-30-3	95,66	IGHD6-25	IGHJ4	ARAPAGDAAMGFDY	14	0.99
MBL-12	MBL cells, LC-MBL	IGHV3-30	93,72	IGHD2-21	IGHJ4	AKDFGGYYFDY	11	0.98
MBL-12	MBL cells, LC-MBL	IGHV3-48	95,78	IGHD5-12	IGHJ6	ARGGEDKIRGTYRPSLSHAMDV	22	0.95
MBL-12	MBL cells, LC-MBL	IGHV4-30-4	97,78	IGHD2-2	IGHJ6	ARDWGDGYCSSTSCHNGMDV	20	0.95
MBL-12	MBL cells, LC-MBL	IGHV2-5	94,35	IGHD6-25	IGHJ3	VHSPIIFVFKGSFDI	15	0.94
mcMBL-13	PBMC, LC-MBL	IGHV4-31	96,55	IGHD4-17	IGHJ6	ARDYGDSRRYYYGMDV	16	1.73
mcMBL-13	PBMC, LC-MBL	IGHV4-34	88,42	IGHD1-14	IGHJ5	VRNMPNSHTPGWFDP	15	1.19
mcMBL-13	PBMC, LC-MBL	IGHV4-30-4	96,56	IGHD3-22	IGHJ6	ARDFNYYDSSDFYGMDV	17	1.11
mcMBL-13	PBMC, LC-MBL	IGHV3-53	100	IGHD6-13	IGHJ6	AREASSSWSVGLWYYGMDV	19	1.08
mcMBL-13	PBMC, LC-MBL	IGHV3-74	91,32	IGHD6-25	IGHJ6	ARRDQQPLKYMDV	13	1.06
mcMBL-13	PBMC, LC-MBL	IGHV3-30	97,92	IGHD2-2	IGHJ6	AKEGRYCSSTSSCYYGMDV	19	1.05
mcMBL-13	PBMC, LC-MBL	IGHV3-33	97,57	IGHD6-13	IGHJ6	ARDGQQLANYAMDV	14	1.04
mcMBL-13	PBMC, LC-MBL	IGHV3-48	96,78	IGHD6-6	IGHJ3	ASGVYDSPPEDAFHI	15	0.95
mcMBL-13	PBMC, LC-MBL	IGHV3-74	94,98	IGHD3-3	IGHJ6	ARQLGLYLPLDHLDV	15	0.95
mcMBL-13	PBMC, LC-MBL	IGHV3-53	97,83	IGHD3-9	IGHJ5	ARGELRYFDWARFDP	15	0.93

mcMBL-14	PBMC, LC-MBL	IGHV3-7	91,32	IGHD2-2	IGHJ4	ARGPGYLIDF	10	7.95
mcMBL-14	PBMC, LC-MBL	IGHV3-9	90,62	IGHD6-19	IGHJ4	VRVNSEISVAGREFDL	16	1.12
mcMBL-14	PBMC, LC-MBL	IGHV4-34	98,6	IGHD6-13	IGHJ4	ARVNRLGIAAAGPFDY	16	1.08
mcMBL-14	PBMC, LC-MBL	IGHV4-34	100	IGHD2-21	IGHJ6	ARGPVVVTARYGMDV	15	1.06
mcMBL-14	PBMC, LC-MBL	IGHV4-31	94,56	IGHD3-9	IGHJ4	ARGGWLRRHIDY	12	1.00
mcMBL-14	PBMC, LC-MBL	IGHV3-21	96,71	IGHD5-12	IGHJ6	ARDGGPLYYYGMDV	14	0.97
mcMBL-14	PBMC, LC-MBL	IGHV3-74	93,45	-	IGHJ6	ARERV	5	0.95
mcMBL-14	PBMC, LC-MBL	IGHV4-34	97,64	IGHD3-22	IGHJ4	ARSSYDSSGYYHGSDY	16	0.94
mcMBL-14	PBMC, LC-MBL	IGHV3-30	94,79	IGHD4-11	IGHJ4	AKGDSSTSCYDL	12	0.93
mcMBL-15	PBMC, LC-MBL	IGHV3-30	100	IGHD4-17	IGHJ4	AKDQEPTTVTTSFDY	15	5.37
mcMBL-15	PBMC, LC-MBL	IGHV4-59	100	IGHD3-3	IGHJ4	ARSDDFWSGTGNY	13	5.36
mcMBL-15	PBMC, LC-MBL	IGHV3-30-3	100	IGHD1-1	IGHJ4	ARGTRTRLGYFDY	13	5.25
mcMBL-15	PBMC, LC-MBL	IGHV3-30-3	96,18	IGHD2-15	IGHJ4	ARDEGYCNDDRCSQGNFDY	19	4.97
mcMBL-15	PBMC, LC-MBL	IGHV3-30	99,65	IGHD6-6	IGHJ6	AKDRIAARPRRYYYYGMDV	19	4.18
mcMBL-15	PBMC, LC-MBL	IGHV3-33	100	IGHD1-26	IGHJ4	ARDGPHVGFDY	11	4.16
mcMBL-15	PBMC, LC-MBL	IGHV3-64	100	IGHD6-19	IGHJ4	ARGRNIAVAGLLGY	14	4.09
mcMBL-15	PBMC, LC-MBL	IGHV3-21	99,65	IGHD3-22	IGHJ4	ARGLRDYYYDSSPFDY	16	3.53
mcMBL-15	PBMC, LC-MBL	IGHV3-48	100	IGHD2-15	IGHJ6	ARGGREWDIVVVVAAFYGMDV	21	3.41
mcMBL-15	PBMC, LC-MBL	IGHV3-30-3	100	IGHD5-24	IGHJ6	AREMATIGVGMDV	13	3.36
mcMBL-15	PBMC, LC-MBL	IGHV4-34	100	IGHD6-25	IGHJ4	ARRRLTQYYFDY	12	3.28
mcMBL-15	PBMC, LC-MBL	IGHV3-9	94,44	IGHD5-12	IGHJ6	AKDIGKWPHYSRLNSYYYYGMDV	23	3.19
mcMBL-15	PBMC, LC-MBL	IGHV3-48	99,65	IGHD3-22	IGHJ6	ARDYYDSSGYYGYYYYYGMDV	21	3.06
mcMBL-15	PBMC, LC-MBL	IGHV4-31	100	IGHD3-22	IGHJ6	ARAVYDSSGYFYYGMDV	17	2.93
mcMBL-15	PBMC, LC-MBL	IGHV3-74	100	IGHD6-6	IGHJ4	ARDPSIAARPGVWGNYYFDY	20	2.92
mcMBL-15	PBMC, LC-MBL	IGHV1-69	100	IGHD6-6	IGHJ6	AGQLQGGYYYYGMDV	15	2.64
mcMBL-15	PBMC, LC-MBL	IGHV3-7	100	IGHD3-22	IGHJ5	ARELARITMIVVVMGNWFDP	20	2.59
mcMBL-15	PBMC, LC-MBL	IGHV2-70	98,97	IGHD2-2	IGHJ3	ARIERTIDAFDI	12	2.46
mcMBL-15	PBMC, LC-MBL	IGHV3-15	98,64	IGHD3-10	IGHJ5	TQMVRGVTSYATKRGWFDP	19	2.34

mcMBL-15	PBMC, LC-MBL	IGHV3-30-3	100	IGHD3-10	IGHJ4	AREGPARRYGSGSSHFDY	18	2.32
mcMBL-15	PBMC, LC-MBL	IGHV1-18	100	IGHD2-15	IGHJ4	ARVRRVVAAMFDY	13	2.18
mcMBL-15	PBMC, LC-MBL	IGHV5-51	100	IGHD1-26	IGHJ4	ARRNSGSYNFDY	12	2.08
mcMBL-15	PBMC, LC-MBL	IGHV3-30	100	IGHD5-12	IGHJ6	AKCLRSKTGDYGMDV	15	2.00
mcMBL-15	PBMC, LC-MBL	IGHV1-18	94,79	IGHD5-18	IGHJ4	TRDSIYRGSPTGKNDY	16	1.97
mcMBL-15	PBMC, LC-MBL	IGHV3-13	100	IGHD1-26	IGHJ3	ARAPYSGSYSGAFDI	15	1.86
mcMBL-15	PBMC, LC-MBL	IGHV4-61	100	IGHD3-22	IGHJ6	ARGTRTYYYDSSGYYSPWYYYYGMDV	26	1.71
mcMBL-15	PBMC, LC-MBL	IGHV4-34	100	IGHD5-12	IGHJ4	ARGWLQDQ	8	1.71
mcMBL-15	PBMC, LC-MBL	IGHV3-53	98,95	IGHD3-10	IGHJ4	ARVKSIFYYGY	11	1.71
mcMBL-15	PBMC, LC-MBL	IGHV3-23	100	IGHD6-13	IGHJ3	AKASSSWHYDAFDI	14	1.66
mcMBL-15	PBMC, LC-MBL	IGHV3-23	100	IGHD5-24	IGHJ4	ARSMDIRDGYNLVYFDY	17	1.29
mcMBL-15	PBMC, LC-MBL	IGHV3-21	93,4	IGHD2-21	IGHJ4	ARDSLDCGGDCYSVYYFDC	19	1.21
mcMBL-15	PBMC, LC-MBL	IGHV5-51	93,4	IGHD5-12	IGHJ4	ASRYSGYEPFDY	12	1.19
mcMBL-15	PBMC, LC-MBL	IGHV3-30-3	100	IGHD2-21	IGHJ4	ARDGRGVVVVTAITPSFDY	19	1.11
mcMBL-15	PBMC, LC-MBL	IGHV3-21	100	IGHD3-10	IGHJ3	ARDRHEMGIYGSGSYYNIGAFDI	23	0.98
mcMBL-16	PBMC, LC-MBL	IGHV4-30-4	99,66	IGHD4-17	IGHJ5	ASLHDYGLFDP	11	1.35
mcMBL-16	PBMC, LC-MBL	IGHV4-34	100	IGHD6-19	IGHJ4	ARGRGSSGWYPVPPAGGY	18	1.26
mcMBL-16	PBMC, LC-MBL	IGHV4-31	100	IGHD3-10	IGHJ4	ARVPYYYGSGSYPPDY	16	1.25
mcMBL-16	PBMC, LC-MBL	IGHV3-48	100	IGHD6-13	IGHJ4	ARDTGPSSSWFPNYFDY	17	1.19
mcMBL-16	PBMC, LC-MBL	IGHV3-66	100	IGHD2-15	IGHJ6	ARESVVVGRDGMDV	14	1.19
mcMBL-16	PBMC, LC-MBL	IGHV3-21	100	IGHD1-26	IGHJ4	ARHRYKWELASFDY	14	1.09
mcMBL-16	PBMC, LC-MBL	IGHV4-59	99,65	IGHD5-18	IGHJ5	ARDREGTAMGLNWFDP	16	1.09
mcMBL-16	PBMC, LC-MBL	IGHV3-30	100	IGHD2-15	IGHJ4	AKDREGYCSGGSCYSFDY	18	1.07
mcMBL-16	PBMC, LC-MBL	IGHV4-31	99,66	IGHD3-10	IGHJ6	ARDPGDAGSFYGMDV	15	1.07
mcMBL-16	PBMC, LC-MBL	IGHV4-59	100	IGHD3-9	IGHJ3	AREGIRYFDGPSLGAFDI	18	1.05
mcMBL-16	PBMC, LC-MBL	IGHV3-23	93,06	IGHD2-21	IGHJ4	AKCGGDCYVNSLYGNYSFDH	20	1.05
mcMBL-16	PBMC, LC-MBL	IGHV3-33	95,67	IGHD3-22	IGHJ4	AGDSSGYPLDY	11	1.00
mcMBL-16	PBMC, LC-MBL	IGHV3-9	94,88	IGHD6-13	IGHJ4	AKDSRIAVAGFDY	13	0.99

mcMBL-16	PBMC, LC-MBL	IGHV3-15	97,61	IGHD4-17	IGHJ6	TTDPTVTTVELLGYYYGMDV	20	0.99
mcMBL-16	PBMC, LC-MBL	IGHV4-4	92,79	IGHD6-13	IGHJ4	ASDSGSYWRGGY	12	0.98
mcMBL-16	PBMC, LC-MBL	IGHV4-31	93,55	IGHD1-26	IGHJ6	ARVVELLFRGMDV	13	0.98
mcMBL-16	PBMC, LC-MBL	IGHV3-11	97,34	IGHD3-22	IGHJ6	ARDSTHYYDSRGFRGGYYGMDV	22	0.97
mcMBL-16	PBMC, LC-MBL	IGHV3-30-3	93,68	IGHD3-3	IGHJ4	ARGKTVVIDPFGY	13	0.93
mcMBL-16	PBMC, LC-MBL	IGHV3-23	94,76	IGHD5-18	IGHJ4	ECGMSYGPYCFDY	13	0.93
mcMBL-17	PBMC, LC-MBL	IGHV4-34	89,82	IGHD6-19	IGHJ6	GAVAAVREYYGMDV	14	6.29
mcMBL-17	PBMC, LC-MBL	IGHV3-74	99,65	IGHD2-15	IGHJ6	ARVVYYYYMDV	11	2.24
mcMBL-17	PBMC, LC-MBL	IGHV3-21	100	IGHD1-26	IGHJ4	ARDPYSGSYPDW	12	1.73
mcMBL-17	PBMC, LC-MBL	IGHV3-21	100	IGHD2-15	IGHJ6	ARADCSGGSCWYGMDV	16	1.52
mcMBL-17	PBMC, LC-MBL	IGHV3-11	100	IGHD6-6	IGHJ5	AREAEQHRWFDP	12	1.50
mcMBL-17	PBMC, LC-MBL	IGHV4-34	100	IGHD6-13	IGHJ4	ARGPAIAGYFDY	12	1.50
mcMBL-17	PBMC, LC-MBL	IGHV3-9	100	IGHD3-3	IGHJ6	AKVYHLDYYYGMDV	14	1.48
mcMBL-17	PBMC, LC-MBL	IGHV3-15	100	IGHD7-27	IGHJ6	TTSPSYKRGYYYYMDV	16	1.47
mcMBL-17	PBMC, LC-MBL	IGHV3-48	95,14	IGHD3-10	IGHJ6	VRDDGGQYFYYGMDV	15	1.45
mcMBL-17	PBMC, LC-MBL	IGHV3-33	100	IGHD3-22	IGHJ4	AREVGYYDSSGYYYFDY	17	1.43
mcMBL-17	PBMC, LC-MBL	IGHV4-31	95,53	IGHD4-17	IGHJ4	ARAGDYVDFGY	11	1.38
mcMBL-17	PBMC, LC-MBL	IGHV4-4	100	IGHD3-3	IGHJ6	ARDWRFLEWLLPSYGMDV	18	1.35
mcMBL-17	PBMC, LC-MBL	IGHV3-43	96,88	IGHD6-13	IGHJ4	AKELGRRSWSEVDS	14	1.34
mcMBL-17	PBMC, LC-MBL	IGHV3-48	100	IGHD3-22	IGHJ4	ARDSLTMIVVVTPFYDY	17	1.33
mcMBL-17	PBMC, LC-MBL	IGHV4-59	99,65	IGHD2-8	IGHJ5	ARRPMAFRNGWFDP	14	1.32
mcMBL-17	PBMC, LC-MBL	IGHV3-21	100	IGHD5-24	IGHJ5	ARDRDYYNSPLG	12	1.27
mcMBL-17	PBMC, LC-MBL	IGHV3-33	99,31	IGHD4-17	IGHJ4	ARDGRVYNDYGEIDY	15	1.24
mcMBL-17	PBMC, LC-MBL	IGHV4-34	100	IGHD3-3	IGHJ4	AIRYYDFWSGSLGY	14	1.21
mcMBL-17	PBMC, LC-MBL	IGHV4-59	100	IGHD3-10	IGHJ4	ARVALTMVRGAYPGPFDY	18	1.18
mcMBL-17	PBMC, LC-MBL	IGHV3-7	97,57	IGHD6-19	IGHJ4	AREFGSDWYYFDY	13	1.15
mcMBL-17	PBMC, LC-MBL	IGHV3-30	100	IGHD6-13	IGHJ6	AKDNQRPEYSSSWYYYYYMDV	21	1.12
mcMBL-17	PBMC, LC-MBL	IGHV3-15	100	IGHD3-16	IGHJ4	TTGVYYDYVWGSYRYTLFDY	20	1.10

mcMBL-17	PBMC, LC-MBL	IGHV3-11	100	IGHD2-2	IGHJ6	ARSPYQLLGRIHYYYYGMDV	20	1.09
mcMBL-17	PBMC, LC-MBL	IGHV3-48	100	IGHD6-19	IGHJ6	ARVGYSSGWGGYYYYMDV	18	1.05
mcMBL-17	PBMC, LC-MBL	IGHV3-15	95,66	IGHD3-10	IGHJ4	STDRPFSGATTFDY	14	1.00
mcMBL-17	PBMC, LC-MBL	IGHV4-39	94,63	IGHD6-19	IGHJ4	AREQLVPWYYFDY	13	0.98
mcMBL-17	PBMC, LC-MBL	IGHV3-30	96,35	IGHD6-19	IGHJ4	AKGARIAVAGMDYFDY	16	0.97
mcMBL-17	PBMC, LC-MBL	IGHV3-33	94,58	IGHD3-3	IGHJ6	ARALTFGGVIVE	12	0.96
mcMBL-17	PBMC, LC-MBL	IGHV4-31	98,52	IGHD3-22	IGHJ4	ARVAYYYDSSGYYYLFDN	18	0.95
mcMBL-17	PBMC, LC-MBL	IGHV3-33	97,39	IGHD2-2	IGHJ6	ARDDMRLRGFYYYYYMDV	18	0.95
mcMBL-17	PBMC, LC-MBL	IGHV3-9	95,31	IGHD2-15	IGHJ4	AKDIGGCGGGDCWGSDY	17	0.95
mcMBL-17	PBMC, LC-MBL	IGHV3-15	94,69	IGHD6-6	IGHJ4	ATDSGVGATIGYH	13	0.93
mcMBL-18	PBMC, LC-MBL	IGHV3-48	97,22	IGHD3-10	IGHJ4	ASTMWVGDRNFDY	13	1.37
mcMBL-18	PBMC, LC-MBL	IGHV3-66	99,65	IGHD6-6	IGHJ6	ARGPDYYYYYMDV	13	1.31
mcMBL-18	PBMC, LC-MBL	IGHV4-39	100	IGHD1-7	IGHJ5	ARLPGTTP	8	1.24
mcMBL-18	PBMC, LC-MBL	IGHV4-31	99,66	IGHD6-6	IGHJ4	ARDTHIAARRRYFDY	15	1.22
mcMBL-18	PBMC, LC-MBL	IGHV3-7	99,65	IGHD4-17	IGHJ6	ARAPTSTVNYYYYYMDV	17	1.20
mcMBL-18	PBMC, LC-MBL	IGHV3-7	100	IGHD6-19	IGHJ4	ARDTGGWYEGFDY	13	1.16
mcMBL-18	PBMC, LC-MBL	IGHV3-21	100	IGHD3-22	IGHJ6	ASFIGNYYDSSGTHYYYGMDV	21	1.13
mcMBL-18	PBMC, LC-MBL	IGHV3-30-3	100	IGHD6-13	IGHJ6	ARAWGQIAAAGMDV	14	1.11
mcMBL-18	PBMC, LC-MBL	IGHV3-48	99,65	IGHD5-18	IGHJ4	ARVRGYSYGPLDY	13	1.07
mcMBL-18	PBMC, LC-MBL	IGHV4-4	99,65	IGHD3-22	IGHJ4	ARERYYYDSSGYYTLDY	17	1.07
mcMBL-18	PBMC, LC-MBL	IGHV3-48	100	IGHD5-12	IGHJ4	ARDGYSGYDPDY	12	1.02
mcMBL-18	PBMC, LC-MBL	IGHV4-59	93,56	IGHD6-19	IGHJ4	ARHRSSGWSSTLDY	14	1.00
mcMBL-18	PBMC, LC-MBL	IGHV4-34	96,12	IGHD6-6	IGHJ6	ARVLKPSIAARPLLLYYYYMDV	22	0.99
mcMBL-18	PBMC, LC-MBL	IGHV3-13	94,56	IGHD3-22	IGHJ4	ARGKYYYDSSGYYYFDY	17	0.98
mcMBL-18	PBMC, LC-MBL	IGHV3-30	97,66	IGHD2-2	IGHJ4	AKDWAYCSSTSCSPLDY	17	0.98
mcMBL-18	PBMC, LC-MBL	IGHV4-31	97,16	IGHD3-3	IGHJ4	ARNYYDFWSGYYTSTTYFDY	20	0.97
mcMBL-18	PBMC, LC-MBL	IGHV4-30-4	96,85	IGHD2-2	IGHJ6	AREGHCSSTSCRYGMDV	17	0.96
mcMBL-18	PBMC, LC-MBL	IGHV3-15	93,25	IGHD6-6	IGHJ5	TTVIDYARVFDP	12	0.96

mcMBL-18	PBMC, LC-MBL	IGHV4-4	94,17	IGHD1-26	IGHJ4	AREDSGYDC	9	0.93
mcMBL-18	PBMC, LC-MBL	IGHV4-34	97,42	IGHD2-15	IGHJ6	ARAGRVVAAAGTPPNCYMDV	20	0.92
mcMBL-19	PBMC, LC-MBL	IGHV1-8	95,83	IGHD4-17	IGHJ4	ARGLGADYGDYGAQSDS	17	6.72
mcMBL-19	PBMC, LC-MBL	IGHV3-15	100	IGHD4-17	IGHJ4	TTDYGDYPY	9	1.15
mcMBL-21	PBMC, LC-MBL	IGHV3-23	95,83	IGHD3-16	IGHJ4	AKNEGVGGIYRLYYFDY	17	2.48
mcMBL-21	PBMC, LC-MBL	IGHV3-7	90,62	IGHD2-15	IGHJ4	TTDLGGSSQS	10	1.44
mcMBL-21	PBMC, LC-MBL	IGHV3-11	99,65	IGHD3-22	IGHJ6	ARDFLSWSIYYYYGMDV	17	1.37
mcMBL-22	PBMC, LC-MBL	IGHV3-15	97,96	IGHD6-19	IGHJ4	TIREGNGWYIY	11	1.11
mcMBL-23	PBMC, LC-MBL	IGHV4-59	99,65	IGHD1-1	IGHJ6	ASLDYYYGMDV	11	1.26
mcMBL-23	PBMC, LC-MBL	IGHV3-21	97,92		IGHJ3	ARNDTFDI	8	1.25
mcMBL-23	PBMC, LC-MBL	IGHV3-30	100	IGHD3-10	IGHJ6	ARDIKNYGSGSYYEDYGMDV	20	1.21
mcMBL-23	PBMC, LC-MBL	IGHV1-8	97,57	IGHD3-3	IGHJ5	ARAPRRAGIIIKDWFDP	17	1.20
mcMBL-23	PBMC, LC-MBL	IGHV4-39	100	IGHD3-10	IGHJ6	ARHLGPYGSGQPYYYYGMDV	20	1.19
mcMBL-23	PBMC, LC-MBL	IGHV3-23	100	IGHD6-19	IGHJ4	AKDVQWLANFDY	12	1.11
mcMBL-23	PBMC, LC-MBL	IGHV3-23	95,49	IGHD3-10	IGHJ6	AKDKRGSASYFDYYGMDV	18	1.08
mcMBL-23	PBMC, LC-MBL	IGHV4-34	95,44	IGHD6-25	IGHJ4	ARARMAAPWLGY	12	1.07
mcMBL-23	PBMC, LC-MBL	IGHV3-21	95,14	IGHD6-25	IGHJ4	ARGGSDFDY	9	1.06
mcMBL-23	PBMC, LC-MBL	IGHV3-15	94,22	IGHD4-17	IGHJ4	TTVPYDYGDSYIDY	14	1.05
mcMBL-23	PBMC, LC-MBL	IGHV3-13	91,23	IGHD6-19	IGHJ4	VRGVVRSGWYRYFDF	15	1.04
mcMBL-23	PBMC, LC-MBL	IGHV4-30-2	100	IGHD3-10	IGHJ5	AGLNYGSAAFDP	12	1.03
mcMBL-23	PBMC, LC-MBL	IGHV4-59	94,66	IGHD3-10	IGHJ4	ARTYGSGSYYDY	12	0.99
mcMBL-23	PBMC, LC-MBL	IGHV4-39	92,98	IGHD3-10	IGHJ4	VGYYGSGSSTLNDY	14	0.98
mcMBL-23	PBMC, LC-MBL	IGHV3-23	93,87	IGHD6-13	IGHJ5	AKGGSSWDTYNWFDP	15	0.95
mcMBL-23	PBMC, LC-MBL	IGHV3-74	94,12	IGHD3-22	IGHJ4	VREFAASGYDFDT	13	0.94
bMBL-1	Normal B cells, LC-MBL	IGHV1-18	89,93	IGHD4-11	IGHJ6	ARGTRVTTSPYYYYMDV	17	1.13
meB-4	Memory B cells, Healthy	IGHV4-34	96,84	IGHD2-8	IGHJ6	ANSPPTNNIFYMDL	14	1.77
meB-4	Memory B cells, Healthy	IGHV3-11	94,44	IGHD4-17	IGHJ6	ATTVTGHYYMDV	12	1.42

meB-4	Memory B cells, Healthy	IGHV4-61	89,69	IGHD2-15	IGHJ4	ARVWRVGVGVTEFDY	15	1.35
meB-4	Memory B cells, Healthy	IGHV3-30	93,06	IGHD2-2	IGHJ4	ARGGGCSSTTCYLAFDY	17	1.12
meB-4	Memory B cells, Healthy	IGHV3-73	98,98	IGHD1-20	IGHJ6	TQETYNWNYYYYYYIDV	17	1.09

Supplemental Table 4. List of the IGHV gene repertoire in all sample categories of the present study. Values represent the relative frequency (%) of each individual IGHV gene in each sample category.

	MBL cells, LC-MBL	Normal B cells, LC-MBL	Normal B cells, Healthy
IGHV1-18	4.9	3.1	5.9
IGHV1-2	2.4	2.3	1.7
IGHV1-24	0.3	0.3	1.1
IGHV1-3	1.4	1.2	1.5
IGHV1-45	0	0	0
IGHV1-46	0.4	0.5	0.7
IGHV1-58	0.2	0.3	0.8
IGHV1-69	2.7	3.3	3.1
IGHV1-69-2	0	0	0
IGHV1-8	5.2	1.3	2.2
IGHV2-26	0.4	0.4	4
IGHV2-5	0.8	0.8	0.6
IGHV2-70	0.4	0.5	2.4
IGHV2-70D	0.1	0.2	0.3
IGHV3-11	1.9	3.4	3.2
IGHV3-13	0.4	0.8	0.3
IGHV3-15	2.8	2.4	2.8
IGHV3-20	0.3	0.4	0.7
IGHV3-21	6.2	4.5	3.8
IGHV3-23	7.4	9.2	3.6
IGHV3-30	8.5	7.6	3.8
IGHV3-30-3	2.6	3.6	0.7
IGHV3-33	3.9	4.2	2
IGHV3-43	0.2	0.4	0.4
IGHV3-43D	0.1	0.1	0.1
IGHV3-48	3.3	3.6	3.9
IGHV3-49	0.4	0.5	0.8
IGHV3-53	2	1.9	0.9
IGHV3-64	0.2	0.3	1
IGHV3-64D	0.1	0	0.2
IGHV3-66	1.3	1.1	1
IGHV3-7	5.4	3.3	2
IGHV3-72	0.4	0.3	0.5
IGHV3-73	0.7	0.5	1.7
IGHV3-74	2.5	2.5	1.2

IGHV3-9	1.4	3.3	1.7
IGHV3-NL1	0	0.1	0
IGHV4-28	0.2	0.1	0.1
IGHV4-30-2	0.4	1	1.4
IGHV4-30-4	1.2	1.7	1.3
IGHV4-31	2	3.3	4.6
IGHV4-34	10.6	6.2	13.5
IGHV4-38-2	0.7	1	0.4
IGHV4-39	3.3	4.8	2.6
IGHV4-4	2.8	3.6	3.8
IGHV4-59	5.1	5.8	5.7
IGHV4-61	0.8	2.1	2
IGHV5-10-1	0.2	0.2	0.5
IGHV5-51	1.3	1.2	1.6
IGHV6-1	0.4	0.3	1.6
IGHV7-4-1	0.1	0.3	0.2

Supplemental Table 5. Post-hoc analysis for multiple comparisons using Bonferroni correction**.** The Bonferroni corrected p-values of pairwise comparisons between all sample groups for the 12 IGHV genes with significant differences are depicted. These genes were selected after performing ANOVA, separately for all genes, to evaluate overall differences regarding gene expression among groups, and subsequently selecting those genes which maintained statistically significant results after Bonferroni correction.

	Comparisons between sample categories		
IGHV gene	MBL cells, LC-MBL versus normal B cells, LC-MBL	MBL cells, LC-MBL versus normal B cells, Healthy	normal B cells, LC-MBL versus normal B cells, Healthy
IGHV3-23	0.34	0.04	0
IGHV3-30	1	0.001	0.019
IGHV2-26	1	0	0
IGHV2-70	1	0	0
IGHV3-73	1	0	0
IGHV6-1	1	0	0
IGHV1-58	0.457	0	0.002
IGHV3-NL1	0.001	0.998	0
IGHV1-24	1	0.001	0.001
IGHV1-45	0.095	0	0.128
IGHV4-39	0.024	0.385	0.001
IGHV3-11	0.003	0.004	1

Supplemental Table 6. List of the IGHD gene repertoire in all sample categories of the present study. Values represent the relative frequency (%) of each individual IGHD gene in each sample category.

	MBL cells. LC-MBL	Normal B cells. LC-MBL	Normal B cells, Healthy
IGHD1-1	1.8	1.5	1.9
IGHD1-14	1	1	1.1
IGHD1-20	0.4	0.6	0.5
IGHD1-26	5.1	5.8	5.4
IGHD1-7	1.6	1	1
IGHD2-15	5.4	5.6	5.2
IGHD2-2	7.2	6.6	8.5
IGHD2-21	2.7	3.5	3.4
IGHD2-8	1.6	2	2.2
IGHD3-10	9.5	10	10.9
IGHD3-16	3.3	4.1	4.1
IGHD3-22	7.9	9.1	7.9
IGHD3-3	8.1	6.7	8.1
IGHD3-9	2.9	2.8	3.6
IGHD4-11	2.6	1.9	1.6
IGHD4-17	4.5	4.8	3.9
IGHD4-23	2.3	2.3	2.2
IGHD5-12	3.3	3.3	3.4
IGHD5-18	4.6	4	3.9
IGHD5-24	1.8	2.6	2.2
IGHD6-13	7.9	8	7.6
IGHD6-19	9.2	7.2	6.2
IGHD6-25	0.6	0.7	0.7
IGHD6-6	3.6	3.7	3.2
IGHD7-27	0.7	0.8	0.6
no IGHD	0.5	0.4	0.4

Supplemental Table 7. List of the IGHJ gene repertoire in all sample categories of the present study. Values represent the relative frequency (%) of each individual IGHJ gene in each sample category.

	MBL cells, LC-MBL	Normal B cells, LC-MBL	Normal B cells, Healthy
IGHJ1	2	1.6	1.5
IGHJ2	0.8	0.8	0.7
IGHJ3	8.5	7.4	7
IGHJ4	47.5	45.1	41.1
IGHJ5	11.1	12.5	12.6
IGHJ6	30.1	32.3	37.1

Supplemental Table 8. List of all clusters containing abundant BcR IG clonotypes from the present study.

Sample ID	Sample category	IGHV gene	SHM status, %	IGHD gene	IGHJ gene	CDR3 length	CDR3 sequence	Cluster	Frequency, %
mcMBL-17	PBMC, LC-MBL	IGHV4-31*01 F	98.52	IGHD3-22*01 F	IGHJ4*01 F	18	ARVAYYYDSSGYYYLFDN	CLUSTER-0-0455	0.95
DE-02-0401-H1	CLL	IGHV4-30-4*01 F	100.0	IGHD3-22*01 F	IGHJ3*02 F	18	ARKTYYYDSSGYYDAFDI	CLUSTER-0-0455	
NY-01-1109-H1	CLL	IGHV4-30-4*01 F	99.66	IGHD3-22*01 F	IGHJ3*02 F	18	ARKTYYYDSSGYYDAFDI	CLUSTER-0-0455	
MBL-5	MBL cells, LC-MBL	IGHV1-18*01 F	95.83	IGHD1-14*01 F	IGHJ4*01 F	9	ARDRSNKDY	CLUSTER-0-1211	1.84
IT-05-0225-H1	CLL	IGHV1-18*04 F	96.8	IGHD6-13*01 F	IGHJ4*02 F	9	ARDRSNSDY	CLUSTER-0-1211	
mcMBL-23	PBMC, LC-MBL	IGHV3-21*01 F	97.92		IGHJ3*01 F	8	ARNDTFDI	CLUSTER-0-1292	1.25
NY-01-0589-H1	CLL	IGHV3-48*01 F	98.26		IGHJ3*02 F	8	ARDDAFDI	CLUSTER-0-1292	
RU-01-0048-H1	CLL	IGHV3-53*01 F	98.6		IGHJ3*02 F	8	ARSDAFDI	CLUSTER-0-1292	
MBL-10	MBL cells, LC-MBL	IGHV4-59*01 F	91.58	IGHD3-22*01 F	IGHJ4*01 F	14	ARFTYDSGGHYLQY	CLUSTER-0-2256	4.36
DE-02-0583-H1	CLL	IGHV4-34*02 F	91.58	IGHD3-22*01 F	IGHJ4*02 F	14	ARGTYDTGGYYIDS	CLUSTER-0-2256	
US-01-0069-H1	CLL	IGHV4-59*07 F	95.32	IGHD3-22*01 F	IGHJ4*02 F	14	ARFSYDSGGYYLDY	CLUSTER-0-2256	
mcMBL-23	PBMC, LC-MBL	IGHV3-23*01 F	95.49	IGHD3-10*01 F	IGHJ6*01 F	18	AKDKRGSASYFDYYGMDV	CLUSTER-0-2356	1.08
DE-02-1174-H1	CLL	IGHV3-33*01 F	99.54	IGHD3-10*01 F	IGHJ6*02 F	18	ARDQWGSGSYFYYYGMDV	CLUSTER-0-2356	
NY-01-0511-H1	CLL	IGHV3-23*04 F	90.28	IGHD3-10*01 F	IGHJ6*02 F	18	AKDPDGSGSYPYYYGMDV	CLUSTER-0-2356	
mcMBL-15	PBMC, LC-MBL	IGHV4-34*01 F	100	IGHD6-25*01 F	IGHJ4*01 F	12	ARRRLTQYYFDY	CLUSTER-0-2983	3.28
DK-01-0943-H1	CLL	IGHV4-34*01 F	96.3	IGHD4-17*01 F	IGHJ4*02 F	12	ARRRTVTYYFDY	CLUSTER-0-2983	
mcMBL-18.	PBMC, LC-MBL	IGHV3-48*01 F	100	IGHD5-12*01 F	IGHJ4*01 F	12	ARDGYSGYDPDY	CLUSTER-0-3004	1.02
IT-01-0294-H1	CLL	IGHV3-21*01 F	98.96	IGHD5-12*01 F	IGHJ4*02 F	12	ARDGYSDYDVDF	CLUSTER-0-3004	
mcMBL-16	PBMC, LC-MBL	IGHV3-33*01 F	95.67	IGHD3-22*01 F	IGHJ4*01 F	11	AGDSSGYPLDY	CLUSTER-0-3325	1
DE-03-2380-H1	CLL	IGHV3-7*03 F	96.37	IGHD1-26*01 F	IGHJ4*02 F	11	ARDSSGSYLDY	CLUSTER-0-3325	
FR-01-0218-H1	CLL	IGHV3-33*01 F	87.17	IGHD2-15*01 F	IGHJ4*02 F	11	ARDGSGYNLDY	CLUSTER-0-3325	
mcMBL-15	PBMC, LC-MBL	IGHV3-33*01 F	100	IGHD1-26*01 F	IGHJ4*01 F	11	ARDGPHVGFDY	CLUSTER-0-3359	4.16
ES-01-0196-H1	CLL	IGHV3-33*01 F	98.26	IGHD3-10*01 F	IGHJ4*02 F	11	ARDQTHSGFDY	CLUSTER-0-3359	
mcMBL-17	PBMC, LC-MBL	IGHV3-43*01 F	96.88	IGHD6-13*01 F	IGHJ4*01 F	14	AKELGRRSWSEVDS	CLUSTER-0-3714	1.34
SE-01-0976-H1	CLL	IGHV3-43D*01 F	91.32	IGHD6-13*01 F	IGHJ4*02 F	14	AKEYRARSWSEVDC	CLUSTER-0-3714	
MBL-12	MBL cells, LC-MBL	IGHV3-30-3*01 F	99.65	IGHD1-26*01 F	IGHJ4*01 F	14	AREGEVGATVATDY	CLUSTER-0-3719	1.45
DK-01-0871-H1	CLL	IGHV3-33*01 F	93.7	IGHD1-26*01 F	IGHJ4*02 F	14	AREGEVAATGGFDY	CLUSTER-0-3719	

mcMBL-13	PBMC, LC-MBL	IGHV4-30-4*01 F	96.56	IGHD3-22*01 F	IGHJ6*01 F	17	ARDFNYYDSSDFYGMDV	CLUSTER-0-3819	1.11
HU-01-0125-H1	CLL	IGHV4-34*01 F	97.2	IGHD3-22*01 F	IGHJ6*02 F	17	ARGFNYYDTSGGLGMDV	CLUSTER-0-3819	
MBL-10	MBL cells, LC-MBL	IGHV1-18*01 F	97.57	IGHD6-6*01 F	IGHJ4*01 F	9	ARGEYYFDY	CLUSTER-0-4464	1.1
DE-03-3596-H1	CLL	IGHV5-51*01 F	94.6	IGHD3-3*01 F	IGHJ4*02 F	9	ARRDYTFDY	CLUSTER-0-4464	
mcMBL-14	PBMC, LC-MBL	IGHV3-30*01 F	94.79	IGHD4-11*01 F	IGHJ4*01 F	12	AKGDSSTSCYDL	CLUSTER-0-4536	0.93
GR-01-1071-H1	CLL	IGHV3-53*01 F	94.8	IGHD2-2*01 F	IGHJ4*02 F	12	ARGCSSTSCYLS	CLUSTER-0-4536	
mcMBL-23	PBMC, LC-MBL	IGHV1-8*01 F	97.57	IGHD3-3*01 F	IGHJ5*01 F	17	ARAPRRAGIIIKDWFDP	CLUSTER-0-4924	1.2
DE-02-1279-H1	CLL	IGHV1-8*01 F	92.04	IGHD6-19*01 F	IGHJ5*02 F	17	ARAPARTGVTGKSWFDP	CLUSTER-0-4924	
mcMBL-18	PBMC, LC-MBL	IGHV4-30-4*01 F	96.85	IGHD2-2*01 F	IGHJ6*01 F	17	AREGHCSSTSCRYGMDV	CLUSTER-0-4929	0.96
FR-01-0765-H1	CLL	IGHV4-34*01 F	90.95	IGHD2-2*01 F	IGHJ6*02 F	17	ARHHICTSTRCPYGMDV	CLUSTER-0-4929	
mcMBL-17	PBMC, LC-MBL	IGHV3-21*01 F	100	IGHD2-15*01 F	IGHJ6*01 F	16	ARADCSGGSCWYGMDV	CLUSTER-0-5298	1.52
DE-03-4658-H1	CLL	IGHV3-30*03 F	92.77	IGHD2-15*01 F	IGHJ6*02 F	16	AKWDCSGATCYYGLDV	CLUSTER-0-5298	
mcMBL-15	PBMC, LC-MBL	IGHV4-34*01 F	100	IGHD5-12*01 F	IGHJ4*01 F	8	ARGWLQDQ	CLUSTER-0-5311	1.71
IT-01-0352-H1	CLL	IGHV4-34*01 F	94.9	IGHD1-26*01 F	IGHJ4*02 F	8	ARGWAPDC	CLUSTER-0-5311	
mcMBL-16	PBMC, LC-MBL	IGHV4-31*01 F	99.66	IGHD3-10*01 F	IGHJ6*01 F	15	ARDPGDAGSFYGMDV	CLUSTER-0-5436	1.07
IT-05-0402-H1	CLL	IGHV6-1*01 F	97.5	IGHD6-19*01 F	IGHJ6*02 F	15	AREGPVAGTWYGMDV	CLUSTER-0-5436	
mcMBL-17	PBMC, LC-MBL	IGHV3-15*01 F	95.66	IGHD3-10*01 F	IGHJ4*01 F	14	STDRPFSGATTFDY	CLUSTER-0-5668	1
GR-03-0132-H1	CLL	IGHV3-15*01 F	92.92	IGHD3-10*02 F	IGHJ4*02 F	14	TTDIPFTMARTFAY	CLUSTER-0-5668	
MBL-12	MBL cells, LC-MBL	IGHV3-30*01 F	100	IGHD6-19*01 F	IGHJ4*01 F	10	AKDWSGCLDY	CLUSTER-1-1678	1.42
DE-03-0549-H1	CLL	IGHV3-7*02 F	91.53	IGHD6-13*01 F	IGHJ4*02 F	10	ARDTSGSLDY	CLUSTER-1-1678	
DE-03-2673-H1	CLL	IGHV3-30*03 F	85.54	IGHD3-10*01 F	IGHJ4*02 F	10	AKDRSWSLDY	CLUSTER-1-1678	
DE-03-0447-H1	CLL	IGHV3-21*01 F	94.78	IGHD6-13*01 F	IGHJ4*02 F	10	ARDLDNSLDY	CLUSTER-1-1678	
mcMBL-18	PBMC, LC-MBL	IGHV4-4*01 F	99.65	IGHD3-22*01 F	IGHJ4*01 F	17	ARERYYYDSSGYYTLDY	CLUSTER-1-2173	1.07
DE-02-2819-H1	CLL	IGHV6-1*01 F	100.0	IGHD3-3*01 F	IGHJ4*02 F	17	ARDRYYDFWSGYYVLDY	CLUSTER-1-2173	
mcMBL-17	PBMC, LC-MBL	IGHV4-34*01 F	89.82	IGHD6-19*01 F	IGHJ6*01 F	14	GAVAAVREYYGMDV	CLUSTER-1-2554	6.29
DE-03-2504-H1	CLL	IGHV4-39*01 F	94.82	IGHD6-13*01 F	IGHJ6*02 F	14	GALAADYYYYGMDV	CLUSTER-1-2554	
DK-01-1361-H1	CLL	IGHV4-34*01 F	96.14	IGHD6-19*01 F	IGHJ6*02 F	14	GAVAADSYYYGMDV	CLUSTER-1-2554	
NL-01-0895-H1	CLL	IGHV4-34*01 F	98.64	IGHD6-19*01 F	IGHJ6*02 F	14	GAVAATYYYYGMDV	CLUSTER-1-2554	
NY-01-0556-H1	CLL	IGHV4-34*02 F	92.63	IGHD6-13*01 F	IGHJ6*02 F	14	VAAAAHYYYYGMDV	CLUSTER-1-2554	
UK-03-0135-H1	CLL	IGHV4-34*02 F	96.14	IGHD2-15*01 F	IGHJ6*02 F	14	AAVAATPSYYGMDV	CLUSTER-1-2554	

SE-01-0246-H1	CLL	IGHV4-34*01 F	98.32	IGHD2-15*01 F	IGHJ6*01 F	14	GVVAATRDYYGMDV	CLUSTER-1-2554	
MBL-12	MBL cells, LC-MBL	IGHV3-72*01 F	87.76	IGHD1-1*01 F	IGHJ4*01 F	10	VRENWYRFDY	CLUSTER-1-2625	2.18
DE-02-2156-H1	CLL	IGHV3-48*01 F	90.28	IGHD7-27*01 F	IGHJ4*02 F	10	ARENWGRFDY	CLUSTER-1-2625	
DK-01-0988-H1	CLL	IGHV3-66*01 F	92.98	IGHD2-8*02 F	IGHJ4*02 F	10	ARWAWKRFDY	CLUSTER-1-2625	
DE-02-2433-H1	CLL	IGHV3-72*01 F	92.47	IGHD7-27*01 F	IGHJ4*02 F	10	ARDNWGSFDC	CLUSTER-1-2625	
DK-01-1182-H1	CLL	IGHV3-7*03 F	93.75	IGHD5-12*01 F	IGHJ4*02 F	10	ARENWGPDTP	CLUSTER-1-2625	
MBL-1	MBL cells, LC-MBL	IGHV1-3*01 F	90.28	IGHD5-18*01 F	IGHJ3*01 F	17	ARGIRVGYDYGYDVFDI	CLUSTER-1-3235	86.28
DK-01-0530-H1	CLL	IGHV1-3*01 F	92.01	IGHD2-21*02 F	IGHJ3*02 F	17	ARGIRVGTRYGDDAFDI	CLUSTER-1-3235	
NY-01-0172-H1	CLL	IGHV1-3*01 F	92.71	IGHD4-17*01 F	IGHJ3*01 F	17	ARGIRVGTAYGDDAFNF	CLUSTER-1-3235	
PL-01-0139-H1	CLL	IGHV1-3*01 F	91.84	IGHD5-18*01 F	IGHJ3*02 F	17	VRGVRGGYDYGEDAFDI	CLUSTER-1-3235	
US-01-0041-H1	CLL	IGHV1-3*01 F	93.31	IGHD1-26*01 F	IGHJ3*02 F	17	ARGVRTGTYYGDDAFDI	CLUSTER-1-3235	
DE-03-1861-H1	CLL	IGHV1-3*01 F	88.98	IGHD1-26*01 F	IGHJ3*01 F	17	ARGLRSGWYYGDDAFEV	CLUSTER-1-3235	
RU-01-0272-H1	CLL	IGHV1-3*01 F	92.01	IGHD5-18*01 F	IGHJ3*01 F	17	ARGLRSGYTYGDDAFDF	CLUSTER-1-3235	
mcMBL-14	PBMC, LC-MBL	IGHV3-74*01 F	93.45		IGHJ6*01 F	5	ARERV	CLUSTER-1-3237	0.95
FR-01-1168-H1	CLL	IGHV3-7*03 F	92.71	IGHD1-14*01 ORF	IGHJ1*01 F	5	ARDRS	CLUSTER-1-3237	
DE-02-1411-H1	CLL	IGHV3-7*01 F	90.82		IGHJ4*01 F	5	ARDKD	CLUSTER-1-3237	
MBL-5	MBL cells, LC-MBL	IGHV3-7*01 F	89.24	IGHD6-19*01 F	IGHJ4*01 F	10	ACGGGWLVDS	CLUSTER-1-3314	12.53
GR-01-0176-H2	CLL	IGHV3-7*01 F	93.75	IGHD5-24*01 ORF	IGHJ6*02 F	10	AKGGGHGMDV	CLUSTER-1-3314	
GR-03-0274-H1	CLL	IGHV3-7*01 F	90.5	IGHD2-21*02 F	IGHJ6*02 F	10	AKGGGWDLDV	CLUSTER-1-3314	
DE-03-4511-H1	CLL	IGHV3-7*01 F	91.2	IGHD2-21*01 F	IGHJ4*02 F	10	ASGSGWLVDR	CLUSTER-1-3314	
mcMBL-15	PBMC, LC-MBL	IGHV3-64*01 F	100	IGHD6-19*01 F	IGHJ4*01 F	14	ARGRNIAVAGLLGY	CLUSTER-1-3483	4.09
DE-03-2906-H1	CLL	IGHV3-23*01 F	96.27	IGHD6-13*01 F	IGHJ4*02 F	14	AKGDNIAAAGHFYY	CLUSTER-1-3483	
UK-01-0168-H1	CLL	IGHV3-13*01 F	96.14	IGHD6-19*01 F	IGHJ4*02 F	14	ARGANGAVAGTFDY	CLUSTER-1-3483	
mcMBL-17	PBMC, LC-MBL	IGHV3-74*01 F	99.65	IGHD2-15*01 F	IGHJ6*01 F	11	ARVVYYYYMDV	CLUSTER-1-3561	2.24
DE-03-1379-H1	CLL	IGHV3-11*01 F	95.98		IGHJ6*02 F	11	ARRSYYYAMDI	CLUSTER-1-3561	
IT-06-0257-H1	CLL	IGHV3-30*03 F	94.79	IGHD3-10*01 F	IGHJ6*02 F	11	VTRDYYYGMDV	CLUSTER-1-3561	
SE-01-0655-H1	CLL	IGHV3-48*03 F	94.09	IGHD6-13*01 F	IGHJ6*02 F	11	AGRPLYYGMDV	CLUSTER-1-3561	
mcMBL-15	PBMC, LC-MBL	IGHV4-61*01 F	100	IGHD3-22*01 F	IGHJ6*01 F	26	ARGTRTYYYDSSGYYSPWYYYYGMDV	CLUSTER-2-0082	1.71
RU-01-0667-H1	CLL	IGHV4-31*03 F	100.0	IGHD3-22*01 F	IGHJ6*02 F	26	ARGLRGDYYDSSGYYYVGYYYYGMDV	CLUSTER-2-0082	
IT-02-0123-H1	CLL	IGHV4-34*01 F	100.0	IGHD3-22*01 F	IGHJ6*03 F	26	ARGLRGPGYDSSGYYTWNYYYYYMDV	CLUSTER-2-0082	

DE-02-2934-H1	CLL	IGHV4-59*01 F	100.0	IGHD3-22*01 F	IGHJ6*02 F	26	ARGIQGYYYDSSGYYYHDTYYYGMDV	CLUSTER-2-0082	
DE-02-4439-H1	CLL	IGHV4-61*01 F	100.0	IGHD3-22*01 F	IGHJ6*02 F	26	ARVGGGEYYDSSGYYYVGYYYYGMDV	CLUSTER-2-0082	
DE-03-3121-H1	CLL	IGHV4-59*01 F	100.0	IGHD3-22*01 F	IGHJ6*02 F	26	ARAPGGDYYDSSGYYYVGYYYYGMDV	CLUSTER-2-0082	
DE-03-3300-H1	CLL	IGHV4-59*01 F	100.0	IGHD3-22*01 F	IGHJ6*02 F	26	ARANGGDYYDSSGYYYVGYYYYGMDV	CLUSTER-2-0082	
ES-01-0208-H1	CLL	IGHV4-59*01 F	100.0	IGHD3-22*01 F	IGHJ6*02 F	26	ARARGLNYYDSSGYYYLNYYYYGMDV	CLUSTER-2-0082	
GR-02-0278-H1	CLL	IGHV4-59*01 F	100.0	IGHD3-22*01 F	IGHJ6*02 F	26	ARAPGPDYYDSSGYYYVGYYYYGMDV	CLUSTER-2-0082	
IT-02-0370-H1	CLL	IGHV4-59*01 F	100.0	IGHD3-22*01 F	IGHJ6*02 F	26	ARCIGGDYYDSSGYYYVSYYYYGMDV	CLUSTER-2-0082	
CZ-01-0087-H1	CLL	IGHV4-61*01 F	100.0	IGHD3-22*01 F	IGHJ6*02 F	26	ARAVSGDYYDSSGYYYVGYYYYGMDV	CLUSTER-2-0082	
CZ-01-1602-H1	CLL	IGHV4-30-4*01 F	100.0	IGHD3-22*01 F	IGHJ6*02 F	26	ARVKRGDYYDSSGYYYVGYYYYGMDV	CLUSTER-2-0082	
DE-02-2982-H1	CLL	IGHV4-30-4*01 F	100.0	IGHD3-22*01 F	IGHJ6*02 F	26	ARALRGDYYDSSGYYYVGYYYYGMDV	CLUSTER-2-0082	
DE-02-4310-H1	CLL	IGHV4-39*01 F	100.0	IGHD3-22*01 F	IGHJ6*02 F	26	ARHASGDYYDSSGYYYVQFYYYGMDV	CLUSTER-2-0082	
DE-03-1212-H1	CLL	IGHV4-38-2*01 F	100.0	IGHD3-22*01 F	IGHJ6*02 F	26	ARGGEGDYYDSSGYYYVWAYYYGMDV	CLUSTER-2-0082	
DE-03-3496-H1	CLL	IGHV4-59*01 F	100.0	IGHD3-22*01 F	IGHJ6*02 F	26	ARDQRGDYYDSSGYYYVGYYYYGMDV	CLUSTER-2-0082	
PL-01-0030-H1	CLL	IGHV4-38-2*01 F	100.0	IGHD3-22*01 F	IGHJ6*02 F	26	ARQVDGDYYDSSGYYYIYYYYYGMDV	CLUSTER-2-0082	
RU-01-0084-H1	CLL	IGHV4-59*01 F	99.65	IGHD3-22*01 F	IGHJ6*02 F	26	ARAIKGDYYDSYGYYSLGYYYYGMDV	CLUSTER-2-0082	
RU-01-0531-H1	CLL	IGHV4-59*08 F	96.08	IGHD3-22*01 F	IGHJ6*03 F	26	GRNLRGDYYDSSGYYFVGFSYYYMDV	CLUSTER-2-0082	
DE-02-3741-H1	CLL	IGHV4-61*01 F	100.0	IGHD3-22*01 F	IGHJ6*01 F	26	ARDPHGGYYDSSGYYYVDYYYYGMDV	CLUSTER-2-0082	
PL-01-0284-H1	CLL	IGHV4-59*01 F	100.0	IGHD3-22*01 F	IGHJ6*02 F	26	ARSGPSDYYDSSGYYYVGYYYYGMDV	CLUSTER-2-0082	
US-01-1222-H1	CLL	IGHV4-59*01 F	100.0	IGHD3-22*01 F	IGHJ6*02 F	26	ARSLGSDYYDSSGYYYVLYYYYGMDV	CLUSTER-2-0082	
mcMBL-23	PBMC, LC-MBL	IGHV4-59*01 F	94.66	IGHD3-10*01 F	IGHJ4*01 F	12	ARTYGSGSYYDY	CLUSTER-2-0088	0.99
DE-03-4177-H1	CLL	IGHV4-59*01 F	93.33	IGHD6-6*01 F	IGHJ4*02 F	12	ARTYGSSFYFDY	CLUSTER-2-0088	
NY-01-0158-H1	CLL	IGHV4-4*02 F	93.06	IGHD1-26*01 F	IGHJ4*02 F	12	ARTIGSGSYLDH	CLUSTER-2-0088	
IT-02-0740-H1	CLL	IGHV4-34*01 F	95.44	IGHD3-10*01 F	IGHJ4*02 F	12	ARAYGSGSYLFY	CLUSTER-2-0088	
DE-03-4476-H1	CLL	IGHV4-31*03 F	94.85	IGHD3-10*01 F	IGHJ4*02 F	12	ACAYGSGSYVDF	CLUSTER-2-0088	
MBL-12	MBL cells, LC-MBL	IGHV4-34*01 F	96.49	IGHD2-2*01 F	IGHJ4*01 F	16	ARGGGYCSSTSCYHDY	CLUSTER-2-0128	1.57
CZ-01-0692-H1	CLL	IGHV4-34*01 F	93.33	IGHD2-2*01 F	IGHJ4*02 F	16	ARGGGYCSGTSCYEDS	CLUSTER-2-0128	
DK-01-0764-H1	CLL	IGHV4-34*01 F	96.84	IGHD2-2*02 F	IGHJ4*02 F	16	ARGGGYCSGTSCYTDY	CLUSTER-2-0128	
UK-03-0178-H1	CLL	IGHV4-34*01 F	94.04	IGHD2-15*01 F	IGHJ4*02 F	16	ARGGGYCSGGSCYEDY	CLUSTER-2-0128	
AT-01-0145-H2	CLL	IGHV4-34*02 F	97.54	IGHD2-2*01 F	IGHJ4*02 F	16	ARGGGYCSSPSCFPDY	CLUSTER-2-0128	
DE-03-4878-H1	CLL	IGHV4-34*01 F	89.8	IGHD2-8*02 F	IGHJ4*02 F	16	ARGGGYCIGSSCYIDN	CLUSTER-2-0128	

DK-01-0693-H1	CLL	IGHV4-34*01 F	97.89	IGHD2-2*01 F	IGHJ4*02 F	16	ARGGGYCRSSSCYVDF	CLUSTER-2-0128	
GR-01-0038-H1	CLL	IGHV4-34*08 F	93.1	IGHD2-2*01 F	IGHJ4*01 F	16	ARGGGYCGSSSCYVDY	CLUSTER-2-0128	
IT-07-0402-H1	CLL	IGHV4-34*01 F	92.28	IGHD2-2*01 F	IGHJ4*01 F	16	ARGGGYCGVTSCYDDF	CLUSTER-2-0128	
GR-03-0350-H1	CLL	IGHV4-34*01 F	92.83	IGHD2-15*01 F	IGHJ4*02 F	16	ARGLRYCAGGSCYLDL	CLUSTER-2-0128	
mcMBL-16	PBMC, LC-MBL	IGHV3-30*01 F	100	IGHD2-15*01 F	IGHJ4*01 F	18	AKDREGYCSGGSCYSFDY	CLUSTER-2-0447	1.07
CZ-01-0167-H1	CLL	IGHV3-74*01 F	93.06	IGHD2-15*01 F	IGHJ4*02 F	18	ARGVPGPCGGGSCYYFDC	CLUSTER-2-0447	
DK-01-1015-H1	CLL	IGHV3-74*01 F	94.44	IGHD2-15*01 F	IGHJ4*02 F	18	ARGVRGYCGGGSCYYFDY	CLUSTER-2-0447	
SE-01-1077-H1	CLL	IGHV3-74*01 F	96.34	IGHD2-15*01 F	IGHJ4*02 F	18	ARGVPGYCSGGSCYFFDD	CLUSTER-2-0447	
NY-01-0053-H1	CLL	IGHV3-74*01 F	97.57	IGHD3-22*01 F	IGHJ4*02 F	18	ARGAPGYDRSGSLYYFDY	CLUSTER-2-0447	
FR-01-0759-H1	CLL	IGHV3-30*03 F	98.2	IGHD2-15*01 F	IGHJ4*02 F	18	AKDNKEGYCSGGSCYSDY	CLUSTER-2-0447	
MBL-2	MBL cells, LC-MBL	IGHV3-30*01 F	93.4	IGHD2-2*01 F	IGHJ4*01 F	14	AKDHGSTSWYYLDY	CLUSTER-2-0482	69.1
DE-02-1696-H1	CLL	IGHV3-23*01 F	92.75	IGHD6-19*01 F	IGHJ4*02 F	14	AKDLGSSGWYYFDY	CLUSTER-2-0482	
DE-03-1982-H1	CLL	IGHV3-74*03 F	93.98	IGHD6-13*01 F	IGHJ4*02 F	14	ARESYSSTWYGPDI	CLUSTER-2-0482	
HU-01-0172-H1	CLL	IGHV3-74*01 F	89.8	IGHD6-13*01 F	IGHJ2*01 F	14	ARESYSSDWYGPDK	CLUSTER-2-0482	
IT-05-0152-H1	CLL	IGHV3-74*01 F	95.47	IGHD6-13*01 F	IGHJ4*02 F	14	AREAYSSTWYGPDH	CLUSTER-2-0482	
DE-02-1832-H1	CLL	IGHV3-23*01 F	93.98	IGHD6-6*01 F	IGHJ6*02 F	14	AKEGGSSSWYGIDV	CLUSTER-2-0482	
mcMBL-17	PBMC, LC-MBL	IGHV3-11*01 F	100	IGHD2-2*01 F	IGHJ6*01 F	20	ARSPYQLLGRIHYYYYGMDV	CLUSTER-2-0501	1.09
DE-01-0024-H1	CLL	IGHV3-30*03 F	100.0	IGHD2-2*02 F	IGHJ6*02 F	20	AKDLYQLLYPNRYYYYGMDV	CLUSTER-2-0501	
RU-01-0152-H1	CLL	IGHV3-9*01 F	100.0	IGHD2-2*02 F	IGHJ6*02 F	20	AKDRQLLLYPSYYYYYGMDV	CLUSTER-2-0501	
DE-02-3511-H1	CLL	IGHV3-48*03 F	100.0	IGHD1-26*01 F	IGHJ6*03 F	20	ARSAWELLLRVYYYYYYMDV	CLUSTER-2-0501	
mcMBL-17	PBMC, LC-MBL	IGHV3-33*01 F	100	IGHD3-22*01 F	IGHJ4*01 F	17	AREVGYYDSSGYYYFDY	CLUSTER-2-0525	1.43
mcMBL-18	PBMC, LC-MBL	IGHV3-13*01 F	94.56	IGHD3-22*01 F	IGHJ4*01 F	17	ARGKYYYDSSGYYYFDY	CLUSTER-2-0525	0.98
DE-03-2760-H1	CLL	IGHV3-74*01 F	92.11	IGHD3-22*01 F	IGHJ4*02 F	17	ARVRYYDNSGGYRDFDY	CLUSTER-2-0525	
GR-01-0317-H1	CLL	IGHV3-7*03 F	95.14	IGHD3-22*01 F	IGHJ4*02 F	17	ARGRYYDSSGFYHYFDY	CLUSTER-2-0525	
DE-03-2559-H1	CLL	IGHV3-74*03 F	93.95	IGHD3-22*01 F	IGHJ4*02 F	17	AKMNYYDSSGFYGYFDS	CLUSTER-2-0525	
ES-01-0331-H1	CLL	IGHV3-33*01 F	100.0	IGHD3-22*01 F	IGHJ6*02 F	17	ARTYYYDSSGRYYGMDV	CLUSTER-2-0525	
DE-02-4371-H1	CLL	IGHV3-33*01 F	95.17	IGHD3-22*01 F	IGHJ4*02 F	17	ARASYYYDSGGYYPIDY	CLUSTER-2-0525	
mcMBL-21	PBMC, LC-MBL	IGHV3-7*01 F	90.62	IGHD2-15*01 F	IGHJ4*01 F	10	TTDLGGSSQS	CLUSTER-2-0601	1.44
CZ-01-1332-H1	CLL	IGHV3-72*01 F	92.86	IGHD4-17*01 F	IGHJ5*01 F	10	TTDAQGSPDS	CLUSTER-2-0601	
DE-03-3473-H1	CLL	IGHV3-15*01 F	93.04	IGHD2-21*02 F	IGHJ4*02 F	10	STDKQLSPDY	CLUSTER-2-0601	

DE-02-0695-H1	CLL	IGHV3-15*01 F	93.43	IGHD3-16*02 F	IGHJ4*02 F	10	TTDKQLSADY	CLUSTER-2-0601	
MBL-3	MBL cells, LC-MBL	IGHV1-8*01 F	95.83	IGHD6-13*01 F	IGHJ4*01 F	10	ARGLADNTDY	CLUSTER-2-0602	97.55
GR-02-0114-H1	CLL	IGHV1-8*01 F	92.71	IGHD2-15*01 F	IGHJ4*01 F	10	ARGLADSRDY	CLUSTER-2-0602	
GR-03-0096-H1	CLL	IGHV1-8*01 F	95.1	IGHD4-23*01 ORF	IGHJ4*02 F	10	ARGLDGGRDY	CLUSTER-2-0602	
DE-02-4772-H2	CLL	IGHV1-8*01 F	96.53	IGHD3-16*01 F	IGHJ5*02 F	10	ARGLGEGGDA	CLUSTER-2-0602	
GR-02-0075-H1	CLL	IGHV1-8*01 F	96.84	IGHD4-17*01 F	IGHJ4*03 F	10	ARGLGVDGDS	CLUSTER-2-0602	
GR-02-0550-H1	CLL	IGHV1-8*01 F	95.83	IGHD3-10*01 F	IGHJ4*02 F	10	ARGLAEGGDS	CLUSTER-2-0602	
US-01-0922-H1	CLL	IGHV1-46*01 F	92.34	IGHD4-23*01 ORF	IGHJ4*02 F	10	ARGIDENADY	CLUSTER-2-0602	
IT-07-0239-H1	CLL	IGHV1-8*01 F	95.14	IGHD4-17*01 F	IGHJ4*02 F	10	ARGLDDHGDG	CLUSTER-2-0602	
CZ-01-1879-H1	CLL	IGHV1-8*01 F	96.18	IGHD2-21*02 F	IGHJ4*02 F	10	ARGLEGDHDC	CLUSTER-2-0602	
GR-02-0009-H1	CLL	IGHV1-2*02 F	100.0	IGHD2-2*01 F	IGHJ6*01 F	10	ARGQAYGMDV	CLUSTER-2-0602	
UK-01-0417-H1	CLL	IGHV1-3*01 F	89.58		IGHJ6*02 F	10	ARDNYYGMDV	CLUSTER-2-0602	
mcMBL-15	PBMC, LC-MBL	IGHV4-31*01 F	100	IGHD3-22*01 F	IGHJ6*01 F	17	ARAVYDSSGYFYYGMDV	CLUSTER-2-0604	2.93
US-01-1142-H1	CLL	IGHV4-59*07 F	100.0	IGHD3-22*01 F	IGHJ6*02 F	17	ARDPADSSGWNYYGMDV	CLUSTER-2-0604	
mcMBL-17	PBMC, LC-MBL	IGHV3-9*01 F	100	IGHD3-3*01 F	IGHJ6*01 F	14	AKVYHLDYYYGMDV	CLUSTER-2-0617	1.48
IT-02-0347-H1	CLL	IGHV3-30*02 F	89.24	IGHD1-1*01 F	IGHJ6*03 F	14	AKGPHLDYYYYMEV	CLUSTER-2-0617	
DK-01-0245-H1	CLL	IGHV3-21*01 F	90.97	IGHD2-8*01 F	IGHJ6*03 F	14	ARGPYADSYYYMDV	CLUSTER-2-0617	
meB-4	Memory B cells, Healthy	IGHV3-30*01 F	93.06	IGHD2-2*01 F	IGHJ4*01 F	17	ARGGGCSSTTCYLAFDY	CLUSTER-3-0104	1.12
CZ-01-0459-H1	CLL	IGHV3-72*01 F	97.62	IGHD2-2*01 F	IGHJ4*02 F	17	ARVRYCSSTSCRGALDY	CLUSTER-3-0104	
GR-02-0620-H1	CLL	IGHV3-23*01 F	95.83	IGHD2-2*02 F	IGHJ4*02 F	17	AKDRHCSSTSCHTGFDY	CLUSTER-3-0104	
DE-03-4880-H1	CLL	IGHV3-72*01 F	96.06	IGHD2-2*01 F	IGHJ3*02 F	17	ARVGYCSSTTCRQAFDI	CLUSTER-3-0104	
NL-01-1271-H1	CLL	IGHV3-21*01 F	95.52	IGHD2-2*01 F	IGHJ5*02 F	17	ARGAYCSSTSCYDWFDP	CLUSTER-3-0104	
NL-04-0117-H1	CLL	IGHV3-72*01 F	98.3	IGHD2-2*03 F	IGHJ3*02 F	17	ARVAYCSSTTCRQAFDI	CLUSTER-3-0104	
FR-01-0240-H1	CLL	IGHV3-23*01 F	92.83	IGHD2-2*03 F	IGHJ4*02 F	17	AKSEYCSSTSCYASFDH	CLUSTER-3-0104	
UK-01-0565-H1	CLL	IGHV3-74*01 F	95.88	IGHD2-2*01 F	IGHJ4*01 F	17	ARALDCSSTSCYRHFDN	CLUSTER-3-0104	
MBL-7	MBL cells, LC-MBL	IGHV2-5*01 F	93.47	IGHD2-2*01 F	IGHJ5*01 F	17	ANRRQYNTNWDAGWFDP	CLUSTER-4-0003	97.15
IT-01-0034-H1	CLL	IGHV2-5*02 F	95.19	IGHD1-7*01 F	IGHJ4*02 F	17	AHRLHLQRDWNYGRFDY	CLUSTER-4-0003	
IT-05-0052-H1	CLL	IGHV2-5*02 F	95.88	IGHD1-7*01 F	IGHJ4*02 F	17	AHRLIGRRDWNYGTFDY	CLUSTER-4-0003	
PL-01-0313-H1	CLL	IGHV2-5*02 F	92.63	IGHD1-7*01 F	IGHJ4*02 F	17	AHRLTLQGDWNYGDFDY	CLUSTER-4-0003	
UK-01-0273-H1	CLL	IGHV2-5*02 F	93.47	IGHD1-7*01 F	IGHJ4*02 F	17	AHRRFLHGDWNYGDFDY	CLUSTER-4-0003	

US-01-0620-H1	CLL	IGHV2-5*02 F	93.73	IGHD1-7*01 F	IGHJ4*02 F	17	AHRRLISGNWNYGDFDY	CLUSTER-4-0003
CZ-01-0909-H1	CLL	IGHV2-5*02 F	94.85	IGHD1-7*01 F	IGHJ4*02 F	17	AHRQWLMSDWNFGYFDY	CLUSTER-4-0003
DE-02-0147-H1	CLL	IGHV2-5*02 F	97.41	IGHD6-19*01 F	IGHJ4*02 F	17	AHRLIKMSDWNCGYFDY	CLUSTER-4-0003
NL-04-0025-H1	CLL	IGHV2-5*02 F	91.41	IGHD2-21*02 F	IGHJ4*02 F	17	AHRRALASDWNFGYFDY	CLUSTER-4-0003
NL-01-0695-H1	CLL	IGHV2-5*02 F	89.16	IGHD3-3*01 F	IGHJ4*02 F	17	ARRRERFSQWLSGDFDY	CLUSTER-4-0003
US-01-1360-H1	CLL	IGHV2-5*02 F	91.75	IGHD3-9*01 F	IGHJ4*02 F	17	AHRRFRYSDWVSGDFDY	CLUSTER-4-0003
CZ-01-1652-H1	CLL	IGHV2-5*02 F	94.85	IGHD1-1*01 F	IGHJ4*02 F	17	AHRLRGRDIWNDGDFDY	CLUSTER-4-0003
DK-01-0206-H1	CLL	IGHV2-5*02 F	93.13	IGHD1-7*01 F	IGHJ4*02 F	17	AHRRRGPDIWNYGDFDY	CLUSTER-4-0003
DE-03-3016-H1	CLL	IGHV2-5*02 F	95.88	IGHD4-17*01 F	IGHJ4*02 F	17	AHRLATGSPWPWGYFDY	CLUSTER-4-0003
NL-01-1260-H1	CLL	IGHV2-5*02 F	91.41	IGHD3-10*01 F	IGHJ4*02 F	17	AHRLRMGAPWSWGTFDY	CLUSTER-4-0003
UK-01-0013-H1	CLL	IGHV2-5*02 F	92.34	IGHD1-26*01 F	IGHJ4*02 F	17	AHRLATGSPWTWGYFDY	CLUSTER-4-0003
US-01-1139-H1	CLL	IGHV2-5*02 F	94.12	IGHD4-23*01 ORF	IGHJ4*02 F	17	AHRLALGPPWTWGYFDY	CLUSTER-4-0003
IT-02-0220-H1	CLL	IGHV2-5*02 F	92.78	IGHD1-1*01 F	IGHJ4*02 F	17	GHRVITGSPWDGGFFDY	CLUSTER-4-0003
DE-03-2774-H1	CLL	IGHV2-5*02 F	94.16	IGHD3-10*01 F	IGHJ4*02 F	17	AHRGYLYGSWDVGWFDY	CLUSTER-4-0003
NL-04-0173-H1	CLL	IGHV2-5*02 F	95.88	IGHD2-2*02 F	IGHJ4*02 F	17	AHRRFLSGSWDTGYFDY	CLUSTER-4-0003
NY-01-1026-H1	CLL	IGHV2-5*02 F	93.81	IGHD3-9*01 F	IGHJ4*02 F	17	AHRGTLSGFWDTGYFDY	CLUSTER-4-0003
DK-01-0081-H1	CLL	IGHV2-5*02 F	92.1	IGHD1-20*01 F	IGHJ4*02 F	17	AHRRELQGSWSEGYFDY	CLUSTER-4-0003
DE-02-3635-H1	CLL	IGHV2-5*02 F	94.3	IGHD6-13*01 F	IGHJ4*02 F	17	AHRRGPSVSWDGGYFDY	CLUSTER-4-0003
DK-01-0925-H1	CLL	IGHV2-5*02 F	96.91	IGHD1-1*01 F	IGHJ4*02 F	17	AHRRGYASNWDVGYFDY	CLUSTER-4-0003
US-01-0554-H1	CLL	IGHV2-5*02 F	90.79	IGHD6-13*01 F	IGHJ5*02 F	17	AHRRQYSGNWDVGWFDP	CLUSTER-4-0003
DE-02-3283-H1	CLL	IGHV2-5*02 F	91.45	IGHD2-21*01 F	IGHJ4*02 F	17	AHRSISGSPWAKAYFDY	CLUSTER-4-0003
DE-03-4343-H1	CLL	IGHV2-5*02 F	92.44	IGHD2-15*01 F	IGHJ4*02 F	17	AHRRGSGSPWDNAYFDY	CLUSTER-4-0003
US-01-0229-H1	CLL	IGHV2-5*02 F	92.97	IGHD3-16*01 F	IGHJ4*02 F	17	AHRLASGSPWVNAYFDY	CLUSTER-4-0003
RU-01-0308-H1	CLL	IGHV2-5*02 F	92.31	IGHD2-15*01 F	IGHJ4*02 F	17	AHRSRRGSPWALSYFDY	CLUSTER-4-0003
DE-03-0064-H1	CLL	IGHV2-5*02 F	91.24	IGHD3-3*01 F	IGHJ4*02 F	17	AHRRQHNGNWDFGDFDY	CLUSTER-4-0003
UK-01-0701-H1	CLL	IGHV2-5*02 F	95.19	IGHD1-7*01 F	IGHJ4*02 F	17	AHRRQLNGNWDGGHFDY	CLUSTER-4-0003
DE-03-0266-H1	CLL	IGHV2-5*02 F	90.55	IGHD1-1*01 F	IGHJ3*01 F	17	AHRVYLNGNWDGGVFDV	CLUSTER-4-0003
DE-03-3116-H1	CLL	IGHV2-5*02 F	91.29	IGHD1-1*01 F	IGHJ4*02 F	17	ARRGWLAGNWDGGYFDY	CLUSTER-4-0003
AT-01-0113-H1	CLL	IGHV2-5*02 F	92.78	IGHD1-7*01 F	IGHJ4*02 F	17	AHRQMKMRDWNYGEFDY	CLUSTER-4-0003
DE-02-5072-H1	CLL	IGHV2-5*02 F	93.42	IGHD1-1*01 F	IGHJ4*02 F	17	AHRRVRMRDWNHGDFDY	CLUSTER-4-0003

IT-05-0189-H1	CLL	IGHV2-5*02 F	95.88	IGHD2-15*01 F	IGHJ4*02 F	17	AHRRQLGGSWNYGDFDY	CLUSTER-4-0003
UK-01-0510-H1	CLL	IGHV2-5*02 F	91.07	IGHD2-21*01 F	IGHJ4*02 F	17	AHRRYIGGYWDYGDFDY	CLUSTER-4-0003
DK-01-1541-H1	CLL	IGHV2-5*02 F	93.13	IGHD6-13*01 F	IGHJ4*02 F	17	AHRRVYSGSWSYGDFDY	CLUSTER-4-0003
ES-01-0205-H1	CLL	IGHV2-5*02 F	95.88	IGHD1-7*01 F	IGHJ4*02 F	17	AHRRPQSSSWDYGDFDF	CLUSTER-4-0003
IT-01-0310-H1	CLL	IGHV2-5*02 F	99.66	IGHD3-10*01 F	IGHJ4*02 F	17	AHRRVGSRSWDVGDFDY	CLUSTER-4-0003
DE-03-3400-H1	CLL	IGHV2-5*02 F	96.56	IGHD3-3*01 F	IGHJ4*02 F	17	AHRRAYHGVWDGGNFDY	CLUSTER-4-0003
GR-01-0107-H1	CLL	IGHV2-5*02 F	95.4	IGHD2-21*01 F	IGHJ4*02 F	17	AHRRDYYGAWDEGYFDY	CLUSTER-4-0003
NL-01-0583-H1	CLL	IGHV2-5*02 F	89.56	IGHD2-15*01 F	IGHJ3*02 F	17	AHRRDYNGLWDGGTFDI	CLUSTER-4-0003
CZ-01-1411-H1	CLL	IGHV2-5*02 F	93.47	IGHD5-12*01 F	IGHJ4*02 F	17	AHRRIVGSPWGHYYFDY	CLUSTER-4-0003
DE-03-2121-H1	CLL	IGHV2-5*02 F	96.36	IGHD1-26*01 F	IGHJ4*02 F	17	AHRLASGAPWGMYYFDY	CLUSTER-4-0003
NL-04-0089-H1	CLL	IGHV2-5*02 F	98.28	IGHD6-13*01 F	IGHJ4*02 F	17	AHRVAAGSPWGSYYFDY	CLUSTER-4-0003
DE-03-3486-H1	CLL	IGHV2-5*02 F	93.13	IGHD1-26*01 F	IGHJ4*02 F	17	AHRRIVGGPWARGEYDY	CLUSTER-4-0003
FR-01-0712-H1	CLL	IGHV2-5*02 F	93.81	IGHD2-15*01 F	IGHJ4*02 F	17	AHRRIVGGPWVRVDFDY	CLUSTER-4-0003
DE-03-0094-H1	CLL	IGHV2-5*02 F	92.36	IGHD2-2*01 F	IGHJ4*02 F	17	AHRLPSDSPWDWGYFDY	CLUSTER-4-0003
DK-01-1564-H1	CLL	IGHV2-5*02 F	93.47	IGHD2-15*01 F	IGHJ3*02 F	17	AHRLRRGSPWEWGAFDI	CLUSTER-4-0003
IT-05-0506-H1	CLL	IGHV2-5*02 F	92.44	IGHD3-10*01 F	IGHJ4*02 F	17	AHRLPSGSPWDWGDFDF	CLUSTER-4-0003
AT-01-0087-H1	CLL	IGHV2-5*02 F	95.19	IGHD1-7*01 F	IGHJ5*01 F	17	ANRRPQGHSWDYGVFDS	CLUSTER-4-0003
DE-03-2539-H1	CLL	IGHV2-5*02 F	94.16	IGHD4-17*01 F	IGHJ4*02 F	17	AHRMQHNGDWDVGYFDS	CLUSTER-4-0003
DK-01-0302-H1	CLL	IGHV2-5*02 F	92.44	IGHD1-7*01 F	IGHJ3*01 F	17	AHRQYQMSDWNYGVFDF	CLUSTER-4-0003
NL-01-0926-H1	CLL	IGHV2-5*02 F	94.17	IGHD1-26*01 F	IGHJ4*02 F	17	AHRRAYGGSWNYGEFDY	CLUSTER-4-0003
US-01-1358-H1	CLL	IGHV2-5*02 F	93.47	IGHD6-19*01 F	IGHJ4*02 F	17	AHRRAGGGGWNEGYFDS	CLUSTER-4-0003
CZ-01-1028-H1	CLL	IGHV2-5*02 F	93.13	IGHD6-19*01 F	IGHJ4*02 F	17	AHRRPGSAGWNEGLFDY	CLUSTER-4-0003
DE-02-3681-H1	CLL	IGHV2-5*02 F	92.64	IGHD1-1*01 F	IGHJ4*02 F	17	AHRHPLMSTWDHGSFDF	CLUSTER-4-0003
NY-01-0151-H1	CLL	IGHV2-5*02 F	93.13	IGHD2-2*01 F	IGHJ4*02 F	17	AHRRHQGDTWSYGAFDY	CLUSTER-4-0003
DK-01-1589-H1	CLL	IGHV2-5*02 F	91.07	IGHD2-21*02 F	IGHJ3*01 F	17	ARRQSYNGAWDGGVLDV	CLUSTER-4-0003
DE-03-0496-H1	CLL	IGHV2-5*02 F	93.09	IGHD1-1*01 F	IGHJ4*02 F	17	AHRRGPYTNWDDADFDY	CLUSTER-4-0003
DE-02-4636-H1	CLL	IGHV2-5*02 F	93.42	IGHD6-13*01 F	IGHJ4*01 F	17	AHRRPTSSSWFLVYFDY	CLUSTER-4-0003
DE-03-1733-H1	CLL	IGHV2-5*02 F	93.13	IGHD2-8*01 F	IGHJ3*02 F	17	AHRISLNQKWDEAAFDI	CLUSTER-4-0003
DE-03-1240-H1	CLL	IGHV2-5*02 F	93.13	IGHD6-19*01 F	IGHJ4*02 F	17	AHRLLGSGGWDVGVFDY	CLUSTER-4-0003
DK-01-0800-H1	CLL	IGHV2-5*02 F	93.81	IGHD6-19*01 F	IGHJ4*02 F	17	VHRQPNSGGWDTGCFDY	CLUSTER-4-0003

UK-03-0188-H1	CLL	IGHV2-5*02 F	90.38	IGHD6-19*01 F	IGHJ4*02 F	17	AHRQIGSGDWDHGTFDY	CLUSTER-4-0003
US-01-1257-H1	CLL	IGHV2-5*02 F	92.55	IGHD3-3*01 F	IGHJ4*03 F	17	AHRKIGSGGWDVGAFDY	CLUSTER-4-0003
US-01-1283-H1	CLL	IGHV2-5*02 F	95.31	IGHD3-10*02 F	IGHJ4*02 F	17	VHRQIGSGSWDVGVFDY	CLUSTER-4-0003
DE-02-0221-H1	CLL	IGHV2-5*02 F	92.78	IGHD5-12*01 F	IGHJ4*02 F	17	AHRRPYHGNWNWGDFDY	CLUSTER-4-0003
NL-04-0160-H1	CLL	IGHV2-5*02 F	93.81	IGHD3-3*01 F	IGHJ4*02 F	17	AHRRPYQGLWDWGDFDF	CLUSTER-4-0003
DK-01-0379-H1	CLL	IGHV2-5*02 F	94.16	IGHD1-7*01 F	IGHJ5*02 F	17	AHRLPFSINWNYGWFDP	CLUSTER-4-0003
NL-01-1206-H1	CLL	IGHV2-5*02 F	93.17	IGHD1-1*01 F	IGHJ5*01 F	17	AHRLPFSSNWDVGWFDP	CLUSTER-4-0003
NY-01-0439-H1	CLL	IGHV2-5*02 F	95.53	IGHD2-8*01 F	IGHJ5*02 F	17	AHRRPFSYDWNTGWFDP	CLUSTER-4-0003
DE-03-3785-H1	CLL	IGHV2-5*02 F	93.13	IGHD1-26*01 F	IGHJ4*02 F	17	AHRRPYYGNWGSGYFDY	CLUSTER-4-0003
DE-02-3914-H1	CLL	IGHV2-5*02 F	88.46	IGHD4-23*01 ORF	IGHJ5*02 F	17	AHRRDFRGNWDVGWFGP	CLUSTER-4-0003
DK-01-1581-H1	CLL	IGHV2-5*02 F	91.07	IGHD3-16*02 F	IGHJ5*02 F	17	AHRREFSGDWDVGWLGP	CLUSTER-4-0003
DE-03-0817-H1	CLL	IGHV2-5*02 F	93.81	IGHD4-23*01 ORF	IGHJ5*02 F	17	VHRRAYNGNWDVGWFDP	CLUSTER-4-0003
DK-01-0997-H1	CLL	IGHV2-5*02 F	95.19	IGHD6-13*01 F	IGHJ5*02 F	17	VHRIAYSGNWDVGWFDP	CLUSTER-4-0003
NY-01-0285-H1	CLL	IGHV2-5*02 F	94.85	IGHD4-17*01 F	IGHJ4*02 F	17	AHRRELNADWDYGDFDY	CLUSTER-4-0003
IT-01-0281-H1	CLL	IGHV2-5*02 F	90.38	IGHD2-15*01 F	IGHJ4*02 F	17	AHRLVQNGDWNFGSFDH	CLUSTER-4-0003
IT-05-0360-H1	CLL	IGHV2-5*02 F	96.91	IGHD1-7*01 F	IGHJ4*02 F	17	AHRLKLNGNWNFGYFDY	CLUSTER-4-0003
DE-03-0108-H1	CLL	IGHV2-5*02 F	89.21	IGHD1-20*01 F	IGHJ4*02 F	17	AHRVAYNTNWNEGFFDY	CLUSTER-4-0003
DE-03-3483-H1	CLL	IGHV2-5*02 F	93.47	IGHD1-20*01 F	IGHJ4*02 F	17	AHRREYNSNWNEGVFDY	CLUSTER-4-0003
DE-02-2771-H1	CLL	IGHV2-5*02 F	96.67	IGHD2-21*02 F	IGHJ4*02 F	17	VHRRLRSGDWDLGEFDY	CLUSTER-4-0003
DE-02-2967-H1	CLL	IGHV2-5*02 F	90.38	IGHD6-25*01 F	IGHJ4*02 F	17	AHRRPRSGDWATGDFDY	CLUSTER-4-0003
UK-03-0119-H1	CLL	IGHV2-5*02 F	95.53	IGHD2-21*02 F	IGHJ4*01 F	17	AHRRARNGDWNWGDFDY	CLUSTER-4-0003
UK-01-0311-H1	CLL	IGHV2-5*02 F	95.19	IGHD3-9*01 F	IGHJ4*02 F	17	AHRISRYSDWLYGSFDY	CLUSTER-4-0003
DE-03-1676-H1	CLL	IGHV2-5*02 F	94.85	IGHD2-8*01 F	IGHJ4*02 F	17	AHRVVANGLWDGGHFNY	CLUSTER-4-0003
CZ-01-0731-H1	CLL	IGHV2-5*02 F	92.44	IGHD6-13*01 F	IGHJ4*03 F	17	AHRQSHNSDWNWGTFDY	CLUSTER-4-0003
DE-03-3905-H1	CLL	IGHV2-5*02 F	95.53	IGHD4-11*01 ORF	IGHJ4*02 F	17	AHRRAHNGDWNWATFDF	CLUSTER-4-0003
DE-02-2685-H1	CLL	IGHV2-5*02 F	90.35	IGHD2-15*01 F	IGHJ4*02 F	17	AHRRPDSGYWDGGTFDS	CLUSTER-4-0003
DK-01-0758-H1	CLL	IGHV2-5*02 F	93.81	IGHD1-1*01 F	IGHJ4*02 F	17	AHRRPDYGNWDEGIFDY	CLUSTER-4-0003
DK-01-0167-H1	CLL	IGHV2-5*02 F	94.5	IGHD3-3*01 F	IGHJ4*02 F	17	AHRRARGLYWDDGDFDY	CLUSTER-4-0003
GR-02-0174-H1	CLL	IGHV2-5*02 F	94.5	IGHD1-7*01 F	IGHJ4*02 F	17	AHRRYNMAYWNYGYFDY	CLUSTER-4-0003
NY-01-0280-H1	CLL	IGHV2-5*02 F	93.81	IGHD7-27*01 F	IGHJ4*02 F	17	AHRVAHSANWDVGFFDY	CLUSTER-4-0003

CZ-01-1603-H1	CLL	IGHV2-5*02 F	93.47	IGHD1-7*01 F	IGHJ4*02 F	17	AHRLRYMGNWDYGDFDY	CLUSTER-4-0003
DE-03-4518-H1	CLL	IGHV2-5*02 F	93.81	IGHD3-10*01 F	IGHJ4*01 F	17	AHRLRIRGFWDGGDFDY	CLUSTER-4-0003
DE-02-0020-H1	CLL	IGHV2-5*02 F	93.47	IGHD6-19*01 F	IGHJ4*02 F	17	AHRRLYSGRWDEATFDY	CLUSTER-4-0003
DE-03-1169-H1	CLL	IGHV2-5*02 F	92.1	IGHD1-1*01 F	IGHJ4*02 F	17	AHRRDYSGDWNEATFDY	CLUSTER-4-0003
DE-03-3323-H1	CLL	IGHV2-5*02 F	96.56	IGHD1-7*01 F	IGHJ4*02 F	17	AHRRDVRRDWNYGDYDF	CLUSTER-4-0003
ES-01-0338-H1	CLL	IGHV2-5*02 F	94.85	IGHD1-7*01 F	IGHJ4*02 F	17	AHRRDVRNNWNYGDFDY	CLUSTER-4-0003
DE-03-3114-H1	CLL	IGHV2-5*02 F	92.1	IGHD3-9*01 F	IGHJ4*02 F	17	AHRVSLTGYWDYGAFDS	CLUSTER-4-0003
DE-03-3953-H1	CLL	IGHV2-5*02 F	92.44	IGHD3-9*01 F	IGHJ4*02 F	17	AHRLTLTGYWDQGVFNY	CLUSTER-4-0003
DE-03-3966-H1	CLL	IGHV2-5*02 F	94.5	IGHD3-10*01 F	IGHJ4*02 F	17	AHRQSLTGYWNSGVLDY	CLUSTER-4-0003
DE-03-3587-H1	CLL	IGHV2-5*02 F	92.44	IGHD1-1*01 F	IGHJ5*02 F	17	AYRLHHSANWDVGWFGP	CLUSTER-4-0003
DE-02-0294-H1	CLL	IGHV2-5*02 F	89.0	IGHD6-25*01 F	IGHJ5*02 F	17	AHRAHYNSDWNSGWFDP	CLUSTER-4-0003
DE-03-4633-H1	CLL	IGHV2-5*02 F	95.53	IGHD6-13*01 F	IGHJ5*02 F	17	AHRLAYSSSWNSGWFDP	CLUSTER-4-0003
UK-01-0375-H1	CLL	IGHV2-5*02 F	91.75	IGHD6-13*01 F	IGHJ5*02 F	17	VHRLHYSGDWNSGWFDP	CLUSTER-4-0003
ES-01-0401-H1	CLL	IGHV2-5*02 F	94.2	IGHD1-1*01 F	IGHJ5*02 F	17	AHRLAYGDNWNAGWFDP	CLUSTER-4-0003
IT-07-0414-H1	CLL	IGHV2-5*02 F	92.1	IGHD3-10*01 F	IGHJ4*02 F	17	AHRVHRNSDWGSGDFDF	CLUSTER-4-0003
DE-03-3342-H1	CLL	IGHV2-5*02 F	93.47	IGHD1-1*01 F	IGHJ3*02 F	17	AHRVPYSANWNGGSFDI	CLUSTER-4-0003
ES-01-0612-H1	CLL	IGHV2-5*02 F	89.23	IGHD1-7*01 F	IGHJ3*02 F	17	GHRRPFSLNWNYGTFDI	CLUSTER-4-0003
DE-03-2342-H1	CLL	IGHV2-5*02 F	95.88	IGHD6-13*01 F	IGHJ3*01 F	17	AHRVPYSSSWSWGAFDV	CLUSTER-4-0003
AT-01-0092-H1	CLL	IGHV2-5*01 F	96.56	IGHD2-2*01 F	IGHJ3*02 F	17	AHRPPFCSTTSWGAFNI	CLUSTER-4-0003
GR-01-0468-H1	CLL	IGHV2-5*02 F	93.81	IGHD1-7*01 F	IGHJ4*02 F	17	AHRLPLASDWNYGRFDY	CLUSTER-4-0003
NY-01-0989-H1	CLL	IGHV2-5*02 F	95.19	IGHD1-1*01 F	IGHJ4*02 F	17	AHRLRLQSDWNYGRFDY	CLUSTER-4-0003
DE-02-0204-H1	CLL	IGHV2-5*02 F	95.19	IGHD1-7*01 F	IGHJ4*02 F	17	AHRLAASSNWNYGDFDY	CLUSTER-4-0003
DE-03-1329-H1	CLL	IGHV2-5*02 F	96.22	IGHD6-19*01 F	IGHJ4*02 F	17	AHRLLHSGDWNYGNFDF	CLUSTER-4-0003
RU-01-0343-H1	CLL	IGHV2-5*02 F	91.81	IGHD6-13*01 F	IGHJ4*02 F	17	AHRLIASGNWQAGSFDY	CLUSTER-4-0003
GR-03-0103-H1	CLL	IGHV2-5*01 F	95.19	IGHD5-18*01 F	IGHJ4*02 F	17	AHRQRLHRDYSYGRFDY	CLUSTER-4-0003
DE-03-1706-H1	CLL	IGHV2-5*02 F	92.1	IGHD3-16*01 F	IGHJ4*01 F	17	AHRRFLHSNWGWGDFDY	CLUSTER-4-0003
CZ-01-0313-H1	CLL	IGHV2-5*02 F	90.38	IGHD1-1*01 F	IGHJ4*02 F	17	AHRRPYYGNWNEGIFNY	CLUSTER-4-0003
DE-03-4024-H1	CLL	IGHV2-5*02 F	95.53	IGHD6-13*01 F	IGHJ4*02 F	17	AHRRGDSSNWYWGVFDY	CLUSTER-4-0003
UK-01-0605-H1	CLL	IGHV2-5*02 F	94.16	IGHD7-27*01 F	IGHJ4*03 F	17	AHRLVYNSNWGVGYFDP	CLUSTER-4-0003
DE-02-5055-H1	CLL	IGHV2-5*02 F	94.89	IGHD1-26*01 F	IGHJ4*02 F	17	AHRRVGPNQWFWGDFDY	CLUSTER-4-0003

DK-01-0519-H1	CLL	IGHV2-5*02 F	94.5	IGHD5-24*01 ORF	IGHJ4*02 F	17	AHRHRDAYNWDSGFFDY	CLUSTER-4-0003
CH-01-0007-H1	CLL	IGHV2-5*02 F	94.5	IGHD6-13*01 F	IGHJ4*02 F	17	AHRMAYGLNWGTGYFDY	CLUSTER-4-0003
UK-03-0421-H1	CLL	IGHV2-5*02 F	94.5	IGHD5-12*01 F	IGHJ4*02 F	17	AHRVHSSYNWDSGYFDF	CLUSTER-4-0003
GR-03-0111-H1	CLL	IGHV2-5*02 F	95.73	IGHD6-13*01 F	IGHJ4*02 F	17	AHRLDESRSWYRGAFDY	CLUSTER-4-0003
DE-03-1075-H1	CLL	IGHV2-5*02 F	95.88	IGHD6-19*01 F	IGHJ4*02 F	17	AHRLPQRGGWDVGVFDF	CLUSTER-4-0003
SE-01-0613-H1	CLL	IGHV2-5*02 F	95.9	IGHD6-13*01 F	IGHJ4*02 F	17	AHRRQFNSDWSWGDFDY	CLUSTER-4-0003
DK-01-1171-H1	CLL	IGHV2-5*02 F	96.91	IGHD6-13*01 F	IGHJ4*02 F	17	AHRRIHNSYWSSGDFDY	CLUSTER-4-0003
DK-01-1159-H1	CLL	IGHV2-5*02 F	94.85	IGHD6-13*01 F	IGHJ4*02 F	17	AHRLPGIGDWDTGVLDY	CLUSTER-4-0003
DE-03-3125-H1	CLL	IGHV2-5*02 F	96.22	IGHD4-17*01 F	IGHJ4*02 F	17	AHRQSHYGDWDIGVFDY	CLUSTER-4-0003
NY-01-0690-H1	CLL	IGHV2-5*02 F	93.47	IGHD2-8*01 F	IGHJ4*02 F	17	AHRQSTKSPWNYGDFDY	CLUSTER-4-0003
NL-01-1149-H1	CLL	IGHV2-5*02 F	93.98	IGHD3-3*01 F	IGHJ4*02 F	17	AHRQYLYSDWNWATFDS	CLUSTER-4-0003
UK-01-0732-H1	CLL	IGHV2-5*02 F	94.16	IGHD3-9*01 F	IGHJ4*02 F	17	AHRRMTRHPWDRGDFDY	CLUSTER-4-0003
DK-01-0399-H1	CLL	IGHV2-5*02 F	93.47	IGHD1-1*01 F	IGHJ4*02 F	17	AHRRLRNGDWNEGLFDR	CLUSTER-4-0003
US-01-1156-H1	CLL	IGHV2-5*02 F	92.97	IGHD6-19*01 F	IGHJ4*02 F	17	AHRRHHNGDWNHGEFDY	CLUSTER-4-0003
DE-02-5166-H1	CLL	IGHV2-5*02 F	93.59	IGHD1-14*01 ORF	IGHJ4*02 F	17	AHRLVGMNEWNHGYFDY	CLUSTER-4-0003
DK-01-1277-H1	CLL	IGHV2-5*02 F	96.22	IGHD1-7*01 F	IGHJ4*02 F	17	AHRLPGYQNWNYGYFDY	CLUSTER-4-0003
GR-02-0483-H1	CLL	IGHV2-5*02 F	95.53	IGHD1-7*01 F	IGHJ4*02 F	17	SHRRRIMSDWNYGSFDY	CLUSTER-4-0003
DE-03-2074-H1	CLL	IGHV2-5*02 F	92.36	IGHD2-15*01 F	IGHJ4*02 F	17	AHRRLYNGDWDRGVFDH	CLUSTER-4-0003
DE-03-1275-H1	CLL	IGHV2-5*02 F	93.81	IGHD6-19*01 F	IGHJ4*02 F	17	AHRKLYNNDWDRGILDY	CLUSTER-4-0003
FR-01-0852-H1	CLL	IGHV2-5*02 F	93.47	IGHD3-3*01 F	IGHJ5*02 F	17	AHRVLWNGYWDQGWFDH	CLUSTER-4-0003
FR-01-0065-H1	CLL	IGHV2-5*02 F	86.19	IGHD6-19*01 F	IGHJ5*01 F	17	THRVLWNSHWDLGWFDP	CLUSTER-4-0003
NY-01-0791-H1	CLL	IGHV2-5*02 F	93.81	IGHD3-3*01 F	IGHJ4*02 F	17	AHRANWNGYWDLSYFDY	CLUSTER-4-0003
CZ-01-0442-H1	CLL	IGHV2-5*02 F	95.19	IGHD2-8*02 F	IGHJ3*01 F	17	AHRKAENNAWDTGVFDF	CLUSTER-4-0003
DE-02-4458-H1	CLL	IGHV2-5*02 F	93.94	IGHD6-13*01 F	IGHJ4*02 F	17	AHRGIMNTNWDSGYFDF	CLUSTER-4-0003
SE-01-0685-H1	CLL	IGHV2-5*02 F	93.98	IGHD1-1*01 F	IGHJ4*02 F	17	AHRVTGNNIWDGGALDF	CLUSTER-4-0003

Supplemental Table 9. Basic immunogenetic information of all expanded BcR IG clonotypes (>1 sequence) from the present study that were assigned to major CLL stereotyped subsets[4].

Sample ID	Sample category	IGHV gene	SHM status, %	IGHD gene	IGHJ gene	CDR3 sequence	CDR3 length	Frequency, %	Subset
mcMBL-14	PBMC, LC-MBL	IGHV1-3	100	IGHD6-19	IGHJ4	AREQWLVRVNFDY	13	0.00512	CLL#1
mcMBL-14	PBMC, LC-MBL	IGHV1-3	99.65	IGHD6-19	IGHJ4	AREQWLVRGNFDY	13	0.00046	CLL#1
mcMBL-14	PBMC, LC-MBL	IGHV1-3	99.65	IGHD6-19	IGHJ4	AREQWLVQGNFDY	13	0.00023	CLL#1
mcMBL-14	PBMC, LC-MBL	IGHV1-3	100	IGHD6-19	IGHJ4	AREQWLVRVDFDY	13	0.00023	CLL#1
mcMBL-14	PBMC, LC-MBL	IGHV1-2	98.96	IGHD6-19	IGHJ4	ARGQWLVQLNFDY	13	0.00209	CLL#1
mcMBL-14	PBMC, LC-MBL	IGHV1-18	98.96	IGHD6-19	IGHJ4	ARGQWLVQLNFDY	13	0.00023	CLL#1
bMBL-14	Normal B cells, LC-MBL	IGHV1-2	99.65	IGHD6-19	IGHJ4	ARGQWLVQYYFDY	13	0.00259	CLL#1
bMBL-19	Normal B cells, LC-MBL	IGHV1-2	100	IGHD6-19	IGHJ4	ARAQWLVRFPFDY	13	0.00642	CLL#1
naB-5	Naïve B cells, Healthy	IGHV5-51	100	IGHD6-19	IGHJ4	ARLQWLVDRFIDY	13	0.00048	CLL#1
MBL-12	MBL cells, LC-MBL	IGHV3-21	93.05	IGHD5-12	IGHJ6	ATDRNCMDV	9	0.00024	CLL#2
MBL-12	MBL cells, LC-MBL	IGHV3-21	93.41	IGHD5-12	IGHJ6	ATDRNGIDV	9	0.00024	CLL#2
MBL-12	MBL cells, LC-MBL	IGHV3-21	93.05	IGHD5-12	IGHJ6	ATDRNGMDV	9	0.04441	CLL#2
MBL-7	MBL cells, LC-MBL	IGHV3-21	97.22	IGHD5-12	IGHJ6	ATDRNGMDV	9	0.00024	CLL#2
mcMBL-14	PBMC, LC-MBL	IGHV3-21	98.25	-	IGHJ6	ARDQNGMDV	9	0.00023	CLL#2
mcMBL-16	PBMC, LC-MBL	IGHV3-21	98.61	-	IGHJ6	ARDQNAMDV	9	0.00025	CLL#2
bMBL-10	Normal B cells, LC-MBL	IGHV3-21	100	IGHD1-26	IGHJ6	ARDRAGMDV	9	0.00029	CLL#2
bMBL-10	Normal B cells, LC-MBL	IGHV3-21	100	IGHD3-10	IGHJ6	ARDRGGMDV	9	0.00029	CLL#2
bMBL-13	Normal B cells, LC-MBL	IGHV3-21	96.53	IGHD6-13	IGHJ6	ARDKQDMDV	9	0.00032	CLL#2
bMBL-17	Normal B cells, LC-MBL	IGHV3-21	95.49	IGHD3-16	IGHJ6	ARDFRGMDV	9	0.00028	CLL#2
naB-3	Naïve B cells, Healthy	IGHV3-21	100	IGHD1-1	IGHJ3	ARETYAFDV	9	0.00016	CLL#2
meB-1	Memory B cells, Healthy	IGHV3-21	89.93	-	IGHJ6	AGDNYGLDV	9	0.00017	CLL#2
meB-1	Memory B cells, Healthy	IGHV3-21	90.28	-	IGHJ6	AKDNYGLDV	9	0.00017	CLL#2
meB-1	Memory B cells, Healthy	IGHV3-21	92.71	-	IGHJ6	ARDNYGMDV	9	0.00017	CLL#2
meB-2	Memory B cells, Healthy	IGHV3-21	88.53	IGHD2-2	IGHJ6	AGELYHLDV	9	0.00046	CLL#2
MBL-9	MBL cells, LC-MBL	IGHV1-69	100	IGHD2-2	IGHJ6	ARAEDIVVVPAAISYYYYGMDV	22	0.02824	CLL#3

MBL-9	MBL cells, LC-MBL	IGHV1-69	100	IGHD2-2	IGHJ6	ARAEDIVVVPAAISFYYYGMDV	22	0.00027	CLL#3
MBL-9	MBL cells, LC-MBL	IGHV1-69	100	IGHD2-2	IGHJ6	ARAEDIVVVPAAISYYYDGMDV	22	0.00027	CLL#3
mcMBL-20	PBMC, LC-MBL	IGHV1-69	100	IGHD2-2	IGHJ6	ARAEDIVVVPAAISYYYYGMDV	22	0.00022	CLL#3
bMBL-17	Normal B cells, LC-MBL	IGHV1-69	99.65	IGHD2-2	IGHJ6	ARGVGDIVVVPAAKSYYYGMDV	22	0.00028	CLL#3
bMBL-17	Normal B cells, LC-MBL	IGHV1-69	100	IGHD2-2	IGHJ6	AGDWDIVVVPAAPPYYYYGMDV	22	0.00028	CLL#3
bMBL-17	Normal B cells, LC-MBL	IGHV1-69	100	IGHD2-2	IGHJ6	ARDRDIVVVPAALYYYYYGMDV	22	0.00369	CLL#3
bMBL-17	Normal B cells, LC-MBL	IGHV1-69	100	IGHD2-2	IGHJ6	ARDWDIVVVPAAPPYYYYGMDV	22	0.00199	CLL#3
bMBL-17	Normal B cells, LC-MBL	IGHV1-69	99.65	IGHD2-2	IGHJ6	ARGVGDIVVVPAAKGYYYGMDV	22	0.01251	CLL#3
naB-1	Naïve B cells, Healthy	IGHV1-69	99.65	IGHD2-2	IGHJ6	ARDVAGSVVPAATEGYYYGMDV	22	0.00314	CLL#3
naB-1	Naïve B cells, Healthy	IGHV1-69	99.65	IGHD2-2	IGHJ6	ARVWVDIVVVPAAIWKSEGMDV	22	0.00279	CLL#3
naB-1	Naïve B cells, Healthy	IGHV1-69	99.65	IGHD2-2	IGHJ6	ARDQDIVVVPAAIRSGYYGMDV	22	0.00209	CLL#3
naB-1	Naïve B cells, Healthy	IGHV1-69	100	IGHD2-15	IGHJ6	AREGGIVVVVAAWDYYYYGMDV	22	0.00034	CLL#3
naB-1	Naïve B cells, Healthy	IGHV1-69	100	IGHD2-2	IGHJ6	ARVWVDIVVVPAAIWKSEGIDV	22	0.00034	CLL#3
naB-3	Naïve B cells, Healthy	IGHV1-69	99.65	IGHD2-2	IGHJ6	ARDRGIVVVPAAIGYYYYYMDV	22	0.00048	CLL#3
naB-3	Naïve B cells, Healthy	IGHV1-69	100	IGHD2-2	IGHJ6	ARAGFDVVVPAALTYYYYYMDV	22	0.00032	CLL#3
naB-3	Naïve B cells, Healthy	IGHV1-69	99.65	IGHD2-2	IGHJ6	ARDTNVIVVVPAAPDYYYGMDV	22	0.00016	CLL#3
naB-3	Naïve B cells, Healthy	IGHV1-69	100	IGHD3-22	IGHJ6	ARGITMIVVGPGKYYYYYGMDV	22	0.00016	CLL#3
meB-1	Memory B cells, Healthy	IGHV1-69	94.1	IGHD2-21	IGHJ6	ARGREDIVVVIGDNQKYYGMDV	22	0.00017	CLL#3
bMBL-1	Normal B cells, LC-MBL	IGHV4-34	100	IGHD6-13	IGHJ6	ARVLPPDYSSRRYYYYYMDV	20	0.00059	CLL#4
naB-1	Naïve B cells, Healthy	IGHV4-34	98.95	IGHD5-12	IGHJ6	AREDGIVATYRRYYYYGMDV	20	0.00034	CLL#4
naB-2	Naïve B cells, Healthy	IGHV4-34	99.65	IGHD3-16	IGHJ6	ARGWGELSLLRRYYYYGMDV	20	0.01062	CLL#4
naB-2	Naïve B cells, Healthy	IGHV4-34	100	IGHD3-16	IGHJ6	ARGWGELSLLRRYYYYGTDV	20	0.0004	CLL#4
naB-2	Naïve B cells, Healthy	IGHV4-34	100	IGHD2-2	IGHJ6	ARGGPRAPAAKRYYYYYMDV	20	0.00817	CLL#4
naB-2	Naïve B cells, Healthy	IGHV4-34	100	IGHD2-2	IGHJ6	ARGGPGAPAAKRYYYYYMDV	20	0.0004	CLL#4
naB-3	Naïve B cells, Healthy	IGHV4-34	100	IGHD5-18	IGHJ6	ARVYIGELRSRRYYYYGMDV	20	0.00032	CLL#4
naB-3	Naïve B cells, Healthy	IGHV4-34	99.65	IGHD5-12	IGHJ6	ARVRADIVATRRYYYYGMDV	20	0.00016	CLL#4
naB-4	Naïve B cells, Healthy	IGHV4-34	99.3	IGHD1-26	IGHJ6	ARGPKYLGATRRYYYYGMDV	20	0.00226	CLL#4
naB-4	Naïve B cells, Healthy	IGHV4-34	100	IGHD1-26	IGHJ6	ARGPKYLGATRRYYYYGMDG	20	0.00028	CLL#4
mcMBL-13	PBMC, LC-MBL	IGHV1-69	100	IGHD3-3	IGHJ6	ARGGDFGVVIIDAYYYGMDV	20	0.00516	CLL#5
naB-1	Naïve B cells, Healthy	IGHV1-69	99.65	IGHD1-26	IGHJ6	ARDKGFGVGATDCYYYGMDV	20	0.00034	CLL#5

naB-1	Naïve B cells, Healthy	IGHV1-69	99.65	IGHD1-26	IGHJ6	ARDKGFGVRATDYYYYGMDV	20	0.00034	CLL#5
naB-1	Naïve B cells, Healthy	IGHV1-69	100	IGHD1-26	IGHJ6	ARDKGLGVGATDYYYYGMDV	20	0.00034	CLL#5
naB-1	Naïve B cells, Healthy	IGHV1-69	100	IGHD1-26	IGHJ6	ARDRGFGVGATDYYYYGMDV	20	0.00034	CLL#5
naB-1	Naïve B cells, Healthy	IGHV1-69	99.65	IGHD1-26	IGHJ6	ARDKGFGVGATDYYYYGMDV	20	0.00279	CLL#5
naB-1	Naïve B cells, Healthy	IGHV1-69	100	IGHD3-16	IGHJ4	ARSPNYDYVWGSYRRDHYFDY	21	0.00314	CLL#6
naB-1	Naïve B cells, Healthy	IGHV1-69	99.65	IGHD3-16	IGHJ3	ARWAYYDYVWGSYRPVGAFDI	21	0.00034	CLL#6
naB-1	Naïve B cells, Healthy	IGHV1-69	100	IGHD3-3	IGHJ6	ARGDLYYDFWSGYWAGDYYYGMDV	24	0.00034	CLL#7H
bMBL-10	Normal B cells, LC-MBL	IGHV1-2	100	IGHD3-22	IGHJ6	ARDLYYYDSSGYYNYGMDV	19	0.00832	CLL#12
bMBL-10	Normal B cells, LC-MBL	IGHV1-2	100	IGHD3-22	IGHJ6	ARDLYYYDSSGYYDYGMDV	19	0.00029	CLL#12
bMBL-10	Normal B cells, LC-MBL	IGHV1-2	98.96	IGHD3-22	IGHJ6	ARNLYYYDSSGYYNYGMDV	19	0.00029	CLL#12
naB-2	Naïve B cells, Healthy	IGHV1-2	94.51	IGHD3-22	IGHJ4	ARDLGYYDSSGYYQKTRGY	19	0.0004	CLL#12
bMBL-1	Normal B cells, LC-MBL	IGHV4-4	94.79	IGHD6-13	IGHJ4	VRGGHWRFDY	10	0.00029	CLL#14
bMBL-1	Normal B cells, LC-MBL	IGHV4-4	92.98	IGHD6-13	IGHJ4	VRGGYWRFDY	10	0.00088	CLL#14
bMBL-14	Normal B cells, LC-MBL	IGHV4-4	88.89	IGHD2-21	IGHJ4	AKGGDWQFDS	10	0.01076	CLL#14
meB-2	Memory B cells, Healthy	IGHV4-4	95.49	IGHD2-21	IGHJ5	ARGGDWRFDS	10	0.00138	CLL#14
meB-2	Memory B cells, Healthy	IGHV4-4	95.83	IGHD2-15	IGHJ4	ARGGGWRFDS	10	0.00046	CLL#14
MBL-2	MBL cells, LC-MBL	IGHV1-2	100	IGHD2-21	IGHJ6	ARDLWGLGYYYYYGMDV	17	0.00234	CLL#28A
MBL-5	MBL cells, LC-MBL	IGHV1-2	100	IGHD6-19	IGHJ6	ARASSGWWNYYYYGMDV	17	0.03815	CLL#28A
mcMBL-18	PBMC, LC-MBL	IGHV1-2	100	IGHD2-21	IGHJ6	ARVQSGRDPYYYYGMDV	17	0.00077	CLL#28A
bMBL-10	Normal B cells, LC-MBL	IGHV1-2	99.65	IGHD3-10	IGHJ6	ARDGSGSYKYYYYGMDV	17	0.00029	CLL#28A
bMBL-10	Normal B cells, LC-MBL	IGHV1-2	100	IGHD7-27	IGHJ6	ARERTGAFYYYYYGMDV	17	0.00029	CLL#28A
bMBL-13	Normal B cells, LC-MBL	IGHV1-2	100	IGHD2-21	IGHJ6	ARGGLGWLNYYYYGMDV	17	0.00289	CLL#28A
bMBL-17	Normal B cells, LC-MBL	IGHV1-2	99.65	IGHD2-8	IGHJ6	AACTNGVCYYYYYGMDV	17	0.01906	CLL#28A
bMBL-17	Normal B cells, LC-MBL	IGHV1-2	99.65	IGHD2-8	IGHJ6	AACTNGVCCYYYYGMDV	17	0.00028	CLL#28A
bMBL-17	Normal B cells, LC-MBL	IGHV1-2	100	IGHD6-6	IGHJ6	ACSSPGPAPYYYYGMDV	17	0.00028	CLL#28A
bMBL-17	Normal B cells, LC-MBL	IGHV1-2	99.65	IGHD2-8	IGHJ6	VACTNGVCYYYYYGMDV	17	0.00028	CLL#28A
bMBL-19	Normal B cells, LC-MBL	IGHV1-2	99.65	IGHD1-1	IGHJ6	ARGYYGNIVYYYYGMDV	17	0.00029	CLL#28A
bMBL-3	Normal B cells, LC-MBL	IGHV1-2	99.31	IGHD6-19	IGHJ6	ARHSSGWYAYYYYGMDV	17	0.06555	CLL#28A
bMBL-3	Normal B cells, LC-MBL	IGHV1-2	100	IGHD6-19	IGHJ6	ARHCSGWYAYYYYGMDV	17	0.00128	CLL#28A
bMBL-3	Normal B cells, LC-MBL	IGHV1-2	100	IGHD6-19	IGHJ6	ARHSSGWYVYYYYGMDV	17	0.00042	CLL#28A

naB-1	Naïve B cells, Healthy	IGHV1-2	100	IGHD6-19	IGHJ6	ARDSSGGYYYYYYGMDV	17	0.00034	CLL#28A
naB-2	Naïve B cells, Healthy	IGHV1-2	99.65	IGHD3-16	IGHJ6	ARGWQGAMGYYYYGMDV	17	0.01103	CLL#28A
MBL-2	MBL cells, LC-MBL	IGHV3-48	99.65	IGHD2-15	IGHJ6	ARDSPLVVVAAIYYYYYGMDV	21	0.00117	CLL#64B
MBL-3	MBL cells, LC-MBL	IGHV3-48	99.65	IGHD2-15	IGHJ6	ARDSPLVVVAAIYYYYYGMDV	21	0.05783	CLL#64B
MBL-4	MBL cells, LC-MBL	IGHV3-48	99.65	IGHD2-15	IGHJ6	ARDSPLVVVAAIYYYYYGMDV	21	0.01948	CLL#64B
MBL-4	MBL cells, LC-MBL	IGHV3-48	99.31	IGHD2-15	IGHJ6	ARDSPLVVVAAIYYHYYGMDV	21	0.00035	CLL#64B
MBL-4	MBL cells, LC-MBL	IGHV3-48	99.31	IGHD2-15	IGHJ6	ARDSPLVVVAAIYYYYDGMDV	21	0.00035	CLL#64B
MBL-4	MBL cells, LC-MBL	IGHV3-48	99.65	IGHD2-15	IGHJ6	ARDSPLVVVAAIYYYYYGVDV	21	0.00035	CLL#64B
mcMBL-20	PBMC, LC-MBL	IGHV3-48	99.31	IGHD2-15	IGHJ6	ARDSPLVVVAAIYYYYYGMDV	21	0.2797	CLL#64B
bMBL-10	Normal B cells, LC-MBL	IGHV3-48	100	IGHD2-15	IGHJ6	ATWGDIVVAKSDYYYYYGMDV	21	0.00446	CLL#64B
bMBL-10	Normal B cells, LC-MBL	IGHV3-48	100	IGHD2-15	IGHJ6	AKDIVVVVAATLGDYYYGMDV	21	0.00029	CLL#64B
bMBL-10	Normal B cells, LC-MBL	IGHV3-48	100	IGHD2-21	IGHJ6	ARDAPPVVVTNRIYYYYGMDV	21	0.00029	CLL#64B
bMBL-10	Normal B cells, LC-MBL	IGHV3-48	100	IGHD2-21	IGHJ6	ARDFFSVVIAILTPDYYGMDV	21	0.00029	CLL#64B
bMBL-1	Normal B cells, LC-MBL	IGHV3-48	100	IGHD2-2	IGHJ6	AREAIVVVPAASLDYYYYMDV	21	0.00266	CLL#64B
bMBL-1	Normal B cells, LC-MBL	IGHV3-48	100	IGHD2-15	IGHJ6	AKDGVVVVAAYLYYYYYYMDV	21	0.00029	CLL#64B
bMBL-13	Normal B cells, LC-MBL	IGHV3-48	100	IGHD2-21	IGHJ6	ARATIVVVTAPEYYYYYGMDV	21	0.00354	CLL#64B
bMBL-13	Normal B cells, LC-MBL	IGHV3-48	100	IGHD2-2	IGHJ6	AKDLAVVVPAALRYYYYGMDV	21	0.00032	CLL#64B
bMBL-13	Normal B cells, LC-MBL	IGHV3-48	99.65	IGHD2-21	IGHJ6	ARATIVVVTAPEYYYYYGIDV	21	0.00032	CLL#64B
bMBL-13	Normal B cells, LC-MBL	IGHV3-48	100	IGHD2-21	IGHJ6	ARATIVVVTTPEYYYYYGMDV	21	0.00032	CLL#64B
bMBL-14	Normal B cells, LC-MBL	IGHV3-48	98.26	IGHD2-15	IGHJ5	ARGRREVVGARVYVPPGWFDP	21	0.00408	CLL#64B
bMBL-14	Normal B cells, LC-MBL	IGHV3-48	98.26	IGHD2-15	IGHJ5	ARGRREVVGARAYVPPGWFDP	21	0.00037	CLL#64B
bMBL-17	Normal B cells, LC-MBL	IGHV3-48	100	IGHD2-21	IGHJ6	ARDAPPVVVTNRIYYYYGMDV	21	0.01451	CLL#64B
bMBL-17	Normal B cells, LC-MBL	IGHV3-48	99.31	IGHD2-2	IGHJ6	AREDIVVVPAAPSHYYYYMDV	21	0.01081	CLL#64B
bMBL-17	Normal B cells, LC-MBL	IGHV3-48	100	IGHD2-21	IGHJ6	ARDAPPVVVANRIYYYYGMDV	21	0.00028	CLL#64B
bMBL-19	Normal B cells, LC-MBL	IGHV3-48	99.65	IGHD2-15	IGHJ6	ARESVVVVAATGGYHYYGMDV	21	0.00029	CLL#64B
bMBL-3	Normal B cells, LC-MBL	IGHV3-48	100	IGHD2-2	IGHJ6	ARDDVVVVPAARVHYYYGMDV	21	0.00042	CLL#64B
naB-1	Naïve B cells, Healthy	IGHV3-48	100	IGHD2-15	IGHJ6	ASTFDPVVVQSDYYYYYGMDV	21	0.00734	CLL#64B
naB-2	Naïve B cells, Healthy	IGHV3-48	99.31	IGHD2-2	IGHJ6	ARAGVTVVVPAATDYYYGMDV	21	0.0004	CLL#64B
naB-3	Naïve B cells, Healthy	IGHV3-48	100	IGHD2-2	IGHJ6	ARDLMVVVPAALYYYYYYMDV	21	0.00273	CLL#64B
naB-3	Naïve B cells, Healthy	IGHV3-48	99.31	IGHD2-2	IGHJ6	ARDLMVVVPAALYYYCYYMDV	21	0.00112	CLL#64B

naB-5	Naïve B cells, Healthy	IGHV3-48	99.65	IGHD2-2	IGHJ6	ARDRDIVVVPAAMPYYYYMDV	21	0.00024	CLL#64B
naB-5	Naïve B cells, Healthy	IGHV3-48	95.4	IGHD2-2	IGHJ6	ARINRVVVPAAIYYYYYYMDV	21	0.00024	CLL#64B
naB-5	Naïve B cells, Healthy	IGHV3-48	95.37	IGHD2-2	IGHJ6	ARVNIVVVPAAMWGPHYYMDV	21	0.00024	CLL#64B
MBL-5	MBL cells, LC-MBL	IGHV4-4	95.44	IGHD6-19	IGHJ4	ARGDRSSGWYYFDY	14	0.00051	CLL#77
bMBL-3	Normal B cells, LC-MBL	IGHV4-59	100	IGHD6-19	IGHJ4	ARGPDSSGWEPFDY	14	0.00042	CLL#77
naB-1	Naïve B cells, Healthy	IGHV4-59	96.13	IGHD6-19	IGHJ4	ARGAYSSGWYQFDY	14	0.00664	CLL#77
naB-1	Naïve B cells, Healthy	IGHV4-59	98.95	IGHD6-19	IGHJ4	ARGLYSSGWCYFDY	14	0.00034	CLL#77
naB-1	Naïve B cells, Healthy	IGHV4-59	98.95	IGHD6-19	IGHJ4	ARGLYSSGWYYFDY	14	0.00244	CLL#77
naB-2	Naïve B cells, Healthy	IGHV4-59	99.65	IGHD6-19	IGHJ4	ARGRYRSGWYYFDY	14	0.0004	CLL#77
naB-2	Naïve B cells, Healthy	IGHV4-59	100	IGHD6-19	IGHJ4	ARGRYSSGWYYFDY	14	0.00122	CLL#77
naB-2	Naïve B cells, Healthy	IGHV4-59	100	IGHD6-19	IGHJ5	ARGVGGSGWIWFDP	14	0.0004	CLL#77
naB-3	Naïve B cells, Healthy	IGHV4-4	99.65	IGHD6-19	IGHJ3	ARGWVLSGWYSFDI	14	0.00016	CLL#77
naB-3	Naïve B cells, Healthy	IGHV4-59	99.65	IGHD6-19	IGHJ3	ARGWVLSGWYSFDI	14	0.00016	CLL#77
meB-1	Memory B cells, Healthy	IGHV4-59	98.6	IGHD6-19	IGHJ4	ARGLCSSGWYYFDY	14	0.00017	CLL#77
meB-1	Memory B cells, Healthy	IGHV4-59	98.95	IGHD6-19	IGHJ4	ARGLYSSGWHYFDY	14	0.00017	CLL#77
meB-1	Memory B cells, Healthy	IGHV4-59	98.95	IGHD6-19	IGHJ4	ARGLYSSGWNYFDY	14	0.00017	CLL#77
meB-1	Memory B cells, Healthy	IGHV4-59	98.95	IGHD6-19	IGHJ4	ARGLYSSGWYYFDY	14	0.01429	CLL#77
meB-1	Memory B cells, Healthy	IGHV4-59	98.95	IGHD6-19	IGHJ4	ARGLYSSGWYYFNY	14	0.00017	CLL#77
naB-2	Naïve B cells, Healthy	IGHV4-34	96.91	IGHD3-3	IGHJ4	ARRKDFWSGYLSFYFDY	17	0.0004	CLL#201
bMBL-1	Normal B cells, LC-MBL	IGHV3-23	96.88	IGHD4-17	IGHJ6	ARGGYGDYVGSMDV	14	0.00029	CLL#202
bMBL-17	Normal B cells, LC-MBL	IGHV3-33	100	IGHD4-17	IGHJ4	ARGGDGDYGGGLDY	14	0.00085	CLL#202
bMBL-17	Normal B cells, LC-MBL	IGHV3-33	99.65	IGHD4-17	IGHJ4	ARGLYGDYAPDFDY	14	0.00028	CLL#202
naB-5	Naïve B cells, Healthy	IGHV3-11	100	IGHD4-17	IGHJ4	ARGGKGDYQEDFDY	14	0.02528	CLL#202
naB-5	Naïve B cells, Healthy	IGHV3-30	100	IGHD4-17	IGHJ4	ARGGKGDYQEDFDY	14	0.00024	CLL#202
naB-5	Naïve B cells, Healthy	IGHV3-11	100	IGHD4-17	IGHJ4	ARGGKGDYQEDFGY	14	0.00024	CLL#202
naB-5	Naïve B cells, Healthy	IGHV3-11	99.65	IGHD5-12	IGHJ4	ARGGKGDYQGDFDY	14	0.00024	CLL#202
meB-5	Memory B cells, Healthy	IGHV3-11	100	IGHD4-17	IGHJ4	ARGGKGDYQEDFDY	14	0.0003	CLL#202