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## Association of JAK-STAT pathway related genes with lymphoma risk: results of a European case-control study (EpiLymph)

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**Association of JAK-STAT pathway related genes with lymphoma risk: results of a European case-control study (EpiLymph)**

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## Summary

Previous studies have suggested an important role of the JAK-STAT signalling pathway in tumour development. Therefore, we explored genetic variants in JAK-STAT pathway associated genes with lymphoma risk. In samples of the EpiLymph case-control study we genotyped 1536 single nucleotide polymorphisms (SNPs) using GoldenGate BeadArray™ Technology (Illumina, San Diego, CA). Here, we report the associations between selected SNPs and haplotypes of the JAK-STAT pathway and risk of Hodgkin lymphoma (HL), B-cell lymphoma (B-NHL) and most frequent B-NHL subtypes. Among 210 relevant JAK-STAT pathway-related SNPs, polymorphisms in nine genes (*BMF*, *IFNG*, *IL12A*, *SOCS1*, *STAT1*, *STAT3*, *STAT5A*, *STAT6*, *TP63*) were significantly associated with lymphoma risk. At a study-wise significance level, we obtained a risk reduction of 28 % among carriers of the heterozygous genotype of the *STAT3* variant (rs1053023) for B-NHL. For six other variants within the *STAT3* gene we observed an inverse association with different lymphoma subtypes. A reduced risk for HL was observed for the heterozygous genotype of the *STAT6* SNP (rs324011). This is an explorative investigation to examine associations between JAK-STAT signalling related genes and lymphoma risk. The results implicate a relevant role of certain pathway-related genes in the lymphomagenesis, but still need to be approved by independent studies.

**Keywords:** lymphoma, susceptibility, JAK-STAT, epidemiology, association study

## Introduction

Lymphomas are a heterogeneous group of malignancies originating from lymphocytes, with the main types of non-Hodgkin lymphoma and Hodgkin lymphoma (Jaffe E. S. 2001) and multiple subtypes within these categories. Strong risk factors for these lymphoid malignancies are genetic and acquired immunodeficiencies (Ekstrom Smedby, *et al* 2008),

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3 infectious agents (Hjalgrim and Engels 2008) and several occupational exposures (Cocco, *et*  
4 *al* 2010, Miligi, *et al* 2006). Apart from these, various studies (Mensah, *et al* 2007,  
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7 Villeneuve, *et al* 2009, Wang, *et al* 2007, Zhang, *et al* 2007) reported an increased risk of  
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10 NHL for those with a first degree relative diagnosed with a haematopoietic malignancy. This  
11  
12 data indicates the importance of genetic predisposition for lymphoma risk (Skibola, *et al*  
13  
14 2007), and the interplay with environmental factors as the possible etiological mechanism.

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17 The signal-transducer and activator of transcription (STAT) family consists of 7 members  
18  
19 latently expressed in the cytoplasm and which are phosphorylated by Janus kinases (JAK)  
20  
21 cytosolic tyrosine kinases in response to different cytokine stimuli (Schindler, *et al* 2007).  
22  
23 They are involved in signalling cascades of various immune regulatory pathways (Egwuagu  
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25 2009). Among these factors, particularly stat3 is emerging as an important player in the  
26  
27 development of malignancies. It is constitutively activated in different cancer types (Coppo, *et*  
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29 *al* 2009, Ding, *et al* 2008, Frank 2003, Hazan-Halevy, *et al* 2010, Mackenzie, *et al* 2008,  
30  
31 Tomita, *et al* 2006), and known to promote tumourigenesis by enhancing expression of pro-  
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33 survival factors such as B-cell lymphoma 2 (bcl-2), bcl-xL and myeloid cell leukaemia  
34  
35 sequence 1 (mcl-1) (reviewed by (Hu and Ivashkiv 2009, Yu, *et al* 2009)). Also other factors  
36  
37 of this family, such as stat 1, 5 and 6 appear to play a role in the pathogenesis of human  
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39 cancers (Adamkova, *et al* 2007, Bruns and Kaplan 2006, Martini, *et al* 2008, Yu and Jove  
40  
41 2004) and present constitutive activation in breast cancer, head and neck cancer, leukaemia  
42  
43 and multiple myeloma (Bowman, *et al* 2000, Bromberg 2002, Yu and Jove 2004). Their  
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45 prominent role in signalling pathways of well-established risk factors for cancer and their  
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47 implication in various cancer types prompted us to investigate the association between genetic  
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49 variants of selected genes of the JAK-STAT pathway and lymphoma risk in samples of  
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51 participants to the European EpiLymph multi-centre case-control study.  
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## Material and Methods

### *Study design*

A detailed description of the EpiLymph study has been published elsewhere (de Sanjose, *et al* 2006). Briefly, the EpiLymph study was carried out in six European countries (Spain, France, Germany, Italy, Ireland, and Czech Republic) from 1998 to 2004. Incident cases of lymphoid malignancies were recruited for the study and their diagnoses were categorized according to the WHO classification (Jaffe E. S. 2001). Controls were selected from the same hospitals as the cases in all centers, except in Germany and Italy where they were randomly sampled from population registries. Controls were frequency-matched to cases by age, sex, and study centre. The study included 2,348 cases and 2,462 controls. All participants were asked to donate a blood sample for DNA extraction and underwent a personal interview gathering sociodemographic information, familial and medical history, smoking and alcohol habits, a complete occupational history and details on recreational and occupational exposure to sunlight. The study was approved by the competent ethical committee in each study area, and informed consent was obtained from each study subject. The present genotyping study was restricted to EpiLymph study subjects for whom DNA was available: a total of 1,481 cases of lymphoma, including Hodgkin lymphoma (HL,  $n=272$ ), T-cell lymphoma (T-NHL,  $n=95$ ), and B-cell lymphoma (B-NHL,  $n=1,114$ ), in turn including the subtypes diffuse large B-cell lymphoma (DLBCL,  $n=408$ ), follicular lymphoma (FL,  $n=200$ ), chronic lymphocytic leukaemia (CLL,  $n=340$ ), marginal zone B-cell lymphoma (MZL,  $n=112$ ), and mantle cell lymphoma (MCL,  $n=54$ ). The corresponding EpiLymph controls ( $n=1,491$ ) were frequency-matched by age (< 30, 30-39, 40-49, 50-59, 60-69, 70-79,  $\geq 80$ ), sex, and study centre. The German cases and controls were individually matched by gender and age ( $\pm 1$  year of birth).

### *SNP selection*

Genes and single nucleotide polymorphisms (SNPs) which have either previously been associated with lymphomagenesis or have a high biological plausibility to be involved in the development of lymphoid neoplasms, were selected from public databases. Tagging SNPs for the selected genes and their  $\pm 10$ kb flanking region were selected via pairwise SNP selection with an  $r^2$  threshold of 0.9 using Haploview (Barrett, *et al* 2005, Carlson, *et al* 2004, de Bakker, *et al* 2005) and the genotyping information for the CEU population of the HapMap database (Consortium 2003) (<http://hapmap.ncbi.nlm.nih.gov>, NCBI 36 assembly, dbSNP b126, phase II).

Only SNPs with a minor allele frequency (MAF)  $\geq 5\%$  and an Illumina GoldenGate Design Score of at least 0.6 were included into the oligonucleotide pooled assay (OPA).

### *Genotyping and sample preparation*

Genotyping was performed using the Illumina<sup>TM</sup> GoldenGate assay technology (Illumina, San Diego, CA). The 1,481 cases and 1,491 controls were newly plated in a 96-well format. 350 ng of DNA was required, with a concentration of at least 70 ng/ $\mu$ l. The available DNA concentration was measured using PicoGreen<sup>®</sup> (Invitrogen, Darmstadt, Germany). Samples with insufficient DNA ( $n=822$ ) were whole-genome amplified according to the manufacturer's protocol for the Illustra GenomePhi V2 DNA Amplification Kit (GE Healthcare, Buckinghamshire, UK). In addition, DNA extraction from blood clots was performed for 312 samples using the Gentra Puregene Blood Kit (Qiagen, Hilden, Germany). For quality control, three random DNA samples were placed on each plate for replication.

The genotyping was carried out according to the manufacturer's protocol and as specified by Fan *et al.* (Fan, *et al* 2006, Fan, *et al* 2003), in cooperation with the Genomics & Proteomics Core Facility at the German Cancer Research Centre in Heidelberg.



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3 After generation of genotype calls with the GenCall version (5.2.0), all SNPs were  
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5 visually examined for individual clustering. Loci with poor performance or monomorphic  
6  
7 characteristics were excluded.  
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10 Individual DNA samples with a call rate below 0.96 were removed from the dataset.  
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### 13 14 15 *Statistical analysis* 16

17 To test for deviation of genotype distribution from Hardy-Weinberg equilibrium (HWE)  
18 among the controls we conducted a chi-square test. SNPs with deviation from HWE in  
19 controls were excluded from further analysis. We used an adjusted  $p$ -value of  $3 \times 10^{-5}$   
20 (Bonferroni correction for 1,418 SNPs relevant after quality control). We also determined  
21 whether the allelic frequency distribution differed between cases and controls.  
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29 Heterogeneity of risks according to sex, age (cut-off for B-NHL: 50years, HL: 40years)  
30 and study centres was tested using a chi-square test.  
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### 34 35 36 *SNP analysis* 37

38 Of the 1,536 SNPs genotyped in 1,481 cases and 1,491 controls, 97 were excluded from  
39 analyses due to clustering and low call frequency, 21 due to being monomorphic in our study  
40 population, and 42 because they showed a deviation from HWE ( $p$ -value less than  $3 \times 10^{-5}$ )  
41 among the controls. Irrespectively, a total of 109 samples were excluded on the basis of a call  
42 rate less than 0.96, leading to a failure rate of 3.6 %. The failure rates for cases and controls  
43 were 4.5 % ( $n=65$ ) and 3 % ( $n=44$ ), respectively.  
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53 The associations between polymorphisms and risk of HL, T-NHL and B-NHL, as well as  
54 the most frequent B-NHL subtypes, were estimated by calculating odds ratios (OR), and the  
55 corresponding 95 % confidence intervals (CI) using unconditional logistic regression,  
56 adjusting for age (continuous), sex and study centre, using SAS 9.2 (SAS Institute Inc. Cary,  
57 NC). After quality control of the genotyping data, samples were excluded from the statistical  
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3 analysis. To avoid loss of power in conditional logistic regression analysis, frequency  
4 matching for the whole study population using the matching variables (age, sex and study  
5 centre) was performed as was done in previous publications of the EpiLymph study (Besson,  
6 et al 2006, de Sanjose, et al 2006). Previous analysis presented similar results from  
7 conditional and unconditional logistic regression analysis of EpiLymph data (Boffetta, *et al*  
8 2008). Therefore, subsequent statistical analyses were performed using unconditional logistic  
9 regression adjusted for the matching variables (de Sanjose, *et al* 2006).

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The homozygote genotype of the most common allele was used as reference group. To  
increase statistical power and detect the allelic effect, we performed tests under the dominant  
model by combining the heterozygous and mutant genotype. We also calculated the risk  
association for each genotype by using the co-dominant model for the logistic regression.

The test for trend was calculated including a continuous SNP variable in the log-additive  
model (Breslow NE 2000). As positive association we defined an odds ratio larger than 1,  
whereas an inverse association was specified by an OR below 1.

Additionally, we conducted analysis for risk of HL with conditional logistic regression  
with complete case sets, 1:1 matched within each age-category (< 30, 30-39, 40-49, 50-59,  
60-69, 70-79,  $\geq$  80) and by sex and study centre. As sensitivity analysis for B-NHL we  
conducted stratified analysis by sex and age, with cut point set at 50 years as performed by  
Lan et al. and Wang et al. (Lan, *et al* 2009, Wang, *et al* 2007). For HL cases the stratified  
analysis by age was done with a cut point of less than 40 years versus equal or older than 40  
years, due to the bimodal age distribution.

As a large number of tests were performed, we had to control the family-wise error rate.  
The gold standard to adjust for multiple comparison is a permutation test, which is  
computational extensive. Since, this is a candidate gene approach based on prior knowledge  
of the relevance of the included genes, we selected the SNP Spectral Decomposition  
Approach (*simpleM* method) (Gao, *et al* 2008), which yields similar results as a permutation

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3 based approach (Johnson, *et al* 2010). The *simpleM* method starts with the calculation of the  
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5 effective number of independent SNPs,  $M_{\text{eff}}$ , for each gene, based on the underlying LD  
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7 structure of the genotyping data. Gene-specific  $M_{\text{eff}}$  values ( $^G M_{\text{eff}}$ ) were received, which were  
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9 added up to a study-wise  $M_{\text{eff}}$  value,  $^{SG} M_{\text{eff}} = \text{sum}(^G M_{\text{eff}})$  under the assumption that the genes  
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11 are independent with respect to the endpoints. By applying the Bonferroni correction to the  
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13 number of independent tests, we obtained a study-wise significance level of  $0.05/^{SG} M_{\text{eff}} = 2.9$   
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15  $\times 10^{-4}$ . Based on the distinct aetiology of the three main lymphoma subtypes (B-NHL, T-  
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17 NHL, and HL) (Morton, *et al* 2008), we considered the tested association between SNPs and  
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19 the subtypes as independent from each other and did not take them into account for the  
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21 multiple comparison correction.  
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27 Statistical interaction was assessed for the SNPs of the most prominent genes for which  
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29 biological interaction was plausible based on the current knowledge of the JAK-STAT  
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31 pathway (Yu, *et al* 2009), by adding an interaction term in the regression model. To formally  
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33 test statistical interaction, the log-likelihood ratio test was applied. Furthermore, if the  
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35 interaction  $p$ -value was below 0.05 as well as for the most promising SNPs of the single SNP  
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37 analysis, where biological interaction was likely, we calculated risk estimates for one genetic  
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39 variant stratified by the genotype of the second variant included in the previous regression  
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41 model.  
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#### 48 *Haplotype analysis*

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50 The genotyping data of the controls was transformed into Haploview format (linkage  
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52 format) using the SNPtool ([http://www.dkfz.de/de/molgen\\_epidemiology/tools/SNPtool.html](http://www.dkfz.de/de/molgen_epidemiology/tools/SNPtool.html))  
53  
54 to reconstruct haplotype blocks with Haploview, using the implemented algorithm based on  
55  
56 confidence bounds by Gabriel *et al.* (Gabriel, *et al* 2002). The cut-off values for the haplotype  
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58 block generation are: MAF > 5 %, Hardy Weinberg  $p$ -value cut-off  $\geq 0.01$  and 75 % of non-  
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60 missing genotypes of this marker.

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3 Maximum likelihood haplotype frequency estimates were generated based on the  
4 expectation-maximization (EM) algorithm implemented in the *PROC HAPLOTYPE*  
5 procedure of the SAS/Genetics package (SAS 9.2). Haplotypes with a frequency < 0.05 were  
6 defined as rare haplotypes and combined. The haplotype with the highest frequency was used  
7 as reference.  
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## 17 Results

### 18 *Descriptive Statistics*

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20 Details regarding the main characteristics of the study population used for the statistical  
21 analysis and the distribution of cases are presented in Table I. Briefly, 1,414 cases and 1,447  
22 controls were included in the statistical analysis. The age distribution was similar among  
23 cases and controls and the mean age is 55 years for both. To assess if the frequency matching  
24 had worked properly, heterogeneity between cases and controls was checked by applying the  
25 chi-square test, which revealed non-significant *p*-values for all three matching variables (age-  
26 group: *p*=0.9; sex: *p*=0.9 and study centre: *p*=1.0). The largest lymphoma subtypes were  
27 Hodgkin lymphoma (*n*=259), chronic lymphocytic leukaemia (*n*=321), and diffuse large B-  
28 cell lymphoma (*n*=391).  
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### 46 *Results of Single SNP analyses*

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48 Supplemental Table 1 (S1) summarizes the genes and the 210 SNPs belonging to the  
49 JAK-STAT signalling pathway we studied. Eight SNPs (rs1053005, rs1053023, rs12949918,  
50 rs4103200, rs6503695, rs9891119, rs9912773, rs2293158) in *STAT3* and *STAT5A* showed a  
51 nominal significant association (*p*-trend < 0.01) with B-cell lymphomas combined. Five SNPs  
52 (rs6581795, rs4103200, rs9912773, rs6790068, rs9681004) in interferon gamma gene  
53 (*IFNG*), *STAT3*, *STAT6* and tumour protein 63 gene (*TP63*) showed a nominal sufficient  
54 association with HL risk (*p*-trend < 0.05). Two of these SNPs showed a study-wise significant  
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3 association with lymphoma risk ( $p$ -value  $\leq 0.0003$ ). The heterozygous genotype of variant  
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5 rs1053023, located in *STAT3*, was associated with a 28 % risk reduction for B-NHL (OR<sub>AG</sub> of  
6  
7 0.72, 95 % CI 0.60-0.86,  $p$ -value 0.0003). Moreover, for the *STAT6* variant, rs324011, a risk  
8  
9 reduction of 45 % was obtained for carriers of the heterozygous genotype (OR<sub>GA</sub> of 0.55, 95  
10  
11 % CI 0.40-0.76,  $p$ -value 0.0003). The corresponding odds ratios and 95 % confidence  
12  
13 intervals of the most prominent SNPs are shown in Table II, as for the main B-cell lymphoma  
14  
15 subtypes in Table III.

#### 22 *Associations with B-NHL and subtypes*

23  
24 Among the 10 tagSNPs of *STAT3*, 7 SNPs (rs1053005, rs1053023, rs12949918,  
25  
26 rs4103200, rs6503695, rs9891119, rs9912773) showed a nominal statistically significant ( $p$ -  
27  
28 value  $<0.01$ ) inverse association with B-NHL overall, and stayed significant at the  $\alpha=0.05$   
29  
30 level for DLBCL (see Table III and S2). *STAT3* rs4103200 was related to B-NHL risk with an  
31  
32 OR<sub>CG/CC</sub> of 0.78 (95 % CI 0.66-0.92) and a  $p$ -value for trend of 0.003. Similar risk reductions  
33  
34 in association with this variant were also evident for DLBCL (OR<sub>GC/CC</sub> of 0.76, 95 % CI 0.60-  
35  
36 0.96); FL (OR<sub>GC/CC</sub> of 0.73, 95% CI 0.54-0.99); and HL (OR<sub>CC</sub> of 0.49, 95 % CI 0.27-0.90,  $p$ -  
37  
38 value for trend 0.006).

39  
40 Furthermore, a nominal significant association was observed for *STAT5A* – homozygous  
41  
42 mutant carriers of rs2293158 were at 32 % reduced risk of B-NHL (95 % CI 0.51-0.92,  $p$ -  
43  
44 trend 0.002). An inverse association could also be seen for the other B-NHL subtypes, but  
45  
46 with lower significance.

47  
48 The mutant allele of the suppressor of cytokine signalling 1 gene (*SOCS1*) variant  
49  
50 showed a nominal significant association with an increased risk for B-NHL (OR  
51  
52 rs149311<sub>GA/AA</sub> 1.42, 95% CI 1.12-1.60) as well as for DLBCL ( $p$ -trend of 0.003).

53  
54 Two variants in Bcl-2 modifying factor gene (*BMF*) (rs3923235, rs7183977) were  
55  
56 associated with risk for DLBCL (OR rs3923235<sub>GG</sub> of 0.43, 95 % CI 0.24-0.77; OR  
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3 rs7183977<sub>GG</sub> of 0.69, 95 % CI 0.46-1.02), but neither with total B-cell lymphomas nor other  
4  
5 subtypes (Table III). The GG genotype of interferon gamma receptor 1 gene (*IFNGR1*)  
6  
7 variant (rs4896243) was positively associated with CLL risk (OR<sub>GG</sub> 1.69, 95 % CI 1.19-2.40).  
8  
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#### 10 11 12 *Associations with T-NHL*

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15 The analysis between the genetic variants and risk for T-NHL did not reveal any  
16  
17 association with a p-value less than 0.01. However, for the *STAT5A* variant (rs2293158) we  
18  
19 observed an inverse association with the risk of T-NHL for the GG genotype (OR<sub>GG</sub> 0.18,  
20  
21 95 % CI 0.04-0.76) with a p-trend of 0.03 (see Table II). Among carriers of the interleukin  
22  
23 12A gene (*IL12A*) variant, for heterozygous mutants a nearly 2-fold increase in the T-NHL  
24  
25 risk was detected (OR rs755004<sub>GA</sub> 1.93, 95 % CI 1.22-3.05).  
26  
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#### 32 *Associations with HL*

33  
34 Within the HL analysis we obtained one SNP with study-wide significance, and  
35  
36 additionally 11 SNPs showed nominal significant association with HL risk. (Table II and  
37  
38 Supplementary Table 3). HL risk was most strikingly associated with variants in *STAT6*.  
39  
40 Here, rs324011 and rs703817 showed a 40-45 % risk reduction for HL (OR rs324011<sub>GA/AA</sub> of  
41  
42 0.61, 95 % CI 0.45-0.82; OR rs703817<sub>GA/AA</sub> of 0.62, 95 % CI 0.45-0.85). Statistical  
43  
44 significance for the association of HL risk with both *STAT6* variants at the  $\alpha = 0.01$  level was  
45  
46 lost when only complete case sets were analyzed (Supplemental Table S3).  
47  
48  
49

50  
51 In addition, the conditional logistic regression analyses revealed an association of caspase  
52  
53 6 (*CASP6*) (rs1800627) with an increased risk (OR rs1800627<sub>AG/GG</sub> of 1.75, 95 % CI 1.16-  
54  
55 2.64, p-value 0.007) and *STAT4* (rs4853546) with decreased risk for HL (OR rs4853546<sub>GA/AA</sub>  
56  
57 0.59, 95 % CI 0.40-0.85, p-value 0.005), respectively.  
58  
59  
60

#### *Associations within the stratified analysis*

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2  
3 The age-stratified analysis revealed significant associations for HL with the variants of  
4  
5 *IFNG* (rs2069718) and *STAT4* (rs7599504) as well as with *TP63* variants (rs6790068,  
6  
7 rs9681004) among the older age-group (S5). Within the younger B-NHL cases (age < 50 y)  
8  
9 the *CASP6* variant (rs5030552) was associated with an increased risk (OR<sub>AG/GG</sub> 1.94, 95 % CI  
10  
11 1.22-3.11, *p*-trend 0.003). The analysis by sex showed a decreased risk for women, who were  
12  
13 heterozygous for the *IL7R* variant rs12516866 (OR rs12516866<sub>CA</sub> 0.61, 95 % CI 0.47-0.81, *p*-  
14  
15 trend 0.03) (data not shown). For the stratified analyses all herein presented *p*-values for  
16  
17 heterogeneity were below 0.05.  
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#### 25 *Haplotype associations*

26  
27 The estimated haplotype frequencies with the most frequent haplotype taken as the  
28  
29 reference are presented in Supplemental Table (S4). Mainly the haplotype-based associations  
30  
31 were consistent with those of single SNP based analyses. The *STAT3* haplotype (rs4103200-  
32  
33 rs9891119-rs9912773-rs12949918-rs17405722) with a frequency of 27 % and containing the  
34  
35 two most significant *STAT3* SNPs, rs4103200 and rs9912773, showed a reduced risk for B-  
36  
37 NHL (OR of 0.82, 95 % CI 0.72-0.94) and DLBCL (OR of 0.81, 95 % CI 0.67-0.98). HL risk  
38  
39 was significantly increased for carriers of haplotypes of *BMF* (Block 1-3), *IFNG* (Block1 and  
40  
41 2), *STAT6* and *TP63* (see Supplemental Table 4).  
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#### 50 *Gene-gene interaction*

51 We formally investigated interaction between different genes of the JAK-STAT pathway  
52  
53 by comparing the genetic variants of *CASP6*, *STAT3*, *STAT1*, *IFNG* and *IL12A* between B-  
54  
55 NHL cases and controls stratified by genotype of *BMF*, *STAT1*, *IL10*, *IFNG*, *SOCS1* and  
56  
57 *STAT4*, respectively. Significant results are summarized in Table IV.  
58  
59  
60

Interaction between the homozygous mutant carriers of *IL12A* (rs4680534) and the  
homozygous mutants of *STAT4* (rs517352) resulted in a nearly 3-fold increased B-NHL risk

1  
2  
3 (OR of 2.80, 95 % CI 1.30-6.05). Interaction between the *CASP6* variant (rs5030552) and two  
4  
5 *BMF* variants (rs537455, rs16970325) showed a 57 % and 50 % increased risk, respectively.  
6  
7  
8 The interaction analysis of *STAT3* and *STAT1* revealed a 40 % reduced risk for carriers of the  
9  
10 homozygous mutant of the *STAT3* variant (rs6503695) in carriers of the AA genotype of  
11  
12 *STAT1* (OR rs6503695 of 0.60, 95 % CI 0.41-0.88). Among those of the *IL10* wildtype,  
13  
14 carriers of the heterozygous mutant of the *STAT3* variant (rs1053023) showed decreased risk  
15  
16 for B-NHL at the study-wise significance level (Table IV). Additionally, the heterozygous  
17  
18 mutant of the *STAT3* SNP (rs4103200) was associated with a 29 % decreased risk for B-NHL  
19  
20 among carriers of the *IFNG* wildtype.  
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## 27 Discussion

28  
29 Our study identified 9 SNPs in 3 genes (*SOCS1*, *STAT3*, *STAT5A*) implicated in the JAK-  
30  
31 STAT pathways significantly associated with risk of B-cell lymphoma, and 10 SNPs in 7  
32  
33 genes of this pathway (*BMF*, *CASP6*, *IFNG*, *STAT3*, *STAT4*, *STAT6*, *TP63*) associated with  
34  
35 HL risk.  
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38  
39 Seven SNPs in *STAT3* presented a statistically significant inverse association with B-cell  
40  
41 lymphoma risk, and particularly with the DLBCL and FL subtypes. One of these, the  
42  
43 rs1053023, located in haplotype block 1, showed even study-wise significance. To our  
44  
45 knowledge this is the first time that genetic variants in *STAT3* have been associated with  
46  
47 lymphoma risk. Stat3 is a major mediator of il6 activation (Leonard and O'Shea 1998) and it  
48  
49 is induced by several exogenous factors, such as like lipopolysaccharid (LPS) (Samavati, *et al*  
50  
51 2009), cigarette smoke (Liu 2007), and infection with Hepatitis C virus (Yoshida, *et al* 2002).  
52  
53 In normal cells stat3 activation is usually transient, whereas it is often constitutively activated  
54  
55 in many cancers (reviewed in (Benekli, *et al* 2003, Bowman, *et al* 2000)). The transcription  
56  
57 factor promotes tumour development and survival of tumour cells by regulating pro-survival  
58  
59 factors, such as bcl-xL, bcl-2 and mcl-1 (reviewed (Hu and Ivashkiv 2009)). Aberrant stat3  
60



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3 activation has also been shown for HL (Kube, *et al* 2001), NK/T-cell lymphoma (Chiarle, *et*  
4 *al* 2005, Zhang, *et al* 2002, Zheng, *et al* 2002), and activated DLBCL (Ding, *et al* 2008, Lam,  
5 *et al* 2008). The interplay between STAT and nuclear factor kappa B (NFκB) pathways  
6 appears to be implicated in lymphomagenesis (Bollrath and Greten 2009, Lam, *et al* 2008,  
7 Scheeren, *et al* 2008).

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15 Mutations in *STAT3* are a hallmark of Hyper-IgE-syndrome (HIES), a complex primary  
16 immunodeficiency (Minegishi and Karasuyama 2009) and several case reports also suggest an  
17 increased risk for certain lymphoma types and HL among HIES patients (Belada, *et al* 2010,  
18 Kashef, *et al* 2006, Minegishi 2009, Wallet, *et al* 2007). This adds to the eminent role of *stat3*  
19 in immune response and the remarkable impact of its dysfunction in the aetiology of various  
20 immune diseases.  
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29  
30 On the basis of the close functional relationship between *stat3/stat1* and the cytokines *il6*  
31 and *il10*, joint effects have been explored. For B-cell lymphoma we found evidence for  
32 statistical interaction between *STAT3* and *IL10*, as well as between *STAT3* and *STAT1*.  
33 Immunoregulatory *il10* is upregulated by *stat3* and is part of the *stat3* feedforward loop (Yu,  
34 *et al* 2007). The opponent factor of the JAK-STAT signalling *socs1*, a member of the family  
35 of suppressors of cytokine signalling (Alexander 2002), was associated with increased risk for  
36 B-NHL. This is in line with recent publications indicating *socs1* as tumour suppressor  
37 (Weniger, *et al* 2006), and data reporting inactivation of this gene due to mutation or  
38 hypermethylation in B-cell lymphoma entities and multiple myeloma, respectively (Galm, *et*  
39 *al* 2003, Mottok, *et al* 2009).  
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53 One of our most prominent results was the inverse association of *STAT5A* rs2293158  
54 mutant genotype (GG) with risk of all main B-cell lymphoma subtypes (DLBCL, FL, CLL),  
55 as well as for T-NHL and HL. Constitutively activated *stat5* in B-cell lymphoma cell lines  
56 induces the important cell cycle regulator *cylinD1* (Melzner, *et al* 2005). A prominent target  
57 gene of *stat5* is *BCL6*, encoding *bcl-6*, which regulates the expression of *stat3* (Ding, *et al*  
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3 2008) and is crucial for germinal centre development. Genetic variability of *BCL6* has  
4  
5 previously been associated with NHL risk (Jardin, *et al* 2007, Morton, *et al* 2009, Parekh, *et*  
6  
7 *al* 2007, Saito, *et al* 2009, Tibiletti, *et al* 2009, Zhang, *et al* 2005). Taken together, our results  
8  
9 add epidemiological evidence to the significant role of STAT genes in lymphomagenesis.  
10  
11

12 Bmf binds to bcl-2 and functions as an apoptotic activator. Recent mice data suggests a  
13  
14 relevance of this factor in c-myc-driven B-cell lymphomagenesis (Frenzel, *et al* 2010) and  $\gamma$   
15  
16 irradiation-induced thymic lymphoma development (Labi, *et al* 2008). In our study, variants  
17  
18 in *BMF* (rs7183977, rs3923235) were specifically associated with DLBCL risk, but not with  
19  
20 the other lymphoma subtypes. Noteworthy is the evidence for gene-gene interactions between  
21  
22 variants in *BMF* and *CASP6*, which were seen for B-cell lymphoma. This supports the  
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24 connection between variability in genes of apoptotic pathways and the pathogenesis of  
25  
26 lymphomas (Lan, *et al* 2009, Morton, *et al* 2009).  
27  
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32 Pathogenesis of the various lymphoma subentities differs in relation to some  
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34 environmental (Fisher and Fisher 2004, Landgren and Caporaso 2007, Smedby, *et al* 2006,  
35  
36 Thomas, *et al* 2002) and also underlying genetic risk factors (Caporaso, *et al* 2009, El-Zein, *et*  
37  
38 *al* 2009, Skibola, *et al* 2007, Wang, *et al* 2006). In this study of the JAK-STAT pathway  
39  
40 related genes, HL risk has been associated with variants in *STAT3* (rs4103200, rs9912773),  
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42 *STAT6* (rs324011, rs703817) and *TP63* (rs6790068, rs9681004).  
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46 A hallmark of classical HL is the deregulated cytokine expression, particularly of il6 and  
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48 il13, which might promote the oncogenic transformation (Skinnider, *et al* 2002, Skinnider and  
49  
50 Mak 2002). These cytokines are well-known activators of the JAK-STAT pathway. Previous  
51  
52 data on HL cell lines support an important role of stat3 in the genesis of HL (Baus and  
53  
54 Pfitzner 2006, Kube, *et al* 2001, Skinnider, *et al* 2002, Skinnider and Mak 2002), and  
55  
56 inhibition of this pathway via small molecules is discussed as a therapeutic option (Holtick, *et*  
57  
58 *al* 2005, Kim, *et al* 2008, Mackenzie, *et al* 2008). Adding to this point, are observations from  
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3 tissue microarrays, where *stat3* was identified as heavily over expressed in Hodgkin and Reed  
4  
5 Sternberg (HRS) cells (Garcia, *et al* 2003).  
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7

8 Carriers of the rare putatively functional variant in *STAT6* (rs324011) were at reduced  
9  
10 risk for HL. This *STAT6* variant located in a NFκB binding site in intron2 appears to have an  
11  
12 impact on *stat6* isoform expression (Schedel, *et al* 2004, Schedel, *et al* 2009) and was  
13  
14 previously associated with elevated serum IgE levels (Kabesch, *et al* 2006, Weidinger, *et al*  
15  
16 2004). *Stat6* activation is a common and distinct feature of HRS cells (Skinnider and Mak  
17  
18 2002) and has been associated with HRS cell survival antagonistic to *stat1* activity (Baus and  
19  
20 Pfitzner 2006). Genomic imbalances detected in HRS cells revealed a frequent gain of *STAT6*  
21  
22 (Feys, *et al* 2007, Hartmann, *et al* 2008).  
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27 We observed an 80 % increased risk for HL among homozygous carriers of the mutant  
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29 allele of the *IFNG* SNP rs2069718. For this variant located in intron 3, an influence on *ifng*  
30  
31 expression was reported (Pravica, *et al* 2000) and an association with the risk of SLE (OR  
32  
33 2.42 for CC vs TT/TC) (Kim, *et al* 2009), a reported risk factor for NHL and HL (Bernatsky,  
34  
35 *et al* 2007, Gayed, *et al* 2009, Landgren, *et al* 2006, Mellekjaer, *et al* 2008).  
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39 A major strength of our study is the sample size, which allowed analysis of genetic  
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41 variants for lymphoma overall, as well as for the major subtypes like DLBCL, FL and CLL.  
42  
43 However, the power to detect associations with rare subtypes such as T-NHL, MZL and MCL  
44  
45 was limited, and the same holds true for the analysis of strata by sex and age.  
46  
47

48 Power for the detection of GxG interactions was limited in this study. However our  
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50 analysis of biologically plausible interactions may put forward good candidates for replication  
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52 in the framework of pooled analyses.  
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55 Another limitation of the presented study setup is the incomplete coverage of genes  
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57 related to the JAK-STAT pathway. Though, we were not able to give information about the  
58  
59 risk profile of variants in genes of the entire pathway in the context of lymphomagenesis.  
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3 Since the EpiLymph study was conducted in different European countries we checked for  
4 heterogeneity of our results across the different study centres. Among the SNPs with  
5 significant association, four variants (rs6503685, rs9912773, rs34997637, rs4853546)  
6 presented heterogeneity between study centres. Considering the high LD of the associated  
7 *STAT3* variants, their independent role in lymphoma aetiology is questionable. Thus, a more  
8 in-depth analysis of this gene is recommended to identify the functional variant(s) underlying  
9 differential risk for lymphoma associated with this region.  
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20 This exploration of the implication of JAK-STAT signalling related genes in lymphoma  
21 aetiology involved a large number of performed tests and required an adjustment for multiple  
22 comparison. Since, prior knowledge about the biological relevance of the genes was used for  
23 the selection of candidate genes, a less stringent significance threshold can be used  
24 (Hirschhorn and Altshuler 2002), as compared to GWAS. We applied the SNP Spectral  
25 Decomposition Approach (*simpleM* method) first introduced by Gao et al. (Gao, *et al* 2008)  
26 and applied in several recent association studies (He, *et al* 2010, Reynolds, *et al* 2010). This  
27 method takes the correlation between the different SNPs into account and calculates the  
28 effective number of independent tests for each gene.  
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41 Within the single SNP analysis two variants showed study-wise significance and support  
42 their relevance for lymphomagenesis. Furthermore, the results from the single point analyses  
43 were underlined by the haplotype analysis as well as by the GxG analysis. Nevertheless, to  
44 our knowledge there is no convenient and comprehensible solution to account for multiple  
45 comparisons due to subtype analyses. As a result, we only considered for the number of tests  
46 due to the number of analyzed SNPs.  
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55 SNPs associated with DLBCL in this study were not listed among the top 30 ranked  
56 SNPs associated with DLBCL in Skibola et al. (Skibola, *et al* 2009). But their analysis was  
57 based on a moderate number of DLBCL cases (n=221) and had limited power to identify  
58 variants of moderate risk. In general, there is an ongoing discussion that GWAS only identify  
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3 genetic variants with a strong impact on disease development and are not able to detect those  
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5 with smaller effects (Wu, *et al* 2010).  
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8 Nevertheless, recent experimental and clinical data (Baran-Marszak, *et al* 2010, Baus, *et*  
9  
10 *al* 2009, Cotto, *et al* 2010, Ding, *et al* 2008, Hazan-Halevy, *et al* 2010, Kupferman, *et al*  
11  
12 2009, Mackenzie, *et al* 2008, Martini, *et al* 2008, Stewart, *et al* 2009, Verma, *et al* 2010,  
13  
14 Zhang, *et al* 2010), linking JAK-STAT pathway genes with the pathogenesis of lymphomas  
15  
16 provide strong biological support for the observed associations.  
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20 To our knowledge, we reported for the first time inter-individual differences in  
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22 susceptibility to the major lymphoma subtypes in relation to variability in genes related to the  
23  
24 JAK-STAT pathway, specifically *STAT3* (all lymphoma), *STAT6* (HL) and *STAT5A* (B-cell  
25  
26 lymphoma). Our data adds to the growing evidence of a pivotal role of this pathway in cancer  
27  
28 pathogenesis and other inflammation-driven phenotypes. Replication of our findings in  
29  
30 independent studies and pooled analyses are warranted to assess subtype-specific risks and  
31  
32 gene-gene interactions, for which statistical power in our study was limited.  
33  
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37

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**Conflict of interest**

The authors declare no conflict of interest.

**Table I.** Selected characteristics of the final sample subset of the EpiLymph study

Characteristics	Case	Control
	patients	subjects
	N (%)*	N (%)*
<b>Age</b>		
<30	147 (10)	129 (9)
30-39	147 (10)	153 (11)
40-49	175 (12)	183 (13)
50-59	269 (19)	274 (19)
60-69	390 (28)	397 (27)
≥70	286 (21)	311 (21)
<b>Study Centre</b>		
Spain	301 (21)	318 (22)
France	149 (11)	152 (10)
Germany	518 (37)	530 (37)
Italy	106 (7)	110 (8)
Ireland	105 (7)	102 (7)
Czech Republic	235 (17)	235 (16)
<b>Sex</b>		
Male	787 (56)	802 (55)
Female	627 (44)	645 (45)
<b>Lymphoma subtype</b>		
Hodgkin lymphoma (HL)	259 (18)	-
T-cell lymphoma (T-NHL)	90 (6)	-
B-cell lymphoma (B-NHL)	1,114 (76)	-

Diffuse large B-cell lymphoma (DLBCL)	391 (28)	-
Follicular lymphoma (FL)	195 (14)	-
Chronic lymphocytic leukemia (CLL)	321 (23)	-
Mantle cell lymphoma (MCL)	48 (3)	-
Marginal zone B-cell lymphoma (MZL)	110 (8)	-
removed samples †	67	44
	<hr/> 1,481	<hr/> 1,491

\* Percentage is based on the final population for statistical analysis

† 65 cases and 44 controls were removed due to low performance of the genotyping (call-rate below 0.96); additionally, 2 cases were excluded due to missing information on age



**Table II.** Odds ratios (OR) and 95% confidence intervals (CI) for associated SNPs of the JAK-STAT pathway with B-cell lymphoma, T-cell lymphoma and Hodgkin lymphoma.

Genotype	B-NHL				T-NHL			HL			
	Controls* N (%)	N (%)	OR <sup>†</sup> (95%CI)	p-value	N (%)	OR <sup>†</sup> (95%CI)	p-value	Controls* N (%)	N (%)	OR <sup>†</sup> (95%CI)	p-value
<b><i>BMF</i> rs1540686</b>											
AA	316 (26)	300 (28)	Reference		27 (30)	Reference		297 (26)	76 (29)	Reference	
AG	608 (51)	513 (48)	0.88 (0.72-1.07)	0.2	45 (50)	0.92 (0.56-1.53)	0.8	582 (50)	140 (54)	0.91 (0.65-1.28)	0.6
GG	268 (22)	246 (23)	0.96 (0.76-1.22)	0.8	18 (20)	0.84 (0.45-1.56)	0.6	273 (24)	39 (15)	0.54 (0.34-0.85)	<b>0.007</b>
AG/GG			0.91 (0.75-1.09)	0.3		0.90 (0.56-1.44)	0.7			0.79 (0.57-1.09)	0.2
			p-trend	0.7		p-trend	0.6			p-trend	0.01
<b><i>BMF</i> rs648289</b>											
AA	357 (30)	339 (32)	Reference		31 (34)	Reference		337 (29)	84 (32)	Reference	
AG	590 (49)	497 (47)	0.88 (0.73-1.07)	0.2	43 (48)	0.91 (0.56-1.48)	0.7	569 (49)	142 (55)	0.97 (0.69-1.34)	0.8
GG	249 (21)	230 (22)	0.97 (0.77-1.23)	0.8	16 (18)	0.79 (0.42-1.48)	0.5	250 (22)	33 (13)	0.52 (0.33-0.83)	<b>0.006</b>
AG/GG			0.91 (0.76-1.09)	0.3		0.87 (0.55-1.38)	0.6			0.83 (0.61-1.14)	0.3
			p-trend	0.7		p-trend	0.5			p-trend	0.01
<b><i>IFNG</i> rs2069718</b>											
GG	456 (38)	420 (40)	Reference		76 (84)	Reference		436 (38)	87 (34)	Reference	

GA	573 (48)	494 (46)	0.93 (0.77-1.11)	0.4	14 (16)	1.24 (0.68-2.27)	0.5	558 (48)	124 (48)	1.08 (0.78-1.50)	0.6
AA	164 (14)	149 (14)	0.98 (0.76-1.27)	0.9	-	-	-	159 (14)	48 (19)	1.80 (1.16-2.79)	<b>0.009</b>
GA/AA			0.94 (0.79-1.11)	0.5		1.17 (0.64-2.14)	0.6			1.22 (0.89-1.66)	0.2
			p-trend	0.7		p-trend	0.8			p-trend	0.02

**IFNG** rs6581795

AA	648 (54)	577 (54)	Reference		51 (57)	Reference		619 (54)	115 (44)	Reference	
AG	464 (39)	411 (39)	1.00 (0.83-1.19)	1.0	33 (37)	0.92 (0.58-1.46)	0.7	454 (39)	120 (46)	1.47 (1.08-2.01)	0.01
GG	84 (7)	78 (7)	1.04 (0.75-1.45)	0.8	6 (7)	0.95 (0.39-2.31)	0.9	83 (7)	24 (9)	1.91 (1.10-3.29)	0.02
AG/GG			1.00 (0.85-1.19)	1.0		0.93 (0.60-1.44)	0.7			1.53 (1.14-2.06)	<b>0.005</b>
			p-trend	0.9		p-trend	0.8			p-trend	<b>0.003</b>

**IL12A** rs755004

GG	903 (76)	802 (75)	Reference		56 (62)	Reference		876 (76)	188 (73)	Reference	
GA	272 (23)	239 (22)	0.99 (0.81-1.21)	0.9	32 (36)	1.93 (1.22-3.05)	<b>0.005</b>	263 (23)	66 (25)	1.08 (0.77-1.52)	0.6
AA	21 (2)	25 (2)	1.35 (0.75-2.43)	0.3	1 (1)	0.76 (0.10-5.86)	0.8	17 (1)	5 (2)	1.42 (0.47-4.30)	0.5
GA/AA			1.01 (0.84-1.23)	0.9		1.84 (1.17-2.90)	<b>0.008</b>			1.10 (0.79-1.54)	0.6
			p-trend	0.7		p-trend	0.02			p-trend	0.5

Table II. cont.'d

Genotype	Controls*	B-NHL			T-NHL			Controls*	HL		
		N (%)	OR <sup>†</sup> (95%CI)	p-value	N (%)	OR <sup>†</sup> (95%CI)	p-value		N (%)	N (%)	OR <sup>†</sup> (95%CI)
<b><i>SOCS1</i> rs149311</b>											
GG	857 (72)	697 (65)	Reference		68 (76)	Reference		823 (71)	171 (66)	Reference	
GA	295 (25)	321 (30)	1.34 (1.11-1.62)	<b>0.002</b>	18 (20)	0.77 (0.45-1.32)	0.3	284 (25)	79 (31)	1.37 (0.99-1.90)	0.06
AA	43 (4)	45 (4)	1.30 (0.85-2.01)	0.2	4 (4)	1.12 (0.39-3.27)	0.8	48 (4)	9 (3)	0.81 (0.37-1.79)	0.6
GA/AA			1.34 (1.12-1.60)	<b>0.002</b>		0.81 (0.49-1.35)	0.4			1.29 (0.94-1.76)	0.1
			p-trend	<b>0.003</b>		p-trend	0.6			p-trend	0.3
<b><i>STAT1</i> rs34997637</b>											
GG	709 (59)	634 (59)	Reference		64 (71)	Reference		682 (59)	158 (61)	Reference	
GA	410 (34)	374 (35)	1.02 (0.85-1.22)	0.8	24 (27)	0.63 (0.39-1.03)	0.07	397 (34)	91 (35)	0.93 (0.68-1.27)	0.7
AA	76 (6)	57 (5)	0.84 (0.59-1.21)	0.4	2 (2)	0.28 (0.07-1.18)	0.08	76 (7)	10 (4)	0.64 (0.31-1.33)	0.2
GA/AA			0.99 (0.84-1.17)	0.9		0.58 (0.36-0.93)	0.02			0.89 (0.66-1.20)	0.5
			p-trend	0.6		p-trend	0.01			p-trend	0.3
<b><i>STAT3</i> rs1053005</b>											
AA	737 (62)	732 (69)	Reference		55 (61)	Reference		708 (61)	169 (65)	Reference	
AG	401 (34)	287 (27)	0.72 (0.60-0.86)	<b>0.0004</b>	34 (38)	1.16 (0.74-1.82)	0.5	391 (34)	83 (32)	0.89 (0.65-1.21)	0.5

GG	57 (5)	48 (5)	0.85 (0.57-1.27)	0.4	1 (1)	0.23 (0.03-1.71)	0.1	57 (5)	7 (3)	0.54 (0.23-1.26)	0.2
AG/GG			0.73 (0.62-0.87)	<b>0.0005</b>		1.04 (0.67-1.63)	0.9			0.84 (0.62-1.15)	0.3
			p-trend	<b>0.003</b>		p-trend	0.7			p-trend	0.2

**STAT3 rs1053023**

AA	737 (62)	732 (69)	Reference		55 (61)	Reference		708 (61)	169 (65)	Reference	
AG	401 (34)	286 (27)	0.72 (0.60-0.86)	<b>0.0003</b>	34 (38)	1.16 (0.74-1.82)	0.5	391 (34)	83 (32)	0.89 (0.65-1.21)	0.5
GG	57 (5)	49 (5)	0.87 (0.58-1.29)	0.5	1 (1)	0.23 (0.03-1.71)	0.2	57 (5)	7 (3)	0.54 (0.23-1.26)	0.2
AG/GG			0.73 (0.62-0.87)	<b>0.0005</b>		1.04 (0.67-1.63)	0.9			0.84 (0.62-1.15)	0.3
			p-trend	<b>0.003</b>		p-trend	0.7			p-trend	0.2

**STAT3 rs12949918**

AA	402 (34)	403 (38)	Reference		30 (33)	Reference		387 (33)	103 (40)	Reference	
AG	574 (48)	506 (47)	0.87 (0.73-1.05)	0.2	49 (54)	1.14 (0.71-1.84)	0.6	538(47)	115 (44)	0.81 (0.59-1.11)	0.2
GG	220 (18)	158 (15)	0.72 (0.56-0.92)	<b>0.008</b>	10 (11)	0.61 (0.29-1.27)	0.2	231 (20)	41 (16)	0.63 (0.41-0.97)	0.03
AG/GG			0.83 (0.70-0.99)	0.03		0.99 (0.63-1.57)	0.9			0.75 (0.56-1.02)	0.07
			p-trend	<b>0.008</b>		p-trend	0.3			p-trend	0.03

Table II. cont.'d

Genotype	Controls*	B-NHL			T-NHL			Controls*	HL		
		N (%)	OR <sup>†</sup> (95%CI)	p-value	N (%)	OR <sup>†</sup> (95%CI)	p-value		N (%)	N (%)	OR <sup>†</sup> (95%CI)
<b>STAT3 rs4103200</b>											
GG	575 (48)	577 (54)	Reference		50 (56)	Reference		556 (48)	148 (57)	Reference	
GC	506 (42)	407(38)	0.79 (0.67-0.95)	0.01	33 (37)	0.76 (0.48-1.21)	0.2	483 (42)	96 (37)	0.74 (0.54-1.00)	0.05
CC	115 (10)	83 (8)	0.72 (0.53-0.97)	0.03	7 (8)	0.73 (0.32-1.65)	0.5	117 (10)	15 (6)	0.49 (0.27-0.90)	0.02
GC/CC			0.78 (0.66-0.92)	<b>0.003</b>		0.76 (0.49-1.17)	0.2			0.69 (0.51-0.92)	0.01
			p-trend	<b>0.003</b>		p-trend	0.2			p-trend	<b>0.006</b>
<b>STAT3 rs6503695</b>											
AA	504 (42)	505 (47)	Reference		39 (43)	Reference		483 (42)	126 (49)	Reference	
AG	523 (44)	444 (42)	0.84 (0.70-1.00)	0.06	44 (49)	1.08 (0.69-1.70)	0.7	501 (43)	106 (41)	0.80 (0.59-1.10)	0.2
GG	169 (14)	118 (11)	0.69 (0.53-0.91)	<b>0.007</b>	7 (8)	0.53 (0.23-1.22)	0.1	172 (15)	27 (10)	0.57 (0.35-0.92)	0.02
AG/GG			0.81 (0.68-0.95)	0.01		0.94 (0.61-1.46)	0.8			0.74 (0.55-1.00)	0.05
			p-trend	<b>0.004</b>		p-trend	0.3			p-trend	0.02
<b>STAT3 rs9891119</b>											
AA	461 (39)	464 (43)	Reference		40 (44)	Reference		447 (39)	119 (46)	Reference	
AC	566 (47)	480 (45)	0.84 (0.70-1.00)	0.05	41 (46)	0.85 (0.54-1.34)	0.5	533 (46)	115 (44)	0.81 (0.59-1.10)	0.2

1												
2	CC	169 (14)	123 (12)	0.72 (0.55-0.94)	0.02	9 (10)	0.64 (0.30-1.35)	0.2	176 (15)	25 (10)	0.54 (0.32-0.88)	0.01
3												
4	AC/CC			0.81 (0.68-0.96)	0.02		0.80 (0.52-1.24)	0.3			0.74 (0.55-1.00)	0.05
5												
6				p-trend	<b>0.008</b>		p-trend	0.2			p-trend	0.01
7												
8												
9												
10	<b>STAT3</b> rs9912773											
11	CC	613 (51)	606 (57)	Reference		54 (60)	Reference		588 (51)	153 (59)	Reference	
12												
13	CG	485 (41)	388 (36)	0.80 (0.67-0.95)	0.01	30 (33)	0.72 (0.45-1.15)	0.2	470 (41)	96 (37)	0.78 (0.57-1.06)	0.1
14												
15	GG	98 (9)	73 (7)	0.75 (0.54-1.04)	0.08	6 (7)	0.74 (0.31-1.77)	0.5	98 (8)	10 (4)	0.43 (0.21-0.87)	0.02
16												
17	CG/GG			0.79 (0.67-0.94)	<b>0.006</b>		0.72 (0.47-1.12)	0.2			0.72 (0.54-0.97)	0.03
18												
19				p-trend	<b>0.008</b>		p-trend	0.2			p-trend	<b>0.009</b>
20												
21												
22												
23	<b>STAT5A</b> rs2293158											
24	AA	556 (46)	561 (53)	Reference		49 (54)	Reference		547 (47)	125 (48)	Reference	
25												
26	AG	513 (43)	418 (39)	0.80 (0.67-0.95)	0.01	39 (43)	0.89 (0.57-1.38)	0.6	484 (42)	114 (44)	1.07 (0.78-1.45)	0.7
27												
28	GG	127 (11)	88 (8)	0.68 (0.51-0.92)	0.01	2 (2)	0.18 (0.04-0.76)	0.02	125 (11)	20 (8)	0.62 (0.36-1.08)	0.09
29												
30	AG/GG			0.78 (0.66-0.92)	<b>0.003</b>		0.75 (0.48-1.15)	0.2			0.97 (0.72-1.30)	0.8
31												
32				p-trend	<b>0.002</b>		p-trend	0.03			p-trend	0.3
33												
34												
35												
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Table II. cont.'d

Genotype	Controls*	B-NHL			T-NHL			Controls*	HL		
		N (%)	OR <sup>†</sup> (95%CI)	p-value	N (%)	OR <sup>†</sup> (95%CI)	p-value		N (%)	N (%)	OR <sup>†</sup> (95%CI)
<b>STAT6 rs324011</b>											
GG	471 (39)	435 (41)	Reference		38 (42)	Reference		437 (38)	119 (46)	Reference	
GA	557 (47)	470 (44)	0.91 (0.76-1.09)	0.3	39 (43)	0.83 (0.52-1.33)	0.4	552 (48)	97 (37)	0.55 (0.40-0.76)	<b>0.0003</b>
AA	166 (14)	159 (15)	1.04 (0.80-1.34)	0.8	13 (14)	0.91 (0.47-1.76)	0.8	166 (14)	43 (17)	0.80 (0.52-1.23)	0.03
GA/AA			0.94 (0.79-1.11)	0.5		0.85 (0.55-1.32)	0.5			0.61 (0.45-0.82)	<b>0.001</b>
			p-trend	0.9		p-trend	0.6			p-trend	0.04
<b>STAT6 rs703817</b>											
GG	310 (26)	289 (27)	Reference		23 (26)	Reference		292 (25)	87 (34)	Reference	
GA	599 (50)	525 (49)	0.94 (0.77-1.14)	0.5	47 (52)	1.00 (0.60-1.69)	1.0	578 (50)	113 (44)	0.60 (0.42-0.84)	<b>0.003</b>
AA	287 (24)	247 (23)	0.92 (0.73-1.17)	0.5	20 (22)	0.90 (0.48-1.67)	0.7	286 (25)	59 (23)	0.65 (0.44-0.98)	0.04
GA/AA			0.93 (0.77-1.12)	0.5		0.97 (0.59-1.59)	0.9			0.62 (0.45-0.85)	<b>0.003</b>
			p-trend	0.5		p-trend	0.7			p-trend	0.03
<b>TP63 rs6790068</b>											
AA	424 (35)	398 (37)	Reference		32 (36)	Reference		426 (37)	77 (30)	Reference	
AG	588 (49)	498 (47)	0.90 (0.75-1.08)	0.3	43 (48)	0.96 (0.59-1.54)	0.9	556 (48)	123 (47)	1.19 (0.85-1.67)	0.3
GG	184 (15)	171 (16)	0.99 (0.77-1.27)	0.9	15 (17)	1.06 (0.56-2.02)	0.9	174 (15)	59 (23)	1.94 (1.28-2.94)	<b>0.002</b>

AG/GG			0.92 (0.78-1.09)	0.4		0.98 (0.62-1.54)	0.9		1.37 (1.00-1.87)	0.05
			p-trend	0.7		p-trend	0.9		p-trend	<b>0.003</b>
<b>TP63 rs9681004</b>										
AA	417 (35)	393 (37)	Reference		33 (37)	Reference		415 (36)	78 (30)	Reference
AG	588 (49)	497 (47)	0.90 (0.75-1.08)	0.2	40 (44)	0.85 (0.52-1.37)	0.5	563 (49)	120 (46)	1.10 (0.78-1.54) 0.6
GG	189 (16)	177 (17)	0.99 (0.77-1.27)	1.0	17 (19)	1.12 (0.61-2.08)	0.7	175 (15)	61 (24)	1.95 (1.29-2.95) <b>0.002</b>
AG/GG			0.92 (0.77-1.09)	0.3		0.91 (0.58-1.43)	0.7			1.29 (0.94-1.77) 0.1
			p-trend	0.7		p-trend	0.9		p-trend	<b>0.004</b>

\* 1196 controls were taken into account for the risk analysis with the B-cell and T-cell lymphoma cases and 1153 controls were taken into account for the risk analysis with the Hodgkin lymphoma cases

† Odds ratios were adjusted for the matching variables: age (continuous), sex and study center (categorical); the common homozygote was used as reference group for each SNP

Significant *p*-values (< 0.01) are printed in bold



**Table III.** Odds ratios (OR) and 95 % confidence intervals (CI) for associated SNPs of the JAK-STAT pathway with B-cell lymphoma subtypes:

## DLBCL, FL and CLL

Genotype	Controls*		DLBCL		FL			CLL		
	N (%)	N (%)	OR <sup>†</sup> (95%CI)	p-value	N (%)	OR <sup>†</sup> (95%CI)	p-value	N (%)	OR <sup>†</sup> (95%CI)	p-value
<b><i>BMF</i> rs7183977</b>										
AA	519 (43)	199 (51)	Reference		79 (41)	Reference		138 (43)	Reference	
AG	535 (45)	155 (39)	0.75 (0.58-0.95)	0.02	87 (45)	1.07 (0.76-1.48)	0.7	155 (48)	1.09 (0.84-1.42)	0.5
GG	142 (12)	38 (10)	0.69 (0.46-1.02)	0.06	29 (15)	1.31 (0.82-2.10)	0.3	27 (8)	0.76 (0.48-1.21)	0.3
AG/GG			0.73 (0.58-0.93)	<b>0.009</b>		1.12 (0.82-1.53)	0.5		1.02 (0.79-1.32)	0.9
			p-trend	0.01		p-trend	0.3		p-trend	0.6
<b><i>BMF</i> rs3923235</b>										
AA	622 (52)	230 (59)	Reference		102 (52)	Reference		171 (53)	Reference	
AG	482 (40)	148 (38)	0.82 (0.65-1.05)	0.1	76 (39)	0.97 (0.70-1.34)	0.9	133 (41)	1.00 (0.77-1.30)	1.00
GG	92 (8)	15 (4)	0.43 (0.24-0.77)	<b>0.004</b>	17 (9)	1.15 (0.65-2.02)	0.6	17 (5)	0.67 (0.39-1.16)	0.2
AG/GG			0.76 (0.60-0.96)	0.02		1.00 (0.74-1.36)	1.0		0.95 (0.74-1.22)	0.7
			p-trend	<b>0.003</b>		p-trend	0.8		p-trend	0.4
<b><i>IFNGRI</i> rs4896243</b>										
AA	370 (31)	113 (29)	Reference		65 (33)	Reference		81 (25)	Reference	
AG	588 (49)	172 (44)	0.93 (0.71-1.23)	0.6	92 (47)	0.90 (0.63-1.27)	0.5	149(46)	1.15 (0.85-1.56)	0.4

GG	238 (20)	107 (27)	1.47 (1.06-2.00)	0.02	38 (19)	0.90 (0.58-1.40)	0.7	89 (28)	1.69 (1.19-2.40)	<b>0.003</b>
AG/GG			1.09 (0.84-1.40)	0.5		0.90 (0.65-1.25)	0.5		1.30 (0.98-1.73)	0.07
			p-trend	0.03		p-trend	0.6		p-trend	<b>0.003</b>
<b>SOCS1</b> rs149311										
GG	857 (72)	244 (62)	Reference		132 (68)	Reference		219 (68)	Reference	
GA	295 (35)	131 (34)	1.54 (1.19-1.98)	<b>0.0009</b>	54 (28)	1.17 (0.83-1.66)	0.4	89 (28)	1.23 (0.92-1.63)	0.2
AA	43 (4)	16 (4)	1.36 (0.74-2.47)	0.3	9 (5)	1.50 (0.71-3.19)	0.3	12 (4)	1.05 (0.54-2.05)	0.9
GA/AA			1.51 (1.19-1.93)	<b>0.0009</b>		1.21 (0.87-1.68)	0.3		1.20 (0.92-1.58)	0.2
			p-trend	<b>0.003</b>		p-trend	0.2		p-trend	0.3
<b>STAT3</b> rs1053005										
AA	737 (62)	271 (69)	Reference		133 (68)	Reference		218 (68)	Reference	
AG	401 (34)	107 (27)	0.73 (0.57-0.95)	0.02	54 (28)	0.71 (0.51-1.01)	0.06	89 (28)	0.75 (0.57-0.99)	0.04
GG	57 (5)	15 (4)	0.77 (0.43-1.40)	0.4	8 (4)	0.79 (0.36-1.70)	0.5	14 (5)	0.81 (0.44-1.49)	0.5
AG/GG			0.74 (0.58-0.94)	0.02		0.72 (0.52-1.00)	0.05		0.76 (0.58-0.99)	0.04
			p-trend	0.03		p-trend	0.08		p-trend	0.06

Table III. cont'd.

Genotype	Controls*	DLBCL			FL			CLL		
		N (%)	OR <sup>†</sup> (95%CI)	p-value	N (%)	OR <sup>†</sup> (95%CI)	p-value	N (%)	OR <sup>†</sup> (95%CI)	p-value
<b>STAT3 rs1053023</b>										
AA	737 (62)	271 (69)	Reference		133 (68)	Reference		218 (68)	Reference	
AG	401 (34)	107 (27)	0.73 (0.57-0.95)	0.02	54 (28)	0.71 (0.51-1.01)	0.06	89 (28)	0.75 (0.57-0.99)	0.04
GG	57 (5)	15 (4)	0.77 (0.43-1.40)	0.4	8 (4)	0.79 (0.36-1.70)	0.5	14 (4)	0.81 (0.44-1.49)	0.5
AG/GG			0.74 (0.58-0.94)	0.02		0.72 (0.52-1.00)	0.05		0.76 (0.58-0.99)	0.04
			p-trend	0.03		p-trend	0.08		p-trend	0.06
<b>STAT3 rs12949918</b>										
AA	402 (34)	150 (38)	Reference		77 (39)	Reference		115 (36)	Reference	
AG	574 (48)	189 (48)	0.87 (0.68-1.13)	0.3	89 (46)	0.80 (0.57-1.12)	0.2	158 (49)	0.96 (0.73-1.27)	0.8
GG	220 (18)	54 (14)	0.67 (0.47-0.95)	0.03	29 (15)	0.65 (0.41-1.04)	0.07	48 (15)	0.79 (0.54-1.16)	0.2
AG/GG			0.82 (0.64-1.04)	0.1		0.76 (0.55-1.04)	0.09		0.91 (0.70-1.19)	0.5
			p-trend	0.03		p-trend	0.06		p-trend	0.3
<b>STAT3 rs4103200</b>										
GG	575 (48)	216 (55)	Reference		107 (55)	Reference		172 (56)	Reference	
GC	506(42)	149 (38)	0.78 (0.61-1.00)	0.05	74 (38)	0.75 (0.54-1.04)	0.08	124 (39)	0.84 (0.64-1.09)	0.2
CC	115 (10)	28 (7)	0.68 (0.43-1.06)	0.09	14 (7)	0.62 (0.34-1.14)	0.1	25 (8)	0.74 (0.46-1.19)	0.2

GC/CC			0.76 (0.60-0.96)	0.02		0.73 (0.54-0.99)	0.04		0.82 (0.64-1.06)	0.1
			p-trend	0.02		p-trend	0.04		p-trend	0.1
<b>STAT3 rs6503695</b>										
AA	504 (42)	184 (47)	Reference		95 (49)	Reference		153 (48)	Reference	
AG	523(44)	169 (43)	0.86 (0.67-1.10)	0.2	81 (42)	0.78 (0.56-1.07)	0.1	129 (40)	0.85 (0.65-1.11)	0.2
GG	169 (14)	40 (10)	0.66 (0.45-0.98)	0.04	19 (10)	0.56 (0.33-0.95)	0.03	39 (12)	0.80 (0.54-1.20)	0.3
AG/GG			0.81 (0.64-1.02)	0.08		0.72 (0.53-0.98)	0.04		0.84 (0.65-1.08)	0.2
			p-trend	0.03		p-trend	0.02		p-trend	0.2
<b>STAT3 rs9891119</b>										
AA	461 (39)	179 (46)	Reference		87 (45)	Reference		131 (41)	Reference	
AC	566 (47)	171 (42)	0.79 (0.62-1.01)	0.07	85 (44)	0.79 (0.57-1.09)	0.2	156 (49)	0.96 (0.73-1.25)	0.8
CC	169 (14)	43 (11)	0.68 (0.47-1.00)	0.05	23 (12)	0.70 (0.43-1.16)	0.2	34 (11)	0.71 (0.47-1.09)	0.1
AC/CC			0.77 (0.61-0.97)	0.03		0.77 (0.56-1.05)	0.1		0.90 (0.70-1.16)	0.4
			p-trend	0.02		p-trend	0.09		p-trend	0.2

\* 1196 controls were taken into account for the risk analysis with the B-cell lymphoma cases

† Odds Ratios were adjusted for the matching variables: age (continuous), sex and study center (categorical); the common homozygote was used as reference group for each SNP

Significant *p*-values (< 0.01) are printed in bold

**Table IV.** Statistical interaction between genotypes of the *BMF*, *IFNG*, *IL10*, *STAT1*, *STAT4* and *SOCS1* variants and *CASP6*, *STAT3*, *IL12*, *INFG* SNPs among B-cell lymphoma cases

	No. of Controls	No. of Cases	OR* (95% CI)	p-value	No. of Controls	No. of Cases	OR* (95% CI)	p-value	No. of Controls	No. of Cases	OR* (95% CI)	p-value
<i>BMF</i> (rs16970325)												
	<b>GG</b>				<b>GA</b>				<b>AA</b>			
<i>CASP6</i> (rs5030552)												
<b>AA</b>	819 (85)	658 (79)	Reference		177 (80)	167 (80)	Reference		5 (83)	18 (90)	Reference	
<b>AG</b>	140 (14)	169 (20)	1.50 (1.17-1.92)	<b>0.001</b>	43 (19)	41 (19)	1.00 (0.62-1.63)	1.0	1 (17)	2 (10)	-	-
<b>GG</b>	8 (1)	7 (1)	1.10 (0.40-3.06)	0.9	2 (1)	2 (1)	1.14 (0.15-8.41)	1.0	-	-	-	-
<i>BMF</i> (rs537455)												
	<b>AA</b>				<b>AC</b>				<b>CC</b>			
<i>CASP6</i> (rs5030552)												
<b>AA</b>	532 (85)	458 (78)	Reference		415 (84)	322 (82)	Reference		55 (75)	62 (77)	Reference	
<b>AG</b>	91 (15)	123 (21)	1.57 (1.16-2.11)	<b>0.003</b>	76 (15)	71 (18)	1.18 (0.82-1.68)	0.4	17 (23)	18 (22)	-	-
<b>GG</b>	4(1)	6 (1)	1.74 (0.48-6.22)	0.4	5 (1)	2 (1)	0.50 (0.10-2.64)	0.4	1 (1)	1 (1)	-	-
<i>IFNG</i> (rs6581795)												
	<b>AA</b>				<b>AG</b>				<b>GG</b>			

**STAT3 (rs4103200)**

<b>GG</b>	308 (48)	323 (56)	Reference		228 (49)	216 (53)	Reference		39 (46)	38 (49)	Reference	
<b>GC</b>	272 (42)	200 (35)	0.70 (0.55-0.89)	<b>0.003</b>	193 (42)	169 (41)	0.92 (0.70-1.22)	0.6	41 (49)	35 (45)	0.82 (0.42-1.56)	0.5
<b>CC</b>	68 (10)	52 (9)	0.72 (0.49-1.07)	0.1	43 (9)	26 (6)	0.65 (0.38-1.10)	0.1	4 (5)	5 (6)	1.69 (0.36-7.94)	0.5

**IL10 (rs6673928)****CC****CA****AA****STAT3 (rs6503695)**

<b>AA</b>	290 (39)	303 (47)	Reference		186 (47)	177 (47)	Reference		27 (47)	24 (50)	Reference	
<b>AG</b>	351 (48)	271 (42)	0.74 (0.59-0.92)	<b>0.008</b>	147 (37)	151 (42)	1.07 (0.79-1.46)	0.7	24 (42)	20 (42)	0.94 (0.40-2.23)	0.9
<b>GG</b>	98 (13)	71 (11)	0.69 (0.49-0.98)	<b>0.04</b>	64 (16)	42 (11)	0.69 (0.44-1.07)	0.1	6 (11)	4 (8)	0.58 (0.13-2.62)	0.5

**IL10 (rs6673928)****CC****CA****AA****STAT3 (rs4103200)**

<b>GG</b>	335 (45)	346 (54)	Reference		208 (52)	294 (55)	Reference		31 (54)	26 (54)	Reference	
<b>GC</b>	235 (45)	245 (38)	0.70 (0.56-0.88)	<b>0.002</b>	146 (37)	140 (38)	0.99 (0.73-1.34)	0.9	23 (40)	19 (40)	-	-
<b>CC</b>	69 (9)	54 (8)	0.76 (0.51-1.11)	0.2	43 (11)	26 (7)	0.63 (0.37-1.07)	0.08	3 (5)	3 (6)	-	-

Table IV. cont'd.

	No. of Controls	No. of Cases	OR* (95 % CI)	p-value	No. of Controls	No. of Cases	OR* (95 % CI)	p-value	No. of Controls	No. of Cases	OR* (95 % CI)	p-value
<i>IL10 (rs6673928)</i>												
	CC				CA				AA			
<i>STAT3 (rs1053023)</i>												
AA	443 (60)	449 (70)	Reference		249 (63)	247 (67)	Reference		44 (77)	34 (71)	Reference	
AG	257 (35)	166 (26)	0.64 (0.50-0.80)	<b>0.0002</b>	129 (32)	107 (29)	0.85 (0.62-1.28)	0.3	13 (23)	11 (23)	-	-
GG	38 (5)	30 (5)	0.78 (0.47-1.28)	0.3	19 (5)	16 (4)	0.87 (0.43-1.73)	0.7	-	3 (6)	-	-
<i>STAT1 (rs13029247)</i>												
	AA				AG				GG			
<i>STAT3 (rs6503695)</i>												
AA	223 (41)	242 (47)	Reference		235 (45)	212 (47)	Reference		46 (35)	50 (50)	Reference	
AG	232 (43)	212 (41)	0.84 (0.65-1.09)	0.2	223 (43)	187 (42)	0.91 (0.70-1.20)	0.5	67 (51)	43 (42)	0.68 (0.38-1.23)	0.2
GG	90 (17)	60 (12)	0.60 (0.41-0.88)	<b>0.008</b>	60 (12)	50 (11)	0.91 (0.60-1.39)	0.7	19 (14)	8 (8)	0.39 (0.15-1.00)	0.05
<i>STAT4 (rs1517352)</i>												
	CC				CA				AA			
<i>IL12A (rs4680534)</i>												

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3	<b>AA</b>	173 (40)	159 (46)	Reference		249 (44)	225(42)	Reference		85 (42)	66 (37)	Reference	
4	<b>AG</b>	197 (46)	148 (43)	0.84 (0.62-1.14)	0.3	242 (43)	261 (49)	1.19 (0.93-1.54)	0.2	103 (51)	88 (49)	1.11 (0.72-1.72)	0.6
5	<b>GG</b>	61 (14)	41 (12)	0.74 (0.47-1.16)	0.2	72 (13)	52 (10)	0.79 (0.53-1.18)	0.3	13 (6)	24 (13)	2.80 (1.30-6.05)	<b>0.009</b>
6													
7													
8													
9													
10		<i>SOCSI (rs243317)</i>											
11													
12		<b>AA</b>				<b>AC</b>				<b>CC</b>			
13													
14		<i>IFNG (rs2069727)</i>											
15	<b>AA</b>	176 (30)	125 (23)	Reference		137 (27)	117 (27)	Reference		21 (20)	25 (26)	Reference	
16	<b>AG</b>	286 (49)	291 (55)	1.44 (1.09-1.91)	<b>0.01</b>	236 (47)	216 (50)	1.08 (0.79-1.47)	0.6	59 (56)	51 (54)	0.72 (0.36-1.46)	0.4
17	<b>GG</b>	124 (21)	120 (22)	1.36 (0.97-1.92)	0.07	131 (26)	106 (23)	0.89 (0.62-1.27)	0.5	26 (25)	19 (20)	0.62 (0.27-1.45)	0.3
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23		*Odds Ratios were adjusted for the matching variables: age (continuous), sex and study center (categorical);											
24		<i>p</i> -values (<0.05) are printed in bold											
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For Peer Review

## JAKSTAT

Gene	rs Number	SNP (NCBI)	Chr	Chr. Position	SNP Score	
BMF	rs10518679	T/C	15	38169733	0.919	
	rs11630670	A/G	15	38198132	0.699	
	rs11634257	A/T	15	38175784	0.873	
	rs11858141	T/C	15	38176975	0.819	
	rs12913170	T/C	15	38163500	0.935	
	rs1540686	A/G	15	38168110	0.524	
	rs16970325	T/C	15	38160423	0.91	
	rs16970349	A/G	15	38171424	0.872	
	rs3743129	A/C	15	38171071	0.918	
	rs3923235	T/C	15	38158413	0.901	
	rs537455	A/C	15	38195116	0.899	
	rs546220	T/G	15	38166552	0.783	
	rs588739	C/G	15	38172380	0.93	
	rs648289	A/G	15	38168225	1.1	
	rs652196	T/C	15	38163439	0.906	
	rs675173	T/C	15	38182151	0.806	
	rs7183977	T/C	15	38164384	0.78	
	rs998713	A/G	15	38165759	1.1	
	CASP6	rs1541373	T/C	4	110848343	1.1
		rs1800627	T/C	4	110833107	0.949
rs3181345		A/G	4	110835362	0.636	
rs3212153		T/C	4	110828930	0.901	
rs5030552		A/G	4	110838455	1.1	
rs768063		A/G	4	110839905	0.972	
IFNG	rs12306852	C/G	12	66849106	0.903	
	rs2069716	A/G	12	66837082	0.892	
	rs2069718	T/C	12	66836429	0.938	
	rs2069727	A/G	12	66834490	0.9	
	rs6581795	A/G	12	66846082	0.966	
IFNGR1	rs12529779	A/G	6	137587799	1.1	
	rs1327474	A/G	6	137582768	1.1	
	rs1327475	T/C	6	137578148	1.1	
	rs1854154	T/C	6	137554340	0.421	
	rs3799488	T/C	6	137561473	1.1	
	rs477768	C/G	6	137590330	0.75	
	rs4896243	T/C	6	137556483	1.1	
	rs608914	T/C	6	137588731	1.1	
	rs7759040	A/T	6	137559184	0.443	
	rs9402877	A/T	6	137550768	1.1	
IFNGR2	rs1015873	A/C	21	33688371	1.1	
	rs12626735	C/G	21	33737849	0.752	
	rs16990664	T/C	21	33689817	0.756	
	rs2012075	T/C	21	33718632	0.97	
	rs2284553	A/G	21	33698565	1.1	
	rs2834211	T/C	21	33711678	1.1	
	rs2834214	T/C	21	33715576	1.1	
	rs8131980	A/G	21	33731877	1.1	
	rs9976971	A/G	21	33689967	1.1	
rs9978166	A/G	21	33692386	0.981		
IL10	rs1554286	T/C	1	205010856	0.901	
	rs17015767	C/G	1	205018021	0.982	
	rs1800871	T/C	1	205013257	1.1	
	rs1800872	A/C	1	205013030	0.833	
	rs2222202	T/C	1	205012004	0.869	
rs3021094	A/C	1	205011575	1.1		



## JAKSTAT

	rs3024505	T/C	1	205006527	1.1
	rs3024509	T/C	1	205009920	1.1
	rs4390174	A/G	1	204999074	0.968
	rs4844553	T/C	1	205000986	1.1
	rs6673928	T/G	1	205003868	1.1
	rs6686931	T/C	1	205022274	0.953
	rs7548373	T/G	1	205000113	0.709
IL12A	rs11927521	A/G	3	161199779	0.942
	rs2243115	T/G	3	161188974	1.1
	rs2243131	A/C	3	161194752	0.711
	rs2243154	A/G	3	161198936	0.939
	rs4680534	T/C	3	161181639	0.438
	rs485497	A/G	3	161201826	0.681
	rs583911	A/G	3	161193084	0.968
	rs6441282	T/G	3	161181771	0.624
	rs6800657	A/G	3	161182066	1.1
	rs692890	T/C	3	161182267	0.847
	rs7372767	A/G	3	161181560	0.908
	rs747825	T/G	3	161182213	0.664
	rs755004	T/C	3	161183019	0.832
	rs9811792	T/C	3	161179692	1.1
	rs9852519	T/C	3	161203322	0.907
IL12B	rs10052709	C/G	5	158693055	0.941
	rs11574790	T/C	5	158676424	0.894
	rs1368439	T/G	5	158674592	0.869
	rs1433048	A/G	5	158688423	1.1
	rs2546890	A/G	5	158692478	0.993
	rs2546893	A/G	5	158688538	0.939
	rs2569253	T/C	5	158683571	0.895
	rs2853694	A/C	5	158681666	0.925
	rs3181216	A/T	5	158685556	0.41
	rs3181225	T/C	5	158673201	0.978
	rs4921466	T/C	5	158665350	0.987
	rs4921468	A/G	5	158668511	0.963
	rs6868898	T/C	5	158696998	0.618
	rs6870828	T/C	5	158671090	0.556
	rs7709212	T/C	5	158696755	0.7
IL4	rs2243248	T/G	5	132036543	1.1
	rs2243263	C/G	5	132041198	0.839
IL6	rs1800797	A/G	7	22732746	1.1
IL7R	rs10058453	T/C	5	35916577	0.98
	rs10063294	A/G	5	35913262	0.988
	rs11567694	A/G	5	35893461	0.46
	rs11567697	A/G	5	35894081	0.898
	rs11567701	T/G	5	35895620	0.865
	rs11567762	A/G	5	35908958	0.761
	rs11957503	T/G	5	35918933	0.959
	rs12516866	T/G	5	35887018	0.983
	rs1494565	A/C	5	35883479	0.617
	rs3777090	A/T	5	35905116	0.896
	rs6891095	T/C	5	35902079	0.714
IL8RB	rs7607437	A/G	2	218716637	1.1
IRF4	rs1033180	T/C	6	328546	1.1
	rs1050975	A/G	6	353012	1.1
	rs11757491	A/G	6	357236	0.72
	rs12211228	C/G	6	353833	0.966

## JAKSTAT

	rs13208928	A/T	6	348470	0.873
	rs1514346	A/G	6	334630	1.1
	rs1877175	A/G	6	355493	0.795
	rs2001508	A/C	6	349632	0.934
	rs3778607	A/G	6	348799	0.947
	rs3800262	A/G	6	350900	0.818
	rs6900384	T/G	6	342937	0.975
	rs6906608	A/C	6	356554	0.921
	rs7768807	T/C	6	353246	0.915
	rs9378805	A/C	6	362727	1.1
	rs9405192	A/G	6	327537	0.956
JAK1	rs10789166	A/G	1	65085401	0.93
	rs2256298	T/C	1	65103270	1.1
	rs310211	A/G	1	65092508	1.1
	rs7546535	T/C	1	65196508	0.924
SOCS1	rs149311	A/G	16	11253255	0.488
	rs149597	C/G	16	11251443	0.865
	rs193778	T/C	16	11258712	0.807
	rs243317	A/C	16	11264832	0.691
	rs408665	T/C	16	11249473	0.607
	rs9940551	T/C	16	11247203	0.586
SOCS5	rs13402099	A/G	2	46800944	0.901
	rs13412085	A/T	2	46786569	0.874
SOCS6	rs17082355	A/G	18	66149957	1.1
	rs17809666	A/G	18	66134737	0.832
	rs4891398	T/C	18	66126238	0.52
STAT1	rs10173099	T/C	2	191575577	0.725
	rs10199181	A/T	2	191581798	1.1
	rs1168	A/G	2	191538022	0.759
	rs12468579	A/G	2	191540509	0.873
	rs12693591	A/C	2	191568747	1.1
	rs13029247	T/C	2	191574903	0.782
	rs13029532	A/C	2	191584146	0.635
	rs13035504	C/G	2	191537598	0.749
	rs13395505	A/G	2	191546759	0.801
	rs1400657	A/C	2	191541785	0.839
	rs1467199	C/G	2	191588747	1.1
	rs1547550	C/G	2	191553970	1.1
	rs16824035	T/C	2	191545879	0.987
	rs17749316	C/G	2	191548954	0.91
	rs17817966	T/C	2	191590508	0.646
	rs2066795	T/C	2	191560142	0.611
	rs2066804	T/C	2	191550004	1.1
	rs2280232	T/G	2	191559011	0.708
	rs2280233	A/G	2	191558811	0.788
	rs2280234	T/C	2	191558344	1.1
	rs34997637	A/G	2	191567075	0.908
	rs4327257	A/C	2	191554382	0.972
	rs4853533	T/C	2	191545016	0.992
	rs7562024	T/C	2	191563766	1.1
	rs867637	T/C	2	191534627	0.884
STAT3	rs1053005	A/G	17	37719436	1.1
	rs1053023	A/G	17	37719142	0.855
	rs12949918	T/C	17	37779799	0.913
	rs17405722	A/G	17	37796027	0.907
	rs2293152	C/G	17	37735055	0.58

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	rs4103200	C/G	17	37760591	0.853
	rs6503695	T/C	17	37753059	0.923
	rs9891119	A/C	17	37761506	0.946
	rs9912773	C/G	17	37764060	0.631
STAT4	rs10168266	T/C	2	191644049	0.763
	rs10189819	T/C	2	191716994	0.878
	rs10931481	A/G	2	191663097	0.701
	rs11685878	T/C	2	191717700	0.946
	rs13020076	A/G	2	191595288	0.583
	rs13389408	T/C	2	191641528	0.88
	rs1517352	A/C	2	191639709	1.1
	rs16833177	T/C	2	191595877	1.1
	rs16833239	A/G	2	191648505	0.666
	rs16833437	T/G	2	191727617	0.914
	rs17769459	T/C	2	191701793	0.814
	rs2459611	T/C	2	191647432	1.1
	rs3024861	A/T	2	191632851	1.1
	rs3024877	A/G	2	191613134	0.699
	rs3024908	A/G	2	191602386	0.949
	rs3024912	T/G	2	191601332	0.887
	rs3024921	A/T	2	191651517	1.1
	rs3024936	C/G	2	191603621	1.1
	rs4571082	T/C	2	191698181	0.814
	rs4853540	T/G	2	191625562	0.757
	rs4853546	A/G	2	191717897	0.962
	rs6434435	A/G	2	191662109	1.1
	rs6752770	A/G	2	191681808	1.1
	rs7558921	C/G	2	191596469	1.1
	rs7574608	A/T	2	191618109	1.1
	rs7599504	T/C	2	191684464	0.673
	rs925847	T/C	2	191605785	0.877
	rs932169	C/G	2	191637523	0.698
STAT5A	rs2293158	A/G	17	37701084	0.854
STAT6	rs3024971	A/C	12	55779994	0.802
	rs3024974	T/C	12	55779012	1.1
	rs3024979	A/T	12	55774560	1.1
	rs324011	T/C	12	55788449	0.912
	rs324015	A/G	12	55776367	0.863
	rs703817	A/G	12	55776095	0.97
TP63	rs1464117	T/G	3	190989225	1.1
	rs6790068	A/G	3	191090320	0.779
	rs6790258	T/C	3	190826843	0.981
	rs9681004	T/C	3	191093888	1.1

## JAKSTAT

Location	MAF CEU (HapMap)	Minorallele	Majorallele	no. Controls
3UTR	0.1739	G	A	1447
flanking_5UTR	0.425	A	G	1447
intron	0.3	T	A	1446
intron	0.483	G	A	1447
flanking_3UTR	0.206	A	G	1447
3UTR	0.4318	G	A	1441
flanking_3UTR	0.083	A	G	1445
intron	0.052	A	G	1447
3UTR	0.458	C	A	1447
flanking_3UTR	0.292	G	A	1447
flanking_5UTR	0.217	C	A	1447
flanking_3UTR	0.367	A	C	1445
intron	0.458	C	G	1447
3UTR	0.417	G	A	1447
flanking_3UTR	0.292	A	G	1446
intron	0.217	A	G	1444
flanking_3UTR	0.317	G	A	1447
flanking_3UTR	0.4	G	A	1446
flanking_5UTR	0.375	G	A	1446
intron	0.482	G	A	1445
intron	0.083	A	G	1447
flanking_3UTR	0.2	A	G	1446
intron	0.092	G	A	1447
intron	0.067	A	G	1447
flanking_5UTR	0.195	G	C	1447
intron	0.092	G	A	1447
intron	0.381	A	G	1444
flanking_3UTR	0.415	G	A	1447
flanking_5UTR	0.337	G	A	1447
flanking_5UTR	0.192	G	A	1442
flanking_5UTR	0.424	G	A	1447
intron	0.133	A	G	1447
flanking_3UTR	0.417	A	G	1446
intron	0.0805	G	A	1447
flanking_5UTR	0.125	C	G	1444
flanking_3UTR	0.458	G	A	1447
flanking_5UTR	0.258	G	A	1444
flanking_3UTR	0.2391	T	A	1447
flanking_3UTR	0.408	T	A	1447
flanking_5UTR	0.076	C	A	1447
flanking_3UTR	-99	G	C	1447
flanking_5UTR	0.06	A	G	1447
intron	0.078	G	A	1422
intron	0.381	A	G	1421
intron	0.136	G	A	1447
intron	0.483	G	A	1447
flanking_3UTR	0.25	A	G	1447
flanking_5UTR	0.408	A	G	1447
flanking_5UTR	0.183	G	A	1447
intron	0.169	A	G	1447
flanking_5UTR	0.212	C	G	1447
flanking_5UTR	0.173	A	G	1443
flanking_5UTR	0.202	A	C	1444
intron	0.491	A	G	1443
intron	0.067	C	A	1446

## JAKSTAT

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2					
3	flanking_3UTR	0.175	A	G	1447
4	intron	0.05	G	A	1447
5	flanking_3UTR	0.317	G	A	1446
6	flanking_3UTR	0.058	A	G	1447
7	flanking_3UTR	0.271	A	C	1443
8	flanking_5UTR	0.183	A	G	1447
9	flanking_3UTR	0.067	A	C	1439
10	flanking_3UTR	0.325	G	A	1443
11	flanking_5UTR	0.083	C	A	1446
12	intron	0.19	C	A	1445
13	flanking_3UTR	0.125	A	G	1447
14	flanking_5UTR	0.258	G	A	1447
15	flanking_3UTR	0.458	G	A	1446
16	intron	0.475	G	A	1446
17	flanking_5UTR	0.433	A	C	1447
18	flanking_5UTR	0.175	G	A	1446
19	flanking_5UTR	0.35	A	G	1447
20	flanking_5UTR	0.492	G	A	1447
21	flanking_5UTR	0.123	A	C	1447
22	flanking_5UTR	0.15	A	G	1447
23	flanking_5UTR	0.475	G	A	1447
24	flanking_3UTR	0.358	A	G	1447
25	flanking_5UTR	0.108	C	G	1445
26	intron	0.083	A	G	1447
27	3UTR	0.217	C	A	1447
28	intron	0.175	G	A	1447
29	flanking_5UTR	0.467	G	A	1447
30	intron	0.483	A	G	1447
31	intron	0.475	G	A	1436
32	intron	0.458	C	A	1447
33	intron	0.321	A	T	1447
34	flanking_3UTR	0.15	A	G	1447
35	flanking_3UTR	0.0625	G	A	1447
36	flanking_3UTR	0.233	A	G	1447
37	flanking_5UTR	0.342	G	A	1447
38	flanking_3UTR	0.458	G	A	1447
39	flanking_5UTR	0.367	G	A	1447
40	flanking_5UTR	0.092	C	A	1447
41	intron	0.114	G	C	1447
42	flanking_5UTR	0.481	A	G	1446
43	flanking_3UTR	0.173	G	A	1447
44	flanking_3UTR	0.408	G	A	1447
45	intron	0.233	G	A	1447
46	intron	0.075	G	A	1429
47	intron	0.345	A	C	1447
48	intron	0.117	A	G	1447
49	flanking_3UTR	0.492	C	A	1447
50	flanking_5UTR	0.379	A	C	1447
51	flanking_5UTR	-99	C	A	1446
52	intron	0.259	T	A	1447
53	intron	0.15	G	A	1447
54	flanking_3UTR	0.483	A	G	1441
55	flanking_5UTR	0.092	A	G	1447
56	3UTR	0.0526	G	A	1447
57	flanking_3UTR	-99	A	G	1447
58	3UTR	-99	C	G	1447
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## JAKSTAT

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3					
4	intron	0.142	A	T	1447
5	flanking_5UTR	0.15	A	G	1447
6	3UTR	0.3421	A	G	1447
7	intron	0.224	C	A	1447
8	intron	0.483	A	G	1447
9	intron	0.158	A	G	1447
10	intron	0.169	C	A	1441
11	flanking_3UTR	-99	A	C	1447
12	3UTR	0.3421	G	A	1447
13	flanking_3UTR	0.446	C	A	1447
14	flanking_5UTR	0.325	A	G	1446
15	intron	0.132	G	A	1447
16	intron	0.208	A	G	1447
17	intron	0.283	G	A	1447
18	flanking_5UTR	0.229	A	G	1431
19	flanking_3UTR	0.142	A	G	1446
20	flanking_3UTR	0.379	G	C	1445
21	flanking_5UTR	0.3	G	A	1446
22	flanking_3UTR	0.233	C	A	1447
23	flanking_3UTR	0.325	A	G	1436
24	flanking_3UTR	0.321	G	A	1447
25	intron	0.086	A	G	1446
26	intron	0.142	A	T	1447
27	flanking_3UTR	0.068	A	G	1447
28	intron	0.092	G	A	1447
29	intron	0.41	G	A	1432
30	intron	0.317	A	G	1441
31	intron	0.342	A	T	1445
32	3UTR	0.45	A	G	1446
33	flanking_3UTR	0.463	G	A	1447
34	intron	0.092	A	C	1447
35	intron	0.26	G	A	1446
36	intron	0.086	C	A	1447
37	3UTR	0.158	C	G	1446
38	intron	0.417	A	G	1447
39	flanking_3UTR	0.11	C	A	1447
40	flanking_5UTR	0.283	G	C	1447
41	intron	0.353	C	G	1439
42	intron	0.213	A	G	1446
43	intron	0.075	G	C	1447
44	flanking_5UTR	0.4792	G	A	1447
45	intron	0.079	A	G	1447
46	intron	0.3333	A	G	1447
47	intron	0.259	C	A	1447
48	intron	-99	G	A	1447
49	intron	0.358	A	G	1447
50	intron	-99	A	G	1446
51	intron	0.136	C	A	1447
52	intron	0.383	A	G	1445
53	intron	0.392	A	G	1447
54	intron	0.4792	A	G	1447
55	3UTR	0.158	G	A	1446
56	3UTR	0.2083	G	A	1446
57	intron	0.432	G	A	1447
58	flanking_5UTR	0.108	A	G	1447
59	intron	0.3542	G	C	1447
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## JAKSTAT

1					
2					
3	intron	0.242	C	G	1447
4	intron	0.348	G	A	1447
5	intron	0.358	C	A	1447
6	intron	0.225	G	C	1447
7	intron	0.225	A	G	1447
8	intron	0.167	G	A	1446
9	-99	0.325	G	A	1447
10	intron	0.317	A	G	1447
11	flanking_3UTR	0.052	G	A	1422
12	intron	0.118	G	A	1447
13	intron	0.392	A	C	1446
14	flanking_3UTR	0.233	G	A	1447
15	intron	0.102	A	G	1446
16	flanking_5UTR	0.284	A	C	1447
17	intron	0.058	A	G	1447
18	intron	0.092	G	A	1447
19	intron	0.317	T	A	1447
20	intron	0.325	A	G	1447
21	flanking_3UTR	0.133	G	A	1447
22	flanking_3UTR	0.275	C	A	1447
23	intron	0.058	A	T	1447
24	intron	0.05	C	G	1447
25	intron	0.322	G	A	1447
26	intron	0.178	A	C	1444
27	intron	0.289	A	G	1447
28	intron	0.183	A	G	1447
29	intron	0.275	G	A	1447
30	flanking_3UTR	0.133	G	C	1447
31	intron	0.133	T	A	1447
32	intron	0.125	G	A	1446
33	intron	0.3	A	G	1446
34	intron	0.067	G	C	1443
35	intron	0.267	G	A	1447
36	intron	0.075	C	A	1378
37	intron	0.1	A	G	1446
38	intron	0.108	T	A	1447
39	intron	0.4	A	G	1445
40	3UTR	0.267	A	G	1447
41	3UTR	0.492	A	G	1447
42	intron	0.117	A	C	1411
43	intron	0.443	G	A	1447
44	flanking_5UTR	0.058	A	G	1447
45	intron	0.417	G	A	1444
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## JAKSTAT

Chisq (controls)	HWE (controls)	Successrate (controls)	MAF	no. Cases
0.2575	0.6119	1.000	0.13	1416
0.4702	0.4929	1.000	0.47	1416
0.3314	0.5648	0.999	0.25	1416
3.5426	0.0598	1.000	0.43	1414
0.0110	0.9164	1.000	0.15	1415
0.5352	0.4644	0.996	0.49	1404
4.2181	0.0400	0.999	0.09	1416
0.0890	0.7655	1.000	0.05	1416
0.1178	0.7314	1.000	0.44	1414
0.0097	0.9217	1.000	0.28	1416
2.2905	0.1302	1.000	0.27	1415
0.4382	0.5080	0.999	0.43	1413
2.6517	0.1034	1.000	0.45	1416
0.0150	0.9024	1.000	0.46	1415
0.0166	0.8975	0.999	0.22	1414
5.4048	0.0201	0.998	0.31	1413
0.1054	0.7454	1.000	0.34	1414
1.8453	0.1743	0.999	0.39	1411
0.2162	0.6419	0.999	0.39	1416
0.7740	0.3790	0.999	0.48	1415
0.0004	0.9840	1.000	0.11	1416
0.4041	0.5250	0.999	0.13	1416
0.1115	0.7384	1.000	0.09	1415
0.5519	0.4576	1.000	0.04	1416
0.1134	0.7363	1.000	0.15	1416
1.6553	0.1982	1.000	0.07	1416
0.6954	0.4043	0.998	0.38	1411
0.4139	0.5200	1.000	0.48	1416
0.0074	0.9312	1.000	0.27	1415
1.9264	0.1652	0.997	0.23	1406
0.0265	0.8707	1.000	0.43	1415
0.7078	0.4002	1.000	0.19	1414
0.0015	0.9689	0.999	0.47	1411
0.6475	0.4210	1.000	0.13	1416
1.4438	0.2295	0.998	0.15	1412
0.0056	0.9402	1.000	0.45	1412
0.1546	0.6942	0.998	0.30	1415
0.0168	0.8968	1.000	0.25	1416
1.5125	0.2188	1.000	0.43	1413
0.7166	0.3973	1.000	0.02	1416
0.4365	0.5088	1.000	0.25	1416
0.8378	0.3600	1.000	0.02	1416
0.1907	0.6623	0.983	0.11	1398
2.2506	0.1336	0.982	0.39	1385
0.5995	0.4388	1.000	0.11	1416
8.8395	0.0029	1.000	0.45	1415
1.1816	0.2770	1.000	0.30	1414
0.0006	0.9807	1.000	0.43	1416
0.2236	0.6363	1.000	0.13	1416
0.0919	0.7618	1.000	0.19	1414
0.1418	0.7065	1.000	0.20	1416
0.0001	0.9928	0.997	0.25	1413
0.0012	0.9718	0.998	0.25	1412
0.7748	0.3787	0.997	0.44	1412
0.5379	0.4633	0.999	0.09	1415



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0.0492	0.8245	1.000	0.15	1415
0.0221	0.8818	1.000	0.07	1416
0.1457	0.7027	0.999	0.38	1411
0.6945	0.4046	1.000	0.07	1415
0.9267	0.3357	0.997	0.21	1413
0.3685	0.5438	1.000	0.24	1414
0.3775	0.5390	0.994	0.07	1403
0.5909	0.4421	0.997	0.39	1414
3.8830	0.0488	0.999	0.12	1413
0.0263	0.8712	0.999	0.16	1415
0.2802	0.5966	1.000	0.10	1416
0.0040	0.9495	1.000	0.35	1416
0.1738	0.6767	0.999	0.48	1416
0.1906	0.6624	0.999	0.45	1415
0.0655	0.7980	1.000	0.45	1415
1.6613	0.1974	0.999	0.10	1411
0.4494	0.5026	1.000	0.30	1416
0.0034	0.9538	1.000	0.42	1414
0.0005	0.9822	1.000	0.19	1415
0.1345	0.7138	1.000	0.13	1414
0.0769	0.7816	1.000	0.44	1415
2.4006	0.1213	1.000	0.40	1414
0.0019	0.9653	0.999	0.14	1415
0.0134	0.9079	1.000	0.12	1415
1.3863	0.2390	1.000	0.18	1415
0.8113	0.3677	1.000	0.19	1415
0.0635	0.8011	1.000	0.49	1416
0.0160	0.8994	1.000	0.47	1416
4.0636	0.0438	0.992	0.47	1410
0.8260	0.3634	1.000	0.48	1416
0.0022	0.9622	1.000	0.30	1416
0.0028	0.9581	1.000	0.17	1416
0.0028	0.9580	1.000	0.11	1416
0.0892	0.7651	1.000	0.30	1416
0.5191	0.4712	1.000	0.31	1416
0.0283	0.8664	1.000	0.48	1413
0.0011	0.9732	1.000	0.34	1416
0.0149	0.9027	1.000	0.07	1415
0.0637	0.8007	1.000	0.11	1415
9.7921	0.0018	0.999	0.40	1416
1.8498	0.1738	1.000	0.33	1416
1.4648	0.2262	1.000	0.46	1415
1.4288	0.2320	1.000	0.26	1416
5.0211	0.0250	0.988	0.09	1396
5.6182	0.0178	1.000	0.28	1414
0.7409	0.3894	1.000	0.15	1415
13.7540	0.0002	1.000	0.42	1416
0.2661	0.6060	1.000	0.40	1416
0.5660	0.4518	0.999	0.41	1415
0.8374	0.3601	1.000	0.32	1415
3.0306	0.0817	1.000	0.13	1416
1.2720	0.2594	0.996	0.46	1412
0.1017	0.7498	1.000	0.07	1415
0.9774	0.3228	1.000	0.08	1416
1.1786	0.2776	1.000	0.07	1416
2.2220	0.1361	1.000	0.15	1415

## JAKSTAT

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2					
3	0.0887	0.7658	1.000	0.08	1416
4	0.2802	0.5966	1.000	0.10	1416
5	0.0007	0.9793	1.000	0.23	1416
6	0.4139	0.5200	1.000	0.16	1416
7	1.2778	0.2583	1.000	0.50	1415
8	0.3180	0.5728	1.000	0.17	1416
9	1.5115	0.2189	0.996	0.09	1408
10	2.2220	0.1361	1.000	0.15	1416
11	0.0343	0.8530	1.000	0.25	1416
12	0.1493	0.6992	1.000	0.48	1416
13	0.5878	0.4433	0.999	0.29	1414
14	0.0981	0.7541	1.000	0.15	1415
15	2.7818	0.0953	1.000	0.26	1416
16	2.5083	0.1132	1.000	0.33	1415
17	1.8086	0.1787	0.989	0.20	1394
18	12.9654	0.0003	0.999	0.16	1414
19	3.5835	0.0584	0.999	0.48	1416
20	3.3463	0.0674	0.999	0.24	1416
21	0.0366	0.8482	1.000	0.30	1415
22	1.9473	0.1629	0.992	0.43	1400
23	1.0847	0.2976	1.000	0.42	1415
24	2.9865	0.0840	0.999	0.12	1414
25	4.2873	0.0384	1.000	0.13	1416
26	2.2122	0.1369	1.000	0.12	1416
27	0.0245	0.8755	1.000	0.07	1415
28	0.0364	0.8486	0.990	0.39	1404
29	0.2275	0.6334	0.996	0.34	1412
30	0.0645	0.7995	0.999	0.38	1416
31	0.1657	0.6839	0.999	0.46	1414
32	0.9153	0.3387	1.000	0.42	1415
33	0.5046	0.4775	1.000	0.13	1416
34	0.0074	0.9316	0.999	0.32	1415
35	1.6603	0.1976	1.000	0.09	1416
36	0.1044	0.7466	0.999	0.16	1416
37	1.3824	0.2397	1.000	0.40	1416
38	0.2333	0.6291	1.000	0.12	1416
39	1.5014	0.2205	1.000	0.24	1416
40	0.2009	0.6540	0.994	0.34	1407
41	0.1992	0.6554	0.999	0.16	1416
42	0.7849	0.3756	1.000	0.07	1416
43	1.4848	0.2230	1.000	0.44	1416
44	0.0929	0.7606	1.000	0.01	1416
45	0.1045	0.7465	1.000	0.23	1415
46	0.3026	0.5823	1.000	0.26	1415
47	0.7077	0.4002	1.000	0.47	1412
48	0.1121	0.7377	1.000	0.37	1411
49	1.8390	0.1751	0.999	0.23	1414
50	0.3070	0.5795	1.000	0.14	1416
51	0.0306	0.8612	0.999	0.37	1415
52	6.1153	0.0134	1.000	0.39	1416
53	0.0131	0.9087	1.000	0.35	1414
54	0.0300	0.8626	0.999	0.22	1416
55	0.0300	0.8626	0.999	0.22	1416
56	1.9682	0.1606	1.000	0.43	1415
57	2.1614	0.1415	1.000	0.07	1416
58	10.2408	0.0014	1.000	0.40	1414
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3	0.2622	0.6086	1.000	0.31	1416
4	5.9072	0.0151	1.000	0.36	1416
5	0.0147	0.9035	1.000	0.38	1416
6	0.0209	0.8850	1.000	0.29	1416
7	0.0158	0.8999	1.000	0.19	1416
8	4.3055	0.0380	0.999	0.22	1416
9	2.6125	0.1060	1.000	0.31	1416
10	1.1677	0.2799	1.000	0.43	1412
11	0.1368	0.7114	0.983	0.08	1387
12	0.0354	0.8508	1.000	0.12	1416
13	0.7184	0.3967	0.999	0.40	1415
14	2.2635	0.1325	1.000	0.20	1416
15	2.8867	0.0893	0.999	0.08	1416
16	0.5872	0.4435	1.000	0.37	1415
17	2.7190	0.0992	1.000	0.06	1416
18	0.1292	0.7192	1.000	0.12	1416
19	0.2302	0.6314	1.000	0.27	1415
20	0.5065	0.4766	1.000	0.31	1416
21	6.0911	0.0136	1.000	0.12	1416
22	0.8629	0.3529	1.000	0.23	1415
23	0.0412	0.8391	1.000	0.05	1416
24	1.5251	0.2168	1.000	0.03	1416
25	0.1340	0.7143	1.000	0.38	1416
26	2.0522	0.1520	0.998	0.22	1413
27	0.0192	0.8899	1.000	0.38	1415
28	0.0157	0.9002	1.000	0.18	1416
29	1.4008	0.2366	1.000	0.28	1416
30	6.4526	0.0111	1.000	0.12	1415
31	1.1556	0.2824	1.000	0.07	1415
32	2.6233	0.1053	0.999	0.17	1416
33	4.3133	0.0378	0.999	0.28	1416
34	0.6664	0.4143	0.997	0.08	1414
35	2.0570	0.1515	1.000	0.32	1416
36	0.4332	0.5104	0.952	0.13	1329
37	1.4939	0.2216	0.999	0.10	1414
38	0.7452	0.3880	1.000	0.12	1415
39	0.0751	0.7841	0.999	0.38	1413
40	1.1112	0.2918	1.000	0.23	1416
41	0.0526	0.8186	1.000	0.49	1410
42	0.4006	0.5268	0.975	0.17	1394
43	0.0528	0.8182	1.000	0.40	1416
44	1.9244	0.1654	1.000	0.07	1416
45	0.0918	0.7619	0.998	0.40	1416
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Chisq (cases)	HWE (cases)	Successrate (cases)
0.0436	0.8346	1.000
1.2954	0.2550	1.000
3.0596	0.0803	1.000
0.0359	0.8498	0.999
0.1046	0.7463	0.999
0.0006	0.9812	0.992
3.6457	0.0562	1.000
0.0816	0.7751	1.000
3.9887	0.0458	0.999
0.7825	0.3764	1.000
1.9914	0.1582	0.999
0.2581	0.6114	0.998
0.1191	0.7301	1.000
0.6281	0.4280	0.999
0.8968	0.3436	0.999
0.2607	0.6097	0.998
0.0710	0.7899	0.999
0.0471	0.8282	0.996
0.7313	0.3925	1.000
0.0920	0.7616	0.999
0.3118	0.5766	1.000
1.2681	0.2601	1.000
0.7750	0.3787	0.999
0.0158	0.8999	1.000
0.3716	0.5421	1.000
0.0874	0.7674	1.000
0.0881	0.7666	0.996
3.7980	0.0513	1.000
0.0046	0.9460	0.999
0.0491	0.8247	0.993
0.3406	0.5595	0.999
1.5921	0.2070	0.999
0.3116	0.5767	0.996
1.2919	0.2557	1.000
0.4725	0.4918	0.997
3.6035	0.0577	0.997
0.2006	0.6542	0.999
1.2166	0.2700	1.000
1.3102	0.2523	0.998
0.0221	0.8818	1.000
0.2355	0.6275	1.000
0.0229	0.8796	1.000
2.2227	0.1360	0.987
4.5440	0.0330	0.978
3.3033	0.0691	1.000
3.0230	0.0821	0.999
3.3167	0.0686	0.999
2.1004	0.1473	1.000
2.4198	0.1198	1.000
0.4862	0.4856	0.999
0.3721	0.5418	1.000
0.0010	0.9754	0.998
0.0016	0.9684	0.997
0.0146	0.9040	0.997
0.0072	0.9324	0.999

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0.1901	0.6629	0.999
0.3401	0.5598	1.000
0.0217	0.8829	0.996
0.0077	0.9301	0.999
0.3453	0.5568	0.998
0.6028	0.4375	0.999
0.2524	0.6154	0.991
0.0974	0.7550	0.999
0.1324	0.7159	0.998
0.1321	0.7163	0.999
0.1679	0.6820	1.000
0.5186	0.4714	1.000
0.0031	0.9556	1.000
0.1380	0.7103	0.999
0.0392	0.8430	0.999
0.6351	0.4255	0.996
0.9058	0.3412	1.000
0.0779	0.7801	0.999
0.3087	0.5785	0.999
0.3919	0.5313	0.999
0.0005	0.9821	0.999
0.6706	0.4128	0.999
0.1118	0.7381	0.999
1.2971	0.2547	0.999
1.0681	0.3014	0.999
0.4906	0.4836	0.999
0.4753	0.4905	1.000
0.1707	0.6795	1.000
5.0247	0.0250	0.996
0.3050	0.5808	1.000
0.2028	0.6525	1.000
0.1234	0.7253	1.000
2.5836	0.1080	1.000
0.8854	0.3467	1.000
0.0060	0.9382	1.000
1.2420	0.2651	0.998
0.0283	0.8665	1.000
0.5159	0.4726	0.999
0.8193	0.3654	0.999
0.9851	0.3209	1.000
0.9572	0.3279	1.000
0.1783	0.6729	0.999
3.4685	0.0625	1.000
3.6349	0.0566	0.986
0.9834	0.3214	0.999
0.4439	0.5052	0.999
0.7181	0.3968	1.000
2.4928	0.1144	1.000
0.0510	0.8214	0.999
0.6878	0.4069	0.999
0.0353	0.8510	1.000
0.0326	0.8567	0.997
0.6325	0.4264	0.999
2.0423	0.1530	1.000
2.7125	0.0996	1.000
0.9778	0.3228	0.999

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4	5.7069	0.0169	1.000
5	0.0166	0.8976	1.000
6	0.0945	0.7585	1.000
7	1.8022	0.1795	1.000
8	0.0177	0.8941	0.999
9	1.7465	0.1863	1.000
10	0.3772	0.5391	0.994
11	1.5440	0.2140	1.000
12	0.8235	0.3641	1.000
13	0.7730	0.3793	1.000
14	1.5182	0.2179	0.999
15	0.7909	0.3738	0.999
16	1.1290	0.2880	1.000
17	0.1289	0.7195	0.999
18	3.1766	0.0747	0.984
19	2.0178	0.1555	0.999
20	1.0350	0.3090	1.000
21	1.3130	0.2519	1.000
22	0.1579	0.6911	0.999
23	0.7133	0.3984	0.989
24	0.6059	0.4363	0.999
25	3.2802	0.0701	0.999
26	1.3254	0.2496	1.000
27	0.2303	0.6313	1.000
28	1.4077	0.2354	0.999
29	1.5521	0.2128	0.992
30	0.0460	0.8301	0.997
31	0.0244	0.8760	1.000
32	0.0218	0.8826	0.999
33	0.0032	0.9547	0.999
34	0.8279	0.3629	1.000
35	0.0116	0.9142	0.999
36	0.2577	0.6117	1.000
37	0.1734	0.6771	1.000
38	0.0000	0.9962	1.000
39	0.0026	0.9595	1.000
40	0.0001	0.9909	1.000
41	0.0039	0.9504	0.994
42	0.7388	0.3900	1.000
43	0.5407	0.4621	1.000
44	0.0073	0.9319	1.000
45	0.1849	0.6672	1.000
46	0.2498	0.6172	0.999
47	0.0125	0.9109	0.999
48	0.1365	0.7117	0.997
49	0.4791	0.4888	0.996
50	0.0061	0.9378	0.999
51	0.2011	0.6538	1.000
52	0.0309	0.8605	0.999
53	0.2505	0.6167	1.000
54	0.0035	0.9528	0.999
55	2.5716	0.1088	1.000
56	3.0513	0.0807	1.000
57	0.0003	0.9873	0.999
58	0.0707	0.7903	1.000
59	0.0555	0.8138	0.999
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2			
3	0.8534	0.3556	1.000
4	1.3956	0.2375	1.000
5	0.0778	0.7803	1.000
6	0.4111	0.5214	1.000
7	0.0050	0.9434	1.000
8	0.0543	0.8157	1.000
9	0.0093	0.9233	1.000
10	4.5589	0.0327	0.997
11	1.4514	0.2283	0.980
12	0.3011	0.5832	1.000
13	0.7375	0.3905	0.999
14	0.0686	0.7934	1.000
15	0.8447	0.3580	1.000
16	3.8449	0.0499	0.999
17	1.5842	0.2082	1.000
18	0.2578	0.6116	1.000
19	0.7921	0.3735	0.999
20	2.9191	0.0875	1.000
21	0.2298	0.6317	1.000
22	0.2704	0.6031	0.999
23	0.1146	0.7350	1.000
24	0.2181	0.6405	1.000
25	0.0765	0.7821	1.000
26	1.9890	0.1584	0.998
27	0.5329	0.4654	0.999
28	0.1154	0.7341	1.000
29	1.7118	0.1908	1.000
30	0.2061	0.6498	0.999
31	0.8805	0.3481	0.999
32	2.5990	0.1069	1.000
33	0.0194	0.8891	1.000
34	0.0530	0.8178	0.999
35	0.0038	0.9509	1.000
36	0.0942	0.7590	0.939
37	0.6826	0.4087	0.999
38	1.7817	0.1819	0.999
39	8.2715	0.0040	0.998
40	0.4094	0.5223	1.000
41	0.9355	0.3334	0.996
42	0.1080	0.7424	0.984
43	1.1827	0.2768	1.000
44	0.0530	0.8180	1.000
45	2.5484	0.1104	1.000
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Supplement Table2. Odds Ratios (OR) and 95% Confidence Intervals of all SNPs with BNHL and subtypes (DLBCL, FL, CLL, T-NHL, MZL and MCL), adjusted for age (continuous), sex and study center)

Gene	db SNP ID	no. of nocalis	BNHL											
			Heterozygous Mutant			Homozygous Mutant			Dominant Model			p-trend		
			OR	95% CI	p-value	OR	95% CI	p-value	OR	95% CI	p-value			
BMF	rs10518679	0	1.03	(0.84, 1.25)	0.79906	0.97	(0.52, 1.80)	0.91791	1.02	(0.84, 1.24)	0.82714	0.87125		
	rs11630670	0	1.03	(0.84, 1.25)	0.78804	0.93	(0.73, 1.18)	0.56562	1.00	(0.83, 1.20)	0.98570	0.60318		
	rs11634257	1	1.06	(0.89, 1.26)	0.53077	0.87	(0.61, 1.26)	0.47201	1.03	(0.87, 1.22)	0.71630	0.97666		
	rs11858141	2	0.96	(0.79, 1.15)	0.63538	1.17	(0.92, 1.49)	0.20836	1.01	(0.84, 1.21)	0.92349	0.31660		
	rs12913170	2	1.10	(0.91, 1.33)	0.30543	0.94	(0.54, 1.65)	0.83500	1.09	(0.91, 1.31)	0.35596	0.46388		
	rs1540686	22	0.88	(0.72, 1.07)	0.21205	0.96	(0.76, 1.22)	0.76405	0.91	(0.75, 1.09)	0.30415	0.70258		
	rs16970325	2	1.10	(0.89, 1.36)	0.35882	3.83	(1.53, 9.60)	0.00411	1.18	(0.96, 1.44)	0.12152	0.03084		
	rs16970349	0	1.09	(0.83, 1.44)	0.52571	1.13	(0.23, 5.62)	0.88230	1.09	(0.83, 1.44)	0.51692	0.51844		
	rs3743129	2	0.96	(0.79, 1.16)	0.66666	1.10	(0.87, 1.38)	0.44745	1.00	(0.84, 1.19)	0.98250	0.54016		
	rs3923235	0	0.90	(0.76, 1.07)	0.24665	0.72	(0.51, 1.01)	0.05565	0.87	(0.74, 1.03)	0.10866	0.04750		
	rs537455	1	0.85	(0.72, 1.01)	0.07101	1.19	(0.85, 1.67)	0.30342	0.90	(0.76, 1.06)	0.19319	0.65289		
	rs456220	5	0.93	(0.77, 1.12)	0.46739	1.04	(0.82, 1.33)	0.74478	0.96	(0.81, 1.15)	0.65838	0.91502		
	rs588739	0	0.98	(0.80, 1.18)	0.79850	1.13	(0.89, 1.44)	0.32007	1.02	(0.85, 1.22)	0.86531	0.39005		
	rs648289	1	0.88	(0.73, 1.07)	0.19178	0.97	(0.77, 1.23)	0.81035	0.91	(0.76, 1.09)	0.28854	0.67873		
	rs652196	3	1.13	(0.95, 1.35)	0.16560	1.21	(0.84, 1.74)	0.31160	1.14	(0.97, 1.35)	0.12133	0.11790		
rs675173	6	0.82	(0.69, 0.98)	0.02516	1.00	(0.74, 1.35)	0.98648	0.85	(0.72, 1.00)	0.05274	0.23157			
rs7183977	2	0.92	(0.77, 1.10)	0.35530	0.83	(0.63, 1.09)	0.17862	0.90	(0.76, 1.06)	0.21898	0.15004			
rs998713	6	0.88	(0.74, 1.06)	0.17335	1.01	(0.79, 1.30)	0.92163	0.91	(0.77, 1.08)	0.28853	0.70658			
CASP6	rs1541373	1	0.94	(0.79, 1.13)	0.52786	1.04	(0.80, 1.34)	0.78828	0.96	(0.81, 1.14)	0.66839	0.99209		
	rs1800627	3	0.98	(0.81, 1.20)	0.87980	0.94	(0.74, 1.19)	0.58951	0.97	(0.80, 1.17)	0.74619	0.59442		
	rs3181345	0	1.16	(0.94, 1.44)	0.16319	0.84	(0.39, 1.85)	0.67318	1.14	(0.93, 1.41)	0.20911	0.30292		
	rs3212153	1	1.02	(0.84, 1.25)	0.80917	0.68	(0.35, 1.29)	0.23505	1.00	(0.82, 1.21)	0.96203	0.70607		
	rs5030552	1	1.37	(1.10, 1.70)	0.00515	1.07	(0.43, 2.64)	0.88532	1.35	(1.09, 1.67)	0.00597	0.01016		
	rs768063	0	0.76	(0.54, 1.08)	0.13141	1.14	(0.07, 18.24)	0.92716	0.77	(0.54, 1.09)	0.13709	0.14906		
IFNG	rs12306852	0	0.96	(0.80, 1.17)	0.70909	1.12	(0.66, 1.92)	0.67677	0.98	(0.81, 1.17)	0.80271	0.93451		
	rs2069716	0	1.06	(0.83, 1.36)	0.62374	0.51	(0.16, 1.65)	0.25963	1.03	(0.81, 1.31)	0.79492	0.99670		
	rs2069718	8	0.93	(0.77, 1.11)	0.40711	0.98	(0.76, 1.27)	0.89704	0.94	(0.79, 1.11)	0.47077	0.68137		
	rs2069727	0	1.21	(0.99, 1.47)	0.06404	1.07	(0.84, 1.35)	0.59181	1.16	(0.96, 1.40)	0.11913	0.52701		
	rs6581795	1	1.00	(0.83, 1.19)	0.95994	1.04	(0.75, 1.45)	0.80928	1.00	(0.85, 1.19)	0.97728	0.89587		
IFNGR1	rs12529779	15	0.91	(0.76, 1.09)	0.29287	0.96	(0.66, 1.40)	0.84194	0.92	(0.77, 1.09)	0.31142	0.40123		
	rs1327474	1	1.03	(0.85, 1.24)	0.77822	1.14	(0.90, 1.45)	0.28374	1.06	(0.89, 1.26)	0.53283	0.31355		
	rs1327475	2	0.84	(0.70, 1.01)	0.05850	0.99	(0.64, 1.52)	0.95823	0.85	(0.71, 1.02)	0.07871	0.15842		
	rs1854154	6	0.94	(0.77, 1.14)	0.50077	0.82	(0.65, 1.04)	0.10859	0.90	(0.75, 1.08)	0.26468	0.11577		
	rs3799488	0	0.92	(0.75, 1.13)	0.42332	0.96	(0.47, 1.99)	0.92089	0.92	(0.76, 1.12)	0.42766	0.45961		
	rs477768	8	0.88	(0.73, 1.07)	0.21046	1.09	(0.60, 1.98)	0.77978	0.90	(0.74, 1.08)	0.26029	0.36961		
IFNGR2	rs4896243	4	1.02	(0.84, 1.24)	0.85279	1.38	(1.10, 1.74)	0.00619	1.12	(0.94, 1.35)	0.20951	0.00960		
	rs608914	4	1.08	(0.90, 1.28)	0.41406	1.13	(0.84, 1.52)	0.40827	1.09	(0.92, 1.28)	0.33339	0.30716		
	rs759040	0	0.95	(0.80, 1.13)	0.56194	1.17	(0.83, 1.65)	0.37213	0.98	(0.83, 1.16)	0.80675	0.83177		
	rs9402877	3	0.96	(0.79, 1.15)	0.64046	0.91	(0.72, 1.16)	0.46075	0.94	(0.79, 1.13)	0.52265	0.45282		
	rs1015873	0	0.99	(0.66, 1.49)	0.97829				0.99	(0.66, 1.49)	0.97829	0.97829		
	rs12626735	0	1.06	(0.89, 1.26)	0.50599	1.25	(0.89, 1.74)	0.19228	1.09	(0.92, 1.29)	0.32025	0.20130		
	rs16990664	0	1.11	(0.76, 1.63)	0.58147				1.11	(0.76, 1.63)	0.58147	0.58147		
	rs2012075	45	1.22	(0.99, 1.51)	0.05669	1.50	(0.80, 2.80)	0.20799	1.24	(1.02, 1.52)	0.03375	0.02731		
	rs2284553	59	0.96	(0.80, 1.15)	0.65675	1.04	(0.81, 1.33)	0.77826	0.98	(0.82, 1.16)	0.80694	0.92403		
	rs2834211	0	0.83	(0.66, 1.03)	0.08797	1.03	(0.53, 2.01)	0.93407	0.84	(0.68, 1.04)	0.10951	0.16993		
	rs2834214	1	1.02	(0.84, 1.23)	0.84796	0.96	(0.77, 1.22)	0.76135	1.00	(0.84, 1.19)	0.98650	0.80807		
rs8131980	2	0.86	(0.72, 1.03)	0.10048	0.96	(0.72, 1.29)	0.78796	0.88	(0.75, 1.04)	0.13509	0.29144			
rs9976971	0	0.90	(0.75, 1.08)	0.26580	1.03	(0.81, 1.31)	0.80525	0.93	(0.78, 1.11)	0.44252	0.96369			
rs9978166	0	0.97	(0.79, 1.18)	0.74296	0.50	(0.22, 1.10)	0.08442	0.93	(0.77, 1.14)	0.49687	0.29098			
IL10	rs1554286	2	0.94	(0.78, 1.12)	0.48583	1.23	(0.79, 1.91)	0.35570	0.97	(0.81, 1.15)	0.69420	0.98893		
	rs17015767	0	0.96	(0.80, 1.15)	0.64981	1.21	(0.79, 1.86)	0.37003	0.98	(0.83, 1.17)	0.85708	0.84928		
	rs1800871	9	0.96	(0.80, 1.14)	0.61197	0.94	(0.66, 1.34)	0.72764	0.95	(0.81, 1.13)	0.57618	0.57904		
	rs1800872	10	0.95	(0.80, 1.14)	0.59249	0.97	(0.68, 1.39)	0.86403	0.96	(0.81, 1.13)	0.59456	0.64525		
	rs2222202	9	1.10	(0.91, 1.33)	0.33788	1.03	(0.81, 1.31)	0.83778	1.08	(0.90, 1.29)	0.42012	0.72444		
	rs3021094	2	0.94	(0.75, 1.18)	0.58893	1.61	(0.61, 4.25)	0.33776	0.96	(0.77, 1.20)	0.73687	0.92114		
	rs3024505	1	1.07	(0.88, 1.29)	0.48602	0.79	(0.46, 1.36)	0.40015	1.04	(0.87, 1.25)	0.65877	0.91179		
	rs3024509	0	1.00	(0.78, 1.27)	0.98226	0.57	(0.17, 1.92)	0.36594	0.98	(0.77, 1.24)	0.85207	0.72002		
	rs4390174	7	0.99	(0.83, 1.19)	0.93660	1.02	(0.78, 1.32)	0.90928	1.00	(0.84, 1.18)	0.97972	0.95123		
	rs4844553	1	1.02	(0.80, 1.31)	0.86261	0.64	(0.21, 1.92)	0.42514	1.00	(0.79, 1.27)	0.98971	0.87260		
	rs6673928	8	1.06	(0.89, 1.27)	0.50820	0.95	(0.64, 1.42)	0.81362	1.05	(0.88, 1.25)	0.58760	0.74610		
IL12A	rs6686931	2	0.90	(0.75, 1.07)	0.23277	0.89	(0.61, 1.28)	0.52102	0.90	(0.76, 1.06)	0.20418	0.22726		
	rs7548373	22	1.01	(0.79, 1.30)	0.92884	0.51	(0.16, 1.68)	0.26959	0.98	(0.77, 1.26)	0.89924	0.72316		
	rs11927521	6	0.95	(0.79, 1.14)	0.58117	0.96	(0.75, 1.24)	0.76932	0.95	(0.80, 1.13)	0.58430	0.67128		
	rs2243115	4	0.88	(0.71, 1.09)	0.25061	0.74	(0.38, 1.45)	0.38311	0.87	(0.71, 1.07)	0.18909	0.16268		
	rs2243131	3	1.01	(0.83, 1.21)	0.95609	1.03	(0.59, 1.80)	0.91099	1.01	(0.84, 1.21)	0.93726	0.91919		
	rs2243154	0	0.90	(0.72, 1.11)	0.32013	1.02	(0.45, 2.32)	0.96671	0.90	(0.73, 1.11)	0.33969	0.39100		
	rs4680534	0	1.04	(0.87, 1.24)	0.66298	0.90	(0.69, 1.19)	0.46921	1.01	(0.86, 1.20)	0.89870	0.72778		
	rs485497	1	1.00	(0.82, 1.21)	0.97859	1.02	(0.81, 1.29)	0.86616	1.00	(0.83, 1.21)	0.96360	0.87426		
	rs583911	2	1.02	(0.84, 1.23)	0.86420	1.03	(0.81, 1.30)	0.82304	1.02	(0.85, 1.22)	0.83110	0.81818		
	rs6441282	1	1.04	(0.86, 1.26)	0.66665	0.99	(0.78, 1.25)	0.90550	1.03	(0.86, 1.23)	0.77858	0.97209		
	rs6800657	6	1.02	(0.82, 1.27)	0.84561	1.04	(0.50, 2.17)	0.91812	1.02	(0.83, 1.27)	0.83318	0.82991		
IL12B	rs692890	0	0.98	(0.82, 1.17)	0.83764	1.07	(0.80, 1.45)	0.63789	1.00	(0.84, 1.18)	0.97733	0.82245		
	rs7372767	2	1.02	(0.85, 1.23)	0.84528	1.07	(0.84, 1.36)	0.59745	1.03	(0.86, 1.23)	0.73023	0.61383		
	rs747825	1	0.87	(0.73, 1.05)	0.14711	0.81	(0.50, 1.31)	0.38650	0.87	(0.73, 1.03)	0.11337	0.11008		
	rs755004	2	0.99	(0.81, 1.21)	0.91566	1.35	(0.75, 2.43)	0.31981	1.01	(0.84, 1.23)	0.88013	0.66908		
	rs9811792	1	1.05	(0.86, 1.27)	0.63505	1.06	(0.83, 1.34)	0.64098	1.05	(0.88, 1.26)	0.59286	0.61759		
	rs9852519	2	1.11	(0.93, 1.34)	0.24529	0.92	(0.72, 1.18)	0.50956	1.06	(0.89, 1.26)	0.49888	0.83447		
	rs10052709	3	1.02	(0.84, 1.23)	0.87733	1.16	(0.64, 2.09)	0.62543	1.03	(0.85, 1.24)	0.79513	0.71309		
	rs11574790	1	1.08	(0.89, 1.32)	0.43100	0.85	(0.41, 1.75)	0.65697	1.07	(0.88, 1.30)	0.50374	0.62508		
	rs1368439	1	1.16	(0.96, 1.39)	0.11503	0.80	(0.50, 1.28)	0.35013	1.12	(0.93, 1.33)	0.22449	0.50448		
	rs1433048	1	1.05	(0.87, 1.26)	0.60682	0.72	(0.45, 1.15)	0.17269	1.01	(0.85, 1.20)	0.90955	0.70377		
	rs2546890	0	1.10	(0.90, 1.35)	0.36391	1.30	(1.02, 1.65)	0.03161	1.16	(0.95, 1.41)	0.13614	0.03120		
rs2546893	0	0.92	(0.76, 1.12)	0.38948	0.82	(0.65, 1.04)	0.10453	0.89	(0					





		rs324011		6	0.91	(0.76	-.109)	0.31504		1.04	(0.80	-.134)	0.78200		0.94	(0.79	-.111)	0.47358		0.88567
		rs324015		0	0.99	(0.83	-.118)	0.88528		1.38	(0.95	-.200)	0.09080		1.03	(0.87	-.122)	0.73024		0.34078
		rs703817		6	0.94	(0.77	-.114)	0.51925		0.92	(0.73	-.117)	0.50187		0.93	(0.77	-.112)	0.46311		0.49401
	<b>TP63</b>	rs1464117		56	1.13	(0.94	-.135)	0.20481		1.56	(0.94	-.259)	0.08871		1.16	(0.97	-.139)	0.10579		0.05622
		rs6790068		0	0.90	(0.75	-.108)	0.26356		0.99	(0.77	-.127)	0.92709		0.92	(0.78	-.109)	0.35480		0.66698
		rs6790258		0	1.21	(0.95	-.155)	0.11474		2.33	(0.58	-.937)	0.23224		1.24	(0.97	-.157)	0.08126		0.06073
		rs9681004		3	0.90	(0.75	-.108)	0.23798		0.99	(0.77	-.127)	0.95046		0.92	(0.77	-.109)	0.33780		0.68288

For Peer Review

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**Supplement Table2. Odds Ratios (OR) and 95% Confidence Intervals of all SNPs with BNHL and subtypes (DLBCL, FL, CLL, T-NHL, MZL and MCL), adjusted for age (continuous), sex and study center)**

Gene	db SNP ID	no. of nocalls	T-NHL											
			Heterozygous Mutant				Homozygous Mutant				Dominant Model			
			OR	95% CI	p-value		OR	95% CI	p-value		OR	95% CI	p-value	p-trend
BMF	rs10518679	0	0.48	(0.25 ,0.90)	0.02146	1.98	(0.65 ,6.04)	0.23011		0.59	(0.33 ,1.03)	0.06452	0.23181	
	rs11630670	0	0.69	(0.42 ,1.13)	0.13782	0.80	(0.44 ,1.45)	0.46665		0.72	(0.46 ,1.14)	0.16415	0.38376	
	rs11634257	1	1.63	(1.04 ,2.56)	0.03332	1.55	(0.66 ,3.63)	0.30972		1.62	(1.05 ,2.50)	0.02975	0.04929	
	rs11858141	2	0.86	(0.54 ,1.39)	0.53852	0.68	(0.34 ,1.35)	0.27245		0.82	(0.52 ,1.28)	0.37592	0.26692	
	rs12913170	2	0.34	(0.17 ,0.67)	0.00395	1.82	(0.61 ,5.41)	0.22986		0.45	(0.25 ,0.81)	0.00791	0.04935	
	rs1540686	22	0.92	(0.56 ,1.53)	0.78093	0.84	(0.45 ,1.56)	0.57373		0.90	(0.56 ,1.44)	0.65615	0.57417	
	rs16970325	2	1.09	(0.63 ,1.87)	0.76761	9.42	(2.45 ,36.25)	0.00111		1.29	(0.78 ,2.15)	0.32506	0.08183	
	rs16970349	0	0.87	(0.41 ,1.86)	0.71713	5.39	(0.51 ,56.57)	0.16027		0.96	(0.47 ,1.98)	0.91427	0.87416	
	rs3743129	2	0.60	(0.37 ,0.99)	0.04445	1.00	(0.56 ,1.77)	0.99705		0.71	(0.46 ,1.11)	0.13419	0.69028	
	rs3923235	0	1.16	(0.74 ,1.83)	0.51233	1.21	(0.52 ,2.78)	0.66043		1.17	(0.76 ,1.80)	0.47887	0.49301	
	rs5374555	1	0.85	(0.54 ,1.34)	0.47458	1.24	(0.53 ,2.85)	0.62034		0.89	(0.58 ,1.38)	0.61591	0.88656	
	rs546220	5	0.94	(0.57 ,1.52)	0.78696	1.06	(0.57 ,1.99)	0.84296		0.97	(0.61 ,1.53)	0.89212	0.91566	
	rs588739	0	0.85	(0.52 ,1.39)	0.51703	0.95	(0.51 ,1.77)	0.86210		0.88	(0.55 ,1.39)	0.57184	0.77650	
	rs648289	1	0.91	(0.56 ,1.48)	0.69364	0.79	(0.42 ,1.48)	0.45861		0.87	(0.55 ,1.38)	0.55570	0.45864	
	rs652196	3	0.48	(0.28 ,0.83)	0.00822	1.72	(0.83 ,3.57)	0.14511		0.65	(0.41 ,1.03)	0.06626	0.50701	
	rs675173	6	0.71	(0.44 ,1.12)	0.13856	0.99	(0.47 ,2.10)	0.98177		0.75	(0.49 ,1.16)	0.19531	0.40789	
	rs7183977	2	1.21	(0.76 ,1.92)	0.43154	1.29	(0.65 ,2.57)	0.46931		1.22	(0.79 ,1.90)	0.37303	0.37575	
	rs998713	6	1.10	(0.66 ,1.82)	0.70836	1.99	(1.10 ,3.62)	0.02367		1.30	(0.81 ,2.09)	0.26878	0.03974	
	CASP6	rs1541373	1	1.24	(0.77 ,2.00)	0.37874	0.96	(0.46 ,1.97)	0.90225		1.18	(0.74 ,1.87)	0.48843	0.82378
		rs1800627	3	1.49	(0.86 ,2.57)	0.15403	1.02	(0.52 ,1.98)	0.96464		1.33	(0.79 ,2.26)	0.28689	0.93519
rs3181345		0	1.13	(0.66 ,1.94)	0.66175	-	-	-		1.07	(0.62 ,1.84)	0.81372	0.99863	
rs3212153		1	1.03	(0.62 ,1.71)	0.90703	-	-	-		0.94	(0.57 ,1.55)	0.80973	0.52810	
rs5030552		1	1.33	(0.76 ,2.32)	0.31530	-	-	-		1.26	(0.73 ,2.20)	0.40856	0.55236	
rs768063		0	0.63	(0.22 ,1.77)	0.37898	-	-	-		0.62	(0.22 ,1.75)	0.36988	0.36483	
IFNG	rs12306852	0	1.01	(0.62 ,1.65)	0.95821	0.95	(0.22 ,4.14)	0.94785		1.01	(0.63 ,1.62)	0.97262	0.99230	
	rs2069716	0	1.24	(0.68 ,2.27)	0.47674	-	-	-		1.17	(0.64 ,2.14)	0.60437	0.77434	
	rs2069718	8	0.94	(0.59 ,1.50)	0.79303	0.80	(0.38 ,1.65)	0.54197		0.91	(0.58 ,1.42)	0.67190	0.55929	
IFNGR1	rs2069727	0	1.57	(0.91 ,2.70)	0.10747	1.12	(0.57 ,2.18)	0.74652		1.42	(0.84 ,2.40)	0.19151	0.68951	
	rs6561795	1	0.92	(0.58 ,1.46)	0.72659	0.95	(0.39 ,2.31)	0.91236		0.93	(0.60 ,1.44)	0.73047	0.77202	
	rs12529774	15	1.01	(0.63 ,1.62)	0.96347	1.66	(0.72 ,3.86)	0.23617		1.09	(0.70 ,1.70)	0.69469	0.43748	
	rs137474	1	0.89	(0.55 ,1.42)	0.61295	0.83	(0.32 ,1.28)	0.19015		0.82	(0.52 ,1.28)	0.37441	0.20693	
	rs1327475	2	1.06	(0.65 ,1.71)	0.82698	1.54	(0.58 ,4.09)	0.38705		1.11	(0.70 ,1.75)	0.65334	0.50087	
	rs1854154	6	1.08	(0.63 ,1.82)	0.78775	1.34	(0.73 ,2.45)	0.33979		1.16	(0.70 ,1.90)	0.56494	0.34572	
	rs3799488	0	1.21	(0.74 ,2.00)	0.45190	0.87	(0.11 ,6.77)	0.89194		1.19	(0.73 ,1.95)	0.48414	0.54932	
	rs477768	8	0.99	(0.60 ,1.64)	0.96693	2.88	(0.94 ,8.78)	0.06364		1.10	(0.68 ,1.78)	0.69092	0.37323	
	rs4896243	4	0.98	(0.61 ,1.58)	0.94620	0.62	(0.31 ,1.23)	0.16958		0.88	(0.56 ,1.39)	0.57537	0.22988	
	rs608914	4	0.89	(0.56 ,1.42)	0.63221	1.26	(0.61 ,2.59)	0.53593		0.95	(0.62 ,1.47)	0.83057	0.85295	
	rs759040	0	1.09	(0.69 ,1.71)	0.71542	1.06	(0.43 ,2.60)	0.89502		1.08	(0.70 ,1.67)	0.71509	0.75088	
	rs9402877	3	1.41	(0.84 ,2.35)	0.19157	1.31	(0.69 ,2.49)	0.40807		1.38	(0.85 ,2.25)	0.19697	0.33433	
	IFNGR2	rs1015873	0	0.84	(0.25 ,2.76)	0.77160	-	-	-		1.12	(0.39 ,3.20)	0.83091	0.46650
		rs12626735	0	0.90	(0.57 ,1.43)	0.66584	0.64	(0.22 ,1.84)	0.41090		0.87	(0.56 ,1.34)	0.52022	0.41102
		rs16990664	0	1.01	(0.35 ,2.88)	0.96644	-	-	-		1.27	(0.49 ,3.28)	0.62416	0.33159
		rs2012075	45	0.99	(0.57 ,1.74)	0.98259	0.77	(0.10 ,5.93)	0.79905		0.98	(0.57 ,1.69)	0.93568	0.88789
rs2284553		59	0.85	(0.53 ,1.38)	0.51748	1.03	(0.54 ,1.95)	0.92819		0.90	(0.57 ,1.41)	0.63350	0.89718	
rs2834211		0	0.70	(0.38 ,1.28)	0.24452	-	-	-		0.65	(0.35 ,1.19)	0.15992	0.11582	
rs2834214		1	0.90	(0.55 ,1.47)	0.67443	0.81	(0.44 ,1.48)	0.48927		0.87	(0.55 ,1.37)	0.54717	0.48263	
rs8131980		2	1.09	(0.68 ,1.74)	0.71532	1.76	(0.90 ,3.43)	0.09748		1.21	(0.78 ,1.87)	0.38721	0.16334	
rs9976971		0	0.80	(0.49 ,1.31)	0.37557	0.99	(0.53 ,1.85)	0.98475		0.85	(0.54 ,1.34)	0.48584	0.81586	
rs9978166		0	0.92	(0.53 ,1.58)	0.75538	1.09	(0.25 ,4.85)	0.90822		0.93	(0.55 ,1.57)	0.79131	0.84715	
IL10	rs1554286	2	1.08	(0.68 ,1.72)	0.73526	1.05	(0.31 ,3.53)	0.93761		1.08	(0.69 ,1.69)	0.73683	0.76175	
	rs17015767	0	0.75	(0.46 ,1.22)	0.24496	0.80	(0.24 ,2.68)	0.71279		0.75	(0.47 ,1.21)	0.23752	0.27744	
	rs1800871	9	0.83	(0.52 ,1.32)	0.42009	0.86	(0.33 ,2.23)	0.74881		0.83	(0.53 ,1.29)	0.41021	0.46002	
	rs1800872	10	0.85	(0.54 ,1.35)	0.49271	0.86	(0.33 ,2.23)	0.75066		0.85	(0.55 ,1.32)	0.47522	0.51068	
	rs2222202	9	0.91	(0.56 ,1.49)	0.71105	-	-	-		0.92	(0.58 ,1.46)	0.72113	0.80452	
	rs3021094	2	0.76	(0.40 ,1.43)	0.38849	0.94	(0.51 ,1.74)	0.84272		0.72	(0.38 ,1.36)	0.31483	0.26279	
	rs3024505	1	0.89	(0.53 ,1.50)	0.35348	1.18	(0.35 ,3.99)	0.78793		0.92	(0.56 ,1.51)	0.73334	0.84791	
	rs3024509	0	1.08	(0.58 ,2.01)	0.81008	1.69	(0.20 ,14.65)	0.63343		1.11	(0.61 ,2.02)	0.74187	0.68087	
	rs4390174	7	0.82	(0.52 ,1.32)	0.41837	0.87	(0.44 ,1.71)	0.68613		0.83	(0.54 ,1.30)	0.42029	0.52470	
	rs4844553	1	0.99	(0.52 ,1.87)	0.97221	1.46	(0.17 ,12.36)	0.72844		1.01	(0.55 ,1.88)	0.96758	0.90477	
	rs6673928	8	0.87	(0.54 ,1.41)	0.57535	0.85	(0.29 ,2.48)	0.77224		0.87	(0.55 ,1.38)	0.55146	0.56912	
	rs6868931	2	0.49	(0.29 ,0.83)	0.00812	1.14	(0.50 ,2.61)	0.76023		0.58	(0.36 ,0.93)	0.02309	0.12427	
	rs7548373	22	1.02	(0.54 ,1.94)	0.94986	1.41	(0.17 ,11.93)	0.75479		1.04	(0.56 ,1.94)	0.89707	0.84671	
	IL12A	rs11927521	6	1.21	(0.76 ,1.95)	0.42055	0.88	(0.43 ,1.79)	0.72103		1.13	(0.72 ,1.78)	0.58910	0.99645
rs2243115		4	0.85	(0.48 ,1.51)	0.58856	1.19	(0.27 ,5.29)	0.81783		0.88	(0.51 ,1.52)	0.65157	0.74830	
rs2243131		3	0.76	(0.45 ,1.29)	0.30266	0.99	(0.23 ,4.35)	0.99151		0.77	(0.46 ,1.29)	0.32549	0.39270	
rs2243154		0	0.92	(0.53 ,1.60)	0.76636	1.12	(0.14 ,8.85)	0.91536		0.93	(0.54 ,1.60)	0.78861	0.82486	
rs4860534		0	1.38	(0.87 ,2.20)	0.17186	0.82	(0.37 ,1.82)	0.61990		1.26	(0.80 ,1.97)	0.31343	0.80133	
rs485497		1	1.22	(0.72 ,2.06)	0.45641	1.08	(0.57 ,2.06)	0.80561		1.18	(0.72 ,1.94)	0.51814	0.76232	
rs583911		2	1.55	(0.91 ,2.65)	0.10882	1.18	(0.60 ,2.31)	0.63406		1.44	(0.86 ,2.42)	0.16659	0.53524	
rs6441282		1	1.64	(0.98 ,2.75)	0.05977	0.83	(0.40 ,1.73)	0.61987		1.41	(0.85 ,2.32)	0.18402	0.96388	
rs6800657		6	0.85	(0.46 ,1.58)	0.61630	0.91	(0.12 ,7.12)	0.92615		0.86	(0.47 ,1.56)	0.61513	0.63627	
rs692890		0	0.97	(0.62 ,1.52)	0.88991	0.71	(0.29 ,1.72)	0.44460		0.92	(0.60 ,1.43)	0.71912	0.54042	
rs7372767		2	1.68	(1.01 ,2.81)	0.04769	1.01	(0.49 ,2.09)	0.97722		1.50	(0.91 ,2.44)	0.10898	0.60289	
rs747825		1	1.01	(0.64 ,1.61)	0.95872	0.67	(0.16 ,2.86)	0.58626		0.98	(0.62 ,1.55)	0.92943	0.79745	
rs755004		2	1.93	(1.22 ,3.05)	0.00517	0.76	(0.10 ,5.86)	0.79375		1.84	(1.17 ,2.90)	0.00841	0.02320	
rs9811792	1	1.88	(1.08 ,3.28)	0.02469										



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	rs6790068	0	0.96	(0.59	,-1.54)	0.85576	1.06	(0.56	,-2.02)	0.85559	0.98	(0.62	,-1.54)	0.93626	0.92276
	rs6790258	0	1.10	(0.58	,-2.08)	0.77886	5.73	(0.57	,-57.26)	0.13735	1.17	(0.63	,-2.18)	0.61328	0.46202
	rs9681004	3	0.85	(0.52	,-1.37)	0.49916	1.12	(0.61	,-2.08)	0.71133	0.91	(0.58	,-1.43)	0.69553	0.90000

For Peer Review

Supplement Table2. Odds Ratios (OR) and 95% Confidence Intervals of all SNPs with BNHL and subtypes (DLBCL, FL, CLL, T-NHL, MZL and MCL), adjusted for age (continuous), sex and study cen

Gene	db SNP ID	no. of nocsalls	Heterozygous Mutant			DLBCL			Dominant model		
			OR	95% CI	p-value	OR	95% CI	p-value	OR	95% CI	p-value
BMF	rs10518679	0	1.04	(0.79, 1.37)	0.76510	1.23	(0.56, 2.74)	0.60592	1.06	(0.81, 1.38)	0.68099
	rs11630670	0	1.00	(0.76, 1.31)	0.98520	0.84	(0.60, 1.18)	0.31145	0.95	(0.74, 1.23)	0.69761
	rs11634257	1	1.24	(0.97, 1.57)	0.08429	1.16	(0.72, 1.89)	0.54896	1.22	(0.97, 1.52)	0.08519
	rs11858141	2	0.95	(0.73, 1.23)	0.67833	1.05	(0.75, 1.48)	0.76224	0.97	(0.76, 1.25)	0.83209
	rs12913170	2	1.27	(0.98, 1.64)	0.06691	0.98	(0.44, 2.18)	0.95165	1.25	(0.97, 1.60)	0.08403
	rs1540686	22	0.91	(0.69, 1.21)	0.51984	1.07	(0.78, 1.48)	0.67128	0.96	(0.74, 1.25)	0.77125
	rs16970325	2	1.10	(0.82, 1.47)	0.52911	2.36	(0.70, 7.95)	0.16598	1.13	(0.85, 1.51)	0.38728
	rs16970349	0	0.88	(0.58, 1.32)	0.53027	2.36	(0.38, 14.48)	0.35447	0.91	(0.61, 1.36)	0.64741
	rs3743129	2	1.01	(0.77, 1.32)	0.96134	1.30	(0.94, 1.79)	0.11171	1.09	(0.85, 1.40)	0.50638
	rs3923235	0	0.82	(0.65, 1.05)	0.11377	0.43	(0.24, 0.77)	0.00412	0.76	(0.60, 0.96)	0.02165
	rs537455	1	0.76	(0.59, 0.97)	0.02880	1.08	(0.67, 1.72)	0.75676	0.80	(0.63, 1.01)	0.06139
	rs546220	5	1.09	(0.84, 1.42)	0.52300	1.16	(0.83, 1.63)	0.38702	1.11	(0.86, 1.42)	0.41849
	rs588739	0	0.89	(0.68, 1.16)	0.38424	0.95	(0.68, 1.33)	0.77333	0.91	(0.71, 1.16)	0.43851
	rs648289	1	0.93	(0.71, 1.22)	0.59446	1.09	(0.79, 1.50)	0.60559	0.98	(0.76, 1.26)	0.85555
	rs652196	3	1.27	(1.00, 1.63)	0.05108	1.18	(0.70, 1.98)	0.52955	1.26	(1.00, 1.60)	0.05172
rs675173	6	0.72	(0.57, 0.93)	0.00988	0.91	(0.60, 1.38)	0.64451	0.75	(0.60, 0.95)	0.01683	
rs7183977	2	0.75	(0.58, 0.95)	0.01998	0.69	(0.46, 1.02)	0.06407	0.73	(0.58, 0.93)	0.00905	
rs9398713	6	0.74	(0.58, 0.95)	0.01893	0.78	(0.54, 1.12)	0.17668	0.75	(0.59, 0.95)	0.01617	
rs1541373	1	0.81	(0.63, 1.04)	0.09573	0.76	(0.52, 1.11)	0.15442	0.80	(0.63, 1.01)	0.06371	
rs1800627	3	1.23	(0.93, 1.64)	0.15325	1.03	(0.74, 1.45)	0.84246	1.17	(0.89, 1.53)	0.26749	
rs3181345	0	1.57	(1.19, 2.08)	0.00145	1.11	(0.40, 3.13)	0.83712	1.54	(1.17, 2.03)	0.00186	
rs3212153	1	0.99	(0.75, 1.31)	0.95798	0.23	(0.05, 0.99)	0.04778	0.93	(0.70, 1.22)	0.58152	
rs5030552	1	1.77	(1.33, 2.35)	0.00008	0.69	(0.15, 3.23)	0.64194	1.72	(1.30, 2.27)	0.00016	
rs768063	0	0.62	(0.37, 1.06)	0.08126	-	-	-	0.62	(0.36, 1.05)	0.07583	
rs12306852	0	1.01	(0.77, 1.31)	0.96112	1.20	(0.58, 2.48)	0.61722	1.02	(0.79, 1.32)	0.86753	
rs2069716	0	1.06	(0.76, 1.48)	0.74181	0.73	(0.15, 3.42)	0.68506	1.04	(0.75, 1.45)	0.81242	
rs2069718	8	0.92	(0.71, 1.18)	0.49307	1.00	(0.70, 1.44)	0.99719	0.93	(0.73, 1.19)	0.57625	
rs2069727	0	1.19	(0.91, 1.57)	0.20972	0.98	(0.70, 1.37)	0.90862	1.12	(0.86, 1.46)	0.38101	
rs6581795	1	1.07	(0.84, 1.37)	0.58311	1.20	(0.77, 1.87)	0.42986	1.09	(0.86, 1.38)	0.47089	
rs1252979	15	0.87	(0.68, 1.13)	0.29705	1.33	(0.82, 2.14)	0.24352	0.93	(0.74, 1.18)	0.56709	
rs1327474	1	0.91	(0.70, 1.19)	0.50219	1.15	(0.83, 1.59)	0.39852	0.98	(0.77, 1.25)	0.86377	
rs1327475	2	0.85	(0.66, 1.11)	0.23172	1.12	(0.64, 1.97)	0.68794	0.88	(0.69, 1.13)	0.32833	
rs1854154	6	0.95	(0.73, 1.24)	0.72155	0.76	(0.54, 1.07)	0.11055	0.89	(0.69, 1.15)	0.38364	
rs3799488	0	0.90	(0.68, 1.20)	0.48819	1.50	(0.61, 3.73)	0.37914	0.94	(0.71, 1.23)	0.63565	
rs477758	8	0.78	(0.58, 1.03)	0.07771	1.15	(0.52, 2.56)	0.73249	0.80	(0.61, 1.05)	0.11067	
rs4896243	4	0.93	(0.71, 1.23)	0.61834	1.46	(1.06, 2.00)	0.01955	1.08	(0.84, 1.40)	0.53972	
rs608914	4	1.03	(0.81, 1.32)	0.78632	0.93	(0.61, 1.43)	0.73987	1.02	(0.81, 1.28)	0.89369	
rs7759040	0	0.93	(0.72, 1.19)	0.54669	1.48	(0.95, 2.32)	0.08645	1.00	(0.79, 1.26)	0.99445	
rs9402877	3	0.98	(0.75, 1.27)	0.85953	0.91	(0.65, 1.27)	0.57173	0.96	(0.75, 1.22)	0.72523	
rs1015873	0	0.83	(0.45, 1.53)	0.55387	-	-	-	0.83	(0.45, 1.53)	0.55387	
rs12626735	0	0.98	(0.76, 1.25)	0.84298	1.28	(0.82, 2.01)	0.27355	1.02	(0.81, 1.29)	0.86160	
rs16990664	0	0.90	(0.51, 1.59)	0.70794	-	-	-	0.90	(0.51, 1.59)	0.70794	
rs2012075	45	1.31	(0.99, 1.74)	0.06285	2.17	(1.02, 4.63)	0.04429	1.37	(1.04, 1.80)	0.02302	
rs2284553	59	1.01	(0.78, 1.31)	0.94477	1.15	(0.82, 1.62)	0.41418	1.05	(0.82, 1.33)	0.71796	
rs2834211	0	0.92	(0.68, 1.25)	0.60326	1.49	(0.63, 3.53)	0.35882	0.96	(0.72, 1.29)	0.79447	
rs2834214	1	0.89	(0.69, 1.17)	0.40621	0.99	(0.72, 1.35)	0.92556	0.92	(0.72, 1.18)	0.52122	
rs8131980	2	0.85	(0.66, 1.09)	0.20161	1.07	(0.73, 1.59)	0.71916	0.89	(0.71, 1.13)	0.34086	
rs978971	0	0.98	(0.75, 1.27)	0.85832	1.16	(0.83, 1.62)	0.39277	1.02	(0.80, 1.31)	0.85679	
rs9789716	0	0.76	(0.57, 1.03)	0.07570	0.53	(0.18, 1.58)	0.25477	0.75	(0.56, 1.00)	0.04850	
rs1554286	2	0.79	(0.61, 1.03)	0.08372	1.47	(0.84, 2.58)	0.18022	0.86	(0.67, 1.10)	0.22379	
rs1701567	0	1.25	(0.94, 1.54)	0.15116	0.91	(0.52, 1.60)	0.79678	1.07	(0.84, 1.36)	0.58840	
rs1800871	9	0.83	(0.65, 1.07)	0.15233	0.76	(0.44, 1.30)	0.31283	0.91	(0.72, 1.15)	0.49335	
rs1800872	10	1.17	(0.90, 1.54)	0.24161	1.10	(0.78, 1.54)	0.59274	0.92	(0.72, 1.16)	0.46376	
rs2222202	9	1.17	(0.90, 1.51)	0.25011	0.68	(0.29, 1.57)	0.36277	1.15	(0.89, 1.49)	0.27745	
rs3021094	2	0.89	(0.69, 1.14)	0.34266	1.10	(0.68, 1.76)	0.70113	0.91	(0.66, 1.25)	0.54300	
rs3024505	1	0.89	(0.69, 1.14)	0.34901	1.05	(0.65, 1.69)	0.85672	1.12	(0.87, 1.44)	0.39189	
rs3024509	0	0.84	(0.58, 1.22)	0.36303	0.43	(0.05, 3.56)	0.43461	0.83	(0.57, 1.19)	0.29879	
rs4390174	7	1.09	(0.85, 1.40)	0.50821	0.89	(0.61, 1.30)	0.55359	1.04	(0.82, 1.33)	0.72390	
rs4844553	1	0.89	(0.62, 1.29)	0.54406	0.39	(0.05, 3.16)	0.37820	0.91	(0.64, 1.30)	0.61757	
rs6673928	8	0.91	(0.66, 1.26)	0.56173	0.83	(0.17, 4.07)	0.81685	1.16	(0.91, 1.48)	0.22210	
rs6686931	2	1.05	(0.82, 1.35)	0.69239	1.22	(0.69, 2.15)	0.50287	0.82	(0.65, 1.04)	0.10961	
rs7548373	22	0.94	(0.66, 1.34)	0.73674	0.40	(0.05, 3.23)	0.38852	0.87	(0.60, 1.25)	0.43961	
rs11927521	6	0.82	(0.64, 1.06)	0.12917	1.11	(0.79, 1.54)	0.55559	0.89	(0.70, 1.13)	0.33834	
rs2243115	4	0.89	(0.66, 1.20)	0.44459	1.09	(0.48, 2.50)	0.83583	0.91	(0.68, 1.21)	0.50363	
rs2243131	3	0.90	(0.69, 1.18)	0.46236	1.17	(0.55, 2.47)	0.68566	0.92	(0.71, 1.20)	0.54797	
rs2243154	0	0.86	(0.64, 1.17)	0.34414	1.22	(0.42, 3.55)	0.71200	0.88	(0.65, 1.19)	0.40167	
rs4680534	0	0.97	(0.76, 1.23)	0.77799	0.70	(0.46, 1.05)	0.08541	0.91	(0.72, 1.15)	0.41656	
rs485497	1	1.01	(0.76, 1.33)	0.95887	1.07	(0.77, 1.48)	0.70718	1.02	(0.79, 1.33)	0.85471	
rs583911	2	0.93	(0.71, 1.21)	0.57372	1.03	(0.74, 1.43)	0.87312	0.95	(0.74, 1.23)	0.71865	
rs6441282	1	0.92	(0.70, 1.19)	0.50789	0.83	(0.59, 1.16)	0.27955	0.89	(0.69, 1.14)	0.35922	
rs6800657	6	1.01	(0.74, 1.37)	0.95800	1.21	(0.46, 3.18)	0.69872	1.02	(0.76, 1.37)	0.88725	
rs692890	0	1.01	(0.79, 1.29)	0.93041	0.88	(0.57, 1.36)	0.55866	0.99	(0.78, 1.25)	0.91866	
rs7372767	2	0.85	(0.65, 1.11)	0.23521	1.23	(0.89, 1.70)	0.20665	0.95	(0.74, 1.22)	0.68911	
rs747825	1	0.82	(0.63, 1.06)	0.12554	0.72	(0.36, 1.47)	0.37278	0.81	(0.63, 1.04)	0.09447	
rs755004	2	1.06	(0.81, 1.39)	0.67443	1.15	(0.49, 2.65)	0.75172	1.07	(0.82, 1.39)	0.63439	
rs9811792	1	0.90	(0.69, 1.18)	0.45701	1.20	(0.87, 1.65)	0.27427	0.99	(0.77, 1.27)	0.91979	
rs9852519	2	1.06	(0.82, 1.36)	0.65242	0.78	(0.54, 1.12)	0.17226	0.98	(0.77, 1.25)	0.89345	
rs10052709	3	1.12	(0.86, 1.47)	0.38493	1.20	(0.54, 2.66)	0.65885	1.13	(0.87, 1.46)	0.35271	
rs11574790	1	1.26	(0.96, 1.66)	0.08974	0.99	(0.36, 2.75)	0.99083	1.25	(0.96, 1.63)	0.10202	
rs1368439	1	1.15	(0.89, 1.49)	0.28771	0.77	(0.39, 1.52)	0.44500	1.10	(0.86, 1.41)	0.44145	
rs1433048	1	1.07	(0.83, 1.38)	0.61584	0.74	(0.38, 1.47)	0.39153	1.03	(0.80, 1.32)	0.81868	
rs2546890	0	1.02	(0.77, 1.36)	0.87626	1.24	(0.89, 1.73)	0.19604	1.09	(0.83, 1.43)	0.53939	
rs2546893	0	0.83	(0.63, 1.09)	0.17323	0.77	(0.56, 1.07)	0.11829	0.81	(0.63, 1.04)	0.10317	
rs2569253	19	0.77	(0.59, 1.00)	0.04945	0.68	(0.49, 0.94)	0.01818	0.74	(0.57, 0.94)	0.01575	
rs2953694	0	0.97	(0.74, 1.28)	0.85003	0.92	(0.66, 1.29)	0.63309	0.96	(0.74, 1.24)	0.74573	
rs3181216	0	0.83	(0.64, 1.06)	0.12981	0.90	(0.59, 1.37)	0.62036	0.84	(0.66, 1.06)	0.14219	
rs3181225	0	0.79	(0.60, 1.03)	0.07691	0.75	(0.35, 1.59)	0.44373	0.78	(0.60, 1.01)	0.06227	
rs4921466	0	1.39	(1.06, 1.83)	0.01694	0.66	(0.19, 2.32)	0.51623	1.35	(1.03, 1.76)	0.02852	
rs4921468	0	0.99	(0.77, 1.26)	0.91292	0.94	(0.60, 1.47)	0.78252	0.98	(0.78, 1.23)	0.85862	
rs6688898	0	0.85	(0.66, 1.08)	0.18233	0.74	(0.49, 1.14)	0.17532	0.83	(0.65, 1.04)	0.11122	
rs6870828	3	0.94	(0.71, 1.23)	0.63442	1.01	(0.73, 1.40)	0.96672	0.96	(0.74, 1.24)	0.73937	
rs7709212	0	0.99	(0.77, 1.27)	0.91840	1.						

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	rs11567762	1	1.20	(0.93)	(.56)	0.16257	0.70	(0.28)	(.73)	0.44036	1.16	(0.90)	(.50)	0.24865
	rs11957503	0	1.10	(0.85)	(.42)	0.46235	0.84	(0.60)	(.17)	0.29599	1.02	(0.80)	(.29)	0.89544
	rs12516866	0	0.86	(0.66)	(.11)	0.24416	1.09	(0.77)	(.53)	0.63845	0.91	(0.72)	(.16)	0.44705
	rs1494565	2	1.40	(1.07)	(.82)	0.01400	1.32	(0.93)	(.86)	0.11533	1.38	(1.07)	(.77)	0.01363
	rs3777090	1	1.15	(0.90)	(.47)	0.27094	1.23	(0.84)	(.80)	0.28423	1.17	(0.92)	(.47)	0.19983
	rs6891095	0	1.24	(0.95)	(.62)	0.12197	0.71	(0.29)	(.73)	0.44728	1.19	(0.91)	(.54)	0.20118
IL6RB	rs7607437	10	1.02	(0.78)	(.34)	0.87627	1.20	(0.87)	(.66)	0.27532	1.07	(0.83)	(.39)	0.58324
IRF4	rs1033180	1	0.97	(0.88)	(.37)	0.85279	1.96	(0.95)	(1.02)	0.44572	0.99	(0.70)	(.39)	0.94518
	rs1050975	0	1.14	(0.83)	(.57)	0.42349	0.98	(0.27)	(.37)	0.97143	1.19	(0.83)	(.55)	0.44250
	rs11757491	0	0.90	(0.63)	(.28)	0.55996	0.78	(0.16)	(.37)	0.75649	0.86	(0.63)	(.27)	0.52902
	rs12211228	1	0.78	(0.59)	(.03)	0.07696	1.59	(0.78)	(.29)	0.19852	0.83	(0.64)	(.09)	0.17642
	rs13208928	0	0.95	(0.67)	(.33)	0.75166	2.54	(0.70)	(.23)	0.15524	0.99	(0.71)	(.39)	0.97520
	rs1514346	0	0.97	(0.72)	(.32)	0.85307	1.13	(0.30)	(.42)	0.86000	0.98	(0.73)	(.32)	0.88103
	rs1877175	0	0.85	(0.66)	(.09)	0.19430	0.91	(0.53)	(.55)	0.72018	0.85	(0.67)	(.09)	0.19923
	rs2001508	0	1.00	(0.77)	(.30)	0.98189	0.70	(0.30)	(.62)	0.40299	0.97	(0.75)	(.26)	0.81878
	rs3778607	1	0.98	(0.73)	(.30)	0.86471	1.12	(0.81)	(.55)	0.47829	1.03	(0.78)	(.34)	0.85221
	rs3800262	0	0.92	(0.70)	(.19)	0.51489	1.46	(0.78)	(.27)	0.23201	0.96	(0.75)	(.24)	0.78094
	rs6900384	14	0.95	(0.69)	(.31)	0.75955	2.05	(0.48)	(.87)	0.33411	0.98	(0.71)	(.34)	0.88789
	rs6906608	0	0.74	(0.56)	(.08)	0.03739	1.72	(0.86)	(.34)	0.12568	0.81	(0.62)	(.05)	0.11550
	rs7768807	0	0.92	(0.72)	(.17)	0.48481	0.96	(0.59)	(.56)	0.85902	0.92	(0.73)	(.17)	0.49664
	rs9378805	0	0.96	(0.73)	(.27)	0.78804	1.04	(0.75)	(.44)	0.80033	0.99	(0.76)	(.28)	0.92912
	rs9405192	3	1.00	(0.78)	(.27)	0.97757	0.93	(0.60)	(.44)	0.75435	0.99	(0.78)	(.24)	0.90158
JAK1	rs10789166	1	1.06	(0.81)	(.38)	0.66615	0.53	(0.20)	(.40)	0.20049	1.01	(0.78)	(.31)	0.91823
	rs2256298	0	1.22	(0.96)	(.55)	0.10723	1.12	(0.68)	(.83)	0.65116	1.21	(0.96)	(.52)	0.11481
	rs310211	1	1.25	(0.98)	(.60)	0.06988	1.07	(0.62)	(.62)	0.75734	1.22	(0.98)	(.54)	0.08649
	rs7546535	39	1.06	(0.82)	(.37)	0.65628	1.12	(0.64)	(.95)	0.68717	1.07	(0.84)	(.36)	0.59919
SOCS1	rs149311	3	1.54	(1.19)	(.98)	0.00094	1.36	(0.74)	(.27)	0.31983	1.51	(1.19)	(.93)	0.00089
	rs149597	2	1.08	(0.82)	(.43)	0.56822	1.26	(0.91)	(.73)	0.16384	1.14	(0.88)	(.48)	0.32635
	rs193778	1	0.70	(0.54)	(.09)	0.00485	1.10	(0.64)	(.86)	0.73741	0.74	(0.58)	(.04)	0.01268
	rs243317	1	1.03	(0.81)	(.31)	0.82879	0.81	(0.51)	(.27)	0.35589	0.99	(0.78)	(.25)	0.92398
	rs408665	28	0.90	(0.70)	(.17)	0.43959	0.91	(0.64)	(.30)	0.61700	0.91	(0.71)	(.16)	0.43023
	rs9940551	1	0.99	(0.76)	(.28)	0.93269	0.96	(0.67)	(.38)	0.84047	0.98	(0.77)	(.26)	0.89184
SOCS5	rs13402099	3	1.15	(0.86)	(.54)	0.33167	1.27	(0.55)	(.29)	0.57496	1.16	(0.88)	(.53)	0.28655
	rs13412085	0	1.20	(0.92)	(.58)	0.18404	1.05	(0.48)	(.28)	0.90318	1.19	(0.91)	(.54)	0.19939
SOCS6	rs17082355	0	1.23	(0.93)	(.63)	0.14428	0.26	(0.06)	(.12)	0.07010	1.14	(0.87)	(.50)	0.34265
	rs17809666	1	1.12	(0.80)	(.58)	0.50526	1.41	(0.34)	(.80)	0.63158	1.14	(0.81)	(.59)	0.45801
	rs4891398	29	1.04	(0.81)	(.35)	0.73711	0.92	(0.64)	(.32)	0.64536	1.01	(0.80)	(.29)	0.91137
STAT1	rs10173099	10	0.89	(0.69)	(.14)	0.34841	0.82	(0.55)	(.20)	0.30820	0.87	(0.69)	(.10)	0.25520
	rs10199181	2	0.96	(0.74)	(.23)	0.73322	0.93	(0.65)	(.32)	0.66933	0.95	(0.75)	(.20)	0.66902
	rs1168	3	0.93	(0.71)	(.21)	0.56657	0.78	(0.56)	(.10)	0.15896	0.88	(0.69)	(.13)	0.33119
	rs12465879	1	1.18	(0.91)	(.53)	0.22141	1.03	(0.73)	(.44)	0.88262	1.13	(0.88)	(.46)	0.32124
	rs12693581	1	1.03	(0.79)	(.35)	0.81059	0.82	(0.30)	(.22)	0.70723	1.02	(0.78)	(.33)	0.87790
	rs13029247	2	0.89	(0.70)	(.14)	0.36220	0.73	(0.48)	(.11)	0.13802	0.86	(0.68)	(.08)	0.20175
	rs13029532	0	1.18	(0.87)	(.60)	0.27308	0.53	(0.12)	(.37)	0.40214	1.15	(0.85)	(.54)	0.37373
	rs13035504	1	0.90	(0.70)	(.17)	0.44070	1.23	(0.62)	(.45)	0.55208	0.93	(0.72)	(.19)	0.56157
	rs13395505	0	1.11	(0.86)	(.43)	0.42156	0.89	(0.63)	(.27)	0.53555	1.05	(0.83)	(.34)	0.68132
	rs1400657	0	1.27	(0.96)	(.67)	0.09685	1.02	(0.40)	(.26)	0.96891	1.25	(0.95)	(.63)	0.11013
	rs1467199	0	1.10	(0.86)	(.40)	0.45830	0.68	(0.39)	(.17)	0.16383	1.03	(0.81)	(.30)	0.80386
	rs1547550	20	1.00	(0.78)	(.28)	0.98903	1.15	(0.78)	(.68)	0.48072	1.03	(0.81)	(.30)	0.80659
	rs16824035	1	0.87	(0.67)	(.13)	0.30198	1.22	(0.61)	(.24)	0.57121	0.90	(0.70)	(.16)	0.40432
	rs17749316	0	0.93	(0.65)	(.34)	0.70263	1.18	(0.30)	(.47)	0.81195	0.94	(0.66)	(.34)	0.74885
	rs17817966	0	1.14	(0.88)	(.49)	0.32384	1.02	(0.73)	(.42)	0.90972	1.11	(0.86)	(.42)	0.43183
	rs2066795	0	0.82	(0.30)	(.23)	0.69429	-	-	-	-	0.82	(0.30)	(.23)	0.69429
	rs2068004	1	1.03	(0.81)	(.31)	0.81238	0.96	(0.55)	(.67)	0.87895	1.02	(0.81)	(.29)	0.86016
	rs2280232	1	1.02	(0.80)	(.31)	0.84782	1.35	(0.87)	(.21)	0.18263	1.07	(0.85)	(.35)	0.56767
	rs2280233	4	0.96	(0.74)	(.26)	0.78492	0.84	(0.60)	(.17)	0.28986	0.92	(0.72)	(.19)	0.53751
	rs2290234	5	1.14	(0.89)	(.47)	0.29862	1.16	(0.81)	(.67)	0.41357	1.15	(0.90)	(.46)	0.26077
	rs34957637	3	1.04	(0.82)	(.33)	0.73697	0.66	(0.37)	(.16)	0.14732	0.98	(0.78)	(.25)	0.88621
	rs4327257	0	0.88	(0.67)	(.16)	0.36049	1.15	(0.50)	(.24)	0.74257	0.90	(0.69)	(.17)	0.42460
	rs4853533	0	0.98	(0.76)	(.27)	0.89468	1.26	(0.89)	(.79)	0.19178	1.05	(0.83)	(.32)	0.71297
	rs7562024	0	1.15	(0.89)	(.49)	0.27956	1.12	(0.80)	(.58)	0.50498	1.14	(0.90)	(.45)	0.27283
	rs867837	2	1.00	(0.78)	(.28)	0.99594	1.17	(0.81)	(.69)	0.40029	1.04	(0.82)	(.31)	0.77073
STAT3	rs1053005	1	0.73	(0.57)	(.09)	0.01849	0.77	(0.43)	(.40)	0.39772	0.74	(0.58)	(.04)	0.01592
	rs1053023	1	0.73	(0.57)	(.09)	0.01849	0.77	(0.43)	(.40)	0.39772	0.74	(0.58)	(.04)	0.01592
	rs12949918	1	0.87	(0.68)	(.13)	0.30026	0.67	(0.47)	(.05)	0.02533	0.82	(0.64)	(.04)	0.09866
	rs17405722	0	1.02	(0.71)	(.47)	0.91637	0.70	(0.15)	(.30)	0.65042	1.00	(0.70)	(.43)	0.99987
	rs2293152	2	1.27	(0.98)	(.64)	0.06558	0.94	(0.66)	(.34)	0.73921	1.18	(0.92)	(.50)	0.18574
	rs4103200	0	0.78	(0.61)	(.00)	0.04641	0.68	(0.43)	(.06)	0.08850	0.76	(0.60)	(.06)	0.02175
	rs6503695	0	0.86	(0.67)	(.10)	0.22430	0.66	(0.45)	(.08)	0.03819	0.81	(0.64)	(.02)	0.07887
	rs9891119	0	0.79	(0.62)	(.01)	0.06504	0.68	(0.47)	(.00)	0.05175	0.77	(0.61)	(.07)	0.02686
	rs9912773	0	0.81	(0.63)	(.03)	0.08283	0.73	(0.45)	(.16)	0.18215	0.79	(0.63)	(.00)	0.05046
STAT4	rs10168266	0	1.00	(0.77)	(.28)	0.97203	1.18	(0.66)	(.21)	0.57034	1.02	(0.80)	(.30)	0.89771
	rs10189819	1	1.18	(0.92)	(.52)	0.18110	0.82	(0.47)	(.43)	0.47658	1.13	(0.89)	(.43)	0.31845
	rs10931481	0	1.14	(0.89)	(.46)	0.23942	1.29	(0.88)	(.89)	0.18411	1.17	(0.93)	(.48)	0.18368
	rs11685878	4	1.00	(0.77)	(.30)	0.98938	1.10	(0.79)	(.53)	0.58468	1.03	(0.80)	(.31)	0.83593
	rs13020076	56	0.94	(0.67)	(.30)	0.69709	0.33	(0.04)	(.26)	0.29235	0.91	(0.65)	(.26)	0.55532
	rs13389408	0	1.17	(0.88)	(.54)	0.27936	0.88	(0.29)	(.26)	0.81455	1.15	(0.87)	(.51)	0.31768
	rs1517352	2	1.23	(0.95)	(.60)	0.11874	1.23	(0.87)	(.73)	0.23662	1.23	(0.96)	(.58)	0.09973
	rs16833177	0	1.16	(0.90)	(.48)	0.25525	0.69	(0.37)	(.28)	0.23306	1.09	(0.86)	(.39)	0.48723
	rs16833239	1	1.09	(0.79)	(.50)	0.60928	1.23	(0.11)	(.84)	0.86936	1.09	(0.79)	(.50)	0.59979
	rs16833437	1	0.96	(0.75)	(.24)	0.76013	1.15	(0.80)	(.63)	0.45474	1.00	(0.79)	(.27)	0.98108
	rs17769459	0	1.17	(0.81)	(.68)	0.39375	-	-	-	-	1.11	(0.77)	(.59)	0.57031
	rs2459611	0	1.10	(0.84)	(.46)	0.48282	0.64	(0.22)	(.92)	0.42919	1.07	(0.82)	(.41)	0.61883
	rs3024861	1	1.23	(0.97)	(.57)	0.09048	1.14	(0.72)	(.80)	0.56868	1.22	(0.97)	(.54)	0.09502
	rs3024877	0	1.03	(0.81)	(.3									

	rs6790068	0	0.96	(0.75	-.124)	0.77374	0.91	(0.63	-.130)	0.60512	0.95	(0.75	-.121)	0.68156
	rs6790258	0	1.08	(0.76	-.152)	0.67558	2.11	(0.34	-.13.12)	0.42398	1.10	(0.78	-.154)	0.59524
	rs9681004	3	0.92	(0.71	-.119)	0.52388	0.94	(0.66	-.134)	0.72020	0.92	(0.73	-.118)	0.52359

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For Peer Review



Supplement Table2. Odds Ratios (OR) and 95% Confidence Intervals of all SNPs with BNHL and subtypes (DLBCL, FL, CLL, T-NHL, MZL and MCL), adjusted for age (continuous), sex and study center)

Gene	db SNP ID	no. of nocalis	Heterozygous Mutant				FL				Dominant model				p-trend
			OR	95% CI	p-value	OR	95% CI	p-value	OR	95% CI	p-value				
BMF	rs10518679	0	1.29	(0.91, 1.83)	0.15157	1.14	(0.38, 3.42)	0.82159	1.28	(0.91, 1.80)	0.15617			0.193828	
	rs11630670	0	0.88	(0.61, 1.27)	0.49890	1.06	(0.69, 1.62)	0.79002	0.93	(0.67, 1.31)	0.69765			0.843723	
	rs11634257	1	0.82	(0.59, 1.14)	0.23580	0.90	(0.46, 1.76)	0.75693	0.83	(0.61, 1.14)	0.24480			0.323546	
	rs11858141	2	1.04	(0.72, 1.48)	0.84428	1.52	(0.98, 2.34)	0.05940	1.16	(0.82, 1.62)	0.40007			0.08341	
	rs12913170	2	1.06	(0.75, 1.50)	0.74682	0.40	(0.09, 1.70)	0.21302	1.00	(0.71, 1.41)	0.99674			0.695732	
	rs1540686	22	0.68	(0.48, 0.96)	0.02993	0.60	(0.38, 0.94)	0.02406	0.66	(0.47, 0.91)	0.01131			0.015239	
	rs16970325	2	1.25	(0.86, 1.82)	0.23521	3.35	(0.81, 13.82)	0.09493	1.31	(0.91, 1.88)	0.14889			0.090352	
	rs16970349	0	1.10	(0.66, 1.82)	0.72552	-	-	-	1.07	(0.64, 1.77)	0.80495			0.894461	
	rs3743129	2	0.78	(0.56, 1.09)	0.14844	0.54	(0.33, 0.87)	0.01198	0.71	(0.52, 0.98)	0.03580			0.010167	
	rs3923235	0	0.97	(0.70, 1.34)	0.86665	1.15	(0.65, 2.02)	0.63239	1.00	(0.74, 1.36)	0.99821			0.818811	
	rs537455	1	0.77	(0.56, 1.07)	0.12307	1.28	(0.71, 2.31)	0.40582	0.84	(0.61, 1.14)	0.25457			0.659875	
	rs546220	5	0.85	(0.60, 1.18)	0.32836	0.80	(0.50, 1.26)	0.33402	0.83	(0.61, 1.14)	0.25915			0.272435	
	rs588739	0	1.12	(0.77, 1.62)	0.55607	1.67	(1.08, 2.58)	0.02148	1.26	(0.89, 1.79)	0.19890			0.026046	
	rs648289	1	0.74	(0.52, 1.03)	0.07561	0.60	(0.38, 0.95)	0.02918	0.70	(0.51, 0.96)	0.02616			0.019473	
	rs652196	3	1.01	(0.73, 1.40)	0.94121	1.00	(0.50, 2.03)	0.99281	1.01	(0.74, 1.38)	0.94448			0.95519	
	rs675173	6	0.79	(0.57, 1.10)	0.16163	0.90	(0.51, 1.57)	0.70231	0.81	(0.60, 1.10)	0.17991			0.297221	
rs7183977	2	1.07	(0.76, 1.48)	0.70798	1.31	(0.82, 2.10)	0.25646	1.12	(0.82, 1.53)	0.48438			0.301069		
rs998713	6	1.19	(0.84, 1.68)	0.33648	1.37	(0.86, 2.17)	0.18429	1.23	(0.88, 1.70)	0.22415			0.166166		
CASP6	rs1541373	1	1.03	(0.73, 1.44)	0.88668	1.34	(0.85, 2.12)	0.21096	1.09	(0.79, 1.51)	0.59208			0.286549	
	rs1800627	3	0.83	(0.57, 1.20)	0.31508	0.98	(0.64, 1.49)	0.92660	0.88	(0.62, 1.24)	0.45459			0.906133	
	rs3181345	0	0.70	(0.45, 1.09)	0.11710	1.67	(0.54, 5.21)	0.37428	0.76	(0.50, 1.16)	0.20193			0.374342	
	rs3212153	1	1.19	(0.83, 1.70)	0.34755	1.17	(0.39, 3.45)	0.77921	1.19	(0.84, 1.68)	0.33725			0.360586	
	rs5030552	1	1.03	(0.68, 1.56)	0.90452	2.71	(0.82, 8.97)	0.10193	1.11	(0.74, 1.65)	0.62392			0.391515	
	rs768063	0	0.36	(0.14, 0.90)	0.02981	5.91	(0.36, 98.01)	0.21523	0.43	(0.18, 1.00)	0.04980			0.090113	
IFNG	rs12306852	0	0.76	(0.52, 1.10)	0.14125	1.17	(0.47, 2.91)	0.73666	0.79	(0.55, 1.13)	0.19557			0.325065	
	rs2069716	0	1.37	(0.91, 2.08)	0.13261	0.66	(0.08, 5.36)	0.69579	1.33	(0.89, 2.00)	0.16745			0.237236	
	rs2069718	8	0.98	(0.70, 1.36)	0.89142	0.88	(0.54, 1.46)	0.62649	0.96	(0.70, 1.31)	0.78258			0.662816	
	rs2069727	0	1.02	(0.70, 1.48)	0.92790	1.30	(0.86, 1.98)	0.21686	1.11	(0.78, 1.57)	0.55854			0.22134	
IFNGR1	rs6581795	1	0.98	(0.70, 1.35)	0.88366	1.00	(0.54, 1.84)	0.99416	0.98	(0.72, 1.34)	0.89527			0.925543	
	rs12529779	15	1.29	(0.94, 1.79)	0.11570	1.00	(0.49, 2.03)	0.98888	1.25	(0.92, 1.71)	0.15375			0.29054	
	rs1327474	1	0.99	(0.70, 1.39)	0.94461	1.01	(0.65, 1.57)	0.97838	0.99	(0.72, 1.37)	0.96565			0.994374	
	rs1327475	2	1.22	(0.88, 1.70)	0.23005	1.23	(0.58, 2.62)	0.58946	1.22	(0.89, 1.68)	0.21185			0.238295	
	rs1854154	6	1.01	(0.70, 1.45)	0.96260	1.06	(0.69, 1.64)	0.79267	1.02	(0.73, 1.44)	0.89003			0.79969	
	rs3799488	0	0.92	(0.62, 1.34)	0.64995	1.47	(0.47, 4.56)	0.50395	0.95	(0.66, 1.37)	0.77671			0.941805	
	rs477768	8	0.92	(0.64, 1.32)	0.66249	0.54	(0.12, 2.33)	0.40754	0.90	(0.63, 1.28)	0.54518			0.443656	
	rs4896243	4	0.90	(0.63, 1.27)	0.54068	0.90	(0.58, 1.40)	0.64547	0.90	(0.65, 1.25)	0.52098			0.596622	
	rs608914	4	1.02	(0.74, 1.40)	0.91500	0.99	(0.57, 1.72)	0.97356	1.01	(0.75, 1.38)	0.93501			0.973365	
	rs759040	0	0.94	(0.68, 1.30)	0.70982	0.97	(0.51, 1.87)	0.93266	0.94	(0.69, 1.29)	0.71912			0.766185	
	rs9402877	3	1.02	(0.71, 1.45)	0.92858	1.09	(0.71, 1.68)	0.69376	1.04	(0.75, 1.44)	0.82454			0.7109	
	IFNGR2	rs1015873	0	1.24	(0.63, 2.45)	0.52942	-	-	-	1.24	(0.63, 2.45)	0.52942			0.529416
rs12626735		0	1.03	(0.75, 1.43)	0.85095	1.21	(0.66, 2.19)	0.54159	1.06	(0.78, 1.44)	0.72168			0.602649	
rs16990664		0	1.43	(0.76, 2.70)	0.26518	-	-	-	1.43	(0.76, 2.70)	0.26518			0.265175	
rs2012075		45	1.16	(0.80, 1.70)	0.42877	0.86	(0.25, 3.00)	0.81427	1.14	(0.79, 1.64)	0.48720			0.591936	
rs2284553		59	0.70	(0.49, 0.99)	0.04250	1.10	(0.72, 1.68)	0.66888	0.80	(0.58, 1.10)	0.17187			0.839835	
rs2834211		0	0.88	(0.58, 1.32)	0.52853	1.76	(0.64, 4.87)	0.27428	0.94	(0.64, 1.39)	0.75968			0.956469	
rs2834214		1	1.00	(0.69, 1.43)	0.98227	1.25	(0.82, 1.88)	0.29653	1.08	(0.77, 1.50)	0.66528			0.328176	
rs8131980		2	0.76	(0.55, 1.06)	0.10560	0.76	(0.43, 1.34)	0.34803	0.76	(0.56, 1.04)	0.08547			0.118545	
rs9976971		0	0.74	(0.52, 1.05)	0.08777	0.94	(0.61, 1.45)	0.77630	0.79	(0.58, 1.09)	0.15717			0.519887	
rs9978166		0	1.33	(0.94, 1.89)	0.10889	0.27	(0.04, 2.09)	0.21159	1.25	(0.88, 1.76)	0.21266			0.459116	
rs1554286		2	1.10	(0.79, 1.54)	0.57264	1.88	(0.93, 3.82)	0.07995	1.17	(0.85, 1.61)	0.32516			0.15707	
rs17015767		0	1.02	(0.73, 1.42)	0.92228	0.95	(0.41, 2.18)	0.89702	1.01	(0.73, 1.39)	0.95401			0.999861	
IL10	rs1800871	9	1.06	(0.77, 1.46)	0.72757	1.23	(0.66, 2.28)	0.50752	1.08	(0.80, 1.47)	0.61167			0.515841	
	rs1800872	10	1.06	(0.76, 1.46)	0.74254	1.26	(0.68, 2.34)	0.45899	1.08	(0.80, 1.48)	0.60923			0.492902	
	rs2222202	9	0.84	(0.59, 1.19)	0.33572	0.88	(0.57, 1.37)	0.57768	0.85	(0.62, 1.18)	0.34502			0.497029	
	rs3021094	2	0.89	(0.57, 1.38)	0.59454	2.44	(0.62, 9.67)	0.20299	0.95	(0.62, 1.45)	0.80121			0.948944	
	rs3024505	1	0.90	(0.63, 1.28)	0.54652	0.68	(0.24, 1.98)	0.48385	0.87	(0.62, 1.24)	0.44871			0.387887	
	rs3024509	0	1.08	(0.69, 1.69)	0.72550	-	-	-	1.04	(0.67, 1.62)	0.86683			0.968497	
	rs4390174	7	0.86	(0.61, 1.21)	0.38073	0.92	(0.57, 1.48)	0.73083	0.87	(0.63, 1.20)	0.40634			0.558914	
	rs4844553	1	1.06	(0.67, 1.67)	0.80094	0.81	(0.10, 6.60)	0.84868	1.05	(0.67, 1.63)	0.83604			0.881167	
	rs6673928	8	1.03	(0.74, 1.44)	0.85355	0.75	(0.33, 1.71)	0.49632	1.00	(0.72, 1.37)	0.98756			0.782363	
	rs6686931	2	0.97	(0.70, 1.34)	0.85347	0.97	(0.49, 1.90)	0.92312	0.97	(0.71, 1.32)	0.84509			0.85397	
	rs7548373	22	1.09	(0.69, 1.71)	0.72055	-	-	-	1.03	(0.66, 1.62)	0.88721			0.921917	
	rs11927521	6	0.91	(0.65, 1.27)	0.58089	0.94	(0.59, 1.48)	0.77598	0.92	(0.67, 1.25)	0.58538			0.674748	
	rs2243115	4	0.58	(0.37, 0.91)	0.01872	1.06	(0.35, 3.16)	0.91858	0.62	(0.41, 0.95)	0.02793			0.062393	
rs2243131	3	0.95	(0.67, 1.36)	0.78591	1.29	(0.51, 3.25)	0.58538	0.98	(0.70, 1.38)	0.90283			0.946098		
rs2243154	0	1.08	(0.73, 1.59)	0.69931	1.55	(0.42, 5.70)	0.50560	1.10	(0.76, 1.61)	0.61289			0.533794		
rs4680534	0	1.16	(0.84, 1.62)	0.36568	1.11	(0.67, 1.83)	0.68653	1.15	(0.84, 1.58)	0.37524			0.486214		
rs485497	1	0.87	(0.60, 1.25)	0.43702	1.02	(0.66, 1.56)	0.93090	0.91	(0.65, 1.28)	0.59548			0.979415		
rs583911	2	0.97	(0.68, 1.39)	0.87004	1.10	(0.71, 1.70)	0.67223	1.01	(0.72, 1.41)	0.96772			0.712856		
rs6441282	1	1.15	(0.80, 1.64)	0.45141	1.13	(0.72, 1.76)	0.59953	1.14	(0.81, 1.61)	0.44546			0.554278		
rs6800657	6	1.02	(0.68, 1.53)	0.91650	0.73	(0.16, 3.28)	0.68222	1.00	(0.67, 1.48)	0.99715			0.914664		
rs692890	0	0.91	(0.66, 1.27)	0.57931	1.19	(0.71, 2.00)	0.50356	0.96	(0.71, 1.31)	0.80075			0.840512		
rs7372767	2	1.05	(0.74, 1.49)	0.78832	1.15	(0.73, 1.79)	0.55142	1.07	(0.77, 1.49)	0.67161			0.561739		
rs747825	1	1.02	(0.73, 1.42)	0.92383	1.00	(0.41, 2.43)	0.99921	1.01	(0.74, 1.40)	0.92834			0.94025		
rs755004	2	1.11	(0.77, 1.59)	0.58144	1.30	(0.47, 3.58)	0.60705	1.12	(0.79, 1.59)	0.51483			0.475318		
rs9811792	1	1.06	(0.74, 1.52)	0.73495	1.13	(0.73, 1.75)	0.58060	1.08	(0.77, 1.52)	0.64263			0.578356		
rs9852519	2	1.00	(0.71, 1.41)	0.98606	1.17	(0.76, 1.80)	0.48556	1.05	(0.76, 1.44)	0.77518			0.545208		
IL12B	rs10052709	3	0.97	(0.68, 1.40)	0.88538	1.88	(0.73, 4.82)	0.19015	1.03	(0.73, 1.46)	0.86559			0.596029	
	rs11574790	1	1.10	(0.76, 1.59)	0.62280	1.15	(0.33, 4.07)	0.82759	1.10	(0.77,					



		rs324011		6	0.79	(0.57	.111)	0.17330	1.05	(0.67	.164)	0.83926	0.85	(0.62	.116)	0.31165	0.767385
		rs324015		0	0.94	(0.68	.131)	0.73240	1.66	(0.91	.302)	0.10054	1.03	(0.75	.140)	0.86467	0.416069
		rs703817		6	0.87	(0.60	.125)	0.44811	0.88	(0.57	.135)	0.55366	0.87	(0.62	.123)	0.43148	0.539697
	<b>TP63</b>	rs1464117		56	1.46	(1.05	.204)	0.02499	2.49	(1.13	.552)	0.02399	1.54	(1.12	.212)	0.00844	0.00342
		rs6790068		0	0.70	(0.50	.098)	0.03538	0.74	(0.46	.119)	0.21217	0.71	(0.52	.097)	0.03088	0.076356
		rs6790258		0	1.40	(0.91	.213)	0.12229	2.65	(0.27	.2620)	0.40329	1.42	(0.93	.215)	0.10167	0.087868
		rs9681004		3	0.70	(0.50	.098)	0.03834	0.75	(0.47	.120)	0.22837	0.71	(0.52	.098)	0.03474	0.087727

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Supplement Table 2. Odds Ratios (OR) and 95% Confidence Intervals of all SNPs with BNHL and subtypes (DLBCL, FL, CLL, T-NHL, MZL and MCL), adjusted for age (continuous), sex and study center)

Gene	db SNP ID	no. of nocalis	CLL												p-trend
			Heterozygous Mutant			Homozygous Mutant			Dominant Model						
			OR	95% CI	p-value	OR	95% CI	p-value	OR	95% CI	p-value				
BMF	rs10518679	0	0.98	(0.72, 1.32)	0.88411	0.83	(0.31, 2.26)	0.71530	0.97	(0.72, 1.30)	0.82094	0.763094			
	rs11630670	0	1.28	(0.94, 1.74)	0.11584	1.12	(0.77, 1.63)	0.53829	1.23	(0.92, 1.65)	0.16224	0.480387			
	rs11634257	1	1.07	(0.83, 1.39)	0.58958	0.57	(0.30, 1.09)	0.08978	1.00	(0.78, 1.29)	0.99001	0.488433			
	rs11858141	2	0.90	(0.68, 1.20)	0.47017	1.10	(0.77, 1.59)	0.59696	0.95	(0.73, 1.24)	0.71261	0.766421			
	rs12913170	2	1.05	(0.79, 1.40)	0.72985	1.00	(0.44, 2.25)	0.99325	1.05	(0.79, 1.38)	0.74599	0.785161			
	rs1540686	22	0.96	(0.71, 1.30)	0.80710	0.96	(0.67, 1.37)	0.81235	0.96	(0.72, 1.28)	0.78639	0.806258			
	rs16970325	2	1.23	(0.90, 1.68)	0.20208	4.42	(1.43, 13.65)	0.00968	1.32	(0.97, 1.78)	0.07602	0.02424			
	rs16970349	0	1.33	(0.89, 1.98)	0.15777	-	-	-	1.29	(0.87, 1.91)	0.21180	0.295679			
	rs3743129	2	1.07	(0.80, 1.43)	0.64596	1.10	(0.77, 1.57)	0.60341	1.08	(0.82, 1.42)	0.58547	0.584027			
	rs3923235	0	1.00	(0.77, 1.30)	0.99637	0.67	(0.39, 1.16)	0.15401	0.95	(0.74, 1.22)	0.67435	0.346408			
	rs537455	1	1.02	(0.78, 1.33)	0.88201	1.37	(0.85, 2.23)	0.19671	1.07	(0.83, 1.37)	0.61021	0.348726			
	rs546220	5	0.86	(0.65, 1.14)	0.29943	0.96	(0.66, 1.38)	0.81004	0.89	(0.68, 1.15)	0.36850	0.636685			
	rs588739	0	1.00	(0.75, 1.34)	0.99424	1.06	(0.73, 1.52)	0.77197	1.02	(0.77, 1.34)	0.91210	0.792726			
	rs648289	1	0.90	(0.67, 1.20)	0.45977	0.93	(0.65, 1.33)	0.69944	0.91	(0.69, 1.19)	0.48198	0.641079			
	rs652196	3	1.14	(0.87, 1.49)	0.34460	1.45	(0.87, 2.43)	0.15785	1.18	(0.91, 1.52)	0.20506	0.129247			
rs675173	6	0.94	(0.72, 1.23)	0.65558	1.18	(0.76, 1.84)	0.45396	0.98	(0.76, 1.26)	0.87605	0.770954				
rs7183977	2	1.09	(0.84, 1.42)	0.52297	0.76	(0.48, 1.21)	0.24592	1.02	(0.79, 1.32)	0.85347	0.595082				
rs998713	6	0.94	(0.72, 1.25)	0.68774	1.17	(0.80, 1.71)	0.42192	0.99	(0.76, 1.29)	0.96271	0.599211				
CASP6	rs1541373	1	1.10	(0.84, 1.45)	0.48958	1.12	(0.75, 1.67)	0.59071	1.11	(0.85, 1.44)	0.45896	0.498812			
	rs1800627	3	0.94	(0.70, 1.27)	0.68277	0.88	(0.62, 1.27)	0.50229	0.92	(0.70, 1.22)	0.57373	0.501056			
	rs3181345	0	1.13	(0.82, 1.55)	0.46806	0.40	(0.09, 1.77)	0.22482	1.07	(0.78, 1.46)	0.68400	0.969381			
	rs3212153	1	0.99	(0.74, 1.34)	0.96707	0.70	(0.26, 1.89)	0.48789	0.97	(0.72, 1.30)	0.83229	0.697332			
	rs5030552	1	1.34	(0.96, 1.85)	0.08147	0.94	(0.25, 3.51)	0.92607	1.31	(0.95, 1.80)	0.09587	0.13551			
	rs768063	0	1.01	(0.62, 1.65)	0.97263	-	-	-	0.99	(0.61, 1.62)	0.97972	0.930434			
	rs12306852	0	1.07	(0.81, 1.43)	0.62495	1.27	(0.58, 2.77)	0.55191	1.09	(0.83, 1.43)	0.54442	0.483973			
IFNG	rs2069716	0	0.86	(0.58, 1.27)	0.44820	0.38	(0.05, 3.08)	0.36521	0.83	(0.56, 1.23)	0.34786	0.281284			
	rs2069718	8	0.95	(0.72, 1.24)	0.68783	1.12	(0.76, 1.63)	0.57333	0.98	(0.76, 1.27)	0.90238	0.74984			
	rs2069727	0	1.26	(0.94, 1.71)	0.12683	0.93	(0.64, 1.35)	0.69939	1.15	(0.87, 1.54)	0.32919	0.812717			
	rs6581795	1	0.88	(0.67, 1.15)	0.33891	0.93	(0.56, 1.55)	0.79135	0.89	(0.69, 1.14)	0.35256	0.445322			
	IFNGR1	rs12529779	15	0.81	(0.61, 1.06)	0.11818	0.81	(0.44, 1.49)	0.50518	0.81	(0.62, 1.05)	0.10528	0.132612		
		rs1327474	1	1.09	(0.82, 1.46)	0.54250	1.22	(0.85, 1.76)	0.27826	1.13	(0.86, 1.48)	0.38598	0.278846		
		rs1327475	2	0.71	(0.53, 0.95)	0.01930	0.93	(0.47, 1.84)	0.83161	0.73	(0.55, 0.96)	0.02539	0.058731		
		rs1854154	6	1.01	(0.75, 1.35)	0.94073	0.79	(0.54, 1.15)	0.22370	0.95	(0.72, 1.25)	0.69467	0.268551		
		rs3799488	0	0.90	(0.66, 1.23)	0.50411	0.67	(0.19, 2.37)	0.53681	0.89	(0.66, 1.20)	0.43892	0.392315		
		rs477768	8	0.94	(0.70, 1.27)	0.70584	1.31	(0.57, 3.02)	0.52587	0.97	(0.73, 1.29)	0.83824	0.99151		
	IFNGR2	rs4896243	4	1.15	(0.85, 1.56)	0.37291	1.69	(1.19, 2.40)	0.00319	1.30	(0.98, 1.73)	0.06776	0.003813		
		rs608914	4	1.00	(0.77, 1.31)	0.98705	1.40	(0.91, 2.13)	0.12220	1.07	(0.83, 1.37)	0.60654	0.263521		
		rs759040	0	0.88	(0.67, 1.15)	0.34403	0.92	(0.53, 1.59)	0.75864	0.88	(0.69, 1.14)	0.34440	0.408862		
		rs9402877	3	1.10	(0.83, 1.46)	0.51283	0.96	(0.66, 1.38)	0.81126	1.06	(0.81, 1.39)	0.68149	0.941775		
		rs1015873	0	0.90	(0.48, 1.70)	0.75123	-	-	-	0.90	(0.48, 1.70)	0.75123	0.751233		
rs12626735		0	1.12	(0.86, 1.46)	0.38529	1.56	(0.97, 2.52)	0.06799	1.18	(0.92, 1.52)	0.18830	0.082972			
rs16990664		0	1.08	(0.61, 1.90)	0.79070	-	-	-	1.08	(0.61, 1.90)	0.79070	0.790702			
rs2012075		45	1.07	(0.78, 1.47)	0.68221	1.12	(0.40, 3.11)	0.82923	1.07	(0.79, 1.46)	0.65879	0.65366			
rs2284553		59	1.01	(0.77, 1.33)	0.95208	0.83	(0.56, 1.23)	0.35295	0.96	(0.74, 1.25)	0.77417	0.460263			
rs2834211		0	0.67	(0.47, 0.96)	0.02971	0.49	(0.14, 1.71)	0.26467	0.66	(0.46, 0.93)	0.01794	0.016692			
rs2834214		1	1.04	(0.78, 1.38)	0.79429	0.74	(0.51, 1.07)	0.10685	0.94	(0.72, 1.23)	0.66278	0.172365			
rs8131980		2	0.94	(0.72, 1.22)	0.64324	1.01	(0.65, 1.58)	0.97229	0.95	(0.74, 1.22)	0.69845	0.82318			
rs9976971		0	0.83	(0.63, 1.10)	0.18930	0.85	(0.59, 1.24)	0.40486	0.84	(0.64, 1.09)	0.18181	0.289336			
rs9978166		0	0.95	(0.70, 1.29)	0.73510	0.43	(0.10, 1.88)	0.26115	0.91	(0.67, 1.24)	0.56763	0.418783			
IL10		rs1554286	2	1.12	(0.85, 1.46)	0.41627	0.83	(0.39, 1.76)	0.62969	1.09	(0.84, 1.41)	0.52155	0.714499		
	rs17015767	0	0.92	(0.70, 1.21)	0.56298	1.17	(0.61, 2.26)	0.63194	0.95	(0.73, 1.23)	0.67744	0.868114			
	rs1800871	9	1.08	(0.83, 1.40)	0.56822	0.83	(0.47, 1.48)	0.52464	1.04	(0.81, 1.34)	0.73623	0.98607			
	rs1800872	10	1.08	(0.83, 1.40)	0.58822	0.79	(0.44, 1.43)	0.44423	1.04	(0.80, 1.34)	0.78140	0.911788			
	rs2222202	9	1.04	(0.78, 1.38)	0.80105	0.97	(0.67, 1.40)	0.85402	1.02	(0.78, 1.34)	0.89966	0.910174			
	rs3021094	2	1.00	(0.71, 1.40)	0.99561	3.09	(0.94, 10.12)	0.06199	1.06	(0.77, 1.48)	0.71355	0.446022			
	rs3024505	1	1.03	(0.77, 1.38)	0.85665	0.84	(0.36, 1.93)	0.67488	1.01	(0.76, 1.34)	0.95390	0.931981			
	rs3024509	0	1.09	(0.76, 1.56)	0.63536	0.37	(0.04, 3.03)	0.35189	1.05	(0.74, 1.50)	0.78255	0.963114			
	rs4390174	7	1.03	(0.79, 1.36)	0.80768	1.14	(0.78, 1.68)	0.49829	1.06	(0.82, 1.37)	0.66535	0.528407			
	rs4844553	1	1.06	(0.74, 1.53)	0.74507	0.32	(0.04, 2.60)	0.28615	1.02	(0.71, 1.45)	0.93010	0.860657			
	rs6673928	8	1.02	(0.78, 1.33)	0.90063	0.89	(0.47, 1.68)	0.71218	1.00	(0.77, 1.30)	0.98778	0.896753			
	rs6686931	2	0.98	(0.75, 1.28)	0.86053	1.14	(0.67, 1.95)	0.62135	1.00	(0.77, 1.29)	0.99243	0.84231			
	rs7548373	22	1.09	(0.76, 1.57)	0.62994	0.34	(0.04, 2.79)	0.31577	1.05	(0.73, 1.50)	0.79645	0.99949			
	IL12A	rs11927521	6	1.09	(0.83, 1.44)	0.51735	0.95	(0.65, 1.40)	0.79648	1.06	(0.82, 1.37)	0.66933	0.994411		
		rs2243115	4	1.04	(0.76, 1.42)	0.82959	0.31	(0.07, 1.35)	0.11850	0.97	(0.71, 1.32)	0.84558	0.527703		
rs2243131		3	1.00	(0.75, 1.34)	0.97359	0.63	(0.24, 1.68)	0.35801	0.97	(0.74, 1.29)	0.85292	0.662384			
rs2243154		0	0.95	(0.69, 1.31)	0.74889	0.96	(0.26, 3.55)	0.95191	0.95	(0.69, 1.30)	0.74712	0.756346			
rs4680534		0	0.95	(0.72, 1.24)	0.70473	1.12	(0.75, 1.67)	0.56949	0.98	(0.76, 1.27)	0.90621	0.780877			
rs485497		1	0.97	(0.72, 1.30)	0.83575	0.99	(0.69, 1.41)	0.93485	0.97	(0.74, 1.29)	0.85366	0.922246			
rs583911		2	1.06	(0.79, 1.42)	0.69071	1.06	(0.74, 1.52)	0.75827	1.06	(0.80, 1.40)	0.67857	0.736434			
rs6441282		1	0.96	(0.72, 1.29)	0.79082	1.03	(0.72, 1.47)	0.87943	0.98	(0.75, 1.29)	0.88790	0.923547			
rs6800657		6	0.91	(0.65, 1.28)	0.59553	0.96	(0.31, 2.99)	0.94830	0.91	(0.66, 1.28)	0.60010	0.62869			
rs692890		0	0.91	(0.69, 1.18)	0.46254	1.06	(0.68, 1.66)	0.78320	0.93	(0.72, 1.20)	0.58300	0.841809			
rs7372767		2	1.21	(0.91, 1.62)	0.18594	1.06	(0.72, 1.55)	0.76369	1.17	(0.89, 1.54)	0.25184	0.561796			
rs747825		1	0.88	(0.66, 1.16)	0.36250	1.07	(0.55, 2.06)	0.84445	0.90	(0.69, 1.17)	0.43099	0.572896			
rs755004		2	0.98	(0.72, 1.32)	0.89078	1.47	(0.63, 3.42)	0.37357	1.01	(0.76, 1.35)	0.92942	0.737501			
rs9811792		1	1.17	(0.87, 1.56)	0.30749	1.07	(0.74, 1.54)	0.73150	1.14	(0.86, 1.50)	0.36754	0.636475			
rs9852519		2	1.08	(0.82, 1.43)	0.59575	1.02	(0.70, 1.47)	0.93649	1.06	(0.82, 1.38)	0.65862	0.831063			
IL12B	rs10052709	3	0.94	(0.70, 1.25)	0.66050	0.59	(0.20, 1.76)	0.34233	0.91	(0.69, 1.21)	0.53096	0.412555			
	rs11574790	1	0.96	(0.71, 1.30)	0.77563	0.56	(0.16, 1.96)	0.36255	0.93	(0.69, 1.26)	0.64203	0.511836			
	rs1368439	1	1.00	(0.82, 1.43)	0.57332	0.78	(0.38, 1.59)	0.49343	1.05	(0.80, 1.37)	0.74684	0.992544			
	rs1433048	1	1.08	(0.76, 1.32)	0.97546	0.74	(0.36, 1.50)	0.40578	0.97	(0.74, 1.27)	0.83389	0.63835			
	rs2546890	0	1.05	(0.76, 1.44)	0.77653	1.35	(0.94, 1.94)	0.09987	1.14	(0.84, 1.53)	0.39757	0.09617			
	rs2546893	0	1.14	(0.85, 1.54)	0.37480	0.99	(0.69, 1.43)								





	rs324011	6	0.86	(0.66	-.114)	0.29433	1.13	(0.77	-.165)	0.53841	0.92	(0.71	-.119)	0.52796	0.923835
	rs324015	0	0.96	(0.73	-.125)	0.73918	1.07	(0.59	-.193)	0.82191	0.97	(0.75	-.125)	0.80455	0.91744
	rs703817	6	1.02	(0.76	-.138)	0.87677	0.95	(0.66	-.136)	0.76460	1.00	(0.75	-.133)	0.99529	0.779724
	<b>TP63</b>														
	rs1464117	56	0.98	(0.74	-.130)	0.90770	1.43	(0.69	-.297)	0.33361	1.02	(0.78	-.134)	0.89850	0.676943
	rs6790068	0	1.02	(0.77	-.135)	0.88415	1.21	(0.83	-.174)	0.31990	1.07	(0.82	-.139)	0.63631	0.377747
	rs6790258	0	1.37	(0.97	-.194)	0.07731	4.07	(0.78	-.21.06)	0.09467	1.42	(1.01	-.2.00)	0.04373	0.02585
	rs9681004	3	1.02	(0.77	-.136)	0.86640	1.16	(0.80	-.1.68)	0.42787	1.06	(0.81	-.1.38)	0.67532	0.471548

For Peer Review

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Supplement Table2. Odds Ratios (OR) and 95% Confidence Intervals of all SNPs with BNHL and subtypes (DLBCL, FL, CLL, T-NHL, MZL and MCL), adjusted for age (continuous), sex and study center)													
Gene	db SNP ID	no. of nocalls	Heterozygous Mutant			MZL			Dominant Model			p-trend	
			OR	95% CI	p-value	OR	95% CI	p-value	OR	95% CI	p-value		
BMF	rs10518679	0	0.85	(0.52, 1.40)	0.53052	0.47	(0.06, 3.55)	0.46355	0.82	(0.51, 1.34)	0.43395	0.36831	
	rs11630670	0	0.79	(0.51, 1.25)	0.31506	0.65	(0.37, 1.17)	0.15211	0.75	(0.49, 1.15)	0.18944	0.14202	
	rs11634257	1	0.96	(0.63, 1.46)	0.84665	0.94	(0.39, 2.26)	0.88366	0.96	(0.64, 1.43)	0.82779	0.82455	
	rs11858141	2	0.98	(0.62, 1.54)	0.92571	1.27	(0.72, 2.25)	0.40810	1.05	(0.68, 1.62)	0.82477	0.48063	
	rs12919170	7	0.77	(0.47, 1.25)	0.25045	1.43	(0.48, 4.22)	0.52113	0.83	(0.52, 1.31)	0.41600	0.53374	
	rs1540686	22	0.76	(0.48, 1.21)	0.25044	0.39	(0.58, 1.68)	0.95665	0.83	(0.54, 1.28)	0.39584	0.89731	
	rs16970325	2	0.94	(0.49, 1.45)	0.53009	9.98	(2.79, 35.64)	0.00040	1.06	(0.65, 1.75)	0.80362	0.23507	
	rs16970349	0	1.41	(0.77, 2.57)	0.26287	2.42	(2.24, 24.45)	0.45500	1.45	(0.81, 2.60)	0.21517	0.18945	
	rs3743129	2	0.87	(0.54, 1.38)	0.54899	1.43	(0.85, 2.40)	0.17765	1.03	(0.67, 1.58)	0.88259	0.22942	
	rs3923235	0	0.70	(0.45, 1.08)	0.10654	1.32	(0.68, 2.57)	0.40976	0.80	(0.53, 1.19)	0.26313	0.73468	
	rs5374555	1	0.70	(0.46, 1.08)	0.10455	0.97	(0.44, 2.13)	0.94282	0.74	(0.49, 1.10)	0.14003	0.28099	
	rs546220	5	0.69	(0.44, 1.09)	0.11055	1.15	(0.68, 1.95)	0.60194	0.81	(0.54, 1.23)	0.32427	0.89085	
	rs588739	0	1.01	(0.64, 1.60)	0.96026	1.15	(0.65, 2.05)	0.62641	1.05	(0.68, 1.62)	0.83324	0.65726	
	rs648289	1	0.75	(0.47, 1.19)	0.21851	1.03	(0.61, 1.75)	0.90203	0.83	(0.55, 1.27)	0.39930	0.96172	
	rs652196	3	0.94	(0.61, 1.45)	0.78722	1.43	(0.65, 3.16)	0.37150	1.01	(0.67, 1.51)	0.98002	0.69776	
	rs675173	6	0.74	(0.48, 1.12)	0.15333	1.13	(0.58, 2.21)	0.72043	0.80	(0.54, 1.18)	0.25919	0.61013	
	rs7183977	2	0.81	(0.53, 1.23)	0.32128	1.00	(0.53, 1.87)	0.99766	0.85	(0.57, 1.26)	0.40933	0.65421	
	rs998713	6	0.79	(0.51, 1.23)	0.30505	1.39	(0.80, 2.39)	0.24039	0.93	(0.62, 1.39)	0.71609	0.49013	
	CASP6	rs1541373	1	1.20	(0.77, 1.88)	0.42246	1.43	(0.79, 2.61)	0.24083	1.25	(0.82, 1.91)	0.30530	0.22699
		rs1800627	3	0.80	(0.50, 1.26)	0.33553	0.78	(0.44, 1.36)	0.37595	0.79	(0.51, 1.22)	0.28803	0.34899
		rs3181345	0	0.76	(0.44, 1.32)	0.33030	-	-	-	0.71	(0.41, 1.24)	0.22765	0.16525
		rs3212153	1	1.30	(0.83, 2.05)	0.24619	1.61	(0.47, 5.59)	0.45060	1.33	(0.86, 2.05)	0.20111	0.18491
rs5030552		1	0.79	(0.44, 1.42)	0.43533	-	-	-	0.75	(0.42, 1.36)	0.34540	0.28098	
rs768063		0	0.96	(0.43, 2.15)	0.92361	-	-	-	0.94	(0.42, 2.10)	0.87552	0.82917	
rs12306852		0	1.08	(0.70, 1.68)	0.72270	0.39	(0.05, 2.94)	0.36290	1.03	(0.66, 1.59)	0.90451	0.86160	
IFNG	rs2069716	0	0.82	(0.44, 1.54)	0.53667	-	-	-	0.77	(0.41, 1.43)	0.40238	0.31161	
	rs2069718	8	0.99	(0.64, 1.52)	0.96570	0.80	(0.42, 1.55)	0.51216	0.95	(0.63, 1.43)	0.79373	0.59092	
	rs2069727	0	1.44	(0.88, 2.34)	0.14698	1.07	(0.59, 1.95)	0.81326	1.32	(0.82, 2.10)	0.25057	0.75537	
	rs6581795	1	1.10	(0.73, 1.66)	0.65393	0.80	(0.33, 1.94)	0.62935	1.05	(0.71, 1.57)	0.79562	0.97339	
	rs12529779	15	0.77	(0.50, 1.18)	0.22205	0.48	(0.15, 1.57)	0.22482	0.73	(0.48, 1.11)	0.39119	0.10374	
	rs1371979	1	1.19	(0.75, 1.88)	0.45462	1.30	(0.73, 2.32)	0.36547	1.22	(0.79, 1.88)	0.36830	0.34263	
	rs1327475	2	0.55	(0.34, 0.89)	0.01589	0.68	(0.20, 2.29)	0.53872	0.56	(0.36, 0.90)	0.01526	0.02654	
	rs1854154	6	0.73	(0.46, 1.14)	0.18759	0.74	(0.43, 1.29)	0.28466	0.73	(0.48, 1.11)	0.14567	0.23914	
IFNGR1	rs3799488	0	1.22	(0.78, 1.91)	0.37417	-	-	-	1.15	(0.73, 1.79)	0.55025	0.83362	
	rs477768	8	1.20	(0.78, 1.86)	0.41119	1.05	(0.24, 4.61)	0.95108	1.19	(0.78, 1.83)	0.42356	0.47010	
	rs4896243	4	1.10	(0.69, 1.75)	0.69541	1.42	(0.81, 2.46)	0.21849	1.18	(0.76, 1.84)	0.44773	0.23580	
	rs608914	4	1.19	(0.79, 1.79)	0.41068	0.77	(0.34, 1.75)	0.52684	1.11	(0.75, 1.66)	0.59162	0.96565	
	rs7759040	0	1.31	(0.87, 1.98)	0.20056	1.51	(0.71, 3.22)	0.28799	1.34	(0.90, 1.99)	0.15030	0.13989	
	rs9402877	3	0.66	(0.43, 1.02)	0.06188	0.63	(0.35, 1.12)	0.11339	0.65	(0.43, 0.98)	0.03748	0.06215	
	rs1015873	0	1.62	(0.74, 3.54)	0.22487	-	-	-	1.62	(0.74, 3.54)	0.22487	0.22487	
	rs12626735	0	1.04	(0.69, 1.57)	0.84471	0.69	(0.27, 1.80)	0.45254	0.99	(0.67, 1.47)	0.96530	0.72372	
	rs16990664	0	1.63	(0.78, 3.44)	0.19442	-	-	-	1.63	(0.78, 3.44)	0.19442	0.19442	
	rs2012075	45	1.44	(0.89, 2.32)	0.13908	2.10	(0.59, 7.49)	0.25207	1.49	(0.94, 2.36)	0.09224	0.07343	
	rs2284553	59	0.96	(0.62, 1.50)	0.86492	1.08	(0.61, 1.93)	0.78202	1.00	(0.66, 1.50)	0.98140	0.85618	
	rs2834211	0	0.76	(0.44, 1.33)	0.34204	0.51	(0.07, 3.91)	0.51543	0.74	(0.43, 1.27)	0.27938	0.25655	
	rs2834214	1	1.28	(0.80, 2.05)	0.29484	1.34	(0.77, 2.32)	0.30227	1.30	(0.84, 2.01)	0.23921	0.27547	
	rs8131980	2	0.90	(0.60, 1.36)	0.62746	0.63	(0.28, 1.42)	0.26618	0.85	(0.57, 1.27)	0.42825	0.28676	
rs9976971	0	1.10	(0.69, 1.73)	0.68983	1.29	(0.73, 2.27)	0.37559	1.15	(0.75, 1.77)	0.52435	0.38698		
rs9978166	0	1.55	(0.99, 2.42)	0.05500	1.34	(0.30, 5.98)	0.70054	1.53	(0.99, 2.37)	0.05490	0.07201		
IL10	rs1554286	2	0.75	(0.48, 1.18)	0.21163	0.91	(0.31, 2.65)	0.86554	0.77	(0.50, 1.18)	0.22733	0.29955	
	rs17015767	0	0.65	(0.41, 1.05)	0.07619	1.72	(0.73, 4.04)	0.21129	0.75	(0.49, 1.16)	0.20285	0.58250	
	rs1800871	9	0.74	(0.48, 1.14)	0.17427	0.74	(0.31, 1.79)	0.50750	0.74	(0.49, 1.12)	0.15329	0.18706	
	rs1800872	10	0.74	(0.48, 1.14)	0.17268	0.89	(0.39, 2.03)	0.78107	0.76	(0.51, 1.15)	0.19118	0.28870	
	rs2222202	9	1.42	(0.88, 2.30)	0.15153	-	-	-	1.45	(0.92, 2.29)	0.11361	0.14045	
	rs3021094	2	1.00	(0.59, 1.71)	0.99444	1.51	(0.85, 2.70)	0.16104	1.45	(0.92, 2.29)	0.11361	0.14045	
	rs3024505	0	1.44	(0.93, 2.22)	0.10422	-	-	-	0.97	(0.57, 1.65)	0.89869	0.78370	
	rs3024509	0	1.03	(0.59, 1.81)	0.91191	1.34	(0.46, 3.96)	0.59114	1.43	(0.94, 2.17)	0.09793	0.12533	
	rs4390174	7	0.78	(0.51, 1.21)	0.28917	1.07	(0.60, 1.91)	0.81919	0.85	(0.57, 1.27)	0.42465	0.83911	
	rs4844553	1	1.12	(0.64, 1.94)	0.69172	1.93	(0.39, 9.44)	0.41915	1.17	(0.69, 1.98)	0.56697	0.46896	
	rs6673928	8	0.81	(0.51, 1.26)	0.34666	1.73	(0.78, 3.84)	0.17903	0.91	(0.60, 1.38)	0.64652	0.85432	
	rs6689331	2	0.87	(0.57, 1.33)	0.52726	0.59	(0.21, 1.68)	0.32333	0.83	(0.55, 1.25)	0.38320	0.28780	
	rs7548373	22	1.00	(0.56, 1.78)	0.98796	1.86	(0.39, 9.11)	0.44452	1.05	(0.60, 1.82)	0.86154	0.71806	
	IL12A	rs11927521	6	1.00	(0.66, 1.52)	0.99977	0.50	(0.24, 1.04)	0.06361	0.87	(0.58, 1.31)	0.51477	0.13981
		rs2243115	4	1.00	(0.61, 1.64)	0.98765	0.55	(0.07, 4.18)	0.56243	0.96	(0.59, 1.57)	0.87582	0.76297
		rs2243131	3	1.28	(0.83, 1.99)	0.26672	1.25	(0.36, 4.31)	0.72142	1.28	(0.84, 1.96)	0.25727	0.28393
		rs2243154	0	0.70	(0.41, 1.22)	0.20766	-	-	-	0.67	(0.39, 1.16)	0.15247	0.11727
		rs4860534	0	1.32	(0.87, 2.00)	0.19853	0.66	(0.30, 1.44)	0.29315	1.18	(0.78, 1.77)	0.42877	0.87183
		rs485497	1	1.24	(0.77, 1.99)	0.37922	1.02	(0.56, 1.85)	0.95695	1.17	(0.74, 1.85)	0.49085	0.87581
		rs583911	2	1.48	(0.91, 2.40)	0.11573	1.13	(0.61, 2.08)	0.69263	1.38	(0.86, 2.20)	0.18296	0.59276
rs6441282		1	1.45	(0.90, 2.32)	0.12436	1.00	(0.54, 1.88)	0.99085	1.32	(0.84, 2.09)	0.22849	0.78198	
rs6800657		6	1.03	(0.60, 1.76)	0.92518	1.58	(0.35, 7.19)	0.55039	1.06	(0.63, 1.79)	0.81726	0.71330	
rs692890		0	0.98	(0.64, 1.49)	0.91818	1.16	(0.58, 2.34)	0.66716	1.01	(0.68, 1.50)	0.96626	0.80572	
rs7372767		2	1.10	(0.71, 1.70)	0.66976	0.68	(0.35, 1.32)	0.25946	0.99	(0.65, 1.51)	0.97418	0.41943	
rs747825		1	0.85	(0.55, 1.32)	0.46115	0.49	(0.12, 2.09)	0.33499	0.81	(0.53, 1.25)	0.34273	0.26314	
rs755004		2	0.68	(0.40, 1.16)	0.15885	0.91	(0.21, 4.02)	0.90517	0.70	(0.42, 1.16)	0.17021	0.21857	
rs9811792		1	1.25	(0.80, 1.97)	0.32991	0.68	(0.35, 1.32)	0.25404	1.09	(0.70, 1.69)	0.69913	0.44038	
rs9852519		2	1.84	(1.16, 2.90)	0.00908	0.80	(0.40, 1.61)	0.53368	1.54	(0.99, 2.41)	0.05555	0.79901	
IL12B	rs10052709	3	0.87	(0.54, 1.39)	0.55692	1.62	(0.53, 4.98)	0.40097	0.92	(0.59, 1.45)	0.73146	0.97643	
	rs11574790	1	0.81	(0.49, 1.34)	0.40772	0.87	(0.19, 3.93)	0.85960	0.81	(0.50, 1.32)	0.40584	0.43893	
	rs1368439	1	1.38	(0.90, 2.11)	0.14539	1.30	(0.49, 3.41)	0.59876	1.37	(0.90, 2.06)	0.13802	0.17546	
	rs1433048	1	1.46	(0.96, 2.22)	0.07783	1.03	(0.36, 2.98)	0.95704	1.41	(0.94, 2.11)	0.10090	0.18947	
	rs2546890	0	0.79	(0.50, 1.27)	0.33500	0.77	(0.44, 1.36)	0.37539	0.79	(0.51, 1.23)	0.29157	0.36118	
	rs2546893	0	0.72	(0.46, 1.19)	0.15113	0.80	(0.46, 1.37)	0.41771	0.74	(0.49, 1.13)	0.16401	0.33915	
	rs2569253	19	0.75	(0.47, 1.19)	0.21929	0.94	(0.56, 1.60)	0.82746	0.81	(0.53, 1.24)	0.33356	0.73778	
	rs2853694	0											



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	rs6790068	0	0.75	(0.49	-.1.17)	0.20447	-	0.93	(0.53	-.1.65)	-	0.81302	0.80	(0.53	-.1.20)	0.27532	0.55829
	rs6790258	0	0.86	(0.46	-.1.61)	0.63937	-	-	-	-	-	-	0.83	(0.45	-.1.57)	0.57366	0.51616
	rs9681004	3	0.81	(0.52	-.1.25)	0.33368	-	0.98	(0.56	-.1.73)	-	0.95295	0.85	(0.57	-.1.28)	0.43655	0.74675

For Peer Review

**Supplement Table 2.** Odds Ratios (OR) and 95% Confidence Intervals of all SNPs with BNHL and subtypes (DLBCL, FL, CLL, T-NHL, MZL and MCL), adjusted for age (continuous), sex and study center

Gene	db SNP ID	no. of nocalls	Heterozygous mutant			MCL			Dominant Model			p-trend	
			OR	95% CI	p-value	OR	95% CI	p-value	OR	95% CI	p-value		
BMF	rs10518679	0	0.68	(0.31, 1.48)	0.33126	0.00	(0.00, -)	0.98455	0.63	(0.29, 1.37)	0.23931	0.18841	
	rs11630670	0	1.16	(0.59, 2.26)	0.66460	0.73	(0.29, 1.85)	0.50248	1.03	(0.54, 1.97)	0.92134	0.61367	
	rs11634257	1	0.99	(0.54, 1.82)	0.98648	0.30	(0.04, 2.27)	0.24399	0.89	(0.49, 1.61)	0.70474	0.42564	
	rs11858141	2	1.16	(0.59, 2.26)	0.66875	1.22	(0.51, 2.90)	0.65128	1.18	(0.62, 2.23)	0.62288	0.62529	
	rs12913170	2	1.11	(0.58, 2.12)	0.75031	0.83	(0.11, 6.36)	0.85508	1.09	(0.58, 2.04)	0.79831	0.72892	
	rs1540686	22	1.58	(0.70, 3.58)	0.26869	2.26	(0.93, 5.48)	0.07059	1.79	(0.82, 3.88)	0.14386	0.06661	
	rs16970325	2	0.77	(0.34, 1.76)	0.53509	-	-	-	0.84	(0.29, 2.40)	0.73815	0.45626	
	rs16970349	0	0.85	(0.30, 2.45)	0.76390	-	-	-	0.84	(0.29, 2.40)	0.73815	0.45626	
	rs3743129	2	1.00	(0.50, 2.02)	0.99225	1.47	(0.67, 3.22)	0.33228	1.14	(0.60, 2.18)	0.68219	0.36104	
	rs3923235	0	1.19	(0.65, 2.17)	0.56655	0.53	(0.12, 2.30)	0.39453	1.08	(0.60, 1.94)	0.78940	0.82925	
	rs5374555	1	1.32	(0.73, 2.40)	0.36358	0.88	(0.20, 3.88)	0.86839	1.27	(0.71, 2.28)	0.42522	0.59001	
	rs546220	5	1.33	(0.67, 2.63)	0.42057	1.42	(0.59, 3.42)	0.43215	1.35	(0.70, 2.60)	0.37059	0.38858	
	rs588739	0	1.19	(0.58, 2.41)	0.63894	1.41	(0.60, 3.28)	0.42969	1.24	(0.63, 2.44)	0.52401	0.42950	
	rs648289	1	1.41	(0.66, 3.02)	0.37030	2.02	(0.87, 4.67)	0.10027	1.59	(0.78, 3.25)	0.20398	0.09847	
	rs652196	3	0.97	(0.52, 1.79)	0.91186	0.37	(0.05, 2.81)	0.33870	0.89	(0.49, 1.62)	0.69819	0.49081	
	rs675173	6	1.26	(0.68, 2.33)	0.45813	0.75	(0.22, 2.59)	0.64688	1.17	(0.65, 2.13)	0.60143	0.91956	
	rs1783977	2	1.11	(0.61, 2.05)	0.72943	0.51	(0.15, 1.75)	0.28157	0.99	(0.55, 1.79)	0.96639	0.52716	
	rs998713	6	1.01	(0.54, 1.87)	0.98358	0.41	(0.12, 1.42)	0.15860	0.88	(0.48, 1.61)	0.67112	0.27379	
	CASP6	rs1541373	1	0.55	(0.29, 1.06)	0.07472	1.27	(0.56, 2.88)	0.56209	0.69	(0.38, 1.24)	0.21178	0.83042
		rs1800627	3	0.82	(0.40, 1.67)	0.58605	0.97	(0.44, 2.16)	0.94158	0.87	(0.45, 1.68)	0.68069	0.94414
		rs3181345	0	1.59	(0.80, 3.15)	0.18279	-	-	-	1.46	(0.74, 2.88)	0.27689	0.45513
		rs3212153	1	0.67	(0.31, 1.47)	0.31644	1.04	(0.13, 8.13)	0.97357	0.70	(0.33, 1.47)	0.34451	0.41519
rs5030552		1	1.26	(0.60, 2.68)	0.54164	-	-	-	1.19	(0.56, 2.52)	0.65388	0.80166	
rs768063		0	1.23	(0.42, 3.55)	0.70739	-	-	-	1.22	(0.42, 3.54)	0.70739	0.71261	
IFNG	rs12306852	0	0.68	(0.32, 1.44)	0.31484	0.94	(0.12, 7.26)	0.95001	0.70	(0.34, 1.43)	0.33098	0.38795	
	rs2069716	0	1.62	(0.78, 3.36)	0.19673	-	-	-	1.57	(0.76, 3.25)	0.22631	0.27797	
	rs2069718	8	0.65	(0.34, 1.21)	0.17454	0.77	(0.30, 1.97)	0.59213	0.67	(0.37, 1.22)	0.18839	0.32506	
	rs2069727	0	1.27	(0.59, 2.72)	0.53709	1.79	(0.78, 4.10)	0.16775	1.44	(0.70, 2.93)	0.32218	0.32218	
	rs6581795	1	1.07	(0.58, 1.99)	0.82160	1.24	(0.41, 3.73)	0.69858	1.10	(0.61, 1.98)	0.75451	0.69547	
	rs12529779	15	1.03	(0.56, 1.90)	0.81630	0.34	(0.05, 2.80)	0.30117	0.93	(0.51, 1.70)	0.82811	0.54573	
	rs1327475	1	1.41	(0.72, 2.79)	0.31917	0.81	(0.30, 2.19)	0.68280	1.25	(0.65, 2.42)	0.50837	0.93119	
	rs1327475	2	0.97	(0.51, 1.84)	0.92301	0.54	(0.07, 4.08)	0.54740	0.92	(0.49, 1.73)	0.79989	0.67268	
	rs1854154	6	0.60	(0.30, 1.20)	0.15015	0.95	(0.44, 2.07)	0.90375	0.71	(0.38, 1.31)	0.27233	0.37119	
	rs3799488	0	0.64	(0.29, 1.40)	0.28470	-	-	-	0.61	(0.28, 1.33)	0.21387	0.18396	
	rs477768	8	0.66	(0.31, 1.39)	0.27561	0.93	(0.12, 7.20)	0.94098	0.68	(0.33, 1.39)	0.29064	0.34625	
rs4896243	4	1.28	(0.63, 2.59)	0.49544	1.06	(0.43, 2.58)	0.89872	1.21	(0.62, 2.39)	0.57377	0.83492		
rs608914	4	2.31	(1.15, 4.67)	0.01928	4.74	(1.96, 11.47)	0.00056	2.70	(1.38, 5.27)	0.00369	0.00040		
rs759040	0	0.79	(0.42, 1.48)	0.46345	0.77	(0.18, 3.37)	0.73265	0.79	(0.43, 1.44)	0.44174	0.46555		
rs9402877	3	0.64	(0.33, 1.25)	0.19074	0.89	(0.40, 1.97)	0.77555	0.71	(0.39, 1.30)	0.27079	0.57775		
IFNGR2	rs1015873	0	0.40	(0.05, 3.02)	0.37692	-	-	-	0.40	(0.05, 3.02)	0.37692	0.37692	
	rs12626735	0	1.78	(0.98, 3.22)	0.05741	0.53	(0.07, 4.02)	0.53580	1.63	(0.91, 2.94)	0.10268	0.29659	
	rs16990664	0	0.39	(0.05, 2.94)	0.36442	-	-	-	0.39	(0.05, 2.94)	0.36442	0.36442	
	rs2012075	45	1.17	(0.59, 2.32)	0.65170	-	-	-	1.09	(0.55, 2.15)	0.81070	0.98180	
	rs2284553	59	1.68	(0.85, 3.31)	0.13691	1.01	(0.37, 2.75)	0.97818	1.50	(0.78, 2.91)	0.22576	0.63711	
	rs2834211	0	1.09	(0.53, 2.25)	0.81525	-	-	-	1.01	(0.49, 2.07)	0.98330	0.83237	
	rs2834214	1	1.65	(0.84, 3.23)	0.14458	0.41	(0.13, 1.28)	0.12276	1.23	(0.64, 2.38)	0.53835	0.31184	
	rs8131980	2	0.81	(0.43, 1.53)	0.52255	1.31	(0.52, 3.32)	0.57086	0.90	(0.50, 1.62)	0.72856	0.93182	
	rs9976971	0	1.23	(0.62, 2.45)	0.55231	0.99	(0.40, 2.46)	0.98155	1.17	(0.60, 2.26)	0.64730	0.92331	
	rs9978166	0	0.43	(0.18, 1.04)	0.06129	-	-	-	0.41	(0.17, 0.97)	0.04326	0.03883	
	IL10	rs1554286	2	0.85	(0.44, 1.65)	0.63599	-	-	-	0.77	(0.40, 1.48)	0.43003	0.27413
rs17015767		0	1.04	(0.56, 1.93)	0.91238	0.96	(0.22, 4.24)	0.95603	1.03	(0.56, 1.88)	0.93089	0.96226	
rs1800871		9	0.91	(0.49, 1.67)	0.75095	-	-	-	0.78	(0.42, 1.44)	0.42620	0.19470	
rs1800872		10	0.90	(0.49, 1.67)	0.74748	-	-	-	0.78	(0.42, 1.44)	0.42596	0.19568	
rs2222202		9	1.49	(0.74, 2.97)	0.28049	0.64	(0.23, 1.75)	0.38179	1.22	(0.62, 2.40)	0.55756	0.56346	
rs3021094		2	0.75	(0.31, 1.82)	0.52880	-	-	-	0.73	(0.30, 1.75)	0.47645	0.43676	
rs3024505		1	0.70	(0.34, 1.45)	0.33944	0.77	(0.10, 5.94)	0.80040	0.71	(0.35, 1.42)	0.33285	0.36460	
rs3024509		0	1.38	(0.62, 3.05)	0.42730	-	-	-	1.34	(0.61, 2.97)	0.46727	0.52765	
rs4390174		7	1.11	(0.58, 2.12)	0.75594	1.31	(0.55, 3.14)	0.54730	1.15	(0.62, 2.13)	0.64790	0.55387	
rs4844553		1	1.17	(0.51, 2.68)	0.71962	-	-	-	1.13	(0.49, 2.61)	0.77039	0.83550	
rs6673928		8	1.03	(0.56, 1.92)	0.91306	0.68	(0.16, 2.98)	0.61186	0.98	(0.54, 1.79)	0.95925	0.80150	
rs6869631		2	0.71	(0.37, 1.38)	0.31349	0.65	(0.15, 2.81)	0.56291	0.70	(0.37, 1.32)	0.27184	0.28782	
rs7548373		22	1.22	(0.53, 2.81)	0.64441	-	-	-	1.18	(0.51, 2.73)	0.69327	0.75835	
IL12A	rs11927521	6	1.18	(0.62, 2.26)	0.61339	1.11	(0.44, 2.78)	0.82161	1.17	(0.63, 2.16)	0.62763	0.72368	
	rs2243115	4	0.99	(0.47, 2.11)	0.98651	-	-	-	0.92	(0.44, 1.95)	0.83368	0.68220	
	rs2243131	3	1.38	(0.75, 2.55)	0.30329	0.71	(0.09, 5.55)	0.74806	1.32	(0.72, 2.41)	0.37028	0.52274	
	rs2243154	0	0.55	(0.21, 1.42)	0.21506	-	-	-	0.52	(0.20, 1.35)	0.18264	0.16723	
	rs4680534	0	1.23	(0.65, 2.32)	0.52849	1.26	(0.51, 3.14)	0.61242	1.24	(0.68, 2.26)	0.49152	0.52087	
	rs485497	1	1.37	(0.65, 2.88)	0.40922	0.94	(0.38, 2.32)	0.88773	1.22	(0.60, 2.51)	0.58274	0.88042	
	rs583911	2	0.94	(0.50, 1.79)	0.86222	0.63	(0.24, 1.63)	0.33716	0.86	(0.46, 1.59)	0.63058	0.38717	
	rs6441282	1	1.48	(0.70, 3.16)	0.30540	1.61	(0.68, 3.80)	0.27736	1.52	(0.74, 3.12)	0.25104	0.27660	
	rs6800657	6	1.58	(0.82, 3.05)	0.17110	-	-	-	1.45	(0.75, 2.78)	0.26813	0.47269	
	rs692890	0	1.55	(0.81, 2.98)	0.18541	1.96	(0.77, 4.99)	0.15985	1.62	(0.87, 3.03)	0.12853	0.10737	
	rs7372767	2	0.91	(0.49, 1.71)	0.77785	0.54	(0.20, 1.49)	0.23470	0.82	(0.45, 1.49)	0.51102	0.28004	
	rs747825	1	1.01	(0.54, 1.89)	0.98538	-	-	-	0.89	(0.48, 1.67)	0.72072	0.44323	
	rs755004	2	0.78	(0.37, 1.65)	0.51239	2.63	(0.57, 12.15)	0.21473	0.89	(0.45, 1.79)	0.75178	0.93250	
	rs9811792	1	0.93	(0.49, 1.75)	0.81943	0.57	(0.22, 1.47)	0.24258	0.82	(0.45, 1.51)	0.53286	0.28518	
	rs9852519	2	1.30	(0.68, 2.45)	0.42521	0.88	(0.34, 2.29)	0.79167	1.19	(0.64, 2.19)	0.58265	0.95029	
	IL12B	rs10052709	3	0.96	(0.49, 1.89)	0.91032	-	-	-	0.91	(0.46, 1.80)	0.79533	0.66887
rs11574790		1	0.95	(0.46, 1.95)	0.89969	-	-	-	0.91				

		rs11567762	1	1.30	(0.69	-2.46)	0.41651	0.76	(0.10	-5.85)	0.79412	1.25	(0.67	-2.32)	0.48725	0.62150
		rs11957503	0	1.41	(0.74	-2.68)	0.29802	0.76	(0.29	2.00)	0.58324	1.21	(0.65	-2.25)	0.53743	0.88359
		rs12516866	0	1.05	(0.54	-2.05)	0.88004	1.64	(0.72	-3.74)	0.23688	1.19	(0.64	-2.20)	0.58899	0.30019
		rs14945655	2	1.05	(0.54	-2.03)	0.87901	1.20	(0.51	-2.79)	0.67859	1.09	(0.59	-2.02)	0.78668	0.69385
		rs3777990	1	1.11	(0.60	-2.06)	0.72876	0.73	(0.24	-2.19)	0.57772	1.03	(0.57	-1.87)	0.91200	0.80650
		rs6891095	0	1.46	(0.75	-2.85)	0.26161	1.33	(0.17	-10.46)	0.78682	1.45	(0.76	-2.78)	0.25806	0.28846
	<b>IL8RB</b>	rs7607437	10	0.79	(0.40	-1.54)	0.48069	0.93	(0.42	-2.06)	0.86094	0.83	(0.45	-1.54)	0.55622	0.79651
	<b>IRF4</b>	rs1033180	1	1.37	(0.64	-2.93)	0.41366	-	-	-	-	1.34	(0.63	-2.86)	0.44854	0.50258
		rs1050975	0	1.11	(0.51	-2.44)	0.79341	-	-	-	-	1.05	(0.48	-2.31)	0.90116	0.97491
		rs11757491	0	1.50	(0.70	-3.20)	0.29278	-	-	-	-	1.44	(0.68	-3.06)	0.34515	0.42944
		rs12211228	1	0.66	(0.31	-1.39)	0.27181	-	-	-	-	0.62	(0.30	-1.31)	0.21931	0.17753
		rs13208928	0	1.44	(0.67	-3.06)	0.34823	-	-	-	-	1.39	(0.65	-2.95)	0.39552	0.37769
		rs1514346	0	1.16	(0.56	-2.39)	0.68343	-	-	-	-	1.11	(0.54	-2.28)	0.78004	0.90454
		rs1877175	0	0.92	(0.49	-1.72)	0.79297	0.44	(0.06	-3.34)	0.42839	0.87	(0.47	-1.59)	0.64318	0.50265
		rs2001508	0	1.31	(0.70	-2.46)	0.39534	0.84	(0.11	-6.46)	0.86524	1.27	(0.69	-2.35)	0.44575	0.55363
		rs3778607	1	2.40	(1.08	-5.34)	0.03193	1.04	(0.38	-2.84)	0.93837	1.90	(0.87	-4.15)	0.10657	0.91766
		rs3800262	0	0.96	(0.50	-1.87)	0.91562	1.26	(0.28	-5.63)	0.76055	1.00	(0.53	-1.87)	0.98958	0.92413
		rs6900384	14	1.12	(0.51	-2.46)	0.77553	-	-	-	-	1.09	(0.49	-2.38)	0.83839	0.91413
		rs6906608	0	0.65	(0.31	-1.37)	0.26199	-	-	-	-	0.62	(0.29	-1.30)	0.20581	0.17103
		rs7788807	0	0.97	(0.52	-1.82)	0.92611	1.65	(0.60	-4.53)	0.32998	1.07	(0.60	-1.93)	0.81974	0.54757
		rs9378805	0	1.31	(0.64	-2.66)	0.45562	0.99	(0.42	-2.35)	0.98168	1.20	(0.61	-2.36)	0.59440	0.97294
		rs9405192	3	2.01	(1.08	-3.76)	0.02766	0.96	(0.27	-3.39)	0.95541	1.82	(0.99	-3.36)	0.05387	0.22912
	<b>JAK1</b>	rs10789166	1	0.98	(0.50	-1.94)	0.95869	2.19	(0.48	-9.92)	0.30822	1.07	(0.56	-2.03)	0.84270	0.63279
		rs2256298	0	0.91	(0.48	-1.72)	0.78098	1.86	(0.72	-4.78)	0.19694	1.05	(0.59	-1.89)	0.86315	0.46988
		rs310211	1	0.68	(0.35	-1.34)	0.26762	2.38	(1.12	-5.06)	0.02392	1.00	(0.55	-1.79)	0.98831	0.15131
	<b>SOCS1</b>	rs7546535	39	0.78	(0.39	-1.55)	0.47849	1.73	(0.50	-6.01)	0.38626	0.88	(0.47	-1.65)	0.68759	0.99916
		rs149311	3	1.18	(0.61	-2.30)	0.61586	0.72	(0.09	-5.48)	0.74902	1.13	(0.59	-2.16)	0.70566	0.83909
		rs149597	2	0.79	(0.41	-1.53)	0.48597	0.71	(0.31	-1.63)	0.41963	0.77	(0.41	-1.41)	0.39455	0.39078
		rs193778	1	1.72	(0.94	-3.14)	0.07598	1.36	(0.30	-6.05)	0.69039	1.69	(0.94	-3.04)	0.08188	0.12644
		rs243317	1	0.83	(0.45	-1.54)	0.54977	0.84	(0.28	-2.48)	0.74807	0.83	(0.46	-1.49)	0.53228	0.57590
		rs408665	28	0.56	(0.28	-1.10)	0.09307	1.06	(0.48	-2.31)	0.89036	0.68	(0.37	-1.26)	0.22126	0.82047
		rs940551	1	0.66	(0.34	-1.27)	0.21275	1.01	(0.45	-2.25)	0.98895	0.74	(0.40	-1.37)	0.33978	0.78148
	<b>SOCS5</b>	rs13402099	3	0.91	(0.42	-2.00)	0.81857	-	-	-	-	0.86	(0.39	-1.88)	0.70791	0.80677
		rs13412085	0	0.94	(0.46	-1.93)	0.86794	-	-	-	-	0.87	(0.43	-1.79)	0.71524	0.57305
	<b>SOCS6</b>	rs17082355	0	1.48	(0.73	-2.99)	0.27904	1.38	(0.18	-10.88)	0.75711	1.47	(0.74	-2.90)	0.27010	0.29794
		rs17809666	1	0.95	(0.36	-2.46)	0.90777	7.39	(0.71	-76.47)	0.09345	1.11	(0.46	-2.68)	0.82499	0.56722
		rs4831398	29	0.89	(0.47	-1.70)	0.72855	1.25	(0.52	-2.99)	0.81416	0.97	(0.53	-1.77)	0.91020	0.77769
	<b>STAT1</b>	rs11043099	10	0.49	(0.26	-0.93)	0.03028	0.35	(0.10	-1.17)	0.08873	0.46	(0.25	-0.84)	0.01203	0.01414
		rs10199181	2	0.52	(0.27	-0.98)	0.04392	0.63	(0.25	-1.07)	0.31859	0.54	(0.30	-0.98)	0.04127	0.10063
		rs11168	3	1.31	(0.63	-2.72)	0.47075	1.22	(0.51	-2.90)	0.65637	1.28	(0.64	-2.58)	0.48916	0.64560
		rs12468579	1	0.84	(0.44	-1.62)	0.60789	0.97	(0.42	-2.24)	0.94809	1.88	(0.48	-1.61)	0.67325	0.85151
		rs12893591	0	0.37	(0.15	-0.96)	0.04105	4.58	(1.20	-17.49)	0.02586	0.57	(0.26	-1.24)	0.15514	0.54666
		rs13029247	2	0.54	(0.29	-1.03)	0.06087	0.44	(0.13	-1.47)	0.18070	0.52	(0.29	-0.95)	0.03455	0.04162
		rs13029532	0	0.79	(0.33	-1.90)	0.59846	-	-	-	-	0.75	(0.31	-1.82)	0.53049	0.47781
		rs13035504	1	0.57	(0.28	-1.17)	0.12496	1.55	(0.35	-6.92)	0.56664	0.64	(0.32	-1.25)	0.18887	0.34419
		rs13395505	0	0.86	(0.46	-1.60)	0.62795	0.67	(0.26	-1.72)	0.40371	0.81	(0.45	-1.47)	0.48349	0.39148
		rs1400657	0	0.97	(0.46	-2.05)	0.94265	-	-	-	-	0.92	(0.44	-1.95)	0.83622	0.72508
		rs1467199	0	0.65	(0.33	-1.29)	0.21739	0.57	(0.13	-2.47)	0.45542	0.64	(0.34	-1.22)	0.17279	0.18658
		rs1547550	20	0.98	(0.53	-1.80)	0.93926	0.67	(0.19	-2.29)	0.51945	0.92	(0.51	-1.67)	0.79676	0.62364
		rs16824035	1	0.55	(0.27	-1.14)	0.10712	1.54	(0.34	-6.87)	0.57344	0.62	(0.32	-1.22)	0.16384	0.30802
		rs17749316	0	0.98	(0.41	-2.37)	0.96413	-	-	-	-	0.91	(0.38	-2.19)	0.82744	0.70457
		rs17817966	0	0.67	(0.36	-1.23)	0.19300	0.22	(0.07	-0.75)	0.01554	0.54	(0.30	-0.97)	0.03831	0.00896
		rs2066795	0	5.45	(1.44	-20.71)	0.01270	-	-	-	-	5.45	(1.44	-20.71)	0.01270	0.01270
		rs2066804	1	0.94	(0.50	-1.75)	0.84041	1.11	(0.25	-4.91)	0.88859	0.95	(0.52	-1.74)	0.87873	0.94129
		rs2280232	1	0.65	(0.34	-1.22)	0.17843	0.85	(0.25	-2.91)	0.80048	0.67	(0.37	-1.23)	0.19684	0.29322
		rs2280233	4	1.33	(0.62	-2.85)	0.45834	1.43	(0.61	-3.35)	0.41498	1.36	(0.66	-2.80)	0.39952	0.42070
		rs2280234	5	1.01	(0.55	-1.86)	0.98148	0.76	(0.25	-2.29)	0.62468	0.96	(0.53	-1.73)	0.89569	0.73215
		rs34997637	3	0.73	(0.38	-1.41)	0.34595	0.63	(0.15	-2.74)	0.53930	0.71	(0.38	-1.34)	0.29289	0.29855
		rs4327257	0	0.64	(0.30	-1.36)	0.24820	2.20	(0.48	-10.08)	0.31031	0.74	(0.37	-1.48)	0.39324	0.65504
		rs4853533	3	0.90	(0.49	-1.65)	0.73045	0.48	(0.14	-1.63)	0.23879	0.81	(0.45	-1.46)	0.48887	0.28987
		rs7562024	0	0.95	(0.51	-1.75)	0.85896	0.70	(0.26	-1.91)	0.48694	0.89	(0.49	-1.60)	0.69324	0.53576
		rs867637	2	1.05	(0.57	-1.92)	0.87794	0.65	(0.19	-2.24)	0.49228	0.98	(0.54	-1.76)	0.94334	0.69486
	<b>STAT3</b>	rs1053005	1	0.74	(0.37	-1.47)	0.38689	3.20	(1.23	-8.31)	0.01669	0.99	(0.44	-1.82)	0.98024	0.32492
		rs1053023	1	0.74	(0.37	-1.47)	0.38689	3.20	(1.23	-8.31)	0.01669	0.99	(0.54	-1.82)	0.98024	0.32492
		rs12949918	1	1.57	(0.76	-3.25)	0.22467	2.10	(0.90	-4.91)	0.08537	1.71	(0.86	-3.41)	0.12836	0.08062
		rs17405722	0	1.18	(0.48	-2.86)	0.71788	4.17	(0.46	-38.13)	0.20635	1.31	(0.57	-3.02)	0.52083	0.37070
		rs2293152	2	0.69	(0.38	-1.26)	0.22845	0.08	(0.01	-0.59)	0.01314	0.51	(0.28	-0.93)	0.02667	0.00287
		rs4103200	0	1.32	(0.69	-2.51)	0.39678	2.36	(0.98	-5.66)	0.05455	1.49	(0.82	-2.73)	0.19162	0.07193
		rs6503695	0	1.56	(0.81	-3.02)	0.18733	1.63	(0.67	-3.98)	0.27909	1.58	(0.84	-2.96)	0.15621	0.19002
		rs9891119	0	1.25	(0.63	-2.49)	0.52920	2.58	(1.15	-5.77)	0.02140	1.53	(0.80	-2.90)	0.19646	0.03348
	<b>STAT4</b>	rs9912773	0	1.40	(0.74	-2.63)	0.30238	2.35	(0.94	-5.83)	0.06647	1.55	(0.85	-2.81)	0.15301	0.06968
		rs10168266	0	0.89	(0.46	-1.72)	0.73486	-	-	-	-	0.76	(0.40	-1.47)	0.41479	0.21908
		rs10189819	1	0.77	(0.40	-1.49)	0.43954	-	-	-	-	0.67	(0.35	-1.30)	0.23688	0.12719
		rs10931481	0	1.16	(0.63	-2.17)	0.63050	1.09	(0.40	-2.95)	0.87171	1.15	(0.64	-2.06)	0.64474	0.72046
		rs11685878	4	1.00	(0.54	-1.87)	0.99883	0.66	(0.24	-1.83)	0.42751	0.92	(0.50	-1.68)	0.78518	0.52913
		rs13020076	56	0.34	(0.10	-1.11)	0.07271	2.96	(0.34	-25.80)	0.32547	0.43	(0.15	-1.23)	0.11681	0.21247
		rs13389408	0	0.80	(0.37	-1.76)	0.58293	-	-	-	-	0.76	(0.35	-1.67)	0.49861	0.43000
		rs1517352	2	0.86	(0.46	-1.59)	0.62594	0.56	(0.21	-1.5						

	rs6790068	0	0.71	(0.37	.1.37)	0.30998	1.29	(0.58	-2.88)	0.52929	0.84	(0.46	-1.53)	0.57425	0.81935
	rs6790258	0	1.49	(0.70	-3.18)	0.30068	-	-	-	-	1.47	(0.69	-3.12)	0.32178	0.35458
	rs9681004	3	0.75	(0.39	-1.45)	0.39631	1.31	(0.58	-2.94)	0.51344	0.88	(0.48	-1.60)	0.66895	0.75598

For Peer Review

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**Supplementary Table 3. Odds Ratios (OR) and 95% Confidence Intervals of all SNPs with HL calculated with unconditional logistic regression adjusted for age (continuous), sex and study center**

Gene symbol	SNP Name	no. of no calls	Heterozygous mutant				HL (unconditional logistic regression)				Dominant Model				
			OR	95% CI		p-value	OR	95% CI		p-value	OR	95% CI		p-value	p-trend
				OR	95% CI			OR	95% CI			OR	95% CI		
BMF	rs10518679	0	0.90	(0.64, 1.26)	0.54116	0.79	(0.21, 2.99)	0.73227	0.89	(0.64, 1.25)	0.51041	0.49535			
	rs11830670	0	0.93	(0.67, 1.31)	0.88288	0.78	(0.51, 1.18)	0.24062	0.88	(0.64, 1.21)	0.44486	0.25514			
	rs11634257	1	1.08	(0.80, 1.47)	0.61528	1.05	(0.58, 1.91)	0.87138	1.08	(0.80, 1.44)	0.61955	0.67329			
	rs11858141	2	1.01	(0.73, 1.40)	0.94956	0.96	(0.62, 1.49)	0.84553	1.00	(0.73, 1.36)	0.98586	0.88038			
	rs12913170	2	0.84	(0.60, 1.18)	0.32480	0.71	(0.25, 2.03)	0.52116	0.83	(0.60, 1.16)	0.27560	0.25738			
	rs1540686	22	0.91	(0.65, 1.28)	0.58069	0.54	(0.34, 0.85)	0.00726	0.79	(0.57, 1.09)	0.15581	0.01036			
	rs16970325	2	1.14	(0.79, 1.63)	0.49222	6.78	(1.41, 32.53)	0.01678	1.21	(0.85, 1.73)	0.28572	0.14004			
	rs16970349	0	1.17	(0.75, 1.82)	0.49514	-	-	-	1.16	(0.75, 1.81)	0.50708	0.52161			
	rs3743129	2	0.86	(0.62, 1.20)	0.37845	0.80	(0.52, 1.23)	0.30931	0.85	(0.62, 1.15)	0.28768	0.27469			
	rs3923235	0	1.11	(0.82, 1.51)	0.50572	1.50	(0.85, 2.65)	0.16618	1.16	(0.87, 1.55)	0.32190	0.19022			
	rs537455	1	0.89	(0.65, 1.21)	0.46122	1.13	(0.63, 2.02)	0.68617	0.92	(0.69, 1.24)	0.59234	0.84299			
	rs546220	5	0.86	(0.62, 1.19)	0.36441	0.61	(0.39, 0.97)	0.03638	0.79	(0.58, 1.08)	0.14123	0.04196			
rs587399	0	0.86	(0.62, 1.19)	0.36070	0.80	(0.52, 1.23)	0.31259	0.94	(0.68, 1.15)	0.28007	0.27481				
rs648289	1	0.97	(0.69, 1.34)	0.83693	0.52	(0.33, 0.83)	0.00579	0.83	(0.61, 1.14)	0.24664	0.01315				
rs652196	3	0.95	(0.70, 1.30)	0.75251	1.01	(0.52, 1.94)	0.97933	0.96	(0.71, 1.29)	0.78081	0.84365				
rs675173	6	1.00	(0.73, 1.36)	0.99305	1.07	(0.63, 1.80)	0.81158	1.01	(0.75, 1.35)	0.94782	0.87088				
rs7183977	2	1.29	(0.95, 1.77)	0.10790	1.43	(0.88, 2.31)	0.14764	1.32	(0.98, 1.77)	0.06903	0.06925				
rs998713	6	1.39	(1.00, 1.93)	0.04896	1.59	(1.01, 2.50)	0.04499	1.43	(1.05, 1.96)	0.02477	0.02351				
CASP6	rs1541373	1	0.97	(0.71, 1.33)	0.86601	0.80	(0.50, 1.26)	0.33357	0.93	(0.69, 1.25)	0.62827	0.39933			
	rs1800627	3	1.30	(0.90, 1.87)	0.16335	1.40	(0.93, 2.12)	0.10497	1.33	(0.95, 1.88)	0.10000	0.10624			
	rs3181345	0	0.69	(0.47, 1.01)	0.05853	1.56	(0.37, 6.50)	0.54399	0.72	(0.49, 1.04)	0.08305	0.13877			
	rs3212153	1	1.04	(0.73, 1.47)	0.83229	0.96	(0.30, 3.04)	0.94786	1.03	(0.74, 1.45)	0.85107	0.88273			
	rs5030552	1	0.84	(0.56, 1.26)	0.39782	1.20	(0.30, 4.85)	0.79503	0.86	(0.58, 1.27)	0.44832	0.53239			
	rs768063	0	0.77	(0.43, 1.38)	0.37813	-	-	-	0.77	(0.43, 1.38)	0.37376	0.37059			
IFNG	rs12308552	0	0.99	(0.71, 1.39)	0.97019	1.42	(0.59, 3.44)	0.43366	1.03	(0.74, 1.42)	0.81613	0.70564			
	rs2069716	0	0.66	(0.41, 1.08)	0.09726	0.89	(0.18, 4.54)	0.89074	0.68	(0.42, 1.08)	0.10293	0.13195			
	rs2089718	8	1.08	(0.78, 1.50)	0.64233	1.80	(1.16, 2.79)	0.00878	1.22	(0.89, 1.66)	0.21008	0.02230			
	rs2069727	0	0.76	(0.55, 1.07)	0.11670	0.60	(0.39, 0.93)	0.02096	0.71	(0.52, 0.98)	0.03767	0.01840			
	rs6581795	1	1.47	(1.08, 2.01)	0.01436	1.91	(1.10, 3.29)	0.02080	1.53	(1.14, 2.06)	0.00499	0.00310			
	rs12529779	15	1.04	(0.77, 1.42)	0.78791	0.95	(0.40, 2.28)	0.91130	1.04	(0.77, 1.40)	0.81833	0.87611			
IFNGR1	rs1327474	1	1.12	(0.80, 1.55)	0.51714	1.07	(0.69, 1.64)	0.76480	1.10	(0.81, 1.51)	0.54084	0.68053			
	rs1327475	2	1.04	(0.75, 1.43)	0.82430	0.87	(0.31, 2.40)	0.78698	1.02	(0.75, 1.40)	0.87853	0.95892			
	rs1854154	6	1.10	(0.78, 1.56)	0.58045	1.00	(0.66, 1.53)	0.99314	1.07	(0.77, 1.49)	0.67942	0.94689			
	rs3799488	0	1.04	(0.74, 1.46)	0.82349	0.26	(0.03, 2.07)	0.20115	0.99	(0.71, 1.39)	0.96930	0.72393			
	rs477768	8	0.75	(0.53, 1.05)	0.09717	1.44	(0.38, 5.44)	0.58857	0.77	(0.55, 1.08)	0.12523	0.18833			
	rs4896243	4	1.14	(0.81, 1.61)	0.45371	1.36	(0.89, 2.07)	0.15141	1.20	(0.87, 1.67)	0.27021	0.15430			
IFNGR2	rs4860914	4	0.78	(0.57, 1.06)	0.11079	1.07	(0.64, 1.76)	0.80398	0.83	(0.62, 1.11)	0.23036	0.50899			
	rs7759040	0	0.96	(0.71, 1.31)	0.80633	0.65	(0.35, 1.23)	0.18648	0.91	(0.66, 1.28)	0.52939	0.30050			
	rs4020377	3	0.99	(0.71, 1.38)	0.95990	1.07	(0.70, 1.63)	0.75478	1.01	(0.74, 1.38)	0.93584	0.79183			
	rs1015873	0	1.81	(0.98, 3.37)	0.05983	-	-	-	1.81	(0.98, 3.37)	0.05983	0.05983			
	rs12626735	0	1.24	(0.91, 1.68)	0.17558	1.24	(0.67, 2.28)	0.49778	1.24	(0.92, 1.66)	0.15726	0.19013			
	rs16990664	0	1.73	(0.95, 3.17)	0.07307	-	-	-	1.73	(0.95, 3.17)	0.07307	0.07307			
IL10	rs2012075	45	0.89	(0.61, 1.29)	0.53749	1.41	(0.46, 4.27)	0.54794	0.92	(0.64, 1.32)	0.65567	0.81954			
	rs2284553	59	0.97	(0.70, 1.34)	0.83821	0.90	(0.58, 1.40)	0.65216	0.95	(0.70, 1.29)	0.74185	0.66002			
	rs2834211	0	0.87	(0.60, 1.26)	0.46766	0.50	(0.10, 2.47)	0.39651	0.85	(0.59, 1.22)	0.37775	0.31207			
	rs2834214	1	1.07	(0.77, 1.50)	0.69119	0.64	(0.42, 0.98)	0.03796	0.91	(0.67, 1.25)	0.56688	0.06282			
	rs8131980	2	1.35	(1.00, 1.84)	0.05288	0.89	(0.51, 1.55)	0.68774	1.26	(0.94, 1.69)	0.12245	0.44224			
	rs9976971	0	0.84	(0.60, 1.17)	0.30156	0.74	(0.48, 1.13)	0.16640	0.81	(0.59, 1.11)	0.18744	0.14888			
	rs9978166	0	0.98	(0.69, 1.40)	0.93223	0.31	(0.07, 1.38)	0.12423	0.92	(0.65, 1.30)	0.62846	0.37055			
	rs1544286	2	1.13	(0.82, 1.54)	0.45606	1.38	(0.67, 2.87)	0.38312	1.15	(0.85, 1.55)	0.33853	0.29461			
	rs17015767	0	1.00	(0.73, 1.38)	0.99344	0.53	(0.22, 1.25)	0.14544	0.94	(0.69, 1.28)	0.68209	0.38253			
	rs1800871	9	1.07	(0.79, 1.45)	0.86957	1.14	(0.62, 2.07)	0.67343	1.08	(0.80, 1.45)	0.61366	0.56882			
	rs1800872	10	1.07	(0.79, 1.45)	0.87813	1.01	(0.55, 1.85)	0.98677	1.06	(0.79, 1.42)	0.70674	0.78410			
	rs2222202	9	0.90	(0.65, 1.25)	0.51858	0.81	(0.53, 1.24)	0.33057	0.87	(0.64, 1.19)	0.38374	0.31735			
rs3021094	2	0.87	(0.58, 1.30)	0.49415	-	-	-	0.82	(0.55, 1.22)	0.32988	0.21159				
rs3024505	1	1.11	(0.79, 1.54)	0.55281	1.12	(0.40, 3.11)	0.83352	1.11	(0.80, 1.53)	0.53920	0.55135				
rs3024509	0	0.75	(0.47, 1.20)	0.23187	-	-	-	0.74	(0.46, 1.18)	0.20141	0.17485				
rs4390174	7	1.12	(0.81, 1.54)	0.49110	0.92	(0.59, 1.43)	0.69935	1.06	(0.79, 1.44)	0.69109	0.91800				
rs4844553	1	0.80	(0.50, 1.27)	0.34357	1.23	(0.11, 13.31)	0.86692	0.81	(0.51, 1.28)	0.36408	0.40097				
rs6673928	8	0.96	(0.70, 1.33)	0.82572	0.52	(0.23, 1.17)	0.11299	0.90	(0.66, 1.23)	0.50085	0.25051				
rs6686931	2	1.17	(0.86, 1.59)	0.31346	0.79	(0.40, 1.57)	0.50033	1.12	(0.83, 1.50)	0.46396	0.79058				
rs7548373	22	0.83	(0.52, 1.32)	0.43377	-	-	-	0.81	(0.51, 1.29)	0.38927	0.19053				
rs11927521	6	1.04	(0.75, 1.43)	0.81079	1.11	(0.71, 1.72)	0.63875	1.06	(0.78, 1.43)	0.72229	0.64379				
rs2243115	4	1.07	(0.75, 1.52)	0.70955	0.18	(0.02, 1.42)	0.10279	0.99	(0.70, 1.41)	0.97530	0.61158				
rs2243131	3	0.80	(0.57, 1.13)	0.20130	1.51	(0.65, 3.50)	0.33645	0.85	(0.62, 1.18)	0.33887	0.16168				
rs2243154	0	1.03	(0.70, 1.52)	0.88217	-	-	-	0.98	(0.67, 1.45)	0.93586	0.73758				
rs4680534	0	0.77	(0.56, 1.06)	0.10651	0.90	(0.57, 1.43)	0.66152	0.80	(0.60, 1.07)	0.13699	0.30164				
rs485497	1	1.00	(0.70, 1.43)	0.99250	1.06	(0.70, 1.59)	0.79326	1.02	(0.73, 1.43)	0.90904	0.79467				
rs583911	2	0.91	(0.65, 1.27)	0.57460	0.98	(0.65, 1.50)	0.93974	0.93	(0.68, 1.27)	0.64990	0.86414				
rs6441282	1	0.67	(0.48, 0.93)	0.01774	0.79	(0.53, 1.19)	0.26387	0.71	(0.52, 0.96)	0.02685	0.15540				
rs6800657	6	0.90	(0.61, 1.32)	0.58529	0.66	(0.14, 3.00)	0.58742	0.88	(0.61, 1.28)	0.51685	0.46974				
rs692890	0	0.73	(0.54, 1.00)	0.05139	0.94	(0.56, 1.57)	0.80726	0.77	(0.57, 1.03)	0.07912	0.22592				
rs7372767	2	0.94	(0.67, 1.30)	0.69609	1.13	(0.75, 1.72)	0.55604	0.99	(0.73, 1.34)	0.94347	0.67308				
rs747825	1	0.78	(0.56, 1.10)	0.15988	1.38	(0.65, 2.92)	0.40065	0.84	(0.61, 1.15)						

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		rs3777090	1	1.23	(0.90	-1.68)	0.19638	1.18	(0.73	-1.91)	0.48808	1.22	(0.91	-1.64)	0.19184	0.27300
		rs6891095	0	0.87	(0.61	-1.24)	0.45426	0.53	(0.14	-1.97)	0.34524	0.85	(0.60	-1.20)	0.35131	0.27670
	ILBRB	rs7607437	10	1.03	(0.73	-1.44)	0.88461	0.89	(0.59	-1.36)	0.59157	0.98	(0.72	-1.35)	0.91844	0.63631
	IRF4	rs1033180	1	1.05	(0.68	-1.62)	0.81807	2.55	(0.25	-26.19)	0.43035	1.07	(0.70	-1.64)	0.74585	0.66979
		rs1050975	0	1.05	(0.70	-1.58)	0.80429	0.67	(0.08	-5.50)	0.70823	1.04	(0.69	-1.54)	0.86218	0.93328
		rs11757491	0	0.72	(0.46	-1.15)	0.16870	2.19	(0.47	-10.23)	0.31910	0.78	(0.50	-1.21)	0.26162	0.42073
		rs12211228	1	0.86	(0.61	-1.21)	0.39151	1.32	(0.47	-3.67)	0.59986	0.89	(0.64	-1.23)	0.48135	0.63694
		rs13208928	0	0.66	(0.41	-1.06)	0.08339	2.47	(0.62	-3.79)	0.19911	0.73	(0.47	-1.14)	0.17158	0.36081
		rs1514346	0	0.94	(0.64	-1.37)	0.73365	0.90	(0.22	-3.63)	0.87839	0.93	(0.64	-1.36)	0.71783	0.71540
		rs1877175	0	0.87	(0.64	-1.19)	0.38841	0.96	(0.48	-1.92)	0.91735	0.88	(0.65	-1.19)	0.41331	0.50464
		rs2001508	0	0.90	(0.64	-1.25)	0.52214	0.62	(0.20	-1.87)	0.39528	0.87	(0.63	-1.21)	0.41523	0.33694
		rs3778607	1	1.03	(0.72	-1.47)	0.86008	1.90	(0.59	-1.38)	0.62661	0.99	(0.71	-1.39)	0.95107	0.63446
		rs3800262	0	1.22	(0.89	-1.68)	0.22376	1.90	(0.90	-4.02)	0.09284	1.28	(0.94	-1.74)	0.11666	0.06327
		rs6900384	14	0.82	(0.54	-1.25)	0.35511	1.67	(0.36	-7.87)	0.51565	0.85	(0.57	-1.28)	0.44185	0.57466
		rs6906608	0	0.86	(0.61	-1.21)	0.38835	1.32	(0.47	-3.66)	0.59927	0.89	(0.64	-1.23)	0.47789	0.63229
		rs7768807	0	1.24	(0.91	-1.69)	0.16929	1.46	(0.83	-2.59)	0.19084	1.27	(0.95	-1.71)	0.10960	0.08979
		rs9378805	0	0.94	(0.67	-1.31)	0.69695	0.61	(0.39	-0.94)	0.02618	0.83	(0.60	-1.15)	0.26209	0.03594
		rs9405192	3	1.19	(0.88	-1.62)	0.26737	0.99	(0.57	-1.75)	0.98139	1.16	(0.86	-1.55)	0.33321	0.53635
	JAK1	rs10789166	1	0.89	(0.64	-1.25)	0.51643	0.25	(0.06	-1.12)	0.06980	0.83	(0.60	-1.16)	0.27580	0.12866
		rs2256298	0	0.86	(0.63	-1.17)	0.33981	1.07	(0.56	-2.08)	0.83713	0.88	(0.66	-1.19)	0.41350	0.58224
		rs310211	1	0.80	(0.59	-1.09)	0.15986	0.79	(0.46	-1.36)	0.39712	0.80	(0.60	-1.07)	0.13708	0.17325
		rs7546535	39	1.16	(0.85	-1.59)	0.35513	0.85	(0.39	-1.84)	0.67209	1.12	(0.83	-1.52)	0.46408	0.67660
	SOCS1	rs149311	3	1.37	(0.99	-1.90)	0.05674	0.81	(0.37	-1.79)	0.60729	1.29	(0.94	-1.76)	0.11327	0.29837
		rs149597	2	1.02	(0.72	-1.43)	0.91410	0.85	(0.57	-1.28)	0.43717	0.96	(0.70	-1.32)	0.79866	0.46659
		rs193778	1	1.00	(0.74	-1.36)	0.98295	0.97	(0.47	-1.99)	0.93662	1.00	(0.74	-1.34)	0.99953	0.97555
		rs243317	1	0.87	(0.64	-1.19)	0.38312	0.64	(0.37	-1.11)	0.11257	0.83	(0.62	-1.11)	0.19880	0.10687
		rs408665	28	1.02	(0.73	-1.43)	0.89516	1.05	(0.68	-1.63)	0.81718	1.03	(0.75	-1.42)	0.85414	0.81721
		rs9940551	1	1.07	(0.77	-1.50)	0.68198	1.14	(0.74	-1.75)	0.55315	1.09	(0.79	-1.50)	0.59644	0.54270
	SOCS5	rs13402099	3	0.95	(0.65	-1.38)	0.77865	0.43	(0.10	-1.92)	0.26785	0.90	(0.63	-1.30)	0.57693	0.41779
		rs13412085	0	0.95	(0.66	-1.36)	0.77681	0.52	(0.15	-1.82)	0.30772	0.91	(0.64	-1.29)	0.58515	0.43444
	SOCS6	rs17082355	0	1.03	(0.72	-1.48)	0.85716	0.54	(0.15	-1.97)	0.35250	0.99	(0.70	-1.41)	0.95468	0.74600
		rs1790966	1	1.03	(0.65	-1.64)	0.89824	2.40	(0.36	-16.17)	0.36911	1.07	(0.68	-1.68)	0.70980	0.64466
		rs4891398	29	1.08	(0.78	-1.49)	0.85439	1.35	(0.87	-2.09)	0.18231	1.14	(0.84	-1.55)	0.40527	0.21502
	STAT1	rs10173099	10	0.92	(0.68	-1.26)	0.61557	0.81	(0.49	-1.35)	0.41603	0.90	(0.67	-1.21)	0.48752	0.39775
		rs10199181	2	1.06	(0.77	-1.45)	0.72531	0.79	(0.49	-1.29)	0.34904	1.00	(0.74	-1.35)	0.98609	0.55512
		rs1168	3	1.29	(0.91	-1.83)	0.15837	1.10	(0.71	-1.70)	0.66802	1.23	(0.88	-1.72)	0.22350	0.58200
		rs12468579	1	1.02	(0.74	-1.41)	0.90049	0.90	(0.58	-1.40)	0.63983	0.99	(0.73	-1.35)	0.94336	0.71383
		rs12693591	0	1.07	(0.78	-1.51)	0.68691	1.01	(0.31	-3.30)	0.98592	1.07	(0.76	-1.50)	0.69578	0.72408
		rs13029247	2	0.92	(0.68	-1.26)	0.61744	0.86	(0.50	-1.48)	0.59052	0.91	(0.68	-1.23)	0.54744	0.51575
		rs13029532	0	1.26	(0.86	-1.86)	0.23619	0.54	(0.11	-2.57)	0.43791	1.20	(0.82	-1.75)	0.34773	0.53422
		rs13035504	1	1.07	(0.77	-1.49)	0.69692	1.01	(0.38	-2.65)	0.98672	1.06	(0.77	-1.47)	0.70957	0.74686
		rs13395505	0	0.94	(0.68	-1.29)	0.69482	0.87	(0.56	-1.35)	0.52912	0.92	(0.68	-1.24)	0.58339	0.51647
		rs1400657	0	0.92	(0.63	-1.34)	0.66177	0.74	(0.20	-2.69)	0.64623	0.91	(0.63	-1.30)	0.59567	0.55167
		rs1467199	0	0.94	(0.69	-1.29)	0.71911	0.47	(0.21	-1.04)	0.06293	0.87	(0.64	-1.18)	0.37191	0.15180
		rs1547550	20	1.22	(0.90	-1.67)	0.20063	0.98	(0.59	-1.63)	0.94033	1.18	(0.87	-1.59)	0.28576	0.57667
		rs16824035	1	1.03	(0.74	-1.44)	0.84528	1.00	(0.38	-2.62)	0.99559	1.03	(0.75	-1.42)	0.85550	0.87778
		rs17749316	0	1.31	(0.87	-1.97)	0.19249	-	-	-	-	1.26	(0.84	-1.89)	0.25682	0.36184
		rs17817966	0	0.99	(0.71	-1.37)	0.95066	0.81	(0.52	-1.24)	0.32802	0.94	(0.69	-1.28)	0.67698	0.38735
		rs2066795	0	0.99	(0.31	-3.23)	0.91099	-	-	-	-	0.99	(0.31	-3.23)	0.91099	0.91099
		rs2066804	1	1.00	(0.74	-1.36)	0.99813	0.57	(0.26	-1.23)	0.14997	0.94	(0.70	-1.27)	0.68634	0.37926
		rs2280232	1	0.98	(0.72	-1.33)	0.90298	1.88	(0.45	-1.69)	0.69215	0.97	(0.72	-1.30)	0.82647	0.74350
		rs2280233	4	1.33	(0.93	-1.90)	0.12087	1.20	(0.78	-1.84)	0.40633	1.29	(0.92	-1.81)	0.14698	0.37831
		rs2280234	5	1.15	(0.84	-1.57)	0.39624	0.79	(0.48	-1.30)	0.35452	1.06	(0.79	-1.44)	0.68454	0.70840
		rs34997637	3	0.93	(0.68	-1.27)	0.65638	0.64	(0.31	-1.33)	0.22926	0.89	(0.66	-1.20)	0.45116	0.29145
		rs4327257	0	1.00	(0.70	-1.42)	0.99665	1.27	(0.44	-3.69)	0.65489	1.02	(0.72	-1.43)	0.91490	0.82646
		rs4853533	3	0.98	(0.72	-1.34)	0.92173	0.69	(0.42	-1.13)	0.14359	0.92	(0.68	-1.23)	0.56337	0.23794
		rs756924	0	1.20	(0.87	-1.68)	0.26431	0.77	(0.49	-1.29)	0.27308	1.08	(0.80	-1.46)	0.61852	0.60537
		rs867637	2	0.99	(0.73	-1.35)	0.96004	0.72	(0.44	-1.20)	0.21196	0.93	(0.70	-1.25)	0.64725	0.33422
	STAT3	rs1053005	1	0.89	(0.65	-1.21)	0.45331	0.54	(0.23	-1.26)	0.15359	0.84	(0.62	-1.15)	0.27683	0.16284
		rs1053023	1	0.89	(0.65	-1.21)	0.45331	0.54	(0.23	-1.26)	0.15359	0.84	(0.62	-1.15)	0.27683	0.16284
		rs12949918	1	0.81	(0.59	-1.11)	0.19498	0.63	(0.41	-0.97)	0.03476	0.75	(0.56	-1.02)	0.06583	0.03030
		rs17405722	0	1.14	(0.75	-1.74)	0.54582	-	-	-	-	1.09	(0.72	-1.67)	0.67647	0.84207
		rs2293152	2	1.00	(0.72	-1.39)	0.98804	-	-	-	-	1.10	(0.72	-1.66)	0.66277	0.70303
		rs4103200	0	0.74	(0.54	-1.00)	0.05031	0.49	(0.27	-0.90)	0.02090	0.69	(0.51	-0.92)	0.01302	0.00568
		rs6503695	0	0.80	(0.59	-1.10)	0.17094	0.57	(0.35	-0.92)	0.02176	0.74	(0.55	-1.00)	0.04696	0.01688
		rs9891119	0	0.81	(0.59	-1.10)	0.17525	0.54	(0.32	-0.88)	0.01475	0.74	(0.55	-1.00)	0.04712	0.01297
		rs9912773	0	0.78	(0.57	-1.06)	0.10859	0.43	(0.21	-0.87)	0.01913	0.72	(0.54	-0.97)	0.03046	0.00941
	STAT4	rs10162666	0	0.94	(0.69	-1.29)	0.71603	0.61	(0.24	-1.55)	0.29671	0.91	(0.67	-1.24)	0.54193	0.39143
		rs10169819	1	0.92	(0.67	-1.26)	0.60235	0.64	(0.32	-1.29)	0.21947	0.87	(0.64	-1.19)	0.38817	0.24901
		rs10931481	0	1.09	(0.81	-1.49)	0.56556	0.73	(0.42	-1.28)	0.27876	0.92	(0.76	-1.37)	0.67391	0.64397
		rs11685878	4	0.83	(0.60	-1.15)	0.27077	0.45	(0.45	-1.08)	0.10828	0.80	(0.58	-1.08)	0.14374	0.00371
		rs13020076	56	0.95	(0.63	-1.44)	0.81878	1.58	(0.28	-8.85)	0.60264	0.97	(0.65	-1.46)	0.89747	0.98739
		rs13389408	0	1.11	(0.77	-1.59)	0.57357	1.55	(0.11	-2.68)	0.45690	1.07	(0.75	-1.53)	0.69630	0.86466
		rs1517352	2	1.09	(0.79	-1.51)	0.60383	1.04	(0.67	-1.60)	0.86211	1.08	(0.79	-1.46)	0.63813	0.77219
		rs16833177	0	1.04	(0.75	-1.43)	0.82158	0.43	(0.16	-1.16)	0					

**Supplementary Table 3. Odds Ratios (OR) and 95% Confidence Intervals of all SNPs with HL calculated with conditional logistic regression (1:1 matching by age, sex and study center)**

Gene symbol	SNP Name	no. of no calls	HL (conditional logistic regression)													
			Heterozygous mutant						Homozygous Mutant						Dominant Model	
			OR	95% CI	p-value	OR	95% CI	p-value	OR	95% CI	p-value	p-trend				
BMF	rs10516679	0	1.02	(0.69, 1.54)	0.91651	3.00	(0.31, 28.84)	0.34139	1.07	(0.71, 1.59)	0.73928	0.63902				
	rs11630670	0	0.84	(0.57, 1.26)	0.40619	0.77	(0.47, 1.25)	0.28609	0.82	(0.56, 1.19)	0.27275	0.26888				
	rs11634257	1	0.92	(0.63, 1.34)	0.65427	1.15	(0.57, 2.34)	0.69152	0.95	(0.66, 1.37)	0.78153	1.00000				
	rs11858141	2	0.92	(0.62, 1.36)	0.67379	0.89	(0.52, 1.53)	0.68284	0.91	(0.63, 1.33)	0.63520	0.64234				
	rs12913170	2	0.92	(0.62, 1.37)	0.68255	0.98	(0.28, 3.41)	0.97893	0.92	(0.63, 1.36)	0.69214	0.72735				
	rs1540686	22	0.89	(0.56, 1.41)	0.61022	0.44	(0.25, 0.76)	0.00353	0.71	(0.46, 1.10)	0.12842	0.00367				
	rs16970325	2	1.54	(0.95, 2.47)	0.07730	-	-	-	1.64	(1.03, 2.63)	0.03835	0.02321				
	rs16970349	0	1.47	(0.82, 2.64)	0.19203	-	-	-	1.47	(0.82, 2.64)	0.19203	0.19203				
	rs3743129	2	1.02	(0.69, 1.49)	0.93005	0.91	(0.55, 1.49)	0.70221	0.98	(0.69, 1.40)	0.92757	0.76051				
	rs3923235	0	1.17	(0.79, 1.72)	0.42974	1.05	(0.53, 2.09)	0.88476	1.15	(0.80, 1.64)	0.46180	0.56992				
	rs537455	1	0.97	(0.67, 1.40)	0.86986	0.88	(0.44, 1.75)	0.71223	0.95	(0.68, 1.35)	0.79169	0.72699				
	rs546220	5	0.74	(0.48, 1.15)	0.18652	0.45	(0.25, 0.80)	0.00666	0.65	(0.43, 1.00)	0.04805	0.00754				
	rs588739	0	0.71	(0.47, 1.08)	0.11096	0.62	(0.37, 1.03)	0.06694	0.68	(0.46, 1.01)	0.05351	0.05285				
	rs648289	1	0.92	(0.60, 1.41)	0.69664	0.43	(0.24, 0.75)	0.00312	0.76	(0.51, 1.14)	0.18366	0.00545				
	rs652196	3	1.17	(0.79, 1.74)	0.42551	1.41	(0.59, 3.37)	0.44469	1.20	(0.82, 1.75)	0.34102	0.30366				
	rs675173	6	1.07	(0.73, 1.55)	0.73507	1.20	(0.63, 2.28)	0.58384	1.09	(0.76, 1.56)	0.64680	0.57183				
	rs7183977	2	1.34	(0.93, 1.94)	0.12023	1.34	(0.73, 2.44)	0.34364	1.34	(0.94, 1.91)	0.10724	0.15351				
rs998713	6	1.57	(1.06, 2.34)	0.02441	1.55	(0.89, 2.69)	0.12389	1.57	(1.07, 2.29)	0.01970	0.04749					
rs1541373	1	1.31	(0.89, 1.93)	0.17704	0.64	(0.37, 1.11)	0.13119	1.09	(0.76, 1.56)	0.64680	0.40679					
rs1800627	3	1.68	(1.09, 2.57)	0.01798	1.95	(1.16, 3.26)	0.01122	1.75	(1.16, 2.64)	0.00739	0.01017					
rs3181345	0	0.57	(0.36, 0.91)	0.01798	0.87	(0.12, 6.29)	0.89043	0.58	(0.37, 0.92)	0.01961	0.02801					
rs3212153	1	1.19	(0.78, 1.82)	0.42282	1.44	(0.32, 6.50)	0.63772	1.20	(0.79, 1.83)	0.39442	0.37608					
rs5030552	1	0.66	(0.42, 1.05)	0.08089	0.61	(0.10, 3.70)	0.59314	0.66	(0.42, 1.04)	0.07208	0.07734					
rs768063	0	0.73	(0.38, 1.38)	0.33243	-	-	-	0.73	(0.38, 1.38)	0.33243	0.33243					
rs12306852	0	1.08	(0.73, 1.59)	0.70188	1.68	(0.53, 5.26)	0.37542	1.10	(0.75, 1.62)	0.62239	0.47647					
rs2069716	0	0.67	(0.39, 1.14)	0.14072	1.00	(0.14, 7.10)	1.00000	0.69	(0.41, 1.15)	0.15456	0.19472					
rs2069718	8	1.05	(0.71, 1.57)	0.79508	1.53	(0.89, 2.62)	0.12443	1.16	(0.80, 1.68)	0.44600	0.17031					
rs2069727	0	0.75	(0.50, 1.13)	0.17372	0.61	(0.36, 1.05)	0.07405	0.72	(0.48, 1.06)	0.09545	0.06411					
rs6581795	1	1.33	(0.91, 1.94)	0.13741	1.67	(0.85, 3.26)	0.13425	1.38	(0.96, 1.99)	0.08288	0.06499					
rs12529779	15	0.79	(0.53, 1.17)	0.23378	2.08	(0.53, 8.15)	0.29479	0.82	(0.56, 1.21)	0.32755	0.59023					
rs1327474	1	0.89	(0.60, 1.30)	0.53427	0.95	(0.56, 1.61)	0.84575	0.90	(0.62, 1.30)	0.57093	0.74222					
rs1327475	2	0.83	(0.57, 1.22)	0.34472	2.31	(0.44, 12.03)	0.31865	0.86	(0.59, 1.26)	0.44184	0.65223					
rs1854154	6	1.05	(0.69, 1.59)	0.83557	1.11	(0.66, 1.86)	0.69202	1.06	(0.71, 1.58)	0.76070	0.69372					
rs3799488	0	1.08	(0.71, 1.63)	0.71938	0.25	(0.03, 2.27)	0.22032	1.02	(0.68, 1.53)	0.91741	0.84599					
rs477769	8	0.78	(0.52, 1.16)	0.22149	0.96	(0.19, 4.77)	0.95929	0.79	(0.53, 1.17)	0.20771	0.26652					
rs4896243	4	1.03	(0.68, 1.55)	0.90690	1.19	(0.70, 2.03)	0.51952	1.06	(0.71, 1.59)	0.76070	0.54517					
rs680914	4	0.75	(0.51, 1.09)	0.13233	1.00	(0.55, 1.82)	0.98859	0.80	(0.56, 1.14)	0.20964	0.46379					
rs7759040	0	0.98	(0.67, 1.43)	0.91189	0.61	(0.28, 1.31)	0.20086	0.92	(0.64, 1.32)	0.64114	0.36649					
rs9402877	3	0.99	(0.67, 1.46)	0.95119	1.16	(0.71, 1.90)	0.56097	1.04	(0.72, 1.49)	0.85269	0.62127					
rs1015873	0	1.70	(0.78, 3.71)	0.18303	-	-	-	1.70	(0.78, 3.71)	0.18303	0.18303					
rs12626735	0	1.35	(0.88, 2.07)	0.16492	1.08	(0.53, 2.18)	0.83413	1.28	(0.87, 1.89)	0.20573	0.34020					
rs16990664	0	1.64	(0.77, 3.46)	0.19816	-	-	-	1.64	(0.77, 3.46)	0.19816	0.19816					
rs2012075	45	0.80	(0.51, 1.25)	0.32873	2.42	(0.47, 12.52)	0.29044	0.86	(0.56, 1.33)	0.50797	0.76537					
rs2284553	59	1.05	(0.71, 1.56)	0.80145	0.81	(0.47, 1.37)	0.42842	0.98	(0.68, 1.42)	0.92505	0.59504					
rs2834211	0	0.93	(0.59, 1.47)	0.75755	0.48	(0.04, 5.36)	0.54841	0.92	(0.59, 1.45)	0.72910	0.65488					
rs2834214	1	1.20	(0.78, 1.83)	0.40277	0.78	(0.47, 1.27)	0.31487	1.02	(0.70, 1.49)	0.92299	0.46062					
rs8131980	2	1.23	(0.83, 1.81)	0.29617	0.71	(0.38, 1.32)	0.27571	1.09	(0.76, 1.55)	0.64953	0.78649					
rs9976971	0	1.03	(0.69, 1.53)	0.88966	0.73	(0.43, 1.24)	0.24813	0.95	(0.65, 1.38)	0.77387	0.33065					
rs9978166	0	0.97	(0.64, 1.47)	0.87944	0.40	(0.08, 2.05)	0.27135	0.92	(0.61, 1.38)	0.68001	0.51066					
rs1554286	2	1.29	(0.89, 1.88)	0.17612	1.20	(0.50, 2.85)	0.68145	1.28	(0.90, 1.84)	0.17379	0.22112					
rs17016767	0	1.13	(0.77, 1.65)	0.54799	0.57	(0.22, 1.45)	0.23493	1.05	(0.73, 1.53)	0.67920	0.89650					
rs1800971	9	1.21	(0.83, 1.75)	0.32048	1.18	(0.57, 2.44)	0.68384	1.20	(0.84, 1.73)	0.31397	0.37180					
rs1800972	10	1.20	(0.82, 1.73)	0.34531	1.00	(0.53, 2.24)	0.80700	1.18	(0.83, 1.69)	0.36187	0.46145					
rs2222202	9	0.86	(0.57, 1.30)	0.48245	1.07	(0.45, 1.31)	0.33548	0.84	(0.57, 1.24)	0.37114	0.31819					
rs3021094	2	0.91	(0.56, 1.48)	0.70991	-	-	-	0.86	(0.53, 1.29)	0.54168	0.41357					
rs3024505	1	0.86	(0.57, 1.29)	0.46446	2.40	(0.46, 12.41)	0.29732	0.90	(0.61, 1.34)	0.61545	0.85269					
rs3024509	0	0.61	(0.33, 1.11)	0.10461	-	-	-	0.61	(0.33, 1.11)	0.10461	0.10461					
rs4390174	7	0.96	(0.64, 1.44)	0.84408	0.72	(0.41, 1.28)	0.26797	0.91	(0.61, 1.34)	0.61897	0.32784					
rs4844553	1	0.65	(0.36, 1.17)	0.14985	0.81	(0.05, 13.32)	0.88121	0.66	(0.37, 1.17)	0.15195	0.16876					
rs6673928	8	1.03	(0.71, 1.51)	0.87559	0.62	(0.25, 1.53)	0.30433	0.98	(0.68, 1.42)	0.92505	0.63111					
rs6686931	2	1.24	(0.85, 1.80)	0.26336	0.70	(0.30, 1.65)	0.42089	1.16	(0.81, 1.67)	0.40980	0.75766					
rs7548373	22	0.66	(0.37, 1.17)	0.15195	-	-	-	0.66	(0.37, 1.17)	0.15195	0.15195					
rs11927521	6	1.18	(0.79, 1.75)	0.42518	1.03	(0.59, 1.77)	0.92306	1.14	(0.78, 1.66)	0.50285	0.73893					
rs2243115	4	1.01	(0.65, 1.58)	0.94864	0.17	(0.02, 1.40)	0.09851	0.93	(0.60, 1.43)	0.74199	0.42450					
rs2243131	3	0.90	(0.60, 1.35)	0.60765	0.96	(0.36, 2.59)	0.93762	0.91	(0.61, 1.34)	0.61897	0.66938					
rs2243154	0	1.29	(0.78, 2.11)	0.31858	0.00	(0.00, 0.00)	0.98569	1.24	(0.76, 2.02)	0.38619	0.46754					
rs4860534	0	0.76	(0.51, 1.12)	0.16082	1.06	(0.58, 1.94)	0.84359	0.82	(0.57, 1.17)	0.27413	0.58984					
rs485497	1	1.12	(0.73, 1.73)	0.5987	0.96	(0.59, 1.59)	0.87249	1.07	(0.71, 1.62)	0.75320	0.67650					
rs583911	2	1.10	(0.73, 1.64)	0.65395	0.96	(0.57, 1.61)	0.87116	1.06	(0.72, 1.55)	0.75973	0.94821					
rs6441282	1	0.64	(0.42, 0.99)	0.04319	0.83	(0.50, 1.39)	0.47935	0.70	(0.47, 1.04)	0.07625	0.30662					
rs6800657	6	0.92	(0.57, 1.48)	0.72745	0.39	(0.08, 2.02)	0.26256	0.87	(0.54, 1.38)	0.55325	0.39486					
rs692890	0	0.80	(0.55, 1.16)	0.23925	0.93	(0.48, 1.81)	0.83721	0.82	(0.57, 1.17)	0.27413	0.43137					
rs7372767	2	1.10	(0.73, 1.65)	0.63982	1.14	(0.69, 1.86)	0.61281	1.11	(0.77, 1.61)	0.57093	0.58055					
rs747825	1	0.88	(0.60, 1.29)	0.51255	1.06	(0.43, 2.64)	0.90134	0.90	(0.62, 1.30)	0.56746	0.68615					
rs755004	2	0.96	(0.62, 1.48)	0.85307	1.23	(0.33, 4.63)	0.75631	0.98	(0.64, 1.49)	0.91363	1.00000					
rs9811792	1	1.05	(0.70, 1.57)	0.80640	1.25	(0.77, 2.04)	0.36964	1.11	(0.77, 1.61)	0.57093	0.39302					
rs9825519	2	0.99	(0.68, 1.44)	0.96116	0.86	(0.48, 1.53)	0.60535	0.97	(0.67, 1.39)	0.85393	0.68178					
rs10052709	3	0.99	(0.64, 1.53)	0.97595	0.57	(0.17, 1.95)	0.37167	0.94	(0.62, 1.41)	0.75320	0.58728					
rs11574790	1	0.94	(0.60, 1.49)	0.80310	0.74	(0.17, 3.33)	0.69863	0.93	(0.60, 1.44)	0.73578	0.68631					
rs1368439	1	0.96	(0.67, 1.39)	0.83530	1.54	(0.59, 4.04)	0.37550	1.00	(0.70, 1.43)	1.00000	0.75036					
rs1433048	1	0.93	(0.65, 1.33)	0.68385	1.53	(0.59, 3.98)	0.38663	0.97	(0.68, 1.37)	0.85859	0.87665					
rs2546890	0	0.83	(0.54, 1.27)	0.39137	0.69	(0.42, 1.14)	0.14721	0.78	(0.52, 1.17)	0.22661	0.14642					
rs2546893	0	1.06	(0.70, 1.61)	0.77791	1.49	(0.90, 2.47)	0.12008	1.17	(0.79, 1.74)	0.42421	0.13049					
rs2569253	19	0.94	(0.62, 1.43)	0.77752	1.23	(0.75, 2.01)	0.41422	1.02	(0.69, 1.51)	0.91995	0.41789					
rs2836394	0	1.17	(0.75, 1.81)	0.48769												

	rs3777090	1	1.12	(0.78, 1.62)	0.53765	1.11	(0.62, 1.99)	0.71787	1.12	(0.79, 1.60)	0.52815	0.58812
	rs6891095	0	0.89	(0.59, 1.34)	0.58260	0.73	(0.16, 3.26)	0.67572	0.88	(0.59, 1.32)	0.54056	0.51063
	rs7607437	10	1.09	(0.71, 1.68)	0.68286	0.79	(0.48, 1.31)	0.36376	0.98	(0.65, 1.46)	0.91828	0.37845
	rs1033180	1	1.24	(0.72, 2.12)	0.43975	0.54	(0.05, 5.96)	0.61164	1.20	(0.71, 2.04)	0.50078	0.61180
	rs1050975	0	0.96	(0.60, 1.54)	0.87392	0.49	(0.04, 5.47)	0.56527	0.95	(0.60, 1.50)	0.81369	0.73580
	rs11757491	0	0.81	(0.45, 1.44)	0.46665	0.67	(0.11, 3.99)	0.65692	0.79	(0.46, 1.37)	0.40643	0.39408
	rs12211228	1	0.89	(0.59, 1.36)	0.59212	1.33	(0.30, 5.96)	0.70642	0.92	(0.61, 1.38)	0.68001	0.77971
	rs13208928	0	0.78	(0.44, 1.38)	0.38772	1.00	(0.20, 4.95)	1.00000	0.80	(0.47, 1.37)	0.41518	0.44052
	rs1514346	0	0.05	(0.65, 1.69)	0.83954	0.50	(0.09, 2.76)	0.42947	1.00	(0.63, 1.59)	1.00000	0.83119
	rs1877175	0	0.91	(0.62, 1.34)	0.64736	0.79	(0.33, 1.93)	0.61001	0.90	(0.62, 1.30)	0.57433	0.52743
	rs2001508	0	1.01	(0.67, 1.51)	0.96216	0.30	(0.08, 1.09)	0.06765	0.89	(0.61, 1.31)	0.56026	0.27832
	rs3778607	1	1.14	(0.74, 1.76)	0.53855	0.92	(0.56, 1.52)	0.74469	1.07	(0.71, 1.60)	0.75578	0.74944
	rs3800262	0	1.26	(0.85, 1.87)	0.24514	2.27	(0.76, 6.80)	0.14288	1.31	(0.89, 1.93)	0.17112	0.10134
	rs6900384	14	0.90	(0.54, 1.51)	0.69624	1.00	(0.14, 7.10)	1.00000	0.91	(0.55, 1.49)	0.70556	0.72915
	rs6906608	0	0.89	(0.59, 1.36)	0.59212	1.33	(0.30, 5.96)	0.70642	0.92	(0.61, 1.38)	0.68001	0.77971
	rs7768807	0	1.29	(0.87, 1.92)	0.20444	1.68	(0.77, 3.63)	0.19067	1.32	(0.89, 1.95)	0.16703	0.12123
	rs9378805	0	0.95	(0.62, 1.46)	0.82144	0.60	(0.35, 1.03)	0.06337	0.84	(0.56, 1.27)	0.40986	0.08129
	rs9405192	3	1.19	(0.82, 1.72)	0.35778	1.00	(0.51, 1.96)	0.99892	1.16	(0.81, 1.67)	0.40980	0.60889
	rs10789166	1	0.90	(0.59, 1.38)	0.62850	0.39	(0.08, 2.03)	0.26588	0.85	(0.56, 1.30)	0.45855	0.33707
	rs2256298	0	0.78	(0.55, 1.11)	0.17290	1.08	(0.48, 2.44)	0.85599	0.81	(0.58, 1.14)	0.22735	0.38210
	rs310211	1	0.80	(0.56, 1.14)	0.21619	0.67	(0.35, 1.28)	0.22571	0.77	(0.55, 1.09)	0.14155	0.12169
	rs7546535	39	0.96	(0.65, 1.41)	0.83004	0.66	(0.27, 1.62)	0.36368	0.92	(0.64, 1.32)	0.64114	0.48130
	rs149311	3	1.17	(0.80, 1.73)	0.41608	0.57	(0.24, 1.36)	0.20238	1.07	(0.74, 1.56)	0.70552	0.81425
	rs149597	2	0.96	(0.63, 1.45)	0.83099	0.77	(0.47, 1.26)	0.30611	0.89	(0.61, 1.31)	0.55652	0.32370
	rs193779	1	1.07	(0.74, 1.54)	0.73595	0.93	(0.39, 2.23)	0.87934	1.05	(0.73, 1.51)	0.78333	0.67690
	rs243317	1	0.95	(0.65, 1.39)	0.80948	0.70	(0.35, 1.38)	0.30589	0.90	(0.63, 1.29)	0.58404	0.39443
	rs408665	28	1.38	(0.92, 2.08)	0.12074	0.98	(0.58, 1.65)	0.93403	1.26	(0.86, 1.84)	0.24482	0.79544
	rs9940551	1	1.38	(0.92, 2.06)	0.21179	1.05	(0.63, 1.73)	0.85269	1.27	(0.87, 1.84)	0.21830	0.61722
	rs13402099	3	0.94	(0.61, 1.46)	0.79389	0.50	(0.09, 2.71)	0.41742	0.91	(0.59, 1.39)	0.66264	0.54889
	rs13412085	0	0.98	(0.64, 1.50)	0.94248	0.50	(0.12, 2.00)	0.32567	0.94	(0.62, 1.41)	0.75320	0.57446
	rs17082355	0	1.08	(0.69, 1.67)	0.73658	1.04	(0.21, 5.22)	0.96347	1.08	(0.70, 1.67)	0.73894	0.75579
	rs17809666	1	1.00	(0.56, 1.78)	1.00000	-	-	-	1.09	(0.62, 1.91)	0.77289	0.58671
	rs4891398	29	1.24	(0.81, 1.87)	0.32016	2.03	(1.12, 3.68)	0.01901	1.41	(0.96, 2.07)	0.08190	0.02271
	rs10173099	10	0.99	(0.68, 1.44)	0.96963	0.94	(0.48, 1.86)	0.86246	0.98	(0.69, 1.40)	0.92816	0.88754
	rs10199181	2	1.14	(0.77, 1.68)	0.51676	0.85	(0.46, 1.58)	0.61058	1.07	(0.74, 1.55)	0.70799	0.94432
	rs11168	3	1.16	(0.74, 1.82)	0.52159	1.06	(0.62, 1.80)	0.82987	1.13	(0.73, 1.74)	0.58336	0.83936
	rs12468579	1	1.03	(0.70, 1.53)	0.87114	1.13	(0.65, 1.96)	0.67250	1.05	(0.73, 1.53)	0.77780	0.68899
	rs12693591	0	1.48	(0.94, 2.33)	0.09215	0.79	(0.18, 3.55)	0.76055	1.41	(0.91, 2.19)	0.12395	0.19794
	rs13029247	2	0.97	(0.66, 1.42)	0.87293	1.21	(0.57, 2.57)	0.61313	1.00	(0.69, 1.44)	1.00000	0.82161
	rs13029532	0	1.14	(0.73, 1.80)	0.56399	0.67	(0.11, 3.99)	0.65692	1.11	(0.71, 1.71)	0.65486	0.75830
	rs13035504	1	1.55	(1.00, 2.41)	0.04996	1.25	(0.39, 3.97)	0.70966	1.53	(0.99, 2.36)	0.05405	0.08845
	rs13395505	0	0.97	(0.67, 1.42)	0.88329	1.10	(0.62, 1.95)	0.73235	0.98	(0.70, 1.43)	1.00000	0.84296
	rs1400667	0	0.79	(0.51, 1.21)	0.27447	0.92	(0.18, 4.61)	0.92210	0.79	(0.52, 1.11)	0.28198	0.31860
	rs1467199	0	0.90	(0.62, 1.32)	0.60149	0.54	(0.18, 1.61)	0.26708	0.87	(0.60, 1.26)	0.45407	0.32160
	rs1547550	20	1.18	(0.81, 1.73)	0.38570	0.91	(0.50, 1.68)	0.77091	1.12	(0.78, 1.61)	0.52132	0.83639
	rs16824035	1	1.56	(1.00, 2.44)	0.04852	1.20	(0.38, 3.82)	0.75221	1.53	(0.99, 2.36)	0.05405	0.09139
	rs17749316	0	1.16	(0.72, 1.88)	0.54168	0.00	(0.00, 0.00)	0.98585	1.16	(0.72, 1.88)	0.54168	0.62782
	rs17817966	0	1.00	(0.68, 1.48)	1.00000	0.94	(0.55, 1.59)	0.81634	0.98	(0.68, 1.41)	0.92634	0.84802
	rs2066795	0	0.75	(0.17, 3.35)	0.70642	-	-	-	0.75	(0.17, 3.35)	0.70642	0.70642
	rs2066804	1	0.95	(0.66, 1.38)	0.80313	0.49	(0.20, 1.23)	0.12911	0.89	(0.63, 1.27)	0.52815	0.28398
	rs2280232	1	1.02	(0.71, 1.48)	0.89875	0.93	(0.40, 2.19)	0.86978	1.02	(0.71, 1.47)	0.92571	1.00000
	rs2280233	4	1.24	(0.79, 1.95)	0.34601	1.15	(0.67, 1.97)	0.61351	1.22	(0.79, 1.88)	0.37775	0.63163
	rs2280234	5	1.09	(0.74, 1.60)	0.65838	0.68	(0.38, 1.23)	0.20341	1.00	(0.69, 1.45)	1.00000	0.40819
	rs34997637	3	0.94	(0.64, 1.38)	0.76617	0.53	(0.19, 1.46)	0.22024	0.90	(0.62, 1.30)	0.57093	0.36829
	rs4327257	0	1.48	(0.93, 2.35)	0.09530	1.56	(0.41, 5.99)	0.51888	1.48	(0.94, 2.34)	0.08944	0.10136
	rs4853533	3	0.91	(0.63, 1.31)	0.61142	0.60	(0.34, 1.08)	0.09025	0.84	(0.59, 1.19)	0.32963	0.13167
	rs7562024	0	1.08	(0.74, 1.60)	0.68122	0.69	(0.40, 1.20)	0.19201	0.98	(0.68, 1.42)	0.92505	0.35243
	rs867637	2	0.90	(0.62, 1.30)	0.57298	0.62	(0.34, 1.11)	0.10935	0.84	(0.59, 1.19)	0.32963	0.14490
	rs1053005	1	0.90	(0.61, 1.33)	0.58876	0.67	(0.25, 1.78)	0.41659	0.88	(0.60, 1.28)	0.49485	0.39874
	rs1053023	1	0.90	(0.61, 1.33)	0.58876	0.67	(0.25, 1.78)	0.41659	0.88	(0.60, 1.28)	0.49485	0.39874
	rs12949918	1	0.93	(0.64, 1.36)	0.70159	0.64	(0.39, 1.07)	0.09114	0.85	(0.59, 1.21)	0.36187	0.12173
	rs17405722	0	1.03	(0.64, 1.66)	0.90277	-	-	-	1.00	(0.62, 1.61)	1.00000	0.90553
	rs2293152	2	1.05	(0.70, 1.56)	0.82136	0.91	(0.56, 1.47)	0.69956	1.00	(0.69, 1.44)	1.00000	0.76137
	rs4103200	0	0.77	(0.54, 1.11)	0.16233	0.46	(0.22, 0.97)	0.04214	0.73	(0.51, 1.00)	0.08796	0.03340
	rs6503695	0	0.88	(0.61, 1.27)	0.49780	0.61	(0.35, 1.08)	0.08916	0.81	(0.57, 1.16)	0.24951	0.10883
	rs9891119	0	0.88	(0.61, 1.26)	0.48168	0.51	(0.28, 0.94)	0.03212	0.81	(0.57, 1.15)	0.24579	0.05820
	rs9912773	0	0.74	(0.51, 1.06)	0.10068	0.41	(0.18, 0.94)	0.03588	0.71	(0.49, 1.01)	0.06954	0.02176
	rs10168266	0	0.88	(0.59, 1.30)	0.51428	0.32	(0.08, 1.18)	0.08611	0.82	(0.56, 1.21)	0.32755	0.16227
	rs10189819	1	0.81	(0.56, 1.19)	0.28373	0.59	(0.24, 1.42)	0.23633	0.78	(0.54, 1.12)	0.17379	0.13125
	rs10931481	0	1.03	(0.70, 1.53)	0.87549	0.59	(0.30, 1.15)	0.12303	0.95	(0.65, 1.38)	0.77183	0.30040
	rs11688878	4	0.64	(0.44, 0.95)	0.02482	0.55	(0.32, 0.95)	0.03069	0.62	(0.43, 0.90)	0.01134	0.01290
	rs13020076	56	1.53	(0.86, 2.72)	0.15195	2.00	(0.18, 22.06)	0.57143	1.55	(0.88, 2.72)	0.12650	0.12533
	rs13389408	0	1.00	(0.65, 1.53)	1.00000	0.33	(0.03, 3.24)	0.34354	0.98	(0.64, 1.49)	0.91363	0.75579
	rs1517352	2	1.22	(0.80, 1.87)	0.36412	1.01	(0.59, 1.74)	0.95997	1.15	(0.78, 1.71)	0.48209	0.78930
	rs16833177	0	1.00	(0.67, 1.48)	0.99272	0.57	(0.17, 1.97)	0.37459	0.96	(0.66, 1.41)	0.84453	0.65991
	rs16833239	1	0.95	(0.60, 1.50)	0.81369	-	-	-	0.90	(0.57, 1.42)	0.64210	0.50286
	rs16833437	1	0.74	(0.50, 1.10)	0.13584	0.69	(0.40, 1.21)	0.19888	0.73	(0.51, 1.06)	0.09602	0.11358
	rs17769459	0	1.30	(0.76, 2.25)	0.33771	-	-	-	1.25	(0.73, 2.14)	0.41518	0.50846
	rs2459611	0	1.64	(1.02, 2.65)	0.04298	1.66	(0.27, 10.06)	0.58060	1.64	(1.03, 2.63)	0.03835	0.04421
	rs3024861	1	0.98	(0.67, 1.43)	0.91545	0.57	(0.27, 1.17)	0.12672	0.90	(0.63, 1.30)	0.57764	0.27124
	rs3024877	0	1.24	(0.85, 1.81)	0.26219	1.36	(0.66, 2.79)	0.40321	1.25	(0.87, 1.81)	0.22641	0.22905
	rs3024908	0	0.98	(0.64, 1.49)	0.91462	0.50	(0.13, 2.00)	0.32696	0.92	(0.62, 1.37)	0.68318	0.52835
	rs3024912	1	0.90	(0.62, 1.31)	0.58847	0.48	(0.14, 1.61)	0.23317	0.87	(0.60, 1.26)	0.46407	0.31144
	rs3024921	0	1.42	(0.79, 2.								

BNHL

Supplementary Table 4. Odds Ratios and 95% Confidence Intervals for estimated Haplotypes for BNHL and subtypes (adjusted for age (continuous), se

Gene	Block	Haplotype	Frequency	hapname	BNHL		
					OR	95% CI	p-value
BMF	Block 1	rs3923235-rs16970325					
		A_G	0.624	H1	1.00		
		g_G	0.268	H2	0.88	(0.76 ,1.02)	0.0845
		A_a	0.109	H3	1.14	(0.91 ,1.43)	0.2441
		HRare	0.000	HRare	-	-	-
BMF	Block 2	rs12913170-rs7183977-rs998713-rs546220					
		G_A_A_a	0.418	H1	1.00		
		G_g_g_C	0.331	H2	0.94	(0.82 ,1.08)	0.3881
		a_A_A_C	0.151	H3	1.03	(0.87 ,1.23)	0.7026
		G_A_g_C	0.060	H4	1.26	(0.97 ,1.63)	0.0858
		HRare	0.040	HRare	0.96	(0.70 ,1.32)	0.8139
BMF	Block 3	rs648289-rs10518679					
		g_A	0.450	H1	1.00		
		A_A	0.417	H2	1.02	(0.90 ,1.16)	0.7405
		A_g	0.132	H3	1.03	(0.86 ,1.23)	0.7571
		HRare	0.001	HRare	0.56	(0.05 ,6.29)	0.6392
BMF	Block 4	rs11634257-rs11858141-rs675173					
		A_g_G	0.429	H1	1.00		
		A_A_a	0.309	H2	0.92	(0.80 ,1.05)	0.2130
		t_A_G	0.252	H3	0.96	(0.83 ,1.12)	0.6162
		HRare	0.010	HRare	1.04	(0.59 ,1.82)	0.8955
BMF	Block 5	rs537455-rs11630670					
		A_G	0.534	H1	1.00		
		c_a	0.265	H2	0.98	(0.84 ,1.14)	0.7622
		A_a	0.201	H3	0.96	(0.81 ,1.13)	0.6249
		HRare	0.000	HRare	-	-	-
IFNGR1	Block 1	rs7759040-rs3799488-rs1327475					
		A_A_G	0.564	H1	1.00		
		A_A_a	0.189	H2	0.89	(0.77 ,1.04)	0.1594
		t_A_G	0.126	H3	1.05	(0.88 ,1.26)	0.5774
		t_g_G	0.121	H4	0.92	(0.77 ,1.11)	0.4104
		HRare	0.001	HRare	0.55	(0.05 ,6.11)	0.6248
IFNG	Block 1	rs2069727-rs2069718					
		g_G	0.482	H1	1.00		
		A_a	0.375	H2	0.97	(0.85 ,1.10)	0.5988
		A_G	0.142	H3	0.95	(0.79 ,1.13)	0.5558
		HRare	0.000	HRare	-	-	-
IFNG	Block 2	rs2069716-rs6581795-rs12306852					
		A_A_C	0.509	H1	1.00		
		A_g_C	0.264	H2	1.01	(0.88 ,1.17)	0.8885
		A_A_g	0.155	H3	1.00	(0.83 ,1.21)	0.9923
		g_A_C	0.072	H4	1.01	(0.77 ,1.32)	0.9393
		HRare	0.001	HRare	-	-	-
IL10	Block 1	rs17015767-rs1800871-rs1800872-rs2222202-rs3021094-rs1554286-rs3024509-rs3024505-rs6673928-rs4844553-rs754837					
		G_G_C_G_A_G_A_G_C_G_C	0.309	H1	1.00		
		c_G_C_a_A_G_A_G_a_G_C	0.194	H2	1.00	(0.84 ,1.18)	0.9652
		G_G_C_a_A_G_A_a_C_G_C	0.149	H3	0.99	(0.83 ,1.20)	0.9564
		G_a_a_G_A_a_A_G_C_G_C	0.125	H4	0.94	(0.77 ,1.15)	0.5683
		G_G_C_a_A_G_g_G_C_a_a	0.070	H5	0.95	(0.75 ,1.22)	0.7043
		G_a_a_G_c_a_A_G_C_G_C	0.064	H6	1.05	(0.81 ,1.35)	0.7289
			0.090	HRare	0.97	(0.77 ,1.21)	0.7603
IL12A	Block 1	rs9811792-rs7372767-rs4680534-rs6441282-rs6800657-rs747825					
		g_g_A_C_A_C	0.425	H1	1.00		
		A_A_g_a_A_a	0.179	H2	0.88	(0.75 ,1.04)	0.1476
		A_A_g_a_A_C	0.168	H3	1.07	(0.90 ,1.27)	0.4354
		A_A_A_a_g_C	0.102	H4	1.02	(0.83 ,1.25)	0.8686
		A_A_A_C_A_C	0.098	H5	0.93	(0.75 ,1.14)	0.4617
	0.028	HRare	1.03	(0.72 ,1.47)	0.8820		
IL12A	Block 2	rs2243115-rs583911-rs2243131-rs2243154-rs11927521					
		A_g_A_G_A	0.354	H1	1.00		
		A_A_A_G_g	0.274	H2	1.00	(0.86 ,1.16)	0.9721
		A_A_c_G_A	0.155	H3	0.98	(0.82 ,1.18)	0.8422
		c_A_A_G_g	0.112	H4	0.85	(0.70 ,1.04)	0.1207

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		A_g_A_a_A	0.104	H5	0.89	(0.72 ,1.10)	0.2909
		HRare	0.001	HRare	1.41	(0.31 ,6.34)	0.6562
IL12B	Block 1	rs4921466-rs4921468-rs6870828-rs3181225-rs1368439-rs11574790-rs2853694					
		A_G_A_G_A_G_c	0.291	H1	1.00		
		A_G_A_G_A_G_A	0.230	H2	1.23	(1.04 ,1.45)	0.0136
		A_G_g_G_c_G_c	0.178	H3	1.17	(0.98 ,1.40)	0.0803
		A_a_g_a_A_G_A	0.168	H4	1.10	(0.91 ,1.31)	0.3189
		g_a_g_G_A_a_A	0.115	H5	1.21	(0.99 ,1.49)	0.0660
		HRare	0.018	HRare	0.87	(0.54 ,1.38)	0.5438
IL12B	Block 2	rs2569253-rs3181216					
		A_T	0.540	H1	1.00		
		g_a	0.286	H2	0.82	(0.72 ,0.94)	0.0056
		g_T	0.172	H3	0.90	(0.77 ,1.06)	0.1964
		HRare	0.001	HRare	1.17	(0.16 ,8.40)	0.8728
IL12B	Block 3	rs1433048-rs2546893					
		A_a	0.464	H1	1.00		
		A_G	0.352	H2	1.12	(0.97 ,1.29)	0.1212
		g_G	0.183	H3	1.06	(0.89 ,1.27)	0.5225
		HRare	0.001	HRare	-	-	-
IL12B	Block 4	rs2546890-rs10052709-rs7709212-rs6868898					
		g_G_g_A	0.345	H1	1.00		
		A_G_A_g	0.292	H2	0.83	(0.72 ,0.97)	0.0162
		A_G_A_A	0.204	H3	0.93	(0.79 ,1.10)	0.3961
		g_c_A_A	0.144	H4	0.96	(0.80 ,1.15)	0.6642
		HRare	0.014	HRare	1.38	(0.82 ,2.32)	0.2210
IL7R	Block 1	rs11567694-rs11567697-rs11567701-rs6891095-rs3777090-rs11567762-rs10063294-rs10058453					
		A_A_a_A_A_G_A_A	0.272	H1	1.00		
		g_A_C_A_A_G_A_A	0.254	H2	0.95	(0.81 ,1.11)	0.5138
		A_A_C_A_t_a_g_g	0.156	H3	1.21	(1.01 ,1.45)	0.0438
		A_A_C_g_A_G_g_A	0.137	H4	1.08	(0.89 ,1.31)	0.4511
		A_g_C_A_t_G_g_g	0.095	H5	0.92	(0.74 ,1.15)	0.4731
		A_A_C_A_t_G_g_g	0.078	H6	1.09	(0.86 ,1.39)	0.4818
		HRare	0.008	HRare	1.02	(0.53 ,1.96)	0.9480
IRF4	Block 1	rs9405192-rs1033180					
		G_G	0.703	H1	1.00		
		a_G	0.224	H2	1.04	(0.90 ,1.21)	0.5718
		a_a	0.074	H3	0.95	(0.63 ,1.42)	0.7873
		HRare	0.000	HRare	-	-	-
IRF4	Block 2	rs13208928-rs3778607					
		T_G	0.500	H1	1.00		
		T_a	0.429	H2	1.02	(0.90 ,1.15)	0.7914
		a_a	0.070	H3	0.92	(0.73 ,1.16)	0.4756
		HRare	0.001	HRare	1.05	(0.06 ,16.91)	0.9740
IRF4	Block 3	rs1050975-rs7768807					
		A_A	0.667	H1	1.00		
		A_g	0.246	H2	1.00	(0.87 ,1.15)	0.9897
		g_A	0.086	H3	1.08	(0.87 ,1.34)	0.4947
		HRare	0.001	HRare	4.46	(0.08 #####)	0.4622
IRF4	Block 4	rs12211228-rs1877175-rs6906608					
		G_G_C	0.780	H1	1.00		
		c_a_a	0.147	H2	0.91	(0.77 ,1.08)	0.2688
		G_a_C	0.072	H3	0.81	(0.65 ,1.02)	0.0754
		HRare	0.002	HRare	1.08	(0.27 ,4.33)	0.9168
IRF4	Block 5	rs11757491-rs9378805					
		G_c	0.476	H1	1.00		
		G_A	0.456	H2	1.06	(0.94 ,1.20)	0.3549
		a_A	0.068	H3	0.85	(0.67 ,1.08)	0.1886
		HRare	0.000	HRare	0.05	(0.00 #####)	0.5520
Jak1	Block 1	rs310211-rs2256298					
		A_G	0.676	H1	1.00		
		g_a	0.259	H2	0.99	(0.86 ,1.13)	0.8812
		g_G	0.065	H3	0.95	(0.75 ,1.21)	0.6705
		HRare	0.000	HRare			
LIG4	Block 1	rs915047-rs9514825					
		A_G	0.635	H1	1.00		
		A_a	0.201	H2	1.08	(0.93 ,1.25)	0.2923
		g_a	0.164	H3	1.07	(0.91 ,1.26)	0.3812

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		HRare	0.000	HRare	-	-	-	-
LIG4	Block 2	rs868284-rs1151402-rs10131-rs3093772-rs3093748						
		G_a_G_A_G	0.432	H1	1.00			
		G_G_G_A_a	0.184	H2	0.94	(0.80	,1.10)	0.4177
		G_G_G_A_G	0.142	H3	1.06	(0.88	,1.26)	0.5495
		a_G_G_g_G	0.107	H4	0.96	(0.79	,1.17)	0.6870
		G_G_a_A_G	0.092	H5	1.19	(0.97	,1.47)	0.1016
		HRare	0.044	HRare	1.18	(0.88	,1.58)	0.2663
LIG4	Block 3	rs12428162-rs7322498-rs9520823						
		C_A_A	0.353	H1	1.00			
		C_A_c	0.283	H2	0.99	(0.85	,1.17)	0.9284
		g_g_A	0.267	H3	1.03	(0.87	,1.22)	0.6912
		C_g_A	0.097	H4	1.13	(0.92	,1.40)	0.2382
		HRare	0.000	HRare	-	-	-	-
SOCS1	Block 1	rs193778-rs243317						
		A_A	0.464	H1	1.00			
		A_c	0.294	H2	0.97	(0.84	,1.11)	0.6183
		g_A	0.241	H3	0.99	(0.86	,1.15)	0.9118
		HRare	0.001	HRare	1.01	(0.06	,16.28)	0.9928
STAT1	Block 1	rs13035504-rs1168-rs12468579-rs1400657						
		G_a_A_A	0.445	H1	1.00			
		G_G_g_A	0.265	H2	1.12	(0.97	,1.29)	0.1204
		c_G_g_A	0.171	H3	1.00	(0.84	,1.18)	0.9711
		G_G_A_c	0.115	H4	1.03	(0.85	,1.25)	0.7388
		HRare	0.004	HRare	1.29	(0.49	,3.37)	0.6052
STAT1	Block 2	rs16824035-rs13395505-rs17749316-rs2066804						
		G_G_C_G	0.528	H1	1.00			
		G_a_C_a	0.229	H2	1.05	(0.90	,1.21)	0.5502
		a_a_C_G	0.172	H3	0.96	(0.82	,1.13)	0.6520
		G_G_g_G	0.066	H4	0.96	(0.76	,1.23)	0.7695
		HRare	0.005	HRare	0.58	(0.25	,1.34)	0.2023
STAT1	Block 3	rs432757-rs2280234-rs2280233						
		A_G_g	0.455	H1	1.00			
		A_a_A	0.377	H2	1.06	(0.94	,1.21)	0.3361
		c_G_A	0.139	H3	0.99	(0.83	,1.19)	0.9425
		HRare	0.029	HRare	1.05	(0.74	,1.49)	0.7897
STAT1	Block 4	rs7562024-rs34997637						
		G_G	0.606	H1	1.00			
		a_a	0.230	H2	0.99	(0.86	,1.14)	0.9300
		a_G	0.164	H3	1.13	(0.96	,1.33)	0.1382
		HRare	0.000	HRare	-	-	-	-
STAT1	Block 5	rs13029247-rs10173099-rs10199181						
		A_G_T	0.616	H1	1.00			
		g_a_a	0.315	H2	0.92	(0.81	,1.05)	0.2217
		HRare	0.070	HRare	1.22	(0.96	,1.54)	0.1004
STAT1	Block 6	rs13029532-rs1467199-rs17817966						
		A_C_A	0.563	H1	1.00			
		A_g_g	0.234	H2	0.96	(0.83	,1.10)	0.5347
		A_C_g	0.113	H3	0.98	(0.81	,1.19)	0.8741
		c_C_g	0.089	H4	0.99	(0.81	,1.23)	0.9586
		HRare	0.000	HRare	-	-	-	-
STAT3	Block 1	rs1053023-rs1053005						
		A_A	0.801	H1	1.00			
		g_g	0.199	H2	0.80	(0.69	,0.93)	0.0029
		HRare	0.000	HRare	-	-	-	-
STAT3	Block 2	rs4103200-rs9891119-rs9912773-rs12949918-rs17405722						
		G_A_C_A_G	0.588	H1	1.00			
		c_c_g_g_G	0.267	H2	0.82	(0.72	,0.94)	0.0052
		G_c_C_g_a	0.065	H3	0.95	(0.75	,1.21)	0.6866
		G_A_C_g_G	0.053	H4	0.91	(0.69	,1.19)	0.4712
		HRare	0.027	HRare	0.76	(0.53	,1.10)	0.1452
STAT4	Block 1	rs13020076-rs16833177-rs7558921						
		A_A_C	0.600	H1	1.00			
		A_g_C	0.205	H2	0.97	(0.83	,1.14)	0.7166
		A_A_g	0.113	H3	0.89	(0.73	,1.08)	0.2304
		g_A_C	0.081	H4	0.87	(0.68	,1.12)	0.2893
		HRare	0.000	HRare	-	-	-	-

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STAT4	Block 2	rs7574608-rs4853540					
		A_C	0.766	H1	1.00		
		A_a	0.170	H2	1.09	(0.93 ,1.28)	0.2746
		t_a	0.062	H3	1.02	(0.80 ,1.31)	0.8658
		HRare	0.002	HRare	1.69	(0.28 ,10.15)	0.5660
STAT4	Block 3	rs3024861-rs932169					
		A_C	0.659	H1	1.00		
		t_C	0.264	H2	1.07	(0.93 ,1.23)	0.3214
		A_g	0.076	H3	1.07	(0.85 ,1.36)	0.5529
		HRare	0.001	HRare	-	-	-
STAT4	Block 4	rs10168266-rs2459611					
		G_A	0.685	H1	1.00		
		a_A	0.187	H2	1.05	(0.89 ,1.23)	0.5889
		G_g	0.127	H3	1.05	(0.86 ,1.28)	0.6266
		HRare	0.001	HRare	-	-	-
STAT4	Block 5	rs7599504-rs4571082-rs17769459					
		A_A_G	0.560	H1	1.00		
		A_g_G	0.219	H2	1.07	(0.93 ,1.24)	0.3353
		g_g_G	0.161	H3	1.06	(0.89 ,1.25)	0.5260
		A_A_a	0.059	H4	1.18	(0.92 ,1.51)	0.1968
		HRare	0.001	HRare	0.55	(0.05 ,6.18)	0.6318
STAT6	Block 1	rs3024979-rs703817-rs324015-rs3024974-rs3024971-rs324011					
		A_a_G_G_A_a	0.358	H1	1.00		
		A_G_a_G_A_G	0.232	H2	1.07	(0.91 ,1.25)	0.4205
		t_a_G_G_A_G	0.114	H3	0.91	(0.75 ,1.12)	0.3832
		A_G_G_G_c_G	0.114	H4	1.02	(0.84 ,1.26)	0.8196
		A_G_G_a_A_G	0.087	H5	0.83	(0.66 ,1.03)	0.0949
		A_G_G_G_A_G	0.067	H6	1.16	(0.90 ,1.49)	0.2603
		HRare	0.028	HRare	0.98	(0.67 ,1.45)	0.9281
TP63	Block 1	rs6790068-rs9681004					
		A_A	0.595	H1	1.00		
		g_g	0.395	H2	0.97	(0.86 ,1.10)	0.6680
		HRare	0.010	HRare	0.82	(0.43 ,1.54)	0.5313



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For Peer Review

## DLBCL

Supplementary Table 4. Odds Ratios and 95% Confidence Intervals for estimated Haplotypes for BNHL and subtypes (adjusted for age (continuous), se

Gene	Block	Haplotype	Frequency	hapname	DLBCL		
					OR	95% CI	p-value
BMF	Block 1	rs3923235-rs16970325					
		A_G	0.624	H1	1.00		
		g_G	0.268	H2	0.69	(0.56 ,0.85)	0.0006
		A_a	0.109	H3	0.87	(0.63 ,1.21)	0.4221
		HRare	0.000	HRare	-	-	-
BMF	Block 2	rs12913170-rs7183977-rs998713-rs546220					
		G_A_A_a	0.418	H1	1.00		
		G_g_g_C	0.331	H2	0.83	(0.68 ,1.00)	0.0551
		a_A_A_C	0.151	H3	1.09	(0.86 ,1.39)	0.4789
		G_A_g_C	0.060	H4	1.11	(0.77 ,1.60)	0.5779
		HRare	0.040	HRare	1.08	(0.71 ,1.64)	0.7146
BMF	Block 3	rs648289-rs10518679					
		g_A	0.450	H1	1.00		
		A_A	0.417	H2	0.94	(0.79 ,1.13)	0.5118
		A_g	0.132	H3	1.03	(0.81 ,1.33)	0.7916
		HRare	0.001	HRare	1.24	(0.10 ,14.85)	0.8659
BMF	Block 4	rs11634257-rs11858141-rs675173					
		A_g_G	0.429	H1	1.00		
		A_A_a	0.309	H2	0.88	(0.72 ,1.08)	0.2184
		t_A_G	0.252	H3	1.10	(0.89 ,1.34)	0.3775
		HRare	0.010	HRare	0.98	(0.43 ,2.24)	0.9544
BMF	Block 5	rs537455-rs11630670					
		A_G	0.534	H1	1.00		
		c_a	0.265	H2	0.91	(0.73 ,1.14)	0.4092
		A_a	0.201	H3	0.95	(0.75 ,1.19)	0.6467
		HRare	0.000	HRare	-	-	-
IFNGR1	Block 1	rs7759040-rs3799488-rs1327475					
		A_A_G	0.564	H1	1.00		
		A_A_a	0.189	H2	0.94	(0.76 ,1.17)	0.5900
		t_A_G	0.126	H3	1.07	(0.84 ,1.38)	0.5701
		t_g_G	0.121	H4	1.30	(0.90 ,1.88)	0.1626
		HRare	0.001	HRare	-	-	-
IFNG	Block 1	rs2069727-rs2069718					
		g_G	0.482	H1	1.00		
		A_a	0.375	H2	0.99	(0.82 ,1.18)	0.8825
		A_G	0.142	H3	1.03	(0.81 ,1.32)	0.8168
		HRare	0.000	HRare	-	-	-
IFNG	Block 2	rs2069716-rs6581795-rs12306852					
		A_A_C	0.509	H1	1.00		
		A_g_C	0.264	H2	1.10	(0.90 ,1.35)	0.3298
		A_A_g	0.155	H3	1.07	(0.82 ,1.39)	0.6399
		g_A_C	0.072	H4	1.05	(0.74 ,1.51)	0.7729
		HRare	0.001	HRare	-	-	-
IL10	Block 1	rs17015767-rs1800871-rs1800872-rs2222202-rs3021094-rs1554286-rs3024509-rs3024505-rs6673928-rs4844553-rs754837					
		G_G_C_G_A_G_A_G_C_G_C	0.309	H1	1.00		
		c_G_C_a_A_G_A_G_a_G_C	0.194	H2	1.06	(0.83 ,1.34)	0.6391
		G_G_C_a_A_G_A_a_C_G_C	0.149	H3	1.06	(0.82 ,1.36)	0.6470
		G_a_a_G_A_a_A_G_C_G_C	0.125	H4	0.95	(0.72 ,1.25)	0.6975
		G_G_C_a_A_G_g_G_C_a_a	0.070	H5	0.85	(0.59 ,1.23)	0.3950
		G_a_a_G_c_a_A_G_C_G_C	0.064	H6	0.93	(0.64 ,1.35)	0.7123
			0.090	HRare	1.12	(0.83 ,1.52)	0.4513
IL12A	Block 1	rs9811792-rs7372767-rs4680534-rs6441282-rs6800657-rs747825					
		g_g_A_C_A_C	0.425	H1	1.00		
		A_A_g_a_A_a	0.179	H2	0.81	(0.64 ,1.03)	0.0874
		A_A_g_a_A_C	0.168	H3	0.96	(0.76 ,1.22)	0.7627
		A_A_A_a_g_C	0.102	H4	0.99	(0.75 ,1.31)	0.9620
		A_A_A_C_A_C	0.098	H5	1.01	(0.76 ,1.34)	0.9415
	0.028	HRare	1.06	(0.66 ,1.71)	0.8017		
IL12A	Block 2	rs2243115-rs583911-rs2243131-rs2243154-rs11927521					
		A_g_A_G_A	0.354	H1	1.00		
		A_A_A_G_g	0.274	H2	1.01	(0.82 ,1.24)	0.9452
		A_A_c_G_A	0.155	H3	0.96	(0.74 ,1.23)	0.7385
		c_A_A_G_g	0.112	H4	0.91	(0.69 ,1.19)	0.4829

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		A_g_A_a_A	0.104	H5	0.89	(0.67 ,1.20)	0.4476
		HRare	0.001	HRare	1.13	(0.11 ,11.27)	0.9180
IL12B	Block 1	rs4921466-rs4921468-rs6870828-rs3181225-rs1368439-rs11574790-rs2853694					
		A_G_A_G_A_G_c	0.291	H1	1.00		
		A_G_A_G_A_G_A	0.230	H2	1.13	(0.90 ,1.41)	0.3081
		A_G_g_G_c_G_c	0.178	H3	1.07	(0.84 ,1.36)	0.6019
		A_a_g_a_A_G_A	0.168	H4	0.88	(0.68 ,1.14)	0.3421
		g_a_g_G_A_a_A	0.115	H5	1.28	(0.97 ,1.69)	0.0817
		HRare	0.018	HRare	1.00	(0.52 ,1.94)	1.0000
IL12B	Block 2	rs2569253-rs3181216					
		A_T	0.540	H1	1.00		
		g_a	0.286	H2	0.88	(0.72 ,1.07)	0.2074
		g_T	0.172	H3	0.73	(0.57 ,0.94)	0.0131
		HRare	0.001	HRare	-	-	-
IL12B	Block 3	rs1433048-rs2546893					
		A_a	0.464	H1	1.00		
		A_G	0.352	H2	1.14	(0.94 ,1.38)	0.1957
		g_G	0.183	H3	1.13	(0.89 ,1.44)	0.3090
		HRare	0.001	HRare	-	-	-
IL12B	Block 4	rs2546890-rs10052709-rs7709212-rs6868898					
		g_G_g_A	0.345	H1	1.00		
		A_G_A_g	0.292	H2	0.87	(0.70 ,1.07)	0.1910
		A_G_A_A	0.204	H3	0.99	(0.79 ,1.25)	0.9589
		g_c_A_A	0.144	H4	1.06	(0.82 ,1.37)	0.6573
		HRare	0.014	HRare	1.73	(0.88 ,3.40)	0.1135
IL7R	Block 1	rs11567694-rs11567697-rs11567701-rs6891095-rs3777090-rs11567762-rs10063294-rs10058453					
		A_A_a_A_A_G_A_A	0.272	H1	1.00		
		g_A_C_A_A_G_A_A	0.254	H2	1.04	(0.83 ,1.30)	0.7388
		A_A_C_A_t_a_g_g	0.156	H3	1.17	(0.90 ,1.52)	0.2339
		A_A_C_g_A_G_g_A	0.137	H4	1.20	(0.92 ,1.58)	0.1828
		A_g_C_A_t_G_g_g	0.095	H5	1.13	(0.84 ,1.54)	0.4172
		A_A_C_A_t_G_g_g	0.078	H6	1.27	(0.91 ,1.77)	0.1555
		HRare	0.008	HRare	0.94	(0.36 ,2.43)	0.9022
IRF4	Block 1	rs9405192-rs1033180					
		G_G	0.703	H1	1.00		
		a_G	0.224	H2	0.97	(0.80 ,1.18)	0.7740
		a_a	0.074	H3	1.01	(0.72 ,1.40)	0.9753
		HRare	0.000	HRare	-	-	-
IRF4	Block 2	rs13208928-rs3778607					
		T_G	0.500	H1	1.00		
		T_a	0.429	H2	0.94	(0.79 ,1.11)	0.4451
		a_a	0.070	H3	1.00	(0.72 ,1.38)	0.9828
		HRare	0.001	HRare	-	-	-
IRF4	Block 3	rs1050975-rs7768807					
		A_A	0.667	H1	1.00		
		A_g	0.246	H2	0.96	(0.78 ,1.17)	0.6719
		g_A	0.086	H3	1.10	(0.79 ,1.54)	0.5737
		HRare	0.001	HRare	-	-	-
IRF4	Block 4	rs12211228-rs1877175-rs6906608					
		G_G_C	0.780	H1	1.00		
		c_a_a	0.147	H2	0.89	(0.71 ,1.13)	0.3500
		G_a_C	0.072	H3	0.91	(0.66 ,1.26)	0.5740
		HRare	0.002	HRare	-	-	-
IRF4	Block 5	rs11757491-rs9378805					
		G_c	0.476	H1	1.00		
		G_A	0.456	H2	0.99	(0.84 ,1.17)	0.9091
		a_A	0.068	H3	0.90	(0.64 ,1.27)	0.5601
		HRare	0.000	HRare	-	-	-
Jak1	Block 1	rs310211-rs2256298					
		A_G	0.676	H1	1.00		
		g_a	0.259	H2	1.14	(0.94 ,1.38)	0.1873
		g_G	0.065	H3	1.01	(0.72 ,1.41)	0.9541
		HRare	0.000	HRare	-	-	-
LIG4	Block 1	rs915047-rs9514825					
		A_G	0.635	H1	1.00		
		A_a	0.201	H2	0.97	(0.79 ,1.20)	0.7839
		g_a	0.164	H3	1.07	(0.86 ,1.34)	0.5465

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		HRare	0.000	HRare	-	-	-	-
LIG4	Block 2	rs868284-rs1151402-rs10131-rs3093772-rs3093748						
		G_a_G_A_G	0.432	H1	1.00			
		G_G_G_A_a	0.184	H2	1.03	(0.83	,1.28)	0.8044
		G_G_G_A_G	0.142	H3	1.08	(0.84	,1.39)	0.5573
		a_G_G_g_G	0.107	H4	0.98	(0.75	,1.29)	0.8958
		G_G_a_A_G	0.092	H5	1.03	(0.76	,1.39)	0.8543
		HRare	0.044	HRare	1.13	(0.75	,1.71)	0.5478
LIG4	Block 3	rs12428162-rs7322498-rs9520823						
		C_A_A	0.353	H1	1.00			
		C_A_c	0.283	H2	0.89	(0.71	,1.12)	0.3294
		g_g_A	0.267	H3	1.02	(0.81	,1.28)	0.8759
		C_g_A	0.097	H4	0.90	(0.67	,1.21)	0.4829
		HRare	0.000	HRare	-	-	-	-
SOCS1	Block 1	rs193778-rs243317						
		A_A	0.464	H1	1.00			
		A_c	0.294	H2	0.93	(0.75	,1.15)	0.5233
		g_A	0.241	H3	0.85	(0.66	,1.09)	0.1890
		HRare	0.001	HRare	-	-	-	-
STAT1	Block 1	rs13035504-rs1168-rs12468579-rs1400657						
		G_a_A_A	0.445	H1	1.00			
		G_G_g_A	0.265	H2	1.12	(0.92	,1.38)	0.2569
		c_G_g_A	0.171	H3	1.03	(0.82	,1.31)	0.7840
		G_G_A_c	0.115	H4	1.25	(0.96	,1.62)	0.0950
		HRare	0.004	HRare	0.70	(0.14	,3.36)	0.6518
STAT1	Block 2	rs16824035-rs13395505-rs17749316-rs2066804						
		G_G_C_G	0.528	H1	1.00			
		G_a_C_a	0.229	H2	0.99	(0.81	,1.22)	0.9563
		a_a_C_G	0.172	H3	0.94	(0.75	,1.19)	0.6054
		G_G_g_G	0.066	H4	0.95	(0.68	,1.32)	0.7450
		HRare	0.005	HRare	0.84	(0.29	,2.48)	0.7570
STAT1	Block 3	rs432757-rs2280234-rs2280233						
		A_G_g	0.455	H1	1.00			
		A_a_A	0.377	H2	1.10	(0.92	,1.32)	0.2894
		c_G_A	0.139	H3	0.99	(0.76	,1.28)	0.9362
		HRare	0.029	HRare	1.33	(0.84	,2.09)	0.2209
STAT1	Block 4	rs7562024-rs34997637						
		G_G	0.606	H1	1.00			
		a_a	0.230	H2	0.97	(0.80	,1.19)	0.7860
		a_G	0.164	H3	1.23	(0.99	,1.53)	0.0621
		HRare	0.000	HRare	-	-	-	-
STAT1	Block 5	rs13029247-rs10173099-rs10199181						
		A_G_T	0.616	H1	1.00			
		g_a_a	0.315	H2	0.89	(0.74	,1.07)	0.2147
		HRare	0.070	HRare	1.31	(0.95	,1.80)	0.0959
STAT1	Block 6	rs13029532-rs1467199-rs17817966						
		A_C_A	0.563	H1	1.00			
		A_g_g	0.234	H2	0.98	(0.80	,1.19)	0.8242
		A_C_g	0.113	H3	1.06	(0.81	,1.38)	0.6892
		c_C_g	0.089	H4	1.10	(0.83	,1.46)	0.5193
		HRare	0.000	HRare	-	-	-	-
STAT3	Block 1	rs1053023-rs1053005						
		A_A	0.801	H1	1.00			
		g_g	0.199	H2	0.79	(0.64	,0.98)	0.0282
		HRare	0.000	HRare	-	-	-	-
STAT3	Block 2	rs4103200-rs9891119-rs9912773-rs12949918-rs17405722						
		G_A_C_A_G	0.588	H1	1.00			
		c_c_g_g_G	0.267	H2	0.81	(0.67	,0.98)	0.0317
		G_c_C_g_a	0.065	H3	0.89	(0.64	,1.25)	0.5054
		G_A_C_g_G	0.053	H4	0.94	(0.65	,1.35)	0.7206
		HRare	0.027	HRare	0.65	(0.37	,1.16)	0.1482
STAT4	Block 1	rs13020076-rs16833177-rs7558921						
		A_A_C	0.600	H1	1.00			
		A_g_C	0.205	H2	0.96	(0.77	,1.19)	0.6860
		A_A_g	0.113	H3	0.93	(0.72	,1.21)	0.6142
		g_A_C	0.081	H4	0.80	(0.55	,1.17)	0.2506
		HRare	0.000	HRare	-	-	-	-

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4	STAT4	Block 2	rs7574608-rs4853540					
5			A_C	0.766	H1	1.00		
6			A_a	0.170	H2	1.15	(0.92 ,1.42)	0.2130
7			t_a	0.062	H3	1.12	(0.80 ,1.57)	0.5126
8			HRare	0.002	HRare	1.03	(0.09 ,11.75)	0.9797
9	STAT4	Block 3	rs3024861-rs932169					
10			A_C	0.659	H1	1.00		
11			t_C	0.264	H2	1.14	(0.94 ,1.38)	0.1864
12			A_g	0.076	H3	1.05	(0.73 ,1.50)	0.7943
13			HRare	0.001	HRare	-	-	-
14	STAT4	Block 4	rs10168266-rs2459611					
15			G_A	0.685	H1	1.00		
16			a_A	0.187	H2	1.01	(0.81 ,1.27)	0.9097
17			G_g	0.127	H3	1.00	(0.75 ,1.32)	0.9899
18			HRare	0.001	HRare	-	-	-
19	STAT4	Block 5	rs7599504-rs4571082-rs17769459					
20			A_A_G	0.560	H1	1.00		
21			A_g_G	0.219	H2	1.14	(0.93 ,1.40)	0.2045
22			g_g_G	0.161	H3	0.97	(0.76 ,1.22)	0.7716
23			A_A_a	0.059	H4	1.07	(0.75 ,1.52)	0.7201
24			HRare	0.001	HRare	1.57	(0.14 ,17.95)	0.7161
25	STAT6	Block 1	rs3024979-rs703817-rs324015-rs3024974-rs3024971-rs324011					
26			A_a_G_G_A_a	0.358	H1	1.00		
27			A_G_a_G_A_G	0.232	H2	1.09	(0.87 ,1.36)	0.4487
28			t_a_G_G_A_G	0.114	H3	0.83	(0.62 ,1.11)	0.2063
29			A_G_G_G_c_G	0.114	H4	0.97	(0.73 ,1.29)	0.8367
30			A_G_G_a_A_G	0.087	H5	0.74	(0.53 ,1.03)	0.0717
31			A_G_G_G_A_G	0.067	H6	1.34	(0.96 ,1.88)	0.0830
32			HRare	0.028	HRare	0.82	(0.46 ,1.46)	0.4907
33	TP63	Block 1	rs6790068-rs9681004					
34			A_A	0.595	H1	1.00		
35			g_g	0.395	H2	0.96	(0.80 ,1.13)	0.6004
36			HRare	0.010	HRare	1.01	(0.44 ,2.32)	0.9744
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Supplementary Table 4. Odds Ratios and 95% Confidence Intervals for estimated Haplotypes for BNHL and subtypes (adjusted for age (continuous), sex)

Gene	Block	Haplotype	Frequency	hapname	FL		
					OR	95% CI	p-value
BMF	Block 1	rs3923235-rs16970325					
		A_G	0.624	H1	1.00		
		g_G	0.268	H2	1.13	(0.87, 1.47)	0.3508
		A_a	0.109	H3	1.53	(1.02, 2.29)	0.0385
		HRare	0.000	HRare	-	-	-
BMF	Block 2	rs12913170-rs7183977-rs998713-rs546220					
		G_A_A_a	0.418	H1	1.00		
		G_g_g_C	0.331	H2	1.17	(0.91, 1.50)	0.2260
		a_A_A_C	0.151	H3	1.03	(0.74, 1.43)	0.8526
		G_A_g_C	0.060	H4	1.26	(0.77, 2.07)	0.3619
		HRare	0.040	HRare	0.81	(0.43, 1.54)	0.5205
BMF	Block 3	rs648289-rs10518679					
		g_A	0.450	H1	1.00		
		A_A	0.417	H2	1.24	(0.96, 1.59)	0.1028
		A_g	0.132	H3	1.44	(1.02, 2.03)	0.0385
		HRare	0.001	HRare	-	-	-
BMF	Block 4	rs11634257-rs11858141-rs675173					
		A_g_G	0.429	H1	1.00		
		A_A_a	0.309	H2	0.82	(0.63, 1.07)	0.1376
		t_A_G	0.252	H3	0.82	(0.62, 1.08)	0.1543
		HRare	0.010	HRare	1.73	(0.74, 4.06)	0.2039
BMF	Block 5	rs537455-rs11630670					
		A_G	0.534	H1	1.00		
		c_a	0.265	H2	1.05	(0.80, 1.39)	0.7182
		A_a	0.201	H3	1.00	(0.74, 1.35)	0.9934
		HRare	0.000	HRare	-	-	-
IFNGR1	Block 1	rs7759040-rs3799488-rs1327475					
		A_A_G	0.564	H1	1.00		
		A_A_a	0.189	H2	1.16	(0.87, 1.53)	0.3099
		t_A_G	0.126	H3	1.14	(0.70, 1.86)	0.5860
		t_g_G	0.121	H4	0.96	(0.68, 1.36)	0.8184
		HRare	0.001	HRare	-	-	-
IFNG	Block 1	rs2069727-rs2069718					
		g_G	0.482	H1	1.00		
		A_a	0.375	H2	0.91	(0.72, 1.15)	0.4423
		A_G	0.142	H3	0.78	(0.56, 1.10)	0.1631
		HRare	0.000	HRare	-	-	-
IFNG	Block 2	rs2069716-rs6581795-rs12306852					
		A_A_C	0.509	H1	1.00		
		A_g_C	0.264	H2	0.98	(0.74, 1.30)	0.9035
		A_A_g	0.155	H3	0.86	(0.58, 1.27)	0.4552
		g_A_C	0.072	H4	1.22	(0.82, 1.82)	0.3258
		HRare	0.001	HRare	-	-	-
IL10	Block 1	rs17015767-rs1800871-rs1800872-rs2222202-rs3021094-rs1554286-rs3024509-rs3024505-rs6673928-rs4844553-rs754837					
		G_G_C_G_A_G_A_G_C_G_C	0.309	H1	1.00		
		c_G_C_a_A_G_A_G_a_G_C	0.194	H2	0.98	(0.71, 1.34)	0.8829
		G_G_C_a_A_G_A_a_C_G_C	0.149	H3	0.87	(0.62, 1.23)	0.4374
		G_a_a_G_A_a_A_G_C_G_C	0.125	H4	1.17	(0.82, 1.65)	0.3894
		G_G_C_a_A_G_g_G_C_a_a	0.070	H5	1.03	(0.65, 1.62)	0.9010
		G_a_a_G_c_a_A_G_C_G_C	0.064	H6	1.17	(0.74, 1.87)	0.4971
			0.090	HRare	0.84	(0.54, 1.30)	0.4268
IL12A	Block 1	rs9811792-rs7372767-rs4680534-rs6441282-rs6800657-rs747825					
		g_g_A_C_A_C	0.425	H1	1.00		
		A_A_g_a_A_a	0.179	H2	0.97	(0.72, 1.32)	0.8501
		A_A_g_a_A_C	0.168	H3	1.06	(0.78, 1.44)	0.7196
		A_A_A_a_g_C	0.102	H4	0.94	(0.65, 1.38)	0.7598
		A_A_A_C_A_C	0.098	H5	0.68	(0.44, 1.04)	0.0736
	0.028	HRare	0.90	(0.46, 1.77)	0.7533		
IL12A	Block 2	rs2243115-rs583911-rs2243131-rs2243154-rs11927521					
		A_g_A_G_A	0.354	H1	1.00		
		A_A_A_G_g	0.274	H2	1.08	(0.82, 1.42)	0.5858
		A_A_c_G_A	0.155	H3	1.02	(0.73, 1.42)	0.9259
		c_A_A_G_g	0.112	H4	0.72	(0.48, 1.09)	0.1173

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		A_g_A_a_A	0.104	H5	1.10	(0.76	,1.60)	0.6190
		HRare	0.001	HRare	-	-	-	-
IL12B	Block 1	rs4921466-rs4921468-rs6870828-rs3181225-rs1368439-rs11574790-rs2853694						
		A_G_A_G_A_G_c	0.291	H1	1.00			
		A_G_A_G_A_G_A	0.230	H2	1.38	(1.01	,1.89)	0.0439
		A_G_g_G_c_G_c	0.178	H3	1.38	(0.98	,1.92)	0.0622
		A_a_g_a_A_G_A	0.168	H4	1.39	(1.00	,1.94)	0.0505
		g_a_g_G_A_a_A	0.115	H5	1.44	(0.98	,2.11)	0.0607
		HRare	0.018	HRare	1.20	(0.49	,2.93)	0.6863
IL12B	Block 2	rs2569253-rs3181216						
		A_T	0.540	H1	1.00			
		g_a	0.286	H2	0.71	(0.55	,0.93)	0.0129
		g_T	0.172	H3	1.00	(0.76	,1.32)	0.9959
		HRare	0.001	HRare	-	-	-	-
IL12B	Block 3	rs1433048-rs2546893						
		A_a	0.464	H1	1.00			
		A_G	0.352	H2	1.36	(1.06	,1.75)	0.0166
		g_G	0.183	H3	1.04	(0.74	,1.46)	0.8128
		HRare	0.001	HRare	-	-	-	-
IL12B	Block 4	rs2546890-rs10052709-rs7709212-rs6868898						
		g_G_g_A	0.345	H1	1.00			
		A_G_A_g	0.292	H2	0.63	(0.48	,0.84)	0.0014
		A_G_A_A	0.204	H3	0.78	(0.58	,1.06)	0.1138
		g_c_A_A	0.144	H4	0.90	(0.64	,1.26)	0.5437
		HRare	0.014	HRare	1.18	(0.47	,2.97)	0.7240
IL7R	Block 1	rs11567694-rs11567697-rs11567701-rs6891095-rs3777090-rs11567762-rs10063294-rs10058453						
		A_A_a_A_A_G_A_A	0.272	H1	1.00			
		g_A_C_A_A_G_A_A	0.254	H2	0.91	(0.68	,1.21)	0.5089
		A_A_C_A_t_a_g_g	0.156	H3	1.37	(1.00	,1.87)	0.0533
		A_A_C_g_A_G_g_A	0.137	H4	1.05	(0.73	,1.49)	0.8072
		A_g_C_A_t_G_g_g	0.095	H5	0.71	(0.46	,1.10)	0.1241
		A_A_C_A_t_G_g_g	0.078	H6	0.90	(0.56	,1.44)	0.6525
		HRare	0.008	HRare	1.00	(0.28	,3.52)	0.9963
IRF4	Block 1	rs9405192-rs1033180						
		G_G	0.703	H1	1.00			
		a_G	0.224	H2	0.89	(0.68	,1.17)	0.4163
		a_a	0.074	H3	1.13	(0.75	,1.70)	0.5622
		HRare	0.000	HRare	-	-	-	-
IRF4	Block 2	rs13208928-rs3778607						
		T_G	0.500	H1	1.00			
		T_a	0.429	H2	0.94	(0.75	,1.19)	0.6154
		a_a	0.070	H3	1.00	(0.57	,1.76)	0.9901
		HRare	0.001	HRare	-	-	-	-
IRF4	Block 3	rs1050975-rs7768807						
		A_A	0.667	H1	1.00			
		A_g	0.246	H2	1.12	(0.86	,1.45)	0.4109
		g_A	0.086	H3	1.32	(0.87	,2.01)	0.1896
		HRare	0.001	HRare	-	-	-	-
IRF4	Block 4	rs12211228-rs1877175-rs6906608						
		G_G_C	0.780	H1	1.00			
		c_a_a	0.147	H2	0.88	(0.64	,1.20)	0.4099
		G_a_C	0.072	H3	0.77	(0.50	,1.20)	0.2470
		HRare	0.002	HRare	-	-	-	-
IRF4	Block 5	rs11757491-rs9378805						
		G_c	0.476	H1	1.00			
		G_A	0.456	H2	1.11	(0.89	,1.39)	0.3625
		a_A	0.068	H3	0.88	(0.56	,1.38)	0.5739
		HRare	0.000	HRare	-	-	-	-
Jak1	Block 1	rs310211-rs2256298						
		A_G	0.676	H1	1.00			
		g_a	0.259	H2	0.88	(0.68	,1.14)	0.3475
		g_G	0.065	H3	0.98	(0.64	,1.52)	0.9436
		HRare	0.000	HRare	-	-	-	-
LIG4	Block 1	rs915047-rs9514825						
		A_G	0.635	H1	1.00			
		A_a	0.201	H2	1.10	(0.83	,1.44)	0.5140
		g_a	0.164	H3	1.18	(0.87	,1.58)	0.2820



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		HRare	0.000	HRare	-	-	-	-
LIG4	Block 2	rs868284-rs1151402-rs10131-rs3093772-rs3093748						
		G_a_G_A_G	0.432	H1	1.00			
		G_G_G_A_a	0.184	H2	0.77	(0.56	,1.06)	0.1116
		G_G_G_A_G	0.142	H3	0.98	(0.70	,1.37)	0.8983
		a_G_G_g_G	0.107	H4	1.00	(0.70	,1.42)	0.9927
		G_G_a_A_G	0.092	H5	0.95	(0.63	,1.43)	0.8045
		HRare	0.044	HRare	1.45	(0.88	,2.39)	0.1442
LIG4	Block 3	rs12428162-rs7322498-rs9520823						
		C_A_A	0.353	H1	1.00			
		C_A_c	0.283	H2	1.06	(0.79	,1.42)	0.7059
		g_g_A	0.267	H3	0.95	(0.69	,1.31)	0.7453
		C_g_A	0.097	H4	0.90	(0.60	,1.35)	0.6130
		HRare	0.000	HRare	-	-	-	-
SOCS1	Block 1	rs193778-rs243317						
		A_A	0.464	H1	1.00			
		A_c	0.294	H2	1.08	(0.82	,1.44)	0.5726
		g_A	0.241	H3	1.24	(0.90	,1.69)	0.1839
		HRare	0.001	HRare	-	-	-	-
STAT1	Block 1	rs13035504-rs1168-rs12468579-rs1400657						
		G_a_A_A	0.445	H1	1.00			
		G_G_g_A	0.265	H2	0.85	(0.65	,1.12)	0.2585
		c_G_g_A	0.171	H3	0.92	(0.68	,1.25)	0.5913
		G_G_A_c	0.115	H4	0.87	(0.61	,1.25)	0.4500
		HRare	0.004	HRare	2.43	(0.61	,9.66)	0.2072
STAT1	Block 2	rs16824035-rs13395505-rs17749316-rs2066804						
		G_G_C_G	0.528	H1	1.00			
		G_a_C_a	0.229	H2	0.80	(0.60	,1.06)	0.1201
		a_a_C_G	0.172	H3	0.94	(0.70	,1.27)	0.6832
		G_G_g_G	0.066	H4	0.88	(0.56	,1.40)	0.6032
		HRare	0.005	HRare	0.83	(0.20	,3.47)	0.7958
STAT1	Block 3	rs432757-rs2280234-rs2280233						
		A_G_g	0.455	H1	1.00			
		A_a_A	0.377	H2	0.90	(0.71	,1.14)	0.3958
		c_G_A	0.139	H3	0.95	(0.68	,1.32)	0.7597
		HRare	0.029	HRare	0.69	(0.33	,1.44)	0.3267
STAT1	Block 4	rs7562024-rs34997637						
		G_G	0.606	H1	1.00			
		a_a	0.230	H2	0.87	(0.67	,1.13)	0.3065
		a_G	0.164	H3	1.03	(0.76	,1.39)	0.8661
		HRare	0.000	HRare	-	-	-	-
STAT1	Block 5	rs13029247-rs10173099-rs10199181						
		A_G_T	0.616	H1	1.00			
		g_a_a	0.315	H2	0.81	(0.64	,1.03)	0.0900
		HRare	0.070	HRare	1.31	(0.87	,1.99)	0.1992
STAT1	Block 6	rs13029532-rs1467199-rs17817966						
		A_C_A	0.563	H1	1.00			
		A_g_g	0.234	H2	0.77	(0.59	,1.01)	0.0592
		A_C_g	0.113	H3	0.86	(0.60	,1.23)	0.4089
		c_C_g	0.089	H4	0.97	(0.66	,1.41)	0.8611
		HRare	0.000	HRare	-	-	-	-
STAT3	Block 1	rs1053023-rs1053005						
		A_A	0.801	H1	1.00			
		g_g	0.199	H2	0.78	(0.59	,1.03)	0.0820
		HRare	0.000	HRare	-	-	-	-
STAT3	Block 2	rs4103200-rs9891119-rs9912773-rs12949918-rs17405722						
		G_A_C_A_G	0.588	H1	1.00			
		c_c_g_g_G	0.267	H2	0.79	(0.61	,1.02)	0.0695
		G_c_C_g_a	0.065	H3	1.04	(0.68	,1.59)	0.8560
		G_A_C_g_G	0.053	H4	0.72	(0.42	,1.23)	0.2319
		HRare	0.027	HRare	0.46	(0.20	,1.08)	0.0754
STAT4	Block 1	rs13020076-rs16833177-rs7558921						
		A_A_C	0.600	H1	1.00			
		A_g_C	0.205	H2	0.74	(0.54	,1.00)	0.0529
		A_A_g	0.113	H3	0.80	(0.54	,1.18)	0.2664
		g_A_C	0.081	H4	0.78	(0.51	,1.19)	0.2533
		HRare	0.000	HRare	-	-	-	-

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STAT4	Block 2	rs7574608-rs4853540						
		A_C	0.766	H1	1.00			
		A_a	0.170	H2	1.15	(0.87	,1.52)	0.3280
		t_a	0.062	H3	0.83	(0.51	,1.34)	0.4417
		HRare	0.002	HRare	2.19	(0.19	,25.32)	0.5305
STAT4	Block 3	rs3024861-rs932169						
		A_C	0.659	H1	1.00			
		t_C	0.264	H2	0.94	(0.72	,1.21)	0.6245
		A_g	0.076	H3	0.96	(0.59	,1.57)	0.8819
		HRare	0.001	HRare	-	-	-	-
STAT4	Block 4	rs10168266-rs2459611						
		G_A	0.685	H1	1.00			
		a_A	0.187	H2	0.99	(0.73	,1.34)	0.9662
		G_g	0.127	H3	1.14	(0.81	,1.62)	0.4453
		HRare	0.001	HRare	-	-	-	-
STAT4	Block 5	rs7599504-rs4571082-rs17769459						
		A_A_G	0.560	H1	1.00			
		A_g_G	0.219	H2	1.02	(0.77	,1.35)	0.8802
		g_g_G	0.161	H3	1.20	(0.89	,1.61)	0.2286
		A_A_a	0.059	H4	1.09	(0.68	,1.74)	0.7295
		HRare	0.001	HRare	-	-	-	-
STAT6	Block 1	rs3024979-rs703817-rs324015-rs3024974-rs3024971-rs324011						
		A_a_G_G_A_a	0.358	H1	1.00			
		A_G_a_G_A_G	0.232	H2	1.14	(0.85	,1.51)	0.3841
		t_a_G_G_A_G	0.114	H3	0.94	(0.64	,1.37)	0.7442
		A_G_G_G_c_G	0.114	H4	1.04	(0.71	,1.51)	0.8568
		A_G_G_a_A_G	0.087	H5	0.88	(0.58	,1.33)	0.5381
		A_G_G_G_A_G	0.067	H6	1.14	(0.72	,1.83)	0.5734
		HRare	0.028	HRare	1.02	(0.51	,2.03)	0.9589
TP63	Block 1	rs6790068-rs9681004						
		A_A	0.595	H1	1.00			
		g_g	0.395	H2	0.82	(0.65	,1.03)	0.0810
		HRare	0.010	HRare	0.54	(0.12	,2.35)	0.4112

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For Peer Review

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TNHL

**Supplementary Table 4.** Odds Ratios and 95% Confidence Intervals for estimated Haplotypes for TNHL (adjusted for age (continuous), sex and study c

Gene	Block	Haplotype	Frequency	hapname	T-NHL		
					OR	95% CI	p-value
BMF	Block 1	rs3923235-rs16970325					
		A_G	0.624	H1	1.00		
		g_G	0.268	H2	1.30	(0.89 ,1.89)	0.1705
		A_a	0.109	H3	1.82	(1.06 ,3.13)	0.0290
		HRare	0.000	HRare	-	-	-
BMF	Block 2	rs12913170-rs7183977-rs998713-rs546220					
		G_A_A_a	0.418	H1	1.00		
		G_g_g_C	0.331	H2	1.17	(0.82 ,1.66)	0.3911
		a_A_A_C	0.151	H3	0.55	(0.31 ,0.98)	0.0437
		G_A_g_C	0.060	H4	1.82	(1.02 ,3.25)	0.0435
		HRare	0.040	HRare	1.23	(0.60 ,2.52)	0.5796
BMF	Block 3	rs648289-rs10518679					
		g_A	0.450	H1	1.00		
		A_A	0.417	H2	1.21	(0.86 ,1.71)	0.2628
		A_g	0.132	H3	0.85	(0.48 ,1.50)	0.5761
		HRare	0.001	HRare	-	-	-
BMF	Block 4	rs11634257-rs11858141-rs675173					
		A_g_G	0.429	H1	1.00		
		A_A_a	0.309	H2	1.00	(0.68 ,1.48)	0.9831
		t_A_G	0.252	H3	1.40	(0.97 ,2.02)	0.0760
		HRare	0.010	HRare	1.04	(0.23 ,4.71)	0.9565
BMF	Block 5	rs537455-rs11630670					
		A_G	0.534	H1	1.00		
		c_a	0.265	H2	1.03	(0.70 ,1.51)	0.8852
		A_a	0.201	H3	0.73	(0.47 ,1.14)	0.1619
		HRare	0.000	HRare	-	-	-
IFNGR1	Block 1	rs7759040-rs3799488-rs1327475					
		A_A_G	0.564	H1	1.00		
		A_A_a	0.189	H2	1.16	(0.78 ,1.72)	0.4643
		t_A_G	0.126	H3	1.26	(0.64 ,2.46)	0.5031
		t_g_G	0.121	H4	1.00	(0.61 ,1.64)	0.9986
		HRare	0.001	HRare	-	-	-
IFNG	Block 1	rs2069727-rs2069718					
		g_G	0.482	H1	1.00		
		A_a	0.375	H2	0.92	(0.65 ,1.29)	0.6221
		A_G	0.142	H3	0.99	(0.62 ,1.56)	0.9500
		HRare	0.000	HRare	-	-	-
IFNG	Block 2	rs2069716-rs6581795-rs12306852					
		A_A_C	0.509	H1	1.00		
		A_g_C	0.264	H2	0.94	(0.65 ,1.37)	0.7614
		A_A_g	0.155	H3	0.83	(0.51 ,1.35)	0.4591
		g_A_C	0.072	H4	0.81	(0.40 ,1.64)	0.5634
		HRare	0.001	HRare	-	-	-
IL10	Block 1	rs17015767-rs1800871-rs1800872-rs2222202-rs3021094-rs1554286-rs3024509-rs3024505-rs6673928-rs4844553-rs754837					
		G_G_C_G_A_G_A_G_C_G_C	0.309	H1	1.00		
		c_G_C_a_A_G_A_G_a_G_C	0.194	H2	0.77	(0.49 ,1.22)	0.2732
		G_G_C_a_A_G_A_a_C_G_C	0.149	H3	0.90	(0.56 ,1.43)	0.6461
		G_a_a_G_A_a_A_G_C_G_C	0.125	H4	1.05	(0.64 ,1.72)	0.8511
		G_G_C_a_A_G_g_G_C_a_a	0.070	H5	0.96	(0.52 ,1.76)	0.8853
		G_a_a_G_c_a_A_G_C_G_C	0.064	H6	0.75	(0.36 ,1.52)	0.4215
			0.090	HRare	0.70	(0.37 ,1.31)	0.2628
IL12A	Block 1	rs9811792-rs7372767-rs4680534-rs6441282-rs6800657-rs747825					
		g_g_A_C_A_C	0.425	H1	1.00		
		A_A_g_a_A_a	0.179	H2	0.92	(0.60 ,1.41)	0.6927
		A_A_g_a_A_C	0.168	H3	1.06	(0.69 ,1.64)	0.7935
		A_A_A_a_g_C	0.102	H4	0.57	(0.29 ,1.09)	0.0897
		A_A_A_C_A_C	0.098	H5	0.86	(0.48 ,1.53)	0.6074
	0.028	HRare	1.72	(0.82 ,3.60)	0.1532		
IL12A	Block 2	rs2243115-rs583911-rs2243131-rs2243154-rs11927521					
		A_g_A_G_A	0.354	H1	1.00		
		A_A_A_G_g	0.274	H2	0.95	(0.65 ,1.40)	0.8087
		A_A_c_G_A	0.155	H3	0.80	(0.49 ,1.32)	0.3805
		c_A_A_G_g	0.112	H4	0.86	(0.51 ,1.44)	0.5650

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		A_g_A_a_A	0.104	H5	0.90	(0.52 ,1.54)	0.6936
		HRare	0.001	HRare	-	-	-
IL12B	Block 1	rs4921466-rs4921468-rs6870828-rs3181225-rs1368439-rs11574790-rs2853694					
		A_G_A_G_A_G_c	0.291	H1	1.00		
		A_G_A_G_A_G_A	0.230	H2	0.86	(0.56 ,1.31)	0.4716
		A_G_g_G_c_G_c	0.178	H3	0.95	(0.62 ,1.48)	0.8338
		A_a_g_a_A_G_A	0.168	H4	0.63	(0.38 ,1.05)	0.0737
		g_a_g_G_A_a_A	0.115	H5	0.77	(0.45 ,1.33)	0.3536
		HRare	0.018	HRare	0.70	(0.21 ,2.32)	0.5632
IL12B	Block 2	rs2569253-rs3181216					
		A_T	0.540	H1	1.00		
		g_a	0.286	H2	1.15	(0.82 ,1.61)	0.4170
		g_T	0.172	H3	0.65	(0.40 ,1.07)	0.0893
		HRare	0.001	HRare	-	-	-
IL12B	Block 3	rs1433048-rs2546893					
		A_a	0.464	H1	1.00		
		A_G	0.352	H2	1.26	(0.90 ,1.78)	0.1832
		g_G	0.183	H3	1.19	(0.79 ,1.81)	0.4041
		HRare	0.001	HRare	-	-	-
IL12B	Block 4	rs2546890-rs10052709-rs7709212-rs6868898					
		g_G_g_A	0.345	H1	1.00		
		A_G_A_g	0.292	H2	1.34	(0.91 ,1.99)	0.1420
		A_G_A_A	0.204	H3	1.06	(0.67 ,1.66)	0.8150
		g_c_A_A	0.144	H4	1.14	(0.70 ,1.87)	0.5909
		HRare	0.014	HRare	2.43	(0.80 ,7.37)	0.1168
IL7R	Block 1	rs11567694-rs11567697-rs11567701-rs6891095-rs3777090-rs11567762-rs10063294-rs10058453					
		A_A_a_A_A_G_A_A	0.272	H1	1.00		
		g_A_C_A_A_G_A_A	0.254	H2	0.96	(0.63 ,1.46)	0.8475
		A_A_C_A_t_a_g_g	0.156	H3	1.31	(0.82 ,2.08)	0.2549
		A_A_C_g_A_G_g_A	0.137	H4	0.95	(0.56 ,1.60)	0.8425
		A_g_C_A_t_G_g_g	0.095	H5	1.15	(0.67 ,1.96)	0.6130
		A_A_C_A_t_G_g_g	0.078	H6	1.02	(0.53 ,1.97)	0.9480
		HRare	0.008	HRare	0.75	(0.10 ,5.90)	0.7863
IRF4	Block 1	rs9405192-rs1033180					
		G_G	0.703	H1	1.00		
		a_G	0.224	H2	1.08	(0.75 ,1.55)	0.6680
		a_a	0.074	H3	1.08	(0.59 ,1.99)	0.7976
		HRare	0.000	HRare	-	-	-
IRF4	Block 2	rs13208928-rs3778607					
		T_G	0.500	H1	1.00		
		T_a	0.429	H2	0.99	(0.72 ,1.37)	0.9577
		a_a	0.070	H3	0.95	(0.42 ,2.16)	0.9062
		HRare	0.001	HRare	-	-	-
IRF4	Block 3	rs1050975-rs7768807					
		A_A	0.667	H1	1.00		
		A_g	0.246	H2	0.97	(0.66 ,1.43)	0.8968
		g_A	0.086	H3	1.27	(0.71 ,2.27)	0.4171
		HRare	0.001	HRare	-	-	-
IRF4	Block 4	rs12211228-rs1877175-rs6906608					
		G_G_C	0.780	H1	1.00		
		c_a_a	0.147	H2	0.90	(0.58 ,1.40)	0.6392
		G_a_C	0.072	H3	0.77	(0.41 ,1.46)	0.4256
		HRare	0.002	HRare	-	-	-
IRF4	Block 5	rs11757491-rs9378805					
		G_c	0.476	H1	1.00		
		G_A	0.456	H2	1.02	(0.74 ,1.41)	0.8996
		a_A	0.068	H3	1.01	(0.47 ,2.16)	0.9737
		HRare	0.000	HRare	-	-	-
Jak1	Block 1	rs310211-rs2256298					
		A_G	0.676	H1	1.00		
		g_a	0.259	H2	1.24	(0.88 ,1.75)	0.2243
		g_G	0.065	H3	0.89	(0.45 ,1.75)	0.7405
		HRare	0.000	HRare	-	-	-
LIG4	Block 1	rs915047-rs9514825					
		A_G	0.635	H1	1.00		
		A_a	0.201	H2	0.96	(0.65 ,1.43)	0.8547
		g_a	0.164	H3	1.04	(0.67 ,1.60)	0.8739

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		HRare	0.000	HRare	-	-	-	-
LIG4	Block 2	rs868284-rs1151402-rs10131-rs3093772-rs3093748						
		G_a_G_A_G	0.432	H1	1.00			
		G_G_G_A_a	0.184	H2	1.18	(0.78	,1.78)	0.4344
		G_G_G_A_G	0.142	H3	1.08	(0.67	,1.73)	0.7481
		a_G_G_g_G	0.107	H4	0.93	(0.55	,1.57)	0.7938
		G_G_a_A_G	0.092	H5	1.17	(0.68	,2.01)	0.5691
		HRare	0.044	HRare	0.85	(0.35	,2.05)	0.7219
LIG4	Block 3	rs12428162-rs7322498-rs9520823						
		C_A_A	0.353	H1	1.00			
		C_A_c	0.283	H2	0.94	(0.65	,1.38)	0.7652
		g_g_A	0.267	H3	1.02	(0.69	,1.52)	0.9192
		C_g_A	0.097	H4	1.00	(0.58	,1.71)	0.9892
		HRare	0.000	HRare	-	-	-	-
SOCS1	Block 1	rs193778-rs243317						
		A_A	0.464	H1	1.00			
		A_c	0.294	H2	0.99	(0.68	,1.44)	0.9617
		g_A	0.241	H3	1.37	(0.94	,1.99)	0.0991
		HRare	0.001	HRare	-	-	-	-
STAT1	Block 1	rs13035504-rs1168-rs12468579-rs1400657						
		G_a_A_A	0.445	H1	1.00			
		G_G_g_A	0.265	H2	0.79	(0.54	,1.16)	0.2286
		c_G_g_A	0.171	H3	0.91	(0.59	,1.42)	0.6891
		G_G_A_c	0.115	H4	0.92	(0.56	,1.51)	0.7458
		HRare	0.004	HRare	1.67	(0.20	,13.93)	0.6340
STAT1	Block 2	rs16824035-rs13395505-rs17749316-rs2066804						
		G_G_C_G	0.528	H1	1.00			
		G_a_C_a	0.229	H2	0.79	(0.53	,1.18)	0.2484
		a_a_C_G	0.172	H3	0.99	(0.64	,1.51)	0.9501
		G_G_g_G	0.066	H4	1.24	(0.69	,2.22)	0.4656
		HRare	0.005	HRare	0.84	(0.11	,6.17)	0.8602
STAT1	Block 3	rs432757-rs2280234-rs2280233						
		A_G_g	0.455	H1	1.00			
		A_a_A	0.377	H2	0.86	(0.61	,1.20)	0.3799
		c_G_A	0.139	H3	0.86	(0.53	,1.39)	0.5265
		HRare	0.029	HRare	1.09	(0.47	,2.56)	0.8364
STAT1	Block 4	rs7562024-rs34997637						
		G_G	0.606	H1	1.00			
		a_a	0.230	H2	0.62	(0.41	,0.95)	0.0283
		a_G	0.164	H3	1.27	(0.87	,1.85)	0.2233
		HRare	0.000	HRare	-	-	-	-
STAT1	Block 5	rs13029247-rs10173099-rs10199181						
		A_G_T	0.616	H1	1.00			
		g_a_a	0.315	H2	0.72	(0.50	,1.03)	0.0706
		HRare	0.070	HRare	1.56	(0.94	,2.59)	0.0865
STAT1	Block 6	rs13029532-rs1467199-rs17817966						
		A_C_A	0.563	H1	1.00			
		A_g_g	0.234	H2	0.62	(0.41	,0.93)	0.0210
		A_C_g	0.113	H3	0.84	(0.51	,1.40)	0.5088
		c_C_g	0.089	H4	0.73	(0.42	,1.29)	0.2803
		HRare	0.000	HRare	-	-	-	-
STAT3	Block 1	rs1053023-rs1053005						
		A_A	0.801	H1	1.00			
		g_g	0.199	H2	0.92	(0.63	,1.35)	0.6737
		HRare	0.000	HRare	-	-	-	-
STAT3	Block 2	rs4103200-rs9891119-rs9912773-rs12949918-rs17405722						
		G_A_C_A_G	0.588	H1	1.00			
		c_c_g_g_G	0.267	H2	0.78	(0.54	,1.13)	0.1907
		G_c_C_g_a	0.065	H3	0.89	(0.47	,1.68)	0.7129
		G_A_C_g_G	0.053	H4	1.01	(0.52	,1.96)	0.9756
		HRare	0.027	HRare	1.00	(0.42	,2.38)	0.9927
STAT4	Block 1	rs13020076-rs16833177-rs7558921						
		A_A_C	0.600	H1	1.00			
		A_g_C	0.205	H2	0.62	(0.39	,0.98)	0.0407
		A_A_g	0.113	H3	0.66	(0.39	,1.12)	0.1250
		g_A_C	0.081	H4	0.80	(0.43	,1.50)	0.4823
		HRare	0.000	HRare	-	-	-	-

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4	STAT4	Block 2	rs7574608-rs4853540					
5			A_C	0.766	H1	1.00		
6			A_a	0.170	H2	1.68	(1.18 ,2.40)	0.0043
7			t_a	0.062	H3	1.05	(0.55 ,2.01)	0.8809
8			HRare	0.002	HRare	6.43	(0.53 ,78.67)	0.1451
9	STAT4	Block 3	rs3024861-rs932169					
10			A_C	0.659	H1	1.00		
11			t_C	0.264	H2	0.88	(0.60 ,1.29)	0.5120
12			A_g	0.076	H3	1.26	(0.69 ,2.32)	0.4497
13			HRare	0.001	HRare	-	-	-
14	STAT4	Block 4	rs10168266-rs2459611					
15			G_A	0.685	H1	1.00		
16			a_A	0.187	H2	0.86	(0.55 ,1.32)	0.4842
17			G_g	0.127	H3	1.33	(0.87 ,2.04)	0.1845
18			HRare	0.001	HRare	-	-	-
19	STAT4	Block 5	rs7599504-rs4571082-rs17769459					
20			A_A_G	0.560	H1	1.00		
21			A_g_G	0.219	H2	1.29	(0.89 ,1.87)	0.1846
22			g_g_G	0.161	H3	1.21	(0.79 ,1.83)	0.3791
23			A_A_a	0.059	H4	1.04	(0.51 ,2.09)	0.9235
24			HRare	0.001	HRare	-	-	-
25	STAT6	Block 1	rs3024979-rs703817-rs324015-rs3024974-rs3024971-rs324011					
26			A_a_G_G_A_a	0.358	H1	1.00		
27			A_G_a_G_A_G	0.232	H2	0.81	(0.50 ,1.29)	0.3718
28			t_a_G_G_A_G	0.114	H3	1.34	(0.81 ,2.22)	0.2471
29			A_G_G_G_c_G	0.114	H4	1.69	(1.03 ,2.77)	0.0381
30			A_G_G_a_A_G	0.087	H5	1.15	(0.65 ,2.03)	0.6366
31			A_G_G_G_A_G	0.067	H6	1.13	(0.57 ,2.26)	0.7255
32			HRare	0.028	HRare	3.03	(1.41 ,6.47)	0.0043
33	TP63	Block 1	rs6790068-rs9681004					
34			A_A	0.595	H1	1.00		
35			g_g	0.395	H2	1.01	(0.74 ,1.39)	0.9383
36			HRare	0.010	HRare	3.37	(1.21 ,9.39)	0.0199
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Supplementary Table 4. Odds Ratios and 95% Confidence Intervals for estimated Haplotypes for BNHL and subtypes (adjusted for age (continuous), se

Gene	Block	Haplotype	Frequency	hapname	CLL		
					OR	95% CI	p-value
BMF	Block 1	rs3923235-rs16970325					
		A_G	0.624	H1	1.00		
		g_G	0.268	H2	0.94	(0.76 ,1.18)	0.6071
		A_a	0.109	H3	1.32	(0.95 ,1.84)	0.0966
		HRare	0.000	HRare	-	-	-
BMF	Block 2	rs12913170-rs7183977-rs998713-rs546220					
		G_A_A_a	0.418	H1	1.00		
		G_g_g_C	0.331	H2	1.01	(0.81 ,1.24)	0.9553
		a_A_A_C	0.151	H3	1.04	(0.80 ,1.36)	0.7566
		G_A_g_C	0.060	H4	1.41	(0.97 ,2.05)	0.0751
		HRare	0.040	HRare	0.95	(0.59 ,1.52)	0.8218
BMF	Block 3	rs648289-rs10518679					
		g_A	0.450	H1	1.00		
		A_A	0.417	H2	1.05	(0.87 ,1.28)	0.5987
		A_g	0.132	H3	1.00	(0.76 ,1.33)	0.9766
		HRare	0.001	HRare	-	-	-
BMF	Block 4	rs11634257-rs11858141-rs675173					
		A_g_G	0.429	H1	1.00		
		A_A_a	0.309	H2	1.01	(0.81 ,1.24)	0.9585
		t_A_G	0.252	H3	0.93	(0.74 ,1.17)	0.5273
		HRare	0.010	HRare	0.99	(0.40 ,2.43)	0.9759
BMF	Block 5	rs537455-rs11630670					
		A_G	0.534	H1	1.00		
		c_a	0.265	H2	1.11	(0.90 ,1.37)	0.3475
		A_a	0.201	H3	1.01	(0.80 ,1.28)	0.9105
		HRare	0.000	HRare	-	-	-
IFNGR1	Block 1	rs7759040-rs3799488-rs1327475					
		A_A_G	0.564	H1	1.00		
		A_A_a	0.189	H2	0.76	(0.59 ,0.98)	0.0315
		t_A_G	0.126	H3	0.90	(0.68 ,1.20)	0.4803
		t_g_G	0.121	H4	0.82	(0.61 ,1.09)	0.1711
		HRare	0.001	HRare	2.32	(0.21 ,26.03)	0.4962
IFNG	Block 1	rs2069727-rs2069718					
		g_G	0.482	H1	1.00		
		A_a	0.375	H2	1.03	(0.85 ,1.24)	0.7857
		A_G	0.142	H3	1.00	(0.76 ,1.31)	0.9923
		HRare	0.000	HRare	-	-	-
IFNG	Block 2	rs2069716-rs6581795-rs12306852					
		A_A_C	0.509	H1	1.00		
		A_g_C	0.264	H2	0.90	(0.73 ,1.12)	0.3639
		A_A_g	0.155	H3	1.00	(0.76 ,1.31)	0.9928
		g_A_C	0.072	H4	0.73	(0.48 ,1.13)	0.1586
		HRare	0.001	HRare	-	-	-
IL10	Block 1	rs17015767-rs1800871-rs1800872-rs2222202-rs3021094-rs1554286-rs3024509-rs3024505-rs6673928-rs4844553-rs754837					
		G_G_C_G_A_G_A_G_C_G_C	0.309	H1	1.00		
		c_G_C_a_A_G_A_G_a_G_C	0.194	H2	0.96	(0.74 ,1.24)	0.7671
		G_G_C_a_A_G_A_a_C_G_C	0.149	H3	0.97	(0.74 ,1.28)	0.8435
		G_a_a_G_A_a_A_G_C_G_C	0.125	H4	0.92	(0.68 ,1.26)	0.6101
		G_G_C_a_A_G_g_G_C_a_a	0.070	H5	0.99	(0.69 ,1.42)	0.9510
		G_a_a_G_c_a_A_G_C_G_C	0.064	H6	1.19	(0.82 ,1.73)	0.3507
			0.090	HRare	0.90	(0.64 ,1.27)	0.5503
IL12A	Block 1	rs9811792-rs7372767-rs4680534-rs6441282-rs6800657-rs747825					
		g_g_A_C_A_C	0.425	H1	1.00		
		A_A_g_a_A_a	0.179	H2	0.92	(0.71 ,1.17)	0.4842
		A_A_g_a_A_C	0.168	H3	1.08	(0.83 ,1.39)	0.5671
		A_A_A_a_g_C	0.102	H4	0.86	(0.62 ,1.20)	0.3795
		A_A_A_C_A_C	0.098	H5	0.91	(0.66 ,1.25)	0.5476
	0.028	HRare	0.99	(0.57 ,1.73)	0.9721		
IL12A	Block 2	rs2243115-rs583911-rs2243131-rs2243154-rs11927521					
		A_g_A_G_A	0.354	H1	1.00		
		A_A_A_G_g	0.274	H2	1.00	(0.80 ,1.25)	0.9844
		A_A_c_G_A	0.155	H3	0.92	(0.70 ,1.21)	0.5347
		c_A_A_G_g	0.112	H4	0.88	(0.65 ,1.20)	0.4287

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		A_g_A_a_A	0.104	H5	0.93	(0.68 ,1.28)	0.6484
		HRare	0.001	HRare	2.22	(0.36 ,13.92)	0.3930
IL12B	Block 1	rs4921466-rs4921468-rs6870828-rs3181225-rs1368439-rs11574790-rs2853694					
		A_G_A_G_A_G_c	0.291	H1	1.00		
		A_G_A_G_A_G_A	0.230	H2	1.43	(1.11 ,1.83)	0.0053
		A_G_g_G_c_G_c	0.178	H3	1.17	(0.89 ,1.53)	0.2543
		A_a_g_a_A_G_A	0.168	H4	1.14	(0.87 ,1.51)	0.3436
		g_a_g_G_A_a_A	0.115	H5	1.07	(0.78 ,1.48)	0.6590
		HRare	0.018	HRare	0.92	(0.47 ,1.79)	0.7965
IL12B	Block 2	rs2569253-rs3181216					
		A_T	0.540	H1	1.00		
		g_a	0.286	H2	0.79	(0.64 ,0.98)	0.0335
		g_T	0.172	H3	0.90	(0.70 ,1.15)	0.3821
		HRare	0.001	HRare	3.87	(0.50 ,29.93)	0.1954
IL12B	Block 3	rs1433048-rs2546893					
		A_a	0.464	H1	1.00		
		A_G	0.352	H2	1.01	(0.83 ,1.24)	0.8863
		g_G	0.183	H3	0.96	(0.75 ,1.22)	0.7308
		HRare	0.001	HRare	-	-	-
IL12B	Block 4	rs2546890-rs10052709-rs7709212-rs6868898					
		g_G_g_A	0.345	H1	1.00		
		A_G_A_g	0.292	H2	0.80	(0.63 ,1.00)	0.0527
		A_G_A_A	0.204	H3	0.81	(0.63 ,1.04)	0.0955
		g_c_A_A	0.144	H4	0.81	(0.61 ,1.08)	0.1500
		HRare	0.014	HRare	1.28	(0.61 ,2.68)	0.5070
IL7R	Block 1	rs11567694-rs11567697-rs11567701-rs6891095-rs3777090-rs11567762-rs10063294-rs10058453					
		A_A_a_A_A_G_A_A	0.272	H1	1.00		
		g_A_C_A_A_G_A_A	0.254	H2	0.81	(0.63 ,1.02)	0.0781
		A_A_C_A_t_a_g_g	0.156	H3	1.04	(0.79 ,1.37)	0.7644
		A_A_C_g_A_G_g_A	0.137	H4	1.01	(0.75 ,1.34)	0.9701
		A_g_C_A_t_G_g_g	0.095	H5	0.87	(0.62 ,1.21)	0.4113
		A_A_C_A_t_G_g_g	0.078	H6	1.17	(0.83 ,1.67)	0.3703
		HRare	0.008	HRare	1.06	(0.38 ,2.96)	0.9072
IRF4	Block 1	rs9405192-rs1033180					
		G_G	0.703	H1	1.00		
		a_G	0.224	H2	1.08	(0.87 ,1.33)	0.4833
		a_a	0.074	H3	0.94	(0.65 ,1.35)	0.7389
		HRare	0.000	HRare	-	-	-
IRF4	Block 2	rs13208928-rs3778607					
		T_G	0.500	H1	1.00		
		T_a	0.429	H2	1.01	(0.83 ,1.21)	0.9495
		a_a	0.070	H3	0.95	(0.61 ,1.48)	0.8142
		HRare	0.001	HRare	-	-	-
IRF4	Block 3	rs1050975-rs7768807					
		A_A	0.667	H1	1.00		
		A_g	0.246	H2	1.00	(0.81 ,1.24)	0.9948
		g_A	0.086	H3	0.87	(0.61 ,1.23)	0.4241
		HRare	0.001	HRare	-	-	-
IRF4	Block 4	rs12211228-rs1877175-rs6906608					
		G_G_C	0.780	H1	1.00		
		c_a_a	0.147	H2	0.84	(0.64 ,1.09)	0.1952
		G_a_C	0.072	H3	0.72	(0.50 ,1.03)	0.0746
		HRare	0.002	HRare	-	-	-
IRF4	Block 5	rs11757491-rs9378805					
		G_c	0.476	H1	1.00		
		G_A	0.456	H2	1.00	(0.83 ,1.22)	0.9599
		a_A	0.068	H3	0.78	(0.49 ,1.24)	0.2939
		HRare	0.000	HRare	-	-	-
Jak1	Block 1	rs310211-rs2256298					
		A_G	0.676	H1	1.00		
		g_a	0.259	H2	0.93	(0.75 ,1.14)	0.4707
		g_G	0.065	H3	0.89	(0.61 ,1.31)	0.5604
		HRare	0.000	HRare	-	-	-
LIG4	Block 1	rs915047-rs9514825					
		A_G	0.635	H1	1.00		
		A_a	0.201	H2	1.18	(0.94 ,1.46)	0.1469
		g_a	0.164	H3	1.09	(0.85 ,1.40)	0.5160

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		HRare	0.000	HRare	-	-	-	-
LIG4	Block 2	rs868284-rs1151402-rs10131-rs3093772-rs3093748						
		G_a_G_A_G	0.432	H1	1.00			
		G_G_G_A_a	0.184	H2	1.05	(0.82	,1.34)	0.7157
		G_G_G_A_G	0.142	H3	1.21	(0.92	,1.58)	0.1677
		a_G_G_g_G	0.107	H4	1.01	(0.75	,1.36)	0.9637
		G_G_a_A_G	0.092	H5	1.56	(1.15	,2.12)	0.0041
		HRare	0.044	HRare	1.23	(0.78	,1.95)	0.3704
LIG4	Block 3	rs12428162-rs7322498-rs9520823						
		C_A_A	0.353	H1	1.00			
		C_A_c	0.283	H2	1.00	(0.78	,1.28)	0.9994
		g_g_A	0.267	H3	1.17	(0.91	,1.51)	0.2190
		C_g_A	0.097	H4	1.43	(1.06	,1.93)	0.0194
		HRare	0.000	HRare	-	-	-	-
SOCS1	Block 1	rs193778-rs243317						
		A_A	0.464	H1	1.00			
		A_c	0.294	H2	1.16	(0.92	,1.46)	0.2022
		g_A	0.241	H3	1.19	(0.92	,1.53)	0.1835
		HRare	0.001	HRare	-	-	-	-
STAT1	Block 1	rs13035504-rs1168-rs12468579-rs1400657						
		G_a_A_A	0.445	H1	1.00			
		G_G_g_A	0.265	H2	1.33	(1.07	,1.65)	0.0097
		c_G_g_A	0.171	H3	1.18	(0.92	,1.51)	0.1956
		G_G_A_c	0.115	H4	0.97	(0.71	,1.32)	0.8454
		HRare	0.004	HRare	1.51	(0.38	,6.02)	0.5552
STAT1	Block 2	rs16824035-rs13395505-rs17749316-rs2066804						
		G_G_C_G	0.528	H1	1.00			
		G_a_C_a	0.229	H2	1.29	(1.04	,1.60)	0.0211
		a_a_C_G	0.172	H3	1.15	(0.90	,1.47)	0.2574
		G_G_g_G	0.066	H4	1.07	(0.74	,1.54)	0.7207
		HRare	0.005	HRare	0.48	(0.11	,2.02)	0.3153
STAT1	Block 3	rs432757-rs2280234-rs2280233						
		A_G_g	0.455	H1	1.00			
		A_a_A	0.377	H2	1.17	(0.96	,1.42)	0.1208
		c_G_A	0.139	H3	1.19	(0.91	,1.55)	0.2069
		HRare	0.029	HRare	1.24	(0.74	,2.08)	0.4127
STAT1	Block 4	rs7562024-rs34997637						
		G_G	0.606	H1	1.00			
		a_a	0.230	H2	1.08	(0.87	,1.33)	0.4907
		a_G	0.164	H3	1.11	(0.86	,1.42)	0.4231
		HRare	0.000	HRare	-	-	-	-
STAT1	Block 5	rs13029247-rs10173099-rs10199181						
		A_G_T	0.616	H1	1.00			
		g_a_a	0.315	H2	1.11	(0.92	,1.34)	0.2827
		HRare	0.070	HRare	1.21	(0.86	,1.72)	0.2778
STAT1	Block 6	rs13029532-rs1467199-rs17817966						
		A_C_A	0.563	H1	1.00			
		A_g_g	0.234	H2	1.07	(0.86	,1.31)	0.5524
		A_C_g	0.113	H3	1.21	(0.91	,1.59)	0.1851
		c_C_g	0.089	H4	0.89	(0.64	,1.24)	0.4800
		HRare	0.000	HRare	-	-	-	-
STAT3	Block 1	rs1053023-rs1053005						
		A_A	0.801	H1	1.00			
		g_g	0.199	H2	0.81	(0.65	,1.01)	0.0659
		HRare	0.000	HRare	-	-	-	-
STAT3	Block 2	rs4103200-rs9891119-rs9912773-rs12949918-rs17405722						
		G_A_C_A_G	0.588	H1	1.00			
		c_c_g_g_G	0.267	H2	0.85	(0.69	,1.05)	0.1352
		G_c_C_g_a	0.065	H3	0.99	(0.69	,1.41)	0.9536
		G_A_C_g_G	0.053	H4	1.06	(0.71	,1.60)	0.7607
		HRare	0.027	HRare	0.92	(0.54	,1.57)	0.7558
STAT4	Block 1	rs13020076-rs16833177-rs7558921						
		A_A_C	0.600	H1	1.00			
		A_g_C	0.205	H2	1.10	(0.87	,1.38)	0.4174
		A_A_g	0.113	H3	0.79	(0.58	,1.09)	0.1491
		g_A_C	0.081	H4	1.16	(0.81	,1.67)	0.4112
		HRare	0.000	HRare	-	-	-	-

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4	STAT4	Block 2	rs7574608-rs4853540					
5			A_C	0.766	H1	1.00		
6			A_a	0.170	H2	1.19	(0.95 ,1.50)	0.1378
7			t_a	0.062	H3	1.02	(0.70 ,1.49)	0.9229
8			HRare	0.002	HRare	3.64	(0.30 ,44.27)	0.3114
9	STAT4	Block 3	rs3024861-rs932169					
10			A_C	0.659	H1	1.00		
11			t_C	0.264	H2	1.11	(0.91 ,1.36)	0.2976
12			A_g	0.076	H3	1.18	(0.84 ,1.65)	0.3414
13			HRare	0.001	HRare	-	-	-
14	STAT4	Block 4	rs10168266-rs2459611					
15			G_A	0.685	H1	1.00		
16			a_A	0.187	H2	1.15	(0.91 ,1.47)	0.2383
17			G_g	0.127	H3	1.20	(0.90 ,1.60)	0.2232
18			HRare	0.001	HRare	-	-	-
19	STAT4	Block 5	rs7599504-rs4571082-rs17769459					
20			A_A_G	0.560	H1	1.00		
21			A_g_G	0.219	H2	1.02	(0.81 ,1.28)	0.8721
22			g_g_G	0.161	H3	1.10	(0.82 ,1.47)	0.5389
23			A_A_a	0.059	H4	1.36	(0.96 ,1.94)	0.0862
24			HRare	0.001	HRare	-	-	-
25	STAT6	Block 1	rs3024979-rs703817-rs324015-rs3024974-rs3024971-rs324011					
26			A_a_G_G_A_a	0.358	H1	1.00		
27			A_G_a_G_A_G	0.232	H2	0.98	(0.77 ,1.26)	0.9024
28			t_a_G_G_A_G	0.114	H3	0.91	(0.67 ,1.23)	0.5466
29			A_G_G_G_c_G	0.114	H4	1.10	(0.81 ,1.49)	0.5345
30			A_G_G_a_A_G	0.087	H5	0.89	(0.64 ,1.25)	0.5079
31			A_G_G_G_A_G	0.067	H6	0.96	(0.65 ,1.43)	0.8461
32			HRare	0.028	HRare	1.14	(0.64 ,2.04)	0.6479
33	TP63	Block 1	rs6790068-rs9681004					
34			A_A	0.595	H1	1.00		
35			g_g	0.395	H2	1.08	(0.90 ,1.29)	0.4201
36			HRare	0.010	HRare	0.17	(0.02 ,1.28)	0.0860
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73

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**Supplementary Table 4.** Odds Ratios and 95% Confidence Intervals for estimated Haplotypes for BNHL and subtypes (adjusted for age (continuous), se:

Gene	Block	Haplotype	Frequency	hapname	MZL		
					OR	95% CI	p-value
BMF	Block 1	rs3923235-rs16970325					
		A_G	0.624	H1	1.00		
		g_G	0.268	H2	1.03	(0.74 ,1.45)	0.8472
		A_a	0.109	H3	1.43	(0.87 ,2.36)	0.1560
		HRare	0.000	HRare	-	-	-
BMF	Block 2	rs12913170-rs7183977-rs998713-rs546220					
		G_A_A_a	0.418	H1	1.00		
		G_g_g_C	0.331	H2	0.95	(0.68 ,1.32)	0.7547
		a_A_A_C	0.151	H3	0.85	(0.55 ,1.32)	0.4629
		G_A_g_C	0.060	H4	1.84	(1.08 ,3.13)	0.0255
		HRare	0.040	HRare	0.97	(0.48 ,1.97)	0.9383
BMF	Block 3	rs648289-rs10518679					
		g_A	0.450	H1	1.00		
		A_A	0.417	H2	1.06	(0.79 ,1.42)	0.7100
		A_g	0.132	H3	0.85	(0.53 ,1.36)	0.4908
		HRare	0.001	HRare	-	-	-
BMF	Block 4	rs11634257-rs11858141-rs675173					
		A_g_G	0.429	H1	1.00		
		A_A_a	0.309	H2	0.88	(0.63 ,1.25)	0.4833
		t_A_G	0.252	H3	0.91	(0.64 ,1.30)	0.5982
		HRare	0.010	HRare	0.37	(0.05 ,2.81)	0.3388
BMF	Block 5	rs537455-rs11630670					
		A_G	0.534	H1	1.00		
		c_a	0.265	H2	0.86	(0.59 ,1.25)	0.4273
		A_a	0.201	H3	0.77	(0.52 ,1.15)	0.1969
		HRare	0.000	HRare	-	-	-
IFNGR1	Block 1	rs7759040-rs3799488-rs1327475					
		A_A_G	0.564	H1	1.00		
		A_A_a	0.189	H2	0.66	(0.43 ,1.00)	0.0523
		t_A_G	0.126	H3	1.27	(0.85 ,1.88)	0.2393
		t_g_G	0.121	H4	1.05	(0.68 ,1.61)	0.8299
		HRare	0.001	HRare	-	-	-
IFNG	Block 1	rs2069727-rs2069718					
		g_G	0.482	H1	1.00		
		A_a	0.375	H2	0.94	(0.70 ,1.28)	0.7069
		A_G	0.142	H3	0.98	(0.64 ,1.51)	0.9432
		HRare	0.000	HRare	-	-	-
IFNG	Block 2	rs2069716-rs6581795-rs12306852					
		A_A_C	0.509	H1	1.00		
		A_g_C	0.264	H2	0.97	(0.67 ,1.40)	0.8719
		A_A_g	0.155	H3	0.97	(0.60 ,1.56)	0.8883
		g_A_C	0.072	H4	0.73	(0.39 ,1.34)	0.3065
		HRare	0.001	HRare	-	-	-
IL10	Block 1	rs17015767-rs1800871-rs1800872-rs2222202-rs3021094-rs1554286-rs3024509-rs3024505-rs6673928-rs4844553-rs754837					
		G_G_C_G_A_G_A_G_C_G_C	0.309	H1	1.00		
		c_G_C_a_A_G_A_G_a_G_C	0.194	H2	0.96	(0.63 ,1.46)	0.8503
		G_G_C_a_A_G_A_a_C_G_C	0.149	H3	1.30	(0.87 ,1.95)	0.1982
		G_a_a_G_A_a_A_G_C_G_C	0.125	H4	0.83	(0.50 ,1.37)	0.4601
		G_G_C_a_A_G_g_G_C_a_a	0.070	H5	1.12	(0.66 ,1.92)	0.6668
		G_a_a_G_c_a_A_G_C_G_C	0.064	H6	0.92	(0.48 ,1.77)	0.8132
			0.090	HRare	1.16	(0.69 ,1.95)	0.5654
IL12A	Block 1	rs9811792-rs7372767-rs4680534-rs6441282-rs6800657-rs747825					
		g_g_A_C_A_C	0.425	H1	1.00		
		A_A_g_a_A_a	0.179	H2	0.90	(0.60 ,1.36)	0.6200
		A_A_g_a_A_C	0.168	H3	1.24	(0.83 ,1.85)	0.2897
		A_A_a_a_g_C	0.102	H4	1.28	(0.80 ,2.05)	0.3006
		A_A_C_A_C	0.098	H5	1.25	(0.77 ,2.02)	0.3607
	0.028	HRare	1.09	(0.46 ,2.56)	0.8517		
IL12A	Block 2	rs2243115-rs583911-rs2243131-rs2243154-rs11927521					
		A_g_A_G_A	0.354	H1	1.00		
		A_A_A_G_g	0.274	H2	0.74	(0.51 ,1.06)	0.1011
		A_A_c_G_A	0.155	H3	1.03	(0.69 ,1.55)	0.8877
		c_A_A_G_g	0.112	H4	0.76	(0.47 ,1.25)	0.2832

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		A_g_A_a_A	0.104	H5	0.58	(0.33	,1.01)	0.0537
		HRare	0.001	HRare	-	-	-	-
IL12B	Block 1	rs4921466-rs4921468-rs6870828-rs3181225-rs1368439-rs11574790-rs2853694						
		A_G_A_G_A_G_c	0.291	H1	1.00			
		A_G_A_G_A_G_A	0.230	H2	1.07	(0.71	,1.60)	0.7473
		A_G_g_G_c_G_c	0.178	H3	1.34	(0.90	,2.01)	0.1535
		A_a_g_a_A_G_A	0.168	H4	1.19	(0.77	,1.82)	0.4350
		g_a_g_G_A_a_A	0.115	H5	1.03	(0.63	,1.69)	0.9063
		HRare	0.018	HRare	0.37	(0.09	,1.56)	0.1751
IL12B	Block 2	rs2569253-rs3181216						
		A_T	0.540	H1	1.00			
		g_a	0.286	H2	0.93	(0.66	,1.31)	0.6875
		g_T	0.172	H3	1.00	(0.68	,1.47)	0.9963
		HRare	0.001	HRare	-	-	-	-
IL12B	Block 3	rs1433048-rs2546893						
		A_a	0.464	H1	1.00			
		A_G	0.352	H2	1.06	(0.78	,1.45)	0.7018
		g_G	0.183	H3	1.30	(0.91	,1.88)	0.1530
		HRare	0.001	HRare	-	-	-	-
IL12B	Block 4	rs2546890-rs10052709-rs7709212-rs6868898						
		g_G_g_A	0.345	H1	1.00			
		A_G_A_g	0.292	H2	1.08	(0.74	,1.56)	0.6953
		A_G_A_A	0.204	H3	1.31	(0.90	,1.92)	0.1637
		g_c_A_A	0.144	H4	1.07	(0.68	,1.67)	0.7716
		HRare	0.014	HRare	1.12	(0.32	,3.87)	0.8586
IL7R	Block 1	rs11567694-rs11567697-rs11567701-rs6891095-rs3777090-rs11567762-rs10063294-rs10058453						
		A_A_a_A_A_G_A_A	0.272	H1	1.00			
		g_A_C_A_A_G_A_A	0.254	H2	1.06	(0.73	,1.55)	0.7565
		A_A_C_A_t_a_g_g	0.156	H3	1.53	(1.02	,2.31)	0.0408
		A_A_C_g_A_G_g_A	0.137	H4	0.79	(0.48	,1.29)	0.3402
		A_g_C_A_t_G_g_g	0.095	H5	0.81	(0.47	,1.39)	0.4450
		A_A_C_A_t_G_g_g	0.078	H6	0.68	(0.34	,1.37)	0.2841
		HRare	0.008	HRare	1.93	(0.57	,6.54)	0.2933
IRF4	Block 1	rs9405192-rs1033180						
		G_G	0.703	H1	1.00			
		a_G	0.224	H2	1.22	(0.88	,1.68)	0.2332
		a_a	0.074	H3	1.93	(1.22	,3.06)	0.0049
		HRare	0.000	HRare	-	-	-	-
IRF4	Block 2	rs13208928-rs3778607						
		T_G	0.500	H1	1.00			
		T_a	0.429	H2	1.42	(1.07	,1.88)	0.0166
		a_a	0.070	H3	0.68	(0.34	,1.35)	0.2691
		HRare	0.001	HRare	-	-	-	-
IRF4	Block 3	rs1050975-rs7768807						
		A_A	0.667	H1	1.00			
		A_g	0.246	H2	0.84	(0.58	,1.22)	0.3639
		g_A	0.086	H3	1.23	(0.73	,2.08)	0.4402
		HRare	0.001	HRare	-	-	-	-
IRF4	Block 4	rs12211228-rs1877175-rs6906608						
		G_G_C	0.780	H1	1.00			
		c_a_a	0.147	H2	1.35	(0.94	,1.95)	0.1076
		G_a_C	0.072	H3	0.66	(0.36	,1.21)	0.1812
		HRare	0.002	HRare	-	-	-	-
IRF4	Block 5	rs11757491-rs9378805						
		G_c	0.476	H1	1.00			
		G_A	0.456	H2	1.41	(1.06	,1.89)	0.0195
		a_A	0.068	H3	0.75	(0.39	,1.44)	0.3943
		HRare	0.000	HRare	-	-	-	-
Jak1	Block 1	rs310211-rs2256298						
		A_G	0.676	H1	1.00			
		g_a	0.259	H2	0.76	(0.54	,1.07)	0.1158
		g_G	0.065	H3	0.55	(0.26	,1.14)	0.1076
		HRare	0.000	HRare	-	-	-	-
LIG4	Block 1	rs915047-rs9514825						
		A_G	0.635	H1	1.00			
		A_a	0.201	H2	1.25	(0.88	,1.77)	0.2108
		g_a	0.164	H3	1.28	(0.88	,1.87)	0.1966

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		HRare	0.000	HRare				
LIG4	Block 2	rs868284-rs1151402-rs10131-rs3093772-rs3093748						
		G_a_G_A_G	0.432	H1	1.00			
		G_G_G_A_a	0.184	H2	0.98	(0.66	,1.45)	0.9059
		G_G_G_A_G	0.142	H3	1.13	(0.74	,1.73)	0.5654
		a_G_G_g_G	0.107	H4	0.96	(0.59	,1.55)	0.8719
		G_G_a_A_G	0.092	H5	1.32	(0.80	,2.16)	0.2811
		HRare	0.044	HRare	1.46	(0.77	,2.77)	0.2453
LIG4	Block 3	rs12428162-rs7322498-rs9520823						
		C_A_A	0.353	H1	1.00			
		C_A_c	0.283	H2	1.09	(0.73	,1.62)	0.6742
		g_g_A	0.267	H3	1.14	(0.76	,1.72)	0.5340
		C_g_A	0.097	H4	1.54	(0.96	,2.46)	0.0707
		HRare	0.000	HRare	-	-	-	-
SOCS1	Block 1	rs193778-rs243317						
		A_A	0.464	H1	1.00			
		A_c	0.294	H2	0.85	(0.61	,1.20)	0.3581
		g_A	0.241	H3	1.04	(0.74	,1.47)	0.8223
		HRare	0.001	HRare	-	-	-	-
STAT1	Block 1	rs13035504-rs1168-rs12468579-rs1400657						
		G_a_A_A	0.445	H1	1.00			
		G_G_g_A	0.265	H2	1.21	(0.87	,1.68)	0.2675
		c_G_g_A	0.171	H3	0.75	(0.48	,1.16)	0.1914
		G_G_A_c	0.115	H4	1.00	(0.64	,1.59)	0.9843
		HRare	0.004	HRare	1.36	(0.16	,11.46)	0.7759
STAT1	Block 2	rs16824035-rs13395505-rs17749316-rs2066804						
		G_G_C_G	0.528	H1	1.00			
		G_a_C_a	0.229	H2	1.17	(0.83	,1.65)	0.3802
		a_a_C_G	0.172	H3	0.77	(0.50	,1.18)	0.2261
		G_G_g_G	0.066	H4	0.90	(0.49	,1.66)	0.7435
		HRare	0.005	HRare	-	-	-	-
STAT1	Block 3	rs432757-rs2280234-rs2280233						
		A_G_g	0.455	H1	1.00			
		A_a_A	0.377	H2	1.12	(0.84	,1.52)	0.4385
		c_G_A	0.139	H3	0.71	(0.44	,1.15)	0.1627
		HRare	0.029	HRare	0.98	(0.42	,2.28)	0.9682
STAT1	Block 4	rs7562024-rs34997637						
		G_G	0.606	H1	1.00			
		a_a	0.230	H2	1.18	(0.86	,1.64)	0.3080
		a_G	0.164	H3	1.21	(0.83	,1.76)	0.3260
		HRare	0.000	HRare	-	-	-	-
STAT1	Block 5	rs13029247-rs10173099-rs10199181						
		A_G_T	0.616	H1	1.00			
		g_a_a	0.315	H2	0.92	(0.68	,1.25)	0.5924
		HRare	0.070	HRare	1.05	(0.60	,1.84)	0.8714
STAT1	Block 6	rs13029532-rs1467199-rs17817966						
		A_C_A	0.563	H1	1.00			
		A_g_g	0.234	H2	1.07	(0.76	,1.51)	0.6807
		A_C_g	0.113	H3	0.73	(0.43	,1.23)	0.2313
		c_C_g	0.089	H4	1.38	(0.81	,2.34)	0.2330
		HRare	0.000	HRare	-	-	-	-
STAT3	Block 1	rs1053023-rs1053005						
		A_A	0.801	H1	1.00			
		g_g	0.199	H2	0.64	(0.44	,0.93)	0.0209
		HRare	0.000	HRare	-	-	-	-
STAT3	Block 2	rs4103200-rs9891119-rs9912773-rs12949918-rs17405722						
		G_A_C_A_G	0.588	H1	1.00			
		c_c_g_g_G	0.267	H2	0.64	(0.45	,0.90)	0.0099
		G_c_C_g_a	0.065	H3	0.74	(0.40	,1.34)	0.3172
		G_A_C_g_G	0.053	H4	0.87	(0.45	,1.71)	0.6946
		HRare	0.027	HRare	1.14	(0.57	,2.31)	0.7097
STAT4	Block 1	rs13020076-rs16833177-rs7558921						
		A_A_C	0.600	H1	1.00			
		A_g_C	0.205	H2	0.99	(0.68	,1.44)	0.9604
		A_A_g	0.113	H3	1.03	(0.66	,1.60)	0.9062
		g_A_C	0.081	H4	0.32	(0.13	,0.80)	0.0140
		HRare	0.000	HRare	-	-	-	-



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4	STAT4	Block 2	rs7574608-rs4853540					
5			A_C	0.766	H1	1.00		
6			A_a	0.170	H2	0.62	(0.40 ,0.96)	0.0339
7			t_a	0.062	H3	2.37	(0.95 ,5.95)	0.0652
8			HRare	0.002	HRare	-	-	-
9	STAT4	Block 3	rs3024861-rs932169					
10			A_C	0.659	H1	1.00		
11			t_C	0.264	H2	1.09	(0.79 ,1.51)	0.5888
12			A_g	0.076	H3	0.91	(0.46 ,1.80)	0.7806
13			HRare	0.001	HRare	-	-	-
14	STAT4	Block 4	rs10168266-rs2459611					
15			G_A	0.685	H1	1.00		
16			a_A	0.187	H2	1.10	(0.76 ,1.59)	0.6182
17			G_g	0.127	H3	0.86	(0.52 ,1.40)	0.5359
18			HRare	0.001	HRare	-	-	-
19	STAT4	Block 5	rs7599504-rs4571082-rs17769459					
20			A_A_G	0.560	H1	1.00		
21			A_g_G	0.219	H2	1.13	(0.80 ,1.59)	0.4988
22			g_g_G	0.161	H3	1.19	(0.81 ,1.74)	0.3714
23			A_A_a	0.059	H4	1.12	(0.61 ,2.03)	0.7207
24			HRare	0.001	HRare	-	-	-
25	STAT6	Block 1	rs3024979-rs703817-rs324015-rs3024974-rs3024971-rs324011					
26			A_a_G_G_A_a	0.358	H1	1.00		
27			A_G_a_G_A_G	0.232	H2	1.35	(0.94 ,1.95)	0.1028
28			t_a_G_G_A_G	0.114	H3	0.97	(0.60 ,1.57)	0.9134
29			A_G_G_G_c_G	0.114	H4	0.94	(0.56 ,1.55)	0.7999
30			A_G_G_a_A_G	0.087	H5	0.74	(0.42 ,1.31)	0.3075
31			A_G_G_G_A_G	0.067	H6	0.85	(0.44 ,1.65)	0.6313
32			HRare	0.028	HRare	0.77	(0.26 ,2.24)	0.6322
33	TP63	Block 1	rs6790068-rs9681004					
34			A_A	0.595	H1	1.00		
35			g_g	0.395	H2	0.92	(0.69 ,1.23)	0.5915
36			HRare	0.010	HRare	2.44	(0.89 ,6.70)	0.0840
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Supplementary Table 4. Odds Ratios and 95% Confidence Intervals for estimated Haplotypes for BNHL and subtypes (adjusted for age (continuous), se:

Gene	Block	Haplotype	Frequency	hapname	MCL		
					OR	95% CI	p-value
BMF	Block 1	rs3923235-rs16970325					
		A_G	0.624	H1	1.00		
		g_G	0.268	H2	0.89	(0.54, 1.46)	0.6439
		A_a	0.109	H3	0.66	(0.25, 1.75)	0.4054
		HRare	0.000	HRare	-	-	-
BMF	Block 2	rs12913170-rs7183977-rs998713-rs546220					
		G_A_A_a	0.418	H1	1.00		
		G_g_g_C	0.331	H2	0.78	(0.48, 1.28)	0.3247
		a_A_A_C	0.151	H3	0.95	(0.53, 1.71)	0.8596
		G_A_g_C	0.060	H4	0.58	(0.17, 1.97)	0.3857
		HRare	0.040	HRare	0.84	(0.26, 2.74)	0.7701
BMF	Block 3	rs648289-rs10518679					
		g_A	0.450	H1	1.00		
		A_A	0.417	H2	0.70	(0.44, 1.11)	0.1266
		A_g	0.132	H3	0.76	(0.35, 1.65)	0.4802
		HRare	0.001	HRare	-	-	-
BMF	Block 4	rs11634257-rs11858141-rs675173					
		A_g_G	0.429	H1	1.00		
		A_A_a	0.309	H2	0.97	(0.60, 1.58)	0.9100
		t_A_G	0.252	H3	0.81	(0.47, 1.38)	0.4359
		HRare	0.010	HRare	1.05	(0.13, 8.42)	0.9645
BMF	Block 5	rs537455-rs11630670					
		A_G	0.534	H1	1.00		
		c_a	0.265	H2	1.06	(0.64, 1.73)	0.8276
		A_a	0.201	H3	0.71	(0.39, 1.30)	0.2688
		HRare	0.000	HRare	-	-	-
IFNGR1	Block 1	rs7759040-rs3799488-rs1327475					
		A_A_G	0.564	H1	1.00		
		A_A_a	0.189	H2	0.83	(0.47, 1.45)	0.5129
		t_A_G	0.126	H3	0.70	(0.20, 2.42)	0.5708
		t_g_G	0.121	H4	1.00	(0.52, 1.95)	0.9922
		HRare	0.001	HRare	-	-	-
IFNG	Block 1	rs2069727-rs2069718					
		g_G	0.482	H1	1.00		
		A_a	0.375	H2	0.77	(0.48, 1.25)	0.2932
		A_G	0.142	H3	0.69	(0.34, 1.41)	0.3111
		HRare	0.000	HRare	-	-	-
IFNG	Block 2	rs2069716-rs6581795-rs12306852					
		A_A_C	0.509	H1	1.00		
		A_g_C	0.264	H2	1.15	(0.69, 1.94)	0.5920
		A_A_g	0.155	H3	0.90	(0.40, 2.05)	0.8052
		g_A_C	0.072	H4	1.54	(0.73, 3.26)	0.2577
		HRare	0.001	HRare	-	-	-
IL10	Block 1	rs17015767-rs1800871-rs1800872-rs2222202-rs3021094-rs1554286-rs3024509-rs3024505-rs6673928-rs4844553-rs754837					
		G_G_C_G_A_G_A_G_C_G_C	0.309	H1	1.00		
		c_G_C_a_A_G_A_G_a_G_C	0.194	H2	0.81	(0.46, 1.41)	0.4538
		G_G_C_a_A_G_A_a_C_G_C	0.149	H3	0.63	(0.33, 1.22)	0.1731
		G_a_a_G_A_a_A_G_C_G_C	0.125	H4	0.60	(0.28, 1.30)	0.1956
		G_G_C_a_A_G_g_G_C_a_a	0.070	H5	0.87	(0.37, 2.04)	0.7521
		G_a_a_G_c_a_A_G_C_G_C	0.064	H6	0.56	(0.19, 1.65)	0.2917
			0.090	HRare	0.52	(0.22, 1.27)	0.1526
IL12A	Block 1	rs9811792-rs7372767-rs4680534-rs6441282-rs6800657-rs747825					
		g_g_A_C_A_C	0.425	H1	1.00		
		A_A_g_a_A_a	0.179	H2	0.96	(0.52, 1.79)	0.9010
		A_A_g_a_A_C	0.168	H3	1.63	(0.93, 2.85)	0.0891
		A_A_a_a_g_C	0.102	H4	1.42	(0.75, 2.71)	0.2844
		A_A_C_A_C	0.098	H5	1.14	(0.54, 2.41)	0.7376
	0.028	HRare	1.18	(0.28, 5.09)	0.8207		
IL12A	Block 2	rs2243115-rs583911-rs2243131-rs2243154-rs11927521					
		A_g_A_G_A	0.354	H1	1.00		
		A_A_A_G_g	0.274	H2	1.15	(0.68, 1.93)	0.6083
		A_A_c_G_A	0.155	H3	1.18	(0.65, 2.11)	0.5884
		c_A_A_G_g	0.112	H4	0.87	(0.41, 1.83)	0.7100

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		A_g_A_a_A	0.104	H5	0.54	(0.21	,1.42)	0.2101
		HRare	0.001	HRare	-	-	-	-
IL12B	Block 1	rs4921466-rs4921468-rs6870828-rs3181225-rs1368439-rs11574790-rs2853694						
		A_G_A_G_A_G_c	0.291	H1	1.00			
		A_G_A_G_A_G_A	0.230	H2	0.92	(0.50	,1.69)	0.7913
		A_G_g_G_c_G_c	0.178	H3	1.03	(0.56	,1.89)	0.9236
		A_a_g_a_A_G_A	0.168	H4	1.20	(0.65	,2.19)	0.5634
		g_a_g_G_A_a_A	0.115	H5	0.97	(0.46	,2.06)	0.9453
		HRare	0.018	HRare	-	-	-	-
IL12B	Block 2	rs2569253-rs3181216						
		A_T	0.540	H1	1.00			
		g_a	0.286	H2	1.07	(0.67	,1.72)	0.7804
		g_T	0.172	H3	1.20	(0.69	,2.08)	0.5214
		HRare	0.001	HRare	-	-	-	-
IL12B	Block 3	rs1433048-rs2546893						
		A_a	0.464	H1	1.00			
		A_G	0.352	H2	0.82	(0.49	,1.37)	0.4489
		g_G	0.183	H3	1.04	(0.57	,1.89)	0.8948
		HRare	0.001	HRare	-	-	-	-
IL12B	Block 4	rs2546890-rs10052709-rs7709212-rs6868898						
		g_G_g_A	0.345	H1	1.00			
		A_G_A_g	0.292	H2	1.15	(0.68	,1.95)	0.5893
		A_G_A_A	0.204	H3	1.12	(0.61	,2.05)	0.7169
		g_c_A_A	0.144	H4	0.96	(0.47	,1.96)	0.9005
		HRare	0.014	HRare	1.12	(0.14	,8.96)	0.9130
IL7R	Block 1	rs11567694-rs11567697-rs11567701-rs6891095-rs3777090-rs11567762-rs10063294-rs10058453						
		A_A_a_A_A_G_A_A	0.272	H1	1.00			
		g_A_C_A_A_G_A_A	0.254	H2	1.24	(0.71	,2.18)	0.4478
		A_A_C_A_t_a_g_g	0.156	H3	1.33	(0.70	,2.51)	0.3807
		A_A_C_g_A_G_g_A	0.137	H4	1.54	(0.78	,3.02)	0.2123
		A_g_C_A_t_G_g_g	0.095	H5	1.02	(0.46	,2.28)	0.9521
		A_A_C_A_t_G_g_g	0.078	H6	0.82	(0.31	,2.20)	0.6975
		HRare	0.008	HRare	-	-	-	-
IRF4	Block 1	rs9405192-rs1033180						
		G_G	0.703	H1	1.00			
		a_G	0.224	H2	1.29	(0.79	,2.08)	0.3062
		a_a	0.074	H3	1.37	(0.65	,2.91)	0.4044
		HRare	0.000	HRare	-	-	-	-
IRF4	Block 2	rs13208928-rs3778607						
		T_G	0.500	H1	1.00			
		T_a	0.429	H2	0.93	(0.61	,1.43)	0.7352
		a_a	0.070	H3	1.29	(0.60	,2.75)	0.5143
		HRare	0.001	HRare	-	-	-	-
IRF4	Block 3	rs1050975-rs7768807						
		A_A	0.667	H1	1.00			
		A_g	0.246	H2	1.30	(0.81	,2.10)	0.2724
		g_A	0.086	H3	1.48	(0.68	,3.20)	0.3206
		HRare	0.001	HRare	-	-	-	-
IRF4	Block 4	rs12211228-rs1877175-rs6906608						
		G_G_C	0.780	H1	1.00			
		c_a_a	0.147	H2	0.62	(0.30	,1.28)	0.1949
		G_a_C	0.072	H3	1.22	(0.60	,2.51)	0.5820
		HRare	0.002	HRare	-	-	-	0.9893
IRF4	Block 5	rs11757491-rs9378805						
		G_c	0.476	H1	1.00			
		G_A	0.456	H2	0.94	(0.61	,1.45)	0.7795
		a_A	0.068	H3	1.31	(0.62	,2.76)	0.4791
		HRare	0.000	HRare	-	-	-	-
Jak1	Block 1	rs310211-rs2256298						
		A_G	0.676	H1	1.00			
		g_a	0.259	H2	1.27	(0.80	,2.01)	0.3202
		g_G	0.065	H3	1.76	(0.87	,3.59)	0.1175
		HRare	0.000	HRare	-	-	-	-
LIG4	Block 1	rs915047-rs9514825						
		A_G	0.635	H1	1.00			
		A_a	0.201	H2	1.20	(0.73	,1.95)	0.4750
		g_a	0.164	H3	0.09	(0.01	,0.65)	0.0169

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		HRare	0.000	HRare	-	-	-	-
LIG4	Block 2	rs868284-rs1151402-rs10131-rs3093772-rs3093748						
		G_a_G_A_G	0.432	H1	1.00			
		G_G_G_A_a	0.184	H2	0.44	(0.22	,0.87)	0.0181
		G_G_G_A_G	0.142	H3	0.35	(0.15	,0.83)	0.0168
		a_G_G_g_G	0.107	H4	0.60	(0.29	,1.27)	0.1841
		G_G_a_A_G	0.092	H5	1.40	(0.77	,2.54)	0.2696
		HRare	0.044	HRare	0.39	(0.09	,1.67)	0.2039
LIG4	Block 3	rs12428162-rs7322498-rs9520823						
		C_A_A	0.353	H1	1.00			
		C_A_c	0.283	H2	1.40	(0.82	,2.40)	0.2144
		g_g_A	0.267	H3	0.66	(0.32	,1.38)	0.2739
		C_g_A	0.097	H4	1.84	(0.98	,3.44)	0.0559
		HRare	0.000	HRare	-	-	-	-
SOCS1	Block 1	rs193778-rs243317						
		A_A	0.464	H1	1.00			
		A_c	0.294	H2	0.92	(0.55	,1.53)	0.7413
		g_A	0.241	H3	1.31	(0.76	,2.24)	0.3298
		HRare	0.001	HRare	-	-	-	-
STAT1	Block 1	rs13035504-rs1168-rs12468579-rs1400657						
		G_a_A_A	0.445	H1	1.00			
		G_G_g_A	0.265	H2	1.08	(0.64	,1.80)	0.7791
		c_G_g_A	0.171	H3	0.74	(0.40	,1.38)	0.3380
		G_G_A_c	0.115	H4	0.84	(0.40	,1.77)	0.6510
		HRare	0.004	HRare	-	-	-	-
STAT1	Block 2	rs16824035-rs13395505-rs17749316-rs2066804						
		G_G_C_G	0.528	H1	1.00			
		G_a_C_a	0.229	H2	0.91	(0.53	,1.56)	0.7252
		a_a_C_G	0.172	H3	0.69	(0.37	,1.29)	0.2501
		G_G_g_G	0.066	H4	0.75	(0.32	,1.77)	0.5094
		HRare	0.005	HRare	-	-	-	-
STAT1	Block 3	rs432757-rs2280234-rs2280233						
		A_G_g	0.455	H1	1.00			
		A_a_A	0.377	H2	0.88	(0.55	,1.41)	0.5976
		c_G_A	0.139	H3	0.83	(0.44	,1.57)	0.5613
		HRare	0.029	HRare	0.30	(0.04	,2.22)	0.2387
STAT1	Block 4	rs7562024-rs34997637						
		G_G	0.606	H1	1.00			
		a_a	0.230	H2	0.76	(0.44	,1.31)	0.3253
		a_G	0.164	H3	1.06	(0.59	,1.90)	0.8570
		HRare	0.000	HRare	-	-	-	-
STAT1	Block 5	rs13029247-rs10173099-rs10199181						
		A_G_T	0.616	H1	1.00			
		g_a_a	0.315	H2	0.60	(0.37	,1.00)	0.0478
		HRare	0.070	HRare	1.11	(0.50	,2.47)	0.7899
STAT1	Block 6	rs13029532-rs1467199-rs17817966						
		A_C_A	0.563	H1	1.00			
		A_g_g	0.234	H2	0.60	(0.35	,1.04)	0.0676
		A_C_g	0.113	H3	0.40	(0.17	,0.95)	0.0388
		c_C_g	0.089	H4	0.62	(0.26	,1.46)	0.2728
		HRare	0.000	HRare	-	-	-	-
STAT3	Block 1	rs1053023-rs1053005						
		A_A	0.801	H1	1.00			
		g_g	0.199	H2	1.27	(0.79	,2.06)	0.3235
		HRare	0.000	HRare	-	-	-	-
STAT3	Block 2	rs4103200-rs9891119-rs9912773-rs12949918-rs17405722						
		G_A_C_A_G	0.588	H1	1.00			
		c_c_g_g_G	0.267	H2	1.57	(0.99	,2.47)	0.0530
		G_c_C_g_a	0.065	H3	1.62	(0.75	,3.50)	0.2230
		G_A_C_g_G	0.053	H4	0.68	(0.20	,2.26)	0.5259
		HRare	0.027	HRare	1.07	(0.25	,4.51)	0.9282
STAT4	Block 1	rs13020076-rs16833177-rs7558921						
		A_A_C	0.600	H1	1.00			
		A_g_C	0.205	H2	0.65	(0.35	,1.20)	0.1687
		A_A_g	0.113	H3	0.73	(0.35	,1.51)	0.3947
		g_A_C	0.081	H4	0.55	(0.21	,1.43)	0.2163
		HRare	0.000	HRare	-	-	-	-

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STAT4	Block 2	rs7574608-rs4853540						
		A_C	0.766	H1	1.00			
		A_a	0.170	H2	0.91	(0.51	,1.62)	0.7404
		t_a	0.062	H3	1.81	(0.47	,6.94)	0.3839
		HRare	0.002	HRare	-	-	-	-
STAT4	Block 3	rs3024861-rs932169						
		A_C	0.659	H1	1.00			
		t_C	0.264	H2	0.68	(0.39	,1.19)	0.1742
		A_g	0.076	H3	1.00	(0.45	,2.23)	0.9914
		HRare	0.001	HRare	-	-	-	-
STAT4	Block 4	rs10168266-rs2459611						
		G_A	0.685	H1	1.00			
		a_A	0.187	H2	0.71	(0.39	,1.29)	0.2610
		G_g	0.127	H3	0.71	(0.33	,1.52)	0.3778
		HRare	0.001	HRare	-	-	-	-
STAT4	Block 5	rs7599504-rs4571082-rs17769459						
		A_A_G	0.560	H1	1.00			
		A_g_G	0.219	H2	1.04	(0.62	,1.75)	0.8882
		g_g_G	0.161	H3	0.91	(0.42	,1.97)	0.8021
		A_A_a	0.059	H4	1.12	(0.51	,2.47)	0.7849
		HRare	0.001	HRare	-	-	-	-
STAT6	Block 1	rs3024979-rs703817-rs324015-rs3024974-rs3024971-rs324011						
		A_a_G_G_A_a	0.358	H1	1.00			
		A_G_a_G_A_G	0.232	H2	0.62	(0.33	,1.17)	0.1399
		t_a_G_G_A_G	0.114	H3	1.17	(0.60	,2.30)	0.6421
		A_G_G_G_c_G	0.114	H4	0.90	(0.42	,1.94)	0.7938
		A_G_G_a_A_G	0.087	H5	0.96	(0.45	,2.08)	0.9271
		A_G_G_G_A_G	0.067	H6	1.84	(0.84	,4.02)	0.1253
		HRare	0.028	HRare	1.85	(0.67	,5.16)	0.2375
TP63	Block 1	rs6790068-rs9681004						
		A_A	0.595	H1	1.00			
		g_g	0.395	H2	1.06	(0.69	,1.63)	0.7873
		HRare	0.010	HRare	1.03	(0.13	,8.18)	0.9789

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x and study center)

For Peer Review

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Supplementary Table 4. Odds Ratios and 95% Confidence Intervals for estimated Haplotypes for HL (adjusted for age (continuous), sex and study center)

Gene	Block	Haplotype	Frequency	Hapname	HL		
					OR	95% CI	p-value
BMF	Block 1	rs3923235-rs16970325					
		A_G	0.628	H1	1.00		
		g_G	0.271	H2	1.33	(1.03, 1.72)	0.0282
		A_a	0.101	H3	1.67	(1.12, 2.48)	0.0119
		HRare	0.000	HRare	-	-	-
BMF	Block 2	rs12913170-rs7183977-rs998713-rs546220					
		G_A_A_a	0.418	H1	1.00		
		G_g_g_C	0.335	H2	1.31	(1.03, 1.67)	0.0296
		a_A_A_C	0.151	H3	0.99	(0.72, 1.37)	0.9593
		G_A_g_C	0.056	H4	1.25	(0.79, 1.97)	0.3354
		HRare	0.040	HRare	1.28	(0.77, 2.12)	0.3367
BMF	Block 3	rs648289-rs10518679					
		g_A	0.450	H1	1.00		
		A_A	0.413	H2	1.40	(1.11, 1.75)	0.0040
		A_g	0.136	H3	1.07	(0.76, 1.49)	0.7089
		HRare	0.001	HRare	-	-	-
BMF	Block 4	rs11634257-rs11858141-rs675173					
		A_g_G	0.424	H1	1.00		
		A_A_a	0.313	H2	1.03	(0.80, 1.32)	0.8255
		t_A_G	0.254	H3	1.05	(0.81, 1.36)	0.7258
		HRare	0.010	HRare	0.65	(0.21, 2.07)	0.4692
BMF	Block 5	rs537455-rs11630670					
		A_G	0.538	H1	1.00		
		c_a	0.265	H2	0.99	(0.76, 1.29)	0.9497
		A_a	0.197	H3	0.78	(0.58, 1.05)	0.1030
		HRare	0.000	HRare	-	-	-
IFNGR1	Block 1	rs7759040-rs3799488-rs1327475					
		A_A_G	0.563	H1	1.00		
		A_A_a	0.182	H2	0.96	(0.72, 1.29)	0.7904
		t_A_G	0.129	H3	0.92	(0.66, 1.28)	0.6286
		t_g_G	0.125	H4	0.83	(0.60, 1.15)	0.2624
		HRare	0.001	HRare	-	-	-
IFNG	Block 1	rs2069727-rs2069718					
		g_G	0.467	H1	1.00		
		A_a	0.388	H2	1.34	(1.07, 1.68)	0.0119
		A_G	0.144	H3	1.13	(0.79, 1.59)	0.5045
		HRare	0.000	HRare	-	-	-
IFNG	Block 2	rs2069716-rs6581795-rs12306852					
		A_A_C	0.496	H1	1.00		
		A_g_C	0.278	H2	1.48	(1.12, 1.94)	0.0054
		A_A_g	0.157	H3	1.21	(0.86, 1.71)	0.2756
		g_A_C	0.069	H4	0.85	(0.52, 1.38)	0.5112
		HRare	0.000	HRare	-	-	-
IL10	Block 1	rs17015767-rs1800871-rs1800872-rs2222202-rs3021094-rs1554286-rs3024509-rs3024505-rs6673928-rs4844553-rs7548373					
		G_G_C_G_A_G_A_G_C_G_C	0.309	H1	1.00		
		c_G_C_a_A_G_A_G_a_G_C	0.194	H2	0.86	(0.63, 1.16)	0.3175
		G_G_C_a_A_G_A_a_C_G_C	0.152	H3	1.02	(0.74, 1.41)	0.9004
		G_a_a_G_A_a_A_G_C_G_C	0.128	H4	1.14	(0.82, 1.60)	0.4332
		G_G_C_a_A_G_g_G_C_a_a	0.066	H5	0.71	(0.44, 1.15)	0.1663
		G_a_a_G_c_a_A_G_C_G_C	0.065	H6	0.89	(0.56, 1.40)	0.6156
			0.085	HRare	0.71	(0.46, 1.08)	0.1091
				HRare			
IL12A	Block 1	rs9811792-rs7372767-rs4680534-rs6441282-rs6800657-rs747825					
		g_g_A_C_A_C	0.413	H1	1.00		
		A_A_g_a_A_a	0.189	H2	0.91	(0.68, 1.21)	0.5162
		A_A_g_a_A_C	0.161	H3	0.89	(0.65, 1.22)	0.4695
		A_A_A_a_g_C	0.107	H4	0.87	(0.61, 1.25)	0.4516
		A_A_A_C_A_C	0.105	H5	1.15	(0.81, 1.64)	0.4285
	0.026	HRare	1.20	(0.67, 2.15)	0.5445		
IL12A	Block 2	rs2243115-rs583911-rs2243131-rs2243154-rs11927521					
		A_g_A_G_A	0.355	H1	1.00		
		A_A_A_G_g	0.270	H2	1.09	(0.84, 1.42)	0.5111
		A_A_c_G_A	0.161	H3	0.94	(0.69, 1.28)	0.6810
		c_A_A_G_g	0.122	H4	0.91	(0.64, 1.29)	0.5950
		A_g_A_a_A	0.092	H5	0.94	(0.64, 1.39)	0.7592
	0.001	HRare	3.54	(0.34, 36.59)	0.2889		
IL12B	Block 1	rs4921466-rs4921468-rs6870828-rs3181225-rs1368439-rs11574790-rs2853694					
		A_G_A_G_A_G_c					
		A_G_A_G_A_G_A	0.313	H1	1.00		
		A_G_g_G_c_G_c	0.213	H2	0.81	(0.61, 1.09)	0.1624



		A_a_g_a_A_G_A	0.179	H3	1.08	(0.80	,1.46)	0.6107
		g_a_g_G_A_a_A	0.169	H4	0.81	(0.59	,1.11)	0.1953
		HRare	0.108	H5	0.83	(0.57	,1.21)	0.3370
			0.017	HRare	0.67	(0.27	,1.71)	0.4063
IL12B	Block 2	rs2569253-rs3181216						
		A_T						
		g_a	0.514	H1	1.00			
		g_T	0.309	H2	1.12	(0.88	,1.41)	0.3665
		HRare	0.175	H3	0.80	(0.59	,1.08)	0.1424
			0.001	HRare				
IL12B	Block 3	rs1433048-rs2546893						
		A_a						
		A_G	0.481	H1	1.00			
		g_G	0.333	H2	0.90	(0.71	,1.13)	0.3636
		HRare	0.185	H3	1.05	(0.79	,1.39)	0.7400
			0.001	HRare				
IL12B	Block 4	rs2546890-rs10052709-rs7709212-rs6868898						
		g_G_g_A						
		A_G_A_g	0.328	H1	1.00			
		A_G_A_A	0.318	H2	1.14	(0.88	,1.48)	0.3129
		g_c_A_A	0.202	H3	1.04	(0.78	,1.40)	0.7750
		HRare	0.140	H4	0.99	(0.70	,1.39)	0.9382
			0.012	HRare	1.75	(0.69	,4.48)	0.2418
IL7R	Block 1	rs11567694-rs11567697-rs11567701-rs6891095-rs3777090-rs11567762-rs10063294-rs10058453						
		A_A_a_A_A_G_A_A	0.276	H1	1.00			
		g_A_C_A_A_G_A_A	0.250	H2	0.98	(0.73	,1.30)	0.8687
		A_A_C_A_t_a_g_g	0.152	H3	1.18	(0.86	,1.62)	0.3087
		A_A_C_g_A_G_g_A	0.132	H4	0.85	(0.60	,1.22)	0.3829
		A_g_C_A_t_G_g_g	0.104	H5	1.06	(0.73	,1.53)	0.7665
		A_A_C_A_t_G_g_g	0.077	H6	0.94	(0.62	,1.42)	0.7560
		HRare	0.009	HRare	0.44	(0.12	,1.59)	0.2085
IRF4	Block 1	rs9405192-rs1033180						
		G_G	0.707	H1	1.00			
		a_G	0.221	H2	1.06	(0.83	,1.37)	0.6244
		a_a	0.072	H3	1.11	(0.73	,1.69)	0.6176
		HRare	0.000	HRare				
IRF4	Block 2	rs13208928-rs3778607						
		T_G	0.502	H1	1.00			
		T_a	0.426	H2	1.09	(0.88	,1.35)	0.4395
		a_a	0.070	H3	0.85	(0.56	,1.30)	0.4579
		HRare	0.001	HRare	2.17	(0.13	,36.12)	0.5899
IRF4	Block 3	rs1050975-rs7768807						
		A_A	0.659	H1	1.00			
		A_g	0.256	H2	1.25	(0.98	,1.60)	0.0757
		g_A	0.085	H3	1.13	(0.72	,1.77)	0.5898
		HRare	0.000	HRare				
IRF4	Block 4	rs12211228-rs1877175-rs6906608						
		G_G_C	0.777	H1	1.00			
		c_a_a	0.148	H2	0.92	(0.68	,1.24)	0.5990
		G_a_C	0.073	H3	0.91	(0.61	,1.35)	0.6332
		HRare	0.001	HRare				
IRF4	Block 5	rs11757491-rs9378805						
		G_c	0.474	H1	1.00			
		G_A	0.455	H2	1.29	(1.03	,1.60)	0.0242
		a_A	0.070	H3	1.01	(0.65	,1.55)	0.9818
		HRare	0.001	HRare				
Jak1	Block 1	rs310211-rs2256298						
		A_G	0.673	H1	1.00			
		g_a	0.261	H2	0.91	(0.71	,1.16)	0.4424
		g_G	0.066	H3	0.69	(0.44	,1.09)	0.1106
		HRare	0.000	HRare				
LIG4	Block 1	rs915047-rs9514825						
		A_G	0.648	H1	1.00			
		A_a	0.196	H2	1.08	(0.83	,1.41)	0.5832
		g_a	0.156	H3	0.96	(0.71	,1.29)	0.7935
		HRare	0.000	HRare				
LIG4	Block 2	rs868284-rs1151402-rs10131-rs3093772-rs3093748						
		G_a_G_A_G	0.434	H1	1.00			
		G_G_G_A_a	0.193	H2	1.08	(0.81	,1.43)	0.5992
		G_G_G_A_G	0.137	H3	1.08	(0.78	,1.48)	0.6509
		a_G_G_g_G	0.106	H4	1.12	(0.79	,1.59)	0.5135
		G_G_a_A_G	0.088	H5	1.05	(0.72	,1.55)	0.7974
		HRare	0.042	HRare	0.81	(0.44	,1.48)	0.4933
LIG4	Block 3	rs12428162-rs7322498-rs9520823						
		C_A_A	0.345	H1	1.00			

		C_A_c	0.288	H2	1.02	(0.75 ,1.38)	0.9231
		g_g_A	0.275	H3	1.23	(0.91 ,1.66)	0.1738
		C_g_A	0.091	H4	1.10	(0.75 ,1.62)	0.6090
		HRare	0.000	HRare	-	-	-
SOCS1	Block 1	rs193778-rs243317					
		A_A	0.466	H1	1.00		
		A_c	0.294	H2	0.84	(0.64 ,1.09)	0.1922
		g_A	0.240	H3	0.96	(0.71 ,1.30)	0.7866
		HRare	0.001	HRare	-	-	-
STAT1	Block 1	rs13035504-rs1168-rs12468579-rs1400657					
		G_a_A_A	0.460	H1	1.00		
		G_G_g_A	0.264	H2	0.91	(0.70 ,1.18)	0.4742
		c_G_g_A	0.158	H3	1.01	(0.74 ,1.37)	0.9525
		G_G_A_c	0.113	H4	0.89	(0.63 ,1.26)	0.4980
		HRare	0.004	HRare	1.95	(0.46 ,8.26)	0.3669
STAT1	Block 2	rs16824035-rs13395505-rs17749316-rs2066804					
		G_G_C_G	0.532	H1	1.00		
		G_a_C_a	0.229	H2	0.91	(0.70 ,1.18)	0.4819
		a_a_C_G	0.159	H3	1.02	(0.76 ,1.37)	0.9037
		G_G_g_G	0.072	H4	1.17	(0.78 ,1.75)	0.4496
		HRare	0.007	HRare	0.51	(0.11 ,2.48)	0.4082
STAT1	Block 3	rs432757-rs2280234-rs2280233					
		A_G_g	0.468	H1	1.00		
		A_a_A	0.373	H2	0.93	(0.74 ,1.17)	0.5489
		c_G_A	0.129	H3	0.97	(0.70 ,1.35)	0.8508
		HRare	0.030	HRare	0.93	(0.51 ,1.70)	0.8125
STAT1	Block 4	rs7562024-rs34997637					
		G_G	0.608	H1	1.00		
		a_a	0.233	H2	0.89	(0.69 ,1.15)	0.3684
		a_G	0.159	H3	1.03	(0.78 ,1.37)	0.8278
		HRare	0.000	HRare	-	-	-
STAT1	Block 5	rs13029247-rs10173099-rs10199181					
		A_G_T	0.619	H1	1.00		
		g_a_a	0.317	H2	0.92	(0.73 ,1.16)	0.4978
		HRare	0.064	HRare	1.06	(0.69 ,1.63)	0.8073
STAT1	Block 6	rs13029532-rs1467199-rs17817966					
		A_C_A	0.567	H1	1.00		
		A_g_g	0.231	H2	0.87	(0.66 ,1.13)	0.2914
		A_C_g	0.109	H3	1.01	(0.71 ,1.43)	0.9546
		c_C_g	0.093	H4	0.91	(0.56 ,1.46)	0.6861
		HRare	0.000	HRare	-	-	-
STAT3	Block 1	rs1053023-rs1053005					
		A_A	0.787	H1	1.00		
		g_g	0.213	H2	0.83	(0.64 ,1.08)	0.1628
		HRare	0.000	HRare	-	-	-
STAT3	Block 2	rs4103200-rs9891119-rs9912773-rs12949918-rs17405722					
		G_A_C_A_G	0.571	H1	1.00		
		c_c_g_g_G	0.275	H2	0.72	(0.56 ,0.92)	0.0093
		G_c_C_g_a	0.069	H3	0.94	(0.62 ,1.43)	0.7835
		G_A_C_g_G	0.058	H4	1.01	(0.65 ,1.57)	0.9531
		HRare	0.027	HRare	0.70	(0.36 ,1.38)	0.3057
STAT4	Block 1	rs13020076-rs16833177-rs7558921					
		A_A_C	0.601	H1	1.00		
		A_g_C	0.197	H2	0.87	(0.64 ,1.17)	0.3506
		A_A_g	0.123	H3	0.86	(0.60 ,1.23)	0.4046
		g_A_C	0.078	H4	0.93	(0.62 ,1.39)	0.7271
		HRare	0.000	HRare	-	-	-
STAT4	Block 2	rs7574608-rs4853540					
		A_C	0.774	H1	1.00		
		A_a	0.156	H2	1.18	(0.89 ,1.55)	0.2448
		t_a	0.067	H3	1.11	(0.74 ,1.67)	0.6254
		HRare	0.003	HRare	0.28	(0.03 ,2.44)	0.2497
STAT4	Block 3	rs3024861-rs932169					
		A_C	0.647	H1	1.00		
		t_C	0.270	H2	0.97	(0.77 ,1.24)	0.8203
		A_g	0.082	H3	1.06	(0.72 ,1.57)	0.7557
		HRare	0.001	HRare	-	-	-
STAT4	Block 4	rs10168266-rs2459611					
		G_A	0.688	H1	1.00		
		a_A	0.191	H2	0.90	(0.67 ,1.21)	0.4917
		G_g	0.121	H3	1.12	(0.79 ,1.59)	0.5148
		HRare	0.000	HRare	-	-	-

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4	STAT4	Block 5	rs7599504-rs4571082-rs17769459					
5			A_A_G	0.559	H1	1.00		
6			A_g_G	0.214	H2	0.96	(0.73 ,1.27)	0.7887
7			g_g_G	0.166	H3	1.07	(0.78 ,1.47)	0.6898
8			A_A_a	0.060	H4	1.19	(0.77 ,1.84)	0.4414
9			HRare	0.001	HRare	-	-	-
10	STAT6	Block 1	rs3024979-rs703817-rs324015-rs3024974-rs3024971-rs324011					
11			A_a_G_G_A_a	0.362	H1	1.00		
12			A_G_a_G_A_G	0.235	H2	1.43	(1.08 ,1.88)	0.0110
13			t_a_G_G_A_G	0.111	H3	1.10	(0.77 ,1.56)	0.6076
14			A_G_G_G_c_G	0.108	H4	1.12	(0.76 ,1.64)	0.5635
15			A_G_G_a_A_G	0.098	H5	1.06	(0.72 ,1.55)	0.7817
16			A_G_G_G_A_G	0.059	H6	1.49	(0.95 ,2.33)	0.0817
17			HRare	0.026	HRare	0.71	(0.33 ,1.56)	0.3978
18	TP63	Block 1	rs6790068-rs9681004					
19			A_A	0.588	H1	1.00		
20			g_g	0.403	H2	1.37	(1.11 ,1.69)	0.0033
21			HRare	0.009	HRare	0.79	(0.22 ,2.89)	0.7262
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For Peer Review

Supplementary Table 5. age-stratified Odds Ratios (OR) and 95% Confidence Intervals for NHL (adjusted for age (continuous), sex and study centre)

Gene	rs Number	no. of no calls	BNHL (below 50)																	
			Heterozygous Mutant						Homozygous Mutant						Dominant Model					
			OR	95% CI	p-value	OR	95% CI	p-value	OR	95% CI	p-value	OR	95% CI	p-value	p-trend					
BMF	rs10518679	0	0.85	(0.56, 1.27)	0.4216	0.87	(0.19, 4.02)	0.8607	0.85	(0.57, 1.26)	0.4167	0.85	(0.57, 1.26)	0.4167	0.4354					
	rs11630670	1	1.03	(0.67, 1.57)	0.9070	0.80	(0.49, 1.33)	0.3953	0.95	(0.63, 1.42)	0.7971	0.95	(0.63, 1.42)	0.7971	0.4132					
	rs11634257	0	1.07	(0.74, 1.56)	0.7185	1.19	(0.58, 2.41)	0.6382	1.09	(0.76, 1.56)	0.6379	1.09	(0.76, 1.56)	0.6379	0.5903					
	rs11858141	2	0.84	(0.56, 1.24)	0.3795	0.94	(0.56, 1.59)	0.8262	0.86	(0.59, 1.26)	0.4423	0.86	(0.59, 1.26)	0.4423	0.6778					
	rs12913170	2	1.29	(0.87, 1.92)	0.2020	0.73	(0.17, 3.16)	0.6739	1.28	(0.85, 1.85)	0.2590	1.28	(0.85, 1.85)	0.2590	0.3038					
	rs1540686	22	0.78	(0.52, 1.19)	0.2472	0.93	(0.57, 1.49)	0.7542	0.83	(0.57, 1.22)	0.3446	0.83	(0.57, 1.22)	0.3446	0.6829					
	rs16970325	2	0.97	(0.62, 1.49)	0.8732	-	-	-	1.07	(0.70, 1.64)	0.7685	1.07	(0.70, 1.64)	0.7685	0.4239					
	rs16970349	0	1.08	(0.62, 1.90)	0.7820	-	-	-	1.13	(0.64, 1.97)	0.6760	1.13	(0.64, 1.97)	0.6760	0.5689					
	rs3743129	2	0.62	(0.41, 0.93)	0.0212	1.11	(0.67, 1.84)	0.6962	0.73	(0.50, 1.07)	0.1122	0.73	(0.50, 1.07)	0.1122	0.9273					
	rs3923235	0	0.85	(0.58, 1.23)	0.3856	1.10	(0.53, 2.29)	0.8026	0.88	(0.61, 1.26)	0.4877	0.88	(0.61, 1.26)	0.4877	0.6984					
	rs537455	1	0.76	(0.52, 1.10)	0.1507	1.38	(0.71, 2.70)	0.3397	0.84	(0.59, 1.20)	0.3427	0.84	(0.59, 1.20)	0.3427	0.8710					
	rs546220	5	1.07	(0.72, 1.59)	0.7425	1.92	(0.56, 1.52)	0.7450	1.09	(0.70, 1.48)	0.9102	1.09	(0.70, 1.48)	0.9102	0.3048					
	rs589739	0	0.63	(0.42, 0.95)	0.0258	0.92	(0.55, 1.55)	0.7654	0.70	(0.48, 1.02)	0.0652	0.70	(0.48, 1.02)	0.0652	0.4260					
	rs648289	1	0.87	(0.58, 1.31)	0.5147	0.93	(0.58, 1.50)	0.7667	0.89	(0.62, 1.30)	0.5522	0.89	(0.62, 1.30)	0.5522	0.7081					
	rs652196	3	1.28	(0.88, 1.86)	0.1914	1.13	(0.50, 2.56)	0.7660	1.26	(0.88, 1.81)	0.2025	1.26	(0.88, 1.81)	0.2025	0.2785					
	rs675173	6	0.90	(0.62, 1.31)	0.5948	1.23	(0.66, 2.29)	0.5064	0.96	(0.67, 1.36)	0.8037	0.96	(0.67, 1.36)	0.8037	0.8329					
	rs7183977	2	0.88	(0.60, 1.28)	0.4972	0.86	(0.48, 1.55)	0.6258	0.87	(0.61, 1.25)	0.4586	0.87	(0.61, 1.25)	0.4586	0.4918					
	rs998713	6	0.91	(0.62, 1.34)	0.6193	1.12	(0.66, 1.88)	0.6775	0.96	(0.67, 1.38)	0.8189	0.96	(0.67, 1.38)	0.8189	0.8521					
rs1047073	1	1.02	(0.69, 1.51)	0.9211	0.95	(0.54, 1.67)	0.8678	1.01	(0.69, 1.46)	0.9780	1.01	(0.69, 1.46)	0.9780	0.3212						
rs1800627	3	0.67	(0.45, 1.01)	0.0266	0.67	(0.40, 1.10)	0.1130	0.80	(0.54, 1.19)	0.2700	0.80	(0.54, 1.19)	0.2700	0.1182						
rs3181345	0	1.31	(0.84, 2.05)	0.2274	-	-	-	1.47	(0.96, 2.27)	0.0796	1.47	(0.96, 2.27)	0.0796	0.0233						
rs3212153	1	0.98	(0.64, 1.50)	0.9120	0.52	(0.13, 2.05)	0.3471	0.93	(0.61, 1.41)	0.7324	0.93	(0.61, 1.41)	0.7324	0.5618						
rs5030552	1	1.81	(1.12, 2.92)	0.0157	6.84	(0.79, 59.45)	0.0813	1.94	(1.22, 3.11)	0.0054	1.94	(1.22, 3.11)	0.0054	0.0029						
rs768063	0	0.85	(0.39, 1.84)	0.6765	-	-	-	0.92	(0.43, 1.96)	0.8312	0.92	(0.43, 1.96)	0.8312	0.9974						
rs12306852	0	0.86	(0.57, 1.29)	0.4552	1.26	(0.47, 3.40)	0.6431	0.89	(0.60, 1.32)	0.5768	0.89	(0.60, 1.32)	0.5768	0.7757						
rs2069716	0	1.54	(0.92, 2.57)	0.1014	0.42	(0.04, 4.11)	0.4536	1.44	(0.87, 2.37)	0.1543	1.44	(0.87, 2.37)	0.1543	0.2607						
rs2069718	8	1.08	(0.69, 1.69)	0.6977	1.50	(0.85, 2.68)	0.1607	1.09	(0.69, 1.67)	0.6189	1.09	(0.69, 1.67)	0.6189	0.2101						
rs2069727	0	1.10	(0.72, 1.67)	0.6733	0.82	(0.50, 1.37)	0.4554	1.00	(0.67, 1.50)	0.9865	1.00	(0.67, 1.50)	0.9865	0.4913						
rs6581795	1	1.28	(0.87, 1.87)	0.2110	1.08	(0.52, 2.26)	0.8331	1.25	(0.86, 1.79)	0.2393	1.25	(0.86, 1.79)	0.2393	0.3592						
rs12529779	15	0.99	(0.67, 1.46)	0.9510	1.84	(0.80, 4.28)	0.1534	1.08	(0.74, 1.56)	0.6975	1.08	(0.74, 1.56)	0.6975	0.3866						
rs1327474	1	0.96	(0.65, 1.43)	0.8473	0.77	(0.46, 1.29)	0.3187	0.90	(0.62, 1.31)	0.5969	0.90	(0.62, 1.31)	0.5969	0.3656						
rs1327475	2	1.18	(0.79, 1.76)	0.4244	1.47	(0.59, 3.69)	0.4119	1.21	(0.83, 1.77)	0.3286	1.21	(0.83, 1.77)	0.3286	0.2832						
rs1854154	6	1.04	(0.69, 1.57)	0.8401	0.81	(0.48, 1.35)	0.4165	0.97	(0.66, 1.42)	0.8782	0.97	(0.66, 1.42)	0.8782	0.4890						
rs3794988	0	0.69	(0.49, 1.01)	0.0232	0.97	(0.57, 1.67)	0.8232	0.69	(0.49, 1.01)	0.9558	0.69	(0.49, 1.01)	0.9558	0.1848						
rs477778	8	0.94	(0.54, 1.24)	0.3433	1.53	(0.42, 7.92)	0.4178	0.86	(0.57, 1.29)	0.4648	0.86	(0.57, 1.29)	0.4648	0.6631						
rs4896243	4	0.94	(0.62, 1.43)	0.7786	1.07	(0.54, 1.76)	0.8046	0.98	(0.66, 1.45)	0.9119	0.98	(0.66, 1.45)	0.9119	0.8445						
rs608914	4	1.10	(0.76, 1.60)	0.6000	0.97	(0.47, 2.01)	0.9296	1.09	(0.76, 1.55)	0.6535	1.09	(0.76, 1.55)	0.6535	0.7850						
rs7759040	0	0.97	(0.66, 1.41)	0.8534	1.07	(0.54, 2.11)	0.8520	0.98	(0.69, 1.40)	0.9193	0.98	(0.69, 1.40)	0.9193	0.9841						
rs9402877	3	0.89	(0.59, 1.32)	0.5534	0.96	(0.58, 1.60)	0.8784	0.91	(0.63, 1.32)	0.6103	0.91	(0.63, 1.32)	0.6103	0.7859						
rs1015873	0	2.23	(0.95, 5.19)	0.0641	-	-	-	2.23	(0.95, 5.19)	0.0641	2.23	(0.95, 5.19)	0.0641	0.0641						
rs1206735	0	1.18	(0.81, 1.72)	0.3877	0.87	(0.44, 1.73)	0.6982	1.14	(0.69, 1.80)	0.5236	1.14	(0.69, 1.80)	0.5236	0.1882						
rs16990684	0	2.27	(1.02, 5.07)	0.0454	-	-	-	2.27	(1.02, 5.07)	0.0454	2.27	(1.02, 5.07)	0.0454	0.0454						
rs2012075	45	1.35	(0.86, 2.10)	0.1882	1.29	(0.25, 6.54)	0.7624	1.34	(0.87, 2.07)	0.1823	1.34	(0.87, 2.07)	0.1823	0.2003						
rs2284553	59	0.78	(0.53, 1.15)	0.2128	0.84	(0.48, 1.48)	0.5516	0.79	(0.55, 1.15)	0.2198	0.79	(0.55, 1.15)	0.2198	0.3397						
rs2834211	0	0.63	(0.40, 1.00)	0.0524	1.24	(0.24, 6.29)	0.7983	0.66	(0.42, 1.03)	0.0692	0.66	(0.42, 1.03)	0.0692	0.1143						
rs2834214	1	1.08	(0.71, 1.63)	0.7260	0.87	(0.53, 1.41)	0.5646	1.00	(0.68, 1.46)	0.9921	1.00	(0.68, 1.46)	0.9921	0.6174						
rs8131980	2	1.06	(0.72, 1.55)	0.7694	0.98	(0.53, 1.82)	0.9482	1.04	(0.73, 1.49)	0.8247	1.04	(0.73, 1.49)	0.8247	0.9164						
rs9976971	0	0.76	(0.51, 1.13)	0.1772	0.97	(0.56, 1.67)	0.9037	0.80	(0.55, 1.17)	0.2580	0.80	(0.55, 1.17)	0.2580	0.1144						
rs9978166	0	1.24	(0.81, 1.88)	0.3186	0.40	(0.11, 1.51)	0.1775	1.13	(0.75, 1.69)	0.5631	1.13	(0.75, 1.69)	0.5631	0.9616						
rs1554286	2	0.95	(0.65, 1.40)	0.8018	2.98	(1.11, 7.99)	0.0305	1.08	(0.74, 1.56)	0.6931	1.08	(0.74, 1.56)	0.6931	0.2560						
rs17015767	0	1.05	(0.72, 1.55)	0.7854	1.02	(0.40, 2.57)	0.9731	1.05	(0.72, 1.53)	0.7940	1.05	(0.72, 1.53)	0.7940	0.8260						
rs1800871	9	0.92	(0.63, 1.34)	0.6719	1.26	(0.60, 2.66)	0.5433	0.96	(0.67, 1.38)	0.8453	0.96	(0.67, 1.38)	0.8453	0.9036						
rs1800872	10	0.93	(0.64, 1.36)	0.7178	1.18	(0.57, 2.47)	0.6559	0.97	(0.68, 1.38)	0.8523	0.97	(0.68, 1.38)	0.8523	0.9517						
rs2222202	9	1.06	(0.70, 1.59)	0.7978	0.93	(0.56, 1.55)	0.7834	1.02	(0.69, 1.50)	0.9305	1.02	(0.69, 1.50)	0.9305	0.8330						
rs3021094	2	1.23	(0.78, 1.99)	0.3999	0.46	(0.09, 2.40)	0.3545	1.14	(0.72, 1.81)	0.5884	1.14	(0.72, 1.81)	0.5884	0.8921						
rs3024955	0	0.85	(0.57, 1.30)	0.4078	0.72	(0.37, 2.26)	0.5691	0.81	(0.54, 1.21)	0.6645	0.81	(0.54, 1.21)	0.6645	0.6845						
rs3024509	0	0.88	(0.52, 1.47)	0.6174	1.52	(0.31, 11.85)	0.4825	0.92	(0.56, 1.52)	0.7590	0.92	(0.56, 1.52)	0.7590	0.9250						
rs4390174	7	0.92	(0.63, 1.34)	0.6521	0.67	(0.37, 1.22)	0.1912	0.86	(0.60, 1.24)	0.4133	0.86	(0.60, 1.24)	0.4133	0.2307						
rs4844553	1	0.90	(0.53, 1.52)	0.6941	1.92	(0.31, 11.87)	0.4811	0.95	(0.57, 1.58)	0.8410	0.95	(0.57, 1.58)	0.8410	0.9960						
rs6673928	2	1.14	(0.78, 1.67)	0.5010	0.67	(0.27, 1.68)	0.3906	1.08	(0.75, 1.56)	0.6862	1.08	(0.75, 1.56)	0.6862	0.8995						
rs6686931	8	0.84	(0.58, 1.23)	0.3782	0.90	(0.42, 1.95)	0.7925	0.85	(0.59, 1.22)	0.3828	0.85	(0.59, 1.22)	0.3828	0.4526						
rs7548373	22	0.96	(0.58, 1.62)	0.8714	1.29	(0.65, 6.00)	0.7584	0.98	(0.59, 1.63)	0.9430	0.98	(0.59, 1.63)	0.9430	0.3212						
rs11927521	0	0.71	(0.49, 1.05)	0.0843	1.21	(0.67, 1.71)	0.5336	0.81	(0.57, 1.14)	0.2125	0.81	(0.57, 1.14)	0.2125	0.768						

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		rs6900384		14	0.67	(0.40	-1.13)	0.1341	0.63	(0.06	-7.09)	0.7048	0.67	(0.40	-1.12)	0.1259	0.1314
		rs6906608		0	0.63	(0.41	-0.96)	0.0304	0.59	(0.19	-1.88)	0.3749	0.62	(0.41	-0.94)	0.0236	0.0293
		rs7768807		0	0.84	(0.58	-1.23)	0.3773	1.35	(0.66	-2.76)	0.4184	0.91	(0.64	-1.30)	0.6042	0.9948
		rs9378605		0	0.65	(0.50	-1.53)	0.1959	1.24	(0.71	-2.03)	0.4203	0.97	(0.71	-1.60)	0.7501	0.9453
		rs9405192		3	1.09	(0.75	-1.59)	0.6577	1.18	(0.63	-2.20)	0.6070	1.10	(0.77	-1.58)	0.5846	0.5489
	JAK1	rs10789166		1	0.70	(0.46	-1.06)	0.0915	0.80	(0.29	-2.16)	0.6531	0.71	(0.48	-1.06)	0.0906	0.1278
		rs2256298		0	1.16	(0.80	-1.69)	0.4248	1.35	(0.62	-2.92)	0.4505	1.19	(0.83	-1.70)	0.3518	0.3178
		rs310211		1	1.11	(0.76	-1.62)	0.5863	1.33	(0.72	-2.46)	0.3662	1.15	(0.80	-1.64)	0.4542	0.3544
		rs7546535		39	1.12	(0.74	-1.68)	0.5925	1.21	(0.58	-2.55)	0.6142	1.14	(0.78	-1.66)	0.5128	0.4960
	SOCS1	rs149311		3	1.52	(1.02	-2.26)	0.0386	1.41	(0.54	-3.71)	0.4807	1.51	(1.03	-2.21)	0.0351	0.0523
		rs19597		2	1.94	(0.86	-2.10)	0.3114	1.67	(1.01	-2.76)	0.0437	1.45	(0.98	-2.20)	0.0789	0.081
		rs193778		0	0.82	(0.56	-1.20)	0.3056	0.99	(0.33	-2.29)	0.9775	0.84	(0.58	-1.21)	0.3397	0.4566
		rs243317		1	0.97	(0.66	-1.41)	0.8547	1.19	(0.65	-2.18)	0.5698	1.01	(0.71	-1.44)	0.9695	0.7433
		rs408665		28	0.83	(0.55	-1.25)	0.3694	1.18	(0.70	-1.99)	0.5237	0.91	(0.62	-1.35)	0.6518	0.6967
		rs9940551		1	1.09	(0.73	-1.63)	0.6808	1.22	(0.72	-2.06)	0.4568	1.12	(0.77	-1.64)	0.5553	0.4575
	SOCS5	rs13402099		3	0.88	(0.57	-1.38)	0.5826	0.43	(0.08	-2.28)	0.3207	0.85	(0.55	-1.30)	0.4461	0.3437
		rs13412085		0	1.08	(0.71	-1.66)	0.7122	0.28	(0.06	-1.33)	0.1088	0.98	(0.65	-1.49)	0.9373	0.5681
	SOCS6	rs1302947		0	1.28	(0.90	-1.20)	0.3149	0.34	(0.07	-1.70)	0.1900	1.14	(0.74	-1.77)	0.5517	0.9160
		rs17809666		1	1.29	(0.77	-2.18)	0.3320	-	-	-	-	1.25	(0.75	-2.09)	0.3906	0.4674
		rs4891398		29	0.84	(0.56	-1.25)	0.3778	0.96	(0.57	-1.63)	0.8898	0.87	(0.60	-1.26)	0.4595	0.7181
	STAT1	rs10173099		10	0.70	(0.48	-1.02)	0.0625	0.69	(0.38	-1.25)	0.2229	0.70	(0.48	-1.00)	0.0485	0.0772
		rs10199181		2	0.86	(0.58	-1.26)	0.4380	0.77	(0.44	-1.35)	0.3629	0.84	(0.58	-1.21)	0.3464	0.3134
		rs1168		3	1.23	(0.82	-1.85)	0.3142	1.23	(0.74	-2.05)	0.4274	1.23	(0.84	-1.81)	0.2881	0.3725
		rs12468579		1	0.95	(0.64	-1.43)	0.8146	0.76	(0.45	-1.28)	0.3054	0.90	(0.61	-1.31)	0.5740	0.3380
		rs1283591		0	0.92	(0.61	-1.38)	0.0891	1.50	(0.44	-5.08)	0.5183	0.98	(0.64	-1.42)	0.8194	0.9958
		rs1302947		0	0.87	(0.57	-1.01)	0.3056	0.63	(0.34	-1.17)	0.1459	0.82	(0.51	-1.34)	0.6455	0.387
		rs13029532		0	0.92	(0.58	-1.48)	0.7353	0.32	(0.03	-2.90)	0.3099	0.88	(0.55	-1.39)	0.5809	0.4480
		rs13035504		1	0.94	(0.63	-1.39)	0.7459	1.37	(0.48	-3.89)	0.5548	0.97	(0.67	-1.42)	0.6796	0.9454
		rs13395505		0	0.85	(0.58	-1.26)	0.4271	0.75	(0.44	-1.28)	0.2966	0.83	(0.57	-1.20)	0.3130	0.2654
		rs1400657		0	1.00	(0.64	-1.56)	0.9907	1.02	(0.27	-3.91)	0.9758	1.00	(0.65	-1.54)	0.9973	0.9952
		rs1467199		0	0.97	(0.66	-1.41)	0.8653	0.34	(0.12	-0.96)	0.0408	0.87	(0.60	-1.25)	0.4587	0.1698
		rs1547550		20	0.85	(0.58	-1.23)	0.3930	0.82	(0.45	-1.50)	0.5250	0.84	(0.59	-1.20)	0.3438	0.3755
		rs16824035		0	0.88	(0.59	-1.30)	0.5812	1.34	(0.47	-3.79)	0.5872	0.91	(0.63	-1.34)	0.6455	0.9460
		rs17749316		0	1.21	(0.71	-2.05)	0.4859	0.99	(0.06	-16.45)	0.9934	1.20	(0.71	-2.02)	0.4942	0.5165
		rs17817966		0	0.81	(0.54	-1.21)	0.3015	0.58	(0.35	-0.99)	0.0462	0.74	(0.51	-1.09)	0.1240	0.0478
		rs2066795		1	1.26	(0.35	-4.46)	0.7224	-	-	-	-	1.26	(0.35	-4.46)	0.7224	0.7224
		rs2066804		1	0.84	(0.58	-1.23)	0.3739	0.63	(0.24	-1.66)	0.3532	0.82	(0.57	-1.18)	0.2893	0.2350
		rs2280232		1	0.88	(0.60	-1.27)	0.4865	1.09	(0.55	-2.13)	0.8123	0.91	(0.64	-1.29)	0.5917	0.8050
		rs2280233		4	1.32	(0.87	-2.01)	0.1924	1.29	(0.77	-2.15)	0.3285	1.31	(0.88	-1.95)	0.1797	0.2888
		rs2280234		5	1.01	(0.69	-1.47)	0.3625	1.34	(0.69	-1.88)	0.1521	0.91	(0.61	-1.33)	0.6802	0.3876
		rs34987837		0	0.86	(0.59	-1.25)	0.4246	0.50	(0.19	-1.36)	0.1783	0.82	(0.57	-1.18)	0.2753	0.1711
		rs4327257		0	0.97	(0.65	-1.45)	0.8840	1.21	(0.38	-3.85)	0.7526	0.99	(0.67	-1.46)	0.9533	0.9630
		rs4853533		3	0.79	(0.54	-1.15)	0.2098	0.70	(0.39	-1.26)	0.2352	0.77	(0.54	-1.10)	0.1485	0.1452
		rs7562024		0	1.25	(0.85	-1.84)	0.2508	0.66	(0.37	-1.19)	0.1679	1.10	(0.76	-1.58)	0.6230	0.5212
		rs867637		2	0.86	(0.59	-1.25)	0.4383	0.70	(0.38	-1.30)	0.2627	0.83	(0.58	-1.19)	0.3079	0.2300
	STAT3	rs1053005		1	0.79	(0.53	-1.16)	0.2314	0.49	(0.18	-1.31)	0.1541	0.75	(0.51	-1.09)	0.1307	0.0841
		rs1053005		1	0.79	(0.53	-1.16)	0.2314	0.49	(0.18	-1.31)	0.1541	0.75	(0.51	-1.09)	0.1307	0.0841
		rs1294918		1	1.13	(0.77	-1.67)	0.5324	0.60	(0.35	-1.04)	0.0694	0.97	(0.67	-1.40)	0.8640	0.1947
		rs17405722		0	0.89	(0.52	-1.53)	0.6814	-	-	-	-	0.87	(0.51	-1.49)	0.6079	0.5394
		rs2293152		2	1.18	(0.79	-1.75)	0.4230	1.03	(0.60	-1.76)	0.9189	1.14	(0.78	-1.65)	0.5036	0.7504
		rs4103200		0	1.02	(0.70	-1.48)	0.9259	0.64	(0.32	-1.30)	0.2171	0.94	(0.66	-1.55)	0.7497	0.4242
		rs6503695		0	1.07	(0.73	-1.57)	0.7214	0.64	(0.35	-1.17)	0.1451	0.96	(0.67	-1.37)	0.8164	0.3391
		rs9891119		0	1.01	(0.69	-1.48)	0.9400	0.61	(0.34	-1.12)	0.1108	0.91	(0.64	-1.31)	0.6183	0.2378
		rs9912739		0	1.06	(0.73	-1.54)	0.7739	0.64	(0.29	-1.39)	0.2612	0.99	(0.69	-1.41)	0.9353	0.5850
	STAT4	rs10168266		0	0.86	(0.58	-1.28)	0.4628	1.46	(0.47	-4.50)	0.5119	0.90	(0.62	-1.32)	0.5896	0.7981
		rs10189819		1	1.05	(0.71	-1.55)	0.8125	0.67	(0.31	-1.42)	0.2970	0.97	(0.67	-1.41)	0.8850	0.5734
		rs10931481		0	0.84	(0.58	-1.22)	0.3678	0.76	(0.40	-1.44)	0.3991	0.83	(0.58	-1.18)	0.2934	0.2789
		rs11685878		4	1.15	(0.78	-1.72)	0.4793	1.18	(0.70	-1.99)	0.5430	1.16	(0.80	-1.69)	0.4395	0.4839
		rs13020076		56	0.70	(0.43	-1.13)	0.1446	1.20	(0.23	-6.19)	0.8311	0.72	(0.45	-1.16)	0.1761	0.2467
		rs13389408		0	1.08	(0.69	-1.68)	0.7346	0.81	(0.13	-5.01)	0.8237	1.07	(0.69	-1.65)	0.7741	0.8319
		rs1517352		2	0.74	(0.50	-1.09)	0.1297	0.68	(0.40	-1.17)	0.1628	0.72	(0.50	-1.05)	0.0897	0.1084
		rs1683177		0	0.99	(0.67	-1.46)	0.9481	0.33	(0.09	-1.23)	0.0983	0.91	(0.62	-1.33)	0.6315	0.3408
		rs16833229		1	0.63	(0.38	-1.05)	0.0763	1.11	(0.07	-18.10)	0.9417	0.64	(0.38	-1.06)	0.0826	0.0998
		rs16833437		1	1.23	(0.84	-1.80)	0.2888	1.35	(0.76	-2.39)	0.3015	1.25	(0.87	-1.80)	0.2179	0.2132
		rs17769459		0	1.51	(0.83	-2.74)	0.1751	-	-	-	-	1.38	(0.77	-2.48)	0.2786	0.4608
		rs2459611		0	0.83	(0.55	-1.27)	0.3956	0.81	(0.22	-2.94)	0.7450	0.83	(0.55	-1.25)	0.3750	0.3869
		rs3024861		1	1.03	(0.71	-1.49)	0.8909	0.91	(0.43	-1.94)	0.8029	1.01	(0.71	-1.44)	0.9578	0.9445
		rs3024877		0	0.72	(0.49	-1.04)	0.0828	0.82	(0.43	-1.56)	0.5371	0.73	(0.51	-1.05)	0.0898	0.1715
		rs3024908		0	0.85	(0.55	-1.34)	0.4952	0.31	(0.07	-5.29)	0.1502	0.72	(0.49	-1.04)	0.2927	0.1754
		rs3024912		1	0.95	(0.65	-1.39)	0.8084	0.32	(0.10	-0.98)	0.0458	0.87	(0.60	-1.25)	0.4441	0.1754
		rs3024921		0	1.39	(0.78	-2.50)	0.2679	-	-	-	-	1.33	(0.75	-2.38)	0.3289	0.4216
		rs3024936		0	0.63	(0.28	-1.41)	0.2642	-	-	-	-	0.63	(0.28	-1.41)	0.2642	0.2642
		rs4571082		0	0.98	(0.66	-1.44)	0.9098	0.84	(0.48	-1.47)	0.5394	0.94	(0.66	-1.36)	0.7593	0.5947
		rs4853540		6	0.66	(0.45	-0.96)	0.0293	0.80	(0.38	-1.69)	0.5671	0.68	(0.47	-0.97)	0.0336	0.0769
		rs4853546		1	0.97	(0.66	-1.43)	0.8827	0.94	(0.54	-1.85)	0.8332	0.96	(0.67	-1.39)	0.8457	0.823

**Supplementary Table 5.** age-stratified Odds Ratios (OR) and 95% Confidence Intervals for NHL (adjusted for age (continuous), sex and study centre)

Gene	rs Number	no. of no calls	BNHL (equal and above 50)											
			Heterozygous Mutant			Homozygous Mutant			Dominant Model			p-trend		
			OR	95% CI	p-value	OR	95% CI	p-value	OR	95% CI	p-value			
BMF	rs10518679	0	1.09	(0.87, 1.36)	0.4653	1.01	(0.51, 2.00)	0.9789	1.08	(0.87, 1.35)	0.4839	0.5386		
	rs11630670	0	1.03	(0.83, 1.29)	0.7627	0.97	(0.74, 1.28)	0.8440	1.02	(0.82, 1.25)	0.8753	0.8881		
	rs11634257	1	1.06	(0.87, 1.28)	0.5819	0.79	(0.51, 1.21)	0.2789	1.02	(0.84, 1.23)	0.8351	0.7784		
	rs11858141	2	0.99	(0.80, 1.23)	0.9234	1.24	(0.94, 1.63)	0.1281	1.05	(0.86, 1.29)	0.6275	0.1851		
	rs12818170	2	1.05	(0.85, 1.30)	0.6343	0.98	(0.63, 1.81)	0.9719	1.05	(0.85, 1.29)	0.6430	0.7255		
	rs1540686	22	0.91	(0.73, 1.15)	0.4339	0.98	(0.75, 1.28)	0.8793	0.92	(0.75, 1.16)	0.5253	0.8423		
	rs16970325	2	1.15	(0.91, 1.47)	0.2456	2.93	(1.13, 7.61)	0.0272	1.22	(0.96, 1.54)	0.1032	0.0406		
	rs16970349	0	1.10	(0.80, 1.51)	0.5474	0.77	(0.13, 4.62)	0.7729	1.09	(0.80, 1.49)	0.5849	0.6368		
	rs3743129	2	1.08	(0.87, 1.34)	0.4705	1.10	(0.84, 1.43)	0.4839	1.09	(0.89, 1.33)	0.4154	0.4492		
	rs3923235	0	0.91	(0.75, 1.11)	0.3734	0.64	(0.43, 0.94)	0.0221	0.87	(0.72, 1.05)	0.1413	0.0392		
	rs537455	1	0.88	(0.72, 1.07)	0.2096	1.12	(0.76, 1.66)	0.5560	0.91	(0.76, 1.10)	0.3412	0.6733		
	rs546220	5	0.90	(0.73, 1.11)	0.3393	1.08	(0.82, 1.42)	0.5594	0.94	(0.77, 1.15)	0.5678	0.8258		
	rs58739	0	1.11	(0.89, 1.38)	0.3718	1.21	(0.92, 1.59)	0.1797	1.13	(0.92, 1.40)	0.2428	0.1746		
	rs648289	1	0.88	(0.71, 1.10)	0.2564	0.98	(0.75, 1.29)	0.9063	0.91	(0.74, 1.12)	0.3700	0.7851		
	rs652196	3	1.09	(0.90, 1.34)	0.3790	1.23	(0.82, 1.85)	0.3208	1.11	(0.92, 1.35)	0.2764	0.2257		
	rs675173	6	0.80	(0.65, 0.97)	0.0244	0.94	(0.67, 1.33)	0.7270	0.82	(0.68, 0.99)	0.0388	0.1390		
	rs7183977	2	0.93	(0.76, 1.14)	0.4880	0.82	(0.59, 1.12)	0.2093	0.91	(0.75, 1.10)	0.3186	0.2074		
	rs998713	6	0.87	(0.71, 1.07)	0.1980	0.98	(0.73, 1.31)	0.8974	0.90	(0.74, 1.09)	0.2767	0.5863		
	rs12818173	1	0.93	(0.76, 1.15)	0.5083	1.07	(0.80, 1.44)	0.6358	0.96	(0.79, 1.17)	0.7063	0.8664		
	rs18006321	3	1.02	(0.81, 1.29)	0.8794	1.01	(0.77, 1.32)	0.9589	1.02	(0.87, 1.22)	0.9851	0.9269		
	rs3181345	0	1.13	(0.88, 1.44)	0.3326	0.38	(0.14, 1.04)	0.0593	1.06	(0.84, 1.35)	0.6107	0.9770		
	rs3212153	1	1.04	(0.83, 1.30)	0.7200	0.74	(0.35, 1.55)	0.4270	1.02	(0.82, 1.27)	0.8722	0.9369		
rs5030552	1	1.27	(0.99, 1.62)	0.0608	0.51	(0.16, 1.67)	0.2670	1.22	(0.96, 1.56)	0.1039	0.2005			
rs768063	0	0.75	(0.51, 1.12)	0.1569	-	-	-	0.74	(0.50, 1.10)	0.1352	0.1182			
rs12306852	0	1.00	(0.81, 1.24)	0.9767	1.05	(0.55, 1.99)	0.8811	1.01	(0.82, 1.24)	0.9497	0.9211			
rs2069716	0	0.95	(0.72, 1.26)	0.7142	0.56	(0.14, 2.24)	0.4096	0.93	(0.71, 1.23)	0.6114	0.5206			
rs2069718	8	0.99	(0.72, 1.09)	0.5433	0.87	(0.60, 1.17)	0.3539	0.88	(0.73, 1.07)	0.2426	0.8503			
rs2069727	0	1.24	(0.99, 1.56)	0.0583	1.15	(0.88, 1.50)	0.3059	1.21	(0.98, 1.50)	0.0752	0.2705			
rs6581795	1	0.93	(0.76, 1.13)	0.4523	1.02	(0.70, 1.48)	0.9143	0.94	(0.78, 1.14)	0.5273	0.7055			
rs12529779	15	0.88	(0.72, 1.08)	0.2260	0.81	(0.53, 1.25)	0.3395	0.87	(0.72, 1.06)	0.1701	0.1569			
rs1327474	1	1.06	(0.85, 1.31)	0.6226	1.26	(0.96, 1.66)	0.0889	1.11	(0.91, 1.36)	0.3061	0.1058			
rs1327475	2	0.76	(0.62, 0.94)	0.0112	0.88	(0.54, 1.43)	0.5994	0.78	(0.63, 0.95)	0.0129	0.0306			
rs1854154	6	0.91	(0.73, 1.14)	0.4181	0.82	(0.63, 1.08)	0.1611	0.89	(0.72, 1.09)	0.2544	0.1605			
rs3794988	0	0.91	(0.71, 1.13)	0.3455	1.29	(0.92, 1.81)	0.1180	1.01	(0.84, 1.20)	0.4530	0.8520			
rs477768	8	0.90	(0.72, 1.12)	0.3398	0.96	(0.50, 1.87)	0.9119	0.90	(0.73, 1.12)	0.3504	0.4011			
rs4896243	4	1.04	(0.83, 1.30)	0.7235	1.48	(1.14, 1.92)	0.0036	1.17	(0.95, 1.43)	0.1449	0.0056			
rs608914	4	1.08	(0.88, 1.31)	0.4606	1.17	(0.84, 1.61)	0.3541	1.09	(0.91, 1.32)	0.3496	0.2951			
rs7759040	0	0.95	(0.78, 1.16)	0.6078	1.23	(0.82, 1.83)	0.3175	0.98	(0.81, 1.19)	0.8740	0.7573			
rs9402877	3	0.98	(0.79, 1.21)	0.8479	0.90	(0.68, 1.18)	0.4308	0.96	(0.78, 1.17)	0.6561	0.4607			
rs1015873	0	0.76	(0.48, 1.22)	0.2604	-	-	-	0.76	(0.48, 1.22)	0.2604	0.2604			
rs1284373	0	1.03	(0.85, 1.26)	0.7370	1.42	(0.96, 2.09)	0.0755	1.08	(0.90, 1.31)	0.4014	0.8520			
rs16990684	0	0.88	(0.57, 1.37)	0.5854	-	-	-	0.88	(0.57, 1.37)	0.5854	0.5854			
rs2012075	45	1.19	(0.94, 1.51)	0.1479	1.52	(0.77, 3.01)	0.2284	1.22	(0.97, 1.53)	0.0929	0.0713			
rs2284553	59	1.01	(0.82, 1.25)	0.9184	1.09	(0.82, 1.44)	0.5539	1.03	(0.85, 1.25)	0.7592	0.5969			
rs2834211	0	0.89	(0.69, 1.14)	0.3465	1.03	(0.49, 2.16)	0.9340	0.90	(0.70, 1.14)	0.3865	0.4694			
rs2834214	1	1.00	(0.80, 1.23)	0.9720	1.00	(0.76, 1.30)	0.9750	1.00	(0.82, 1.22)	0.9690	0.9723			
rs8131980	2	0.81	(0.66, 0.99)	0.0391	0.96	(0.69, 1.33)	0.7954	0.84	(0.69, 1.01)	0.0638	0.2033			
rs9976971	0	0.76	(0.54, 1.06)	0.5438	1.02	(0.60, 1.88)	0.7180	0.97	(0.79, 1.18)	0.4863	0.8520			
rs9978166	0	0.89	(0.71, 1.13)	0.3355	0.57	(0.21, 1.56)	0.2742	0.88	(0.70, 1.10)	0.2538	0.1833			
rs1554286	2	0.94	(0.76, 1.15)	0.5368	0.96	(0.58, 1.59)	0.8714	0.94	(0.77, 1.15)	0.5373	0.5791			
rs17015767	0	0.93	(0.76, 1.14)	0.4932	1.28	(0.79, 2.07)	0.3203	0.96	(0.79, 1.17)	0.7159	0.9334			
rs1800871	9	0.97	(0.79, 1.18)	0.7315	0.86	(0.57, 1.29)	0.4699	0.95	(0.79, 1.15)	0.6040	0.4944			
rs1800872	10	0.96	(0.79, 1.17)	0.6839	0.91	(0.61, 1.38)	0.6702	0.95	(0.79, 1.15)	0.6237	0.5902			
rs2222202	9	1.11	(0.89, 1.38)	0.3549	1.06	(0.81, 1.40)	0.6703	1.09	(0.89, 1.34)	0.3874	0.5826			
rs2301094	2	0.88	(0.68, 1.15)	0.3519	4.39	(0.93, 20.79)	0.0521	0.93	(0.72, 1.20)	0.5760	0.8965			
rs3024505	1	1.19	(0.99, 1.36)	0.3864	0.81	(0.44, 1.51)	0.1776	1.00	(0.82, 1.23)	0.9881	0.9784			
rs3024509	0	1.04	(0.79, 1.38)	0.7827	0.19	(0.02, 1.60)	0.1271	1.00	(0.76, 1.33)	0.9727	0.7878			
rs4390174	7	1.01	(0.82, 1.24)	0.9472	1.12	(0.84, 1.50)	0.4436	1.03	(0.85, 1.25)	0.7486	0.5223			
rs4844553	1	1.07	(0.81, 1.41)	0.6448	0.33	(0.07, 1.59)	0.1656	1.03	(0.78, 1.35)	0.8431	0.9188			
rs6673928	8	1.04	(0.85, 1.27)	0.7240	1.04	(0.66, 1.63)	0.8719	1.04	(0.85, 1.26)	0.7134	0.7308			
rs6686931	2	0.91	(0.75, 1.11)	0.3673	0.89	(0.58, 1.35)	0.5732	0.91	(0.75, 1.10)	0.3258	0.3357			
rs7548373	22	1.03	(0.78, 1.37)	0.6137	0.19	(0.02, 1.61)	0.1284	1.00	(0.75, 1.32)	0.9743	0.7384			
rs11827521	1	0.83	(0.63, 1.09)	0.1171	0.50	(0.20, 1.22)	0.1171	0.82	(0.63, 1.07)	0.2881	0.3881			
rs2243115	4	0.90	(0.71, 1.15)	0.3988	0.62	(0.29, 1.31)	0.2096	0.88	(0.70, 1.10)	0.2619	0.1798			
rs2243131	3	0.97	(0.78, 1.21)	0.8163	0.95	(0.51, 1.77)	0.8691	0.97	(0.79, 1.20)	0.7949	0.7852			
rs2243154	0	0.95	(0.74, 1.21)	0.6834	0.69	(0.22, 2.12)	0.5119	0.94	(0.74, 1.20)	0.6103	0.5398			
rs4680534	0	1.04	(0.85, 1.27)	0.6914	0.97	(0.71, 1.31)	0.8302	1.03	(0.85, 1.24)	0.7947	0.9938			
rs485497	1	0.98	(0.78, 1.23)	0.8558	0.92	(0.70, 1.21)	0.5578	0.96	(0.78, 1.19)	0.7214	0.5652			
rs50391	2	1.10	(0.89, 1.37)	0.3905	1.04	(0.79, 1.37)	0.7604	1.09	(0.88, 1.33)	0.4832	0.8700			
rs541282	6	1.05	(0.84, 1.30)	0.6864	0.99	(0.68, 1.44)	0.9283	1.04	(0.84, 1.28)	0.7442	0.9577			
rs6800657	6	0.96	(0.75, 1.23)	0.7496	1.01	(0.44, 2.30)	0.9870	0.96	(0.76, 1.23)	0.7826	0.7916			
rs692890	0	0.96	(0.78, 1.17)	0.6574	1.05	(0.75, 1.46)	0.7905	0.97	(0.80, 1.17)	0.7650	0.9657			
rs7372767	2	1.08	(0.87, 1.33)	0.4960	1.08	(0.82, 1.43)	0.5837	1.08	(0.88, 1.31)	0.4646	0.5171			
rs747825	1	0.94	(0.76, 1.15)	0.5238	0.89	(0.53, 1.49)	0.6624	0.93	(0.76, 1.13)	0.4773	0.4657			
rs755004	2	0.97	(0.77, 1.21)	0.7871	1.23	(0.63, 2.38)	0.5455	0.99	(0.79, 1.23)	0.9182	0.9262			
rs9911792	1	1.05	(0.85, 1.30)	0.6657	1.07	(0.82, 1.41)	0.6136	1.06	(0.86, 1.29)	0.9552	0.5945			
rs982519	3	1.03	(0.83, 1.41)	0.1921	0.98	(0.65, 1.50)	0.8241	1.06	(0.89, 1.25)	0.4280	0.8544			
rs10052709	3	1.03	(0.83, 1.27)	0.8207	0.72	(0.33, 1.55)	0.3989	1.00	(0.81, 1.24)	0.9648	0.8544			
rs11574790	1	1.09	(0.87, 1.37)	0.4564	0.57	(0.21, 1.55)	0.2714	1.06	(0.85, 1.33)	0.5988	0.8142			
rs1368439	1	1.11	(0.90, 1.36)	0.3406	0.80	(0.48, 1.33)	0.3899	1.07	(0.87, 1.30)	0.5214	0.8362			
rs1433048	1	1.03	(0.84, 1.27)	0.7546	0.60	(0.35, 1.02)	0.0609	0.98	(0.80, 1.19)	0.8299	0.4050			
rs2546890	0	1.20	(0.95, 1.51)	0.1311	1.32	(1.00, 1.72)	0.0460	1.23	(0.99, 1.54)	0.0621	0.0467			
rs2546893	0	1.01	(0.81, 1.26)	0.8964	0.86	(0.66, 1.13)	0.2835	0.97	(0.79, 1.19)	0.7474	0.3252			
rs259253	19	0.74	(0.62, 0.88)	0.4807	0.69	(0.52, 0.90)	0.0059	0.84	(0.69, 1.04)	0.1685	0.0083			
rs2853694	0	0.99	(0.79, 1.23)	0.9090	0.76	(0.58, 1.00)	0.0467	0.91	(0.74, 1.12)	0.3883	0.0585			
rs3181216	0	0.88	(0.72, 1.07)	0.1950	0.64	(0.45, 0.93)	0.0181	0.83	(0.69, 1.01)	0.0618	0.0177			

	rs6900384	14	0.90	(0.69	-1.17)	0.4405	2.26	(0.56	9.11)	0.2507	0.93	(0.72	-1.20)	0.5734	0.7552
	rs6906608	0	0.91	(0.73	-1.13)	0.3841	1.68	(0.87	-3.25)	0.1248	0.95	(0.77	-1.18)	0.6523	0.9423
	rs7768807	0	0.99	(0.81	-1.21)	0.9556	1.01	(0.68	-1.50)	0.9601	1.00	(0.82	-1.21)	0.9724	0.9976
	rs9378805	0	1.03	(0.82	-1.28)	0.1556	0.87	(0.66	-1.28)	0.2958	0.98	(0.79	-1.13)	0.8173	0.9368
	rs9405192	3	1.15	(0.95	-1.41)	0.1533	0.90	(0.63	-1.28)	0.5598	1.11	(0.92	-1.34)	0.2837	0.6830
JAK1	rs10789166	1	0.99	(0.79	-1.23)	0.8994	0.73	(0.35	-1.53)	0.4020	0.97	(0.78	-1.20)	0.7550	0.6129
	rs2256298	0	0.85	(0.70	-1.04)	0.1191	1.10	(0.75	-1.61)	0.6158	0.89	(0.74	-1.07)	0.2201	0.5271
	rs130211	1	0.85	(0.70	-1.04)	0.1143	0.99	(0.72	-1.38)	0.9723	0.88	(0.73	-1.06)	0.1729	0.4096
	rs7546535	39	0.94	(0.76	-1.16)	0.5646	1.22	(0.76	-1.97)	0.4094	0.97	(0.80	-1.18)	0.7670	0.9407
SOCS1	rs149311	3	1.30	(1.05	-1.60)	0.0175	1.27	(0.78	-2.06)	0.3341	1.29	(1.05	-1.58)	0.0136	0.0218
	rs18597	2	1.06	(0.85	-1.33)	0.5897	1.04	(0.60	-1.36)	0.7487	1.06	(0.86	-1.30)	0.0001	0.7266
	rs193778	1	0.89	(0.72	-1.07)	0.2019	1.52	(0.99	-2.25)	0.0531	0.95	(0.78	-1.14)	0.5959	0.6894
	rs243317	1	0.93	(0.77	-1.14)	0.5018	0.92	(0.65	-1.30)	0.6340	0.93	(0.77	-1.12)	0.4612	0.4778
	rs408665	28	0.94	(0.76	-1.17)	0.5841	0.96	(0.72	-1.28)	0.7812	0.95	(0.77	-1.16)	0.5959	0.7042
	rs9940551	1	0.97	(0.78	-1.19)	0.7530	1.09	(0.82	-1.46)	0.5428	1.00	(0.82	-1.21)	0.9640	0.6764
SOCS5	rs13402099	3	0.94	(0.73	-1.19)	0.5924	1.32	(0.66	-2.64)	0.4360	0.97	(0.76	-1.22)	0.7716	0.9905
	rs13412085	0	0.91	(0.73	-1.15)	0.4425	1.21	(0.64	-2.27)	0.5598	0.94	(0.75	-1.17)	0.5743	0.7697
SOCS6	rs18597	0	1.16	(0.93	-1.46)	0.7302	0.96	(0.48	-1.93)	0.5085	1.15	(0.92	-1.43)	0.2272	0.3095
	rs17809666	1	0.77	(0.57	-1.04)	0.0844	1.32	(0.40	-3.37)	0.6520	0.79	(0.59	-1.06)	0.1142	0.1762
	rs4891398	29	1.02	(0.83	-1.26)	0.8352	1.11	(0.84	-1.47)	0.4619	1.04	(0.86	-1.27)	0.6648	0.4990
STAT1	rs10173099	10	1.01	(0.83	-1.24)	0.9071	0.91	(0.67	-1.24)	0.5554	0.99	(0.82	-1.20)	0.9171	0.6923
	rs10199181	2	0.99	(0.81	-1.22)	0.9573	0.98	(0.74	-1.30)	0.8836	0.99	(0.82	-1.20)	0.9238	0.8905
	rs1168	3	0.89	(0.72	-1.11)	0.2968	0.80	(0.61	-1.05)	0.1043	0.86	(0.70	-1.06)	0.1581	0.0993
	rs12468579	1	1.22	(0.98	-1.51)	0.0710	1.21	(0.93	-1.59)	0.1575	1.22	(0.99	-1.49)	0.0564	0.1084
	rs1283591	0	0.96	(0.77	-1.20)	0.7302	1.65	(0.89	-3.64)	0.0738	1.01	(0.82	-1.28)	0.9045	0.7454
	rs13029247	0	0.82	(0.62	-1.01)	0.0541	0.88	(0.63	-1.22)	0.4374	0.97	(0.78	-1.13)	0.0553	0.5503
	rs13029532	0	1.11	(0.86	-1.43)	0.4270	0.75	(0.26	-2.11)	0.5835	1.09	(0.85	-1.40)	0.1505	0.6328
	rs13035504	1	0.89	(0.72	-1.10)	0.2782	1.11	(0.63	-1.95)	0.7105	0.91	(0.74	-1.12)	0.3587	0.5221
	rs13395505	0	1.21	(0.98	-1.49)	0.0764	1.05	(0.80	-1.39)	0.7219	1.16	(0.96	-1.42)	0.1290	0.4293
	rs1400657	0	1.03	(0.82	-1.30)	0.8092	0.79	(0.35	-1.79)	0.5711	1.01	(0.81	-1.27)	0.9144	0.9592
	rs1467199	0	1.02	(0.84	-1.25)	0.8096	0.96	(0.65	-1.42)	0.8459	1.01	(0.84	-1.23)	0.8794	0.9824
	rs1547550	20	1.04	(0.85	-1.27)	0.7274	1.20	(0.88	-1.63)	0.2537	1.07	(0.88	-1.29)	0.4975	0.3074
	rs16824035	0	0.99	(0.72	-1.09)	0.2592	1.29	(0.69	-2.09)	0.5085	1.14	(0.92	-1.23)	0.0222	0.3166
	rs17749316	0	0.94	(0.70	-1.25)	0.6616	0.72	(0.20	-2.58)	0.6186	0.93	(0.70	-1.23)	0.6009	0.5533
	rs17817966	0	1.11	(0.90	-1.38)	0.3384	1.06	(0.81	-1.39)	0.6521	1.10	(0.90	-1.34)	0.3712	0.5628
	rs2066795	0	1.70	(0.86	-3.36)	0.1296	-	-	-	-	1.70	(0.86	-3.36)	0.1296	0.1296
	rs2066804	1	1.11	(0.91	-1.36)	0.2930	1.26	(0.83	-1.91)	0.2731	1.13	(0.94	-1.37)	0.2034	0.1629
	rs2280232	1	1.00	(0.82	-1.22)	0.9886	1.16	(0.80	-1.68)	0.4420	1.02	(0.85	-1.24)	0.8039	0.6022
	rs2280233	4	0.90	(0.72	-1.11)	0.3236	0.80	(0.62	-1.05)	0.1096	0.87	(0.71	-1.06)	0.1718	0.1068
	rs2280234	5	0.89	(0.69	-1.34)	0.0260	1.29	(0.69	-1.70)	0.0877	1.14	(0.94	-1.38)	0.0977	0.1416
	rs34987637	3	1.07	(0.88	-1.31)	0.4943	0.92	(0.62	-1.36)	0.6779	1.05	(0.87	-1.27)	0.6857	0.8754
	rs4327257	0	0.87	(0.70	-1.08)	0.2126	1.21	(0.61	-2.40)	0.5832	0.89	(0.72	-1.11)	0.2928	0.4486
	rs4853533	3	1.10	(0.90	-1.35)	0.3388	1.24	(0.93	-1.65)	0.1471	1.13	(0.94	-1.38)	0.1963	0.1307
	rs7562024	0	1.16	(0.94	-1.43)	0.1601	1.13	(0.86	-1.49)	0.3645	1.15	(0.95	-1.40)	0.1499	0.2425
	rs867637	2	1.05	(0.86	-1.29)	0.6139	1.23	(0.91	-1.65)	0.1823	1.09	(0.90	-1.32)	0.3787	0.2133
STAT3	rs1053005	1	0.70	(0.57	-0.86)	0.0007	0.97	(0.62	-1.51)	0.8915	0.73	(0.60	-0.89)	0.0019	0.0159
	rs1053006	0	0.70	(0.56	-0.86)	0.0006	0.99	(0.64	-1.54)	0.8939	0.73	(0.60	-0.89)	0.0019	0.0159
	rs12949918	1	0.81	(0.66	-1.00)	0.0500	0.74	(0.56	-0.98)	0.0326	0.79	(0.65	-0.96)	0.0202	0.0184
	rs17405722	0	1.10	(0.82	-1.48)	0.5070	0.99	(0.36	-2.75)	0.9833	1.10	(0.82	-1.46)	0.5271	0.5736
	rs2293152	2	1.18	(0.96	-1.45)	0.1216	0.97	(0.73	-1.27)	0.7999	1.12	(0.92	-1.36)	0.2680	0.8180
	rs4103200	0	0.74	(0.61	-0.90)	0.0028	0.73	(0.52	-1.03)	0.0710	0.74	(0.61	-0.89)	0.0015	0.0037
	rs6503695	0	0.78	(0.64	-0.96)	0.0183	0.70	(0.52	-0.95)	0.0206	0.76	(0.63	-0.92)	0.0056	0.0053
	rs9891119	0	0.79	(0.65	-0.97)	0.0233	0.74	(0.55	-1.00)	0.0508	0.78	(0.64	-0.95)	0.0112	0.0150
	rs9912773	0	0.61	(0.41	-0.90)	0.0029	0.77	(0.54	-1.10)	0.1500	0.74	(0.62	-0.90)	0.0025	0.0065
STAT4	rs10168266	0	1.08	(0.88	-1.33)	0.4400	0.98	(0.60	-1.58)	0.9274	1.07	(0.88	-1.30)	0.4933	0.6103
	rs10189819	1	1.20	(0.98	-1.47)	0.0765	0.92	(0.59	-1.44)	0.7201	1.16	(0.96	-1.41)	0.1290	0.3044
	rs10931481	0	1.23	(1.01	-1.50)	0.0434	1.18	(0.86	-1.63)	0.3102	1.22	(1.01	-1.47)	0.0397	0.0798
	rs11685878	4	0.95	(0.77	-1.17)	0.6265	0.96	(0.73	-1.25)	0.7520	0.95	(0.78	-1.16)	0.6215	0.6979
	rs13020076	56	0.94	(0.71	-1.24)	0.6677	1.29	(0.43	-3.85)	0.6540	0.96	(0.73	-1.25)	0.7488	0.8486
	rs13389408	0	1.09	(0.87	-1.37)	0.4563	1.12	(0.51	-2.43)	0.7807	1.09	(0.87	-1.36)	0.4369	0.4431
	rs1517352	2	1.37	(1.11	-1.69)	0.0034	1.27	(0.96	-1.69)	0.0911	1.34	(1.10	-1.64)	0.0036	0.0260
	rs16833177	0	1.11	(0.90	-1.36)	0.3287	0.96	(0.63	-1.46)	0.8392	1.08	(0.89	-1.33)	0.4141	0.5988
	rs16833229	1	1.14	(0.87	-1.49)	0.3478	4.49	(0.50	-40.47)	0.1809	1.16	(0.89	-1.52)	0.2640	0.1954
	rs16833437	1	0.97	(0.80	-1.19)	0.8054	1.03	(0.77	-1.37)	0.8630	0.99	(0.82	-1.19)	0.8924	0.9613
	rs17769459	0	1.16	(0.86	-1.55)	0.3279	0.85	(0.19	-3.81)	0.8302	1.15	(0.86	-1.53)	0.3559	0.4043
	rs2459611	0	1.14	(0.90	-1.43)	0.2764	0.82	(0.36	-1.86)	0.6330	1.11	(0.89	-1.39)	0.3435	0.4664
	rs3024861	1	1.17	(0.96	-1.43)	0.1191	1.09	(0.76	-1.58)	0.6315	1.16	(0.96	-1.40)	0.1272	0.2063
	rs3024877	0	1.21	(0.99	-1.47)	0.0569	1.00	(0.71	-1.40)	0.9904	1.17	(0.97	-1.41)	0.0988	0.3091
	rs3024908	0	1.04	(0.82	-1.31)	0.7660	0.98	(0.26	-3.32)	0.1954	1.00	(0.79	-1.13)	0.9777	0.7036
	rs3024912	1	1.03	(0.84	-1.26)	0.7871	0.93	(0.63	-1.37)	0.6951	1.01	(0.84	-1.22)	0.9080	0.9292
	rs3024921	0	0.99	(0.72	-1.37)	0.9730	3.32	(0.34	-32.08)	0.2992	1.02	(0.74	-1.40)	0.9018	0.7712
	rs3024936	0	0.64	(0.41	-1.00)	0.0497	-	-	-	-	0.66	(0.42	-1.03)	0.0650	0.0888
	rs4571082	0	1.04	(0.85	-1.27)	0.7315	1.21	(0.91	-1.62)	0.1945	1.07	(0.89	-1.30)	0.4645	0.2436
	rs4853540	6	1.22	(1.00	-1.50)	0.0518	1.30	(0.86	-1.97)	0.2113	1.23	(1.02	-1.50)	0.0330	0.0367
	rs4853546	1	0.97	(0.79	-1.19)	0.7853	0.82	(0.61	-1.10)	0.1872	0.94	(0.77	-1.13)	0.5000	0.2524
	rs6434435	0	1.10	(0.89	-1.35)	0.3636	1.59	(0.62	-2.65)	0.0743	1.15	(0.94	-1.40)	0.1611	0.0867
	rs6752770	0	1.25	(1.03	-1.52)	0.0267	0.99	(0.69	-1.41)	0.9450	1.20	(1.00	-1.45)	0.0550	0.2201
	rs7568921	1	1.05	(0.82	-1.33)	0.7153	0.58	(0.26	-1.32)	0.1973	1.00	(0.80	-1.26)	0.9717	0.7468
	rs7574608	1	1.08	(0.81	-1.44)	0.6139	3.37	(0.35	-32.58)	0.2933	1.10	(0.82	-1.47)	0.5185	0.4325
	rs7599504	1	1.12	(0.90	-1.38)	0.3030	0.83	(0.44	-1.58)	0.5706	1.09	(0.89	-1.34)	0.3971	0.5749

Supplementary Table 5. age-stratified Odds Ratios (OR) and 95% Confidence Intervals for HL (adjusted for age (continuous), sex and study centre)

Gene	rs Nummer	no. of no calls	HL (below 40)											
			Heterozygous Mutant				Homozygous Mutant				Dominant Model			
			OR	95% CI	p-value	p-trend	OR	95% CI	p-value	p-trend	OR	95% CI	p-value	p-trend
BMF	rs10518679	0	1.03	(0.67, 1.59)	0.9009	0.35	(0.04, 3.23)	0.3522	0.99	(0.65, 1.52)	0.9635	0.7969		
	rs11630670	0	0.75	(0.48, 1.17)	0.2062	0.61	(0.35, 1.08)	0.0887	0.71	(0.47, 1.08)	0.1062	0.0776		
	rs11634257	1	1.04	(0.69, 1.57)	0.8451	1.14	(0.54, 2.43)	0.7300	1.06	(0.72, 1.56)	0.7823	0.7278		
	rs11858141	2	0.86	(0.55, 1.33)	0.4871	1.03	(0.58, 1.85)	0.9146	0.90	(0.59, 1.36)	0.6093	0.9306		
	rs12913170	2	0.91	(0.59, 1.41)	0.6733	0.79	(0.22, 2.85)	0.7245	0.90	(0.59, 1.37)	0.6284	0.6017		
	rs1540686	22	0.78	(0.49, 1.23)	0.2796	0.52	(0.29, 0.93)	0.0286	0.70	(0.45, 1.08)	0.1077	0.0302		
	rs16970325	2	1.01	(0.62, 1.62)	0.9829	-	-	-	1.09	(0.69, 1.74)	0.7068	0.4370		
	rs16970349	0	1.43	(0.82, 2.51)	0.2077	-	-	-	1.43	(0.82, 2.51)	0.2077	0.2077		
	rs3743129	2	0.90	(0.58, 1.39)	0.6241	0.98	(0.56, 1.72)	0.9358	0.92	(0.60, 1.39)	0.6842	0.8638		
	rs3923235	0	1.09	(0.73, 1.64)	0.6767	1.49	(0.66, 3.36)	0.3368	1.14	(0.77, 1.68)	0.5101	0.3757		
	rs537455	1	0.80	(0.53, 1.21)	0.2901	1.06	(0.48, 2.36)	0.8827	0.84	(0.56, 1.24)	0.3699	0.5640		
	rs546220	5	0.73	(0.47, 1.12)	0.1435	0.60	(0.33, 1.08)	0.0889	0.69	(0.46, 1.04)	0.0760	0.0640		
	rs588739	0	0.90	(0.58, 1.39)	0.6245	0.71	(0.39, 1.28)	0.2537	0.84	(0.56, 1.28)	0.4294	0.2682		
	rs648289	1	0.84	(0.54, 1.30)	0.4260	1.46	(0.25, 8.84)	0.0123	0.72	(0.48, 1.10)	0.1335	0.0179		
	rs652196	3	1.09	(0.72, 1.65)	0.6782	1.10	(0.49, 2.45)	0.8179	1.09	(0.74, 1.62)	0.6601	0.6797		
rs675173	6	0.90	(0.60, 1.35)	0.6017	1.20	(0.59, 2.41)	0.6197	0.94	(0.64, 1.39)	0.7642	0.9529			
rs7183977	2	1.20	(0.80, 1.81)	0.3700	1.17	(0.59, 2.33)	0.6454	1.20	(0.81, 1.77)	0.3584	0.4236			
rs998713	6	1.38	(0.90, 2.12)	0.1425	1.49	(0.81, 2.72)	0.1966	1.40	(0.93, 2.11)	0.1053	0.1242			
CASP6	rs1541373	1	1.09	(0.72, 1.65)	0.6890	0.58	(0.32, 1.10)	0.0956	0.95	(0.64, 1.40)	0.7797	0.2302		
	rs1800627	1	1.59	(0.98, 2.58)	0.0581	1.56	(0.90, 2.68)	0.1099	1.58	(1.01, 2.49)	0.0473	0.1132		
	rs3181345	0	0.70	(0.43, 1.15)	0.1583	-	-	-	0.77	(0.47, 1.24)	0.2815	0.5286		
	rs3212153	1	1.03	(0.65, 1.65)	0.8939	0.87	(0.15, 5.02)	0.8803	1.02	(0.65, 1.61)	0.9228	0.9599		
	rs5030552	1	0.92	(0.55, 1.54)	0.7439	2.69	(0.42, 17.26)	0.2981	0.98	(0.59, 1.62)	0.9393	0.8444		
	rs768063	0	0.93	(0.46, 1.92)	0.8539	-	-	-	0.93	(0.46, 1.92)	0.8539	0.8539		
	rs12306852	0	1.31	(0.85, 2.02)	0.2250	2.32	(0.66, 8.11)	0.1876	1.37	(0.90, 2.09)	0.1421	0.0967		
IFNG	rs2069716	0	0.60	(0.32, 1.13)	0.1168	1.74	(0.24, 12.80)	0.5889	0.65	(0.36, 1.20)	0.1683	0.2709		
	rs2069718	8	1.02	(0.67, 1.56)	0.9127	1.16	(0.62, 2.19)	0.6451	1.05	(0.70, 1.57)	0.8170	0.6882		
	rs2069727	0	0.82	(0.52, 1.30)	0.3981	0.67	(0.38, 1.18)	0.1849	0.78	(0.50, 1.19)	0.2494	0.1626		
	rs581795	1	1.18	(0.79, 1.76)	0.4243	1.34	(0.58, 3.09)	0.4897	1.20	(0.81, 1.77)	0.3671	0.3423		
	rs12529779	15	1.37	(0.91, 2.06)	0.1299	1.13	(0.30, 4.28)	0.8543	1.35	(0.91, 2.02)	0.1366	0.1752		
	rs1327474	1	0.89	(0.58, 1.37)	0.5944	0.89	(0.50, 1.60)	0.7044	0.89	(0.59, 1.34)	0.5769	0.6365		
	rs1327475	2	1.24	(0.81, 1.90)	0.3249	0.59	(0.11, 3.11)	0.5331	1.19	(0.79, 1.82)	0.4057	0.5622		
	rs1854154	6	1.07	(0.67, 1.71)	0.7720	1.11	(0.64, 1.94)	0.7100	1.08	(0.70, 1.69)	0.7214	0.7065		
	rs3799488	0	0.99	(0.63, 1.55)	0.9568	0.36	(0.04, 3.40)	0.3758	0.95	(0.61, 1.48)	0.8265	0.6814		
	rs477768	8	0.65	(0.42, 1.02)	0.0628	1.10	(0.09, 13.33)	0.9428	0.66	(0.42, 1.03)	0.0674	0.0812		
	rs4896243	4	1.02	(0.65, 1.60)	0.9274	1.18	(0.68, 2.05)	0.5618	1.07	(0.70, 1.63)	0.7704	0.5869		
	rs608914	4	0.71	(0.47, 1.08)	0.1130	1.23	(0.63, 2.40)	0.5397	0.80	(0.54, 1.18)	0.2563	0.7083		
	rs7759040	0	1.34	(0.89, 1.97)	0.8438	0.69	(0.32, 1.47)	0.3367	0.97	(0.66, 1.43)	0.8877	0.5799		
	rs9423877	3	1.10	(0.70, 1.70)	0.6848	1.19	(0.68, 2.09)	0.5353	1.12	(0.74, 1.70)	0.5879	0.5275		
	rs1015873	0	2.60	(0.99, 6.80)	0.0518	-	-	-	2.60	(0.99, 6.80)	0.0518	0.0518		
IFNGR2	rs12628735	0	1.24	(0.82, 1.87)	0.3050	1.23	(0.54, 2.84)	0.6215	1.24	(0.84, 1.84)	0.2853	0.3234		
	rs16990664	0	2.28	(0.94, 5.55)	0.0695	-	-	-	2.28	(0.94, 5.55)	0.0695	0.0695		
	rs2012075	45	0.76	(0.46, 1.27)	0.3015	2.10	(0.45, 9.87)	0.3471	0.83	(0.51, 1.36)	0.4602	0.7048		
	rs2284553	59	0.88	(0.56, 1.36)	0.5543	0.89	(0.51, 1.56)	0.6844	0.88	(0.58, 1.33)	0.5417	0.6222		
	rs2834211	0	0.96	(0.59, 1.55)	0.8564	0.58	(0.11, 3.18)	0.5340	0.93	(0.58, 1.48)	0.7461	0.6476		
	rs2834214	1	0.89	(0.57, 1.41)	0.6316	0.55	(0.32, 0.93)	0.0265	0.75	(0.49, 1.14)	0.1816	0.0305		
	rs8131980	2	1.69	(1.12, 2.56)	0.0130	1.10	(0.54, 2.22)	0.7897	1.56	(1.05, 2.30)	0.0288	0.1304		
	rs9978971	0	0.80	(0.51, 1.24)	0.3158	0.78	(0.45, 1.34)	0.3612	0.79	(0.52, 1.20)	0.2661	0.3206		
	rs9978166	0	0.60	(0.36, 0.98)	0.0398	0.34	(0.07, 1.77)	0.2086	0.57	(0.35, 0.92)	0.0223	0.0182		
	rs1554286	2	1.22	(0.81, 1.83)	0.3454	1.06	(0.39, 2.88)	0.9075	1.20	(0.81, 1.78)	0.3650	0.4445		
	rs17015767	0	1.12	(0.73, 1.72)	0.6054	0.49	(0.17, 1.45)	0.1978	1.02	(0.67, 1.55)	0.9152	0.6809		
	rs1800871	9	1.18	(0.79, 1.77)	0.4155	0.94	(0.42, 2.09)	0.8726	1.15	(0.78, 1.69)	0.4943	0.6842		
	rs1800872	10	1.18	(0.79, 1.77)	0.4165	0.89	(0.40, 1.97)	0.7667	1.14	(0.77, 1.68)	0.5226	0.7575		
	rs2222202	9	0.69	(0.45, 1.08)	0.1046	0.95	(0.54, 1.67)	0.8620	0.76	(0.50, 1.15)	0.1906	0.5915		
	rs3021094	2	0.76	(0.46, 1.27)	0.3006	-	-	-	0.72	(0.43, 1.20)	0.2078	0.1457		
rs3024505	1	1.03	(0.66, 1.60)	0.8973	2.44	(0.39, 15.41)	0.3434	1.07	(0.69, 1.64)	0.7698	0.6251			
rs3024509	0	0.88	(0.48, 1.62)	0.6782	-	-	-	0.85	(0.46, 1.57)	0.6076	0.5376			
rs439074	7	1.33	(0.87, 1.99)	0.8891	0.89	(0.50, 1.56)	0.6758	0.99	(0.68, 1.48)	0.9504	0.7480			
rs4844553	3	0.92	(0.50, 1.67)	0.7752	0.53	(0.19, 1.46)	0.2179	0.89	(0.54, 1.46)	0.6243	0.6243			
rs6673928	8	1.07	(0.70, 1.64)	0.7677	0.89	(0.51, 1.51)	0.6392	0.98	(0.65, 1.48)	0.9282	0.5737			
rs6686931	2	1.28	(0.85, 1.91)	0.2385	0.60	(0.24, 1.50)	0.2744	1.17	(0.79, 1.72)	0.4433	0.9214			
rs7548373	22	0.82	(0.44, 1.52)	0.5234	-	-	-	0.79	(0.43, 1.47)	0.4617	0.4050			
IL12A	rs11927521	6	1.08	(0.71, 1.66)	0.7112	1.21	(0.66, 2.23)	0.5334	1.11	(0.74, 1.67)	0.6123	0.5289		
	rs2243115	4	1.09	(0.68, 1.75)	0.7132	0.21	(0.02, 1.78)	0.1513	1.00	(0.63, 1.59)	0.9988	0.6679		
	rs2243131	3	0.88	(0.57, 1.37)	0.5762	2.54	(0.76, 8.53)	0.1302	0.97	(0.64, 1.48)	0.8913	0.7111		
	rs2243154	0	1.05	(0.63, 1.76)	0.8538	-	-	-	1.03	(0.61, 1.71)	0.9214	0.9957		
	rs4680534	0	0.82	(0.54, 1.24)	0.3491	0.91	(0.49, 1.69)	0.7665	0.84	(0.57, 1.24)	0.3787	0.5202		
	rs485497	1	1.10	(0.68, 1.77)	0.7025	1.29	(0.75, 2.24)	0.3597	1.16	(0.74, 1.82)	0.3198	0.3594		
	rs583911	1	0.87	(0.57, 1.38)	0.5876	0.85	(0.44, 1.38)	0.5088	0.85	(0.56, 1.30)	0.4628	0.3844		
	rs6441282	1	0.74	(0.48, 1.16)	0.1879	0.88	(0.51, 1.51)	0.6392	0.78	(0.52, 1.18)	0.2438	0.5114		
	rs6800657	6	1.12	(0.69, 1.81)	0.6573	-	-	-	1.05	(0.65, 1.70)	0.8365	0.9351		
	rs692890	0	0.88	(0.59, 1.32)	0.5343	0.82	(0.39, 1.69)	0.5872	0.87	(0.59, 1.28)	0.4767	0.4666		
	rs7372767	2	0.83	(0.54, 1.29)	0.4125	1.09	(0.62, 1.90)	0.7670	0.90	(0.60, 1.35)	0.6048	0.9488		
	rs747825	1	0.73	(0.47, 1.13)	0.1604	2.49	(0.77, 8.06)	0.1291	0.82	(0.54, 1.25)	0.3560	0.7871		
	rs755004	2	1.14	(0.73, 1.78)	0.5688	0.57	(0.11, 2.96)	0.5045	1.09	(0.71, 1.69)	0.6890	0.8653		
	rs9811792	1	0.92	(0.59, 1.44)	0.7101	1.13	(0.66, 1.94)	0.6521	0.98	(0.65, 1.49)	0.9296	0.7187		
	rs9852519	2	0.98	(0.65, 1.48)	0.9149	0.55	(0.28, 1.06)	0.0719	0.87	(0.58, 1.29)	0.4756	0.1463		
IL12B	rs10052709	3	0.96	(0.60, 1.54)	0.8758	0.50	(0.13, 1.95)	0.3187	0.91	(0.58, 1.42)	0.8680	0.4898		
	rs1154790	1	0.93	(0.57, 1.53)	0.7885	0.55	(0.11, 2.86)	0.4777	0.90	(0.56, 1.45)	0.8569	0.5550		
	rs1368439	1	0.99	(0.65, 1.52)	0.9773	2.44	(0.74, 8.08)	0.1449	1.07	(0.71, 1.62)	0.7377	0.4530		
	rs1433048	1	0.93	(0.60, 1.43)	0.7390	2.07	(0.67, 6.33)	0.2039	1.01	(0.67, 1.53)	0.9693	0.6454		
	rs2546890	0	0.78	(0.49, 1.23)	0.2815	0.88	(0.51, 1.50)	0.6344	0.81	(0.53, 1.24)	0.3316	0.5823		
	rs2546893	0	1.04	(0.64, 1.68)	0.8802	1.33	(0.77, 2.29)	0.3089	1.13	(0.72, 1.77)	0.5979	0.3076		
	rs2569253	19	0.72	(0.45, 1.16)	0.1801	1.03	(0.61, 1.74)	0.8977	0.83	(0.54, 1.28)	0.4029	0.8829		
	rs2853694	0	0.97	(0.61, 1.56)	0.9071	1.38	(0.80, 2.39)	0.2410	1.09	(0.70, 1.70)	0.6944	0.2508		
	rs3181216	0	0.92	(0.61, 1.40)	0.7009	1.52	(0.76, 3.01)	0.2329	1.01	(0.68, 1.50)	0.9636	0.5128		
	rs3181225	0	0.90	(0.59, 1.37)	0.6211	1.00	(0.33, 3.02)	0.9984						



		rs11757491	0	0.88	(0.50	-1.56)	0.6701	2.87	(0.24	-33.88)	0.4017	0.93	(0.54	-1.62)	0.8089	0.9740
		rs12211228	1	0.81	(0.52	-1.25)	0.3450	0.76	(0.17	-3.36)	0.7216	0.81	(0.53	-1.24)	0.3264	0.3337
		rs13208928	0	0.76	(0.43	-1.34)	0.3447	4.38	(0.43	44.16)	0.2108	0.84	(0.49	-1.46)	0.5396	0.8241
		rs1514346	0	1.12	(0.69	-1.82)	0.6349	0.68	(0.12	-3.90)	0.6686	1.09	(0.68	-1.75)	0.7181	0.8347
		rs1877176	0	0.86	(0.57	-1.29)	0.4648	0.90	(0.37	-2.22)	0.5198	0.86	(0.58	-1.28)	0.6464	0.5192
		rs201558	0	1.06	(0.68	-1.63)	0.8018	0.71	(0.12	-4.15)	0.7064	1.04	(0.68	-1.59)	0.8617	0.9454
		rs3778607	1	0.93	(0.58	-1.50)	0.7730	0.84	(0.47	-1.48)	0.5394	0.90	(0.58	-1.42)	0.8585	0.5412
		rs380262	0	1.30	(0.85	-2.00)	0.2246	1.77	(0.64	-4.90)	0.2735	1.35	(0.89	-2.03)	0.1561	0.1264
		rs6900384	14	0.84	(0.50	-1.41)	0.5210	1.36	(0.18	-10.20)	0.7645	0.87	(0.52	-1.43)	0.5727	0.6537
		rs6906608	0	0.81	(0.52	-1.25)	0.3450	0.76	(0.17	-3.36)	0.7216	0.81	(0.53	-1.24)	0.3264	0.3337
		rs776807	0	1.41	(0.94	-2.12)	0.1002	1.51	(0.69	-3.28)	0.2992	1.42	(0.96	-2.10)	0.0783	0.0918
		rs9378005	0	1.06	(0.67	-1.67)	0.7966	0.60	(0.33	-1.09)	0.0939	0.92	(0.59	-1.42)	0.7039	0.1371
		rs9405192	3	1.41	(0.94	-2.13)	0.0988	0.97	(0.44	-2.12)	0.9375	1.34	(0.90	-1.99)	0.1478	0.3534
	JAK1	rs10789166	1	0.81	(0.52	-1.26)	0.3488	0.36	(0.07	-1.77)	0.2101	0.77	(0.50	-1.18)	0.2299	0.1550
		rs2256298	0	0.64	(0.43	-0.97)	0.0344	0.74	(0.27	-1.97)	0.5418	0.65	(0.44	-0.97)	0.0344	0.0573
		rs310211	1	0.65	(0.43	-0.98)	0.0381	0.62	(0.29	-1.32)	0.2153	0.64	(0.44	-0.95)	0.0284	0.0411
		rs7546535	39	1.20	(0.79	-1.83)	0.3940	0.96	(0.34	-2.73)	0.9365	1.17	(0.78	-1.76)	0.4414	0.5552
	SOCS1	rs149311	3	1.60	(1.03	-2.49)	0.0383	0.70	(0.25	-1.90)	0.4796	1.43	(0.94	-2.17)	0.0994	0.3323
		rs149597	2	0.94	(0.60	-1.49)	0.8007	0.99	(0.59	-1.66)	0.9710	0.96	(0.63	-1.46)	0.8505	0.9598
		rs193778	1	1.10	(0.73	-1.64)	0.6556	0.76	(0.28	-2.07)	0.5853	1.06	(0.72	-1.56)	0.7746	0.9837
		rs243317	1	0.94	(0.62	-1.41)	0.7519	0.73	(0.37	-1.41)	0.3473	0.89	(0.60	-1.31)	0.5471	0.3912
		rs408665	28	1.39	(0.88	-2.19)	0.1599	1.28	(0.72	-2.29)	0.4002	1.36	(0.88	-2.10)	0.1673	0.3165
		rs940551	1	1.53	(0.97	-2.41)	0.0657	1.43	(0.81	-2.54)	0.2170	1.50	(0.98	-2.31)	0.0637	0.1522
	SOCS5	rs13402099	3	1.01	(0.62	-1.65)	0.9713	0.97	(0.17	-5.59)	0.9749	1.01	(0.62	-1.62)	0.9781	0.9866
		rs13412085	0	0.96	(0.60	-1.53)	0.8523	1.21	(0.27	-5.32)	0.8053	0.97	(0.62	-1.53)	0.9061	0.9710
	SOCS6	rs1708235	0	1.09	(0.67	-1.76)	0.7424	0.70	(0.19	-3.19)	0.7302	1.05	(0.66	-1.68)	0.8265	0.9381
		rs17809666	1	0.85	(0.46	-1.58)	0.6117	1.86	(0.11	-32.53)	0.6699	0.88	(0.48	-1.61)	0.6733	0.7530
		rs4891398	29	1.02	(0.66	-1.56)	0.9443	1.37	(0.75	-2.50)	0.3069	1.09	(0.73	-1.63)	0.6804	0.3965
	STAT1	rs10173099	10	0.74	(0.49	-1.12)	0.1542	0.68	(0.34	-1.36)	0.2777	0.73	(0.49	-1.08)	0.1165	0.1313
		rs10199181	2	0.98	(0.65	-1.49)	0.9379	0.60	(0.31	-1.17)	0.1354	0.89	(0.60	-1.33)	0.5844	0.2359
		rs1168	3	1.67	(1.04	-2.70)	0.0355	1.43	(0.81	-2.53)	0.2193	1.60	(1.01	-2.52)	0.0448	0.1988
		rs12468579	1	0.87	(0.57	-1.34)	0.5343	0.76	(0.43	-1.36)	0.3578	0.84	(0.56	-1.26)	0.4097	0.3402
		rs12693591	0	1.15	(0.73	-1.80)	0.6544	0.65	(0.12	-3.63)	0.6241	1.11	(0.71	-1.73)	0.6390	0.7681
		rs13029247	2	0.78	(0.52	-1.17)	0.2355	0.69	(0.33	-1.46)	0.3341	0.77	(0.52	-1.13)	0.1833	0.1815
		rs13029532	0	0.98	(0.56	-1.72)	0.9484	1.01	(0.16	-6.38)	0.9222	0.98	(0.57	-1.69)	0.9526	0.9600
		rs13035504	1	1.13	(0.72	-1.77)	0.5975	1.24	(0.31	-4.95)	0.5955	1.14	(0.73	-1.76)	0.5652	0.5555
		rs13395505	0	0.78	(0.51	-1.18)	0.2332	0.81	(0.45	-1.45)	0.4891	0.78	(0.53	-1.16)	0.2211	0.3121
		rs1400657	0	0.84	(0.51	-1.40)	0.5051	0.95	(0.16	-5.51)	0.9556	0.85	(0.52	-1.39)	0.5131	0.5476
		rs1467199	0	0.82	(0.54	-1.25)	0.3586	0.50	(0.19	-1.33)	0.1631	0.77	(0.52	-1.15)	0.2077	0.1294
		rs1547550	20	1.02	(0.68	-1.53)	0.9427	0.60	(0.30	-1.22)	0.1614	0.93	(0.63	-1.37)	0.7056	0.3262
		rs16824035	1	1.12	(0.72	-1.75)	0.6138	1.24	(0.31	-4.95)	0.7600	1.13	(0.73	-1.74)	0.5809	0.5691
		rs17749316	0	1.20	(0.71	-2.05)	0.4962	-	-	-	-	1.15	(0.68	-1.95)	0.6107	0.7700
		rs17817966	0	0.95	(0.62	-1.47)	0.8312	0.60	(0.33	-1.09)	0.0930	0.85	(0.57	-1.28)	0.4393	0.1409
		rs2066795	0	0.63	(0.11	-3.49)	0.5954	-	-	-	-	0.63	(0.11	-3.49)	0.5954	0.5954
		rs2066804	1	0.85	(0.57	-1.28)	0.4430	0.42	(0.16	-1.12)	0.0831	0.78	(0.53	-1.16)	0.2231	0.1030
		rs2280232	1	1.09	(0.73	-1.62)	0.7599	0.67	(0.25	-1.84)	0.4388	1.04	(0.70	-1.53)	0.8442	0.8886
		rs2280233	4	1.82	(1.11	-2.97)	0.0169	1.53	(0.86	-2.72)	0.1447	1.72	(1.08	-2.75)	0.0224	0.1436
		rs2280234	5	0.93	(0.61	-1.41)	0.7366	0.50	(0.25	-1.01)	0.0520	0.83	(0.56	-1.24)	0.3661	0.1040
		rs34997637	3	0.83	(0.55	-1.26)	0.3933	0.38	(0.13	-1.08)	0.0690	0.76	(0.51	-1.14)	0.1895	0.0827
		rs4327257	0	1.00	(0.63	-1.60)	0.9884	3.77	(0.64	-22.21)	0.1420	1.08	(0.68	-1.70)	0.7497	0.5004
		rs4853533	3	0.83	(0.55	-1.25)	0.3700	0.48	(0.24	-0.94)	0.0318	0.74	(0.50	-1.10)	0.1425	0.0412
		rs7562034	0	1.03	(0.68	-1.57)	0.8833	0.61	(0.33	-1.15)	0.1251	0.92	(0.62	-1.36)	0.6680	0.2425
		rs867637	2	0.88	(0.59	-1.32)	0.5410	0.46	(0.22	-0.93)	0.0303	0.78	(0.53	-1.15)	0.2160	0.0557
	STAT3	rs1053005	1	0.77	(0.51	-1.16)	0.2085	0.52	(0.18	-1.52)	0.2328	0.74	(0.49	-1.10)	0.1369	0.1042
		rs1053023	1	0.77	(0.51	-1.16)	0.2085	0.52	(0.18	-1.52)	0.2328	0.74	(0.49	-1.10)	0.1369	0.1042
		rs12439818	1	0.82	(0.54	-1.27)	0.3823	0.69	(0.39	-1.20)	0.1843	0.78	(0.52	-1.17)	0.2314	0.1715
		rs17405722	0	1.10	(0.62	-1.97)	0.7383	-	-	-	-	1.04	(0.59	-1.85)	0.8855	0.9507
		rs2293152	2	0.74	(0.48	-1.14)	0.1704	0.79	(0.45	-1.37)	0.3999	0.75	(0.50	-1.13)	0.1667	0.2802
		rs4103200	0	0.83	(0.55	-1.25)	0.3783	0.53	(0.25	-1.13)	0.1010	0.77	(0.52	-1.14)	0.1908	0.0978
		rs6503695	0	0.93	(0.61	-1.41)	0.7386	0.61	(0.33	-1.13)	0.1149	0.84	(0.57	-1.24)	0.3862	0.1647
		rs9891119	0	0.80	(0.53	-1.21)	0.2955	0.65	(0.34	-1.21)	0.1741	0.76	(0.52	-1.13)	0.1811	0.1356
		rs9912773	0	0.87	(0.58	-1.31)	0.5124	0.37	(0.14	-0.97)	0.0431	0.79	(0.53	-1.17)	0.2372	0.0805
	STAT4	rs10168266	0	0.97	(0.64	-1.48)	0.8892	0.87	(0.26	-2.94)	0.8248	0.96	(0.64	-1.45)	0.8534	0.8212
		rs10189819	1	0.84	(0.55	-1.28)	0.4235	0.34	(0.12	-0.95)	0.0404	0.75	(0.50	-1.13)	0.1682	0.0585
		rs10191481	0	1.22	(0.81	-1.84)	0.3337	0.88	(0.41	-1.86)	0.7297	1.18	(0.79	-1.72)	0.4506	0.7620
		rs11685878	4	0.66	(0.43	-1.01)	0.0575	0.54	(0.30	-0.96)	0.0373	0.82	(0.44	-1.94)	0.2323	0.0239
		rs13020076	56	0.98	(0.58	-1.67)	0.9472	-	-	-	-	1.01	(0.60	-1.71)	0.9752	0.8872
		rs13389408	0	0.96	(0.58	-1.57)	0.8623	0.93	(0.14	-5.97)	0.9373	0.96	(0.59	-1.55)	0.8540	0.8521
		rs1517352	2	1.02	(0.67	-1.57)	0.9103	0.98	(0.55	-1.76)	0.9571	1.01	(0.68	-1.52)	0.9441	0.9906
		rs16833177	0	0.91	(0.59	-1.39)	0.6537	0.57	(0.17	-1.93)	0.3679	0.87	(0.57	-1.32)	0.5150	0.3993
		rs16833239	1	0.92	(0.52	-1.61)	0.7614	-	-	-	-	0.89	(0.51	-1.55)	0.6730	0.5823
		rs16833437	1	0.79	(0.52	-1.19)	0.2560	0.60	(0.33	-1.11)	0.1055	0.74	(0.50	-1.09)	0.1287	0.0832
		rs17769459	0	1.50	(0.81	-2.77)	0.1961	-	-	-	-	1.45	(0.79	-2.66)	0.2325	0.2883
		rs2459611	0	0.88	(0.55	-1.43)	0.6145	1.77	(0.42	-7.47)	0.4379	0.93	(0.59	-1.48)	0.702	0.9734
		rs3024861	1	1.13	(0.75	-1.70)	0.5495	0.74	(0.32	-1.70)	0.4761	1.07	(0.72	-1.57)	0.7448	0.3082
		rs3024977	0	1.05	(0.70	-1.58)	0.8130	1.31	(0.64	-2.67)	0.4891	1.09	(0.74	-1.61)	0.6734	0.5221
		rs3024908	0	0.73	(0.44	-1.23)	0.2429	0.58	(0.15	-2.35)	0.4495	0.72	(0.44	-1.18)	0.1876	0.1790
		rs3024912	1	0.84	(0.56	-1.28)	0.4205	0.39	(0.12	-1.22)	0.1060	0.78	(0.52	-1.17)	0.2317	0.1193
		rs3024921	0	1.57	(0.84	-2.93)	0.1606									

Supplementary Table 5. age-stratified Odds Ratios (OR) and 95% Confidence Intervals for HL (adjusted for age (continuous), sex and study centre)

Gene	rs Nummer	no. of no calls	HL (equal and above 40)											
			Heterozygous Mutant			Homozygous Mutant			Dominant Model			p-trend		
			OR	95% CI	p-value	OR	95% CI	p-value	OR	95% CI	p-value			
BMF	rs10518679	0	0.71	(0.39, 1.29)	0.295	1.42	(0.31, 6.48)	0.6501	0.76	(0.43, 1.33)	0.3315	0.4666		
	rs11630670	0	1.34	(0.76, 2.35)	0.3148	1.16	(0.59, 2.30)	0.6621	1.28	(0.75, 2.20)	0.3665	0.6275		
	rs11634257	1	1.10	(0.68, 1.76)	0.7056	0.89	(0.30, 2.61)	0.8277	1.07	(0.68, 1.69)	0.7766	0.9013		
	rs11858141	2	1.23	(0.73, 2.08)	0.4273	0.86	(0.41, 1.80)	0.6813	1.14	(0.69, 1.88)	0.6136	0.8994		
	rs12913170	2	0.70	(0.39, 1.23)	0.2145	0.52	(0.07, 3.97)	0.5242	0.68	(0.39, 1.19)	0.1795	0.1741		
	rs1540686	22	1.06	(0.62, 1.81)	0.8267	0.52	(0.25, 1.10)	0.0885	0.88	(0.53, 1.48)	0.6327	0.1233		
	rs16970325	2	1.33	(0.76, 2.32)	0.3205	3.79	(0.40, 35.94)	0.2455	1.37	(0.80, 2.38)	0.2547	0.1975		
	rs16970349	2	0.74	(0.31, 1.76)	0.4973	-	-	-	0.73	(0.31, 1.73)	0.4750	0.4585		
	rs3743129	0	0.79	(0.48, 1.29)	0.3442	0.56	(0.27, 1.13)	0.1059	0.72	(0.45, 1.15)	0.1677	0.0964		
	rs3923235	0	1.19	(0.74, 1.93)	0.4732	1.60	(0.71, 3.63)	0.2573	1.25	(0.79, 1.98)	0.3393	0.2420		
	rs537455	1	1.06	(0.66, 1.72)	0.8022	1.35	(0.57, 3.19)	0.4963	1.10	(0.70, 1.74)	0.6791	0.5517		
	rs546220	5	1.11	(0.67, 1.85)	0.6862	0.59	(0.27, 1.31)	0.1938	0.97	(0.59, 1.60)	0.9154	0.3270		
	rs588739	0	0.80	(0.48, 1.34)	0.3951	0.94	(0.49, 1.79)	0.8419	0.84	(0.52, 1.35)	0.4660	0.7221		
	rs648289	1	1.12	(0.67, 1.89)	0.6571	0.59	(0.28, 1.23)	0.1595	0.96	(0.58, 1.57)	0.8573	0.2419		
	rs652196	3	0.75	(0.46, 1.25)	0.2739	0.76	(0.23, 2.57)	0.6639	0.76	(0.47, 1.23)	0.2572	0.2892		
rs675173	6	1.15	(0.71, 1.86)	0.5606	0.98	(0.41, 2.30)	0.9564	1.12	(0.71, 1.79)	0.6220	0.7841			
rs7183977	2	1.54	(0.92, 2.58)	0.0977	1.97	(0.98, 3.94)	0.0565	1.63	(1.00, 2.66)	0.0505	0.0360			
rs998713	6	1.48	(0.87, 2.52)	0.1512	1.81	(0.90, 3.63)	0.0945	1.55	(0.93, 2.59)	0.0937	0.0733			
rs9581735	1	2.10	(1.27, 3.49)	0.0041	3.00	(1.44, 6.25)	0.0035	2.25	(1.39, 3.66)	0.0010	0.0005			
rs1800627	3	1.02	(0.58, 1.81)	0.9416	1.28	(0.67, 2.42)	0.4547	1.10	(0.65, 1.89)	0.7192	0.4498			
rs3181345	0	0.62	(0.32, 1.20)	0.1575	-	-	-	0.58	(0.30, 1.13)	0.1094	0.0869			
rs3212153	1	1.05	(0.62, 1.80)	0.8559	1.12	(0.25, 5.14)	0.8812	1.06	(0.63, 1.78)	0.8350	0.8230			
rs5030552	1	0.71	(0.35, 1.41)	0.3232	-	-	-	0.66	(0.33, 1.32)	0.2386	0.1910			
rs768063	0	0.51	(0.15, 1.68)	0.2677	-	-	-	0.50	(0.15, 1.66)	0.2608	0.2584			
rs12306852	0	0.63	(0.35, 1.13)	0.1217	0.77	(0.17, 3.43)	0.7318	0.64	(0.37, 1.13)	0.1219	0.1591			
rs2069716	0	0.73	(0.34, 1.57)	0.4218	-	-	-	0.68	(0.32, 1.46)	0.3231	0.2636			
rs2069718	8	1.16	(0.67, 2.02)	0.5890	2.90	(1.57, 5.37)	0.0007	1.55	(0.94, 2.56)	0.0869	0.0018			
rs2069727	0	0.66	(0.40, 1.10)	0.1142	0.51	(0.25, 1.00)	0.0490	0.61	(0.38, 0.99)	0.0448	0.0370			
rs6581735	1	2.10	(1.27, 3.49)	0.0041	3.00	(1.44, 6.25)	0.0035	2.25	(1.39, 3.66)	0.0010	0.0005			
rs12529779	15	1.08	(0.41, 1.13)	0.1370	0.71	(0.21, 2.38)	0.5752	0.68	(0.42, 1.11)	0.1258	0.1563			
rs1327474	1	1.58	(0.90, 2.76)	0.1110	1.51	(0.76, 3.01)	0.2379	1.56	(0.91, 2.67)	0.1046	0.1915			
rs1327475	2	0.78	(0.46, 1.31)	0.3438	1.11	(0.32, 3.79)	0.8734	0.81	(0.49, 1.33)	0.3982	0.5190			
rs1854154	6	1.11	(0.66, 1.88)	0.7003	0.78	(0.39, 1.56)	0.4865	1.01	(0.61, 1.67)	0.9739	0.5683			
rs3799488	0	1.11	(0.65, 1.90)	0.6983	-	-	-	1.05	(0.61, 1.78)	0.8710	0.9121			
rs477768	8	0.86	(0.50, 1.50)	0.6041	1.79	(0.39, 8.28)	0.4546	0.91	(0.54, 1.55)	0.7321	0.9108			
rs4896243	4	1.39	(0.78, 2.48)	0.2590	1.77	(0.91, 3.44)	0.0944	1.50	(0.87, 2.59)	0.1486	0.0923			
rs608914	4	0.87	(0.54, 1.41)	0.5814	0.87	(0.37, 2.01)	0.7380	0.87	(0.55, 1.38)	0.5570	0.5886			
rs7759040	0	0.87	(0.54, 1.41)	0.5887	0.57	(0.17, 1.92)	0.3676	0.83	(0.52, 1.32)	0.4314	0.3349			
rs9402877	3	0.84	(0.50, 1.40)	0.5006	0.88	(0.46, 1.70)	0.7112	0.85	(0.53, 1.37)	0.5085	0.6244			
rs1015873	0	1.42	(0.58, 3.48)	0.4457	-	-	-	1.42	(0.58, 3.48)	0.4457	0.4457			
rs12626735	0	1.27	(0.79, 2.04)	0.3318	1.35	(0.54, 3.38)	0.5236	1.28	(0.81, 2.02)	0.2938	0.3057			
rs16990664	0	1.38	(0.56, 3.37)	0.4817	-	-	-	1.38	(0.56, 3.37)	0.4817	0.4817			
rs2012075	45	1.08	(0.63, 1.87)	0.7774	0.82	(0.10, 6.52)	0.8516	1.07	(0.62, 1.82)	0.8171	0.8752			
rs2284553	59	1.15	(0.69, 1.93)	0.5899	0.90	(0.42, 1.94)	0.7909	1.09	(0.67, 1.80)	0.7238	0.9771			
rs2834211	0	0.81	(0.44, 1.48)	0.4849	-	-	-	0.77	(0.42, 1.42)	0.4064	0.3449			
rs2834214	1	1.35	(0.80, 2.29)	0.2603	0.79	0.38	1.64	0.53	1.18	(0.71, 1.96)	0.5146	0.7482		
rs8131980	2	1.01	(0.63, 1.62)	0.9658	0.62	0.24	1.62	0.33	0.94	(0.59, 1.48)	0.7859	0.5072		
rs9978971	0	0.95	(0.57, 1.58)	0.8501	0.64	0.30	1.38	0.26	0.88	(0.54, 1.43)	0.5959	0.3113		
rs9978166	0	1.75	(1.07, 2.87)	0.0262	-	-	-	1.61	(0.98, 2.63)	0.0581	0.1669			
rs1554286	2	1.01	(0.61, 1.68)	0.9593	2.00	0.73	5.48	0.18	1.11	(0.69, 1.79)	0.6748	0.4148		
rs17015767	0	0.83	(0.50, 1.38)	0.4675	0.51	0.12	2.18	0.36	0.79	(0.48, 1.30)	0.3467	0.2745		
rs1800871	9	0.93	(0.57, 1.52)	0.7720	1.57	0.66	3.72	0.31	1.01	(0.64, 1.61)	0.9563	0.6349		
rs1800872	10	0.93	(0.57, 1.52)	0.7602	1.32	0.53	3.29	0.56	0.98	(0.61, 1.56)	0.9233	0.8603		
rs2222202	9	1.21	(0.73, 2.02)	0.4661	0.57	0.27	1.21	0.14	1.01	(0.62, 1.65)	0.9701	0.2688		
rs3021094	2	1.04	(0.56, 1.95)	0.8919	-	-	-	1.00	(0.53, 1.86)	0.9909	0.8652			
rs3024505	1	1.23	(0.74, 2.06)	0.4219	0.80	0.18	3.45	0.76	1.18	(0.72, 1.94)	0.5096	0.6636		
rs3024509	0	0.57	(0.25, 1.27)	0.1700	-	-	-	0.56	(0.25, 1.26)	0.1634	0.1598			
rs4390741	7	1.35	(0.76, 2.06)	0.3799	0.94	0.44	1.99	0.86	1.18	(0.73, 1.90)	0.5059	0.8489		
rs4844553	8	0.61	(0.27, 1.36)	0.2248	2.53	0.25	25.15	0.43	0.87	(0.31, 2.43)	0.3005	0.4221		
rs6673928	1	0.82	(0.49, 1.36)	0.4365	0.40	0.09	1.71	0.22	0.76	(0.46, 1.24)	0.2700	0.1767		
rs6689631	2	1.06	(0.65, 1.72)	0.8108	1.25	0.47	3.37	0.65	1.08	(0.68, 1.72)	0.7315	0.6615		
rs7548373	22	0.81	(0.39, 1.68)	0.5767	-	-	-	0.80	(0.38, 1.65)	0.5372	0.5016			
rs11927521	6	0.99	(0.60, 1.63)	0.9703	1.00	0.50	1.98	1.00	0.99	(0.62, 1.59)	0.9751	0.9874		
rs2243115	4	1.01	(0.58, 1.76)	0.9736	-	-	-	0.95	(0.54, 1.66)	0.8533	0.6577			
rs2243131	3	0.70	(0.40, 1.23)	0.2128	0.80	0.18	3.51	0.76	0.71	(0.41, 1.22)	0.2108	0.2516		
rs2243154	0	1.05	(0.57, 1.94)	0.8674	-	-	-	0.99	(0.54, 1.82)	0.9670	0.7928			
rs4680534	0	0.69	(0.42, 1.14)	0.1464	0.88	0.43	1.79	0.72	0.73	(0.46, 1.16)	0.1845	0.3730		
rs485497	1	0.88	(0.51, 1.50)	0.6306	0.81	0.42	1.55	0.52	0.85	(0.52, 1.42)	0.5627	0.5265		
rs583911	1	0.90	(0.53, 1.62)	0.7047	1.29	0.63	2.40	0.43	1.01	(0.61, 1.66)	0.9688	0.4899		
rs6441282	1	0.56	(0.33, 0.94)	0.0284	0.68	0.36	1.27	0.23	0.60	(0.37, 0.96)	0.0324	0.1365		
rs6800657	6	0.57	(0.28, 1.18)	0.1334	1.34	0.29	6.14	0.71	0.64	(0.33, 1.25)	0.1902	0.3137		
rs692890	0	0.52	(0.31, 0.88)	0.0156	1.09	0.54	2.21	0.81	0.63	(0.39, 1.00)	0.0522	0.3156		
rs7372767	2	1.07	(0.64, 1.80)	0.7921	1.27	0.67	2.42	0.47	1.13	(0.69, 1.83)	0.6327	0.4895		
rs747825	1	0.83	(0.49, 1.38)	0.4668	0.85	0.25	2.89	0.79	0.83	(0.50, 1.36)	0.4545	0.4893		
rs755004	2	1.04	(0.61, 1.80)	0.8768	3.38	0.90	12.64	0.07	1.16	(0.69, 1.94)	0.5847	0.3303		
rs9811792	1	0.99	(0.58, 1.69)	0.9748	1.41	0.76	2.62	0.27	1.11	(0.68, 1.82)	0.6729	0.3136		
rs9852519	2	0.89	(0.54, 1.48)	0.6657	1.04	0.54	1.99	0.91	0.93	(0.59, 1.49)	0.7751	0.9791		
rs10052709	3	1.07	(0.63, 1.83)	0.7390	0.61	0.08	4.75	0.64	1.04	(0.61, 1.75)	0.8947	0.9833		
rs11574790	1	1.03	(0.59, 1.82)	0.9072	0.84	0.11	6.65	0.87	1.02	(0.59, 1.77)	0.9405	0.9823		
rs1368439	1	1.39	(0.84, 2.28)	0.1961	1.41	0.48	4.16	0.53	1.39	(0.86, 2.24)	0.1741	0.1971		
rs1433048	1	1.20	(0.73, 1.96)	0.4688	0.89	0.26	2.99	0.85	1.16	(0.72, 1.86)	0.5444	0.6892		
rs2546890	0	0.72	(0.42, 1.21)	0.2150	0.79	0.42	1.51	0.48	0.74	(0.45, 1.21)	0.2296	0.4171		
rs2546893	0	1.24	(0.71, 2.15)	0.4472	0.85	0.42	1.72	0.66	1.12	(0.66, 1.90)	0.6843	0.7240		
rs2569253	19	1.05	(0.62, 1.79)	0.8526	0.82	0.43	1.58	0.55	0.97	(0.59, 1.61)	0.9091	0.5829		
rs2853694	0	1.04	(0.57, 1.89)	0.8965	1.75	0.93	3.26	0.08	1.27	(0.73, 2.20)	0.3966	0.6665		
rs3181216	0	1.16	(0.72, 1.89)	0.5438	1.20	0.55	2.62	0.64	1.17	(0.74, 1.86)	0.5051	0.5216		
rs3181225	0	0.65	(0.37, 1.15)	0.1398	0.64	0.15	2.79	0.56	0.65	(0.38, 1.12)	0.1209	0.1408		
rs4821466	0	1.07	(0.60, 1.91)	0.8096	1.03									

		rs11757491	0	0.43	(0.17	-1.09)	0.0756	2.00	0.23	17.69	0.53	0.49	(0.21	-1.17)	0.1089	0.1774	
		rs12211228	1	0.92	(0.54	-1.59)	0.7770	2.11	0.58	7.69	0.26	1.00	(0.60	-1.68)	0.9990	0.7378	
		rs13208928	0	0.44	(0.17	-1.11)	0.0833	1.67	0.20	14.32	0.64	0.50	(0.21	-1.18)	0.1149	0.1823	
		rs1514346	0	0.61	(0.30	-1.25)	0.1765	1.49	0.17	12.75	0.72	0.65	(0.32	-1.29)	0.2149	0.2880	
		rs1877176	0	0.85	(0.51	-1.40)	0.5258	1.01	0.34	2.98	0.98	0.87	(0.54	-1.40)	0.5859	0.6638	
		rs2011508	0	0.68	(0.39	-1.18)	0.1719	0.60	0.14	2.60	0.49	0.67	(0.39	-1.14)	0.1395	0.1490	
		rs3778607	1	1.22	(0.69	-2.15)	0.4957	1.02	0.52	1.98	0.96	1.15	(0.67	-1.97)	0.6163	0.9637	
		rs3800262	0	1.15	(0.70	-1.91)	0.5814	2.02	0.67	6.14	0.21	1.23	(0.76	-1.98)	0.4069	0.2717	
		rs6900384	14	0.68	(0.32	-1.46)	0.3256	2.56	0.26	25.56	0.42	0.74	(0.36	-1.53)	0.4206	0.5573	
		rs6906608	0	0.92	(0.54	-1.59)	0.7778	2.11	0.58	7.69	0.26	1.00	(0.60	-1.68)	0.9979	0.7370	
		rs7768807	0	1.05	(0.64	-1.72)	0.8413	1.43	0.61	3.38	0.41	1.11	(0.70	-1.76)	0.6692	0.5058	
		rs9378805	0	0.78	(0.47	-1.31)	0.3534	0.61	0.32	1.19	0.15	0.73	(0.45	-1.18)	0.1994	0.1395	
		rs9405192	3	0.96	(0.59	-1.56)	0.8813	1.05	0.47	2.34	0.91	0.98	(0.62	-1.55)	0.9277	0.9979	
	JAK1	rs10789166	1	1.04	(0.61	-1.75)	0.8940	-	-	-	-	0.93	(0.55	-1.57)	0.7990	0.5033	
		rs2256298	0	1.23	(0.76	-2.00)	0.3925	1.52	0.65	3.58	0.34	1.27	(0.80	-2.02)	0.3009	0.2517	
		rs310211	1	1.03	(0.63	-1.67)	0.9100	1.04	0.48	2.25	0.92	1.03	(0.65	-1.64)	0.8962	0.8948	
		rs7546535	39	1.11	(0.68	-1.83)	0.6670	0.76	0.22	2.58	0.66	1.07	(0.66	-1.72)	0.7934	0.9769	
	SOCS1	rs149311	3	1.20	(0.72	-1.99)	0.4836	1.10	0.32	3.74	0.88	1.19	(0.73	-1.93)	0.4915	0.5465	
		rs149597	2	1.15	(0.68	-1.94)	0.5969	0.61	0.30	1.25	0.18	0.97	(0.59	-1.61)	0.9144	0.2562	
		rs193778	1	0.83	(0.51	-1.36)	0.4669	1.24	0.47	3.33	0.66	0.88	(0.55	-1.40)	0.5853	0.8065	
		rs243317	1	0.81	(0.51	-1.30)	0.3892	0.38	0.11	1.26	0.11	0.74	(0.47	-1.17)	0.2021	0.1006	
		rs408665	28	0.70	(0.42	-1.16)	0.1631	0.81	0.41	1.58	0.53	0.72	(0.45	-1.17)	0.1837	0.3624	
		rs9405151	1	0.69	(0.42	-1.14)	0.1504	0.87	0.45	1.69	0.68	0.73	(0.46	-1.17)	0.1956	0.4341	
	SOCS5	rs13402099	3	0.84	(0.46	-1.55)	0.5836	-	-	-	-	0.75	(0.41	-1.37)	0.3533	0.2191	
		rs13412085	0	0.88	(0.49	-1.57)	0.6558	-	-	-	-	0.77	(0.43	-1.37)	0.3735	0.2643	
		rs1708235	0	0.97	(0.55	-1.70)	0.9059	-	-	-	-	0.51	(0.51	-1.59)	0.7158	0.5303	
	SOCS6	rs17808666	1	1.29	(0.65	-2.56)	0.4603	3.78	0.29	49.10	0.31	1.36	(0.70	-2.63)	0.3679	0.2906	
		rs4891398	29	1.19	(0.71	-1.99)	0.5150	1.45	0.75	2.81	0.27	1.25	(0.77	-2.03)	0.3641	0.2685	
	STAT1	rs10173099	10	1.27	(0.78	-2.07)	0.3424	1.01	0.47	2.20	0.97	1.21	(0.76	-1.94)	0.4219	0.6574	
		rs10199181	2	1.18	(0.71	-1.95)	0.5205	1.09	0.53	2.21	0.82	1.16	(0.72	-1.86)	0.5504	0.6849	
		rs11168	3	0.92	(0.55	-1.55)	0.7818	0.74	0.37	1.48	0.39	0.87	(0.53	-1.42)	0.5813	0.4088	
		rs12468579	1	1.29	(0.76	-2.19)	0.3502	1.16	0.58	2.30	0.68	1.25	(0.75	-2.08)	0.3843	0.5770	
		rs12693591	0	0.94	(0.54	-1.64)	0.8348	1.67	0.36	7.69	0.51	0.99	(0.58	-1.68)	0.9614	0.8933	
		rs13029247	2	1.18	(0.73	-1.92)	0.4929	1.11	0.51	2.41	0.79	1.17	(0.74	-1.86)	0.5041	0.5973	
		rs13029532	0	1.68	(0.98	-2.86)	0.0575	0.00	0.00	-	-	0.98	1.54	(0.80	-2.62)	0.1139	0.2643
		rs13035504	1	1.01	(0.60	-1.69)	0.9734	0.82	0.19	3.61	0.80	0.99	(0.60	-1.63)	0.9712	0.9693	
		rs13395505	0	1.23	(0.74	-2.04)	0.4264	0.98	0.48	2.01	0.96	1.17	(0.72	-1.89)	0.5371	0.8403	
		rs1400657	0	1.05	(0.61	-1.84)	0.8513	0.67	0.08	5.23	0.70	1.02	(0.60	-1.76)	0.9334	0.9703	
		rs1467199	0	1.16	(0.72	-1.86)	0.5372	0.37	0.09	1.58	0.18	1.03	(0.65	-1.64)	0.8890	0.6329	
		rs1547550	20	1.66	(1.00	-2.76)	0.0506	1.78	0.86	3.68	0.12	1.69	(1.03	-2.75)	0.0359	0.0486	
		rs16824035	1	0.94	(0.56	-1.57)	0.8034	0.80	0.18	3.52	0.77	0.92	(0.56	-1.53)	0.7565	0.7229	
		rs17749316	0	1.39	(0.74	-2.62)	0.3078	-	-	-	-	1.35	(0.72	-2.53)	0.3562	0.4320	
		rs17817966	0	1.05	(0.61	-1.78)	0.8705	1.16	0.62	2.18	0.65	1.08	(0.66	-1.77)	0.7588	0.6551	
		rs2066795	0	1.69	(0.37	-2.75)	0.5020	-	-	-	-	1.69	(0.37	-2.75)	0.5020	0.5020	
		rs2066804	1	1.28	(0.80	-2.04)	0.3118	0.83	0.24	2.79	0.76	1.22	(0.77	-1.93)	0.3945	0.5843	
		rs2280232	1	0.86	(0.53	-1.40)	0.5511	1.13	0.48	2.65	0.79	0.90	(0.57	-1.43)	0.6617	0.8660	
		rs2280233	4	0.89	(0.53	-1.51)	0.6745	0.87	0.45	1.66	0.67	0.89	(0.54	-1.45)	0.6307	0.6520	
		rs2280234	5	1.65	(0.98	-2.78)	0.0576	1.40	0.69	2.87	0.35	1.59	(0.97	-2.62)	0.0675	0.1758	
		rs34997637	3	1.14	(0.70	-1.84)	0.6066	1.04	0.39	2.74	0.94	1.12	(0.71	-1.78)	0.6301	0.7061	
		rs4327257	0	0.98	(0.57	-1.68)	0.9312	0.51	0.07	3.87	0.51	0.93	(0.55	-1.59)	0.7978	0.6712	
		rs4853533	3	1.31	(0.79	-2.16)	0.2972	1.15	0.56	2.34	0.70	1.27	(0.78	-2.05)	0.3319	0.5070	
		rs7562024	0	1.56	(0.93	-2.61)	0.0932	1.08	0.53	2.17	0.84	1.41	(0.86	-2.31)	0.1689	0.5351	
		rs867637	2	1.24	(0.75	-2.04)	0.3970	1.27	0.63	2.59	0.50	1.25	(0.78	-2.00)	0.3585	0.3954	
	STAT3	rs1053005	1	1.03	(0.64	-1.68)	0.8903	0.53	0.12	2.29	0.40	0.97	(0.61	-1.57)	0.9149	0.6870	
		rs1053023	1	1.03	(0.64	-1.68)	0.8903	0.53	0.12	2.29	0.40	0.97	(0.61	-1.57)	0.9149	0.6870	
		rs12949818	1	1.01	(0.49	-1.28)	0.3820	0.51	0.24	1.07	0.07	0.71	(0.45	-1.13)	0.1508	0.0697	
		rs17405722	1	1.21	(0.64	-2.29)	0.5487	-	-	-	-	1.18	(0.63	-2.22)	0.6119	0.6976	
		rs2293152	2	1.58	(0.93	-2.70)	0.0929	1.75	0.91	3.36	0.09	1.63	(0.98	-2.70)	0.0576	0.0670	
		rs4103200	0	0.60	(0.37	-0.98)	0.0433	0.40	0.14	1.14	0.09	0.57	(0.35	-0.90)	0.0174	0.0149	
		rs6503695	0	0.67	(0.41	-1.08)	0.1008	0.48	(0.21	-1.09)	0.0807	0.62	(0.39	-0.98)	0.0414	0.0333	
		rs9891119	0	0.81	(0.50	-1.29)	0.3723	0.33	(0.13	-0.87)	0.0242	0.69	(0.44	-1.10)	0.1161	0.0271	
		rs9912773	0	0.64	(0.39	-1.05)	0.0743	0.49	(0.17	-1.41)	0.1867	0.61	(0.38	-0.98)	0.0424	0.0427	
	STAT4	rs10168266	0	0.92	(0.56	-1.51)	0.7374	0.27	(0.04	-2.05)	0.2080	0.84	(0.52	-1.37)	0.4961	0.3026	
		rs10189819	1	1.06	(0.64	-1.73)	0.8320	1.34	(0.53	-3.36)	0.5352	1.10	(0.69	-1.75)	0.7019	0.5896	
		rs1051481	0	0.98	(0.61	-1.57)	0.9304	0.59	(0.24	-1.45)	0.2502	0.89	(0.67	-1.41)	0.6295	0.3641	
		rs11685878	4	1.13	(0.67	-1.89)	0.6543	1.01	(0.50	-2.01)	0.8961	1.08	(0.67	-1.79)	0.7222	0.8994	
		rs13020076	56	0.91	(0.45	-1.84)	0.8011	1.36	(0.16	-11.42)	0.7767	0.94	(0.48	-1.85)	0.8631	0.9342	
		rs13389408	0	1.34	(0.80	-2.26)	0.2896	-	-	-	-	1.26	(0.75	-2.11)	0.3911	0.6065	
		rs1517352	2	1.19	(0.71	-1.99)	0.5185	1.15	(0.59	-2.25)	0.6814	1.18	(0.72	-1.92)	0.5155	0.6088	
		rs16833177	0	1.25	(0.78	-2.02)	0.3558	0.23	(0.03	-1.73)	0.1537	1.10	(0.69	-1.76)	0.6936	0.7657	
		rs16833239	1	1.24	(0.69	-2.22)	0.4683	-	-	-	-	1.21	(0.68	-2.17)	0.5161	0.5864	
		rs16833437	1	1.38	(0.83	-2.30)	0.2095	1.42	(0.70	-2.87)	0.3318	1.39	(0.86	-2.26)	0.1806	0.2255	
		rs17769459	0	1.10	(0.55	-2.02)	0.7810	-	-	-	-	1.07	(0.53	-2.14)	0.8573	0.9454	
		rs2459611	0	1.76	(1.06	-2.92)	0.0285	-	-	-	-	1.63	(0.99	-2.70)	0.0560	0.1426	
		rs3024861	1	1.07	(0.67	-1.73)	0.7732	0.71	(0.27	-1.87)	0.4868	1.01	(0.64	-1.60)	0.9705	0.7579	
		rs3024877	0	1.27	(0.78	-2.05)	0.3380	1.08	(0.48	-2.43)	0.8509	1.23	(0.77	-1.96)	0.3755	0.5365	
		rs3024908	0	1.53	(0.92	-2.54)	0.1012	-	-	-	-	1.36	(0.82	-2.25)	0.2371	0.5686	
		rs3024912	1	1.16	(0.72	-1.86)	0.5426	0.37	(0.09	-1.56)	0.1744	1.03	(0.65	-1.64)	0.9005	0.6179	
		rs3024921	0	1.30	(0.64	-2.64)	0.4607	-	-	-	-	1.29	(0.64	-2.62)	0.4763	0.4987	
		rs3024936	0	0.76	(0.27	-2.20)	0.6178	-	-	-	-	0.76	(0.27	-2.20)	0.6178	0.6178	

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2  
3 1 **Title: Association of JAK-STAT pathway related genes with lymphoma risk: results of a**  
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5 2 **European case-control study (EpiLymph)**  
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10 4 **Running Title: Association of JAK-STAT pathway related genes with lymphoma risk**

11  
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## 1 Summary

2 Previous studies have suggested an important role of the JAK-STAT signalling pathway  
3 in tumour development. Therefore, we explored genetic variants in JAK-STAT pathway  
4 associated genes with lymphoma risk. In samples of the EpiLymph case-control study we  
5 genotyped 1536 single nucleotide polymorphisms (SNPs) using GoldenGate BeadArray™  
6 Technology (Illumina, San Diego, CA). Here, we report the associations between selected  
7 SNPs and haplotypes of the JAK-STAT pathway and risk of Hodgkin lymphoma (HL), B-cell  
8 lymphoma (B-NHL) and most frequent B-NHL subtypes. Among 210 relevant JAK-STAT  
9 pathway-related SNPs, polymorphisms in nine genes (*BMF*, *IFNG*, *IL12A*, *SOCS1*, *STAT1*,  
10 *STAT3*, *STAT5A*, *STAT6*, *TP63*) were significantly associated with lymphoma risk. At a  
11 study-wise significance level, we obtained a risk reduction of 28 % among carriers of the  
12 heterozygous genotype of the *STAT3* variant (rs1053023) for B-NHL. For six other variants  
13 within the *STAT3* gene we observed an inverse association with different lymphoma subtypes.  
14 A reduced risk for HL was observed for the heterozygous genotype of the *STAT6* SNP  
15 (rs324011). **This is an explorative investigation to examine associations between JAK-  
16 STAT signalling related genes and lymphoma risk. The results implicate a relevant role  
17 of certain pathway-related genes in the lymphomagenesis, but still need to be approved  
18 by independent studies.**

19  
20 **Keywords:** lymphoma, susceptibility, JAK-STAT, epidemiology, association study

## 21 Introduction

22 Lymphomas are a heterogeneous group of malignancies originating from lymphocytes,  
23 with the main types of non-Hodgkin lymphoma and Hodgkin lymphoma (Jaffe E. S. 2001)  
24 and multiple subtypes within these categories. Strong risk factors for these lymphoid  
25 malignancies are genetic and acquired immunodeficiencies (Ekstrom Smedby, *et al* 2008),  
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3 1 infectious agents (Hjalgrim and Engels 2008) and several occupational exposures (Cocco, *et*  
4  
5  
6 2 *al* 2010, Miligi, *et al* 2006). Apart from these, various studies (Mensah, *et al* 2007,  
7  
8 3 Villeneuve, *et al* 2009, Wang, *et al* 2007, Zhang, *et al* 2007) reported an increased risk of  
9  
10 4 NHL for those with a first degree relative diagnosed with a haematopoietic malignancy. This  
11  
12 5 data indicates the importance of genetic predisposition for lymphoma risk (Skibola, *et al*  
13  
14 6 2007), and the interplay with environmental factors as the possible etiological mechanism.

17 7 The signal-transducer and activator of transcription (STAT) family consists of 7 members  
18  
19 8 latently expressed in the cytoplasm and which are phosphorylated by Janus kinases (JAK)  
20  
21 9 cytosolic tyrosine kinases in response to different cytokine stimuli (Schindler, *et al* 2007).  
22  
23 10 They are involved in signalling cascades of various immune regulatory pathways (Egwuagu  
24  
25 11 2009). Among these factors, particularly stat3 is emerging as an important player in the  
26  
27 12 development of malignancies. It is constitutively activated in different cancer types (Coppo, *et*  
28  
29 13 *al* 2009, Ding, *et al* 2008, Frank 2003, Hazan-Halevy, *et al* 2010, Mackenzie, *et al* 2008,  
30  
31 14 Tomita, *et al* 2006), and known to promote tumourigenesis by enhancing expression of pro-  
32  
33 15 survival factors such as B-cell lymphoma 2 (bcl-2), bcl-xL and myeloid cell leukaemia  
34  
35 16 sequence 1 (mcl-1) (reviewed by (Hu and Ivashkiv 2009, Yu, *et al* 2009)). Also other factors  
36  
37 17 of this family, such as stat 1, 5 and 6 appear to play a role in the pathogenesis of human  
38  
39 18 cancers (Adamkova, *et al* 2007, Bruns and Kaplan 2006, Martini, *et al* 2008, Yu and Jove  
40  
41 19 2004) and present constitutive activation in breast cancer, head and neck cancer, leukaemia  
42  
43 20 and multiple myeloma (Bowman, *et al* 2000, Bromberg 2002, Yu and Jove 2004). Their  
44  
45 21 prominent role in signalling pathways of well-established risk factors for cancer and their  
46  
47 22 implication in various cancer types prompted us to investigate the association between genetic  
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49 23 variants of selected genes of the JAK-STAT pathway and lymphoma risk in samples of  
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51 24 participants to the European EpiLymph multi-centre case-control study.  
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## 1 **Material and Methods**

### 2 *Study design*

3 A detailed description of the EpiLymph study has been published elsewhere (de Sanjose,  
4 *et al* 2006). Briefly, the EpiLymph study was carried out in six European countries (Spain,  
5 France, Germany, Italy, Ireland, and Czech Republic) from 1998 to 2004. Incident cases of  
6 lymphoid malignancies were recruited for the study and their diagnoses were categorized  
7 according to the WHO classification (Jaffe E. S. 2001). Controls were selected from the same  
8 hospitals as the cases in all centers, except in Germany and Italy where they were randomly  
9 sampled from population registries. Controls were frequency-matched to cases by age, sex,  
10 and study centre. The study included 2,348 cases and 2,462 controls. All participants were  
11 asked to donate a blood sample for DNA extraction and underwent a personal interview  
12 gathering sociodemographic information, familial and medical history, smoking and alcohol  
13 habits, a complete occupational history and details on recreational and occupational exposure  
14 to sunlight. The study was approved by the competent ethical committee in each study area,  
15 and informed consent was obtained from each study subject. The present genotyping study  
16 was restricted to EpiLymph study subjects for whom DNA was available: a total of 1,481  
17 cases of lymphoma, including Hodgkin lymphoma (HL,  $n=272$ ), T-cell lymphoma (T-NHL,  
18  $n=95$ ), and B-cell lymphoma (B-NHL,  $n=1,114$ ), in turn including the subtypes diffuse large  
19 B-cell lymphoma (DLBCL,  $n=408$ ), follicular lymphoma (FL,  $n=200$ ), chronic lymphocytic  
20 leukaemia (CLL,  $n=340$ ), marginal zone B-cell lymphoma (MZL,  $n=112$ ), and mantle cell  
21 lymphoma (MCL,  $n=54$ ). The corresponding EpiLymph controls ( $n=1,491$ ) were frequency-  
22 matched by age (< 30, 30-39, 40-49, 50-59, 60-69, 70-79,  $\geq 80$ ), sex, and study centre. The  
23 German cases and controls were individually matched by gender and age ( $\pm 1$  year of birth).

24

### 1 *SNP selection*

2 Genes and single nucleotide polymorphisms (SNPs) which have either previously been  
3 associated with lymphomagenesis or have a high biological plausibility to be involved in the  
4 development of lymphoid neoplasms, were selected from public databases. Tagging SNPs for  
5 the selected genes and their  $\pm 10$ kb flanking region were selected via pairwise SNP selection  
6 with an  $r^2$  threshold of 0.9 using Haploview (Barrett, *et al* 2005, Carlson, *et al* 2004, de  
7 Bakker, *et al* 2005) and the genotyping information for the CEU population of the HapMap  
8 database (Consortium 2003) (<http://hapmap.ncbi.nlm.nih.gov>, NCBI 36 assembly, dbSNP  
9 b126, phase II).

10 Only SNPs with a minor allele frequency (MAF)  $\geq 5\%$  and an Illumina GoldenGate  
11 Design Score of at least 0.6 were included into the oligonucleotide pooled assay (OPA).

### 12 13 *Genotyping and sample preparation*

14 Genotyping was performed using the Illumina<sup>TM</sup> GoldenGate assay technology (Illumina,  
15 San Diego, CA). The 1,481 cases and 1,491 controls were newly plated in a 96-well format.  
16 350 ng of DNA was required, with a concentration of at least 70 ng/ $\mu$ l. The available DNA  
17 concentration was measured using PicoGreen<sup>®</sup> (Invitrogen, Darmstadt, Germany). Samples  
18 with insufficient DNA ( $n=822$ ) were whole-genome amplified according to the  
19 manufacturer's protocol for the Illustra GenomePhi V2 DNA Amplification Kit (GE  
20 Healthcare, Buckinghamshire, UK). In addition, DNA extraction from blood clots was  
21 performed for 312 samples using the Gentra Puregene Blood Kit (Qiagen, Hilden, Germany).  
22 For quality control, three random DNA samples were placed on each plate for replication.

23 The genotyping was carried out according to the manufacturer's protocol and as specified  
24 by Fan *et al.* (Fan, *et al* 2006, Fan, *et al* 2003), in cooperation with the Genomics &  
25 Proteomics Core Facility at the German Cancer Research Centre in Heidelberg.



1  
2  
3 1 After generation of genotype calls with the GenCall version (5.2.0), all SNPs were  
4  
5 2 visually examined for individual clustering. Loci with poor performance or monomorphic  
6  
7 3 characteristics were excluded.  
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9

10 4 Individual DNA samples with a call rate below 0.96 were removed from the dataset.  
11  
12 5

### 13 6 *Statistical analysis*

14  
15 7 To test for deviation of genotype distribution from Hardy-Weinberg equilibrium (HWE)  
16  
17 8 among the controls we conducted a chi-square test. SNPs with deviation from HWE in  
18  
19 9 controls were excluded from further analysis. We used an adjusted  $p$ -value of  $3 \times 10^{-5}$   
20  
21 10 (Bonferroni correction for 1,418 SNPs relevant after quality control). We also determined  
22  
23 11 whether the allelic frequency distribution differed between cases and controls.  
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29 12 Heterogeneity of risks according to sex, age (cut-off for B-NHL: 50years, HL: 40years)  
30  
31 13 and study centres was tested using a chi-square test.  
32  
33  
34 14

### 35 15 *SNP analysis*

36  
37 16 Of the 1,536 SNPs genotyped in 1,481 cases and 1,491 controls, 97 were excluded from  
38  
39 17 analyses due to clustering and low call frequency, 21 due to being monomorphic in our study  
40  
41 18 population, and 42 because they showed a deviation from HWE ( $p$ -value less than  $3 \times 10^{-5}$ )  
42  
43 19 among the controls. Irrespectively, a total of 109 samples were excluded on the basis of a call  
44  
45 20 rate less than 0.96, leading to a failure rate of 3.6 %. The failure rates for cases and controls  
46  
47 21 were 4.5 % ( $n=65$ ) and 3 % ( $n=44$ ), respectively.  
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53 22 The associations between polymorphisms and risk of HL, T-NHL and B-NHL, as well as  
54  
55 23 the most frequent B-NHL subtypes, were estimated by calculating odds ratios (OR), and the  
56  
57 24 corresponding 95 % confidence intervals (CI) using unconditional logistic regression,  
58  
59 25 adjusting for age (continuous), sex and study centre, using SAS 9.2 (SAS Institute Inc. Cary,  
60  
26 NC). **After quality control of the genotyping data, samples were excluded from the**

1 statistical analysis. To avoid loss of power in conditional logistic regression analysis,  
2 frequency matching for the whole study population using the matching variables (age,  
3 sex and study centre) was performed as was done in previous publications of the  
4 EpiLymph study (Besson, et al 2006, de Sanjose, et al 2006). Previous analysis presented  
5 similar results from conditional and unconditional logistic regression analysis of  
6 EpiLymph data (Boffetta, et al 2008). Therefore, subsequent statistical analyses were  
7 performed using unconditional logistic regression adjusted for the matching variables  
8 (de Sanjose, et al 2006).

9 The homozygote genotype of the most common allele was used as reference group. To  
10 increase statistical power and detect the allelic effect, we performed tests under the dominant  
11 model by combining the heterozygous and mutant genotype. We also calculated the risk  
12 association for each genotype by using the co-dominant model for the logistic regression.

13 The test for trend was calculated including a continuous SNP variable in the log-additive  
14 model (Breslow NE 2000). As positive association we defined an odds ratio larger than 1,  
15 whereas an inverse association was specified by an OR below 1.

16 Additionally, we conducted analysis for risk of HL with conditional logistic regression  
17 with complete case sets, 1:1 matched within each age-category (< 30, 30-39, 40-49, 50-59,  
18 60-69, 70-79,  $\geq$  80) and by sex and study centre. As sensitivity analysis for B-NHL we  
19 conducted stratified analysis by sex and age, with cut point set at 50 years as performed by  
20 Lan et al. and Wang et al. (Lan, et al 2009, Wang, et al 2007). For HL cases the stratified  
21 analysis by age was done with a cut point of less than 40 years versus equal or older than 40  
22 years, due to the bimodal age distribution.

23 As a large number of tests were performed, we had to control the family-wise error  
24 rate. The gold standard to adjust for multiple comparison is a permutation test, which is  
25 computational extensive. Since, this is a candidate gene approach based on prior  
26 knowledge of the relevance of the included genes, we selected the SNP Spectral

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2  
3 1 **Decomposition Approach (*simpleM* method) (Gao, *et al* 2008), which yields similar**  
4  
5 2 **results as a permutation based approach (Johnson, *et al* 2010). The *simpleM* method**  
6  
7 3 **starts with the calculation of the effective number of independent SNPs,  $M_{\text{eff}}$ , for each**  
8  
9 4 **gene, based on the underlying LD structure of the genotyping data. Gene-specific  $M_{\text{eff}}$**   
10  
11 5 **values ( $^G M_{\text{eff}}$ ) were received, which were added up to a study-wise  $M_{\text{eff}}$  value,  $^{SG} M_{\text{eff}} =$**   
12  
13 6 **sum( $^G M_{\text{eff}}$ ) under the assumption that the genes are independent with respect to the endpoints.**  
14  
15 7 **By applying the Bonferroni correction to the number of independent tests, we obtained a**  
16  
17 8 **study-wise significance level of  $0.05/^{SG} M_{\text{eff}} = 2.9 \times 10^{-4}$ . Based on the distinct aetiology of**  
18  
19 9 **the three main lymphoma subtypes (B-NHL, T-NHL, and HL) (Morton, *et al* 2008), we**  
20  
21 10 **considered the tested association between SNPs and the subtypes as independent from**  
22  
23 11 **each other and did not take them into account for the multiple comparison correction.**  
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29 12 Statistical interaction was assessed for the SNPs of the most prominent genes for which  
30  
31 13 biological interaction was plausible based on the current knowledge of the JAK-STAT  
32  
33 14 pathway (Yu, *et al* 2009), by adding an interaction term in the regression model. To formally  
34  
35 15 test statistical interaction, the log-likelihood ratio test was applied. Furthermore, if the  
36  
37 16 interaction  $p$ -value was below 0.05 as well as for the most promising SNPs of the single SNP  
38  
39 17 analysis, where biological interaction was likely, we calculated risk estimates for one genetic  
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41 18 variant stratified by the genotype of the second variant included in the previous regression  
42  
43 19 model.  
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#### 50 21 *Haplotype analysis*

51  
52 22 The genotyping data of the controls was transformed into Haploview format (linkage  
53  
54 23 format) using the SNPtool ([http://www.dkfz.de/de/molgen\\_epidemiology/tools/SNPtool.html](http://www.dkfz.de/de/molgen_epidemiology/tools/SNPtool.html))  
55  
56 24 to reconstruct haplotype blocks with Haploview, using the implemented algorithm based on  
57  
58 25 confidence bounds by Gabriel *et al.* (Gabriel, *et al* 2002). The cut-off values for the haplotype  
59  
60

1 block generation are: MAF > 5 %, Hardy Weinberg  $p$ -value cut-off  $\geq 0.01$  and 75 % of non-  
2 missing genotypes of this marker.

3 Maximum likelihood haplotype frequency estimates were generated based on the  
4 expectation-maximization (EM) algorithm implemented in the *PROC HAPLOTYPE*  
5 procedure of the SAS/Genetics package (SAS 9.2). Haplotypes with a frequency < 0.05 were  
6 defined as rare haplotypes and combined. The haplotype with the highest frequency was used  
7 as reference.

## 9 **Results**

### 10 *Descriptive Statistics*

11 Details regarding the main characteristics of the study population used for the statistical  
12 analysis and the distribution of cases are presented in Table I. Briefly, 1,414 cases and 1,447  
13 controls were included in the statistical analysis. The age distribution was similar among  
14 cases and controls and the mean age is 55 years for both. To assess if the frequency matching  
15 had worked properly, heterogeneity between cases and controls was checked by applying the  
16 chi-square test, which revealed non-significant  $p$ -values for all three matching variables (age-  
17 group:  $p=0.9$ ; sex:  $p=0.9$  and study centre:  $p=1.0$ ). The largest lymphoma subtypes were  
18 Hodgkin lymphoma ( $n=259$ ), chronic lymphocytic leukaemia ( $n=321$ ), and diffuse large B-  
19 cell lymphoma ( $n=391$ ).

### 21 *Results of Single SNP analyses*

22 Supplemental Table 1 (S1) summarizes the genes and the 210 SNPs belonging to the  
23 JAK-STAT signalling pathway we studied. Eight SNPs (rs1053005, rs1053023, rs12949918,  
24 rs4103200, rs6503695, rs9891119, rs9912773, rs2293158) in *STAT3* and *STAT5A* showed a  
25 nominal significant association ( $p$ -trend < 0.01) with B-cell lymphomas combined. Five SNPs  
26 (rs6581795, rs4103200, rs9912773, rs6790068, rs9681004) in interferon gamma gene

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3 1 (*IFNG*), *STAT3*, *STAT6* and tumour protein 63 gene (*TP63*) showed a nominal sufficient  
4  
5 2 association with HL risk ( $p$ -trend  $< 0.05$ ). Two of these SNPs showed a study-wise significant  
6  
7 3 association with lymphoma risk ( $p$ -value  $\leq 0.0003$ ). The heterozygous genotype of variant  
8  
9 4 rs1053023, located in *STAT3*, was associated with a 28 % risk reduction for B-NHL (OR<sub>AG</sub> of  
10  
11 5 0.72, 95 % CI 0.60-0.86,  $p$ -value 0.0003). Moreover, for the *STAT6* variant, rs324011, a risk  
12  
13 6 reduction of 45 % was obtained for carriers of the heterozygous genotype (OR<sub>GA</sub> of 0.55, 95  
14  
15 7 % CI 0.40-0.76,  $p$ -value 0.0003). The corresponding odds ratios and 95 % confidence  
16  
17 8 intervals of the most prominent SNPs are shown in Table II, as for the main B-cell lymphoma  
18  
19 9 subtypes in Table III.  
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#### 27 *Associations with B-NHL and subtypes*

28  
29 12 Among the 10 tagSNPs of *STAT3*, 7 SNPs (rs1053005, rs1053023, rs12949918,  
30  
31 13 rs4103200, rs6503695, rs9891119, rs9912773) showed a nominal statistically significant ( $p$ -  
32  
33 14 value  $< 0.01$ ) inverse association with B-NHL overall, and stayed significant at the  $\alpha = 0.05$   
34  
35 15 level for DLBCL (see Table III and S2). *STAT3* rs4103200 was related to B-NHL risk with an  
36  
37 16 OR<sub>CG/CC</sub> of 0.78 (95 % CI 0.66-0.92) and a  $p$ -value for trend of 0.003. Similar risk reductions  
38  
39 17 in association with this variant were also evident for DLBCL (OR<sub>GC/CC</sub> of 0.76, 95 % CI 0.60-  
40  
41 18 0.96); FL (OR<sub>GC/CC</sub> of 0.73, 95% CI 0.54-0.99); and HL (OR<sub>CC</sub> of 0.49, 95 % CI 0.27-0.90,  $p$ -  
42  
43 19 value for trend 0.006).  
44  
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48 20 Furthermore, a nominal significant association was observed for *STAT5A* – homozygous  
49  
50 21 mutant carriers of rs2293158 were at 32 % reduced risk of B-NHL (95 % CI 0.51-0.92,  $p$ -  
51  
52 22 trend 0.002). An inverse association could also be seen for the other B-NHL subtypes, but  
53  
54 23 with lower significance.  
55  
56

57 24 The mutant allele of the suppressor of cytokine signalling 1 gene (*SOCS1*) variant  
58  
59 25 showed a nominal significant association with an increased risk for B-NHL (OR  
60  
26 rs149311<sub>GA/AA</sub> 1.42, 95% CI 1.12-1.60) as well as for DLBCL ( $p$ -trend of 0.003).

1 Two variants in Bcl-2 modifying factor gene (*BMF*) (rs3923235, rs7183977) were  
2 associated with risk for DLBCL (OR rs3923235<sub>GG</sub> of 0.43, 95 % CI 0.24-0.77; OR  
3 rs7183977<sub>GG</sub> of 0.69, 95 % CI 0.46-1.02), but neither with total B-cell lymphomas nor other  
4 subtypes (Table III). The GG genotype of interferon gamma receptor 1 gene (*IFNGR1*)  
5 variant (rs4896243) was positively associated with CLL risk (OR<sub>GG</sub> 1.69, 95 % CI 1.19-2.40).

#### 7 *Associations with T-NHL*

8 The analysis between the genetic variants and risk for T-NHL did not reveal any  
9 association with a *p*-value less than 0.01. However, for the *STAT5A* variant (rs2293158) we  
10 observed an inverse association with the risk of T-NHL for the GG genotype (OR<sub>GG</sub> 0.18,  
11 95 % CI 0.04-0.76) with a *p*-trend of 0.03 (see Table II). Among carriers of the interleukin  
12 12A gene (*IL12A*) variant, for heterozygous mutants a nearly 2-fold increase in the T-NHL  
13 risk was detected (OR rs755004<sub>GA</sub> 1.93, 95 % CI 1.22-3.05).

#### 15 *Associations with HL*

16 Within the HL analysis we obtained one SNP with study-wide significance, and  
17 additionally 11 SNPs showed nominal significant association with HL risk. (Table II and  
18 Supplementary Table 3). HL risk was most strikingly associated with variants in *STAT6*.  
19 Here, rs324011 and rs703817 showed a 40-45 % risk reduction for HL (OR rs324011<sub>GA/AA</sub> of  
20 0.61, 95 % CI 0.45-0.82; OR rs703817<sub>GA/AA</sub> of 0.62, 95 % CI 0.45-0.85). Statistical  
21 significance for the association of HL risk with both *STAT6* variants at the  $\alpha = 0.01$  level was  
22 lost when only complete case sets were analyzed (Supplemental Table S3).

23 In addition, the conditional logistic regression analyses revealed an association of caspase  
24 6 (*CASP6*) (rs1800627) with an increased risk (OR rs1800627<sub>AG/GG</sub> of 1.75, 95 % CI 1.16-  
25 2.64, *p*-value 0.007) and *STAT4* (rs4853546) with decreased risk for HL (OR rs4853546<sub>GA/AA</sub>  
26 0.59, 95 % CI 0.40-0.85, *p*-value 0.005), respectively.

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6 2*Associations within the stratified analysis*

7  
8 3 The age-stratified analysis revealed significant associations for HL with the variants of  
9  
10 4 *IFNG* (rs2069718) and *STAT4* (rs7599504) as well as with *TP63* variants (rs6790068,  
11  
12 5 rs9681004) among the older age-group (S5). Within the younger B-NHL cases (age < 50 y)  
13  
14 6 the *CASP6* variant (rs5030552) was associated with an increased risk (OR<sub>AG/GG</sub> 1.94, 95 % CI  
15  
16 7 1.22-3.11, *p*-trend 0.003). The analysis by sex showed a decreased risk for women, who were  
17  
18 8 heterozygous for the *IL7R* variant rs12516866 (OR rs12516866<sub>CA</sub> 0.61, 95 % CI 0.47-0.81, *p*-  
19  
20 9 trend 0.03) (data not shown). For the stratified analyses all herein presented *p*-values for  
21  
22 10 heterogeneity were below 0.05.  
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*Haplotype associations*

29 12  
30  
31 13 The estimated haplotype frequencies with the most frequent haplotype taken as the  
32  
33 14 reference are presented in Supplemental Table (S4). Mainly the haplotype-based associations  
34  
35 15 were consistent with those of single SNP based analyses. The *STAT3* haplotype (rs4103200-  
36  
37 16 rs9891119-rs9912773-rs12949918-rs17405722) with a frequency of 27 % and containing the  
38  
39 17 two most significant *STAT3* SNPs, rs4103200 and rs9912773, showed a reduced risk for B-  
40  
41 18 NHL (OR of 0.82, 95 % CI 0.72-0.94) and DLBCL (OR of 0.81, 95 % CI 0.67-0.98). HL risk  
42  
43 19 was significantly increased for carriers of haplotypes of *BMF* (Block 1-3), *IFNG* (Block1 and  
44  
45 20 2), *STAT6* and *TP63* (see Supplemental Table 4).  
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*Gene-gene interaction*

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55 23 We formally investigated interaction between different genes of the JAK-STAT pathway  
56  
57 24 by comparing the genetic variants of *CASP6*, *STAT3*, *STAT1*, *IFNG* and *IL12A* between B-  
58  
59 25 NHL cases and controls stratified by genotype of *BMF*, *STAT1*, *IL10*, *IFNG*, *SOCS1* and  
60  
26 *STAT4*, respectively. Significant results are summarized in Table IV.

1 Interaction between the homozygous mutant carriers of *IL12A* (rs4680534) and the  
2 homozygous mutants of *STAT4* (rs517352) resulted in a nearly 3-fold increased B-NHL risk  
3 (OR of 2.80, 95 % CI 1.30-6.05). Interaction between the *CASP6* variant (rs5030552) and two  
4 *BMF* variants (rs537455, rs16970325) showed a 57 % and 50 % increased risk, respectively.  
5 The interaction analysis of *STAT3* and *STAT1* revealed a 40 % reduced risk for carriers of the  
6 homozygous mutant of the *STAT3* variant (rs6503695) in carriers of the AA genotype of  
7 *STAT1* (OR rs6503695 of 0.60, 95 % CI 0.41-0.88). Among those of the *IL10* wildtype,  
8 carriers of the heterozygous mutant of the *STAT3* variant (rs1053023) showed decreased risk  
9 for B-NHL at the study-wise significance level (Table IV). Additionally, the heterozygous  
10 mutant of the *STAT3* SNP (rs4103200) was associated with a 29 % decreased risk for B-NHL  
11 among carriers of the *IFNG* wildtype.

## 12 13 **Discussion**

14 Our study identified 9 SNPs in 3 genes (*SOCS1*, *STAT3*, *STAT5A*) implicated in the JAK-  
15 STAT pathways significantly associated with risk of B-cell lymphoma, and 10 SNPs in 7  
16 genes of this pathway (*BMF*, *CASP6*, *IFNG*, *STAT3*, *STAT4*, *STAT6*, *TP63*) associated with  
17 HL risk.

18 Seven SNPs in *STAT3* presented a statistically significant inverse association with B-cell  
19 lymphoma risk, and particularly with the DLBCL and FL subtypes. One of these, the  
20 rs1053023, located in haplotype block 1, showed even study-wise significance. To our  
21 knowledge this is the first time that genetic variants in *STAT3* have been associated with  
22 lymphoma risk. Stat3 is a major mediator of il6 activation (Leonard and O'Shea 1998) and it  
23 is induced by several exogenous factors, such as like lipopolysaccharid (LPS) (Samavati, *et al*  
24 2009), cigarette smoke (Liu 2007), and infection with Hepatitis C virus (Yoshida, *et al* 2002).  
25 In normal cells stat3 activation is usually transient, whereas it is often constitutively activated  
26 in many cancers (reviewed in (Benekli, *et al* 2003, Bowman, *et al* 2000)). The transcription



1  
2  
3 1 factor promotes tumour development and survival of tumour cells by regulating pro-survival  
4  
5 2 factors, such as bcl-xL, bcl-2 and mcl-1 (reviewed (Hu and Ivashkiv 2009)). Aberrant stat3  
6  
7 3 activation has also been shown for HL (Kube, *et al* 2001), NK/T-cell lymphoma (Chiarle, *et*  
8  
9 *al* 2005, Zhang, *et al* 2002, Zheng, *et al* 2002), and activated DLBCL (Ding, *et al* 2008, Lam,  
10  
11 *et al* 2008). The interplay between STAT and nuclear factor kappa B (NFκB) pathways  
12  
13 5 appears to be implicated in lymphomagenesis (Bollrath and Greten 2009, Lam, *et al* 2008,  
14  
15 6 Scheeren, *et al* 2008).  
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17 7

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20 8 Mutations in *STAT3* are a hallmark of Hyper-IgE-syndrome (HIES), a complex primary  
21  
22 9 immunodeficiency (Minegishi and Karasuyama 2009) and several case reports also suggest an  
23  
24 10 increased risk for certain lymphoma types and HL among HIES patients (Belada, *et al* 2010,  
25  
26 11 Kashef, *et al* 2006, Minegishi 2009, Wallet, *et al* 2007). This adds to the eminent role of stat3  
27  
28 12 in immune response and the remarkable impact of its dysfunction in the aetiology of various  
29  
30 13 immune diseases.  
31  
32

33  
34 14 On the basis of the close functional relationship between stat3/stat1 and the cytokines il6  
35  
36 15 and il10, joint effects have been explored. For B-cell lymphoma we found evidence for  
37  
38 16 statistical interaction between *STAT3* and *IL10*, as well as between *STAT3* and *STAT1*.  
39  
40 17 Immunoregulatory il10 is upregulated by stat3 and is part of the stat3 feedforward loop (Yu,  
41  
42 *et al* 2007). The opponent factor of the JAK-STAT signalling *socs1*, a member of the family  
43  
44 18 of suppressors of cytokine signalling (Alexander 2002), was associated with increased risk for  
45  
46 19 B-NHL. This is in line with recent publications indicating *socs1* as tumour suppressor  
47  
48 20 (Weniger, *et al* 2006), and data reporting inactivation of this gene due to mutation or  
49  
50 21 hypermethylation in B-cell lymphoma entities and multiple myeloma, respectively (Galm, *et*  
51  
52 *al* 2003, Mottok, *et al* 2009).  
53  
54 22  
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57  
58 24 One of our most prominent results was the inverse association of *STAT5A* rs2293158  
59  
60 25 mutant genotype (GG) with risk of all main B-cell lymphoma subtypes (DLBCL, FL, CLL),  
26 as well as for T-NHL and HL. Constitutively activated stat5 in B-cell lymphoma cell lines

1 induces the important cell cycle regulator cyclinD1 (Melzner, *et al* 2005). A prominent target  
2 gene of stat5 is *BCL6*, encoding bcl-6, which regulates the expression of stat3 (Ding, *et al*  
3 2008) and is crucial for germinal centre development. Genetic variability of *BCL6* has  
4 previously been associated with NHL risk (Jardin, *et al* 2007, Morton, *et al* 2009, Parekh, *et*  
5 *al* 2007, Saito, *et al* 2009, Tibiletti, *et al* 2009, Zhang, *et al* 2005). Taken together, our results  
6 add epidemiological evidence to the significant role of STAT genes in lymphomagenesis.

7 Bmf binds to bcl-2 and functions as an apoptotic activator. Recent mice data suggests a  
8 relevance of this factor in c-myc-driven B-cell lymphomagenesis (Frenzel, *et al* 2010) and  $\gamma$   
9 irradiation-induced thymic lymphoma development (Labi, *et al* 2008). In our study, variants  
10 in *BMF* (rs7183977, rs3923235) were specifically associated with DLBCL risk, but not with  
11 the other lymphoma subtypes. Noteworthy is the evidence for gene-gene interactions between  
12 variants in *BMF* and *CASP6*, which were seen for B-cell lymphoma. This supports the  
13 connection between variability in genes of apoptotic pathways and the pathogenesis of  
14 lymphomas (Lan, *et al* 2009, Morton, *et al* 2009).

15 Pathogenesis of the various lymphoma subentities differs in relation to some  
16 environmental (Fisher and Fisher 2004, Landgren and Caporaso 2007, Smedby, *et al* 2006,  
17 Thomas, *et al* 2002) and also underlying genetic risk factors (Caporaso, *et al* 2009, El-Zein, *et*  
18 *al* 2009, Skibola, *et al* 2007, Wang, *et al* 2006). In this study of the JAK-STAT pathway  
19 related genes, HL risk has been associated with variants in *STAT3* (rs4103200, rs9912773),  
20 *STAT6* (rs324011, rs703817) and *TP63* (rs6790068, rs9681004).

21 A hallmark of classical HL is the deregulated cytokine expression, particularly of il6 and  
22 il13, which might promote the oncogenic transformation (Skinnider, *et al* 2002, Skinnider and  
23 Mak 2002). These cytokines are well-known activators of the JAK-STAT pathway. Previous  
24 data on HL cell lines support an important role of stat3 in the genesis of HL (Baus and  
25 Pfitzner 2006, Kube, *et al* 2001, Skinnider, *et al* 2002, Skinnider and Mak 2002), and  
26 inhibition of this pathway via small molecules is discussed as a therapeutic option (Holtick, *et*

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2  
3 1 *al* 2005, Kim, *et al* 2008, Mackenzie, *et al* 2008). Adding to this point, are observations from  
4  
5 2 tissue microarrays, where *stat3* was identified as heavily over expressed in Hodgkin and Reed  
6  
7 3 Sternberg (HRS) cells (Garcia, *et al* 2003).  
8  
9

10 4 Carriers of the rare putatively functional variant in *STAT6* (rs324011) were at reduced  
11  
12 5 risk for HL. This *STAT6* variant located in a NFκB binding site in intron2 appears to have an  
13  
14 6 impact on *stat6* isoform expression (Schedel, *et al* 2004, Schedel, *et al* 2009) and was  
15  
16 7 previously associated with elevated serum IgE levels (Kabesch, *et al* 2006, Weidinger, *et al*  
17  
18 8 2004). *Stat6* activation is a common and distinct feature of HRS cells (Skinnider and Mak  
19  
20 9 2002) and has been associated with HRS cell survival antagonistic to *stat1* activity (Baus and  
21  
22 10 Pfitzner 2006). Genomic imbalances detected in HRS cells revealed a frequent gain of *STAT6*  
23  
24 11 (Feys, *et al* 2007, Hartmann, *et al* 2008).  
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29 12 We observed an 80 % increased risk for HL among homozygous carriers of the mutant  
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31 13 allele of the *IFNG* SNP rs2069718. For this variant located in intron 3, an influence on *ifng*  
32  
33 14 expression was reported (Pravica, *et al* 2000) and an association with the risk of SLE (OR  
34  
35 15 2.42 for CC vs TT/TC) (Kim, *et al* 2009), a reported risk factor for NHL and HL (Bernatsky,  
36  
37 16 *et al* 2007, Gayed, *et al* 2009, Landgren, *et al* 2006, Mellemkjaer, *et al* 2008).  
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41 17 A major strength of our study is the sample size, which allowed analysis of genetic  
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43 18 variants for lymphoma overall, as well as for the major subtypes like DLBCL, FL and CLL.  
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45 19 However, the power to detect associations with rare subtypes such as T-NHL, MZL and MCL  
46  
47 20 was limited, and the same holds true for the analysis of strata by sex and age.  
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50 21 Power for the detection of GxG interactions was limited in this study. However our  
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52 22 analysis of biologically plausible interactions may put forward good candidates for replication  
53  
54 23 in the framework of pooled analyses.  
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57 24 Another limitation of the presented study setup is the incomplete coverage of genes  
58  
59 25 related to the JAK-STAT pathway. Though, we were not able to give information about the  
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26 risk profile of variants in genes of the entire pathway in the context of lymphomagenesis.

1 Since the EpiLymph study was conducted in different European countries we checked for  
2 heterogeneity of our results across the different study centres. Among the SNPs with  
3 significant association, four variants (rs6503685, rs9912773, rs34997637, rs4853546)  
4 presented heterogeneity between study centres. Considering the high LD of the associated  
5 *STAT3* variants, their independent role in lymphoma aetiology is questionable. Thus, a more  
6 in-depth analysis of this gene is recommended to identify the functional variant(s) underlying  
7 differential risk for lymphoma associated with this region.

8 **This exploration of the implication of JAK-STAT signalling related genes in**  
9 **lymphoma aetiology involved a large number of performed tests and required an**  
10 **adjustment for multiple comparison. Since, prior knowledge about the biological**  
11 **relevance of the genes was used for the selection of candidate genes, a less stringent**  
12 **significance threshold can be used (Hirschhorn and Altshuler 2002), as compared to**  
13 **GWAS. We applied the SNP Spectral Decomposition Approach (*simpleM* method) first**  
14 **introduced by Gao et al. (Gao, et al 2008) and applied in several recent association**  
15 **studies (He, et al 2010, Reynolds, et al 2010). This method takes the correlation between**  
16 **the different SNPs into account and calculates the effective number of independent tests**  
17 **for each gene.**

18 Within the single SNP analysis two variants showed study-wise significance and support  
19 their relevance for lymphomagenesis. Furthermore, the results from the single point analyses  
20 were underlined by the haplotype analysis as well as by the GxG analysis. Nevertheless, to  
21 our knowledge there is no convenient and comprehensible solution to account for multiple  
22 comparisons due to subtype analyses. As a result, we only considered for the number of tests  
23 due to the number of analyzed SNPs.

24 SNPs associated with DLBCL in this study were not listed among the top 30 ranked  
25 SNPs associated with DLBCL in Skibola et al. (Skibola, et al 2009). But their analysis was  
26 based on a moderate number of DLBCL cases (n=221) and had limited power to identify

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3 1 variants of moderate risk. In general, there is an ongoing discussion that GWAS only identify  
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5 2 genetic variants with a strong impact on disease development and are not able to detect those  
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7  
8 3 with smaller effects (Wu, *et al* 2010).  
9

10 4 Nevertheless, recent experimental and clinical data (Baran-Marszak, *et al* 2010, Baus, *et*  
11  
12 5 *al* 2009, Cotto, *et al* 2010, Ding, *et al* 2008, Hazan-Halevy, *et al* 2010, Kupferman, *et al*  
13  
14 6 2009, Mackenzie, *et al* 2008, Martini, *et al* 2008, Stewart, *et al* 2009, Verma, *et al* 2010,  
15  
16 7 Zhang, *et al* 2010), linking JAK-STAT pathway genes with the pathogenesis of lymphomas  
17  
18 8 provide strong biological support for the observed associations.  
19

20 9 To our knowledge, we reported for the first time inter-individual differences in  
21  
22 10 susceptibility to the major lymphoma subtypes in relation to variability in genes related to the  
23  
24 11 JAK-STAT pathway, specifically *STAT3* (all lymphoma), *STAT6* (HL) and *STAT5A* (B-cell  
25  
26 12 lymphoma). Our data adds to the growing evidence of a pivotal role of this pathway in cancer  
27  
28 13 pathogenesis and other inflammation-driven phenotypes. Replication of our findings in  
29  
30 14 independent studies and pooled analyses are warranted to assess subtype-specific risks and  
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32 15 gene-gene interactions, for which statistical power in our study was limited.  
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25 **10 Conflict of interest**  
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27 11 The authors declare no conflict of interest.  
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1 **Table I.** Selected characteristics of the final sample subset of the EpiLymph study

Characteristics	Case	Control
	patients	subjects
	N (%)*	N (%)*
<b>Age</b>		
<30	147 (10)	129 (9)
30-39	147 (10)	153 (11)
40-49	175 (12)	183 (13)
50-59	269 (19)	274 (19)
60-69	390 (28)	397 (27)
≥70	286 (21)	311 (21)
<b>Study Centre</b>		
Spain	301 (21)	318 (22)
France	149 (11)	152 (10)
Germany	518 (37)	530 (37)
Italy	106 (7)	110 (8)
Ireland	105 (7)	102 (7)
Czech Republic	235 (17)	235 (16)
<b>Sex</b>		
Male	787 (56)	802 (55)
Female	627 (44)	645 (45)
<b>Lymphoma subtype</b>		
Hodgkin lymphoma (HL)	259 (18)	-
T-cell lymphoma (T-NHL)	90 (6)	-
B-cell lymphoma (B-NHL)	1,114 (76)	-

Diffuse large B-cell lymphoma (DLBCL)	391 (28)	-
Follicular lymphoma (FL)	195 (14)	-
Chronic lymphocytic leukemia (CLL)	321 (23)	-
Mantle cell lymphoma (MCL)	48 (3)	-
Marginal zone B-cell lymphoma (MZL)	110 (8)	-
removed samples †	67	44
	1,481	1,491

\* Percentage is based on the final population for statistical analysis

† 65 cases and 44 controls were removed due to low performance of the genotyping (call-rate below 0.96); additionally, 2 cases were excluded due to missing information on age



**Table II.** Odds ratios (OR) and 95% confidence intervals (CI) for associated SNPs of the JAK-STAT pathway with B-cell lymphoma, T-cell lymphoma and Hodgkin lymphoma.

Genotype	B-NHL				T-NHL			HL			
	Controls* N (%)	N (%)	OR <sup>†</sup> (95%CI)	p-value	N (%)	OR <sup>†</sup> (95%CI)	p-value	Controls* N (%)	N (%)	OR <sup>†</sup> (95%CI)	p-value
<b><i>BMF</i> rs1540686</b>											
AA	316 (26)	300 (28)	Reference		27 (30)	Reference		297 (26)	76 (29)	Reference	
AG	608 (51)	513 (48)	0.88 (0.72-1.07)	0.2	45 (50)	0.92 (0.56-1.53)	0.8	582 (50)	140 (54)	0.91 (0.65-1.28)	0.6
GG	268 (22)	246 (23)	0.96 (0.76-1.22)	0.8	18 (20)	0.84 (0.45-1.56)	0.6	273 (24)	39 (15)	0.54 (0.34-0.85)	<b>0.007</b>
AG/GG			0.91 (0.75-1.09)	0.3		0.90 (0.56-1.44)	0.7			0.79 (0.57-1.09)	0.2
			p-trend	0.7		p-trend	0.6			p-trend	0.01
<b><i>BMF</i> rs648289</b>											
AA	357 (30)	339 (32)	Reference		31 (34)	Reference		337 (29)	84 (32)	Reference	
AG	590 (49)	497 (47)	0.88 (0.73-1.07)	0.2	43 (48)	0.91 (0.56-1.48)	0.7	569 (49)	142 (55)	0.97 (0.69-1.34)	0.8
GG	249 (21)	230 (22)	0.97 (0.77-1.23)	0.8	16 (18)	0.79 (0.42-1.48)	0.5	250 (22)	33 (13)	0.52 (0.33-0.83)	<b>0.006</b>
AG/GG			0.91 (0.76-1.09)	0.3		0.87 (0.55-1.38)	0.6			0.83 (0.61-1.14)	0.3
			p-trend	0.7		p-trend	0.5			p-trend	0.01
<b><i>IFNG</i> rs2069718</b>											
GG	456 (38)	420 (40)	Reference		76 (84)	Reference		436 (38)	87 (34)	Reference	

GA	573 (48)	494 (46)	0.93 (0.77-1.11)	0.4	14 (16)	1.24 (0.68-2.27)	0.5	558 (48)	124 (48)	1.08 (0.78-1.50)	0.6
AA	164 (14)	149 (14)	0.98 (0.76-1.27)	0.9	-	-	-	159 (14)	48 (19)	1.80 (1.16-2.79)	<b>0.009</b>
GA/AA			0.94 (0.79-1.11)	0.5		1.17 (0.64-2.14)	0.6			1.22 (0.89-1.66)	0.2
			p-trend	0.7		p-trend	0.8			p-trend	0.02

**IFNG** rs6581795

AA	648 (54)	577 (54)	Reference		51 (57)	Reference		619 (54)	115 (44)	Reference	
AG	464 (39)	411 (39)	1.00 (0.83-1.19)	1.0	33 (37)	0.92 (0.58-1.46)	0.7	454 (39)	120 (46)	1.47 (1.08-2.01)	0.01
GG	84 (7)	78 (7)	1.04 (0.75-1.45)	0.8	6 (7)	0.95 (0.39-2.31)	0.9	83 (7)	24 (9)	1.91 (1.10-3.29)	0.02
AG/GG			1.00 (0.85-1.19)	1.0		0.93 (0.60-1.44)	0.7			1.53 (1.14-2.06)	<b>0.005</b>
			p-trend	0.9		p-trend	0.8			p-trend	<b>0.003</b>

**IL12A** rs755004

GG	903 (76)	802 (75)	Reference		56 (62)	Reference		876 (76)	188 (73)	Reference	
GA	272 (23)	239 (22)	0.99 (0.81-1.21)	0.9	32 (36)	1.93 (1.22-3.05)	<b>0.005</b>	263 (23)	66 (25)	1.08 (0.77-1.52)	0.6
AA	21 (2)	25 (2)	1.35 (0.75-2.43)	0.3	1 (1)	0.76 (0.10-5.86)	0.8	17 (1)	5 (2)	1.42 (0.47-4.30)	0.5
GA/AA			1.01 (0.84-1.23)	0.9		1.84 (1.17-2.90)	<b>0.008</b>			1.10 (0.79-1.54)	0.6
			p-trend	0.7		p-trend	0.02			p-trend	0.5

Table II. cont.'d

Genotype	Controls*	B-NHL			T-NHL			Controls*	HL		
		N (%)	OR <sup>†</sup> (95%CI)	p-value	N (%)	OR <sup>†</sup> (95%CI)	p-value		N (%)	N (%)	OR <sup>†</sup> (95%CI)
<b><i>SOCS1</i> rs149311</b>											
GG	857 (72)	697 (65)	Reference		68 (76)	Reference		823 (71)	171 (66)	Reference	
GA	295 (25)	321 (30)	1.34 (1.11-1.62)	<b>0.002</b>	18 (20)	0.77 (0.45-1.32)	0.3	284 (25)	79 (31)	1.37 (0.99-1.90)	0.06
AA	43 (4)	45 (4)	1.30 (0.85-2.01)	0.2	4 (4)	1.12 (0.39-3.27)	0.8	48 (4)	9 (3)	0.81 (0.37-1.79)	0.6
GA/AA			1.34 (1.12-1.60)	<b>0.002</b>		0.81 (0.49-1.35)	0.4			1.29 (0.94-1.76)	0.1
			p-trend	<b>0.003</b>		p-trend	0.6			p-trend	0.3
<b><i>STAT1</i> rs34997637</b>											
GG	709 (59)	634 (59)	Reference		64 (71)	Reference		682 (59)	158 (61)	Reference	
GA	410 (34)	374 (35)	1.02 (0.85-1.22)	0.8	24 (27)	0.63 (0.39-1.03)	0.07	397 (34)	91 (35)	0.93 (0.68-1.27)	0.7
AA	76 (6)	57 (5)	0.84 (0.59-1.21)	0.4	2 (2)	0.28 (0.07-1.18)	0.08	76 (7)	10 (4)	0.64 (0.31-1.33)	0.2
GA/AA			0.99 (0.84-1.17)	0.9		0.58 (0.36-0.93)	0.02			0.89 (0.66-1.20)	0.5
			p-trend	0.6		p-trend	0.01			p-trend	0.3
<b><i>STAT3</i> rs1053005</b>											
AA	737 (62)	732 (69)	Reference		55 (61)	Reference		708 (61)	169 (65)	Reference	
AG	401 (34)	287 (27)	0.72 (0.60-0.86)	<b>0.0004</b>	34 (38)	1.16 (0.74-1.82)	0.5	391 (34)	83 (32)	0.89 (0.65-1.21)	0.5

GG	57 (5)	48 (5)	0.85 (0.57-1.27)	0.4	1 (1)	0.23 (0.03-1.71)	0.1	57 (5)	7 (3)	0.54 (0.23-1.26)	0.2
AG/GG			0.73 (0.62-0.87)	<b>0.0005</b>		1.04 (0.67-1.63)	0.9			0.84 (0.62-1.15)	0.3
			p-trend	<b>0.003</b>		p-trend	0.7			p-trend	0.2

**STAT3 rs1053023**

AA	737 (62)	732 (69)	Reference		55 (61)	Reference		708 (61)	169 (65)	Reference	
AG	401 (34)	286 (27)	0.72 (0.60-0.86)	<b>0.0003</b>	34 (38)	1.16 (0.74-1.82)	0.5	391 (34)	83 (32)	0.89 (0.65-1.21)	0.5
GG	57 (5)	49 (5)	0.87 (0.58-1.29)	0.5	1 (1)	0.23 (0.03-1.71)	0.2	57 (5)	7 (3)	0.54 (0.23-1.26)	0.2
AG/GG			0.73 (0.62-0.87)	<b>0.0005</b>		1.04 (0.67-1.63)	0.9			0.84 (0.62-1.15)	0.3
			p-trend	<b>0.003</b>		p-trend	0.7			p-trend	0.2

**STAT3 rs12949918**

AA	402 (34)	403 (38)	Reference		30 (33)	Reference		387 (33)	103 (40)	Reference	
AG	574 (48)	506 (47)	0.87 (0.73-1.05)	0.2	49 (54)	1.14 (0.71-1.84)	0.6	538(47)	115 (44)	0.81 (0.59-1.11)	0.2
GG	220 (18)	158 (15)	0.72 (0.56-0.92)	<b>0.008</b>	10 (11)	0.61 (0.29-1.27)	0.2	231 (20)	41 (16)	0.63 (0.41-0.97)	0.03
AG/GG			0.83 (0.70-0.99)	0.03		0.99 (0.63-1.57)	0.9			0.75 (0.56-1.02)	0.07
			p-trend	<b>0.008</b>		p-trend	0.3			p-trend	0.03

Table II. cont.'d

Genotype	Controls*	B-NHL			T-NHL			Controls*	HL		
		N (%)	OR <sup>†</sup> (95%CI)	p-value	N (%)	OR <sup>†</sup> (95%CI)	p-value		N (%)	N (%)	OR <sup>†</sup> (95%CI)
<b>STAT3 rs4103200</b>											
GG	575 (48)	577 (54)	Reference		50 (56)	Reference		556 (48)	148 (57)	Reference	
GC	506 (42)	407(38)	0.79 (0.67-0.95)	0.01	33 (37)	0.76 (0.48-1.21)	0.2	483 (42)	96 (37)	0.74 (0.54-1.00)	0.05
CC	115 (10)	83 (8)	0.72 (0.53-0.97)	0.03	7 (8)	0.73 (0.32-1.65)	0.5	117 (10)	15 (6)	0.49 (0.27-0.90)	0.02
GC/CC			0.78 (0.66-0.92)	<b>0.003</b>		0.76 (0.49-1.17)	0.2			0.69 (0.51-0.92)	0.01
			p-trend	<b>0.003</b>		p-trend	0.2			p-trend	<b>0.006</b>
<b>STAT3 rs6503695</b>											
AA	504 (42)	505 (47)	Reference		39 (43)	Reference		483 (42)	126 (49)	Reference	
AG	523 (44)	444 (42)	0.84 (0.70-1.00)	0.06	44 (49)	1.08 (0.69-1.70)	0.7	501 (43)	106 (41)	0.80 (0.59-1.10)	0.2
GG	169 (14)	118 (11)	0.69 (0.53-0.91)	<b>0.007</b>	7 (8)	0.53 (0.23-1.22)	0.1	172 (15)	27 (10)	0.57 (0.35-0.92)	0.02
AG/GG			0.81 (0.68-0.95)	0.01		0.94 (0.61-1.46)	0.8			0.74 (0.55-1.00)	0.05
			p-trend	<b>0.004</b>		p-trend	0.3			p-trend	0.02
<b>STAT3 rs9891119</b>											
AA	461 (39)	464 (43)	Reference		40 (44)	Reference		447 (39)	119 (46)	Reference	
AC	566 (47)	480 (45)	0.84 (0.70-1.00)	0.05	41 (46)	0.85 (0.54-1.34)	0.5	533 (46)	115 (44)	0.81 (0.59-1.10)	0.2

CC	169 (14)	123 (12)	0.72 (0.55-0.94)	0.02	9 (10)	0.64 (0.30-1.35)	0.2	176 (15)	25 (10)	0.54 (0.32-0.88)	0.01
AC/CC			0.81 (0.68-0.96)	0.02		0.80 (0.52-1.24)	0.3			0.74 (0.55-1.00)	0.05
			p-trend	<b>0.008</b>		p-trend	0.2			p-trend	0.01
<b>STAT3 rs9912773</b>											
CC	613 (51)	606 (57)	Reference		54 (60)	Reference		588 (51)	153 (59)	Reference	
CG	485 (41)	388 (36)	0.80 (0.67-0.95)	0.01	30 (33)	0.72 (0.45-1.15)	0.2	470 (41)	96 (37)	0.78 (0.57-1.06)	0.1
GG	98 (9)	73 (7)	0.75 (0.54-1.04)	0.08	6 (7)	0.74 (0.31-1.77)	0.5	98 (8)	10 (4)	0.43 (0.21-0.87)	0.02
CG/GG			0.79 (0.67-0.94)	<b>0.006</b>		0.72 (0.47-1.12)	0.2			0.72 (0.54-0.97)	0.03
			p-trend	<b>0.008</b>		p-trend	0.2			p-trend	<b>0.009</b>
<b>STAT5A rs2293158</b>											
AA	556 (46)	561 (53)	Reference		49 (54)	Reference		547 (47)	125 (48)	Reference	
AG	513 (43)	418 (39)	0.80 (0.67-0.95)	0.01	39 (43)	0.89 (0.57-1.38)	0.6	484 (42)	114 (44)	1.07 (0.78-1.45)	0.7
GG	127 (11)	88 (8)	0.68 (0.51-0.92)	0.01	2 (2)	0.18 (0.04-0.76)	0.02	125 (11)	20 (8)	0.62 (0.36-1.08)	0.09
AG/GG			0.78 (0.66-0.92)	<b>0.003</b>		0.75 (0.48-1.15)	0.2			0.97 (0.72-1.30)	0.8
			p-trend	<b>0.002</b>		p-trend	0.03			p-trend	0.3

Table II. cont.'d

Genotype	Controls*	B-NHL			T-NHL			Controls*	HL		
		N (%)	OR <sup>†</sup> (95%CI)	p-value	N (%)	OR <sup>†</sup> (95%CI)	p-value		N (%)	OR <sup>†</sup> (95%CI)	p-value
<b>STAT6 rs324011</b>											
GG	471 (39)	435 (41)	Reference		38 (42)	Reference		437 (38)	119 (46)	Reference	
GA	557 (47)	470 (44)	0.91 (0.76-1.09)	0.3	39 (43)	0.83 (0.52-1.33)	0.4	552 (48)	97 (37)	0.55 (0.40-0.76)	<b>0.0003</b>
AA	166 (14)	159 (15)	1.04 (0.80-1.34)	0.8	13 (14)	0.91 (0.47-1.76)	0.8	166 (14)	43 (17)	0.80 (0.52-1.23)	0.03
GA/AA			0.94 (0.79-1.11)	0.5		0.85 (0.55-1.32)	0.5			0.61 (0.45-0.82)	<b>0.001</b>
			p-trend	0.9		p-trend	0.6			p-trend	0.04
<b>STAT6 rs703817</b>											
GG	310 (26)	289 (27)	Reference		23 (26)	Reference		292 (25)	87 (34)	Reference	
GA	599 (50)	525 (49)	0.94 (0.77-1.14)	0.5	47 (52)	1.00 (0.60-1.69)	1.0	578 (50)	113 (44)	0.60 (0.42-0.84)	<b>0.003</b>
AA	287 (24)	247 (23)	0.92 (0.73-1.17)	0.5	20 (22)	0.90 (0.48-1.67)	0.7	286 (25)	59 (23)	0.65 (0.44-0.98)	0.04
GA/AA			0.93 (0.77-1.12)	0.5		0.97 (0.59-1.59)	0.9			0.62 (0.45-0.85)	<b>0.003</b>
			p-trend	0.5		p-trend	0.7			p-trend	0.03
<b>TP63 rs6790068</b>											
AA	424 (35)	398 (37)	Reference		32 (36)	Reference		426 (37)	77 (30)	Reference	
AG	588 (49)	498 (47)	0.90 (0.75-1.08)	0.3	43 (48)	0.96 (0.59-1.54)	0.9	556 (48)	123 (47)	1.19 (0.85-1.67)	0.3
GG	184 (15)	171 (16)	0.99 (0.77-1.27)	0.9	15 (17)	1.06 (0.56-2.02)	0.9	174 (15)	59 (23)	1.94 (1.28-2.94)	<b>0.002</b>

AG/GG			0.92 (0.78-1.09)	0.4		0.98 (0.62-1.54)	0.9		1.37 (1.00-1.87)	0.05
			p-trend	0.7		p-trend	0.9		p-trend	<b>0.003</b>
<b>TP63 rs9681004</b>										
AA	417 (35)	393 (37)	Reference		33 (37)	Reference		415 (36)	78 (30)	Reference
AG	588 (49)	497 (47)	0.90 (0.75-1.08)	0.2	40 (44)	0.85 (0.52-1.37)	0.5	563 (49)	120 (46)	1.10 (0.78-1.54) 0.6
GG	189 (16)	177 (17)	0.99 (0.77-1.27)	1.0	17 (19)	1.12 (0.61-2.08)	0.7	175 (15)	61 (24)	1.95 (1.29-2.95) <b>0.002</b>
AG/GG			0.92 (0.77-1.09)	0.3		0.91 (0.58-1.43)	0.7			1.29 (0.94-1.77) 0.1
			p-trend	0.7		p-trend	0.9		p-trend	<b>0.004</b>

\* 1196 controls were taken into account for the risk analysis with the B-cell and T-cell lymphoma cases and 1153 controls were taken into account for the risk analysis with the Hodgkin lymphoma cases

† Odds ratios were adjusted for the matching variables: age (continuous), sex and study center (categorical); the common homozygote was used as reference group for each SNP

Significant *p*-values (< 0.01) are printed in bold



**Table III.** Odds ratios (OR) and 95 % confidence intervals (CI) for associated SNPs of the JAK-STAT pathway with B-cell lymphoma subtypes:

## DLBCL, FL and CLL

Genotype	Controls*		DLBCL		FL			CLL		
	N (%)	N (%)	OR <sup>†</sup> (95%CI)	p-value	N (%)	OR <sup>†</sup> (95%CI)	p-value	N (%)	OR <sup>†</sup> (95%CI)	p-value
<b><i>BMF</i> rs7183977</b>										
AA	519 (43)	199 (51)	Reference		79 (41)	Reference		138 (43)	Reference	
AG	535 (45)	155 (39)	0.75 (0.58-0.95)	0.02	87 (45)	1.07 (0.76-1.48)	0.7	155 (48)	1.09 (0.84-1.42)	0.5
GG	142 (12)	38 (10)	0.69 (0.46-1.02)	0.06	29 (15)	1.31 (0.82-2.10)	0.3	27 (8)	0.76 (0.48-1.21)	0.3
AG/GG			0.73 (0.58-0.93)	<b>0.009</b>		1.12 (0.82-1.53)	0.5		1.02 (0.79-1.32)	0.9
			p-trend	0.01		p-trend	0.3		p-trend	0.6
<b><i>BMF</i> rs3923235</b>										
AA	622 (52)	230 (59)	Reference		102 (52)	Reference		171 (53)	Reference	
AG	482 (40)	148 (38)	0.82 (0.65-1.05)	0.1	76 (39)	0.97 (0.70-1.34)	0.9	133 (41)	1.00 (0.77-1.30)	1.00
GG	92 (8)	15 (4)	0.43 (0.24-0.77)	<b>0.004</b>	17 (9)	1.15 (0.65-2.02)	0.6	17 (5)	0.67 (0.39-1.16)	0.2
AG/GG			0.76 (0.60-0.96)	0.02		1.00 (0.74-1.36)	1.0		0.95 (0.74-1.22)	0.7
			p-trend	<b>0.003</b>		p-trend	0.8		p-trend	0.4
<b><i>IFNGRI</i> rs4896243</b>										
AA	370 (31)	113 (29)	Reference		65 (33)	Reference		81 (25)	Reference	
AG	588 (49)	172 (44)	0.93 (0.71-1.23)	0.6	92 (47)	0.90 (0.63-1.27)	0.5	149(46)	1.15 (0.85-1.56)	0.4

GG	238 (20)	107 (27)	1.47 (1.06-2.00)	0.02	38 (19)	0.90 (0.58-1.40)	0.7	89 (28)	1.69 (1.19-2.40)	<b>0.003</b>
AG/GG			1.09 (0.84-1.40)	0.5		0.90 (0.65-1.25)	0.5		1.30 (0.98-1.73)	0.07
			p-trend	0.03		p-trend	0.6		p-trend	<b>0.003</b>
<b>SOCS1</b> rs149311										
GG	857 (72)	244 (62)	Reference		132 (68)	Reference		219 (68)	Reference	
GA	295 (35)	131 (34)	1.54 (1.19-1.98)	<b>0.0009</b>	54 (28)	1.17 (0.83-1.66)	0.4	89 (28)	1.23 (0.92-1.63)	0.2
AA	43 (4)	16 (4)	1.36 (0.74-2.47)	0.3	9 (5)	1.50 (0.71-3.19)	0.3	12 (4)	1.05 (0.54-2.05)	0.9
GA/AA			1.51 (1.19-1.93)	<b>0.0009</b>		1.21 (0.87-1.68)	0.3		1.20 (0.92-1.58)	0.2
			p-trend	<b>0.003</b>		p-trend	0.2		p-trend	0.3
<b>STAT3</b> rs1053005										
AA	737 (62)	271 (69)	Reference		133 (68)	Reference		218 (68)	Reference	
AG	401 (34)	107 (27)	0.73 (0.57-0.95)	0.02	54 (28)	0.71 (0.51-1.01)	0.06	89 (28)	0.75 (0.57-0.99)	0.04
GG	57 (5)	15 (4)	0.77 (0.43-1.40)	0.4	8 (4)	0.79 (0.36-1.70)	0.5	14 (5)	0.81 (0.44-1.49)	0.5
AG/GG			0.74 (0.58-0.94)	0.02		0.72 (0.52-1.00)	0.05		0.76 (0.58-0.99)	0.04
			p-trend	0.03		p-trend	0.08		p-trend	0.06

Table III. cont'd.

Genotype	Controls*	DLBCL			FL			CLL		
		N (%)	N (%)	OR <sup>†</sup> (95%CI) p-value	N (%)	OR <sup>†</sup> (95%CI) p-value	N (%)	OR <sup>†</sup> (95%CI) p-value		
<b>STAT3 rs1053023</b>										
AA	737 (62)	271 (69)	Reference		133 (68)	Reference		218 (68)	Reference	
AG	401 (34)	107 (27)	0.73 (0.57-0.95)	0.02	54 (28)	0.71 (0.51-1.01)	0.06	89 (28)	0.75 (0.57-0.99)	0.04
GG	57 (5)	15 (4)	0.77 (0.43-1.40)	0.4	8 (4)	0.79 (0.36-1.70)	0.5	14 (4)	0.81 (0.44-1.49)	0.5
AG/GG			0.74 (0.58-0.94)	0.02		0.72 (0.52-1.00)	0.05		0.76 (0.58-0.99)	0.04
			p-trend	0.03		p-trend	0.08		p-trend	0.06
<b>STAT3 rs12949918</b>										
AA	402 (34)	150 (38)	Reference		77 (39)	Reference		115 (36)	Reference	
AG	574 (48)	189 (48)	0.87 (0.68-1.13)	0.3	89 (46)	0.80 (0.57-1.12)	0.2	158 (49)	0.96 (0.73-1.27)	0.8
GG	220 (18)	54 (14)	0.67 (0.47-0.95)	0.03	29 (15)	0.65 (0.41-1.04)	0.07	48 (15)	0.79 (0.54-1.16)	0.2
AG/GG			0.82 (0.64-1.04)	0.1		0.76 (0.55-1.04)	0.09		0.91 (0.70-1.19)	0.5
			p-trend	0.03		p-trend	0.06		p-trend	0.3
<b>STAT3 rs4103200</b>										
GG	575 (48)	216 (55)	Reference		107 (55)	Reference		172 (56)	Reference	
GC	506(42)	149 (38)	0.78 (0.61-1.00)	0.05	74 (38)	0.75 (0.54-1.04)	0.08	124 (39)	0.84 (0.64-1.09)	0.2
CC	115 (10)	28 (7)	0.68 (0.43-1.06)	0.09	14 (7)	0.62 (0.34-1.14)	0.1	25 (8)	0.74 (0.46-1.19)	0.2

GC/CC			0.76 (0.60-0.96)	0.02		0.73 (0.54-0.99)	0.04		0.82 (0.64-1.06)	0.1
			p-trend	0.02		p-trend	0.04		p-trend	0.1
<b>STAT3 rs6503695</b>										
AA	504 (42)	184 (47)	Reference		95 (49)	Reference		153 (48)	Reference	
AG	523(44)	169 (43)	0.86 (0.67-1.10)	0.2	81 (42)	0.78 (0.56-1.07)	0.1	129 (40)	0.85 (0.65-1.11)	0.2
GG	169 (14)	40 (10)	0.66 (0.45-0.98)	0.04	19 (10)	0.56 (0.33-0.95)	0.03	39 (12)	0.80 (0.54-1.20)	0.3
AG/GG			0.81 (0.64-1.02)	0.08		0.72 (0.53-0.98)	0.04		0.84 (0.65-1.08)	0.2
			p-trend	0.03		p-trend	0.02		p-trend	0.2
<b>STAT3 rs9891119</b>										
AA	461 (39)	179 (46)	Reference		87 (45)	Reference		131 (41)	Reference	
AC	566 (47)	171 (42)	0.79 (0.62-1.01)	0.07	85 (44)	0.79 (0.57-1.09)	0.2	156 (49)	0.96 (0.73-1.25)	0.8
CC	169 (14)	43 (11)	0.68 (0.47-1.00)	0.05	23 (12)	0.70 (0.43-1.16)	0.2	34 (11)	0.71 (0.47-1.09)	0.1
AC/CC			0.77 (0.61-0.97)	0.03		0.77 (0.56-1.05)	0.1		0.90 (0.70-1.16)	0.4
			p-trend	0.02		p-trend	0.09		p-trend	0.2

\* 1196 controls were taken into account for the risk analysis with the B-cell lymphoma cases

† Odds Ratios were adjusted for the matching variables: age (continuous), sex and study center (categorical); the common homozygote was used as reference group for each SNP

Significant *p*-values (< 0.01) are printed in bold

**Table IV.** Statistical interaction between genotypes of the *BMF*, *IFNG*, *IL10*, *STAT1*, *STAT4* and *SOCS1* variants and *CASP6*, *STAT3*, *IL12*, *INFG* SNPs among B-cell lymphoma cases

	No. of Controls	No. of Cases	OR* (95% CI)	p-value	No. of Controls	No. of Cases	OR* (95% CI)	p-value	No. of Controls	No. of Cases	OR* (95% CI)	p-value
<b><i>BMF</i> (rs16970325)</b>												
	<b>GG</b>				<b>GA</b>				<b>AA</b>			
<b><i>CASP6</i> (rs5030552)</b>												
<b>AA</b>	819 (85)	658 (79)	Reference		177 (80)	167 (80)	Reference		5 (83)	18 (90)	Reference	
<b>AG</b>	140 (14)	169 (20)	1.50 (1.17-1.92)	<b>0.001</b>	43 (19)	41 (19)	1.00 (0.62-1.63)	1.0	1 (17)	2 (10)	-	-
<b>GG</b>	8 (1)	7 (1)	1.10 (0.40-3.06)	0.9	2 (1)	2 (1)	1.14 (0.15-8.41)	1.0	-	-	-	-
<b><i>BMF</i> (rs537455)</b>												
	<b>AA</b>				<b>AC</b>				<b>CC</b>			
<b><i>CASP6</i> (rs5030552)</b>												
<b>AA</b>	532 (85)	458 (78)	Reference		415 (84)	322 (82)	Reference		55 (75)	62 (77)	Reference	
<b>AG</b>	91 (15)	123 (21)	1.57 (1.16-2.11)	<b>0.003</b>	76 (15)	71 (18)	1.18 (0.82-1.68)	0.4	17 (23)	18 (22)	-	-
<b>GG</b>	4(1)	6 (1)	1.74 (0.48-6.22)	0.4	5 (1)	2 (1)	0.50 (0.10-2.64)	0.4	1 (1)	1 (1)	-	-
<b><i>IFNG</i> (rs6581795)</b>												
	<b>AA</b>				<b>AG</b>				<b>GG</b>			

**STAT3 (rs4103200)**

<b>GG</b>	308 (48)	323 (56)	Reference		228 (49)	216 (53)	Reference		39 (46)	38 (49)	Reference	
<b>GC</b>	272 (42)	200 (35)	0.70 (0.55-0.89)	<b>0.003</b>	193 (42)	169 (41)	0.92 (0.70-1.22)	0.6	41 (49)	35 (45)	0.82 (0.42-1.56)	0.5
<b>CC</b>	68 (10)	52 (9)	0.72 (0.49-1.07)	0.1	43 (9)	26 (6)	0.65 (0.38-1.10)	0.1	4 (5)	5 (6)	1.69 (0.36-7.94)	0.5

**IL10 (rs6673928)****CC****CA****AA****STAT3 (rs6503695)**

<b>AA</b>	290 (39)	303 (47)	Reference		186 (47)	177 (47)	Reference		27 (47)	24 (50)	Reference	
<b>AG</b>	351 (48)	271 (42)	0.74 (0.59-0.92)	<b>0.008</b>	147 (37)	151 (42)	1.07 (0.79-1.46)	0.7	24 (42)	20 (42)	0.94 (0.40-2.23)	0.9
<b>GG</b>	98 (13)	71 (11)	0.69 (0.49-0.98)	<b>0.04</b>	64 (16)	42 (11)	0.69 (0.44-1.07)	0.1	6 (11)	4 (8)	0.58 (0.13-2.62)	0.5

**IL10 (rs6673928)****CC****CA****AA****STAT3 (rs4103200)**

<b>GG</b>	335 (45)	346 (54)	Reference		208 (52)	294 (55)	Reference		31 (54)	26 (54)	Reference	
<b>GC</b>	235 (45)	245 (38)	0.70 (0.56-0.88)	<b>0.002</b>	146 (37)	140 (38)	0.99 (0.73-1.34)	0.9	23 (40)	19 (40)	-	-
<b>CC</b>	69 (9)	54 (8)	0.76 (0.51-1.11)	0.2	43 (11)	26 (7)	0.63 (0.37-1.07)	0.08	3 (5)	3 (6)	-	-

Table IV. cont'd.

	No. of Controls	No. of Cases	OR* (95 % CI)	p-value	No. of Controls	No. of Cases	OR* (95 % CI)	p-value	No. of Controls	No. of Cases	OR* (95 % CI)	p-value
<b><i>IL10</i> (rs6673928)</b>												
	<b>CC</b>				<b>CA</b>				<b>AA</b>			
<b><i>STAT3</i> (rs1053023)</b>												
<b>AA</b>	443 (60)	449 (70)	Reference		249 (63)	247 (67)	Reference		44 (77)	34 (71)	Reference	
<b>AG</b>	257 (35)	166 (26)	0.64 (0.50-0.80)	<b>0.0002</b>	129 (32)	107 (29)	0.85 (0.62-1.28)	0.3	13 (23)	11 (23)	-	-
<b>GG</b>	38 (5)	30 (5)	0.78 (0.47-1.28)	0.3	19 (5)	16 (4)	0.87 (0.43-1.73)	0.7	-	3 (6)	-	-
<b><i>STAT1</i> (rs13029247)</b>												
	<b>AA</b>				<b>AG</b>				<b>GG</b>			
<b><i>STAT3</i> (rs6503695)</b>												
<b>AA</b>	223 (41)	242 (47)	Reference		235 (45)	212 (47)	Reference		46 (35)	50 (50)	Reference	
<b>AG</b>	232 (43)	212 (41)	0.84 (0.65-1.09)	0.2	223 (43)	187 (42)	0.91 (0.70-1.20)	0.5	67 (51)	43 (42)	0.68 (0.38-1.23)	0.2
<b>GG</b>	90 (17)	60 (12)	0.60 (0.41-0.88)	<b>0.008</b>	60 (12)	50 (11)	0.91 (0.60-1.39)	0.7	19 (14)	8 (8)	0.39 (0.15-1.00)	0.05
<b><i>STAT4</i> (rs1517352)</b>												
	<b>CC</b>				<b>CA</b>				<b>AA</b>			
<b><i>IL12A</i> (rs4680534)</b>												

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3	<b>AA</b>	173 (40)	159 (46)	Reference		249 (44)	225(42)	Reference		85 (42)	66 (37)	Reference	
4	<b>AG</b>	197 (46)	148 (43)	0.84 (0.62-1.14)	0.3	242 (43)	261 (49)	1.19 (0.93-1.54)	0.2	103 (51)	88 (49)	1.11 (0.72-1.72)	0.6
5	<b>GG</b>	61 (14)	41 (12)	0.74 (0.47-1.16)	0.2	72 (13)	52 (10)	0.79 (0.53-1.18)	0.3	13 (6)	24 (13)	2.80 (1.30-6.05)	<b>0.009</b>
6													
7													
8													
9													
10		<i>SOCSI (rs243317)</i>											
11													
12		<b>AA</b>				<b>AC</b>				<b>CC</b>			
13													
14		<i>IFNG (rs2069727)</i>											
15	<b>AA</b>	176 (30)	125 (23)	Reference		137 (27)	117 (27)	Reference		21 (20)	25 (26)	Reference	
16	<b>AG</b>	286 (49)	291 (55)	1.44 (1.09-1.91)	<b>0.01</b>	236 (47)	216 (50)	1.08 (0.79-1.47)	0.6	59 (56)	51 (54)	0.72 (0.36-1.46)	0.4
17	<b>GG</b>	124 (21)	120 (22)	1.36 (0.97-1.92)	0.07	131 (26)	106 (23)	0.89 (0.62-1.27)	0.5	26 (25)	19 (20)	0.62 (0.27-1.45)	0.3
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23		*Odds Ratios were adjusted for the matching variables: age (continuous), sex and study center (categorical);											
24		<i>p</i> -values (<0.05) are printed in bold											
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