Supplemental Data

Supplemental Patients and Methods

Patients and Samples

497 unselected patients from 24 French hospitals enrolled into the French Observatory of Myelofibrosis were included in the study. Participating centers were: CHU Angers (n=82), APHP Paris St Louis (n=69), CHU Brest (n=51), CH Lens (n=27), Bordeaux Bergonié (n=26), CHU Toulouse (n=26), CHU Limoges (n=24), CHU Nantes (n=18), CHU Dijon (n=16), CHU Nancy (n=16), CHU Poitiers (n=16), Marseille IPC (n=15), CH Annecy (n=14), CHU Bordeaux (n=14), CH Périgeux (n=14), APHP Paris Cochin (n=13), APHP Paris Créteil (n=11), CH Arras (n=9), CHU Grenoble (n=9), CH Avignon (n=8), CHU Lille (n=7), Lille GHICL (n=5), CH Le Mans (n=4), CH Rochefort (n=4). Samples were identified through FIMBANK, a national network of biological resources for myeloproliferative neoplasms (grant INCa, BCB 2013, Pr Valérie Ugo) and were centralized for genomic analysis.

The French Intergroup of Myeloproliferative neoplasms (FIM) observatory of myelofibrosis has been approved by the French CNIL (National Committee of Informatics and Freedom) and CCTIRS (French Advisory Committee for Data Processing in Health Research) with approvals numbers CCTIRS 12.610 and CNIL DR-2014-324. Patients were informed in accordance with French ethical guidelines and the Declaration of Helsinki.

All diagnoses were made according strictly to the WHO 2008 or 2016 classification (bone marrow biopsy mandatory). Diagnosis criteria were secondarily confirmed by clinicians, biologists and pathologists from the FIM group and 322 bone marrow biopsies (67%) were also reviewed by the French Bone Marrow Biopsy Study Group (GEBOM). This led to the exclusion of 8 patients reclassified as MPN without fibrosis (n=3), myelodysplastic syndrome with fibrosis (n=2) and chronic neutrophilic leukemia with fibrosis (n=3). Two other patients were excluded from the study after NGS because of an atypical mutational profile that led to further reviewing of the diagnostic by clinicians and biologists (one patient with acute myeloid leukemia with fibrosis and one chronic myelomonocytic leukemia, see Supplemental Figure 1).

Clinical and Biological data

Clinical and biological data at diagnosis and follow-up were extracted from the database of the French Observatory of Myelofibrosis (SIBM, Saint-Louis Hospital, Paris). A karyotype was performed at the time of myelofibrosis diagnosis in 294 patients with a failure rate of 10% (n=29). Thus, a karyotype result was available in 265 patients (172 PMF and 93 SMF). Previous prognostic scores were calculated for each patient at the time of diagnosis: IPSS and DIPSS-plus, MIPSS70 and MIPSS70v2 for primary myelofibrosis and MYSEC-PM, MIPSS70 and MIPSS70v2 for secondary myelofibrosis[1–4]. Of note MIPSS70 and MIPSS70v2 have been developed for primary and not for secondary myelofibrosis. Missing data were represented in Supplemental Figure 10 and patients with at least one missing data were compared to patients without to ensure that those patients were not associated to a particular presentation (Supplemental Table 11).

Validation cohort

For validation of our results we used data previously published by *Grinfeld et al* in New England Journal of Medecine in 2018; 379:1416-1430[5]. Data were available in Github (https://github.com/gerstung-lab/MPN-multistage). In this study, the mutational landscape of 2035 MPN was analyzed including 309 myelofibrosis (either primary or secondary) and the multistage model for prognosis was performed on 1875 patients including 276 with myelofibrosis (described as the training cohort in the article of Grinfeld et al.). Thus, we used as a validation set the data available for the 276 myelofibrosis (genomic, age, blood count). Events in the validation cohort were leukemic transformation in 31 patients and deaths in 118 patients.

NGS Sequencing and Analysis

Library preparation

A custom RNA-baits was designed in order to cover all coding exons of the 77 genes of interest (listed below).

List of the 77 genes sequenced

ABL1	CALR	EED	HRAS	KMT2C	PAX5	SH2B3	TET2
ACD	CBL	ETNK1	IDH1	KMT2D	PDS5B	SMC1A	TP53
ANKRD26	CEBPa	ETV6	IDH2	KRAS	PHF6	SMC3	U2AF1
ASXL1	CHEK2	EZH2	IKZF1	MAD1L1	PPM1D	SRP72	U2AF2
ASXL2	CSF3R	FBXW7	JAK1	MPL	PTEN	SRSF2	WT1
ATM	CTCF	FLT3	JAK2	NF1	PTPN11	STAG1	ZBTB33
ATRX	CUX1	GATA1	KDM6A	NFE2	RAD21	STAG2	ZRSR2
BCL11A	DDX41	GATA2	KIT	NOTCH1	RUNX1	SUZ12	
BCOR	DNMT3A	GNAS	KMT2A	NPM1	SETBP1	TERC	
BCORL1	DOT1L	HMGA2	KMT2B	NRAS	SF3B1	TERT	

DNA was quantified with QubitTM dsDNA BR Assay Kit. We used the SureSelectQXT Target kit from Agilent to build the libraries according to the manufacturer's recommendations. Approximately 50ng of DNA for each patient was randomly fragmented with enzymes and adaptor-tagged in the first step. The DNA library was then amplified by PCR, and the amplicons purified with AMPure XP Beads, Beckman Coulter. DNA library quality was assessed using the Agilent 2100 Bioanalyzer and Agilent DNA 1000 Assay, and quantified with the QubitTM dsDNA HS Assay Kit. Between 500 and 750ng of the amplicons was hybridized using the SureSelect Capture Library and then captured on streptavidin-coated beads, to obtain an enriched targeted DNA-library. The library was PCR-amplified by using Dual Indexing primers, and purified with AMPure XP Beads, Beckman Coulter.

Next-generation sequencing

The final quality was checked with the Agilent 2100 Bioanalyzer and Agilent High Sensitivity DNA Assay, and the quantity by using the QubitTM dsDNA HS Assay Kit. Libraries were pooled for multiplex sequencing on a NextSeq500, Illumina, with High or Mid Output Kit v2 300 cycles to ensure a theoretical minimum depth of 4000X.

Bioinformatic pipeline

We developed a bioinformatic pipeline to analyze sequencing data in order to control each step of analysis (SMPHD 2.8).

- <u>Demultiplexing and alignment</u>

First, demultiplexing step with bcl2fastq (version v2.20.0.422) was done. Then, the quality of FASTQ files was checked using Fastqc tool (version 0.11.8). For each paired of FASTQ files, alignment against reference genome hg19 (2013) was done with BWA (bwa 0.7.17-r1188). A BAM file was generated using samtools 1.9 and was intersected to the BED file of the sequenced panel using bedtools v2.27 to keep reads in the region of the panel. After this step, duplicate reads were tagged but not removed using Mark duplicates (dupmark 2.18.23-SNAPSHOT. Finally, coverage was analyzed for each panel gene with bedtools coverage (v2.27.1-65-gc2af1e7-dirty -sorted). A R script allowed to generate and report coverage quality in a html file. This file provided median and mean of coverage, percent of bases upper to 200X and exons with a coverage below 500X in the panel.

- <u>Variant calling</u>

Four different tools (GATK with methods of Haplotype caller, Mutect2 (provided by GATK to detect somatic mutation), Varscan (general) and Pindel (only for long deletions or insertions)) were used for variant calling in order to detect mutations with optimal accuracy.

Details of tools and parameters are detailed bellow:

- **GATK Haplotype caller** (4.1.2.0) was used following the GATK best practices. A base recalibration with dbSNP138 was performed. Haplotype caller was launched with parameters --min-base-quality-score 30 and --dont-use-soft-clipped-bases true.
- **Mutect2 (**4.1.2.0) is more precise than GATK haplotype caller to detect somatic mutation and was used with the same parameters than for GATK HC.
- **Varscan** (2.4.3). Primary, we used samtools mpileup with default value parameter (-Q 13 -q 0 -A -B -d 100000). Then, Varscan calling was performed with the following parameters: --min coverage 50 --min-reads2 8 --min-avg-qual 30 --min-var-freq 0.02 --p-value 0.1 --strand-filter 0.
- **Pindel** (0.2.5) used a primary bam file with unalignement reads. In our case we used this variant calling to detect *FLT3*-ITD mutations or in *CALR* driver mutations. As parameter of length of variant, we used a 500 pb-max insertion or deletion.

o <u>Annotation and filter</u>

We use software Annovar (version 2018-04-16) to annotate all called variants. We have made annotations separately for each variant calling method. Annovar allows to download main database of annotation. As database of annotation, we used:

- COSMIC90 (Release 5 September 2019) Catalogue Of Somatic Mutations In Cancer

- COSMIC 89 (Release) to validate and support new version of cosmic 90

- gnomad 2.1.1 Exomes (Update, March 6, 2019): to know variant frequency in world population

- dbnsfp35a (20180921): Score columns like (whole-exome SIFT, PolyPhen2 HDIV, PolyPhen2 HVAR, LRT, MutationTaster, MutationAssessor, FATHMM, PROVEAN, MetaSVM, MetaLR, VEST, M-CAP, CADD, GERP++, DANN, fathmm-MKL, Eigen, GenoCanyon, fitCons, PhyloP and SiPhy scores from dbNSFP) to classify impact of mutation

- clinvar (20190305) Clinical Data. This descriptor allows to know clinical effect of variant

- cytoBand to know position in chromosome

- IARC TP53 Database July 2019, a WHO database of TP53 mutations

Then, we obtained a vcf for each variant calling tool. Finally, we used pandas (a module of python3.6.9) to merge the four files, to calculate the variant allele frequency (mean of VAF for each caller) and to filter mutations.

The filters applied were as follows:

- Intronic and synonymous mutations were removed
- Variants with VAF < 2% were removed
- Variants with a minor allele frequency (MAF) ≥ 1% in a gnomad population were removed
- Variants known as recurring artifact (manually curated and stocked in a local database) were removed

Review and classification of mutations

Finally, retained variants were reviewed by 2 molecular biologists from the French Intergroup of Myeloproliferative neoplasms (DLP and BC, EV, AC, AM, OM or IS) for (i) visual inspection of reads in BAM file to conclude for real mutation or artifact and for (ii) classification of the pathogenicity of mutations. Cases of discrepancies were discussed in concertation meetings. The classification of mutations was based on the consensus recommendation of the Association for Molecular Pathology and the American Society of Clinical Oncology[6]. Variants were classified as pathogenic, likely pathogenic or of unknow significance according to the following criteria.

Classification of additional mutations

Pathogenic	- Mutation non-sens or frameshift - Mutation described in myeloid malignancy (COSMIC) with somatic validation - Mutation with a functional effect demonstrated
Likely Pathogenic	- Mutation not classified as pathogenic with a VAF <40% or >60%
Variant of Unknown Significance	- Mutation not classified as pathogenic or likely pathogenic with a VAF between 40 and 60 %

Furthermore, we decided also to remove all mutations with a MAF ≥ 0.01% in the category of variant of unknown significance because they were probably rare polymorphisms.

Quality assessment

The quality of both sequencing and bioinformatics were checked by analysis in each sequencing run of a commercial internal quality control with 22 mutations including VAF of 5 to 70% and long deletions/insertions (Horizon Myeloid DNA-HD829). A run was analyzed only if all the mutations of this control were detected. Furthermore, our lab participates every year at the external quality evaluation from the French Group of Molecular Biology in Hematologic Malignancies (GBMHM).

Statistical analysis

Sample size justification

To demonstrate a prognostic effect of the five major genes in myelofibrosis (*ASXL1*, *EZH2*, *SRSF2* and *IDH1/2*), i.e. an increase in hazard ratio of 100%, 450 patients are required. This sample size was calculated according to an overall event rate of 29%[3], a control of the conjunctive power of 80% and a control of the FWER of 5% (with Bonferonni procedure)[7].

Descriptive analysis

Quantitative variables were reported as median and ranges and qualitative variables as proportions. Comparisons were performed using Mann and Whitney test for quantitative variables of Fisher test for qualitative variables. All p-values were corrected using a Benjamini-Hochberg procedure in order to control the False Discovery Rate.

Bayesian network and identification of genomic subgroups in myelofibrosis

A Bayesien Network (BN) was performed by first creating a binary matrix indicating the presence of mutation for genes mutated in at least 20 patients in the whole cohort (4% of the population). Analysis was performed using *bnlearn* package under R software[8]. In details, a forward selection technique for neighborhood detection based on the maximization of the minimum association measure observed with any subset of the nodes selected in the previous iterations. It learns the underlying structure of the Bayesian network (all the arcs are undirected, no attempt is made to detect their orientation)[9].

Hierarchical clustering analysis (HCA) was performed to create homogeneous genes mutated groups based on the selected genes in the BN. This analysis was performed using the Ward's method for linkage criteria combined with a Euclidean distance measure. Finally, groups were determined using BN, HCA and, to be consistent with the available knowledge, with the BN described in *Grinfeld et al.* N=2035 patients)[5]. To explain the prognostic impact of the groups, a cox model was performed and allowed the clustering in four groups (*TP53*, High-risk, *ASXL1 only* and other) according to their impact on overall survival. In this analysis, proportionality was checked using scaled-Schonfeld residuals.

Multiple testing

To describe the association between each gene mutated and the type of myelofibrosis or driver mutation, a Benjamini-Hochberg multiple comparison procedure was performed to control the

False-Discovery Rate (FDR) at the level of 5%. All p-values presented in the manuscript were adjusted p-values.

Missing data

No imputation of missing data was performed. However descriptive analysis using *missforest* package of these data was performed and compared to no missing data in order to discuss about a potential bias.

Multistate model

This model aims to decipher the natural history of myelofibrosis and variable associated with each transition. Therefore individual Cox proportional hazard models were performed for transitions from (i) myelofibrosis chronic phase to acute myeloid leukemia, (ii) myelofibrosis chronic phase to death and (iii) acute myeloid leukemia to death. Time zero was taken to be the time of diagnosis of primary or secondary myelofibrosis. Observations were right-censored at the end of the follow-up. Considering a median time of 17 days between diagnosis and sampling, time zero was the diagnosis time.

Variables included in the model were:

Demographic:

- Gender (female as reference)
- Age at diagnosis, years (continue variable)

Clinical and biological features at diagnosis:

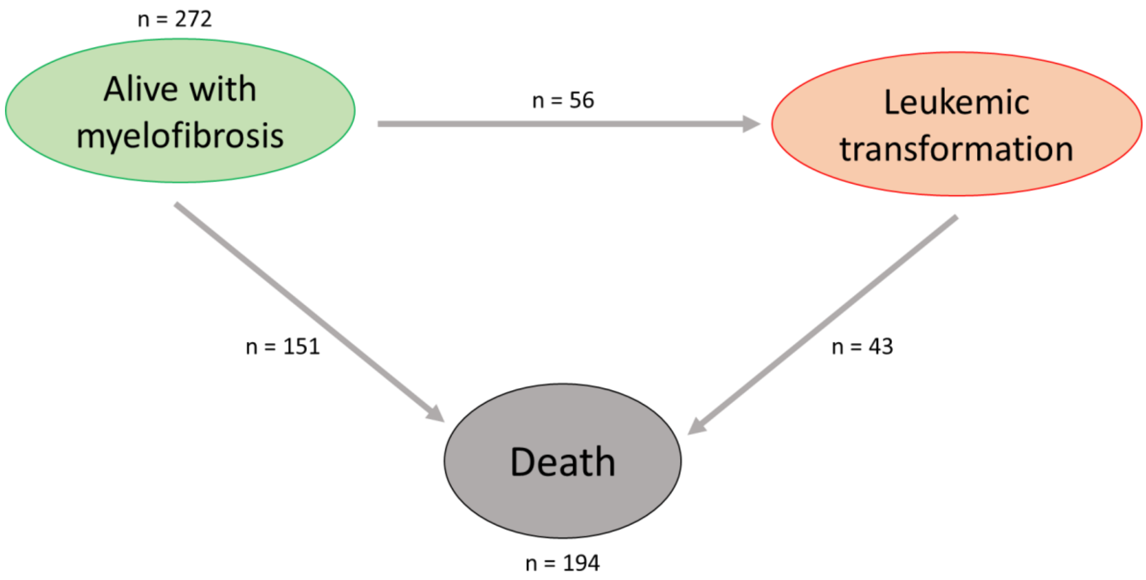
- Type of myelofibrosis (primary myelofibrosis as reference)
- Hemoglobin level, g/dL (continue variable)
- Leukocytes count, 10^9/L (continue variable)
- Platelets count, 10^9/L (continue variable)

Molecular:

- Driver mutation (*JAK2* as reference)
- Genomic groups defined as TP53, High-risk, ASXL1 and Other (reference as Other)

A manual backward step by step selection was done except for the interest variable, i.e. genomics groups. Variance inflation factor (VIF) was computed to check the absence of collinearity against dependent variables. Scaled-Schonfeld residuals were computed to check the proportionality assumption. Statistical tested was performed to validate the non-proportionality combined with a plot of these residuals against time.

These individuals' transition models were used to perform a single multistate model, and death was the only state considered as terminal event. The structure of this model was represented in the following diagram:



Analysis was performed using *mstate* package. Furthermore, two sensitivity analyses considering (i) a left-censored model from the time of diagnosis to time of sample as time zero or (ii) a right-censored model at the date of transplant for patients receiving bone marrow transplantation were performed.

Finally, an external validation was carried out using the *Grinfeld et al.* cohort of 276 myelofibrosis[5].

Prognostic evaluation

To evaluate the added value of genomic classification to classical prognostic tools (see section Clinical and Biological data), we computed the time-dependent AUC (area under receiving operating curve), Brier score and C-index. Indeed, the concordance of models was evaluated using C-index and AUC and the accuracy of the prediction was accessed using the Brier score (integrated Brier score and Brier score over-time). A graphical approach for time-dependent AUC and Brier score over-time was realized to have a global evaluation of each prognostic tool. These analysis were performed with the following R packages: *pec, timeROC, pROC* and *survival*[10, 11].

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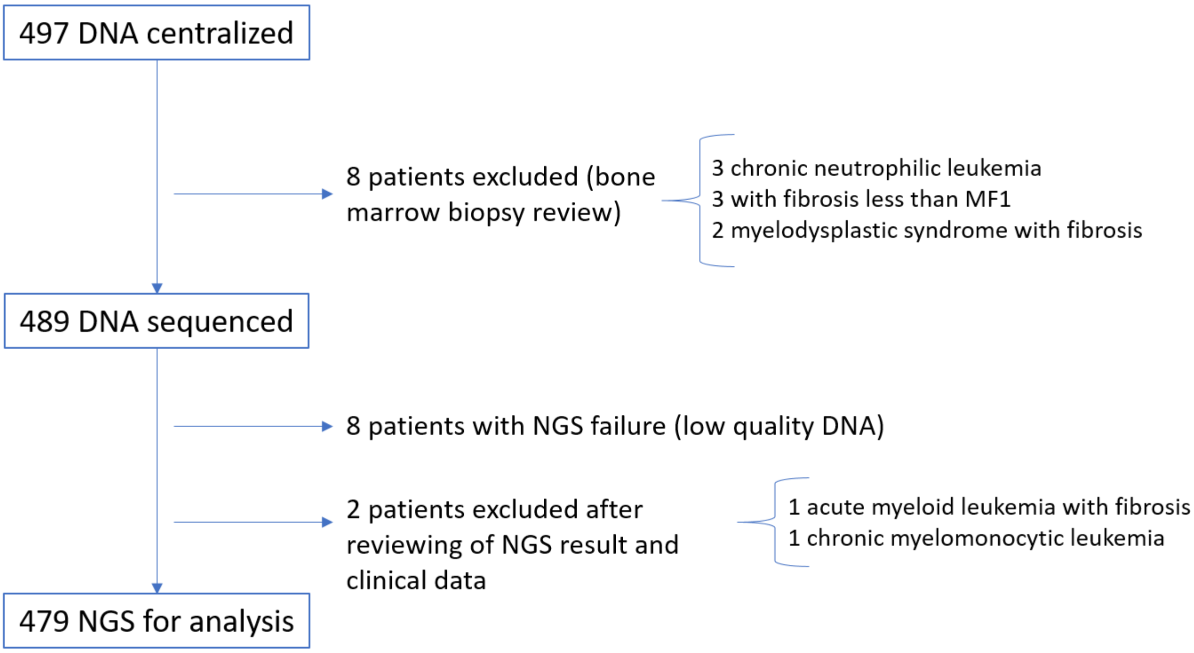
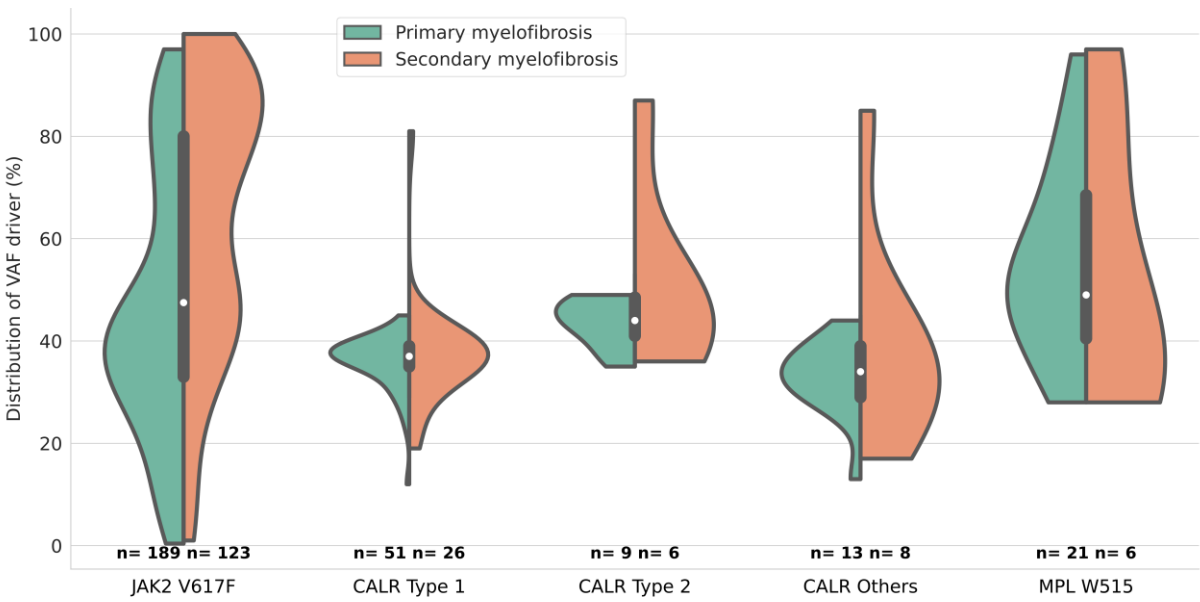
Supplemental Figures

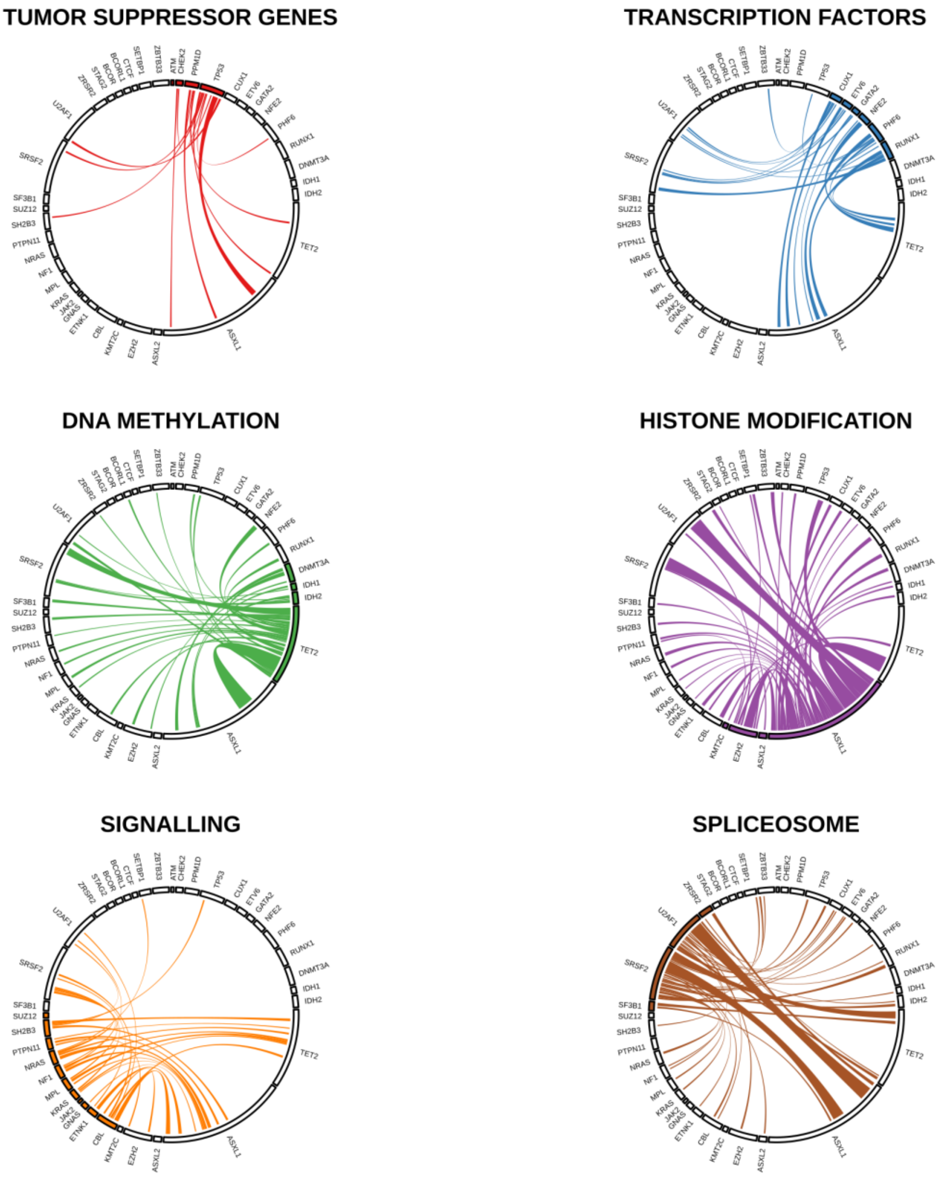


Supplemental Figure 1: Flow-chart of the selected patient's samples for the analysis

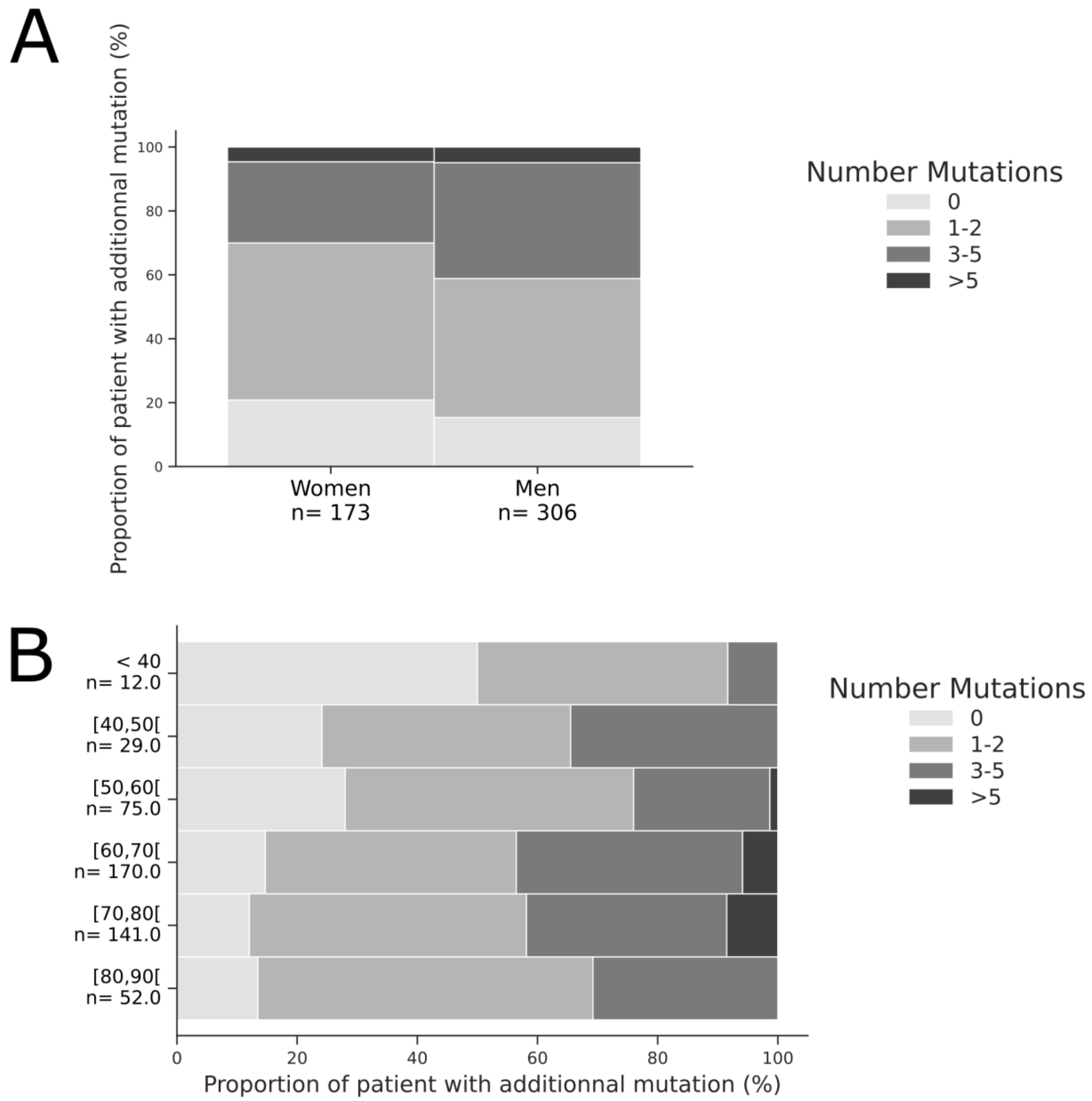


Supplemental Figure 2: Allele burden of driver mutations according to the type of myelofibrosis

Only the mutation with the higher allele burden was represented for patients with two driver mutations

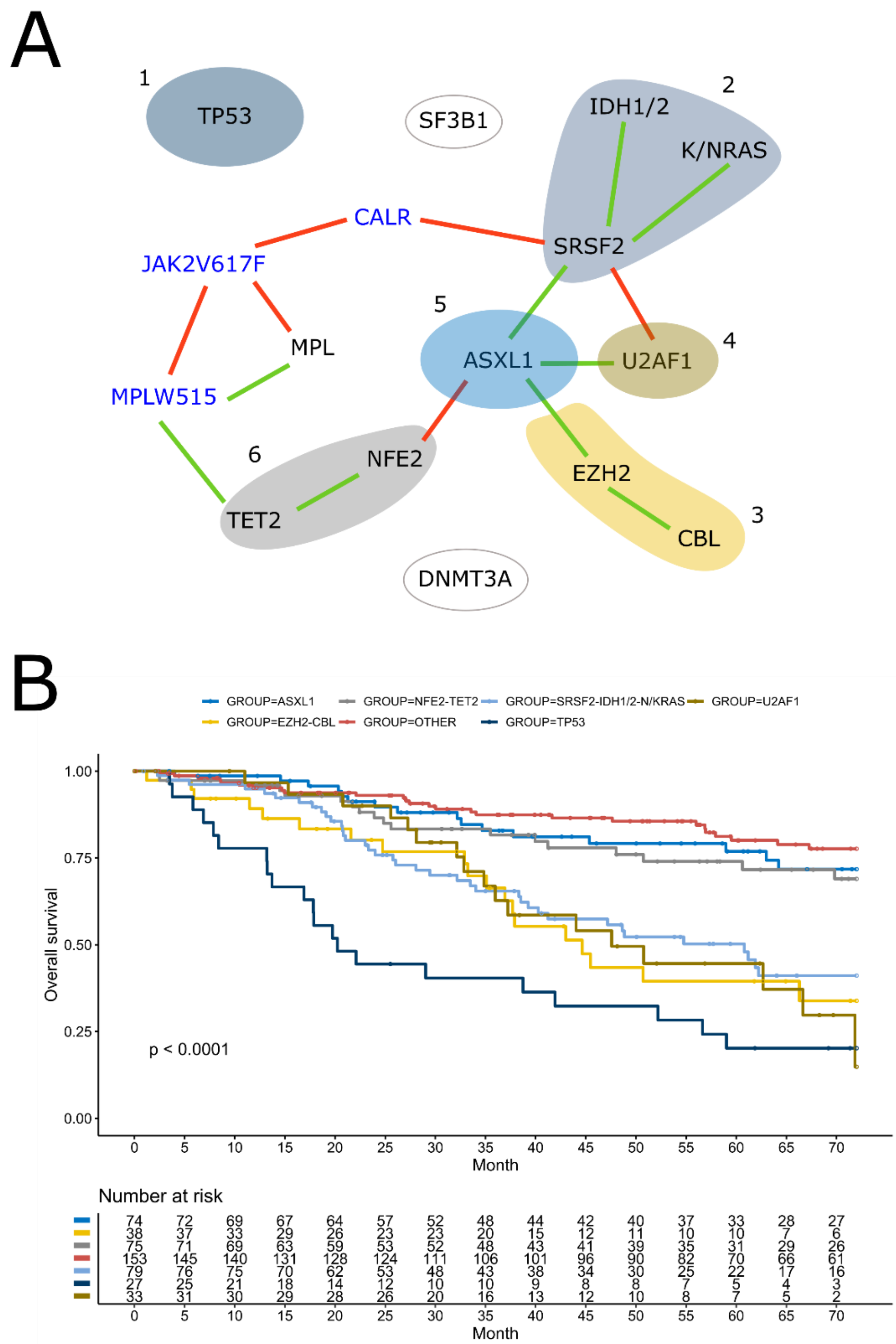


Supplemental Figure 3: Association of pairwise mutations represented by circus plot for each functional category of mutated genes.



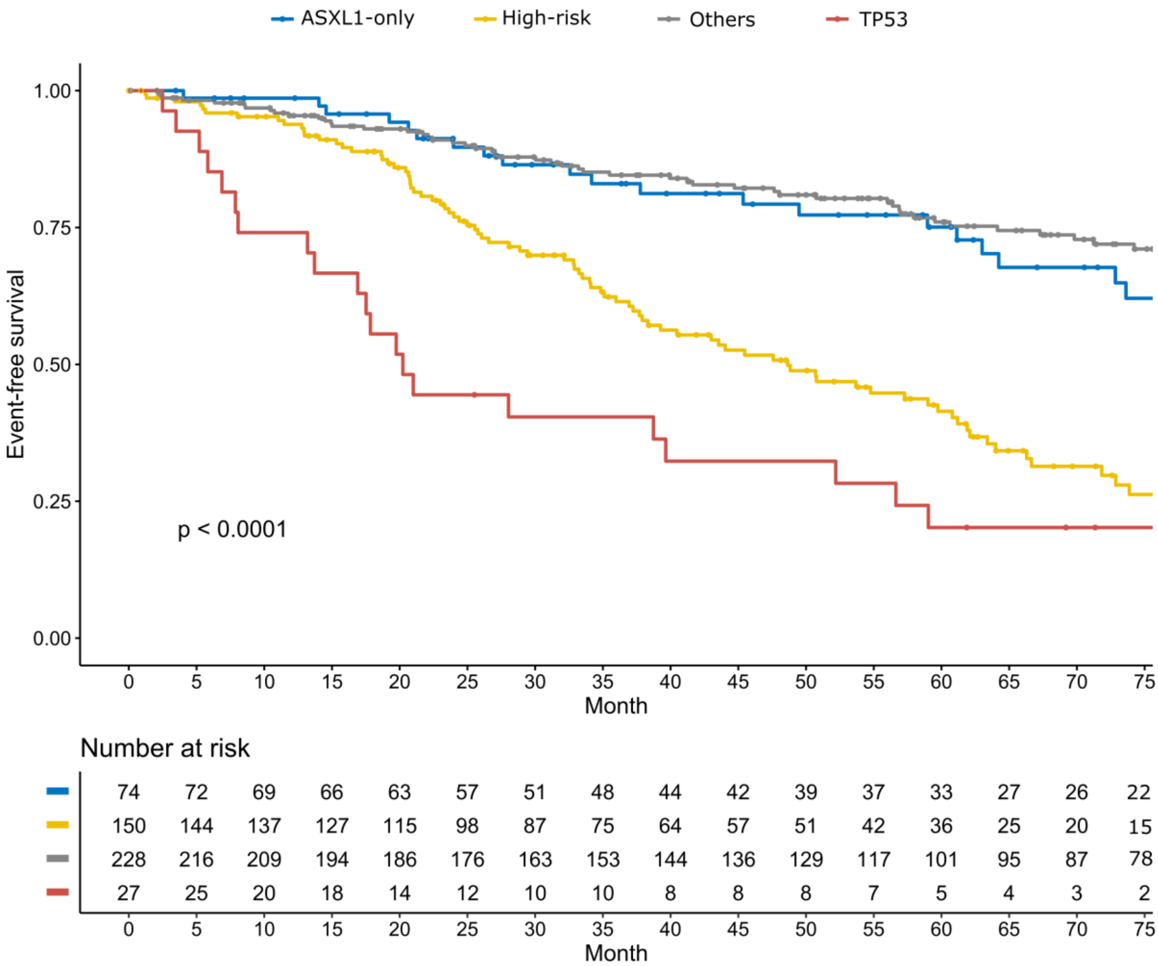
Supplemental Figure 4: Distribution of the number of additional mutations according to gender (A) and the age at diagnosis of myelofibrosis (B)

Only pathogenic and likely pathogenic mutations were considered



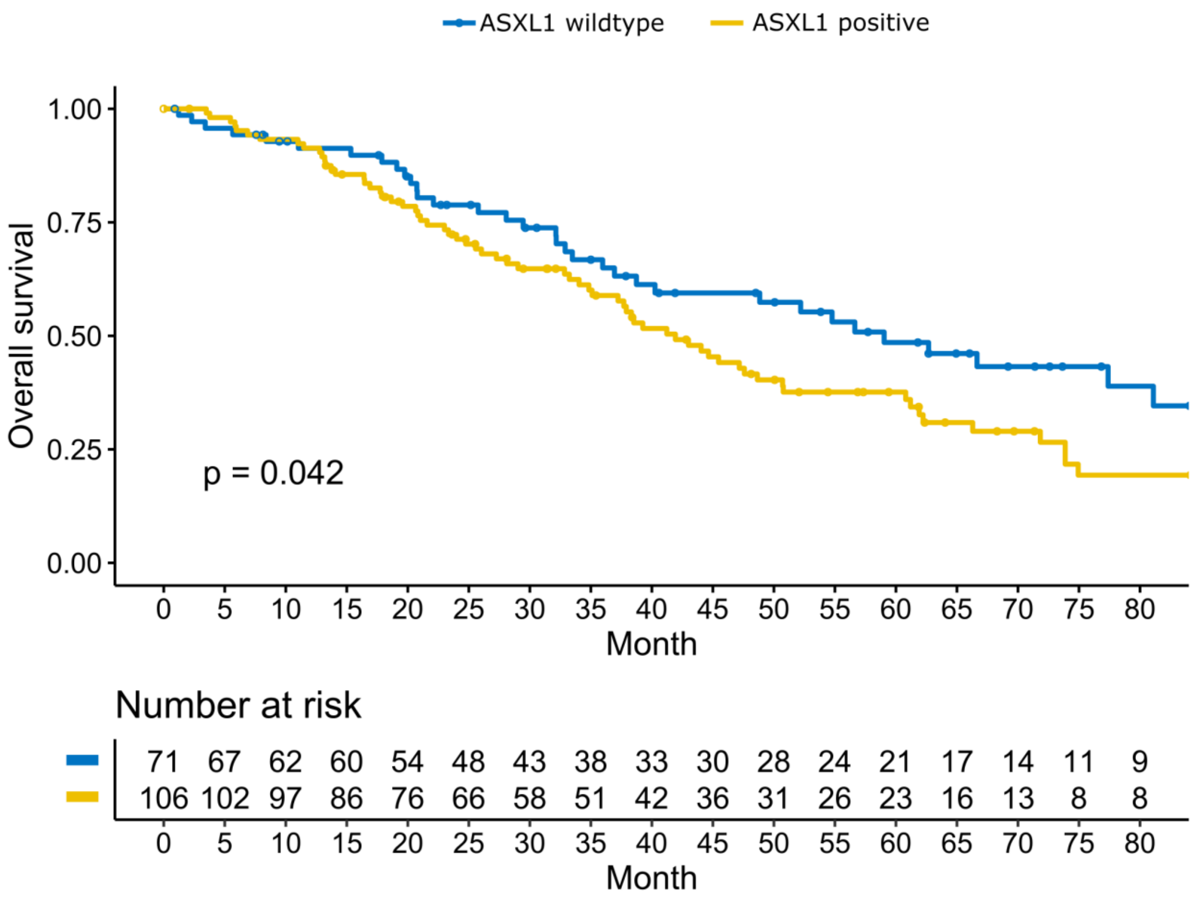
Supplemental Figure 5: (A) The seven genomic groups established on the Bayesian network and on the hierarchical clustering analysis (numbers represent the order of attribution in each group).

(B) Overall survival for the seven genomic groups. We merged groups with similar OS to generate 4 groups instead of the 7 shown (main manuscript **Figure 3A**).

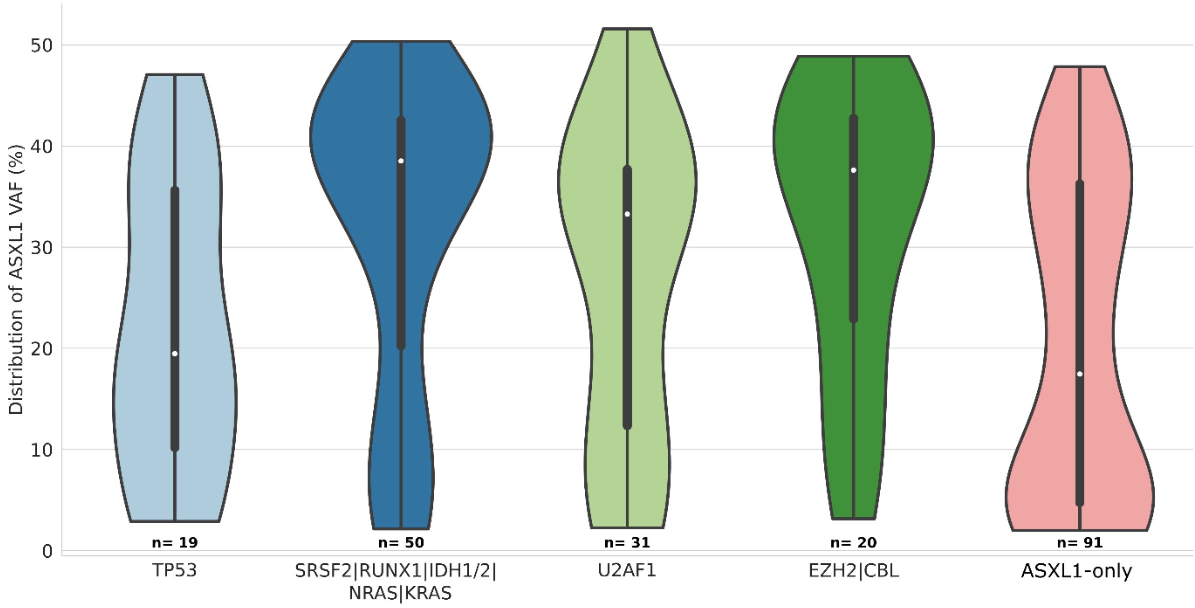


Supplemental Figure 6: Leukemia-free survival according to the genomic groups

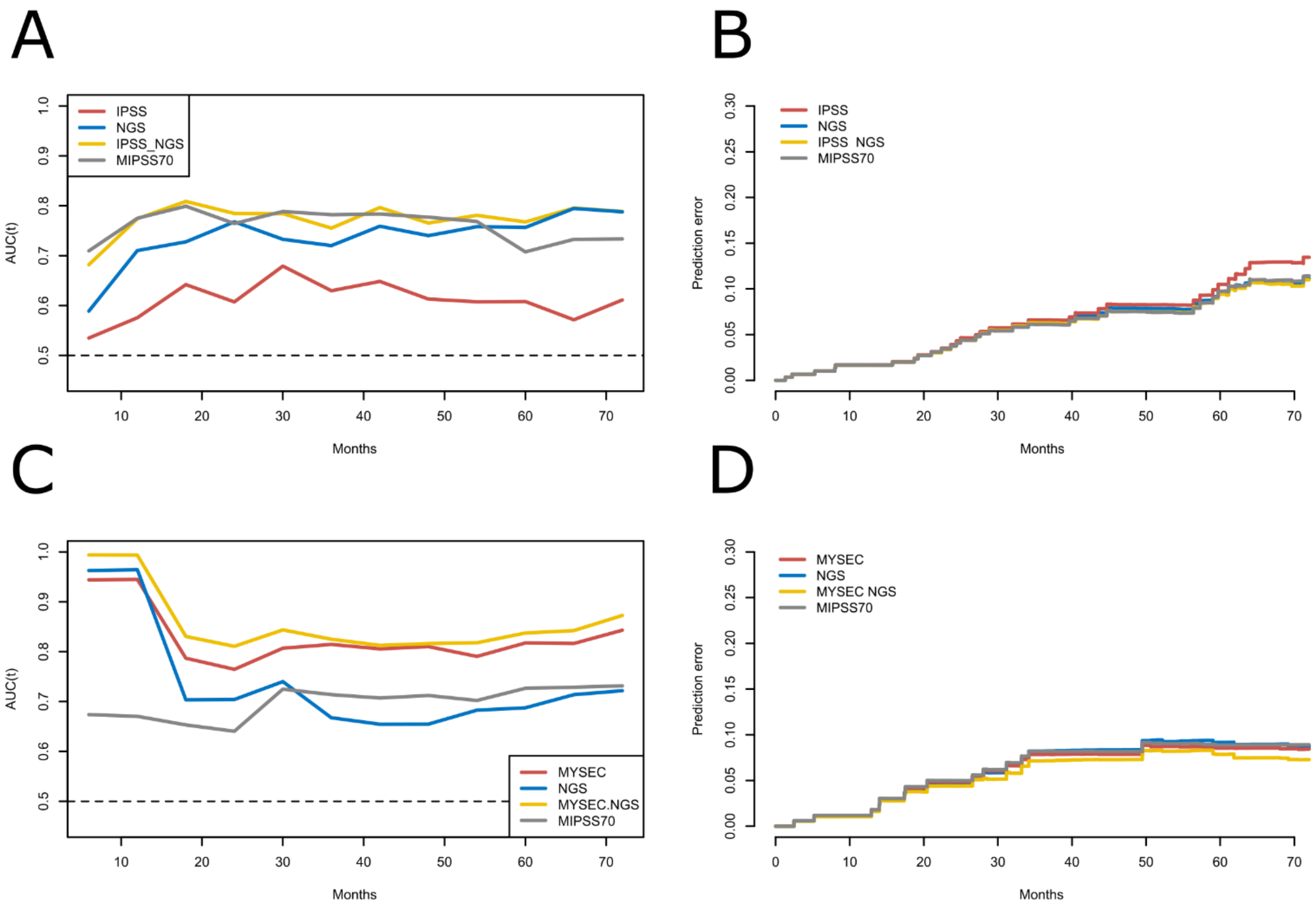
Leukemia-free survival take into account leukemic transformation and death.



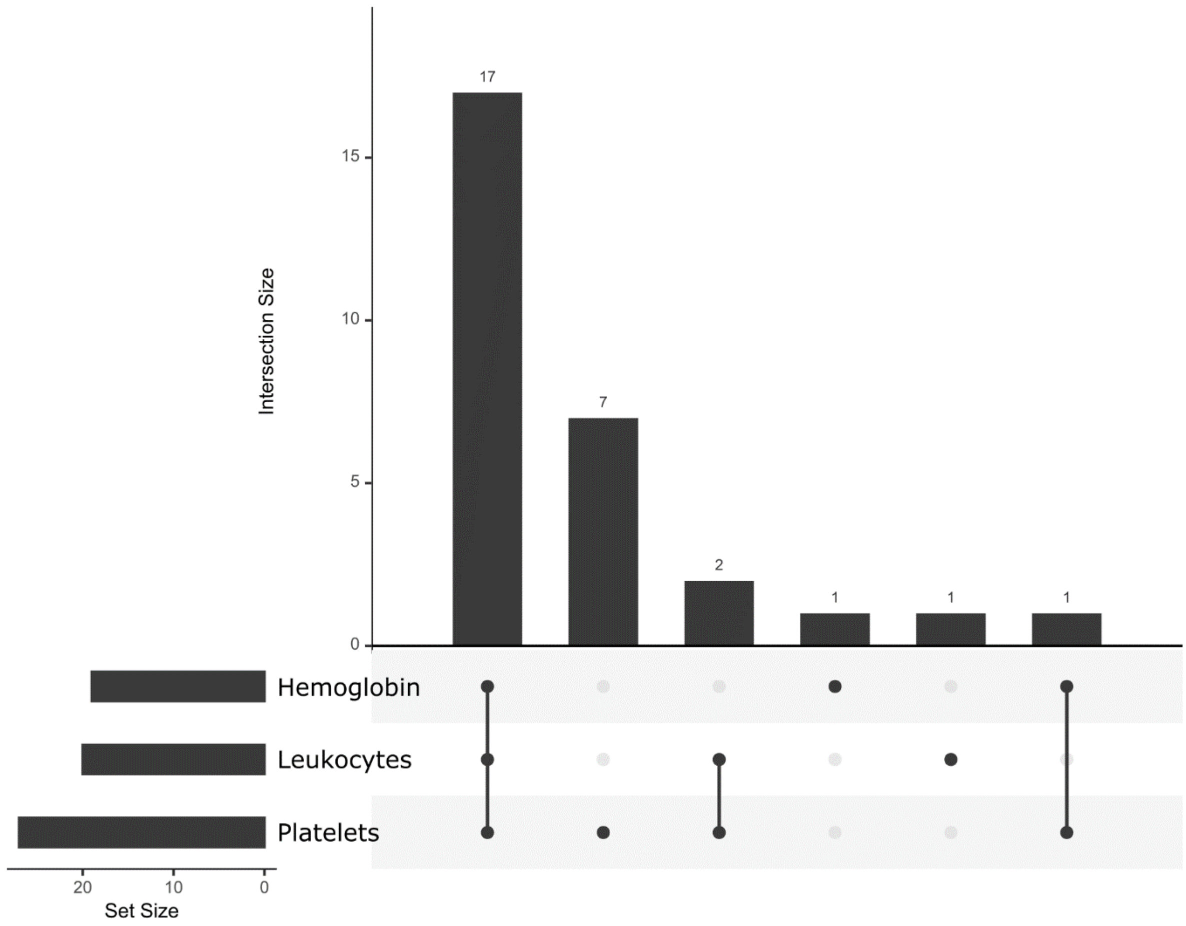
Supplemental Figure 7: Kaplan-Meier curves of overall survival according to the presence or the absence of *ASXL1* mutation in *TP53* or high-risk patients



Supplemental Figure 8: Violin plots aims to described the allele burden of *ASXL1* mutation according to their association with other mutations of adverse prognosis or not (i.e. *ASXL1*-only group)



Supplemental Figure 9: The performance (time-AUC, panels A and C) and the accuracy (Brier score, panels B and D) for leukemic transformation prediction were measured over the time for usually prognosis scoring systems, the 4-tier genomic classification (NGS) alone or in combination for primary (A and B) and secondary (C and D) myelofibrosis patients.



Supplemental Figure 10: Distribution and association of missing data in the cohort

Supplemental Tables

Supplemental Table 1: Characteristics of the cohort

Patient characteristics	Entire cohort (n=479)	Primary myelofibrosis (n=305)	Secondary myelofibrosis (n=174)
Post-PV myelofibrosis (n) Post-ET myelofibrosis (n)	-	-	70 104
Gender (M/F)	306/173	216/89	90/84
Age at diagnosis (year) [range]	66 [18-89]	68 [18-88]	67 [31-89]
Hemoglobin at diagnosis (g/dL) [range]	11.1 [6.2-18]	11.1 [6.3-17.2]	11.1 [6.2-18]
Platelets at diagnosis (10^9/L) [range]	272 [16-999]	250 [16-999]	323 [19-980]
Leucocytes at diagnosis (10^9/L) [range]	9.7 [1.3-76]	9.5 [1.7-76]	9.8 [1.3-68]
Driver mutation n(%)			
JAK2V617F	309 (65%)	187 (61%)	122 (70%)
CALR	110 (23%)	73 (24%)	37 (21%)
MPL	25 (5%)	19 (6%)	6 (3%)
Double mutation	8 (2%)	4 (1%)	4 (2%)
Triple negative	27 (6%)	22 (7%)	5 (3%)
Lille Score n(%)	-		-
Low risk		190 (62%)	
Intermediate risk		90 (30%)	
High risk		25 (8%)	
IPSS classification n(%)	-		-
Low risk		53 (17%)	
Intermediate-1 risk		104 (34%)	
Intermediate-2 risk		89 (29%)	
High risk		59 (19%)	
MYSEC-PM classification n(%)	-	-	
Low risk			36 (21%)
Intermediate-1 risk			74 (43%)
Intermediate-2 risk			41 (24%)
High risk			23 (13%)
MIPSS70 classification* n(%)			
Low risk	51 (11%)	30 (10%)	21 (12%)
Intermediate risk	302 (63%)	188 (62%)	114 (64%)
High risk	126 (26%)	87 (28%)	39 (22%)
MIPSS70-plus-v2 classification* n(%)	*available in n=265*	*available in n=172*	*available in n=93*
Very low risk	12 (5%)	10 (6%)	2 (2%)
Low risk	61 (23%)	36 (21%)	25 (27%)
Intermediate risk	63 (24%)	38 (22%)	25 (27%)
High risk	109 (41%)	78 (45%)	31 (33%)
Very High risk	29 (8%)	10 (6%)	10 (11%)
Events			
Follow-up (median, years)	4 [0.5-15]	4 [0.5-15]	4 [2-13]
AML transformation n(%)	56 (12%)	39 (13%)	17 (10%)
Deaths n(%)	194 (41%)	130 (43%)	64 (37%)
Allograft n(%)	50 (10%)	35 (11%)	15 (9%)

PV: polycythemia Vera; ET: essential thrombocythemia; AML: acute myeloid leukemia

All values were reported as mean [range]; *: MIPSS70 and MIPSS70+v2 were developed for primary myelofibrosis

Supplemental Table 2: Univariate analysis results for each transition of the multistate model

	Myelofibrosis to AML		Myelofibrosis to Death		AML to Death	
	HR [95%CI]	p-value	HR [95%CI]	p-value	HR [95%CI]	p-value
Age at diagnosis (y)	1.01 [0.99-1.03	0.362	**1.06 [1.04-1.08]**	**<0.0001**	1.03 [1.00-1.06]	0.077
Gender (Male)	1.56 [0.88-2.77]	0.125	**1.47 [1.04-2.08]**	**0.027**	1.24 [0.64-2.40]	0.52
Hemoglobin (g/dL)	**0.85 [0.73-0.97]**	**0.018**	**0.84 [0.77-0.91]**	**<0.0001**	0.96 [0.83-1.11]	0.60
Leukocytes (10^9/L)	1.02 [0.99-1.05]	0.098	**1.03 [1.02-1.04]**	**<0.0001**	1.01 [0.99-1.04]	0.39
Platelets (10^9/L)	**0.99 [0.99-0.99]**	**0.0006**	0.99 [0.99-0.99]	0.066	0.99 [0.99-1.00]	0.074
Type of myelofibrosis (PMF)	1.19 [0.68-2.12]	0.532	1.04 [0.74-1.46]	0.817	0.86 [0.45-1.67]	0.662
Driver mutation (*JAK2 as reference*)						
CALR	**0.26 [0.10-0.65]**	**0.004**	**0.61 [0.40-0.92]**	**<0.0001**	1.08 [0.33-3.54]	0.91
MPL	0.40 [0.10-1.65]	0.20	0.60 [0.28-1.29]	0.79	0.20 [0.03-1.48]	0.11
Triple negative	1.57 [0.62-3.97]	0.34	1.13 [0.57-2.24]	0.72	1.25 [0.38-4.10]	0.72
Genomic (*Others as reference*)						
TP53	**8.18 [3.30-20.3]**	**<0.0001**	**4.10 [2.26-7.38]**	**<0.0001**	**3.05 [1.12-8.31]**	**0.029**
High-risk	**4.12 [2.16-7.87]**	**<0.0001**	**2.63 [1.82-3.80]**	**<0.0001**	1.01 [0.47-2.18]	0.98
ASXL1-only	1.77 [0.75-4.18]	0.19	1.15 [0.68-1.93]	0.61	1.15 [0.41-3.18]	0.79

AML: acute myeloid leukemia

Supplemental Table 3: Sensitivity analysis of the multistage model for acute myeloid leukemia and death events considering the censor at the time of allograft

Transitions	**Myelofibrosis to AML**		**Myelofibrosis to Death**		**AML to Death**	
Variable	HR [95% CI]	p-value	HR [95% CI]	p-value	HR [95% CI]	p-value
Age at diagnosis	.	.	1.07 [1.05-1.09]	<0.0001	.	.
Gender (Male)	.	.	1.36 [0.91-2.02]	0.129	.	.
Hemoglobin	.	.	0.79 [0.72-0.88]	<0.0001	.	.
Leukocytes count	.	.	1.04 [1.02-1.05]	<0.0001	.	.
Platelets count	0.99 [0.99-0.99]	0.004	.	.	.	.
Driver mutation (*JAK2* as reference) *CALR*	0.24 [0.07-0.81]	0.021	.	.	.	.
Genomic groups (Others as reference)						
TP53	8.1 [3.1-21.2]	<0.0001	2.73 [1.42-5.24]	0.0026	0.91 [0.23-3.73]	0.920
High-risk	3.0 [1.45-6.21]	0.0032	1.70 [1.1-2.62]	0.017	0.64 [0.21-1.91]	0.419
ASXL1-only	2.06 [0.76-5.56]	0.153	1.25 [0.71-2.19]	0.434	1.64 [0.34-7.90]	0.536

AML: acute myeloid leukemia

Supplemental Table 4: Sensitivity analysis of the multistage model for acute myeloid leukemia and death events considering time zero as the time of sampling

Transitions	**Myelofibrosis to AML**		**Myelofibrosis to Death**		**AML to Death**	
Variable	HR [95% CI]	p-value	HR [95% CI]	p-value	HR [95% CI]	p-value
Age at diagnosis	.	.	1.05 [1.03-1.07]	<0.0001	.	.
Gender (Male)	.	.	1.54 [1.05-2.24]	0.025	.	.
Hemoglobin	.	.	0.82 [0.75-0.90]	<0.0001	.	.
Leukocytes count	.	.	1.03 [1.02-1.05]	<0.0001	.	.
Platelets count	0.99 [0.99-0.99]	0.014	.	.	.	.
<u>Driver mutation</u> (*JAK2* as reference) *CALR*	0.27 [0.08-0.89]	0.032	.	.	.	.
<u>Genomic groups</u> (Others as reference)						
TP53	13.2 [4.91-35.68]	<0.0001	5.76 [3.07-10.78]	<0.0001	1.47 [0.33-6.52]	0.615
High-risk	3.76 [1.81-7.80]	0.0004	2.33 [1.54-3.52]	<0.0001	0.67 [0.22-1.99]	0.472
ASXL1-only	2.67 [1.04-6.87]	0.042	1.38 [0.80-2.38]	0.248	0.73 [0.18-2.97]	0.656

AML: acute myeloid leukemia

Supplemental Table 5: Multistage model for acute myeloid leukemia and death events in the validation cohort of *Grinfeld et al.* (n=276)

Transitions	**Myelofibrosis to AML**		**Myelofibrosis to Death**		**AML to Death**	
Variable	HR [95% CI]	p-value	HR [95% CI]	p-value	HR [95% CI]	p-value
Age at diagnosis	.	.	1.06 [1.04-1.08]	<0.0001	.	.
Gender (Male)	.	.	2.50 [1.41-4.43]	0.002	.	.
Hemoglobin	.	.	0.90 [0.82-0.98]	0.025	.	.
Leukocytes count	.	.	1.02 [1.00-1.04]	0.007	.	.
Platelets count	0.99 [0.99-1.00]	0,087	.	.	.	.
<u>Driver mutation</u> (*JAK2* as reference) *CALR*	0.55 [0.16-1.90]	0.343	.	.	.	.
<u>Genomic groups</u> (Others as reference) TP53 High-risk ASXL1-only	9.90 [3.28-29.9] 3.67 [1.49-9.00] 3.70 [0.78-17.5]	<0.0001 0.004 0.099	0.83 [0.25-2.76] 2.07 [1.24-3.46] 1.98 [0.85-4.61]	0.764 0.005 0.112	0.40 [0.07-2.29] 0.39 [0.08-1.97] 1.02 [0.06-17.7]	0.303 0.254 0.991

AML: acute myeloid leukemia

Supplemental Table 6: Sensitivity analysis of the multistage model for acute myeloid leukemia and death events considering only additional mutations above 15% of allele burden

Transitions Variable	**Myelofibrosis to AML** HR [95% CI]	 p-value	**Myelofibrosis to Death** HR [95% CI]	 p-value	**AML to Death** HR [95% CI]	 p-value
Age at diagnosis	.	.	1.05 [1.03-1.07]	<0.0001	.	.
Gender (Male)	.	.	1.48 [1.01-2.16]	0,0426	.	.
Hemoglobin	.	.	0.81 [0.74-0,89]	<0.0001	.	.
Leukocytes count	.	.	1.04 [1.02-1.05]	<0.0001	.	.
Platelets count	0.99 [0.99-0.99]	0.0124	.	.	.	.
<u>Driver mutation</u> (*JAK2* as reference) *CALR*	 0.22 [0.07-0.73]	 0.013	.	.	.	.
<u>Genomic groups</u> (Others as reference) TP53 High-risk ASXL1-only	 5.83 [1.94-17.5] 2.70 [1.41-5.15] 1.65 [0.61-4.43]	 0.0017 0.0026 0.322	 2.31 [1.13-4.71] 1.54 [1.05-2.31] 0.95 [0.51-1.77]	 0.022 0.034 0.877	 1.58 [0.30-8.44] 0.85 [0.37-1.94] 1.39 [0.38-5.06]	 0.593 0.704 0.614

AML: acute myeloid leukemia

Supplemental Table 7: Prognostic performance comparison for patients with a karyotype available (n=262)

Comparisons were performed between classical prognosis score systems and the 4-tier genomic classification (NGS) alone or in combination with a clinical score. C-index and AUC evaluated the performance of the model and Brier score reflected the accuracy of prediction (i.e. the rate of error). The best values were in bold.

Overall survival		C-Index	Events at 24 months		Events at 48 months		Events at 72 months	
			Brier score	AUC	Brier score	AUC	Brier score	AUC
MFP (n=172)	NGS	0.68	0.045	72	0.099	74	0.013	76
	IPSS	0.66	0.047	70	0.102	73	0.129	73
	MIPSS70+v2	0.69	0.046	74	0.1	74	0.127	76
	NGS-IPSS	**0.74**	**0.045**	**78**	**0.09**	**82**	**0.111**	**85**
SMF (n=93)	NGS	0.66	0.074	68	0.129	69	0.153	73
	MYSEC-PM	0.69	0.083	78	0.126	74	0.145	74
	MIPSS70+v2*	0.72	0.082	74	0.12	**82**	0.138	79
	NGS-MYSEC-PM	**0.76**	**0.071**	**83**	**0.113**	79	**0.129**	**84**
Leukemic transformation		**C-Index**	**Events at 24 months**		**Events at 48 months**		**Events at 72 months**	
			Brier score	AUC	Brier score	AUC	Brier score	AUC
MFP (n=172)	NGS	0.71	**0.013**	85	0.038	73	0.062	75
	IPSS	0.61	0.014	71	0.04	65	0.068	64
	MIPSS70+v2	**0.75**	0.014	82	0.039	76	0.062	77
	NGS-IPSS	0.73	**0.013**	**87**	**0.036**	**76**	**0.06**	**79**

* : MIPSS70+v2 was developed for primary myelofibrosis

Analysis not performed for leukemic transformation in SMF due to the lack of events (models did not converge)

Supplemental Table 8: Deciphering the prognosis of each gene in the high-risk group

The prognostic prediction of the high-risk group was evaluated by both integrated Brier score (0 to 72 months events) and C-index for overall survival. TP53 mutated patients were omitted of the analysis. The analysis was performed by leaving out one-by-one each gene of the high-risk group. A higher C-index and a lower Brier score reflect a better concordance probability and a better accuracy, respectively.

Groups	Integrated Brier Score	C-Index
High risk (HR)	**0.131**	**0.623**
HR with exclusion of ***EZH2***	0.134	0.608
HR with exclusion of ***CBL***	**0.131**	0.622
HR with exclusion of ***U2AF1***	0.135	0.599
HR with exclusion of ***SRSF2***	0.134	0.606
HR with exclusion of ***IDH1***	0.132	0.617
HR with exclusion of ***IDH2***	0.132	0.619
HR with exclusion of ***NRAS***	0.132	0.620
HR with exclusion of ***KRAS***	**0.131**	0.621

Supplemental Table 9: Sensitivity analysis of the multistage model for acute myeloid leukemia and death events with omission of the *ASXL1* c.1934dupG mutation

Transitions	Myelofibrosis to AML		Myelofibrosis to Death		AML to Death	
Variable	HR [95% CI]	p-value	HR [95% CI]	p-value	HR [95% CI]	p-value
Age at diagnosis	.	.	1.05 [1.03-1.07]	<0.0001	.	.
Gender (Male)	.	.	1.41 [0.97-2.07]	0.0743	.	.
Hemoglobin	.	.	0.81 [0.74-0,89]	<0.0001	.	.
Leukocytes count	.	.	1.04 [1.02-1.05]	<0.0001	.	.
Platelets count	0.99 [0.99-0.99]	0.004	.	.	.	.
Driver mutation (*JAK2* as reference)			.	.	.	.
CALR	0.21 [0.06-0.70]	0.011				
Genomic groups (Others as reference)						
TP53	8.04 [3.16-20.46]	<0.0001	3.00 [1.65-5.44]	0.0003	0.99 [0.26-3.77]	0.990
High-risk	2.99 [1.51-5.93]	0.0016	1.75 [1.18-2.59]	0.0055	0.68 [0.27-1.72]	0.416
ASXL1-only	2.58 [0.92-7.25]	0.073	1.20 [0.62-2.29]	0.583	0.59 [0.13-2.56]	0.479

AML: acute myeloid leukemia

Supplemental Table 10: Sensitivity analysis of the multistage model for acute myeloid leukemia and death events dividing *ASXL1* mutation into c.1934dupG (dupG) and other mutations. The AML to death transition was not studied because the model didn't converge for it.

Transitions	**Myelofibrosis to AML**		**Myelofibrosis to Death**		**AML to Death**	
Variable	HR [95% CI]	p-value	HR [95% CI]	p-value	HR [95% CI]	p-value
Age at diagnosis	.	.	1.05 [1.03-1.07]	<0.0001		
Gender (Male)	.	.	1.41 [0.96-2.06]	0.0767		
Hemoglobin	.	.	0.81 [0.74-0,89]	<0.0001		
Leukocytes count	.	.	1.04 [1.02-1.05]	<0.0001		
Platelets count	0.99 [0.99-0.99]	0.0125	.	.		
<u>Driver mutation</u> (*JAK2* as reference)			.	.		
CALR	0.21 [0.06-0.69]	0.0102				
<u>Genomic groups</u> (Others as reference)						
TP53	8.67 [3.31-22.70]	<0.0001	3.03 [1.65-5.55]	0.0003		
High-risk	3.23 [1.57-6.62]	0.0014	1.77 [1.17-2.67]	0.0064		
ASXL1-dupG	1.89 [0.42-8.52]	0.407	1.09 [0.49-2.47]	0.819		
ASXL1-others	2.77 [0.96-7.99]	0.059	1.21 [0.63-2.33]	0.565		

AML: acute myeloid leukemia

Supplemental Table 11: Comparison of characteristics between patient with at least one missing data and patients with no missing data

	Patients with missing data (n=29)	Patients without missing data (n=450)	p-value
Age at diagnosis (year) [range]	66 [30-87]	67 [18-89]	0.218
Gender (% of male)	69%	64%	0.691
Hemoglobin at diagnosis (g/dL) [range]	11.05 [7.6-14.6]	11.1 [6.2-18]	0.802
Platelets at diagnosis (10^9/L) [range]	244 [217-271]	273 [16-999]	0.183
Leucocytes at diagnosis (10^9/L) [range]	9.6 [5.3-24.9]	9.7 [1.3-76.1]	0.783
Driver mutation n(%)			0.528
JAK2V617F	19 (66%)	293 (65%)	
CALR	9 (31%)	104 (23%)	
MPL	0	27 (6%)	
Triple negative	1 (3%)	26 (6%)	
Genomic groups n(%)			0.205
TP53	0	27 (6%)	
High-risk	6 (21%)	144 (32%)	
ASXL1-only	7 (24%)	67 (15%)	
Others	16 (55%)	212 (47%)	

All values were reported as mean [range]

List of mutations in the whole cohort

‡ : mutation found in a non-canonical transcript. For classification of mutations: A=Pathogenic, B=Likely Pathogenic and C=Variant of Unknown Significance

PATIENT	DRIVER	DISEASE	GENE	POSITION	REFERENCE	MUTATION	TYPE MUTATION	PROTEIN CHANGE	CLASSIF	VAF
3	CALR	PMF	CUX1	chr7:101892102	C	G	exonic	p.A1444G	C	50.88
3	CALR	PMF	MAD1L1	chr7:1855752	A	AGGAAGGCAG	exonic	p.F703_L704insPAF	C	43.74
3	CALR	PMF	TET2	chr4:106197348	C	G	exonic	p.P1894R	A	4.32
4	JAK2	SMF	ZBTB33	chrX:119388382	T	A	exonic	p.L371X	A	87.67
4	JAK2	SMF	CBL	chr11:119149242	C	T	exonic	p.P417L	A	7.21
4	JAK2	SMF	CTCF	chr16:67650719	C	A	exonic	p.R342S	B	5.83
5	MPL	PMF	MPL	chr1:43818306	T	G	exonic	p.Y591D	A	41.63
7	CALR	PMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	14.69
7	CALR	PMF	ASXL1	chr20:31021586	C	T	exonic	p.Q529X	A	2.9
7	CALR	PMF	TP53	chr17:7578426	GT	G	exonic	p.H168Pfs*1	A	7.97
7	CALR	PMF	TP53	chr17:7579489	CATTC	CCG	exonic	p.R65Tfs*58	A	9.1
8	JAK2	PMF	TET2	chr4:106157682	CTTGCATCACA	C	exonic	p.L862Cfs*7	A	40.97
8	JAK2	PMF	ZRSR2	chrX:15827443	T	A	splicing	.	B	96.84
9	JAK2	PMF	ASXL1	chr20:31021535	C	T	exonic	p.Q512X	A	15.44
9	JAK2	PMF	CBL	chr11:119149004	G	T	exonic	p.W408C	A	12.39
9	JAK2	PMF	CBL	chr11:119148991	G	A	exonic	p.C404Y	A	4.93
9	JAK2	PMF	GATA2	chr3:128202807	G	A	exonic	p.L305F	A	3.57
9	JAK2	PMF	SH2B3	chr12:111885607	G	A	exonic	p.V462M	B	12.28
10	JAK2	PMF	U2AF1	chr21:44514777	T	C	exonic	p.Q157R	A	45.49
12	CALR	SMF						.		
13	JAK2	PMF	IDH2	chr15:90631934	C	T	exonic	p.R140Q	A	6.48
13	JAK2	PMF	U2AF1	chr21:44514777	T	G	exonic	p.Q157P	A	38.64
16	MPL	PMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	28.88
16	MPL	PMF	ETNK1	chr12:22811995	A	G	exonic	p.N244S	A	34.86
16	MPL	PMF	SRSF2	chr17:74732959	G	A	exonic	p.P95L	A	29.49
17	CALR	PMF	KMT2A	chr11:118377216	A	G	exonic	p.T3537A	C	45.02
18	CALR	SMF	ASXL1	chr20:31022919	GAGC	G	exonic	p.Q803Gfs*14	A	4.25
18	CALR	SMF	ATM	chr11:108121771	T	C	exonic	p.F527L	C	53.77
18	CALR	SMF	ATM	chr11:108198443	C	A	exonic	p.C2349X	A	19.65
18	CALR	SMF	MPL	chr1:43818303	GACT	G	exonic	p.Y591del	B	3.74

18	CALR	SMF	TET2	chr4:106155649	G	T	exonic	p.E184X	A	42.27
20	CALR	SMF	ATM	chr11:108196143	C	T	exonic	p.R2227C	C	49.42
20	CALR	SMF	NOTCH1	chr9:139395297	C	G	exonic	p.G1881R	B	5.54
20	CALR	SMF	ATM	chr11:108114748	A	G	exonic	p.R189G	B	3.01
21	MPL	PMF	MPL	chr1:43818310	G	A	exonic	p.R592Q	A	72.15
21	MPL	PMF	NFE2	chr12:54687026	A	AGC	exonic	p.L85Rfs*26	A	43.66
21	MPL	PMF	SRSF2	chr17:74732959	G	T	exonic	p.P95H	A	46.86
21	MPL	PMF	TET2	chr4:106164069	TC	T	exonic	p.P1194Lfs*31	A	47.63
22	JAK2	SMF	NFE2	chr12:54686543	G	A	exonic	p.P246L	C	46.7
22	JAK2	SMF	STAG1	chr3:136068200	G	A	exonic	p.S1024L	C	50.57
23	CALR	PMF	ASXL1	chr20:31022402	TCACCACTGCCATAGAGAGGCGGC	T	exonic	p.E635Rfs*15	A	7.01
23	CALR	PMF	ASXL1	chr20:31023055	C	CCA	exonic	p.P849Hfs*18	A	6.39
25	CALR	SMF	JAK2	chr9:5080678	C	T	exonic	p.T810I	C	45.04
26	JAK2	PMF	BCORL1	chrX:129149581	C	T	exonic	p.R945X	A	16.08
26	JAK2	PMF	TET2	chr4:106157824	C	T	exonic	p.Q909X	A	2.27
26	JAK2	PMF	NOTCH1	chr9:139396511	A	G	exonic	p.L1805P	C	50.66
26	JAK2	PMF	PDS5B	chr13:33349159	G	A	exonic	p.R1438Q	C	44.28
27	JAK2	SMF	SH2B3	chr12:111885316	G	T	exonic	p.V402L	B	9.59
27	JAK2	SMF	TET2	chr4:106156344	TC	T	exonic	p.P416Lfs*10	A	28.89
28	JAK2	PMF	ASXL1	chr20:31022927	A	AC	exonic	p.T806Hfs*14	A	46.45
28	JAK2	PMF	CTCF	chr16:67650714	A	G	exonic	p.H340R	C	44.58
28	JAK2	PMF	U2AF1	chr21:44514777	T	G	exonic	p.Q157P	A	44.04
29	JAK2	PMF	NF1	chr17:29665757	C	A	exonic	p.Y2285X	A	2.42
30	JAK2	SMF	ACD	chr16:67692242	T	C	exonic	p.M371V	C	49.97
30	JAK2	SMF	ASXL1	chr20:31022440	G	GA	exonic	p.G643Rfs*13	A	44.88
30	JAK2	SMF	KMT2C	chr7:151970884	A	C	exonic	p.Y306X	A	4.5
33	CALR	PMF	ASXL1	chr20:31022628	G	T	exonic	p.E705X	A	39.09
33	CALR	PMF	NRAS	chr1:115258747	C	T	exonic	p.G12D	A	31.65
33	CALR	PMF	U2AF1	chr21:44514777	T	C	exonic	p.Q157R	A	13.14
34	JAK2	PMF	SH2B3	chr12:111856105	T	G	exonic	p.H52Q	A	48.41
34	JAK2	PMF	BCOR	chrX:39921558	C	T	exonic	p.R1421H	C	47.84
35	JAK2	PMF	TET2	chr4:106193931	C	T	exonic	p.R1465X	A	49.3
38	JAK2	PMF	ATM	chr11:108115524	G	T	exonic	p.K224N	C	41.47
41	CALR	PMF	DNMT3A	chr2:25466779	C	A	exonic	p.G642X	A	44.27
41	CALR	PMF	TET2	chr4:106196349	C	G	exonic	p.S1561C	C	49.68
41	CALR	PMF	TET2	chr4:106193855	A	AG	exonic	p.R1440Afs*37	A	3.74

41	CALR	PMF	WT1	chr11:32456321	C	T	exonic	p.G191S	C	47.2
42	CALR	SMF	ASXL1	chr20:31022437	TCGGAG	T	exonic	p.I641Mfs*13	A	43.04
42	CALR	SMF	PPM1D	chr17:58740374	TG	T	exonic	p.W427Cfs*3	A	8.53
42	CALR	SMF	PPM1D	chr17:58740375	G	A	exonic	p.W427X	A	5.01
42	CALR	SMF	PPM1D	chr17:58740488	G	GT	exonic	p.I466Hfs*9	A	2.21
42	CALR	SMF	PPM1D	chr17:58740649	TG	T	exonic	p.G519Afs*2	A	4.14
42	CALR	SMF	PPM1D	chr17:58740536	GC	G	exonic	p.L482fs*	A	3.53
42	CALR	SMF	TP53	chr17:7577108	C	T	exonic	p.C277Y	A	2.14
44	CALR	SMF	ACD	chr16:67692659	T	A	exonic	p.I322F	C	49.28
44	CALR	SMF	ASXL1	chr20:31022877	GA	G	exonic	p.E788Dfs*29	A	39.02
44	CALR	SMF	ATM	chr11:108153536	G	C	exonic	p.D1226H	B	38.09
44	CALR	SMF	EZH2	chr7:148526858	A	G	exonic	p.L149P	A	38.28
44	CALR	SMF	RUNX1	chr21:36171637	T	G	exonic	p.M310L	C	50.2
45	JAK2	PMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	36.21
45	JAK2	PMF	NF1	chr17:29684109	G	A	splicing	.	B	39.36
45	JAK2	PMF	U2AF1	chr21:44514769	T	TCTCATA	exonic	p.E159_M160insYE	B	36.91
46	JAK2	SMF	ATM	chr11:108200963	G	C	exonic	p.E2444Q	C	39.9
46	JAK2	SMF	NOTCH1	chr9:139409811	G	T	exonic	p.P649T	C	47.73
46	JAK2	SMF	NRAS	chr1:115258747	C	T	exonic	p.G12D	A	43.32
50	JAK2	SMF	PPM1D	chr17:58740376	G	A	exonic	p.W427X	A	3.08
51	CALR	PMF						.		
56	JAK2	SMF						.		
58	JAK2	PMF	SF3B1	chr2:198267361	T	G	exonic	p.K666Q	A	28.6
58	JAK2	PMF	ATM	chr11:108151840	T	C	exonic	p.F1174S	C	50.02
59	JAK2	SMF	ASXL1	chr20:31023267	C	T	exonic	p.H918Y	C	48.93
60	CALR	PMF	TP53	chr17:7578208	T	C	exonic	p.H214R	A	46.33
61	JAK2	PMF	SETBP1	chr18:42531917	T	C	exonic	p.I871T	A	97.5
61	JAK2	PMF	ASXL1	chr20:31022402	TCACCACTGCCATAGAGAGGCGGC	T	exonic	p.E635Rfs*15	A	34.6
62	CALR	PMF	CSF3R	chr1:36939086	G	A	exonic	p.A208V	B	3.05
62	CALR	PMF	TET2	chr4:106193801	CA	C	exonic	p.V1423Sfs*24	A	21.66
62	CALR	PMF	TET2	chr4:106196829	T	A,G	exonic	p.L1721X	A	3.81
63	TN	PMF	ATM	chr11:108098419	G	A	exonic	p.R23Q	C	48.7
63	TN	PMF	ATM	chr11:108216623	ACTTCTTCTATTGGTAAT	A	exonic	p.T2858_V2862delinsI	B	2.99
65	CALR	PMF	TET2	chr4:106180773	CAGG	C	exonic	p.R1269Efs*93	A	8.47
65	CALR	PMF	TET2	chr4:106196267	C	T	exonic	p.Q1534X	A	34.9
65	CALR	PMF	EZH2	chr7:148506403	T	G	exonic	p.K703N	B	11.74

65	CALR	PMF	EZH2	chr7:148507485	C	G	exonic	p.D657H	A	22.83
65	CALR	PMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	38.47
66	CALR	SMF						.		
67	JAK2	PMF	ASXL1	chr20:31021250	C	T	exonic	p.R417X	A	47.24
67	JAK2	PMF	CBL	chr11:119148974	C	A	exonic	p.H398Q	A	3.55
67	JAK2	PMF	ETNK1	chr12:22811995	A	G	exonic	p.N244S	A	45.43
67	JAK2	PMF	EZH2	chr7:148526910	G	GA	exonic	p.P132Sfs*5	A	92.68
68	MPL	SMF	TET2	chr4:106157613	AC	A	exonic	p.H839Tfs*1	A	15.75
68	MPL	SMF	TET2	chr4:106193939	G	GA	exonic	p.L1469Tfs*8	A	10.53
69	JAK2	PMF	NOTCH1	chr9:139391016	A	G	exonic	p.M2392T	C	48.02
69	JAK2	PMF	NFE2	chr12:54686997	G	A	exonic	p.P95S	C	50.79
70	JAK2	SMF	KMT2C	chr7:151949068	C	T	exonic	p.R526H	C	50.06
70	JAK2	SMF	NFE2	chr12:54686654	G	C	exonic	p.S209X	A	34.92
71	JAK2	PMF	TET2	chr4:106156589	CT	C	exonic	p.V498Ffs*34	A	3.05
71	JAK2	PMF	SF3B1	chr2:198267358	TC	AA	exonic	p.K666_I667delinsNF	A	33.61
72	TN	PMF	FBXW7	chr4:153273648	C	T	exonic	p.R286Q‡	C	49.86
72	TN	PMF	FLT3	chr13:28578284	A	C	exonic	p.S963A	C	45.09
72	TN	PMF	GATA2	chr3:128199947	AG	A	exonic	p.L453Cfs*23	A	44.37
72	TN	PMF	GNAS	chr20:57484421	G	A	exonic	p.R844H	A	45.0
72	TN	PMF	SH2B3	chr12:111885958	AC	A	exonic	p.L528Wfs*18	A	43.12
72	TN	PMF	SRSF2	chr17:74732960	G	T	exonic	p.P95T	A	40.85
75	TN	PMF	RAD21	chr8:117878915	C	T	exonic	p.W18X	A	43.56
75	TN	PMF	SH2B3	chr12:111885473	C	A	exonic	p.S417X	A	10.03
76	JAK2	SMF						.		
77	CALR	SMF	NFE2	chr12:54686494	GCTCT	G	exonic	p.E261Afs*2	A	5.67
78	JAK2	PMF	SF3B1	chr2:198267359	C	G	exonic	p.K666N	A	48.87
79	JAK2	PMF	CUX1	chr7:101559470	G	A	exonic	p.E47K	C	48.71
81	CALR	PMF						.		
83	JAK2	PMF	DDX41	chr5:176940693	TAGG	T	exonic	p.S363del	A	48.77
83	JAK2	PMF	CUX1	chr7:101891909	C	G	exonic	p.P1380A	C	47.52
83	JAK2	PMF	SRSF2	chr17:74732959	G	T	exonic	p.P95H	A	24.91
84	CALR	SMF	TET2	chr4:106190828	C	T	exonic	p.S1369L	C	42.04
85	JAK2	PMF						.		
86	MPL	PMF	ASXL1	chr20:31023159	CA	C	exonic	p.E883Kfs*2	A	36.92
86	MPL	PMF	ASXL1	chr20:31023383	T	TA	exonic	p.T957Nfs*12	A	2.83
86	MPL	PMF	SRSF2	chr17:74732251	A	C	exonic	p.S220A	B	2.8

86	MPL	PMF	TET2	chr4:106190815	G	A	exonic	p.G1365S	B	36.92
87	JAK2	SMF	NFE2	chr12:54686494	GCTCT	G	exonic	p.E261Afs*2	A	41.1
87	JAK2	SMF	TET2	chr4:106156090	AT	A	exonic	p.I331Nfs*15	A	15.32
87	JAK2	SMF	TET2	chr4:106196819	G	T	exonic	p.V1718L	A	52.14
87	JAK2	SMF	ZBTB33	chrX:119388805	A	G	exonic	p.H512R	B	3.88
88	JAK2	PMF						.		
89	JAK2	SMF						.		
90	CALR	PMF	ATRX	chrX:76938572	C	G	exonic	p.D726H	C	100.0
90	CALR	PMF	ZBTB33	chrX:119387754	A	G	exonic	p.T162A	C	100.0
91	MPL	SMF	TET2	chr4:106157053	C	T	exonic	p.Q652X	A	3.33
92	JAK2	SMF						.		
93	JAK2	SMF						.		
94	CALR	SMF	EZH2	chr7:148516722	T	C	exonic	p.N322S	A	55.16
94	CALR	SMF	TET2	chr4:106164897	C	G	exonic	p.Y1255X	A	40.66
95	CALR	SMF	ASXL1	chr20:31022398	G	GA	exonic	p.G629Rfs*5	A	42.53
95	CALR	SMF	GNAS	chr20:57484420	C	T	exonic	p.R844C	B	3.65
95	CALR	SMF	NF1	chr17:29556079	C	T	exonic	p.R816X	A	42.29
95	CALR	SMF	ZRSR2	chrX:15821848	A	T	exonic	p.K81X	A	24.56
95	CALR	SMF	ZRSR2	chrX:15833949	TC	T	exonic	p.L237fs*	A	22.47
96	CALR	SMF	ASXL1	chr20:31023000	C	T	exonic	p.Q829X	A	2.03
96	CALR	SMF	CUX1	chr7:101892179	C	T	exonic	p.L1470F	C	47.07
96	CALR	SMF	DNMT3A	chr2:25462085	C	G	splicing	.	C	43.24
96	CALR	SMF	KMT2D	chr12:49425138	CAGG	C	exonic	p.L4451del	C	47.51
96	CALR	SMF	NF1	chr17:29579963	G	C	exonic	p.C1373S	C	45.54
96	CALR	SMF	TET2	chr4:106193849	G	GA	exonic	p.R1440Tfs*37	A	40.88
97	CALR	PMF	ASXL1	chr20:31023408	C	T	exonic	p.R965X	A	8.9
97	CALR	PMF	ASXL1	chr20:31022592	C	T	exonic	p.R693X	A	2.0
97	CALR	PMF	KMT2D	chr12:49441794	C	T	exonic	p.C1397Y	B	26.29
97	CALR	PMF	TET2	chr4:106157002	C	T	exonic	p.Q635X	A	42.7
98	JAK2	PMF	EZH2	chr7:148514996	T	A	exonic	p.K405X	A	8.58
98	JAK2	PMF	KMT2C	chr7:151864358	G	C	exonic	p.S3208C	C	46.75
98	JAK2	PMF	TET2	chr4:106158503	G	A	exonic	p.C1135Y	A	3.07
99	JAK2	SMF	NFE2	chr12:54686463	G	A	exonic	p.R273W	C	40.59
99	JAK2	SMF	JAK2	chr9:5081738	A	T	exonic	p.L816F	B	2.04
100	CALR	PMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	31.0
100	CALR	PMF	MAD1L1	chr7:1937984	C	T	exonic	p.R617Q	C	48.26

101	JAK2	PMF	CUX1	chr7:101845221	T	C	exonic	p.W893R	C	50.94
101	JAK2	PMF	KDM6A	chrX:44922745	A	C	exonic	p.N536H	C	48.62
101	JAK2	PMF	U2AF1	chr21:44514777	T	G	exonic	p.Q157P	A	42.11
101	JAK2	PMF	ZBTB33	chrX:119388689	C	G	exonic	p.N473K	C	50.45
102	JAK2	PMF	TET2	chr4:106156227	GA	G	exonic	p.N377Mfs*49	A	45.3
102	JAK2	PMF	ZRSR2	chrX:15841000	G	T	exonic	p.E362X	A	89.17
102	JAK2	PMF	KMT2C	chr7:151856132	C	T	exonic	p.G3829D	C	50.49
102	JAK2	PMF	KMT2C	chr7:151949698	G	C	exonic	p.P468A	C	42.61
105	CALR	PMF	ASXL1	chr20:31024636	T	TG	exonic	p.P1377Sfs*2	A	5.3
105	CALR	PMF	SUZ12	chr17:30322701	TTACCTC	T	exonic	p.L572_L574delinsF	B	6.42
105	CALR	PMF	TET2	chr4:106155736	G	GT	exonic	p.S214Ffs*10	A	37.94
106	JAK2	PMF	CTCF	chr16:67654681	G	A	exonic	p.D390N	A	28.97
106	JAK2	PMF	DNMT3A	chr2:25457242	C	T	exonic	p.R882H	A	45.22
106	JAK2	PMF	U2AF1	chr21:44514777	T	C	exonic	p.Q157R	A	42.54
107	CALR	PMF	ATM	chr11:108206648	C	T	exonic	p.T2743M	C	48.82
107	CALR	PMF	RUNX1	chr21:36252925	T	C	exonic	p.N146S	B	2.94
108	JAK2	SMF	CUX1	chr7:101882866	T	G	splicing	.	B	34.29
110	JAK2	PMF	KMT2B	chr19:36212438	G	A	exonic	p.G730E	C	46.4
111	JAK2	SMF	ASXL1	chr20:31022653	TG	T	exonic	p.M713Ifs*11	A	14.2
111	JAK2	SMF	BCORL1	chrX:129147377	CG	C	exonic	p.A211Pfs*41	A	14.77
111	JAK2	SMF	BCORL1	chrX:129150062	G	A	exonic	p.W1105X	A	4.17
111	JAK2	SMF	DNMT3A	chr2:25469573	CG	C	exonic	p.V399Wfs*7	A	2.46
111	JAK2	SMF	ETNK1	chr12:22778318	TCGCCGTCGCCGTCGTCGTGGTGG TAGTCTC	T	exonic	p.V78_A87del	A	31.84
111	JAK2	SMF	KRAS	chr12:25380279	C	A	exonic	p.G60V	A	11.99
111	JAK2	SMF	PHF6	chrX:133547979	G	C	exonic	p.A238P	A	7.1
111	JAK2	SMF	TET2	chr4:106180835	G	A	exonic	p.G1288D	A	24.05
111	JAK2	SMF	TET2	chr4:106182930	G	GTC	exonic	p.H1325Lfs*38	A	14.1
112	JAK2	PMF	ASXL1	chr20:31023045	AC	A	exonic	p.S846Vfs*20	A	25.22
112	JAK2	PMF	DNMT3A	chr2:25457243	G	A	exonic	p.R882C	A	46.82
112	JAK2	PMF	KMT2C	chr7:151878166	G	C	exonic	p.A2260G	C	49.88
112	JAK2	PMF	TET2	chr4:106193734	CT	C	exonic	p.R1400Efs*47	A	14.18
114	JAK2	PMF	ASXL1	chr20:31023527	CT	C	exonic	p.F1005Lfs*18	A	41.15
114	JAK2	PMF	TET2	chr4:106196614	T	G	exonic	p.Y1649X	A	3.32
115	JAK2	PMF	CBL	chr11:119156046	G	A	exonic	p.D571N	C	46.8
115	JAK2	PMF	SF3B1	chr2:198266834	T	C	exonic	p.K700E	A	36.98

115	JAK2	PMF	TET2	chr4:106157888	TGC	T	exonic	p.P931fs*	A	38.14
116	JAK2	SMF	NOTCH1	chr9:139391512	G	A	exonic	p.P2227S	C	48.88
118	CALR	SMF	KMT2C	chr7:151945696	T	C	exonic	p.Q608R	C	40.26
119	JAK2	PMF	SF3B1	chr2:198267359	C	A	exonic	p.K666N	A	45.74
119	JAK2	PMF	TET2	chr4:106164727	G	T	exonic	p.V1199L	B	21.76
119	JAK2	PMF	TET2	chr4:106190798	G	A	exonic	p.R1359H	A	48.63
125	MPL	PMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	25.05
125	MPL	PMF	SH2B3	chr12:111885180	C	A	exonic	p.D356E	C	46.21
126	TN	SMF						.		
140	CALR	PMF						.		
141	JAK2	PMF	ASXL1	chr20:31022768	T	TG	exonic	p.A752Gfs*21	A	23.2
141	JAK2	PMF	DNMT3A	chr2:25464429	A	G	splicing	.	B	2.79
141	JAK2	PMF	JAK2	chr9:5055751	G	A	exonic	p.R340Q	C	50.99
141	JAK2	PMF	TET2	chr4:106164830	G	C	exonic	p.W1233S	B	29.63
142	JAK2	SMF	DNMT3A	chr2:25457168	C	CG	exonic	p.E907Rfs*13	A	18.4
142	JAK2	SMF	DOT1L	chr19:2223448	G	A	exonic	p.E1187K	C	47.84
142	JAK2	SMF	EZH2	chr7:148504761	C	T	exonic	p.E745K	A	3.4
142	JAK2	SMF	MAD1L1	chr7:1976334	T	C	exonic	p.K599R	C	49.6
142	JAK2	SMF	SUZ12	chr17:30325775	T	G	exonic	p.L658R	B	5.53
143	CALR	SMF	SF3B1	chr2:198267359	C	A	exonic	p.K666N	A	6.03
144	CALR	SMF	ASXL1	chr20:31023130	G	ins67	exonic	p.C872_R1541delins18	A	9.93
158	JAK2	PMF	SRSF2	chr17:74732959	G	C	exonic	p.P95R	A	51.33
159	JAK2	PMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	34.44
159	JAK2	PMF	CBL	chr11:119148991	G	A	exonic	p.C404Y	A	89.9
159	JAK2	PMF	EZH2	chr7:148507434	A	C	exonic	p.L674V	A	91.22
159	JAK2	PMF	RUNX1	chr21:36259210	C	T	exonic	p.S94N	C	46.43
160	JAK2	PMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	38.0
160	JAK2	PMF	JAK2	chr9:5054604	A	C	exonic	p.Q219P	B	3.3
161	TN	PMF	MPL	chr1:43814957	C	CTGGTGCTCTTGG	exonic	p.L498_L500insLVLLVL L	A	38.57
162	CALR	SMF	ASXL1	chr20:31021472	C	T	exonic	p.Q491X	A	37.33
162	CALR	SMF	ASXL1	chr20:31022402	TCACCACTGCCATAGAGAGGCGGC	T	exonic	p.E635Rfs*15	A	3.62
162	CALR	SMF	TET2	chr4:106196324	C	T	exonic	p.Q1553X	A	2.24
162	CALR	SMF	CTCF	chr16:67670643	G	A	exonic	p.V630I	C	50.24
163	TN	PMF	SH2B3	chr12:111885330	CTT	C	exonic	p.F407Sfs*46	A	85.14
163	TN	PMF	TET2	chr4:106197324	TAAAGAATCCC	T	exonic	p.K1887Ifs*17	A	38.25

164	JAK2	SMF	ZRSR2	chrX:15836735	T	C	exonic	p.L266P	B	10.15
164	JAK2	SMF	SRSF2	chr17:74733073	A	T	exonic	p.F57Y	B	5.58
165	JAK2	PMF	PPM1D	chr17:58740819	C	CT	exonic	p.V576fs*	A	42.02
165	JAK2	PMF	ASXL1	chr20:31022795	GGC	G	exonic	p.A761Lfs*11	A	39.3
165	JAK2	PMF	TET2	chr4:106162577	T	G	exonic	p.M1164R	B	12.84
167	JAK2	SMF	ABL1	chr9:133760418	C	T	exonic	p.P933L	C	50.16
167	JAK2	SMF	CUX1	chr7:101755049	A	G	exonic	p.Q212R	C	46.04
167	JAK2	SMF	TET2	chr4:106156091	T	TA	exonic	p.C332Mfs*7	A	45.91
167	JAK2	SMF	TET2	chr4:106157971	C	T	exonic	p.Q958X	A	39.7
167	JAK2	SMF	TET2	chr4:106156790	G	A	exonic	p.W564X	A	5.73
168	CALR	PMF	CALR	chr19:13049564	A	G	exonic	p.K24R	C	52.01
168	CALR	PMF	TET2	chr4:106180823	C	T	exonic	p.S1284F	A	3.52
168	CALR	PMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	2.86
170	JAK2	SMF	ASXL2	chr2:25966987	G	GT	exonic	p.T740Nfs*15	A	46.47
170	JAK2	SMF	CUX1	chr7:101877330	A	G	splicing	.	C	41.02
170	JAK2	SMF	MAD1L1	chr7:2054241	C	G	exonic	p.D419H	C	49.88
170	JAK2	SMF	PHF6	chrX:133559286	C	T	exonic	p.R342X	A	3.09
170	JAK2	SMF	SH2B3	chr12:111885286	C	T	exonic	p.R392W	A	86.47
170	JAK2	SMF	SMC1A	chrX:53432008	C	T	exonic	p.R711Q	B	79.18
170	JAK2	SMF	SRSF2	chr17:74732960	G	T	exonic	p.P95T	A	48.72
170	JAK2	SMF	TP53	chr17:7578475	G	A	exonic	p.P152L	A	45.5
171	JAK2	PMF	ASXL1	chr20:31021649	AAC	A	exonic	p.T551Nfs*1	A	38.16
171	JAK2	PMF	NF1	chr17:29585450	C	G	exonic	p.P1421R	B	8.19
171	JAK2	PMF	TET2	chr4:106164879	C	CGTA	exonic	p.T1249_E1250insV	B	31.59
171	JAK2	PMF	U2AF1	chr21:44514777	T	G	exonic	p.Q157P	A	36.56
172	JAK2	SMF	ASXL1	chr20:31024758	C	T	exonic	p.R1415X	A	47.06
172	JAK2	SMF	NRAS	chr1:115256536	C	T	exonic	p.A59T	A	24.58
172	JAK2	SMF	SRP72	chr4:57355605	A	G	exonic	p.I426V	C	48.57
172	JAK2	SMF	TP53	chr17:7577498	C	T	splicing	.	A	88.2
172	JAK2	SMF	TP53	chr17:7577545	T	C	exonic	p.M246V	A	3.4
176	JAK2	PMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	44.12
176	JAK2	PMF	KMT2D	chr12:49424161	A	G	exonic	p.V4634A	C	48.61
176	JAK2	PMF	SRSF2	chr17:74732959	G	T	exonic	p.P95H	A	48.51
177	JAK2	SMF	ASXL1	chr20:31022385	G	GT	exonic	p.R625Pfs*9	A	13.21
177	JAK2	SMF	ASXL1	chr20:31022471	C	CG	exonic	p.A654Gfs*2	A	4.72
177	JAK2	SMF	ASXL1	chr20:31022922	C	T	exonic	p.Q803X	A	6.09

177	JAK2	SMF	PDS5B	chr13:33241961	A	G	exonic	p.I229V	C	46.99
177	JAK2	SMF	SH2B3	chr12:111885144	T	TG	exonic	p.L347Afs*37	A	6.17
178	CALR	PMF	NOTCH1	chr9:139400986	C	T	exonic	p.C1336Y	C	32.09
178	CALR	PMF	SF3B1	chr2:198267359	C	A	exonic	p.K666N	A	3.12
179	JAK2	PMF	ASXL1	chr20:31022293	T	TA	exonic	p.C594Mfs*24	A	37.84
179	JAK2	PMF	ASXL1	chr20:31022758	AACTCCCCGTT	A	exonic	p.V751Lfs*17	A	2.26
179	JAK2	PMF	EED	chr11:85977172	T	A	exonic	p.H258Q	B	37.83
179	JAK2	PMF	ETV6	chr12:12022357	G	A	splicing	.	B	39.81
179	JAK2	PMF	U2AF1	chr21:44514777	T	G	exonic	p.Q157P	A	43.73
179	JAK2	PMF	ZRSR2	chrX:15827389	C	T	exonic	p.R169X	A	78.65
180	JAK2	PMF	NPM1	chr5:170827922	G	C	exonic	p.R221T	C	53.03
180	JAK2	PMF	SRSF2	chr17:74732935	CGGCGGCTGTGGTGTGAGTCCGGG G	C	exonic	p.P95_R102del	A	30.25
181	JAK2	SMF						.		
182	JAK2	SMF	TET2	chr4:106155778	G	GA	exonic	p.T229Nfs*24	A	28.54
182	JAK2	SMF	TET2	chr4:106196900	A	G	exonic	p.S1745G	C	51.81
185	CALR	PMF						.		
195	JAK2	PMF	KMT2A	chr11:118362578	C	G	exonic	p.L1647V	C	50.17
195	JAK2	PMF	NF1	chr17:29670078	A	T	exonic	p.K2372X	A	5.7
195	JAK2	PMF	NOTCH1	chr9:139405194	C	T	exonic	p.C884Y	B	25.34
195	JAK2	PMF	SF3B1	chr2:198267359	C	G	exonic	p.K666N	A	27.4
195	JAK2	PMF	TET2	chr4:106164913	C	T	exonic	p.R1261C	A	6.59
195	JAK2	PMF	TET2	chr4:106182983	C	A	exonic	p.A1341E	A	5.66
195	JAK2	PMF	TET2	chr4:106197371	T	C	exonic	p.Y1902H	A	4.01
200	JAK2	PMF	SF3B1	chr2:198267359	C	G	exonic	p.K666N	A	48.84
201	JAK2	PMF	SH2B3	chr12:111856571	G	C	exonic	p.E208Q	A	48.56
201	JAK2	PMF	SH2B3	chr12:111885467	G	A	exonic	p.R415H	B	37.17
201	JAK2	PMF	TET2	chr4:106190896	AG	A	exonic	p.S1392Tfs*55	A	43.87
210	MPL	PMF	JAK2	chr9:5073753	T	C	exonic	p.L611S	A	45.15
211	CALR	PMF	KMT2C	chr7:151877154	G	C	exonic	p.R2403G	C	50.97
211	CALR	PMF	KMT2C	chr7:152012241	T	C	exonic	p.K191R	C	41.94
211	CALR	PMF	BCOR	chrX:39911649	G	A	exonic	p.R1661X	A	74.74
215	JAK2	PMF	TP53	chr17:7577548	C	T	exonic	p.G245S	A	83.94
216	MPL	PMF	DOT1L	chr19:2222259	G	C	exonic	p.D1031H	C	49.74
216	MPL	PMF	KMT2A	chr11:118376007	C	T	exonic	p.L3134F	B	89.33
216	MPL	PMF	MPL	chr1:43818306	T	G	exonic	p.Y591D	A	59.9

217	DM	SMF	DNMT3A	chr2:25469506	CCCTT	C	exonic	p.K420Afs*229	A	2.2
217	DM	SMF	IDH1	chr2:209113113	G	A	exonic	p.R132C	A	2.42
217	DM	SMF	KMT2D	chr12:49445043	G	A	exonic	p.P808L	C	58.27
217	DM	SMF	TET2	chr4:106190855	G	A	exonic	p.C1378Y	A	12.23
217	DM	SMF	TET2	chr4:106194076	G	A	splicing	.	B	14.44
222	CALR	SMF						.		
224	JAK2	PMF	ASXL1	chr20:31023174	A	AC	exonic	p.K888Qfs*5	A	44.93
224	JAK2	PMF	U2AF1	chr21:44514777	T	G	exonic	p.Q157P	A	43.09
225	JAK2	PMF						.		
226	MPL	PMF	MPL	chr1:43818306	T	G	exonic	p.Y591D	A	73.65
226	MPL	PMF	KIT	chr4:55589773	G	C	exonic	p.D419H	C	48.53
226	MPL	PMF	TET2	chr4:106190860	C	T	exonic	p.H1380Y	A	47.24
227	JAK2	PMF	TET2	chr4:106156091	T	TA	exonic	p.C332Mfs*7	A	49.62
227	JAK2	PMF	TET2	chr4:106196234	C	T	exonic	p.Q1523X	A	2.28
227	JAK2	PMF	TET2	chr4:106196560	T	A	exonic	p.Y1631X	A	2.37
227	JAK2	PMF	SMC3	chr10:112362637	G	A	exonic	p.G1118R	B	45.15
229	JAK2	PMF	TET2	chr4:106156747	C	T	exonic	p.R550X	A	17.62
229	JAK2	PMF	SRSF2	chr17:74732959	G	T	exonic	p.P95H	A	49.35
230	JAK2	PMF	ASXL1	chr20:31022288	C	G	exonic	p.Y591X	A	4.23
230	JAK2	PMF	EZH2	chr7:148506209	C	G	exonic	p.A717P	B	3.7
230	JAK2	PMF	KMT2C	chr7:151859783	A	T	exonic	p.S3627T	C	51.56
230	JAK2	PMF	U2AF1	chr21:44514777	T	G	exonic	p.Q157P	A	5.01
232	DM	PMF	TET2	chr4:106155457	G	T	exonic	p.G120X	A	47.04
232	DM	PMF	TET2	chr4:106156690	C	T	exonic	p.Q531X	A	45.37
241	JAK2	PMF	SF3B1	chr2:198267484	G	A	exonic	p.R625C	A	30.73
241	JAK2	PMF	TET2	chr4:106157154	AAG	A	exonic	p.R686Sfs*5	A	33.38
246	JAK2	SMF	ATM	chr11:108121603	A	G	exonic	p.N471D	C	44.08
251	MPL	PMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	10.58
251	MPL	PMF	DNMT3A	chr2:25505394	C	A	exonic	p.A122S	C	48.11
251	MPL	PMF	DNMT3A	chr2:25463575	G	C	exonic	p.L703V	A	2.24
251	MPL	PMF	DNMT3A	chr2:25470516	G	A	exonic	p.R320X	A	2.34
251	MPL	PMF	SH2B3	chr12:111885879	C	T	exonic	p.L501F	C	51.34
251	MPL	PMF	TET2	chr4:106196819	G	T	exonic	p.V1718L	A	47.36
252	JAK2	SMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	8.79
252	JAK2	SMF	BCORL1	chrX:129149078	G	GA	exonic	p.Q778Tfs*107	A	7.44
252	JAK2	SMF	PTPN11	chr12:112915523	A	G	exonic	p.N308D	C	48.77

253	CALR	PMF	RAD21	chr8:117862916	G	C	exonic	p.L521V	C	45.39
253	CALR	PMF	TET2	chr4:106157537	A	AT	exonic	p.R814Sfs*1	A	2.44
254	CALR	PMF	EZH2	chr7:148506225	G	T	exonic	p.H711Q	C	48.44
254	CALR	PMF	SF3B1	chr2:198267480	T	C	exonic	p.N626S	A	45.08
255	DM	PMF	KMT2C	chr7:151878029	G	A	exonic	p.P2306S	C	52.08
255	DM	PMF	EED	chr11:85967522	A	G	exonic	p.I174V	C	43.64
255	DM	PMF	IDH1	chr2:209113112	C	T	exonic	p.R132H	A	4.58
255	DM	PMF	ASXL1	chr20:31022857	T	A	exonic	p.L781X	A	3.88
257	JAK2	SMF	ASXL1	chr20:31023283	AGCCCCAGG	A	exonic	p.E923Dfs*21	A	42.7
257	JAK2	SMF	ETV6	chr12:11905466	G	A	exonic	p.R39Q	C	49.66
257	JAK2	SMF	EZH2	chr7:148523666	T	TG	exonic	p.N263Qfs*7	A	46.08
257	JAK2	SMF	KIT	chr4:55569962	A	C	exonic	p.I277L	C	47.88
258	JAK2	SMF	U2AF1	chr21:44514777	T	G	exonic	p.Q157P	A	14.18
259	CALR	PMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	13.31
259	CALR	PMF	ASXL1	chr20:31022628	G	T	exonic	p.E705X	A	2.3
259	CALR	PMF	SH2B3	chr12:111856183	G	C	exonic	p.E78D	C	47.81
259	CALR	PMF	ZRSR2	chrX:15834014	G	A	splicing	.	B	32.46
261	CALR	PMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	36.68
261	CALR	PMF	TET2	chr4:106156307	A	AG	exonic	p.Q403Hfs*38	A	5.85
262	JAK2	PMF	ASXL1	chr20:31021283	C	T	exonic	p.Q428X	A	50.33
262	JAK2	PMF	SRSF2	chr17:74732959	G	T	exonic	p.P95H	A	53.65
263	JAK2	PMF	EZH2	chr7:148507484	T	G	exonic	p.D657A	C	47.82
263	JAK2	PMF	ETNK1	chr12:22811995	A	G	exonic	p.N244S	A	47.22
263	JAK2	PMF	ASXL1	chr20:31021229	A	T	exonic	p.K410X	A	46.93
264	JAK2	SMF	SF3B1	chr2:198267360	T	C	exonic	p.K666R	A	49.76
264	JAK2	SMF	ZRSR2	chrX:15841207	AG	A	exonic	p.D432Tfs*57	A	79.48
264	JAK2	SMF	ATM	chr11:108196825	C	T	exonic	p.S2283L	C	47.08
264	JAK2	SMF	ETV6	chr12:12037492	G	A	exonic	p.G375R	B	2.81
265	JAK2	SMF	ASXL1	chr20:31023456	G	T	exonic	p.E981X	A	28.06
265	JAK2	SMF	ASXL1	chr20:31022402	TCACCACTGCCATAGAGAGGCGGC	T	exonic	p.E635Rfs*15	A	4.29
265	JAK2	SMF	ASXL1	chr20:31022637	CAGGCCGGAACTGCCATGTCCAG	C	exonic	p.A709Lfs*8	A	4.22
265	JAK2	SMF	EZH2	chr7:148506477	C	T	exonic	p.V679M	A	6.82
265	JAK2	SMF	U2AF1	chr21:44514777	T	G	exonic	p.Q157P	A	31.66
265	JAK2	SMF	ZBTB33	chrX:119388976	T	C	exonic	p.I569T	B	39.16
266	JAK2	SMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	37.47
266	JAK2	SMF	ATRX	chrX:76938779	G	A	exonic	p.P657S	C	49.07

266	JAK2	SMF	PHF6	chrX:133551305	T	C	exonic	p.I314T	A	46.64
266	JAK2	SMF	SUZ12	chr17:30323832	T	C	exonic	p.S604P	C	42.17
266	JAK2	SMF	TP53	chr17:7577535	C	A	exonic	p.R249M	A	3.96
267	TN	PMF	ASXL1	chr20:31023239	G	GA	exonic	p.Q910Tfs*13	A	45.68
267	TN	PMF	EZH2	chr7:148512045	G	A	exonic	p.Q545X	A	49.28
267	TN	PMF	EZH2	chr7:148544274	C	A	exonic	p.K39N	C	52.8
267	TN	PMF	IKZF1	chr7:50468296	C	T	exonic	p.R511X	A	4.79
267	TN	PMF	KIT	chr4:55599321	A	T	exonic	p.D816V	A	48.34
267	TN	PMF	KMT2D	chr12:49420846	G	C	exonic	p.P4968R	C	53.49
267	TN	PMF	PTPN11	chr12:112888197	T	G	exonic	p.F71L	A	3.84
267	TN	PMF	U2AF1	chr21:44514777	T	G	exonic	p.Q157P	A	50.38
268	JAK2	SMF	ASXL1	chr20:31024758	C	T	exonic	p.R1415X	A	43.31
268	JAK2	SMF	ETV6	chr12:11992196	C	CT	exonic	p.L97Afs*14	A	46.86
268	JAK2	SMF	KMT2C	chr7:151970884	A	C	exonic	p.Y306X	A	5.46
268	JAK2	SMF	KMT2D	chr12:49444713	G	C	exonic	p.S918C	C	47.72
268	JAK2	SMF	SRSF2	chr17:74732959	G	A	exonic	p.P95L	A	47.56
270	JAK2	SMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	15.9
270	JAK2	SMF	ASXL1	chr20:31023372	C	CT	exonic	p.D954fs*	A	17.77
270	JAK2	SMF	CHEK2	chr22:29121241	C	T	exonic	p.R188Q	B	3.59
270	JAK2	SMF	SRSF2	chr17:74732506	G	T	exonic	p.R135S	B	2.79
270	JAK2	SMF	TP53	chr17:7577556	C	A	exonic	p.C242F	A	47.0
272	JAK2	PMF	SUZ12	chr17:30303624	A	C	exonic	p.D303A	B	36.9
273	CALR	PMF	PPM1D	chr17:58740836	C	T	exonic	p.R581X	A	8.94
273	CALR	PMF	ZRSR2	chrX:15822241	TA	T	exonic	p.K108Rfs*56	A	13.64
273	CALR	PMF	ZRSR2	chrX:15821853	AC	A	exonic	p.Q83Kfs*5	A	3.69
276	JAK2	PMF	SF3B1	chr2:198267359	C	A	exonic	p.K666N	A	27.5
278	JAK2	PMF	ZRSR2	chrX:15841142	A	T	exonic	p.K409I	C	97.36
279	JAK2	PMF	KMT2C	chr7:151970835	T	C	exonic	p.I323V	B	15.08
279	JAK2	PMF	ZRSR2	chrX:15841083	C	G	exonic	p.Y389X	A	89.22
280	JAK2	PMF	NFE2	chr12:54686469	G	A	exonic	p.R271X	A	4.4
280	JAK2	PMF	NOTCH1	chr9:139405720	G	A	exonic	p.A824V	C	48.77
285	JAK2	PMF	DNMT3A	chr2:25457242	C	T	exonic	p.R882H	A	40.56
287	CALR	PMF	ASXL1	chr20:31022440	G	GA	exonic	p.G643Rfs*13	A	30.36
291	JAK2	SMF						.		
293	CALR	PMF	TET2	chr4:106194051	G	A	exonic	p.A1505T	A	49.69
294	JAK2	PMF	ASXL2	chr2:25973210	TG	T	exonic	p.P405Qfs*17	A	38.72

294	JAK2	PMF	CSF3R	chr1:36933434	G	A	exonic	p.T618I	A	42.26
294	JAK2	PMF	TET2	chr4:106197285	T	C	exonic	p.I1873T	A	43.77
294	JAK2	PMF	TP53	chr17:7577120	C	T	exonic	p.R273H	A	35.45
294	JAK2	PMF	U2AF1	chr21:44514777	T	G	exonic	p.Q157P	A	45.8
295	JAK2	PMF	JAK2	chr9:5066713	G	A	exonic	p.G417D	C	47.9
295	JAK2	PMF	ASXL2	chr2:25967005	G	GT	exonic	p.T734Nfs*21	A	45.02
295	JAK2	PMF	SRSF2	chr17:74732951	AGTCCGGGGG	A	exonic	p.P95_D97del	B	43.27
295	JAK2	PMF	RUNX1	chr21:36253007	CCA	C	exonic	p.V118Gfs*18	A	38.2
296	JAK2	PMF						.		
303	JAK2	SMF	PAX5	chr9:37015093	C	T	exonic	p.R104H	C	99.33
303	JAK2	SMF	PHF6	chrX:133511745	T	TA	exonic	p.S34Ifs*1	A	100.3 7
303	JAK2	SMF	PPM1D	chr17:58740529	C	A	exonic	p.C478X	A	12.08
303	JAK2	SMF	TET2	chr4:106158484	G	GA	exonic	p.D1129Efs*12	A	49.92
304	JAK2	PMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	39.11
304	JAK2	PMF	ETNK1	chr12:22811995	A	G	exonic	p.N244S	A	9.97
304	JAK2	PMF	JAK2	chr9:5054840	T	C	exonic	p.W298R	B	7.98
304	JAK2	PMF	U2AF2	chr19:56173940	T	G	exonic	p.L187V	C	48.01
307	JAK2	PMF	ACD	chr16:67692043	C	T	exonic	p.R437H	C	51.61
307	JAK2	PMF	ASXL1	chr20:31022784	C	T	exonic	p.Q757X	A	11.93
307	JAK2	PMF	PTPN11	chr12:112940044	A	T	exonic	p.T566S	C	48.55
307	JAK2	PMF	SETBP1	chr18:42533266	C	T	exonic	p.R1321C	C	48.05
307	JAK2	PMF	SRSF2	chr17:74732959	G	T	exonic	p.P95H	A	34.85
308	JAK2	SMF	CHEK2	chr22:29121357	T	C	splicing	.	C	47.86
308	JAK2	SMF	CSF3R	chr1:36937083	G	C	exonic	p.N412K	C	46.93
308	JAK2	SMF	EED	chr11:85956280	G	T	exonic	p.E3D	C	53.1
309	JAK2	PMF	BCOR	chrX:39934126	C	CT	exonic	p.S158Kfs*27	A	13.89
309	JAK2	PMF	JAK2	chr9:5090448	C	T	exonic	p.R922W	B	39.87
309	JAK2	PMF	KMT2D	chr12:49426151	C	T	exonic	p.G4113R	C	47.22
309	JAK2	PMF	U2AF1	chr21:44524456	G	A	exonic	p.S34F	A	13.96
311	CALR	SMF	ASXL1	chr20:31021115	C	A	exonic	p.Q372K	C	49.8
311	CALR	SMF	CEBPA	chr19:33792851	GGCC	G	exonic	p.G151_R156delinsD	B	60.97
313	JAK2	PMF						.		
314	JAK2	PMF	BCOR	chrX:39933218	T	C	exonic	p.M461V	C	99.95
314	JAK2	PMF	KMT2C	chr7:151845223	G	A	exonic	p.R4597C	C	48.67
315	CALR	PMF	ASXL1	chr20:31022592	C	T	exonic	p.R693X	A	5.24

316	CALR	SMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	41.5
316	CALR	SMF	EZH2	chr7:148504778	A	G	exonic	p.L739P	B	2.9
316	CALR	SMF	EZH2	chr7:148543683	A	AACAT	exonic	p.F42Yfs*2	A	2.16
316	CALR	SMF	KMT2C	chr7:151879312	G	A	exonic	p.S1878L	C	51.99
317	JAK2	PMF	PDS5B	chr13:33247438	A	G	exonic	p.N264S	C	46.73
317	JAK2	PMF	SUZ12	chr17:30325741	A	ATAAT	exonic	p.K649Nfs*1	A	4.9
318	JAK2	PMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	33.26
318	JAK2	PMF	CUX1	chr7:101882758	C	T	exonic	p.R1272X	A	2.89
318	JAK2	PMF	KMT2B	chr19:36224055	T	G	exonic	p.V2202G	C	50.6
318	JAK2	PMF	U2AF1	chr21:44514777	T	G	exonic	p.Q157P	A	36.66
318	JAK2	PMF	ZBTB33	chrX:119388925	G	T	exonic	p.C552F	B	14.37
318	JAK2	PMF	ZRSR2	chrX:15833798	A	G	splicing	.	C	50.53
324	JAK2	PMF	JAK1	chr1:65332620	C	T	exonic	p.G307S	C	46.89
324	JAK2	PMF	TP53	chr17:7579717	G	A	exonic	p.P27S	B	32.75
325	JAK2	SMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	6.0
325	JAK2	SMF	SMC3	chr10:112362637	G	A	exonic	p.G1118R	B	33.53
325	JAK2	SMF	SUZ12	chr17:30323829	T	G	exonic	p.F603V	C	59.33
325	JAK2	SMF	TET2	chr4:106163995	G	A	exonic	p.G1169R	A	32.19
326	CALR	SMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	6.08
326	CALR	SMF	ASXL1	chr20:31022784	C	T	exonic	p.Q757X	A	2.58
326	CALR	SMF	CEBPA	chr19:33793293	C	T	exonic	p.E10K	C	41.28
326	CALR	SMF	NFE2	chr12:54686919	G	A	exonic	p.Q121X	A	50.05
328	JAK2	SMF	ASXL1	chr20:31022385	G	GT	exonic	p.R625Pfs*9	A	42.72
328	JAK2	SMF	ATM	chr11:108170491	A	G	exonic	p.I1686V	C	47.96
328	JAK2	SMF	DNMT3A	chr2:25464554	C	G	exonic	p.L653F	A	9.27
329	CALR	SMF	DNMT3A	chr2:25457242	C	T	exonic	p.R882H	A	47.6
329	CALR	SMF	SH2B3	chr12:111855977	T	TCGCCCTCTTCCG	exonic	p.S16_A17insSAPS	C	39.35
330	MPL	SMF	TET2	chr4:106164895	T	TA	exonic	p.Y1255fs*	A	16.93
330	MPL	SMF	TP53	chr17:7577094	G	A	exonic	p.R282W	A	2.56
331	JAK2	SMF	CSF3R	chr1:36941169	G	A	exonic	p.P57L	C	48.28
331	JAK2	SMF	TET2	chr4:106197282	T	G	exonic	p.L1872R	A	5.11
333	JAK2	PMF	ASXL1	chr20:31021236	C	CT	exonic	p.R413Sfs*24	A	50.02
333	JAK2	PMF	MPL	chr1:43818334	G	A	exonic	p.G600E	B	98.24
333	JAK2	PMF	NF1	chr17:29679283	A	G	exonic	p.K2489R	C	48.53
333	JAK2	PMF	SRSF2	chr17:74732959	G	T	exonic	p.P95H	A	53.62
333	JAK2	PMF	TET2	chr4:106157384	A	AC	exonic	p.Q764Pfs*4	A	49.76

334	CALR	PMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	31.64
334	CALR	PMF	CUX1	chr7:101891892	G	A	exonic	p.R1374Q	C	48.73
335	JAK2	PMF	ASXL1	chr20:31021268	AAT	A	exonic	p.N423Tfs*13	A	42.49
335	JAK2	PMF	SRSF2	chr17:74732959	G	T	exonic	p.P95H	A	47.34
335	JAK2	PMF	TET2	chr4:106190783	GA	G	exonic	p.A1355Hfs*7	A	40.33
336	JAK2	SMF	JAK2	chr9:5064902	T	C	exonic	p.L359S	B	88.22
339	JAK2	SMF	ASXL2	chr2:25966049	G	GGT	exonic	p.Q1053Tfs*6	A	18.92
339	JAK2	SMF	DNMT3A	chr2:25467474	C	A	exonic	p.Q534H	B	13.76
339	JAK2	SMF	NF1	chr17:29508438	A	C	splicing	.	B	2.76
339	JAK2	SMF	PPM1D	chr17:58740374	TG	T	exonic	p.W427Cfs*3	A	29.11
339	JAK2	SMF	PPM1D	chr17:58740375	G	A	exonic	p.W427X	A	18.62
339	JAK2	SMF	SUZ12	chr17:30264453	C	T	exonic	p.A63V	B	34.6
342	JAK2	SMF	SF3B1	chr2:198267359	C	G	exonic	p.K666N	A	47.5
342	JAK2	SMF	TET2	chr4:106190824	T	TTCTCAGGGGTCACTG	exonic	p.T1372_A1373insVSGVT	B	20.04
342	JAK2	SMF	TET2	chr4:106190842	T	TGTTTGGACTTCTGTGCTC	exonic	p.A1379_H1380insRLDFCA	B	13.4
343	CALR	PMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	32.09
343	CALR	PMF	EED	chr11:85979560	A	C	exonic	p.Y308S	B	2.43
343	CALR	PMF	KMT2C	chr7:151917799	T	C	exonic	p.Q1174R	C	46.67
343	CALR	PMF	TET2	chr4:106197245	G	T	exonic	p.G1860W	B	5.88
344	JAK2	SMF	ASXL1	chr20:31023076	C	CT	exonic	p.D855fs*	A	16.87
344	JAK2	SMF	GATA2	chr3:128204842	C	T	exonic	p.G200D	C	47.89
345	JAK2	SMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	32.99
345	JAK2	SMF	KRAS	chr12:25398281	C	T	exonic	p.G13D	A	12.98
345	JAK2	SMF	PHF6	chrX:133527636	C	T	exonic	p.R116X	A	23.72
345	JAK2	SMF	PHF6	chrX:133511668	G	GA	exonic	p.G10Rfs*11	A	3.6
345	JAK2	SMF	ZRSR2	chrX:15836766	G	C	splicing	.	B	22.91
346	JAK2	PMF	SRP72	chr4:57333826	G	C	exonic	p.V9L	C	48.92
346	JAK2	PMF	TET2	chr4:106157215	C	A	exonic	p.Q706K	C	51.27
346	JAK2	PMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	34.58
347	JAK2	SMF	ASXL1	chr20:31022839	T	A	exonic	p.L775X	A	48.86
347	JAK2	SMF	EZH2	chr7:148544291	G	A	exonic	p.R34X	A	89.94
347	JAK2	SMF	EZH2	chr7:148526858	A	C	exonic	p.L149R	B	4.35
347	JAK2	SMF	PHF6	chrX:133549044	AGTT	A	exonic	p.L244Vfs*19	A	92.4
348	JAK2	PMF	ASXL1	chr20:31021642	CTTTCG	C	exonic	p.F548fs*	A	40.3
348	JAK2	PMF	ETV6	chr12:12037471	T	C	exonic	p.F368L	B	2.27

348	JAK2	PMF	SRSF2	chr17:74732959	G	T	exonic	p.P95H	A	46.67
348	JAK2	PMF	TET2	chr4:106196819	G	T	exonic	p.V1718L	A	47.04
349	JAK2	SMF	CBL	chr11:119170387	G	C	exonic	p.D873H	C	47.01
349	JAK2	SMF	TET2	chr4:106162517	A	C	exonic	p.E1144A	A	27.78
350	TN	SMF						.		
352	CALR	PMF	ASXL1	chr20:31023717	C	T	exonic	p.R1068X	A	36.4
352	CALR	PMF	KMT2C	chr7:151945604	C	A	exonic	p.G639C	A	45.02
352	CALR	PMF	TET2	chr4:106156478	C	T	exonic	p.S460F	A	45.59
354	CALR	SMF	ATM	chr11:108165679	G	A	exonic	p.S1601N	C	47.57
354	CALR	SMF	ATM	chr11:108196263	A	G	exonic	p.N2267D	B	2.14
354	CALR	SMF	BCL11A	chr2:60688260	C	T	exonic	p.R596H	C	48.87
354	CALR	SMF	BCORL1	chrX:129162789	C	T	exonic	p.R1420X	A	85.48
354	CALR	SMF	TET2	chr4:106190860	C	T	exonic	p.H1380Y	A	48.76
354	CALR	SMF	TET2	chr4:106157025	G	GT	exonic	p.S643Ffs*37	A	4.04
356	CALR	SMF	ASXL1	chr20:31023489	CTGAGTCCTCACGG	C	exonic	p.H995Rfs*24	A	38.77
356	CALR	SMF	CBL	chr11:119149002	T	G	exonic	p.W408G	A	35.15
356	CALR	SMF	EZH2	chr7:148529764	T	TA	exonic	p.I109Yfs*16	A	49.04
356	CALR	SMF	TP53	chr17:7576928	T	A	splicing	.	A	98.18
357	JAK2	SMF	TET2	chr4:106157017	C	T	exonic	p.Q640X	A	38.47
357	JAK2	SMF	TET2	chr4:106157181	T	TA	exonic	p.M695Nfs*16	A	2.47
357	JAK2	SMF	TET2	chr4:106164778	C	T	exonic	p.R1216X	A	4.71
358	JAK2	SMF	KMT2B	chr19:36216691	C	T	exonic	p.T1286I	C	43.33
358	JAK2	SMF	RUNX1	chr21:36421141	C	T	exonic	p.R19K	A	46.05
358	JAK2	SMF	TET2	chr4:106196819	G	T	exonic	p.V1718L	A	49.01
360	JAK2	SMF	ASXL1	chr20:31022485	A	AGGGAGGT	exonic	p.G662Wfs*7	A	13.75
360	JAK2	SMF	ASXL1	chr20:31022981	AT	A	exonic	p.L823fs*	A	6.25
360	JAK2	SMF	DNMT3A	chr2:25457289	CC	AG	exonic	p.R866S	B	35.54
361	JAK2	SMF	SRSF2	chr17:74732959	G	T	exonic	p.P95H	A	45.02
361	JAK2	SMF	TP53	chr17:7577538	C	T	exonic	p.R248Q	A	37.25
361	JAK2	SMF	ZBTB33	chrX:119388758	T	G	exonic	p.C496W	B	86.42
363	JAK2	SMF	DNMT3A	chr2:25467121	AT	A	exonic	p.M585Cfs*65	A	12.91
363	JAK2	SMF	IDH1	chr2:209116208	C	T	exonic	p.W23X	A	51.13
364	CALR	PMF						.		
365	CALR	PMF	DNMT3A	chr2:25505372	G	A	exonic	p.S129L	C	49.46
368	JAK2	PMF						.		
369	JAK2	PMF	CBL	chr11:119148891	T	C	exonic	p.Y371H	A	90.27

369	JAK2	PMF	CBL	chr11:119144697	C	G	exonic	p.S237W	B	2.39
369	JAK2	PMF	NOTCH1	chr9:139405665	CCCG	C	exonic	p.G842del	C	46.75
369	JAK2	PMF	U2AF1	chr21:44514777	T	C	exonic	p.Q157R	A	47.76
380	JAK2	SMF	ASXL1	chr20:31022385	G	GT	exonic	p.R625Pfs*9	A	17.46
380	JAK2	SMF	ASXL1	chr20:31022796	G	GC	exonic	p.P763Afs*10	A	24.25
380	JAK2	SMF	ASXL1	chr20:31022674	A	AACCTG	exonic	p.D720Efs*6	A	2.27
380	JAK2	SMF	ASXL1	chr20:31022898	TC	T	exonic	p.W796Gfs*21	A	2.12
380	JAK2	SMF	ASXL1	chr20:31022960	G	GT	exonic	p.S816Ffs*4	A	2.36
380	JAK2	SMF	ASXL1	chr20:31023122	TG	T	exonic	p.G870Afs*5	A	2.39
380	JAK2	SMF	ASXL1	chr20:31023399	G	GTGCC	exonic	p.S964Afs*6	A	2.02
380	JAK2	SMF	ASXL1	chr20:31023643	TG	T	exonic	p.S1044Pfs*1	A	2.84
380	JAK2	SMF	PPM1D	chr17:58740536	GC	G	exonic	p.L482fs*	A	18.13
381	TN	PMF	BCOR	chrX:39921390	A	C	splicing	.	B	94.77
381	TN	PMF	BCORL1	chrX:129154981	C	A	exonic	p.P1155T	C	100.0
381	TN	PMF	IDH2	chr15:90631934	C	T	exonic	p.R140Q	A	43.81
381	TN	PMF	SRSF2	chr17:74732959	G	C	exonic	p.P95R	A	51.02
382	MPL	PMF	IDH1	chr2:209113112	C	T	exonic	p.R132H	A	41.67
382	MPL	PMF	KMT2C	chr7:151873980	CA	C	exonic	p.C2853Afs*9	A	37.86
382	MPL	PMF	MPL	chr1:43805735	C	T	exonic	p.S264F	B	72.5
382	MPL	PMF	SRSF2	chr17:74732935	CGGCGGCTGTGGTGTGAGTCCGGG G	C	exonic	p.P95_R102del	A	30.19
383	JAK2	PMF						.		
385	JAK2	SMF	ASXL1	chr20:31023476	AGACTC	A	exonic	p.D988fs*	A	4.78
385	JAK2	SMF	KIT	chr4:55569975	G	A	exonic	p.R281K	C	42.89
385	JAK2	SMF	NFE2	chr12:54686793	T	TC	exonic	p.T163Dfs*37	A	2.54
385	JAK2	SMF	SRP72	chr4:57340269	T	G	exonic	p.L135R	C	48.22
385	JAK2	SMF	TET2	chr4:106182914	A	G	splicing	.	A	25.55
386	MPL	PMF						.		
387	JAK2	PMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	18.28
387	JAK2	PMF	CTCF	chr16:67650714	ATCG	A	exonic	p.R342del	B	22.22
387	JAK2	PMF	JAK2	chr9:5090745	G	A	exonic	p.E965K	C	48.23
387	JAK2	PMF	RUNX1	chr21:36252925	T	C	exonic	p.N146S	B	27.11
387	JAK2	PMF	U2AF1	chr21:44514777	T	G	exonic	p.Q157P	A	25.63
390	TN	PMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	36.79
390	TN	PMF	ETV6	chr12:12037394	G	A	exonic	p.W342X	A	45.41
390	TN	PMF	PHF6	chrX:133549112	A	G	exonic	p.K266E	B	91.85

390	TN	PMF	U2AF1	chr21:44514777	T	G	exonic	p.Q157P	A	43.66
390	TN	PMF	ZBTB33	chrX:119387488	T	G	exonic	p.I73R	B	87.37
396	JAK2	SMF	DNMT3A	chr2:25462067	AATCATCACAGGGTTGG	ATGTGA	exonic	p.p.N776Tfs*5	A	7.29
396	JAK2	SMF	DNMT3A	chr2:25470581	C	T	exonic	p.G298E	A	3.03
396	JAK2	SMF	KMT2C	chr7:151880204	T	C	exonic	p.N1707S	C	49.88
396	JAK2	SMF	KMT2D	chr12:49432300	G	T	exonic	p.H2947N	C	48.51
396	JAK2	SMF	NFE2	chr12:54686494	GCTCT	G	exonic	p.E261Afs*2	A	2.14
396	JAK2	SMF	TET2	chr4:106197207	G	A	exonic	p.W1847X	A	14.13
397	CALR	SMF	STAG2	chrX:123189982	A	G	exonic	p.S401G	C	40.63
399	JAK2	SMF	SF3B1	chr2:198267359	C	G	exonic	p.K666N	A	48.14
400	JAK2	SMF	TET2	chr4:106196291	C	T	exonic	p.Q1542X	A	42.36
400	JAK2	SMF	NFE2	chr12:54686463	G	A	exonic	p.R273W	C	43.49
401	JAK2	PMF	BCOR	chrX:39921390	A	T	splicing	.	B	74.53
401	JAK2	PMF	CUX1	chr7:101747635	T	TA	exonic	p.E155Rfs*6	A	6.2
401	JAK2	PMF	GNAS	chr20:57484421	G	A	exonic	p.R844H	A	24.2
401	JAK2	PMF	PDS5B	chr13:33261421	C	T	exonic	p.R452X	A	25.43
402	CALR	PMF						.		
404	JAK2	PMF	FBXW7	chr4:153249379	T	C	exonic	p.M467V	B	9.9
404	JAK2	PMF	NFE2	chr12:54686516	GC	G	exonic	p.A255Qfs*4	A	16.99
404	JAK2	PMF	SF3B1	chr2:198266834	T	C	exonic	p.K700E	A	35.81
404	JAK2	PMF	TET2	chr4:106157896	C	T	exonic	p.Q933X	A	20.24
405	JAK2	PMF	ASXL2	chr2:25966018	T	C	exonic	p.Q1063R	C	44.29
405	JAK2	PMF	SH2B3	chr12:111885286	C	T	exonic	p.R392W	A	49.69
405	JAK2	PMF	TET2	chr4:106156441	G	T	exonic	p.E448X	A	5.53
405	JAK2	PMF	TET2	chr4:106193849	G	GA	exonic	p.R1440Tfs*37	A	6.46
406	JAK2	SMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	39.67
406	JAK2	SMF	PAX5	chr9:37020726	C	T	exonic	p.R40K	C	54.17
406	JAK2	SMF	U2AF1	chr21:44514777	T	C	exonic	p.Q157R	A	41.73
407	JAK2	PMF	ASXL1	chr20:31023108	G	T	exonic	p.E865X	A	48.01
407	JAK2	PMF	CBL	chr11:119148875	G	C	splicing	.	A	27.26
407	JAK2	PMF	EZH2	chr7:148515005	CTTCT	C	exonic	p.E401Kfs*21	A	89.07
407	JAK2	PMF	PHF6	chrX:133547986	A	G	exonic	p.Y240C	A	2.76
407	JAK2	PMF	PTPN11	chr12:112888190	A	T	exonic	p.E69V	A	9.0
407	JAK2	PMF	PTPN11	chr12:112926887	G	A	exonic	p.G503R	A	7.9
407	JAK2	PMF	RUNX1	chr21:36164825	T	TG	exonic	p.G351Rfs*248	A	6.02
407	JAK2	PMF	TET2	chr4:106190866	C	T	exonic	p.H1382Y	A	46.01

407	JAK2	PMF	TET2	chr4:106158412	A	AT	exonic	p.E1106Rfs*22	A	2.86
407	JAK2	PMF	ZRSR2	chrX:15836766	G	A	splicing	.	B	89.95
409	JAK2	SMF	CUX1	chr7:101813732	G	A	exonic	p.E255K	C	40.2
409	JAK2	SMF	U2AF1	chr21:44514777	T	G	exonic	p.Q157P	A	39.7
409	JAK2	SMF	SH2B3	chr12:111855922	G	T	splicing	.	B	38.53
409	JAK2	SMF	SH2B3	chr12:111885473	C	A	exonic	p.S417X	A	38.15
409	JAK2	SMF	ASXL1	chr20:31022263	G	A	exonic	p.W583X	A	36.09
409	JAK2	SMF	TET2	chr4:106196384	CCCAATCCAGTTAGTCCTTAT	C	exonic	p.N1574Kfs*32	A	28.38
409	JAK2	SMF	MPL	chr1:43818414	C	G	exonic	p.L627V	B	14.4
412	JAK2	PMF	DNMT3A	chr2:25466772	G	GC	exonic	p.A644Gfs*22	A	2.2
414	CALR	PMF	CHEK2	chr22:29107938	T	A	exonic	p.I294F	C	46.87
414	CALR	PMF	ASXL1	chr20:31023144	GAA	G	exonic	p.S878fs*	A	2.68
417	JAK2	PMF	ASXL1	chr20:31022414	T	TA	exonic	p.R634Kfs*22	A	13.19
417	JAK2	PMF	ASXL1	chr20:31022853	C	T	exonic	p.Q780X	A	4.88
417	JAK2	PMF	ATM	chr11:108163438	A	G	exonic	p.K1510R	C	54.63
417	JAK2	PMF	IDH1	chr2:209113112	C	T	exonic	p.R132H	A	15.08
417	JAK2	PMF	PTPN11	chr12:112915818	A	G	exonic	p.K364R	C	55.16
417	JAK2	PMF	TET2	chr4:106156150	G	T	exonic	p.E351X	A	3.17
417	JAK2	PMF	TET2	chr4:106197285	T	C	exonic	p.I1873T	A	2.85
421	JAK2	SMF	ASXL1	chr20:31022415	A	T	exonic	p.R634X	A	45.58
421	JAK2	SMF	ATM	chr11:108170491	A	G	exonic	p.I1686V	C	52.21
421	JAK2	SMF	ETNK1	chr12:22811995	A	T	exonic	p.N244I	B	36.94
421	JAK2	SMF	TET2	chr4:106164778	C	T	exonic	p.R1216X	A	2.2
425	JAK2	PMF	KMT2C	chr7:151949698	G	C	exonic	p.P468A	C	43.13
425	JAK2	PMF	NFE2	chr12:54686494	GCTCT	G	exonic	p.E261Afs*2	A	19.41
426	JAK2	PMF	ASXL1	chr20:31022801	GC	G	exonic	p.L764Yfs*7	A	43.93
426	JAK2	PMF	ETV6	chr12:12038950	C	CTT	exonic	p.L416Ffs*5	A	40.0
426	JAK2	PMF	EZH2	chr7:148526821	TC	T	exonic	p.R161Kfs*5	A	38.88
426	JAK2	PMF	NRAS	chr1:115256532	C	T	exonic	p.G60E	A	43.99
426	JAK2	PMF	DOT1L	chr19:2213960	C	T	exonic	p.A591V	C	47.97
428	JAK2	SMF	ASXL1	chr20:31022385	G	GT	exonic	p.R625Pfs*9	A	3.09
428	JAK2	SMF	KMT2B	chr19:36209047	G	C	exonic	p.V43L	C	48.54
428	JAK2	SMF	NFE2	chr12:54686736	AGGGGTACTCCACT	A	exonic	p.V178Tfs*23	A	2.69
428	JAK2	SMF	ZRSR2	chrX:15833974	G	GC	exonic	p.E246Rfs*42	A	2.37
429	JAK2	SMF	SF3B1	chr2:198267491	C	G	exonic	p.E622D	A	16.07
431	JAK2	PMF	ASXL1	chr20:31022277	C	T	exonic	p.Q588X	A	38.26

431	JAK2	PMF	ETV6	chr12:11992163	A	AC	exonic	p.N85Tfs*3	A	46.61
431	JAK2	PMF	GATA2	chr3:128200118	CGAGTCT	C	exonic	p.Q394_T395del	C	38.73
431	JAK2	PMF	SRSF2	chr17:74732959	G	C	exonic	p.P95R	A	49.16
435	JAK2	PMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	28.42
435	JAK2	PMF	CBL	chr11:119149251	G	T	exonic	p.R420L	A	62.76
435	JAK2	PMF	CBL	chr11:119142443	A	G	splicing	.	B	3.94
435	JAK2	PMF	GATA2	chr3:128200031	G	A	exonic	p.S425L	C	49.31
435	JAK2	PMF	TET2	chr4:106157345	AAATAAAG	A	exonic	p.N752Rfs*57	A	40.81
435	JAK2	PMF	U2AF1	chr21:44514777	T	G	exonic	p.Q157P	A	36.48
445	JAK2	SMF	ASXL1	chr20:31022402	TCACCACTGCCATAGAGAGGCGGC	T	exonic	p.E635Rfs*15	A	5.68
445	JAK2	SMF	ASXL1	chr20:31022969	G	GT	exonic	p.G819Wfs*1	A	4.75
445	JAK2	SMF	CHEK2	chr22:29092892	T	C	exonic	p.I407M	B	2.12
445	JAK2	SMF	KMT2D	chr12:49418493	T	C	splicing	.	B	16.49
445	JAK2	SMF	PPM1D	chr17:58740374	TG	T	exonic	p.W427Cfs*3	A	17.67
445	JAK2	SMF	SF3B1	chr2:198267373	G	C	exonic	p.H662D	A	15.08
445	JAK2	SMF	SH2B3	chr12:111885204	G	T	exonic	p.W364C	B	2.12
445	JAK2	SMF	TP53	chr17:7577535	C	A	exonic	p.R249M	A	35.07
447	JAK2	SMF	TET2	chr4:106193892	C	T	exonic	p.R1452X	A	48.43
447	JAK2	SMF	TP53	chr17:7577580	T	C	exonic	p.Y234C	A	36.48
447	JAK2	SMF	TP53	chr17:7579316	C	CA	exonic	p.C124Lfs*24	A	30.99
447	JAK2	SMF	TP53	chr17:7578394	T	C	exonic	p.H179R	A	5.13
447	JAK2	SMF	TP53	chr17:7579592	T	A	splicing	.	A	5.38
458	JAK2	PMF	KIT	chr4:55599321	AC	TA	exonic	p.D816V	A	2.27
458	JAK2	PMF	KMT2B	chr19:36212413	C	T	exonic	p.H722Y	C	51.5
458	JAK2	PMF	SF3B1	chr2:198267359	C	A	exonic	p.K666N	A	45.53
458	JAK2	PMF	SRSF2	chr17:74732959	G	T	exonic	p.P95H	A	49.15
461	JAK2	PMF	ASXL1	chr20:31021535	C	T	exonic	p.Q512X	A	41.45
461	JAK2	PMF	EZH2	chr7:148506219	T	C	exonic	p.I713M	B	83.03
462	JAK2	PMF	ASXL1	chr20:31024766	AGG	A	exonic	p.G1418Efs*4	A	38.63
462	JAK2	PMF	NOTCH1	chr9:139413934	C	T	exonic	p.V276M	C	47.93
462	JAK2	PMF	RAD21	chr8:117878925	G	T	exonic	p.A15D	C	41.4
462	JAK2	PMF	SF3B1	chr2:198266834	T	C	exonic	p.K700E	A	46.0
462	JAK2	PMF	TET2	chr4:106156454	A	C	exonic	p.E452A	C	52.46
466	CALR	PMF	ASXL1	chr20:31022592	C	T	exonic	p.R693X	A	30.65
466	CALR	PMF	KMT2D	chr12:49433769	C	A	exonic	p.G2595V	C	47.39
466	CALR	PMF	STAG1	chr3:136349733	G	C	exonic	p.T3S	B	34.44

466	CALR	PMF	U2AF1	chr21:44514777	T	C	exonic	p.Q157R	A	41.31
468	JAK2	SMF	ETV6	chr12:12037475	G	A	exonic	p.R369Q	A	18.55
468	JAK2	SMF	NF1	chr17:29588863	A	T	exonic	p.E1571V	B	37.59
468	JAK2	SMF	SRSF2	chr17:74733191	C	G	exonic	p.V18L	B	39.82
468	JAK2	SMF	U2AF1	chr21:44514777	T	C	exonic	p.Q157R	A	35.41
469	JAK2	SMF	ATM	chr11:108218030	A	G	exonic	p.D2870G	B	31.66
470	TN	PMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	40.86
470	TN	PMF	CBL	chr11:119148982	G	A	exonic	p.C401Y	A	11.42
470	TN	PMF	NRAS	chr1:115258744	C	A	exonic	p.G13V	A	3.26
470	TN	PMF	SETBP1	chr18:42531917	T	C	exonic	p.I871T	A	48.19
470	TN	PMF	SRSF2	chr17:74732959	G	T	exonic	p.P95H	A	50.17
472	DM	SMF	ASXL1	chr20:31022638	A	AGGCC	exonic	p.T711Rfs*7	A	44.74
472	DM	SMF	IDH2	chr15:90631934	C	T	exonic	p.R140Q	A	40.8
472	DM	SMF	KRAS	chr12:25378561	G	A	exonic	p.A146V	A	3.04
472	DM	SMF	SRSF2	chr17:74732959	G	T	exonic	p.P95H	A	47.38
473	DM	PMF	NF1	chr17:29676224	T	G	exonic	p.C2426G	C	51.11
473	DM	PMF	SF3B1	chr2:198267359	C	A	exonic	p.K666N	A	48.87
476	JAK2	PMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	6.73
476	JAK2	PMF	ASXL1	chr20:31023408	C	T	exonic	p.R965X	A	5.01
476	JAK2	PMF	RUNX1	chr21:36231782	C	T	exonic	p.R201Q	A	17.34
476	JAK2	PMF	RUNX1	chr21:36231774	G	A	exonic	p.R204X	A	4.36
476	JAK2	PMF	SRSF2	chr17:74732959	G	C	exonic	p.P95R	A	44.34
477	CALR	PMF						.		
478	JAK2	PMF	ASXL1	chr20:31023408	C	T	exonic	p.R965X	A	32.93
478	JAK2	PMF	CBL	chr11:119149297	TC	T	exonic	p.P436Lfs*7	A	33.24
479	JAK2	PMF	ASXL1	chr20:31023717	C	T	exonic	p.R1068X	A	12.61
479	JAK2	PMF	CBL	chr11:119148991	G	A	exonic	p.C404Y	A	30.34
479	JAK2	PMF	CUX1	chr7:101821924	AC	A	exonic	p.N346Kfs*19	A	81.63
479	JAK2	PMF	SRSF2	chr17:74732959	G	A	exonic	p.P95L	A	40.97
479	JAK2	PMF	TET2	chr4:106156963	C	T	exonic	p.Q622X	A	44.7
479	JAK2	PMF	TET2	chr4:106157053	C	T	exonic	p.Q652X	A	39.8
480	JAK2	PMF	ATM	chr11:108126966	C	T	exonic	p.R717W	C	45.63
480	JAK2	PMF	KMT2D	chr12:49425214	G	A	exonic	p.A4425V	C	46.82
481	CALR	PMF	BCOR	chrX:39937172	G	T	exonic	p.A4E	C	46.72
481	CALR	PMF	SF3B1	chr2:198267369	G	A	exonic	p.T663I	A	43.03
482	TN	PMF						.		

483	JAK2	SMF	CHEK2	chr22:29107953	C	G	exonic	p.V289L	C	49.54
484	JAK2	PMF	ASXL1	chr20:31022402	TCACCACTGCCATAGAGAGGCGGC	T	exonic	p.E635Rfs*15	A	2.13
484	JAK2	PMF	DOT1L	chr19:2222310	A	C	exonic	p.T1048P	C	49.82
484	JAK2	PMF	SF3B1	chr2:198266834	T	C	exonic	p.K700E	A	40.83
485	TN	PMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	42.54
485	TN	PMF	ATRX	chrX:76937603	T	C	exonic	p.I1049V	C	53.5
485	TN	PMF	GNAS	chr20:57484421	G	A	exonic	p.R844H	A	45.77
485	TN	PMF	NF1	chr17:29585419	C	T	exonic	p.L1411F	B	6.31
485	TN	PMF	NRAS	chr1:115258747	C	T	exonic	p.G12D	A	2.27
485	TN	PMF	PTPN11	chr12:112888165	G	C	exonic	p.D61H	A	2.58
485	TN	PMF	SETBP1	chr18:42531913	G	A	exonic	p.G870S	A	52.41
485	TN	PMF	SRSF2	chr17:74732959	G	T	exonic	p.P95H	A	44.06
485	TN	PMF	TET2	chr4:106157380	C	CTTTT	exonic	p.P761Lfs*8	A	5.13
486	JAK2	PMF	TET2	chr4:106157008	G	A	exonic	p.E637K	C	43.86
487	JAK2	SMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	33.03
487	JAK2	SMF	ZBTB33	chrX:119389013	AAAG	A	exonic	p.K582_583delinsF	C	42.01
488	JAK2	SMF	ASXL1	chr20:31022487	G	T	exonic	p.G658X	A	13.5
488	JAK2	SMF	ASXL1	chr20:31024110	G	A	exonic	p.A1199T	C	47.29
489	JAK2	PMF	NRAS	chr1:115258745	C	A	exonic	p.G13C	A	31.71
489	JAK2	PMF	MAD1L1	chr7:1976371	C	T	exonic	p.D587N	C	51.52
489	JAK2	PMF	EZH2	chr7:148511085	C	A	exonic	p.C606F	B	99.67
489	JAK2	PMF	SETBP1	chr18:42531907	G	A	exonic	p.D868N	A	35.57
489	JAK2	PMF	ASXL1	chr20:31022234	G	T	splicing	.	C	43.45
489	JAK2	PMF	SETBP1	chr18:42531917	T	C	exonic	p.I871T	A	5.66
491	JAK2	PMF	ASXL1	chr20:31022402	TCACCACTGCCATAGAGAGGCGGC	T	exonic	p.E635Rfs*15	A	26.17
491	JAK2	PMF	ATM	chr11:108150304	A	T	exonic	p.Y1124F	C	59.16
491	JAK2	PMF	CUX1	chr7:101891949	GC	G	exonic	p.P1394Rfs*101	A	27.1
491	JAK2	PMF	SRSF2	chr17:74732959	G	T	exonic	p.P95H	A	44.21
492	JAK2	SMF	NFE2	chr12:54686494	GCTCT	G	exonic	p.E261Afs*2	A	30.91
492	JAK2	SMF	PPM1D	chr17:58740518	G	T	exonic	p.E475X	A	2.33
493	JAK2	PMF	CBL	chr11:119156182	AC	A	exonic	p.R617Gfs*30	A	52.54
494	TN	PMF	DOT1L	chr19:2220147	C	T	exonic	p.S911L	C	49.33
495	TN	PMF	BCOR	chrX:39921457	T	A	exonic	p.R1455X	A	14.35
495	TN	PMF	MPL	chr1:43814964	T	TCCTTGGTGAC	exonic	p.V501Lfs*45	A	31.37
495	TN	PMF	SETBP1	chr18:42456684	A	G	exonic	p.H232R‡	B	4.5
496	JAK2	PMF	KRAS	chr12:25378561	G	A	exonic	p.A146V	A	2.25

497	JAK2	PMF	SF3B1	chr2:198267360	T	G	exonic	p.K666T	A	36.07
497	JAK2	PMF	KDM6A	chrX:44911026	G	T	exonic	p.A243S	C	100.0
498	CALR	PMF	SETBP1	chr18:42532832	G	A	exonic	p.G1176D	C	47.56
498	CALR	PMF	SRSF2	chr17:74732959	G	A	exonic	p.P95L	A	40.03
498	CALR	PMF	TET2	chr4:106157152	C	T	exonic	p.Q685X	A	39.1
499	CALR	SMF	ASXL1	chr20:31023217	TC	T	exonic	p.P902Hfs*4	A	44.27
499	CALR	SMF	NRAS	chr1:115258747	C	T	exonic	p.G12D	A	4.79
499	CALR	SMF	TET2	chr4:106158051	AC	A	exonic	p.P985Lfs*21	A	62.65
499	CALR	SMF	ABL1	chr9:133760618	G	A	exonic	p.V1000I	C	46.45
499	CALR	SMF	ASXL2	chr2:25965152	T	C	exonic	p.S1352G	C	48.02
500	JAK2	SMF	ASXL1	chr20:31022402	TCACCACTGCCATAGAGAGGCGGC	T	exonic	p.E635Rfs*15	A	20.17
500	JAK2	SMF	CHEK2	chr22:29092930	T	C	exonic	p.N395D	B	2.3
500	JAK2	SMF	KMT2A	chr11:118344614	G	C	exonic	p.E914Q	C	46.23
500	JAK2	SMF	TP53	chr17:7578281	G	T	exonic	p.P190T	A	3.15
501	CALR	PMF	ASXL1	chr20:31023573	G	T	exonic	p.E1020X	A	3.21
502	JAK2	SMF	NFE2	chr12:54686367	G	A	exonic	p.R305W	C	39.75
502	JAK2	SMF	SUZ12	chr17:30320955	GAACTGCCGCAAACTTT	G	exonic	p.N456Ifs*26	A	14.56
504	JAK2	PMF	ASXL1	chr20:31022745	G	T	exonic	p.G744X	A	39.08
504	JAK2	PMF	KMT2D	chr12:49446482	G	A	exonic	p.P375S	C	52.66
504	JAK2	PMF	SUZ12	chr17:30302673	C	G	exonic	p.T255S	C	48.14
504	JAK2	PMF	TET2	chr4:106158401	T	TCAATAATTTTATAGAGTCACCTTCC AAATTA	exonic	p.L1112Qfs*1	A	19.44
504	JAK2	PMF	U2AF1	chr21:44524456	G	A	exonic	p.S34F	A	37.46
506	CALR	SMF	KMT2C	chr7:151859375	C	G	exonic	p.A3763P	C	48.76
506	CALR	SMF	KMT2C	chr7:152132852	T	C	exonic	p.K7R	C	53.02
506	CALR	SMF	NOTCH1	chr9:139401831	T	C	exonic	p.H1190R	C	47.39
506	CALR	SMF	SETBP1	chr18:42531659	G	A	exonic	p.G785E	C	45.71
506	CALR	SMF	SH2B3	chr12:111884555	A	C	splicing	.	B	76.09
506	CALR	SMF	TET2	chr4:106197086	G	A	exonic	p.D1807N	C	53.41
507	JAK2	PMF	TET2	chr4:106196328	CAG	C	exonic	p.E1555Vfs*21	A	27.04
507	JAK2	PMF	TET2	chr4:106196726	C	T	exonic	p.Q1687X	A	3.69
507	JAK2	PMF	TET2	chr4:106164752	A	C	exonic	p.E1207A	B	3.88
509	JAK2	SMF	SH2B3	chr12:111885228	G	GA	exonic	p.A374Sfs*10	A	95.8
509	JAK2	SMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	36.96
513	MPL	PMF	ATM	chr11:108099943	T	G	exonic	p.L75R	C	47.71
513	MPL	PMF	MPL	chr1:43814979	G	A	exonic	p.S505N	A	2.0

513	MPL	PMF	SRSF2	chr17:74732959	G	C	exonic	p.P95R	A	43.25
513	MPL	PMF	STAG2	chrX:123229240	C	T	exonic	p.R1242X	A	4.1
513	MPL	PMF	ZBTB33	chrX:119388834	T	G	exonic	p.Y522D	B	2.46
516	JAK2	PMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	36.58
516	JAK2	PMF	SRSF2	chr17:74732959	G	T	exonic	p.P95H	A	45.09
518	JAK2	PMF	ASXL1	chr20:31022402	TCACCACTGCCATAGAGAGGCGGC	T	exonic	p.E635Rfs*15	A	16.69
518	JAK2	PMF	CSF3R	chr1:36945058	G	C	exonic	p.L14V	C	41.84
518	JAK2	PMF	ETNK1	chr12:22811995	A	G	exonic	p.N244S	A	24.17
518	JAK2	PMF	KMT2D	chr12:49434225	C	T	exonic	p.R2443H	C	50.38
518	JAK2	PMF	PHF6	chrX:133511786	G	GT	splicing	.	B	6.72
518	JAK2	PMF	TP53	chr17:7577538	C	T	exonic	p.R248Q	A	22.84
518	JAK2	PMF	U2AF1	chr21:44514777	T	G	exonic	p.Q157P	A	28.55
520	MPL	PMF	ASXL1	chr20:31023186	G	GT	exonic	p.S892Ffs*1	A	33.11
520	MPL	PMF	NRAS	chr1:115258744	C	T	exonic	p.G13D	A	10.89
520	MPL	PMF	NRAS	chr1:115258747	C	A	exonic	p.G12V	A	21.82
520	MPL	PMF	NRAS	chr1:115258745	C	A	exonic	p.G13C	A	6.69
520	MPL	PMF	RUNX1	chr21:36252974	C	A	exonic	p.V130F	B	9.97
520	MPL	PMF	SETBP1	chr18:42618545	G	A	exonic	p.A1366T	C	46.93
520	MPL	PMF	SRSF2	chr17:74732960	G	C	exonic	p.P95A	A	46.79
520	MPL	PMF	TET2	chr4:106180899	T	A	exonic	p.F1309L	A	49.67
521	JAK2	PMF						.		
522	JAK2	PMF	TET2	chr4:106156889	CCAAT	C	exonic	p.N598Kfs*1	A	37.78
522	JAK2	PMF	NOTCH1	chr9:139400161	G	T	exonic	p.P1396H	C	49.07
523	JAK2	PMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	40.93
523	JAK2	PMF	IDH2	chr15:90631935	G	A	exonic	p.R140W	A	46.63
523	JAK2	PMF	SRSF2	chr17:74732959	G	T	exonic	p.P95H	A	48.3
524	MPL	PMF	NFE2	chr12:54686918	T	TG	exonic	p.Q121Pfs*16	A	19.77
524	MPL	PMF	TET2	chr4:106196819	G	T	exonic	p.V1718L	A	49.79
525	JAK2	PMF	EED	chr11:85956306	G	GAACAGACATGCCTGCGGC	exonic	p.A18_K19insTDMPAA	C	42.07
525	JAK2	PMF	TET2	chr4:106197443	C	T	exonic	p.R1926C	B	38.12
525	JAK2	PMF	ZBTB33	chrX:119388880	G	A	exonic	p.R537H	B	9.29
529	JAK2	SMF	DNMT3A	chr2:25469541	C	T	exonic	p.W409X	A	2.11
529	JAK2	SMF	JAK2	chr9:5054646	T	G	exonic	p.F233C	B	20.18
529	JAK2	SMF	KMT2D	chr12:49435056	T	C	exonic	p.Q2166R	C	47.53
529	JAK2	SMF	SH2B3	chr12:111885467	G	A	exonic	p.R415H	B	2.53
530	JAK2	PMF						.		

532	JAK2	SMF	CTCF	chr16:67654681	G	A	exonic	p.D390N	A	29.47
533	CALR	PMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	29.07
533	CALR	PMF	IDH2	chr15:90631935	G	A	exonic	p.R140W	A	32.87
533	CALR	PMF	U2AF1	chr21:44514777	T	G	exonic	p.Q157P	A	38.08
534	JAK2	PMF	BCORL1	chrX:129147533	C	T	exonic	p.P262L	C	99.75
534	JAK2	PMF	KMT2B	chr19:36211940	G	A	exonic	p.R564Q	C	55.62
534	JAK2	PMF	KMT2D	chr12:49427305	A	ins28	exonic	p.R3727_M3728ins9	C	38.41
537	DM	SMF	ANKRD2 6	chr10:27332401	G	C	exonic	p.Y705X	A	6.69
538	CALR	SMF	DOT1L	chr19:2226299	C	T	exonic	p.P1260L	C	48.99
538	CALR	SMF	IDH2	chr15:90631934	C	T	exonic	p.R140Q	A	3.91
538	CALR	SMF	KMT2C	chr7:151859518	G	C	exonic	p.T3715R	C	47.58
538	CALR	SMF	KMT2D	chr12:49433958	G	A	exonic	p.S2532F	C	49.12
539	CALR	PMF	ASXL1	chr20:31022402	TCACCACTGCCATAGAGAGGCGGC	T	exonic	p.E635Rfs*15	A	25.36
539	CALR	PMF	KMT2D	chr12:49431755	G	C	exonic	p.H3128Q	C	48.68
540	JAK2	SMF	TET2	chr4:106157605	AACAAT	A	exonic	p.N837Tfs*6	A	18.19
543	TN	SMF	MPL	chr1:43805160	T	C	exonic	p.S204P	A	63.05
543	TN	SMF	CTCF	chr16:67650693	C	T	exonic	p.T333I	C	43.57
544	JAK2	PMF	RUNX1	chr21:36164609	C	G	exonic	p.E422D	B	90.87
548	CALR	SMF	ASXL1	chr20:31022402	TCACCACTGCCATAGAGAGGCGGC	T	exonic	p.E635Rfs*15	A	17.5
548	CALR	SMF	ASXL1	chr20:31022471	C	CG	exonic	p.A654Gfs*2	A	7.9
548	CALR	SMF	KMT2C	chr7:151853341	C	CTGG	exonic	p.F3920_A3921insP	C	48.16
548	CALR	SMF	KMT2C	chr7:151853343	A	G	exonic	p.F3920S	C	48.45
548	CALR	SMF	SF3B1	chr2:198267373	G	C	exonic	p.H662D	A	2.5
550	JAK2	PMF	ASXL1	chr20:31022592	C	T	exonic	p.R693X	A	18.79
550	JAK2	PMF	ASXL1	chr20:31024147	ACTCC	A	exonic	p.L1213Ifs*2	A	16.74
550	JAK2	PMF	MPL	chr1:43818310	G	A	exonic	p.R592Q	A	39.05
550	JAK2	PMF	U2AF1	chr21:44514777	T	G	exonic	p.Q157P	A	36.22
551	JAK2	SMF	SF3B1	chr2:198267360	T	C	exonic	p.K666R	A	20.14
552	CALR	PMF	ABL1	chr9:133760739	G	A	exonic	p.R1040Q	C	50.71
552	CALR	PMF	ATM	chr11:108205732	A	G	exonic	p.I2683V	C	48.35
552	CALR	PMF	DNMT3A	chr2:25470582	C	T	exonic	p.G298R	B	33.41
552	CALR	PMF	KMT2A	chr11:118343916	C	T	exonic	p.P681L	C	50.89
556	JAK2	SMF	MPL	chr1:43818305	CTACCGAAGA	C	exonic	p.Y591_R593del	B	46.41
556	JAK2	SMF	KMT2B	chr19:36213993	G	T	exonic	p.G940V	C	48.05
558	JAK2	PMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	18.12

558	JAK2	PMF	TET2	chr4:106182955	C	CT	exonic	p.M1333Yfs*4	A	3.67
558	JAK2	PMF	KMT2A	chr11:118377354	G	C	exonic	p.G3583R	C	49.58
559	JAK2	PMF	ASXL1	chr20:31022402	TCACCACTGCCATAGAGAGGCGGC	T	exonic	p.E635Rfs*15	A	20.0
559	JAK2	PMF	TP53	chr17:7577517	A	G	exonic	p.I255T	A	6.84
559	JAK2	PMF	U2AF1	chr21:44514777	T	G	exonic	p.Q157P	A	35.39
560	JAK2	PMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	19.47
560	JAK2	PMF	ASXL1	chr20:31022649	GC	G	exonic	p.M713Cfs*11	A	5.07
560	JAK2	PMF	PTPN11	chr12:112926248	G	T	exonic	p.A461S	A	2.68
560	JAK2	PMF	TP53	chr17:7579367	T	G	exonic	p.Y107S	B	30.05
560	JAK2	PMF	U2AF1	chr21:44514777	T	C	exonic	p.Q157R	A	28.6
561	CALR	PMF	ASXL1	chr20:31023427	A	G	exonic	p.N971S	C	47.29
561	CALR	PMF	TET2	chr4:106156072	C	CA	exonic	p.S327Ifs*3	A	24.4
562	JAK2	SMF	SF3B1	chr2:198266834	T	C	exonic	p.K700E	A	8.56
565	JAK2	PMF	ASXL1	chr20:31022960	G	GT	exonic	p.S816Ffs*4	A	34.43
565	JAK2	PMF	NOTCH1	chr9:139403417	C	T	exonic	p.D1026N	C	48.9
565	JAK2	PMF	U2AF1	chr21:44514777	T	C	exonic	p.Q157R	A	35.38
566	JAK2	PMF	ASXL1	chr20:31022286	T	TA	exonic	p.Y591fs*	A	41.62
566	JAK2	PMF	RUNX1	chr21:36252959	C	T	exonic	p.G135S	B	2.83
566	JAK2	PMF	SRSF2	chr17:74732959	G	T	exonic	p.P95H	A	47.69
568	JAK2	PMF	ATM	chr11:108121752	CAG	C	exonic	p.E522Ifs*41	A	43.61
569	JAK2	SMF	IDH2	chr15:90631934	C	T	exonic	p.R140Q	A	7.06
570	CALR	PMF						.		
571	TN	SMF	MPL	chr1:43814967	T	C	exonic	p.V501A	A	32.35
571	TN	SMF	MPL	chr1:43814979	G	A	exonic	p.S505N	A	31.8
571	TN	SMF	PPM1D	chr17:58740532	T	TA	exonic	p.A481Sfs*7	A	2.23
573	TN	PMF	ANKRD26	chr10:27318243	C	A	exonic	p.A1284S	C	44.37
573	TN	PMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	42.28
573	TN	PMF	SRSF2	chr17:74732959	G	T	exonic	p.P95H	A	41.25
573	TN	PMF	GATA2	chr3:128200139	TTCATGG	T	exonic	p.T387_M388del	C	34.66
573	TN	PMF	GATA2	chr3:128204841	A	AC	exonic	p.S201fs*	A	20.23
579	JAK2	PMF	GATA2	chr3:128205787	C	T	exonic	p.A30T	C	49.42
579	JAK2	PMF	TET2	chr4:106180880	G	A	exonic	p.S1303N	C	45.26
591	JAK2	SMF	KMT2A	chr11:118374775	T	C	exonic	p.V2723A	C	51.92
591	JAK2	SMF	SUZ12	chr17:30302634	G	C	exonic	p.S242T	B	37.62
591	JAK2	SMF	TP53	chr17:7577570	C	T	exonic	p.M237I	A	11.62

592	JAK2	PMF	CHEK2	chr22:29126509	G	A	exonic	p.S116F	C	51.11
592	JAK2	PMF	EED	chr11:85956306	G	C	exonic	p.G12A	C	50.42
592	JAK2	PMF	MPL	chr1:43818305	CTACCGAAGA	C	exonic	p.Y591_R593del	B	32.08
592	JAK2	PMF	PPM1D	chr17:58740603	CAACA	C	exonic	p.N505Lfs*7	A	12.64
592	JAK2	PMF	PPM1D	chr17:58740697	TA	T	exonic	p.R536Gfs*2	A	8.07
592	JAK2	PMF	TET2	chr4:106158446	TA	T	exonic	p.N1118Ifs*18	A	5.59
594	JAK2	PMF	NFE2	chr12:54686465	C	G	exonic	p.R272P	B	38.63
595	JAK2	PMF	ATM	chr11:108235940	T	A	exonic	p.N2994K	C	46.02
595	JAK2	PMF	IDH2	chr15:90631934	C	T	exonic	p.R140Q	A	25.36
595	JAK2	PMF	SH2B3	chr12:111856315	G	C	exonic	p.E122D	C	45.11
595	JAK2	PMF	SRSF2	chr17:74732959	G	T	exonic	p.P95H	A	24.08
595	JAK2	PMF	TP53	chr17:7576897	G	A	exonic	p.Q317X	A	9.17
598	JAK2	SMF	ASXL1	chr20:31023542	C	CA	exonic	p.T1010Nfs*5	A	40.65
598	JAK2	SMF	ASXL1	chr20:31024141	GT	G	exonic	p.F1210Lfs*6	A	2.15
598	JAK2	SMF	IDH1	chr2:209113113	G	A	exonic	p.R132C	A	40.54
598	JAK2	SMF	RUNX1	chr21:36164597	CGGCGGCGA	C	exonic	p.S424Afs*172	A	64.37
599	CALR	PMF	NFE2	chr12:54686223	G	A	exonic	p.Q353X	A	5.36
599	CALR	PMF	TET2	chr4:106155317	G	A	exonic	p.R73H	C	47.96
599	CALR	PMF	TET2	chr4:106157404	C	T	exonic	p.Q769X	A	22.8
599	CALR	PMF	TET2	chr4:106190867	A	G	exonic	p.H1382R	B	13.05
601	JAK2	PMF	ASXL1	chr20:31021276	C	CA	exonic	p.Q428Tfs*9	A	44.89
601	JAK2	PMF	CUX1	chr7:101891741	C	T	exonic	p.Q1324X	A	3.52
601	JAK2	PMF	ETNK1	chr12:22811995	A	G	exonic	p.N244S	A	46.11
601	JAK2	PMF	SRSF2	chr17:74732959	G	T	exonic	p.P95H	A	49.6
601	JAK2	PMF	ZBTB33	chrX:119387502	T	G	exonic	p.F78V	B	93.27
603	JAK2	PMF	ASXL1	chr20:31022441	AGG	A	exonic	p.G645Wfs*10	A	51.58
603	JAK2	PMF	U2AF1	chr21:44514777	T	G	exonic	p.Q157P	A	43.09
604	JAK2	PMF	CHEK2	chr22:29092948	G	C	exonic	p.R389G	C	49.24
605	CALR	PMF	U2AF1	chr21:44514777	T	C	exonic	p.Q157R	A	42.4
606	CALR	PMF	ATM	chr11:108188172	T	C	exonic	p.W2091R	C	42.56
606	CALR	PMF	CSF3R	chr1:36939399	G	A	exonic	p.H151Y	C	53.1
606	CALR	PMF	EZH2	chr7:148526844	CATAATTTTTTATTAGTTCTTCAATGA	C	exonic	p.F145fs*	A	4.31
607	JAK2	SMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	34.53
607	JAK2	SMF	CUX1	chr7:101870919	GT	TA	exonic	p.V1146_F1516del	A	3.83
607	JAK2	SMF	SH2B3	chr12:111856607	G	A	exonic	p.G220R	B	7.83

607	JAK2	SMF	TP53	chr17:7578435	CTGCT	C	exonic	p.K164Sfs*4	A	2.33
607	JAK2	SMF	U2AF1	chr21:44514777	T	G	exonic	p.Q157P	A	39.48
607	JAK2	SMF	ZBTB33	chrX:119388879	C	T	exonic	p.R537C	B	2.23
608	TN	PMF	KMT2C	chr7:151945166	G	T	exonic	p.P785T	B	23.6
609	JAK2	PMF	ASXL1	chr20:31022471	C	CG	exonic	p.A654Gfs*2	A	32.32
609	JAK2	PMF	ATRX	chrX:76849168	T	A	exonic	p.K2036N	B	39.06
609	JAK2	PMF	IDH2	chr15:90631935	G	C	exonic	p.R140G	A	6.93
609	JAK2	PMF	PHF6	chrX:133551266	A	G	exonic	p.Y301C	B	38.32
609	JAK2	PMF	RUNX1	chr21:36231773	C	T	exonic	p.R204Q	A	34.19
609	JAK2	PMF	STAG2	chrX:123197026	G	GA	exonic	p.I599Nfs*32	A	15.72
609	JAK2	PMF	TET2	chr4:106196819	G	T	exonic	p.V1718L	A	50.32
609	JAK2	PMF	U2AF1	chr21:44514777	T	G	exonic	p.Q157P	A	34.79
610	JAK2	PMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	37.47
610	JAK2	PMF	SF3B1	chr2:198265085	T	A	exonic	p.Q931L	C	48.26
611	JAK2	PMF	NF1	chr17:29667551	G	A	exonic	p.W2317X	A	4.21
614	JAK2	SMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	32.85
614	JAK2	SMF	KMT2C	chr7:151859235	TTTA	T	exonic	p.N3808del	C	44.23
614	JAK2	SMF	ZBTB33	chrX:119388912	C	G	exonic	p.R548G	B	3.1
615	JAK2	PMF	ASXL1	chr20:31022592	C	T	exonic	p.R693X	A	35.72
615	JAK2	PMF	TP53	chr17:7578244	C	T	exonic	p.R202H	C	48.67
615	JAK2	PMF	U2AF1	chr21:44514777	T	G	exonic	p.Q157P	A	33.28
616	JAK2	PMF	RUNX1	chr21:36252940	G	A	exonic	p.S141L	A	44.46
616	JAK2	PMF	SRSF2	chr17:74732959	G	C	exonic	p.P95R	A	43.07
616	JAK2	PMF	TET2	chr4:106197024	AGAAT	A	exonic	p.N1787Tfs*31	A	22.71
617	DM	SMF	NFE2	chr12:54686714	A	T	exonic	p.L189X	A	4.54
617	DM	SMF	STAG2	chrX:123215311	C	G	exonic	p.R953G	B	15.27
617	DM	SMF	TET2	chr4:106196234	C	T	exonic	p.Q1523X	A	31.03
617	DM	SMF	TET2	chr4:106164000	GAA	G	exonic	p.K1171Gfs*1	A	3.94
617	DM	SMF	TET2	chr4:106197383	A	AGCATGAATG	exonic	p.N1908_E1909insGMN	B	6.83
618	JAK2	PMF	ANKRD26	chr10:27318269	T	C	exonic	p.D1275G	C	46.83
618	JAK2	PMF	CBL	chr11:119148486	C	T	exonic	p.R343X	A	40.66
618	JAK2	PMF	CUX1	chr7:101840010	A	C	exonic	p.E451A	C	49.13
618	JAK2	PMF	KMT2A	chr11:118352592	C	G	exonic	p.P1266R	C	45.03
618	JAK2	PMF	KMT2D	chr12:49443672	C	G	exonic	p.E1233D	C	50.01
618	JAK2	PMF	KRAS	chr12:25378561	G	A	exonic	p.A146V	A	2.24

618	JAK2	PMF	RUNX1	chr21:36206893	G	A	exonic	p.R207W	C	47.01
618	JAK2	PMF	SRSF2	chr17:74732959	G	T	exonic	p.P95H	A	44.04
618	JAK2	PMF	TET2	chr4:106156357	TCAGAAGGAAAAAGC	T	exonic	p.S420Yfs*17	A	37.05
618	JAK2	PMF	TET2	chr4:106197244	TG	T	exonic	p.G1861Efs*25	A	44.52
626	JAK2	PMF	NRAS	chr1:115258747	C	T	exonic	p.G12D	A	10.99
626	JAK2	PMF	SRSF2	chr17:74733073	A	T	exonic	p.F57Y	B	43.34
626	JAK2	PMF	TET2	chr4:106156432	CT	C	exonic	p.L446fs*	A	40.06
626	JAK2	PMF	TET2	chr4:106157942	AG	A	exonic	p.K948Nfs*4	A	44.57
627	JAK2	PMF	DNMT3A	chr2:25457243	G	A	exonic	p.R882C	A	47.17
627	JAK2	PMF	GATA2	chr3:128200136	TTCTTCATGGTCAGTG	T	exonic	p.P385_E391delinsQQ	B	10.95
627	JAK2	PMF	SRSF2	chr17:74732235	C	A	splicing	.	B	90.88
627	JAK2	PMF	SETBP1	chr18:42531913	G	A	exonic	p.G870S	A	33.3
627	JAK2	PMF	BCOR	chrX:39930346	CTT	C	exonic	p.K1039Rfs*38	A	7.02
629	JAK2	SMF	ASXL1	chr20:31022402	TCACCACTGCCATAGAGAGGCGGC	T	exonic	p.E635Rfs*15	A	27.66
629	JAK2	SMF	STAG2	chrX:123215324	T	C	exonic	p.L957S	B	4.97
629	JAK2	SMF	ZRSR2	chrX:15836765	C	A	exonic	p.S276X	A	72.89
633	MPL	SMF	KMT2D	chr12:49428219	G	A	exonic	p.P3494L	C	52.88
633	MPL	SMF	TET2	chr4:106182956	T	A	exonic	p.L1332H	C	48.52
634	JAK2	PMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	38.78
634	JAK2	PMF	IDH1	chr2:209113112	C	T	exonic	p.R132H	A	47.51
634	JAK2	PMF	PTPN11	chr12:112910785	G	A	exonic	p.R265Q	C	47.41
634	JAK2	PMF	SRSF2	chr17:74732959	G	A	exonic	p.P95L	A	48.59
639	JAK2	PMF	ASXL1	chr20:31022619	CT	TA	exonic	p.L702*	A	35.08
639	JAK2	PMF	RUNX1	chr21:36231786	G	A	exonic	p.P200S	A	33.5
639	JAK2	PMF	TET2	chr4:106155579	T	TA	exonic	p.D162Rfs*8	A	11.04
639	JAK2	PMF	TET2	chr4:106197357	T	G	exonic	p.I1897S	B	34.36
639	JAK2	PMF	TET2	chr4:106156768	C	T	exonic	p.Q557X	A	6.33
639	JAK2	PMF	TET2	chr4:106196427	A	AT	exonic	p.I1588Yfs*25	A	2.03
639	JAK2	PMF	U2AF1	chr21:44514777	T	G	exonic	p.Q157P	A	33.87
641	CALR	PMF	FLT3	chr13:28608321	C	T	exonic	p.V579I	C	50.36
642	JAK2	SMF	GNAS	chr20:57430127	C	T	exonic	p.P603S	C	50.28
643	JAK2	SMF	PPM1D	chr17:58740724	T	TG	exonic	p.L546Pfs*5	A	23.13
643	JAK2	SMF	SMC1A	chrX:53436435	C	G	splicing	.	B	14.19
655	MPL	PMF	ASXL1	chr20:31022402	TCACCACTGCCATAGAGAGGCGGC	T	exonic	p.E635Rfs*15	A	2.38
655	MPL	PMF	ATM	chr11:108201008	C	G	exonic	p.R2459G	C	46.48
655	MPL	PMF	CSF3R	chr1:36932041	C	T	exonic	p.D837N	C	93.16

655	MPL	PMF	JAK2	chr9:5054842	G	C	exonic	p.W298C	C	51.09
656	CALR	PMF	MPL	chr1:43805106	C	G	exonic	p.Q186E	C	48.75
657	JAK2	PMF	ANKRD26	chr10:27303570	A	G	exonic	p.M1526T	B	31.85
657	JAK2	PMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	2.22
657	JAK2	PMF	KMT2B	chr19:36213533	C	G	exonic	p.L879V	C	49.39
657	JAK2	PMF	ZBTB33	chrX:119388568	T	G	exonic	p.V433G	B	2.51
658	JAK2	SMF	TET2	chr4:106156686	CCAGCAGTTGATGAGAAA	C	exonic	p.Q531Rfs*29	A	16.37
658	JAK2	SMF	TET2	chr4:106156747	C	T	exonic	p.R550X	A	47.48
660	JAK2	PMF	ASXL1	chr20:31022402	TCACCACTGCCATAGAGAGGCGGC	T	exonic	p.E635Rfs*15	A	22.7
661	CALR	SMF	GATA2	chr3:128205200	C	G	exonic	p.G81R	C	51.35
661	CALR	SMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	36.55
662	JAK2	SMF	PPM1D	chr17:58740375	G	A	exonic	p.W427X	A	2.51
662	JAK2	SMF	SF3B1	chr2:198267360	T	G	exonic	p.K666T	A	46.31
663	JAK2	PMF	KMT2B	chr19:36218848	C	T	exonic	p.R1487C	C	47.9
663	JAK2	PMF	TET2	chr4:106156478	C	T	exonic	p.S460F	A	45.31
664	JAK2	PMF	ASXL1	chr20:31024314	ACTAC	A	exonic	p.T1268Rfs*10	A	37.53
664	JAK2	PMF	CBL	chr11:119158656	GGT	G	splicing	.	B	24.21
664	JAK2	PMF	U2AF1	chr21:44514769	T	TCTCATA	exonic	p.E159_M160insYE	B	37.96
665	CALR	PMF	TET2	chr4:106162579	G	A	exonic	p.E1165K	B	3.56
665	CALR	PMF	ZBTB33	chrX:119388357	C	CA	exonic	p.N364Kfs*4	A	4.6
666	TN	PMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	10.44
666	TN	PMF	CUX1	chr7:101821905	C	T	exonic	p.Q340X	A	2.84
666	TN	PMF	U2AF1	chr21:44514777	T	C	exonic	p.Q157R	A	40.57
666	TN	PMF	ZRSR2	chrX:15821920	G	A	splicing	.	B	26.46
667	JAK2	SMF	NFE2	chr12:54686387	A	G	exonic	p.L298P	B	2.2
667	JAK2	SMF	NFE2	chr12:54686425	CT	C	exonic	p.K285Rfs*16	A	3.93
668	JAK2	SMF	ASXL1	chr20:31022283	ACTTAC	A	exonic	p.Y591Dfs*25	A	45.26
668	JAK2	SMF	EZH2	chr7:148507440	A	C	exonic	p.F672V	C	41.58
668	JAK2	SMF	MAD1L1	chr7:2265101	T	G	exonic	p.K79Q	C	48.38
668	JAK2	SMF	STAG2	chrX:123171388	T	A	exonic	p.D100E	C	44.92
669	JAK2	SMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	27.22
669	JAK2	SMF	ATM	chr11:108201125	T	G	exonic	p.S2498A	C	48.09
670	JAK2	PMF	ASXL1	chr20:31022439	G	T	exonic	p.G642X	A	43.83
670	JAK2	PMF	CUX1	chr7:101747740	G	A	splicing	.	C	44.53
670	JAK2	PMF	SRSF2	chr17:74732959	G	T	exonic	p.P95H	A	46.29

670	JAK2	PMF	TET2	chr4:106156091	T	TA	exonic	p.C332Mfs*7	A	46.86
670	JAK2	PMF	TET2	chr4:106190860	C	T	exonic	p.H1380Y	A	46.54
671	JAK2	PMF	NFE2	chr12:54686379	GCCGCTCCAGCTC	G	exonic	p.E297_R300del	B	35.13
671	JAK2	PMF	TET2	chr4:106197391	TG	T	exonic	p.E1909Sfs*40	A	37.78
671	JAK2	PMF	TET2	chr4:106157603	C	A	exonic	p.S835X	A	2.77
671	JAK2	PMF	TET2	chr4:106197205	CT	C	exonic	p.W1847Gfs*39	A	2.33
672	CALR	PMF	ABL1	chr9:133759722	G	A	exonic	p.R701Q	C	48.82
672	CALR	PMF	BCORL1	chrX:129149677	G	A	exonic	p.A977T	C	100.0
672	CALR	PMF	CHEK2	chr22:29083920	TG	T	exonic	p.T576Qfs*31	A	46.81
672	CALR	PMF	EED	chr11:85979543	A	T	exonic	p.R302S	B	8.93
677	JAK2	SMF						.		
679	MPL	PMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	39.13
679	MPL	PMF	ATM	chr11:108121708	G	T	exonic	p.G506C	C	46.21
679	MPL	PMF	FLT3	chr13:28611330	T	C	exonic	p.N434S	C	48.69
679	MPL	PMF	KMT2C	chr7:151860675	C	T	exonic	p.M3329I	C	48.71
679	MPL	PMF	TET2	chr4:106180865	G	A	exonic	p.C1298Y	A	45.31
681	MPL	PMF	ASXL1	chr20:31022592	C	T	exonic	p.R693X	A	2.43
681	MPL	PMF	DNMT3A	chr2:25471026	AGGAGGGCTGGCCTCCTCCAC	A	exonic	p.V239Cfs*6	A	6.36
681	MPL	PMF	SRSF2	chr17:74732956	G	T	exonic	p.P96Q	B	6.49
681	MPL	PMF	TET2	chr4:106157288	CA	C	exonic	p.Q731Nfs*19	A	6.91
682	JAK2	SMF	BCORL1	chrX:129189828	G	T	splicing	.	B	2.02
682	JAK2	SMF	IKZF1	chr7:50468071	G	C	exonic	p.D436H	C	49.39
682	JAK2	SMF	NFE2	chr12:54686494	GCTCT	G	exonic	p.E261Afs*2	A	38.73
682	JAK2	SMF	NOTCH1	chr9:139407973	C	G	exonic	p.D742H	B	4.14
682	JAK2	SMF	PPM1D	chr17:58740375	G	A	exonic	p.W427X	A	4.37
682	JAK2	SMF	SH2B3	chr12:111884630	C	CT	exonic	p.D270fs*	A	5.31
682	JAK2	SMF	TET2	chr4:106194076	G	A	splicing	.	B	38.58
682	JAK2	SMF	TP53	chr17:7578190	T	C	exonic	p.Y220C	A	5.12
682	JAK2	SMF	TP53	chr17:7578503	C	T	exonic	p.V143M	A	4.34
683	JAK2	PMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	43.21
683	JAK2	PMF	ATRX	chrX:76953070	C	T	splicing	.	B	92.52
683	JAK2	PMF	CUX1	chr7:101839971	C	T	exonic	p.P438L	C	46.04
683	JAK2	PMF	EZH2	chr7:148516705	G	A	exonic	p.Q328X	A	45.19
683	JAK2	PMF	SETBP1	chr18:42531917	T	C	exonic	p.I871T	A	47.5
684	JAK2	PMF	SH2B3	chr12:111856134	T	G	exonic	p.L62R	C	52.11
684	JAK2	PMF	SETBP1	chr18:42618534	A	G	exonic	p.K1362R	C	49.33

684	JAK2	PMF	U2AF1	chr21:44514666	T	TGCA	exonic	p.C163_T164insC	B	9.64
684	JAK2	PMF	IKZF1	chr7:50450366	CG	C	exonic	p.R185Gfs*7	A	8.34
684	JAK2	PMF	EZH2	chr7:148508777	C	T	exonic	p.W629X	A	5.54
684	JAK2	PMF	TP53	chr17:7577139	G	A	exonic	p.R267W	A	6.92
684	JAK2	PMF	ASXL1	chr20:31022540	T	TGA	exonic	p.P677Sfs*26	A	2.88
685	TN	PMF						.		
686	JAK2	SMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	9.11
686	JAK2	SMF	CBL	chr11:119149251	G	A	exonic	p.R420Q	A	23.96
686	JAK2	SMF	CUX1	chr7:101847837	G	A	splicing	.	B	16.9
686	JAK2	SMF	EZH2	chr7:148526858	A	G	exonic	p.L149P	A	11.53
686	JAK2	SMF	MPL	chr1:43812193	A	G	exonic	p.H353R	C	52.99
686	JAK2	SMF	STAG2	chrX:123197048	T	G	exonic	p.L605X	A	8.8
686	JAK2	SMF	ZBTB33	chrX:119387326	T	C	exonic	p.L19P	B	10.37
686	JAK2	SMF	ZBTB33	chrX:119388891	G	A	exonic	p.E541K	B	2.82
687	JAK2	SMF	EZH2	chr7:148526913	T	A	exonic	p.I131F	A	2.39
687	JAK2	SMF	JAK2	chr9:5054810	A	G	exonic	p.I288V	C	59.18
687	JAK2	SMF	TET2	chr4:106164022	G	T	exonic	p.E1178X	A	2.66
689	JAK2	PMF	TET2	chr4:106196819	G	T	exonic	p.V1718L	A	49.47
689	JAK2	PMF	U2AF1	chr21:44514777	T	G	exonic	p.Q157P	A	16.99
693	JAK2	PMF	DNMT3A	chr2:25463248	G	A	exonic	p.R749C	A	14.0
693	JAK2	PMF	TET2	chr4:106190860	C	T	exonic	p.H1380Y	A	7.61
694	JAK2	PMF	ASXL1	chr20:31024011	A	AGCCCCAGTTCTTT	exonic	p.R1171Pfs*13	A	5.32
694	JAK2	PMF	KMT2C	chr7:151970884	A	C	exonic	p.Y306X	A	4.5
694	JAK2	PMF	SF3B1	chr2:198266834	T	C	exonic	p.K700E	A	35.47
698	JAK2	PMF	ASXL1	chr20:31022909	TG	T	exonic	p.D799Mfs*18	A	33.8
698	JAK2	PMF	ASXL1	chr20:31022592	C	T	exonic	p.R693X	A	2.5
698	JAK2	PMF	DNMT3A	chr2:25457243	G	A	exonic	p.R882C	A	43.46
698	JAK2	PMF	EZH2	chr7:148526877	C	A	exonic	p.G143C	B	30.2
698	JAK2	PMF	U2AF1	chr21:44514777	T	C	exonic	p.Q157R	A	37.65
699	JAK2	SMF	DNMT3A	chr2:25463283	A	C	exonic	p.L737R	A	6.82
699	JAK2	SMF	NOTCH1	chr9:139411817	C	G	exonic	p.E488Q	C	50.48
699	JAK2	SMF	TET2	chr4:106164751	G	T	exonic	p.E1207X	A	14.6
699	JAK2	SMF	TET2	chr4:106155781	A	T	exonic	p.K228X	A	4.95
699	JAK2	SMF	TET2	chr4:106157986	C	T	exonic	p.Q963X	A	3.7
699	JAK2	SMF	TET2	chr4:106190905	G	A	splicing	.	B	7.32
708	JAK2	PMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	41.04

708	JAK2	PMF	EZH2	chr7:148504799	C	A	splicing	.	C	46.49
708	JAK2	PMF	GATA2	chr3:128200137	T	C	exonic	p.K390E	A	40.97
708	JAK2	PMF	PHF6	chrX:133551224	G	A	exonic	p.G287D	B	85.42
709	JAK2	PMF	ASXL1	chr20:31022415	AGAGAGGCGGCCACCACTGCCATC	A	exonic	p.E635Rfs*13	A	5.81
709	JAK2	PMF	CBL	chr11:119149251	G	C	exonic	p.R420P	A	2.83
709	JAK2	PMF	GATA1	chrX:48650332	C	T	exonic	p.T101M	C	99.62
709	JAK2	PMF	IDH2	chr15:90631934	C	T	exonic	p.R140Q	A	8.7
725	JAK2	PMF	ASXL1	chr20:31022390	A	AG	exonic	p.A627Gfs*7	A	40.92
725	JAK2	PMF	IDH1	chr2:209113112	C	T	exonic	p.R132H	A	37.89
725	JAK2	PMF	U2AF1	chr21:44514777	T	G	exonic	p.Q157P	A	42.68
726	JAK2	PMF	BCOR	chrX:39932326	G	T	exonic	p.P758Q	C	45.99
732	JAK2	SMF	CHEK2	chr22:29091856	AG	A	exonic	p.T410Mfs*14	A	47.68
732	JAK2	SMF	KMT2D	chr12:49443805	C	T	exonic	p.R1189H	C	46.93
732	JAK2	SMF	NF1	chr17:29556306	CA	C	exonic	p.S892Afs*9	A	2.59
737	JAK2	PMF	TET2	chr4:106182972	T	A	exonic	p.Y1337X	A	68.13
737	JAK2	PMF	NFE2	chr12:54686468	C	G	exonic	p.R271P	B	38.84
742	JAK2	PMF	DOT1L	chr19:2226273	C	G	exonic	p.I1251M	C	51.84
742	JAK2	PMF	SH2B3	chr12:111885303	G	GCGTGGGGAATA	exonic	p.L403Gfs*11	A	3.93
742	JAK2	PMF	U2AF1	chr21:44514777	T	G	exonic	p.Q157P	A	31.56
747	JAK2	PMF	NFE2	chr12:54686379	GCCGCTCCAGCTC	G	exonic	p.E297_R300del	B	3.12
748	JAK2	PMF						.		
749	JAK2	PMF	ATM	chr11:108159742	C	T	exonic	p.S1383L	C	47.18
749	JAK2	PMF	TET2	chr4:106158285	C	CA	exonic	p.T1063Nfs*4	A	17.84
749	JAK2	PMF	TET2	chr4:106180835	G	T	exonic	p.G1288V	A	3.08
750	JAK2	PMF	ASXL1	chr20:31022976	GAT	G	exonic	p.T822Ifs*9	A	11.04
750	JAK2	PMF	ATM	chr11:108192052	T	G	exonic	p.C2159W	C	46.71
750	JAK2	PMF	GATA2	chr3:128205017	G	C	exonic	p.P142A	C	46.64
750	JAK2	PMF	U2AF1	chr21:44514777	T	C	exonic	p.Q157R	A	16.46
751	JAK2	PMF	GATA2	chr3:128200137	T	C	exonic	p.K390E	A	44.47
751	JAK2	PMF	ATM	chr11:108202273	G	A	exonic	p.V2540I	C	45.27
751	JAK2	PMF	SRSF2	chr17:74732959	G	T	exonic	p.P95H	A	46.8
751	JAK2	PMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	37.64
751	JAK2	PMF	RUNX1	chr21:36206716	G	A	exonic	p.Q266X	A	50.17
752	CALR	PMF	DNMT3A	chr2:25457242	C	T	exonic	p.R882H	A	44.47
752	CALR	PMF	GATA2	chr3:128202707	C	CTTCGCTTGGGCTTGATGAGGG	exonic	p.R337_R338insTLIKPKR	B	19.82

752	CALR	PMF	TET2	chr4:106164085	G	A	splicing	.	C	40.89
752	CALR	PMF	TET2	chr4:106197285	T	C	exonic	p.I1873T	A	40.73
753	JAK2	PMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	40.12
753	JAK2	PMF	ETNK1	chr12:22811995	A	G	exonic	p.N244S	A	41.79
753	JAK2	PMF	SRSF2	chr17:74732959	G	T	exonic	p.P95H	A	48.99
753	JAK2	PMF	KMT2D	chr12:49444220	C	T	exonic	p.V1051I	C	48.4
754	JAK2	PMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	36.75
754	JAK2	PMF	ETV6	chr12:12038961	G	A	splicing	.	C	45.26
754	JAK2	PMF	EZH2	chr7:148506408	C	G	exonic	p.A702P	C	47.1
754	JAK2	PMF	EZH2	chr7:148515024	TC	T	exonic	p.G395Efs*28	A	45.68
754	JAK2	PMF	PTPN11	chr12:112926851	C	T	exonic	p.P491S	A	39.16
754	JAK2	PMF	SETBP1	chr18:42531913	G	A	exonic	p.G870S	A	5.22
755	CALR	PMF	CHEK2	chr22:29092969	G	A	exonic	p.H382Y	B	68.67
756	CALR	PMF	ASXL1	chr20:31022936	TC	T	exonic	p.P808Lfs*9	A	19.32
756	CALR	PMF	ASXL1	chr20:31022483	T	TGAGGGAGGTGGCAGAGGCAGCAGCAGCAGCA	exonic	p.G666Sfs*11	A	8.1
756	CALR	PMF	CUX1	chr7:101844906	G	A	exonic	p.A788T	C	46.91
756	CALR	PMF	DNMT3A	chr2:25463239	A	G	exonic	p.F752L	A	45.03
756	CALR	PMF	EZH2	chr7:148507447	G	C	exonic	p.S669R	A	9.08
756	CALR	PMF	GNAS	chr20:57429911	C	T	exonic	p.P531S	C	46.97
756	CALR	PMF	JAK2	chr9:5022085	A	C	exonic	p.K33T	C	52.17
756	CALR	PMF	SUZ12	chr17:30302702	A	G	exonic	p.M265V	C	51.42
757	CALR	PMF	ASXL1	chr20:31023223	CGAATGATGAGGTAG	C	exonic	p.N904Efs*14	A	32.71
757	CALR	PMF	ASXL1	chr20:31023152	T	TA	exonic	p.T880Nfs*1	A	4.29
757	CALR	PMF	BCOR	chrX:39923606	C	A	exonic	p.R1162L	C	48.05
758	JAK2	PMF	ASXL1	chr20:31022712	C	T	exonic	p.Q733X	A	36.68
758	JAK2	PMF	ETV6	chr12:11992223	C	G	exonic	p.R105G	A	38.71
758	JAK2	PMF	TP53	chr17:7578464	G	A	exonic	p.R156C	A	52.64
759	JAK2	PMF	IDH2	chr15:90631934	C	T	exonic	p.R140Q	A	25.48
759	JAK2	PMF	KMT2D	chr12:49443761	T	C	exonic	p.I1204V	C	50.23
759	JAK2	PMF	TET2	chr4:106190767	A	T	exonic	p.I1349F	B	6.26
760	JAK2	SMF	SETBP1	chr18:42530872	C	T	exonic	p.H523Y	C	48.81
760	JAK2	SMF	TET2	chr4:106190776	G	T	exonic	p.E1352X	A	46.47
761	JAK2	SMF	KRAS	chr12:25398255	G	T	exonic	p.Q22K	A	6.31
761	JAK2	SMF	NFE2	chr12:54686494	GCTCT	G	exonic	p.E261Afs*2	A	5.76
761	JAK2	SMF	SH2B3	chr12:111884836	G	GTA	exonic	p.G309Vfs*15	A	4.52

761	JAK2	SMF	SUZ12	chr17:30320348	A	G	exonic	p.Y430C	B	35.95
761	JAK2	SMF	TET2	chr4:106196819	G	T	exonic	p.V1718L	A	49.17
762	JAK2	PMF	ASXL1	chr20:31022853	C	T	exonic	p.Q780X	A	28.56
763	JAK2	PMF						.		
764	JAK2	PMF	ASXL1	chr20:31021535	C	T	exonic	p.Q512X	A	42.82
764	JAK2	PMF	EZH2	chr7:148515005	CTTCT	C	exonic	p.E401Kfs*21	A	98.05
764	JAK2	PMF	NF1	chr17:29552206	C	T	exonic	p.H647Y	C	48.74
764	JAK2	PMF	SETBP1	chr18:42531913	G	A	exonic	p.G870S	A	2.67
764	JAK2	PMF	TET2	chr4:106193801	C	G	exonic	p.Y1421X	A	84.74
765	JAK2	SMF	ASXL1	chr20:31022385	G	GT	exonic	p.R625Pfs*9	A	47.84
765	JAK2	SMF	CHEK2	chr22:29115387	C	T	exonic	p.G270R	B	31.31
765	JAK2	SMF	ZBTB33	chrX:119389063	C	CA	exonic	p.Y599Ifs*4	A	8.73
766	TN	PMF	ASXL1	chr20:31022288	C	G	exonic	p.Y591X	A	43.69
766	TN	PMF	DOT1L	chr19:2191113	G	A	exonic	p.E123K	B	38.71
766	TN	PMF	NRAS	chr1:115258744	C	A	exonic	p.G13V	A	20.21
766	TN	PMF	PDS5B	chr13:33306277	A	AC	exonic	p.R724Pfs*15	A	10.27
766	TN	PMF	PHF6	chrX:133551305	T	C	exonic	p.I314T	A	89.31
766	TN	PMF	RUNX1	chr21:36171607	G	A	exonic	p.R320X	A	43.3
766	TN	PMF	SRSF2	chr17:74732959	G	A	exonic	p.P95L	A	37.59
766	TN	PMF	TET2	chr4:106182999	TA	T	exonic	p.N1347Ifs*15	A	47.02
766	TN	PMF	TET2	chr4:106157057	TC	T	exonic	p.Q654Kfs*45	A	41.7
767	JAK2	PMF	ASXL1	chr20:31024026	AG	A	exonic	p.A1172Lfs*1	A	13.67
767	JAK2	PMF	BCOR	chrX:39932218	C	G	exonic	p.G794A	C	50.87
767	JAK2	PMF	U2AF1	chr21:44524456	G	A	exonic	p.S34F	A	6.74
768	JAK2	PMF	KMT2A	chr11:118373998	A	G	exonic	p.K2464R	C	49.6
769	JAK2	PMF	ASXL1	chr20:31022402	TCACCACTGCCATAGAGAGGCGGC	T	exonic	p.E635Rfs*15	A	19.0
772	JAK2	PMF	IDH1	chr2:209113112	C	T	exonic	p.R132H	A	3.42
772	JAK2	PMF	RUNX1	chr21:36164601	G	A	exonic	p.P425L	A	66.72
772	JAK2	PMF	SRSF2	chr17:74732959	G	C	exonic	p.P95R	A	41.6
772	JAK2	PMF	GNAS	chr20:57429623	C	T	exonic	p.P435S	C	50.61
773	CALR	PMF						.		
774	JAK2	PMF	SF3B1	chr2:198267359	C	A	exonic	p.K666N	A	21.53
780	JAK2	PMF	ASXL1	chr20:31022441	AGGGGG	A	exonic	p.G644Wfs*10	A	47.67
780	JAK2	PMF	SETBP1	chr18:42531907	G	A	exonic	p.D868N	A	20.63
780	JAK2	PMF	SRSF2	chr17:74732959	G	T	exonic	p.P95H	A	48.25
781	JAK2	PMF	ASXL1	chr20:31023717	C	T	exonic	p.R1068X	A	14.18

781	JAK2	PMF	PPM1D	chr17:58740816	ACT	A	exonic	p.S575fs*	A	8.9
781	JAK2	PMF	U2AF1	chr21:44524456	G	A	exonic	p.S34F	A	8.67
781	JAK2	PMF	ZBTB33	chrX:119387692	A	AT	exonic	p.S142Ffs*2	A	10.02
782	MPL	SMF	BCL11A	chr2:60773426	A	G	exonic	p.L22P	C	48.68
782	MPL	SMF	KMT2D	chr12:49427308	C	T	exonic	p.R3727H	C	52.77
784	CALR	SMF	KMT2B	chr19:36209056	G	C	exonic	p.A46P	C	41.41
785	JAK2	PMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	35.98
785	JAK2	PMF	CBL	chr11:119155977	C	G	exonic	p.P548A	C	49.07
785	JAK2	PMF	NRAS	chr1:115256532	C	A	exonic	p.G60V	A	2.84
785	JAK2	PMF	SRSF2	chr17:74732959	G	T	exonic	p.P95H	A	44.76
786	CALR	SMF	ATM	chr11:108143471	C	T	exonic	p.A1059V	C	41.73
786	CALR	SMF	KMT2B	chr19:36223528	G	C	exonic	p.E2026D	C	50.1
786	CALR	SMF	NFE2	chr12:54686494	GCTCT	G	exonic	p.E261Afs*2	A	16.25
788	JAK2	SMF						.		
789	TN	PMF	CBL	chr11:119149239	G	C	exonic	p.C416S	A	3.27
789	TN	PMF	KIT	chr4:55599321	A	T	exonic	p.D816V	A	6.84
789	TN	PMF	KMT2A	chr11:118360923	A	G	exonic	p.D1552G	C	51.29
789	TN	PMF	KMT2A	chr11:118372555	G	A	exonic	p.R2163Q	C	53.62
789	TN	PMF	NF1	chr17:29664476	CT	C	exonic	p.A2174Lfs*25	A	9.66
789	TN	PMF	SRSF2	chr17:74732959	G	C	exonic	p.P95R	A	44.04
789	TN	PMF	TET2	chr4:106157023	C	T	exonic	p.Q642X	A	67.54
793	CALR	PMF	IDH1	chr2:209113112	C	T	exonic	p.R132H	A	4.57
794	JAK2	PMF	ASXL2	chr2:25973185	C	CAG	exonic	p.V414Lfs*9	A	35.83
794	JAK2	PMF	IDH2	chr15:90631934	C	T	exonic	p.R140Q	A	35.31
794	JAK2	PMF	KRAS	chr12:25380285	G	A	exonic	p.T58I	A	2.42
794	JAK2	PMF	SRSF2	chr17:74732959	G	A	exonic	p.P95L	A	41.57
795	CALR	SMF	ASXL1	chr20:31022592	C	T	exonic	p.R693X	A	40.81
796	JAK2	SMF	DOT1L	chr19:2210451	C	T	exonic	p.A353V	C	47.14
796	JAK2	SMF	IDH2	chr15:90633791	A	C	exonic	p.I98S	C	52.57
796	JAK2	SMF	MPL	chr1:43818306	T	G	exonic	p.Y591D	A	3.25
796	JAK2	SMF	PHF6	chrX:133527529	A	G	splicing	.	B	4.52
796	JAK2	SMF	TET2	chr4:106190843	G	T	exonic	p.C1374F	C	50.12
797	CALR	PMF	EZH2	chr7:148511073	C	T	exonic	p.S610N	C	48.78
797	CALR	PMF	KRAS	chr12:25380268	A	T	exonic	p.Y64N	B	39.69
797	CALR	PMF	RUNX1	chr21:36164907	G	C	exonic	p.T323R	C	53.69
799	TN	PMF	ACD	chr16:67694138	C	T	exonic	p.G82S	C	45.87

799	TN	PMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	41.79
799	TN	PMF	CUX1	chr7:101882712	GAA	G	exonic	p.K1257Tfs*59	A	15.36
799	TN	PMF	DOT1L	chr19:2226731	C	A	exonic	p.P1404Q	C	57.26
799	TN	PMF	NF1	chr17:29562747	G	A	exonic	p.R1276Q	A	46.4
799	TN	PMF	NF1	chr17:29550541	C	T	exonic	p.R601W	B	4.29
802	JAK2	SMF	ASXL1	chr20:31022288	C	A	exonic	p.Y591X	A	6.68
802	JAK2	SMF	CHEK2	chr22:29107938	T	A	exonic	p.I294F	C	48.39
802	JAK2	SMF	NF1	chr17:29657356	T	G	exonic	p.F1884L	B	7.25
802	JAK2	SMF	PHF6	chrX:133511726	G	GA	exonic	p.C28Mfs*7	A	6.08
802	JAK2	SMF	TET2	chr4:106193892	C	T	exonic	p.R1452X	A	46.29
806	JAK2	PMF	ASXL1	chr20:31022402	TCACCACTGCCATAGAGAGGCGGC	T	exonic	p.E635Rfs*15	A	24.11
806	JAK2	PMF	CTCF	chr16:67654646	C	A	exonic	p.P378Q	C	45.45
806	JAK2	PMF	EZH2	chr7:148506477	C	T	exonic	p.V679M	A	15.83
806	JAK2	PMF	MAD1L1	chr7:2255629	A	G	exonic	p.M272T	C	49.65
806	JAK2	PMF	NF1	chr17:29687709	C	A	exonic	p.Q2789K	C	47.79
806	JAK2	PMF	PDS5B	chr13:33349159	G	A	exonic	p.R1438Q	C	49.65
807	CALR	PMF						.		
808	JAK2	PMF	ASXL1	chr20:31022402	TCACCACTGCCATAGAGAGGCGGC	T	exonic	p.E635Rfs*15	A	27.14
808	JAK2	PMF	EZH2	chr7:148506415	GT	G	exonic	p.N699Tfs*6	A	46.24
808	JAK2	PMF	EZH2	chr7:148507433	A	T	exonic	p.L674X	A	45.27
808	JAK2	PMF	NPM1	chr5:170819962	TGAA	T	exonic	p.E170del	C	47.5
809	CALR	PMF						.		
813	TN	PMF	CUX1	chr7:101892123	C	T	exonic	p.P1451L	C	44.95
813	TN	PMF	MPL	chr1:43804375	CT	C	exonic	p.F126Lfs*4	A	51.41
814	JAK2	SMF	ASXL1	chr20:31023105	GA	G	exonic	p.D864Afs*2	A	33.38
814	JAK2	SMF	SRSF2	chr17:74732959	G	T	exonic	p.P95H	A	34.66
814	JAK2	SMF	TET2	chr4:106197300	G	A	exonic	p.R1878H	B	36.56
814	JAK2	SMF	TP53	chr17:7578406	C	T	exonic	p.R175H	A	49.28
815	CALR	PMF	CBL	chr11:119148880	A	G	exonic	p.Q367R	A	2.48
815	CALR	PMF	DNMT3A	chr2:25463265	G	A	exonic	p.P743L	C	45.56
815	CALR	PMF	MPL	chr1:43805230	CA	AG	exonic	p.P227Q	C	51.7
815	CALR	PMF	TET2	chr4:106197373	C	A	exonic	p.Y1902X	A	2.46
816	CALR	PMF						.		
817	JAK2	PMF	ANKRD2 6	chr10:27366308	T	TA	exonic	p.K346fs*	A	53.36
817	JAK2	PMF	ASXL2	chr2:25973214	GT	G	exonic	p.T404Pfs*18	A	43.98

817	JAK2	PMF	CBL	chr11:119156010	C	T	exonic	p.R559X	A	47.12
817	JAK2	PMF	CHEK2	chr22:29091856	AG	A	exonic	p.T410Mfs*14	A	44.88
817	JAK2	PMF	IDH2	chr15:90631934	C	T	exonic	p.R140Q	A	43.7
817	JAK2	PMF	SRSF2	chr17:74732959	G	C	exonic	p.P95R	A	44.86
820	CALR	PMF	ASXL1	chr20:31022502	A	AG	exonic	p.S663Rfs*4	A	42.28
820	CALR	PMF	IDH2	chr15:90631934	C	T	exonic	p.R140Q	A	40.16
825	CALR	PMF	DNMT3A	chr2:25470028	C	G	splicing	.	C	45.22
825	CALR	PMF	GNAS	chr20:57484420	C	T	exonic	p.R844C	B	50.64
827	JAK2	SMF	NFE2	chr12:54686465	C	T	exonic	p.R272Q	B	51.16
829	JAK2	SMF	GNAS	chr20:57429850	C	T	exonic	p.S448F	C	54.75
829	JAK2	SMF	SF3B1	chr2:198267359	C	G	exonic	p.K666N	A	4.37
829	JAK2	SMF	TET2	chr4:106156465	G	T	exonic	p.E456X	A	51.58
830	JAK2	PMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	36.07
830	JAK2	PMF	EZH2	chr7:148506172	A	G	exonic	p.F729S	C	48.92
830	JAK2	PMF	EZH2	chr7:148513775	C	T	splicing	.	C	48.18
830	JAK2	PMF	GNAS	chr20:57484421	G	A	exonic	p.R844H	A	51.28
834	JAK2	SMF	ANKRD26	chr10:27317843	T	A	exonic	p.T1304S	B	29.54
834	JAK2	SMF	NFE2	chr12:54686466	G	A	exonic	p.R272X	A	23.3
836	JAK2	SMF	RUNX1	chr21:36164647	A	C	exonic	p.S410A	C	50.46
836	JAK2	SMF	U2AF1	chr21:44524456	G	A	exonic	p.S34F	A	24.88
837	CALR	PMF						.		
849	CALR	PMF	CBL	chr11:119148991	G	A	exonic	p.C404Y	A	20.75
850	JAK2	SMF	NFE2	chr12:54686465	C	T	exonic	p.R272Q	B	19.49
850	JAK2	SMF	SH2B3	chr12:111856357	G	C	exonic	p.Q136H	C	50.19
851	CALR	SMF	KMT2C	chr7:151878244	G	A	exonic	p.T2234I	C	48.28
851	CALR	SMF	TET2	chr4:106196819	G	T	exonic	p.V1718L	A	50.35
863	JAK2	PMF	IDH2	chr15:90631934	C	T	exonic	p.R140Q	A	2.05
863	JAK2	PMF	SRSF2	chr17:74732959	G	A	exonic	p.P95L	A	32.68
863	JAK2	PMF	TET2	chr4:106196234	C	T	exonic	p.Q1523X	A	2.02
863	JAK2	PMF	NOTCH1	chr9:139410088	C	T	exonic	p.V584I	C	50.24
868	JAK2	PMF	KRAS	chr12:25380276	T	C	exonic	p.Q61R	A	2.44
868	JAK2	PMF	RUNX1	chr21:36231783	G	C	exonic	p.R201G	A	51.82
868	JAK2	PMF	SH2B3	chr12:111885593	G	A	exonic	p.R457Q	C	48.43
868	JAK2	PMF	SRSF2	chr17:74732959	G	A	exonic	p.P95L	A	46.03
868	JAK2	PMF	TET2	chr4:106193781	CT	C	exonic	p.H1416Tfs*31	A	47.11

868	JAK2	PMF	TET2	chr4:106193786	C	A	exonic	p.H1416Q	C	43.78
877	TN	SMF	ACD	chr16:67692676	G	T	exonic	p.S316Y	C	51.06
877	TN	SMF	GNAS	chr20:57429720	C	A	exonic	p.A467D	C	48.05
877	TN	SMF	MPL	chr1:43818304	ACTACCGAAG	A	exonic	p.D590_R593delinsE	A	37.93
878	CALR	PMF						.		
879	JAK2	PMF	JAK2	chr9:5055751	G	A	exonic	p.R340Q	C	53.05
879	JAK2	PMF	TET2	chr4:106196726	C	T	exonic	p.Q1687X	A	2.62
880	CALR	SMF	MPL	chr1:43814664	A	G	exonic	p.T487A	B	3.31
880	CALR	SMF	TP53	chr17:7578470	C	T	exonic	p.G154S	A	48.6
880	CALR	SMF	ZRSR2	chrX:15836766	G	A	splicing	.	B	2.94
881	JAK2	SMF	ASXL1	chr20:31022423	G	GGCCA	exonic	p.T638Sfs*19	A	45.87
881	JAK2	SMF	CSF3R	chr1:36937925	G	T	exonic	p.T304N	C	52.82
881	JAK2	SMF	EZH2	chr7:148512610	G	C	exonic	p.Q512E	B	39.44
881	JAK2	SMF	ZRSR2	chrX:15822239	G	GT	exonic	p.L107Ffs*37	A	14.9
881	JAK2	SMF	ZRSR2	chrX:15822245	G	GA	exonic	p.E109Rfs*35	A	16.29
882	CALR	PMF						.		
883	JAK2	PMF	ASXL1	chr20:31023597	TC	T	exonic	p.S1028Wfs*17	A	42.6
883	JAK2	PMF	ATM	chr11:108122604	A	G	exonic	p.I550V	C	43.42
883	JAK2	PMF	ETV6	chr12:12022430	T	TG	exonic	p.H180Afs*15	A	12.13
884	JAK2	PMF	U2AF1	chr21:44514777	T	C	exonic	p.Q157R	A	37.58
885	JAK2	PMF	CSF3R	chr1:36937992	C	T	exonic	p.V282M	C	47.92
885	JAK2	PMF	SF3B1	chr2:198267359	C	G	exonic	p.K666N	A	44.41
886	JAK2	PMF	CUX1	chr7:101892266	A	T	exonic	p.I1499F	B	18.81
886	JAK2	PMF	PTPN11	chr12:112891012	C	T	exonic	p.H116Y	C	49.35
886	JAK2	PMF	U2AF1	chr21:44514777	T	G	exonic	p.Q157P	A	20.81
887	CALR	SMF	HMGA2	chr12:66219073	C	T	exonic	p.A8V	C	2.37
887	CALR	SMF	KMT2C	chr7:151878907	C	T	exonic	p.R2013K	C	52.25
888	JAK2	SMF						.		
889	JAK2	SMF	DNMT3A	chr2:25463287	G	A	exonic	p.R736C	A	5.06
889	JAK2	SMF	EZH2	chr7:148514434	T	TTC	exonic	p.P431Nfs*32	A	15.3
889	JAK2	SMF	MPL	chr1:43805067	C	G	exonic	p.P173A	C	50.55
889	JAK2	SMF	NOTCH1	chr9:139391320	C	T	exonic	p.G2291R	C	50.84
890	JAK2	SMF	SMC3	chr10:112361545	T	C	exonic	p.L932P	A	18.57
891	JAK2	SMF	ASXL1	chr20:31022403	C	CACCACTG	exonic	p.C632fs*	A	2.47
891	JAK2	SMF	PPM1D	chr17:58740634	G	C	exonic	p.L513F	C	49.08
891	JAK2	SMF	U2AF1	chr21:44524456	G	T	exonic	p.S34Y	A	7.47

892	JAK2	SMF						.		
893	TN	PMF	ASXL2	chr2:25966512	C	G	exonic	p.K898N	C	49.98
893	TN	PMF	PTEN	chr10:89624062	C	G	exonic	p.R119G‡	C	56.77
894	JAK2	PMF	ATM	chr11:108121562	G	A	exonic	p.R457Q	C	50.18
894	JAK2	PMF	NFE2	chr12:54687121	TG	T	exonic	p.P53Qfs*57	A	8.23
894	JAK2	PMF	TET2	chr4:106164937	T	G	splicing	.	B	2.17
895	MPL	PMF	CALR	chr19:13054699	T	G	exonic	p.V409G	C	51.64
895	MPL	PMF	MPL	chr1:43818306	T	G	exonic	p.Y591D	A	46.24
895	MPL	PMF	MPL	chr1:43818330	C	A	exonic	p.L599M	C	45.26
895	MPL	PMF	TET2	chr4:106156687	C	T	exonic	p.Q530X	A	36.46
899	CALR	PMF	ASXL1	chr20:31022441	A	AG	exonic	p.G646Wfs*12	A	4.46
899	CALR	PMF	NOTCH1	chr9:139399321	G	A	exonic	p.R1608C	C	51.72
901	JAK2	SMF	CHEK2	chr22:29120989	C	T	exonic	p.A233T	B	23.15
901	JAK2	SMF	DNMT3A	chr2:25457243	G	A	exonic	p.R882C	A	20.43
903	MPL	PMF	ASXL1	chr20:31022628	G	T	exonic	p.E705X	A	2.23
904	JAK2	SMF	BCORL1	chrX:129148271	TG	T	exonic	p.A509Pfs*3	A	89.74
904	JAK2	SMF	EED	chr11:85988145	T	A	exonic	p.W364R	C	45.64
904	JAK2	SMF	KMT2D	chr12:49427419	C	T	exonic	p.G3690E	C	47.87
904	JAK2	SMF	TET2	chr4:106157911	AC	A	exonic	p.T938Ifs*14	A	46.02
904	JAK2	SMF	TP53	chr17:7577070	G	A	exonic	p.R290C	C	46.87
905	JAK2	PMF	BCORL1	chrX:129148989	GCAGGAGCCCAT	G	exonic	p.Q748Lfs*3	A	2.19
905	JAK2	PMF	CBL	chr11:119148919	T	C	exonic	p.L380P	A	4.04
905	JAK2	PMF	CBL	chr11:119149372	TG	T	exonic	p.E461Nfs*8	A	3.53
922	JAK2	PMF	ACD	chr16:67691689	A	C	exonic	p.L511R	C	46.87
950	CALR	PMF	SH2B3	chr12:111885299	C	T	exonic	p.T396M	C	46.78
950	CALR	PMF	TET2	chr4:106157112	TCATGTGCAGTCACTGTG	T	exonic	p.H672Wfs*2	A	28.59
950	CALR	PMF	WT1	chr11:32450067	G	A	exonic	p.P249S	A	51.32
951	JAK2	SMF	NFE2	chr12:54686923	CGGCTCACTGAGCAGGCCTGAGA	C	exonic	p.L112Rfs*5	A	2.98
951	JAK2	SMF	RUNX1	chr21:36206725	G	A	exonic	p.P263S	C	47.39
952	CALR	SMF	FBXW7	chr4:153271203	T	G	exonic	p.E192A	A	40.26
952	CALR	SMF	NOTCH1	chr9:139405630	GAGA	G	exonic	p.F853del	C	46.41
952	CALR	SMF	PAX5	chr9:36846850	C	T	exonic	p.R286Q‡	C	48.08
954	CALR	PMF	CUX1	chr7:101870884	CC	GT	exonic	p.S1134C	C	49.34
955	JAK2	SMF	CTCF	chr16:67654637	G	A	exonic	p.G375E	B	37.52
955	JAK2	SMF	KMT2D	chr12:49435227	T	C	exonic	p.Q2109R	C	53.77

960	MPL	SMF	ASXL1	chr20:31022402	TCACCACTGCCATAGAGAGGCGGC	T	exonic	p.E635Rfs*15	A	11.87
960	MPL	SMF	NF1	chr17:29562744	T	TC	exonic	p.R1276Pfs*7	A	2.54
962	CALR	SMF						.		
966	JAK2	SMF	ASXL1	chr20:31023186	G	GT	exonic	p.S892Ffs*1	A	3.16
966	JAK2	SMF	BCOR	chrX:39923788	AG	A	exonic	p.P1101Lfs*11	A	24.43
966	JAK2	SMF	CTCF	chr16:67654709	G	A	exonic	p.R399K	B	22.55
966	JAK2	SMF	EED	chr11:85979559	T	C	exonic	p.Y308H	B	4.23
966	JAK2	SMF	EZH2	chr7:148523665	T	A	exonic	p.N263I	B	4.43
966	JAK2	SMF	IDH1	chr2:209108170	A	C	exonic	p.F227V	C	43.93
966	JAK2	SMF	NOTCH1	chr9:139399225	C	T	exonic	p.A1640T	C	49.29
966	JAK2	SMF	PPM1D	chr17:58740642	C	G	exonic	p.S516X	A	2.79
966	JAK2	SMF	PTPN11	chr12:112891014	T	A	exonic	p.H116Q	B	7.94
966	JAK2	SMF	TET2	chr4:106158100	A	T	exonic	p.K1001X	A	27.46
966	JAK2	SMF	TET2	chr4:106190779	C	T	exonic	p.H1353Y	C	44.07

Checklist for REporting of tumor MARKer Studies (REMARK) guidelines

Introduction 1. State the marker examined, the study objectives, and any prespecified hypotheses.	Introduction section (page 1 lines 29-32)
Materials and Methods **Patients** 2. Describe the characteristics (eg, disease stage or comorbidities) of the study patients, including their source and inclusion and exclusion criteria.	Supplemental Table SI
3. Describe treatments received and how chosen (eg, randomized or rule-based). Specimen characteristics	Not applicable
4. Describe the type of biological material used (including control samples) and methods of preservation and storage.	Supplemental section p2
Assay methods 5. Specify the assay method used and provide (or reference) a detailed protocol, including specific reagents or kits used, quality control procedures, reproducibility assessments, quantitation methods, and scoring and reporting protocols. Specify whether and how assays were performed blinded to the study end point.	Supplemental section p4-8
Study design 6. State the method of case selection, including whether the study design was prospective or retrospective and whether stratification or matching (eg, by stage of disease or age) was used. Specify the time period from which cases were taken, the end of the follow-up period, and the median follow-up time.	Patients and samples section in Material and methods (page 2 lines 37-52), Supplemental section p2 and Supplemental Table 1 for median follow-up
7. Precisely define all clinical end points examined.	Supplemental section p11 : death and leukemic transformation
8. List all candidate variables initially examined or considered for inclusion in models.	Supplemental section p10
9. Give rationale for sample size; if the study was designed to detect a specified effect size, give the target power and effect size.	Supplemental section p8
Statistical analysis methods 10. Specify all statistical methods, including details of any variable selection procedures and other model-building issues, how model assumptions were verified, and how missing data were handled.	Supplemental section p8-12
11. Clarify how marker values were handled in the analyses; if relevant, describe methods used for cutpoint determination.	Not applicable
Results **Data** 12. Describe the flow of patients through the study, including the number of patients included in each stage of the analysis (a diagram may be helpful) and reasons for dropout. Specifically, both overall and for each subgroup extensively examined report the numbers of patients and the number of events.	Supplemental Figure 1 and Supplemental Table 1
13. Report distributions of basic demographic characteristics (at least age and sex), standard (disease-specific) prognostic variables, and tumor marker, including numbers of missing values.	Supplemental Table 1
Analysis and presentation 14. Show the relation of the marker to standard prognostic variables.	Not applicable
15. Present univariate analyses showing the relation between the marker and outcome, with the estimated effect (eg, hazard ratio and survival probability). Preferably provide similar analyses for all other variables being analyzed. For the effect of a tumor marker on a time-to-event outcome, a Kaplan-Meier plot is recommended.	Figure 3 and Supplemental Table 2
16. For key multivariable analyses, report estimated effects (eg, hazard ratio) with confidence intervals for the marker and, at least for the final model, all other variables in the model.	Table I and Supplemental Table 2
17. Among reported results, provide estimated effects with confidence intervals from an analysis in which the marker and standard prognostic variables are included, regardless of their statistical significance.	Table I
18. If done, report results of further investigations, such as checking assumptions, sensitivity analyses, and internal validation.	Sensitivity analysis: Supplemental Tables 2, 4 and 6 External validation: Supplemental Table 5
Discussion 19. Interpret the results in the context of the prespecified hypotheses and other relevant studies; include a discussion of limitations of the study.	Discussion section
20. Discuss implications for future research and clinical value.	Discussion section