JAK2 (V617F) Mutation Reflex Testing

Myeloproliferative neoplasms (MPNs) are a group of blood cancers that cause excess blood cell production in the bone marrow and often in the peripheral blood and are characterized by clonal genetic changes. Classic BCR-ABL1 negative MPNs, such as polycythemia vera (PV), essential thrombocythemia (ET) and primary myelofibrosis (PMF), lack the BCR-ABL1 fusion gene.1

The majority of patients with PV, ET, and PMF have a variant in the JAK2, CALR, or MPL gene, and genetic testing is an important tool for the classification and diagnosis of these disorders. A quantitative JAK2 V617F assay can provide additional information such as whether the allele fraction is very low (as can sometimes be seen in healthy individuals). It can also suggest hemi/homozygosity, as seen more frequently with PV and PMF, and can be used in monitoring disease burden with ruxolitinib therapy.

For detailed information on the testing strategy for MPN, including use of genetic testing for variants in the CALR and MPL genes, see the ARUP Consult Myeloproliferative Neoplasms topic.

Genetics

Variants Detected

JAK2 (V617F) Mutation by ddPCR, Quantitative

- Point mutation c.1849G>T (V617F) of the JAK2 gene (quantitative analysis)

JAK2 Gene, V617F Mutation, Qualitative with Reflex to CALR (Calreticulin) Exon 9 Mutation Analysis by PCR with Reflex to MPL Mutation Detection

- Point mutation c.1849G>T (V617F) of the JAK2 gene (qualitative analysis)
- Exon 9 insertion/deletion mutations in the CALR gene
- W515K, W515L, W515A, and S505N mutations in exon 10 of the MPL gene

JAK2 Gene, V617F Mutation, Qualitative with Reflex to JAK2 Exon 12 Mutation Analysis by PCR

- Point mutation c.1849G>T (V617F) of the JAK2 gene (qualitative analysis)
- Exon 12 mutations in the JAK2 gene, located between codons 537 and 544

Test Interpretation

Analytical Specificity

JAK2 V617F by ddPCR: >99%

Limit of Detection

JAK2 V617F by ddPCR: >0.2%

Featured ARUP Testing

JAK2 (V617F) Mutation by ddPCR, Quantitative 3003751
Method: Droplet Digital PCR (ddPCR)
- Aids in the assessment of suspected MPNs
- Use to detect the JAK2 V617F variant in peripheral blood or bone marrow

JAK2 (V617F) Mutation by ddPCR, Qualitative with Reflex to CALR (Calreticulin) Exon 9 Mutation Analysis by PCR with Reflex to MPL Mutation Detection 3003800
Method: Droplet Digital PCR (ddPCR)/Capillary Electrophoresis
- Aids in the assessment of MPN when diagnosis of essential thrombocythemia or primary myelofibrosis is suspected
- If JAK2 V617F is not detected, then CALR exon 9 variant analysis by PCR and MPL variant detection will be added.

JAK2 (V617F) Mutation by ddPCR, Qualitative with Reflex to JAK2 Exon 12 Mutation Analysis by PCR 3003801
Method: Droplet Digital PCR (ddPCR)/Polymerase Chain Reaction
- Aids in the assessment of MPN when diagnosis of polycythemia vera is suspected
- If JAK2 V617F is not detected, then JAK2 exon 12 mutation analysis will be added.
## Results

**JAK2 V617F Mutation by ddPCR Analysis**

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<thead>
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<th>Result</th>
<th>Interpretive Data</th>
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| Positive       | Evidence of the JAK2 V617F variant  
Results are reported as a percent of mutated alleles versus wild type alleles                                                                                                                                 |
| Low positive   | **JAK2 V617F** T-allele is detected but is below the quantifiable limits of the test                                                                                                                                 |
| Negative<sup>a</sup> | No evidence of the JAK2 V617F variant  
Does not entirely exclude the possibility that a point mutation exists in the sample below the detection limit of the test, nor does it exclude variants other than the V617F variant |

<sup>a</sup>Negative result will reflex to additional genetic testing if reflex testing is ordered.

## Limitations

**JAK2 V617F Mutation by ddPCR Analysis**

- Variants in genes other than JAK2 are not detected. Variant alleles of JAK2 other than V617F (c.1849G>T) are not reported.
- Samples with JAK2 V617F variants below the limit of reporting may not be detected.
- Results of this test must always be interpreted in the context of morphologic and other relevant data and should not be used alone for a diagnosis of malignancy.
- This test is not intended to detect minimal residual disease.

## References


## Related Information

**Myeloproliferative Neoplasms - MPNs**  
**BCR-ABL1 (BCR::ABL1) Qualitative and Quantitative Testing**