MAYO CLINIC
Mayo Medical Laboratories

TEST ID: PVJAK

POLYCYTHEMIA VERA, *JAK2* V617F WITH REFLEX TO *JAK2* EXON 12-15, SEQUENCING FOR ERYTHROCYTOSIS

USEFUL FOR

Aiding in the distinction between the myeloproliferative neoplasm polycythemia vera (PV) and other secondary erythrocytosis

CLINICAL INFORMATION

The Janus kinase 2 gene (*JAK2*) codes for a tyrosine kinase (JAK2) that is associated with the cytoplasmic portion of a variety of transmembrane cytokine and growth factor receptors important for signal transduction in hematopoietic cells. Signaling via JAK2 activation causes phosphorylation of downstream signal transducers and activators of transcription (STAT) proteins (eg, STAT5) ultimately leading to cell growth and differentiation. The *JAK2* V617F is located in exon 14 and present in 50% to 60% of primary myelofibrosis and essential thrombocythemia, and 95% to 98% of polycythemia vera (PV). In the rest of the polycythemia vera cases, over 50 different mutations have been reported within exons 12 through 15 of *JAK2* and essentially all of the non-V617F *JAK2* mutations have been identified in polycythemia vera. These mutations include point mutations and small insertions or deletions. Several of the exon 12 mutations have been shown to have biologic effects similar to those caused by the V617F mutation such that it is currently assumed other nonpolymorphic mutations have similar clinical effects. However, some mutations may not be well characterized and requires further clinical and research evaluation.

INTERPRETATION

The results will be reported as 1 of the 3 following states:

- Positive for *JAK2* V617F mutation
- Positive for *JAK2* mutation (other than V617F)
- Negative for *JAK2* mutations

If the result is positive, a description of the mutation at the nucleotide level and the altered protein sequence are reported.

A positive mutation status is highly suggestive of a myeloid neoplasm and may support a diagnosis of polycythemia vera in the appropriate clinical setting. Correlation with clinicopathologic findings and other laboratory results is necessary in all cases.

A negative mutation status makes a diagnosis of polycythemia vera highly unlikely, although it does not completely exclude this possibility, other myeloproliferative neoplasms or other neoplasms.

REFERENCE VALUES

An interpretative report will be provided.

ANALYTIC TIME

7 days

SPECIMEN REQUIRED

Submit only 1 of the following specimens:

Type
Blood

Container/Tube
EDTA (Lavender) or ACD-B (yellow top)

Volume
3 mL

Type
Bone marrow aspirate

Container/Tube
EDTA (Lavender) or ACD-B (yellow top)

Volume
2 mL

09/2017

CLINICAL REFERENCE

1. Baxter EJ, Scott LM, Campbell PJ, et al: Acquired mutation of the tyrosine kinase JAK2 in human myeloproliferative disorders. Lancet 2005 March 16;365(9464):1054-1061
2. James C, Ugo V, Le Couedic JP, et al: A unique clonal *JAK2* mutation leading to constitutive signaling causes polycythaemia vera. Nature 2005 April 28;434(7037):1144-1148
3. Kralovics R, Passamonti F, Buser AS, et al: A gain-of-function mutation of *JAK2* in myeloproliferative disorders. N Engl J Med 2005;352:1779-1790
4. Steensma DP, Dewald GW, Lasho TL, et al: The *JAK2* V617F activating tyrosine kinase mutation is an infrequent event in both "atypical" myeloproliferative disorders and the myelodysplastic syndrome. Blood 2005;106: 1207-1209
5. Ma W, Kantarjian H, Zhang X, et al: Mutation profile of *JAK2* transcripts in patients with chronic myeloid neoplasias. J Mol Diagn 2009;11:49-53
6. Kilpivaara O, Levine RL: *JAK2* and *MPL* mutations in myeloproliferative neoplasms: discovery and science. Leukemia 2008;22:1813-1817
7. Kravolics R: Genetic complexity of myeloproliferative neoplasms. Leukemia 2008;22:1841-1848