JAK2 (Janus kinase 2) V617F MUTATION
Qualitative detection

For in vitro diagnostic use

CE IVD

ORDERING INFORMATIONS

REF: ONC-011-25 RDM Code: 1699886/R
Tests: 25 Reactions: 31
REF: ONC-011-50 RDM Code: 2256590/R
Tests: 50 Reactions: 62
CND Code: W01060299
Manufacturer: BioMol Laboratories s.r.l.

CONTENTS OF THE KIT

The kit consists of reagents for Real-Time PCR amplification
**the reagents for the extraction of genomic DNA are not supplied in the kit*

PRODUCT CHARACTERISTICS

Device belonging to the family of in vitro medical devices **REAL-TIME QUALITATIVE PCR-SOMATIC MUTATIONS.**
Qualitative detection of V617F mutation of the JAK2 gene (Janus kinase 2) by Real-Time PCR technique. Kit optimized for Real-Time PCR instrumentation Biorad CFX96 Dx, Biorad Opus Dx, Agilent AriaDx, Hyris bCUBE and Hyris bCUBE3 with Hyris bAPP.

SCIENTIFIC BACKGROUND

Myeloproliferative neoplasms (MPNs) are hematologic malignancies characterized by the proliferation of one or more myeloid lineages: granulocytic, erythroid, megakaryocytic, and/or mast cell.
The JAK (Janus Kinases) family of enzymes includes JAK1, JAK2, JAK3, and TYK2. These molecules bind to the cytosolic domains of cytokine receptors and are essential for the message transduction of cytokines and growth factors.
Polycythemia vera (PV), idiopathic myelofibrosis (PMF), and essential thrombocythemia (ET) show shared phenotypic features (MPN BCR/ABL neg) that result from direct or indirect constitutive activation of the related tyrosine kinase JAK2 to the hematopoietic growth factor receptors for erythropoietin (EPOR) and thrombopoietin (MPL) and to the G-CSF (granulocyte colony-stimulating factor) receptor.

CLINICAL SIGNIFICANCE

Direct activation of JAK2 is caused by a point mutation (V617F in JAK2 exon 14 or, less commonly, by insertions or deletions in exon 12 of the JAK2 gene).
Indirect activation, on the other hand, is caused by point mutations in the thrombopoietin receptor, MPL, or by mutations in the CALR chaperone calreticulin (CALR) gene that allow MPL to bind and activate JAK2 indirectly.
The JAK2 V617F mutation results from a guanine-to-thymine substitution at nucleotide 1849 of exon 14 of the JAK2 gene, resulting in a single amino acid valine/phenylalanine substitution at codon 617. The mutation results in ligand-independent JAK2 kinase activity. This mutation can be found in approximately 70% of Philadelphia chromosome-negative MPNs (Ph-MPDs): it is present in 65-95% of PV patients, 23-57% of ET patients, and 35-50 % of patients affected by PMF.
20-30% of patients with polycythemia vera become homozygous for the mutation through a loss-of-heterozygosity mechanism.

§ Cancers (Basel). 2024 Apr 26;16(9):1679. doi: 10.3390/cancers16091679.Advances in Molecular Understanding of Polycythemia Vera, Essential Thrombocythemia, and Primary Myelofibrosis: Towards Precision Medicine
§ Front. Pharmacol., 22 July 2024 Sec. Pharmacogenetics and Pharmacogenomics Volume 15 - 2024
§ Myelofibrosis Blood, 20 APRIL 2023 | VOLUME 141, NUMBER 16 1
§ Diagnostics (Basel). 2023 Jan 3;13(1):163. doi: 10.3390/diagnostics13010163. Molecular Genetics of Thrombotic Myeloproliferative Neoplasms: Implications in Precision Oncology
§ Genetic basis and molecular pathophysiology of classical myeloproliferative neoplasms. Blood. 2017 Feb 9;129(6):667-679. Review.
§ The 2016 revision to the World Health Organization classification of myeloid neoplasms and acute leukemia. Blood. 2016 May 19;127(20):2391-405. Epub 2016 Apr 11.
§ Mutations in MPNs: prognostic implications, window to biology, and impact on treatment decision. Hematology Am Soc Hematol Educ Program.2016 Dec 2;2016(1):552-560.
§ Classification and diagnosis of myeloproliferative neoplasms: the 2008 World Health Organization criteria and point-of-care diagnostic algorithms. Leukemia. 2008 Jan;22(1):14-22. Epub 2007 Sep 20. Review.

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EN ISO 9001 CERTIFICATE
EN ISO 13485 CERTIFICATE

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DESCRIPTION	LABEL	VOLUME		STORAGE
		ONC-011-25	ONC-011-50	
Mix oligonucleotides and probes	Mix V617F JAK2 10X	1 x 85 µl	1 x 170 µl	- 20 °C
Mix buffer and Taq-polymerase	Mix Real-Time PCR 5X	1 x 170 µl	1 x 340 µl	- 20 °C
Deionized H_20	Deionized H_20	2 x 1 ml	2 x 1 ml	- 20 °C
Genomic DNA or recombinant DNA	Positive control 1 MUT 40-70% V617F JAK2	1 x 25 µl	1 x 25 µl	- 20 °C
Genomic DNA or recombinant DNA	Positive control 2 MUT 100% V617F JAK2	1 x 25 µl	1 x 25 µl	- 20 °C
Genomic DNA or recombinant DNA	Positive control 3 WT 100% V617F JAK2	1 x 25 µl	1 x 25 µl	- 20 °C

TECHNICAL CHARACTERISTICS

COD. ONC-011-25 / COD. ONC-011-50

STABILITY	18 months
REAGENTS STATUS	Ready to use
BIOLOGICAL MATRIX	Genomic DNA extracted from whole blood, tissue, cells
POSITIVE CONTROL	Recombinant DNA for at least 3 analytical sessions
TECHNOLOGY	Real-time PCR; oligonucleotides and specific probes; 2 FAM/HEX fluorescence channels
VALIDATED INSTRUMENTS	Biorad CFX96 Dx, Biorad Opus Dx, Agilent AriaDx, Hyris b-CUBE e Hyris b-CUBE3 con Hyris bAPP
RUNNING TIME	110 min
THERMAL CYCLING PROFILE	1 cycle at 95 °C (10 min); 50 cycles at 95 °C (15 sec) + 60 °C (1 min)
ANALYTICAL SPECIFICITY	Absence of non-specific pairings of oligonucleotides and probes; absence of cross-reactivity
ANALYTICAL SENSITIVITY: LIMIT OF DETECTION (LOD)	≥ 0,025 ng of genomic DNA; ≥ 2% JAK2 (MUT) versus JAK2 (WT).
ANALYTICAL SENSITIVITY: LIMIT OF BLANK (LOB)	0% NCN
REPRODUCIBILITY	99,9%
DIAGNOSTIC SPECIFICITY / DIAGNOSTIC SENSITIVITY	100%/98%

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