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Clinical laboratory, molecular and pathobiological (CLMP) criteria for diagnosis of the myeloproliferative neoplasms *JAK2*^{V617F} trilinear polycythemia vera (PV), *JAK2* exon 12 PV and *JAK2*^{V617F}, *CALR* or *MPL* mutated thrombocythemias and myelofibrosis

Jan Jacques Michiels

University Hospitals Antwerp and Brussels, Belgium and Goodheart Institute Rotterdam, Netherlands

The *JAK2*^{V617F} mutated trilinear myeloproliferative neoplasms (MPN) include a broad spectrum of clinical laboratory and bone marrow features in essential thrombocythemia (ET), prodromal polycythemia vera (PV) and erythrocythemic PV, classical PV and advanced stages of masked PV and PV complicated by splenomegaly and secondary myelofibrosis (MF). Heterozygous *JAK2*^{V617F} mutated ET is associated with low *JAK2* allele and MPN disease burden and normal life expectance. In combined heterozygous and homozygous or homozygous *JAK2*^{V617F} mutated trilinear MPN, the *JAK2* mutation load increases from less than 50% in prodromal and early stage PV to above 50% up to 100% in classical PV, advanced PV and PV with MF. Bone marrow histology of megakaryocytes with various degrees of erythrocytic, megakaryocytic and granulocytic (EMG) myeloproliferation in *JAK2*^{V617F} mutated trilinear MPN clearly differ from monolinear megakaryocytic (M) or dual megakaryocytic granulocytic (MG) myeloproliferation in *MPL* or *calreticulin* (*CALR*) mutated thrombocythemia without features of PV. The morphology of clustered large pleomorphic megakaryocytes with hyperlobulated nuclei is similar in *JAK2*^{V617F} thrombocythemia, prodromal PV and classical PV patients. Monolinear megakaryocytic (M) myeloproliferation of large to giant megakaryocytes with hyperlobulated staghorn like nuclei is the hallmark of *MPL515* mutated normocellular thrombocythemia. *CALR* mutated thrombocythemia usually presents with high platelet count around 1000x10 9 /l and normocellular megakaryocytic (M) proliferation of immuture megakaryocytes with so called cloud-like hyperchromatic nuclei followed by dual megakaryocytic granulocytic (MG) myeloproliferation followed by various degrees of bone marrow fibrosis. Natural history and life expectancy are related to the degree of anemia, splenomegaly, myelofibrosis and constitutional symptoms. The acquisition of epigenetic mutations at increasing age independently on top of MPN disease burden predicts unfavorable outcome in *JAK2*^{V617F}, *MPL515* and *CALR* mutated myeloproliferative neoplasms (MPNs), which mutually exclude each other.

Biography

Jan Jacques Michiels worked as Multidisciplinary Internist at Blood Coagulation & Vascular Medicine Center, Netherlands. He is a Professor of Nature Medicine & Health Clinical and Molecular Genetics Blood & Coagulation Research at University Hospitals Antwerp, Brussels. He is also an Editor in Chief of World Journal of Clinical Cases, Editor in Journal of Hematology & Thromboembolic Diseases as well as editor of World Journal of Hematology.

goodheartcenter@outlook.com

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