

**CYTOGENETICS AND JAK2 V617F ANALYSIS  
IN MYELOPROLIFERATIVE NEOPLASMS**

*ANALISIS SITOGENETIKA DAN JAK2 V617F  
PADA NEOPLASMA MYELOPROLIFERATIF*



**Thesis**

**Submitted in fulfillment of the assignment and fit-out requisite for the degree  
of Post Graduate Program Majoring Genetic Counseling Diponegoro  
University Semarang**

**Biomedical Science Magister  
Majoring Genetic Counseling**

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**G4A009012**

**BIOMEDICAL SCIENCE POST GRADUATE PROGRAM  
DIPONEGORO UNIVERSITY**

**2012**

**APPROVAL SHEET**

**THESIS**

**CYTOGENETICS AND JAK2 V617F MUTATION ANALYSIS  
IN MYELOPROLIFERATIVE NEOPLASMS**

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## ACKNOWLEDGEMENTS

At first, my greatest gratitude to Allah SWT for giving me chance to be in this field of study and to do this research. I would like to say my gratitude to enormous number of people who have contributed their skills into this study.

First of all, I would like to express my gratitude to Prof. dr. Sultana MH Faradz, PhD as the head of Genetic Counseling Program, Master of Biomedical Science Post Graduate Program Diponegoro University and Director of Center for Biomedical Research (CEBIOR) Medical Faculty Diponegoro University (MFDU) Semarang, and also as my supervisor for her guidance in the completion of my study. I would like to express my gratitude to dr. Santosa, SpPD, FINASIM, for his guidance and encouragement during this research.

I wish to thank A/Prof. George SH Yeo as the coordinator of my six months-Fellowship in KK Women's and Children's Hospital Singapore and also as the Chief of Obstetrics, dr. Angeline Lai as the Head of Genetic Service, dr. Law Hai Yang, DPhil as the head of laboratory for giving me a great chance to do a part of my research within two months in KKH DNA Diagnostic and Research Laboratory (DDRL). I wish to thank to all of DDRL staffs, especially to Tan Yuen Ming, MSc, PhD for their excellent attitude and patience in sharing their skills and experiences in molecular genetics.

I wish to thank to Dr. Kariadi Hospital, Semarang especially Division of Medical Hematology-Oncology. In particular to Dr. dr. C. Soeharti, SpPD-KHOM, PhD, FINASIM, as the Head of the Division, dr. Santosa, SpPD, FINASIM; dr. Eko Adhi Prasetyo, SpPD who have provided the opportunities to involved with the patients subjects whom were under their responsibilities.

I would like to thank to all the staffs of CEBIOR MFDU : dr. Tri Indah Winarni, MSc, dr. Farmaditya EP Mundhofir, MSi.Med, dr. Muflihatul Muniroh, MSi.Med, dr. Nani Maharani, MSi.Med, dr. Mahayu Dewi MSi.Med, dr. Hermawan Istiadi MSi.Med, dr. Tanjung A. Sumekar MSi.Med, dr. Ferdy C.K

MSi.Med,. Particularly I would like to thank Wiwik Lestari, Lusi Suwarsi, Dwi Kustiyani, Rita Indiarti, Inthus Apriasa, and Evi Nurwulan for sharing their technical skill in DNA preparation and molecular analysis.

I would like to thank to the Director of Telogorejo Hospital for giving permit for the research collaboration. I would thank all the staffs of Cytogenetic Laboratory Telogorejo Hospital Semarang Indonesia, especially to Prof. dr. Sultana MH Faradz, PhD; and Bina Pratiwi for sharing their expertise in bone marrow cytogenetics analysis.

I would like to thank to Dr. dr. C. Soeharti, SpPD-KHOM, PhD, FINASIM, dr. Nyoman Suci Widyastiti, M.Kes, SpPK, Dr. dr. Suhartono, M.Kes; Dr. dr. Andrew Johan, MSi; dr. Neni Susilaningsih, MSi; and dr. Tri Indah Winarni, M.Si.Med, PA as examiner committee for their suggestion to make this manuscript a better thesis.

This research is funded by RISBIN IPTEKDOK 2011 research grant. I would like to thank the committee of RISBIN IPTEKDOK 2011, Ministry of Health, Republic Indonesia.

This master study is funded by Beasiswa Unggulan BPKLN Ministry of Education Republic Indonesia. I wish to thank to the staffs of Beasiswa Unggulan Project especially Dr. Abe Susanto, and Ardina Aprilani, S.Sos the staff of Biomedical Science Post Graduate Program.

I wish to thank to Dean of Medical Faculty Diponegoro University, dr. Endang Ambarwati, SpKFR who permit and support me to complete my master study. My grateful thank for all staffs in Histology Department Faculty of Medicine Diponegoro University for all their supports during this study.

I would like to thank all of the patients and their families that participated in this research. This research would not be possible without their involvement and cooperation.

I would give my special gratitude for my parents and parents in law, my husband, my daughter, my brother and sister and friends who always give me endless encouragement and sincere pray in facing all the obstacles during my study.

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**LIST OF ABBREVIATIONS**

JAK	: Janus Kinase
V617F	: amino acid change from Valine into Phenylalanine at codon 617
ARMS	: Amplification Refractory Mutation System
PCR	: Polymerase Chain Reaction
PV	: Polycythemia Vera
ET	: Essential Thrombocythemia
PMF	: Primary Myelofibrosis
MPN	: Myeloproliferative Neoplasm
GOF	: Gain of Function
STAT	: Signal Transducers and Activators of Transcription
CML	: Chronic Myeloid Leukemia
MDS	: Myelodysplastic Syndromes
TE	: Tris base EDTA
EDTA	: Ethylenediaminetetraacetic acid
WHO	: World Health Organization
ATP	: Adenosine Tri Phosphate
IM	: Imatinib mesylate
NAACCR	: The North American Association of Central Cancer Registries
JH	: JAK homology,

FERM : 4-point-1, Erzin, Radixin, Moesin, JAK2 amino-terminal domain

SH2 : SRC homology 2 domain

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## ABSTRACT

**Background:** Three subtypes of myeloproliferative neoplasms (MPNs): Polycythemia vera (PV), essential thrombocythemia (ET), and primary myelofibrosis (PMF) showed overlapping phenotype. There has been no specific cytogenetic marker identified in these subtypes. JAK2 V617F mutation prevalence in Caucasian MPNs was first reported as 97% in PV, 57% in ET, and 50% in PMF.

**Objective:** This study was done to define the prevalence of JAK2 V617F mutation and to identify cytogenetic markers in MPNs.

**Methods:** The study design was cross-sectional. Patients admitted to Dr. Kariadi Hospital with clinical diagnosis of MPNs who were referred for bone marrow cytogenetic analysis in Telogorejo Hospital were tested for JAK2 V617F mutation using Amplification Refractory Mutation System Polymerase Chain Reaction (ARMS-PCR) from venous peripheral blood. Clinical data were secondary data retrieved from hospital medical records.

**Results:** Cytogenetic abnormality in Semarang MPNs patients was 0%. The prevalence of JAK2 V617F mutation in MPNs patients was 73,68%. Mutation prevalence distribution in each subtypes were 100% in PV, 63,6% in ET and 100% in PMF.

**Conclusion:** There was no visible chromosomal abnormality observed using conventional cytogenetic analysis. More sensitive methods might elucidate submicroscopic chromosomal abnormalities in these patients. The prevalence of JAK2 V617F mutation was comparable with studies in Caucasian. It is recommended that JAK2 V617F testing should be incorporated in the management of MPNs in Indonesia.

**Keywords:** ARMS-PCR, cytogenetic marker, JAK2 V617F, ET, MPN, Philadelphia chromosome, PMF, PV

## **ABSTRAK**

**Latar Belakang:** Tiga subtipe neoplasma myeloproliferatif (NMP), yaitu Polisitemia vera (PV), trombositemia esensial (TE), dan myelofibrosis primer (MFP) menunjukkan fenotipe yang tumpang tindih. Belum ditemukan penanda sitogenetika spesifik untuk PV, TE, dan MFP. Prevalensi mutasi JAK2 V617F pada NMP pertama dilaporkan pada ras Kaukasia sebanyak 97% pada PV, 57% pada TE, dan 50% pada MFP.

**Tujuan:** Penelitian ini bertujuan untuk menentukan prevalensi mutasi JAK2 V617F dan penanda sitogenetika pada pasien NMP.

**Metode:** Desain penelitian ini adalah belah lintang. Pasien di Rumah Sakit Umum Pusat (RSUP) Dr. Kariadi dengan diagnosis klinis NMP yang dirujuk untuk analisis sitogenetika sumsum tulang ke RS Telogorejo telah diperiksa mutasi JAK2 V617F menggunakan Amplification Refractory Mutation System Polymerase Chain Reaction (ARMS-PCR) dari darah vena. Data klinis dan laboratorium merupakan data sekunder yang didapatkan dari catatan medik RS.

**Hasil:** Kelainan sitogenetika pada pasien NMP di Semarang adalah 0%. Prevalensi mutasi JAK2 V617F pada pasien NMP adalah 73,68%. Pada masing-masing subtipe prevalensi mutasi adalah 100 % pada PV, 63,6% pada TE dan 100 % pada MFP.

**Simpulan:** Tidak tampak kelainan kromosom menggunakan analisis konvensional. Metode yang lebih sensitif mungkin dapat mengkonfirmasi kelainan submikroskopis. Prevalensi mutasi JAK2 V617F serupa dengan penelitian pada ras Kaukasia. Deteksi JAK2 V617F direkomendasikan untuk disertakan dalam tata laksana NMP di Indonesia.

**Kata Kunci:** ARMS-PCR, JAK2 V617F, kromosom Philadelphia, MFP, NMP, penanda sitogenetika, PV, TE