Malaysian J Pathol 2018; 40(1) : 41 – 48

ORIGINAL ARTICLE

Plasma-Derived Microparticles in Polycythaemia Vera

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Abstract

Introduction: Microparticles are membrane bound vesicles, measuring less than 1.0 um, which are released during cellular activation or during apoptosis. Studies have shown that these circulating microparticles play a role in coagulation, cell signaling and cellular interactions. Increased levels of circulating microparticles have been observed in a number of conditions where there is vascular dysfunction, thrombosis and inflammation. The objective of this study was to determine the various plasma-derived microparticles in patients with polycythaemia vera (PV) in Universiti Kebangsaan Malaysia Medical Centre and to compare them with normal control. *Methods:* A total of 15 patients with PV and 15 healthy volunteers were included in this cross-sectional descriptive study. Plasma samples from both patients and healthy volunteers were prepared and further processed for isolation of microparticles. Flow cytometry analyses were then carried out in all samples to determine the cellular origin of the microparticles. Full blood count parameters for both groups were also collected. Data collected were analyzed using SPSS version 12.0. *Results:* Patients with PV had a significantly higher percentage of platelet derived microparticles compared to healthy controls ($P < 0.05$). The control group had a higher level of endothelial derived microparticles but the differences were not statistically significant ($P > 0.05$). *Conclusion:* The median percentage of positive events for platelet derived microparticles was higher in patients with PV compared to normal healthy controls.

Keywords: Microparticles, polycythaemia vera, haemostasis, flowcytometry

INTRODUCTION

Microparticles were first described by Wolf in 1967 as "platelet dust", composed of vesicles measuring less than 0.1 micrometer (um) in diameter. Two main cellular processes implicated in the formation of microparticles are cellular activation and apoptosis by chemical or physical stress. Both of these processes lead to cytoskeletal reorganisation, membrane blebbing and generation of microparticles.[1-3] The majority of *in vivo* microparticles are platelet microparticles. Microparticles derived from erythrocytes, granulocytes, monocytes, lymphocytes and endothelial cells are present in lower quantities compared to those derived from platelets.[4] Previous studies have demonstrated that differences exist in these subpopulations of microparticles detected in healthy individuals as compared to those with various diseases. Microparticles are mainly composed of lipids and proteins; their composition depends on the cellular origin as well as the processes which led to their formation.[1] In the resting state, various phospholipid components are distributed asymmetrically within the bilayer of phospholipid which surrounds the microparticles. The disruption of this asymmetrical balance subsequently results in the exposure of negatively charged phospholipids such as phosphatidylserine and phosphatidylethanolamine on the surface of microparticles. This results in a prothrombotic state as phosphatidylserine efficiently binds coagulation factors and promote the formation of activity of tenase and prothrombinase complexes.[5,6] Microparticles formed during cell activation or apoptosis have surfaces which are rich in negatively charged phospholipids that can promote procoagulant activity. Phospholipids on the surface of microparticles derived from platelets and endothelial cells provide binding

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