



## Original article

## Early detection of C-reactive protein and von Willebrand factor levels in Malaysian patients with acute coronary syndrome

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## ABSTRACT

**Background:** Diagnosing acute coronary syndrome (ACS) remains a challenge in patients presenting at early phase of hospitalization. We hypothesized that inflammatory markers of plaque rupture could accurately identifying ACS patients from stable coronary artery diseases (CAD).

**Materials and methods:** The serum and peripheral blood gene expression levels of C-reactive protein (CRP) and von Willebrand factor (vWF) in multiethnic Malaysian patients ( $n = 7$ ) admitted with early hospitalization of ACS was evaluated. Nine patients with stable coronary artery disease without previous history of ACS were enrolled as controls.

**Results:** Serum and peripheral blood mRNA levels of CRP and vWF were significantly higher in ACS compared to control groups ( $P < 0.05$ ).

**Conclusions:** Elevated levels of these markers in ACS may reflect an acute phase response due to endothelial dysfunction. Both CRP and vWF may add to the list of useful markers for early detection of ACS in hospitals of developing countries.

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## 1. Introduction

Acute coronary syndrome (ACS) remains as one of the top causes of mortality and morbidity in both developed and developing countries. Rupture of an atherosclerotic coronary plaque i.e. the 'vulnerable plaque', is the hallmark of acute coronary syndrome.<sup>1</sup> Early identification of a patient during the pathophysiological process of coronary atherosclerotic plaque rupture could improve the risk stratification of patients presenting with ACS, provision of more aggressive treatment strategies to those at the highest risk, and potentially improve their clinical outcomes.

A growing number of studies reported that inflammation plays a crucial role in pathogenesis of atherosclerosis.<sup>2–4</sup> It was reported that the acute phase reactant C-reactive protein to be predictive of future cardiovascular events, including myocardial infarction, ischemic cardiac events or sudden death among patients with angina pectoris.<sup>5</sup> As a marker of systemic inflammation, it is still not known if elevated CRP levels are linked to the inflammatory response associated with endothelial dysfunction as represented by von Willebrand factor (vWF) marker in Malaysian patients with

ACS. It was previously suggested that an increased level of CRP within 6 h after onset of acute myocardial infarction may signify vulnerable plaque rupture instead of a consequence of myocardial damage.<sup>6</sup> In addition, it had been reported that endothelial dysfunction is a critical intermediate phenotype to promote interaction between low-grade inflammation with the likelihood of thrombosis and vessel occlusion.<sup>7</sup> Therefore, our principal objective was to investigate the relationship between CRP and vWF, individually, and in combination, at the earliest clinical opportunity in patients presenting to hospital with ACS. By doing so, we aimed to find out if CRP and vWF can be an index for early identification of ACS among those admitted within 1 h of hospitalization after event.

## 2. Materials and methods

## 2.1. Study participants

We enrolled seven consecutive patients who were admitted to Accident and Emergency Unit of Sarawak General Hospital, Kuching. These patients had clinical characteristics consistent with ACS which associated with transient ST-segment or T-wave changes on standard 12-lead electrocardiogram or raised serum troponin T levels occurring with their typical symptom onset, were recruited

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