



# The old biomarkers you know are still useful: D-dimer and troponin I

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See “Troponin I and D-dimer levels as triaging biomarkers to distinguish acute pulmonary thromboembolism from myocardial infarction” by Soo-Jin Kim, Moo Hyun Kim, Kwang Min Lee, Jin Woo Lee, Young Shin Cha, Da Eun Koh, Joo Yeong Hwang, Jong Sung Park

Acute chest pain and dyspnea remain challenging presentations to diagnose and differentiate in emergency settings. These symptoms can occur in a variety of critical conditions, including acute coronary syndrome, which encompasses non-ST segment elevation myocardial infarction (NSTEMI), as well as acute aortic syndrome (AAS), acute pulmonary thromboembolism (APTE), tension pneumothorax, and esophageal rupture. Although distinguishing between APTE and NSTEMI can be difficult, it is important to identify these conditions promptly and treat them effectively to reduce mortality and improve patient outcomes. D-Dimer (DD), a degradation product of cross-linked fibrin, is widely recognized for its diagnostic value in APTE due to its high negative predictive value. However, DD is not specific and may be elevated in various conditions, including myocardial infarction, infection, cancer, trauma, and other inflammatory diseases [1]. Cardiac troponin I (CTI), a biomarker specific to cardiac tissue, is highly useful for diagnosing myocardial infarction. It can also be elevated in cases of APTE, which may cause right ventricular

dysfunction and myocardial damage [1-3]. Several studies have been conducted to differentiate between APTE and NSTEMI using biomarkers such as DD and CTI [4-6]. Kim et al. [6] demonstrated that DD and CTI are useful in differentiating APTE from NSTEMI. Their study proposed a decision tree model for the differential diagnosis of APTE, based on initial DD levels of 3.18 µg/mL and initial CTI levels of 1.14 ng/mL.

In this issue of *Kosin Medical Journal*, Kim et al. [7] validated the tree model algorithm on an additional dataset by comparing it to a test set including the subjects of a prior study [6]. The estimated accuracy rates for the two sets were notably similar (test set: 91%, validation set: 88.6%). Moreover, Kim et al. [7] introduced a decision-making tree for the rapid diagnosis of APTE or NSTEMI, utilizing an initial DD level of 1.5 µg/mL and an initial CTI level of 0.1 ng/mL. A previous study also indicated that a ratio of DD to CTI with a cutoff value of 1.82 could be clinically useful for distinguishing APTE from NSTEMI [5]. These findings suggest that using both DD and CTI levels is more effective than

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using either marker alone to differentiate between APTE and NSTEMI. The algorithm proposed by Kim et al., or a metric such as the ratio of DD to CTI, appears to be beneficial for quickly determining the next steps, such as whether to perform chest computed tomography or coronary angiography, and for reducing unnecessary coronary angiography. A prior study reported an 11.1% rate of unnecessary coronary angiography in cases of APTE (10/90), which was linked to bleeding complications following thrombolysis [5]. Therefore, in the emergency setting, this decision-making tree for patients with acute chest pain or dyspnea may prevent unnecessary invasive procedures and improve the clinical outcomes of APTE.

Another recent study showed that the ratio of DD to CTI, with a cutoff value of 81.3, may also be useful for differentiating thoracic AAS from NSTEMI [8]. This value of the ratio of DD to CTI was notably higher than that reported in a previous study [5], although the conditions being compared were different (differentiating APTE from NSTEMI or AAS from NSTEMI). An explanation for this discrepancy is that the recent (or latest) study [8] utilized high-sensitivity troponin T (ng/mL) measurements instead of conventional troponin I. Based on these findings, it is advisable to consider not only the troponin unit but also the type of troponin—whether conventional troponin I or high-sensitivity troponin I—when applying these research findings in clinical practice.

Although this study [7] had several limitations, such as its retrospective nature, being a single-center study, and not accounting for the time interval between symptom onset and emergency room visit—which is significant because DD and CTI levels can change over time—the tree model algorithm and the decision-making tree for the rapid diagnosis of APTE or NSTEMI could be beneficial. These tools offer a rapid and straightforward method to reduce misdiagnoses and unnecessary invasive procedures, potentially improving clinical outcomes for patients presenting with acute chest pain and dyspnea by rapidly assessing DD and CTI levels in the emergency setting. Further large-scale prospective studies are required to validate their effectiveness in real-world clinical practice.

## Article information

### Conflicts of interest

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### Author contributions

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