Acute and Stable Ischemic Heart Disease

ARTIFICIAL INTELLIGENCE TO DIAGNOSE ACUTE CORONARY SYNDROMES: INSIGHTS FROM A META-ANALYSIS OF MACHINE LEARNING

Moderated Poster Contributions
Acute and Stable Ischemic Heart Disease Moderated Poster Theater, Poster Hall, Hall C
Saturday, March 18, 2017, 10:15 a.m.-10:25 a.m.

Session Title: Blips, Trops, and Chips: New Ways to Diagnose CAD
Abstract Category: 2. Acute and Stable Ischemic Heart Disease: Clinical
Presentation Number: 1217M-07

Authors: *Thao Huynh, Patrick Iannatonne, Xun Zhao, Philippe Minh Tri Nguyen, McGill Health University, Montreal, Canada*

Background: Machine learning (ML) designates artificial intelligence (AI)-generated algorithms which can improve their own functioning when exposed to new data. In other words, ML enables computers with the ability to learn without being explicitly programmed. Although ML is widely used for several scientific and social applications (adaptive websites, computer visions, internet fraud, finances and marketing…), its potential utility in medicine has not been adequately evaluated. We aim to establish the diagnostic values of ML in acute coronary syndromes (ACS) by pooling the published studies of ML on this subject.

Methods: We searched electronic databases including PubMed, Embase and Web of Science up to September 28, 2016 for studies that evaluated ML for the diagnosis of ACS. We used random-effects meta-analysis models to summarize the studies (MetaDisc Version 1.4).

Results and Interpretation: We retained 13 observational studies which evaluated ML in a total of 12,661 patients. The mean age ranged from 53 years to 63 years. The proportions of females ranged from 23% to 60%. The pooled sensitivity was 92.5% (95% confidence intervals (CI): 91.4%-93.4%), pooled specificity was 63.0% (95% CI: 62.2%-63.9%). The pooled positive likelihood ratio was 5.76 (95% CI: 3.37-9.85) and the pooled negative likelihood ratio was 0.10 (95% CI: 0.07-0.16). The summary diagnostic odds ratio was 65.5 (95% CI: 24.6-174.4). Therefore, a patient identified by ML as having ACS will be at least 3 times more likely to have true ACS and less than one-tenth times likely to have no ACS.

Conclusions: AI using ML algorithms was highly sensitive to identify patients with potential ACS. The excellent sensitivity, likelihood and diagnostic odds ratio suggest that these ML algorithms may be useful to exclude ACS. The relatively low specificity of these algorithms may be further improved with their validations in larger cohorts of patients with ACS.