

中文題目：AI 人工智慧 ECG 判讀在早期發現毛地黃中毒之應用

英文題目：**Deep Learning Algorithm to Detect Digoxin Toxicity by Electrocardiography**

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前言

Although digoxin is important in heart rate control, the utilization of digoxin is declining due to its narrow therapeutic window. Misdiagnosis or delayed diagnosis of digoxin toxicity is common due to the lack of awareness and the time-consuming laboratory work that is involved.

Electrocardiography (ECG) may be able to detect potential digoxin toxicity based on characteristic presentations. Our study attempted to develop a deep learning model to detect digoxin toxicity based on ECG manifestations.

材料及方法

This study included 61 ECGs from patients with digoxin toxicity and 177,066 ECGs from patients in the emergency room from November 2011 to February 2019. The deep learning algorithm was trained using approximately 80% of ECGs. The other 20% of ECGs were used to validate the performance of the AI system and to conduct a human-machine competition. Four cardiologists and five emergency physicians participated in the human-machine competition. Area under the receiver operating characteristic curve (AUC), sensitivity, and specificity were used to evaluate the performance of ECG interpretation between humans and our deep learning system.

結果

The AUCs of our deep learning system for identifying digoxin toxicity were 0.912 and 0.929 in the validation cohort and the human-machine competition, respectively, which reached 84.6% of sensitivity and 94.6% of specificity. Interestingly, the deep learning system using only lead I (AUC = 0.960) was not worse than using complete 12 leads (0.912). Stratified analysis showed that our deep learning system was more applicable to patients with heart failure (HF) and without atrial fibrillation (Af) than those without HF and with Af.

結論

Our ECG-based deep learning system provides a high-accuracy, economical, rapid, and accessible way to detect digoxin toxicity, which can be applied as a promising decision supportive system for diagnosing digoxin toxicity in clinical practice.