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**Validating the Effectiveness of Masked Autoencoder for Dyskalemia
Detection from Electrocardiograms**

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Objectives : Dyskalemia can cause fatal arrhythmias and cardiac arrest in severe cases. We detected dyskalemia quickly and easily using a deep learning-based model using pretrained transformer that has learned electrocardiograms (ECG).

Methods : We collected 12-lead ECGs and serum potassium (K⁺) data from two hospitals between 2006 and 2020. The dataset was divided into training, validation, internal test, and external validation sets. The training set was divided into labeled ECGs with paired K⁺ and unlabeled ECGs without paired K⁺. The other sets contained only labeled data. We employed the Vision Transformer (ViT), pre-training it with the whole training data via Masked Autoencoder. Then, the model was fine-tuned with the labeled training data to screen the hyperkalemia (K⁺ ≥ 5.5 mEq/L) and hypokalemia (K⁺ < 3.5 mEq/L).

Results : The ECGs acquired from 373,265 individuals were used to develop and validate the model. Our pre-trained ViT model demonstrated superior performances, with the areas under the receiver operating characteristic curve (AUROCs) of 0.948 and 0.938 in the internal test set and 0.940 and 0.928 in the external validation set for screening the hyperkalemia and hypokalemia, respectively, surpassing the baseline model evaluated as 0.862, 0.850, 0.871 and 0.830, respectively.

Conclusions : We demonstrated the high diagnostic performance of deep learning models for the noninvasive screening of dyskalemia based on electrocardiograms. The diagnostic performance was improved by fine-tuning using a pretrained transformer. By applying these models in clinical practice, it will be possible to diagnose dyskalemia simply and quickly, thereby contributing to the improvement of patient outcomes.