Abstract: **222**

AI-based strategy enables faster Holter ECG analysis with equivalent clinical accuracy compared to a classical strategy

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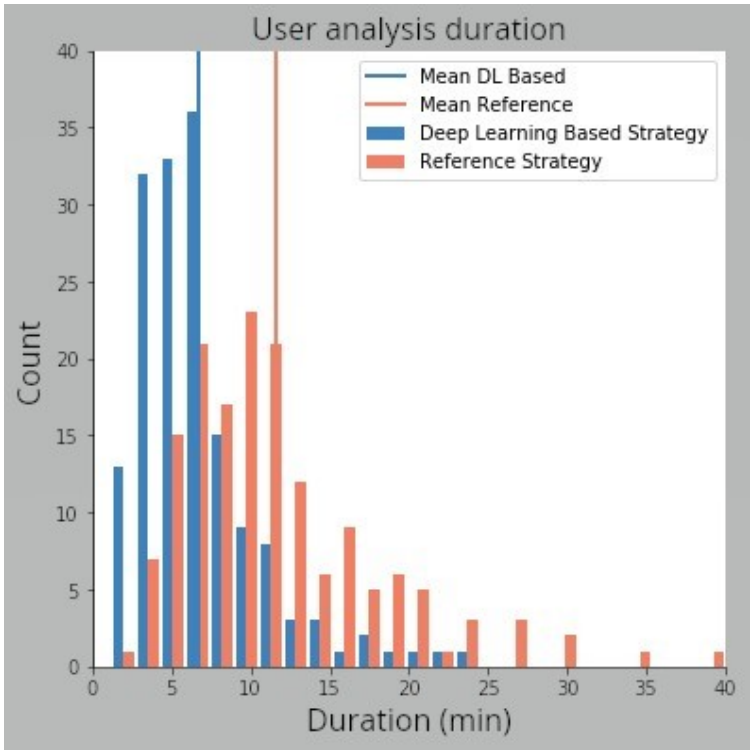
BACKGROUND: Analysis of Holter recordings can be challenging and time-consuming, therefore requiring significant clinical resources in order to achieve a high-quality diagnosis. Such resources depend largely on the qualifications of the person conducting the analysis and the duration of the recordings. A novel Holter analysis platform has been developed, based on deep neural networks trained with a dataset of one million ECGs, to allow fast and reliable Holter recording analysis.

PURPOSE: This study sought to compare the performance of an artificial intelligence (AI)-based Holter analysis platform using deep learning tools with a classical one used on a daily basis in hospitals (the reference). The main endpoints evaluated were duration to complete the analysis by the physician operating it as well as diagnostic accuracy of each strategy, when platforms are used by electrophysiologists (EPs).

METHODS: For this prospective evaluation, a total of 159 Holter recordings (24-hour) were selected from a large Holter dataset from 1 hospital, with a relatively high prevalence of electrical rhythm and conduction disorders. Recordings were analysed by four EPs using independently both the AI-based and classical analysis platforms. All four EPs had no previous experience with the AI-based platform, except for an introductory 6-hour training session. Three EPs had multiple years of experience with the traditional platform, while one EP had limited experience. For each recording, in addition to the analysis duration, diagnostic accuracy was evaluated through the analysis of the presence or absence of predefined cardiac arrhythmias and conduction disorders (prevalence): pauses (25.2%), ventricular tachycardia (VT, 30.2%), atrial fibrillation (AF, 26.4%), high grade atrioventricular block (AVB, 10.1%) and burden of premature ventricular complex larger than 10% (PVC, 23.9%). Definite diagnostics were established by an expert EP after a careful examination of all available analysis reports.

RESULTS: Time required for the AI-based analysis was on average 42% shorter compared to the traditional platform (6.65 min vs 11.5 min, $p < 0.0001$). Regarding accuracy to detect electrical disorders, there was no statistically significant differences between AI-based and classical platforms (AF: 98.7% vs 96.9%, Pause: 99.4% vs 100%, PVC: 98.7% vs 98.7%, VT: 92.5% vs 96.2%, AVB: 98.7% vs 94.3%). CONCLUSION: These preliminary findings suggest that an AI-based strategy to analyse Holter recordings may be highly accurate in detecting cardiac electrical abnormalities, with significant time savings compared to a classical strategy, even for users with no previous experience with the novel AI-based platform. An AI-based Holter analysis platform may contribute to a broader and more resource-efficient adoption of Holter monitoring.


User analysis duration
Mean DL Based
Mean Reference
Deep Learning Based Strategy
Reference Strategy
Count
Duration (min)
0
5
10
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35
40