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Editorial

Evolution of Smart Health Wearables: Novel Application for Detection of Arrhythmia

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▸ See the article "Assessing Accuracy of Wrist-Worn Wearable Devices in Measurement of Paroxysmal Supraventricular Tachycardia Heart Rate" in volume 49 on page 437.

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Widespread adoption of wearable smart devices in health care field has become a new trend that has never been experienced before. An increasing number of devices are entering the market. As a result, both the size and variety of the entire market is on the rise. Many companies are trying to make initiative for popularity of smart health devices and led to a development of brand new smart wearables.

Technology revolution lead the size of devices to become smaller and more suitable to wear during daily activity. Also, the development of the Internet of Things increases the possibility that a large number of devices can be connected directly to health care workers. This technical evolution of smart devices has the potential to provide clinicians with chances to make definitive clinical decisions, beyond simply monitoring their steps, heart rate or sleep status.

The burden of arrhythmic disease is a growing with aging populations and, if not properly diagnosed, can lead to a number of comorbidities. However most of arrhythmia has been challenging to detect as episodes can be sporadic. Conventional office visits electrocardiogram (ECG) or short-term monitoring devices provide only limited value in detecting arrhythmia. This can result in increasing complications. Especially in case of atrial fibrillation (AF), it is associated with increased stroke, leading to increased hospitalization rate and expansion of medical costs. Analysis of Korean national wide cohort data for 10 years by Lee et al.[1] demonstrated that AF-related hospitalization and outpatient clinic visits increased by 2.19- and 3.06-fold, respectively. While the total cost increased from 3.6 to 11.3 billion won. The emergence and rapid growth of mobile health devices has made real time continuous monitoring of heart rhythm possible. As a result, it provides potential tool for early detection of arrhythmia.

The ideal instrument for arrhythmia detection would be noninvasive and provide real-time, accurate heart rhythm recording in a passive fashion. Some studies demonstrated feasibility of mobile single lead ECG recording in diagnosis of arrhythmia.[2] But this type of devices almost always required the user to perform some action for recording and limited to a snapshot of specific episode. In meanwhile, photoplethysmography (PPG) signals can be obtained via smartphone camera or wearable wrist devices such as smartwatches. PPG data

include rate and regularity of heart beats and it can be continuously monitored without user's operation. Prior effort using a PPG based devices for detection of AF exhibited considerable sensitivity and specificity.[3] However diagnosis of arrhythmia using PPG based devices has a significant pitfall. It provided important information of heart rhythm but should be validated with ECG data. Number of studies has been performed for validation of accuracy of PPG based devices. In this article entitled "Assessing Accuracy of Wrist-Worn Wearable Devices in Measurement of Paroxysmal Supraventricular Tachycardia Heart Rate" Hwang et al.[4] showed recording of heart rate with considerable accuracy during supraventricular tachycardia. Probably novel algorithm for improving sensitivity and specificity might be an option for improving diagnosis.[5] Eventually evolution of next generation technology such as deep learning and artificial intelligence could make breakthrough to overcome the obstacles.

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