Cardiovascular risk progression into atrial fibrillation tracked with wearables: a report from mAFA II extension cohort

Y. Guo1, G.Y.H. Lip2

1 Chinese PLA General Hospital, Beijing, China
2 Liverpool Heart and Chest Hospital, Liverpool Centre for Cardiovascular Science, Liverpool, United Kingdom of Great Britain & Northern Ireland

On behalf of mAFA investigators

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Background: Cardiovascular risk, e.g. obstructive sleep apnea (OSA), hypertension, frequent ectopic, are susceptible to atrial fibrillation (AF). Smartwearable-based detection for OSA, ectopics, AF and blood pressure have been tested in mobile health technology supported screening and integrated care for atrial fibrillation (mAFA II programme).

Objective: The present study aimed to investigate the AF occurrence after the cardiovascular risk identified with wearables.

Method: The risk factors which were monitored by wearables are as follows: i) OSA: more than 80% monitoring measures with $15 < \text{apnea-hypopnea index (AHI)} < 30$ during sleep (intermediate risk) or with $\text{AHI} \geq 30$ (high risk); ii) ectopics: the proportion of the premature beats among total monitored heart beats: $0.5\%-10\%$ among over heart beats (intermediate risk) or $>10\%$ premature beat (high risk); iii) High-risk blood pressure (BP): average 24-hour BP $>130/80$ mm Hg, reverse-dippers of BP, and pulse pressure over $60\text{mmHg}$. Subjects aged over 18 years old, who used smart watch/wristband (Huawei Technologies Co., Ltd., Shenzhen, China) across China were enrolled into present study analysis between October 26, 2018 to Dec 14, 2022. The first detection AF episode were analyzed since the subjects were identified with high risk for AF, that was, intermediate- or high risk-OSA, high risk-blood pressure, intermediate- or high risk-ectopic by the wearables.

Results: There were 4.37 million subjects (78.6% male, mean age, SD, $37 \pm 13$ years) involving in the screening programme of mAFA II extension cohort. Among these, 611495 intermediate-risk ectopic, 5037 high-risk ectopic, 43777 intermediate-risk OSA, 22886 high-risk OSA, and 25892 high-risk blood pressure were identified (Figure 1). The rates of progressed into AF from identified cardiovascular risk were as follows: $0.97\%$ (5936/611495) of 611495 intermediate-risk ectopic, $4.80\%$ (242/5037) of high-risk ectopic, $1.09\%$ (475/43777) of intermediate-risk OSA, $1.51\%$ (345/22886) of high-risk OSA, and $1.74\%$ (450/25892) of high-risk blood pressure, respectively. Subjects identified with high-risk blood pressure were much likely to be early monitored with AF episode than other risk, with time to first AF (median, interquartile) of 10 (3-56) days ($p<0.05$). However, the above cardiovascular risk was possibly progressed into AF episode during five months.

Conclusion: Smartwearables facilitated the detection of risk factors, OSA, hypertension, frequent ectopic, which might progressed into AF during five months, calling for the effective proactive management on cardiovascular risk to reduce AF burden.