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Signed:/Date 31st January 2018

Print Name: Marek Malik



Imperial College London

National Heart and Lung Institute

**Peng-Sheng Chen, MD,
Editor-in-Chief
Heart Rhythm**

31st January 2018

Dear Dr Chen,

Thank you for your invitation to write an editorial comment to accompany the manuscript JHRM-D-17-01370R2 "Prognostic Significance of Ventricular Late Potentials in Patients with Pulmonary Sarcoidosis" by Yodogawa et al.

My co-authors and I very much hope that the text which we are submitting will satisfy your expectations and that it will be of interest to the readers of the Journal.

In anticipation, many thanks for considering our submission.

With all best wishes,
Yours sincerely,



Marek Malik

Noninvasive electrophysiology in risk assessment and screening

by

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Short title

Noninvasive electrophysiology

No conflict of interest

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Invasive electrophysiology has substantially advanced over previous years. Procedures such as defibrillator implantations or pulmonary vein isolation that have previously been an exclusive domain of major centers are presently available from many small clinics. This somewhat contrasts with general perception of noninvasive electrophysiology. Whilst substantial noninvasive research advances have been reported, their wide utility in clinical practice is not forthcoming. Some teaching centers even believe that noninvasive electrophysiology including electrocardiography is not worth teaching and that standard electrocardiographic diagnoses can rely on computerized diagnoses by modern equipment.

At the same time, existing research suggests that noninvasive electrophysiology can address a wide spectrum of unmet clinical needs. In addition to the distinction between patients benefitting and not benefitting from defibrillator implantation[1] and diagnosis of channelopathies[2], advanced electrocardiography was reported to aid stratification of patients with both cardiovascular and non-cardiovascular diagnoses, including kidney disease[3], diabetes[4], endocrinopathies[5], and others[6].

In this issue of the Journal, Yodogawa et al[7] add another piece to this mosaic showing possible advantages offered by high-resolution electrocardiography to early diagnosis of cardiac sarcoidosis. Using simple assessment of late potentials previously designed to detect large proarrhythmic ischemic scars, they predicted the risk of sarcoidosis-related cardiovascular events, albeit merging rhythm disturbances and hemodynamic dysfunction. The mechanistic link between positive late potentials and the nature of events described by Yodogawa et al is not easy to see. The finding thus likely means nonspecific identification of cardiac sarcoidosis which might cause variety of abnormalities. Regrettably, Yodogawa et al have also not employed any of the more advanced methods for the signal analysis reported to detect not only late depolarization abnormalities but also deformities well within the QRS complex [8,9]. We can only speculate that if these more powerful methods were used, the success reported by Yodogawa et al would have been stronger. Still, even with the simpler signal analyses, the report broadens the applicability of noninvasive methods.

Naturally, not all previous attempts of clinical outcome improvements by noninvasive electrophysiology have been successful[10]. Nevertheless, considering the disparity between research results and day-to-day clinical application, we share the opinion that noninvasive electrophysiology methods do not presently receive due attention in studies that define evidence-based care. The simplicity of obtaining high quality digital electrocardiographic

signals and their low costs make noninvasive electrophysiology suitable to be included not only in large clinical studies but also in new population screening programs. For example, evidence suggests that noninvasive electrophysiology can meaningfully contribute to the identification of patients in whom sudden cardiac death is the first manifestation of ischemic heart disease[11,12,13], as well as to the detection of impending atrial fibrillation[14], which are both major challenges of present preventive cardiology.

To connect the clinical day-to-day practice with reported research results, new large prospective investigations are needed. Their successful conduct will depend not only on the understanding of the potential of noninvasive methods by funding bodies but also on the industrial support and on the acceptance by clinical community. The manufacturers of noninvasive equipment should facilitate the collection of high quality electrocardiographic signals well above the standard 10-second recordings and the storage of digital signals in easily accessible formats. The clinical community involved in future studies should appreciate the potential value of high quality signal collection. Far too frequently are electrocardiographic recordings obtained in ongoing studies stored only as paper prints which precludes their advanced analyses. The designers of future prospective studies can only gain from involving specialists in noninvasive electrophysiology.

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