**T-Wave Morphology Changes as Surrogate for Blood Potassium Concentration in Hemodialysis Patients**

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**Introduction.** Patients at end-stage renal disease (ESRD) undergoing hemodialysis (HD) are at high cardiovascular mortality risk due to potassium concentration ([K⁺]) changes out of normal ranges. The assessment of [K⁺] levels is limited as it can only be performed through blood tests in a hospital environment. Since [K⁺] levels are reflected on the T-wave in the electrocardiogram (ECG) signal, we hypothesized the T-wave morphology could be used to monitor [K⁺] changes in ESRD patients during HD. The aim of this study was to investigate whether \( d_w \), a time-warping-based ECG marker of T-wave morphology changes, with known association with ventricular repolarization dispersion, can monitor changes in [K⁺] levels.

**Methods.** We used 48-h long ECG recordings and [K⁺] measurements from a set of blood samples collected from 12 ESRD patients undergoing HD. An average T-wave (ATW) was obtained every hour of the ECG recordings and a reference T-wave was taken at the end of the HD session. The morphological changes between each ATW and the reference one were quantified with \( d_w \). The relative variations (\( \Delta[K⁺] \)) in [K⁺] with respect to the reference values (end of treatment), during the HD session were computed. Spearman’s correlation was computed between \( d_w \) and \( \Delta[K⁺] \).

**Results.** The Figure shows the evolution of the distribution of \( \Delta[K⁺] \) and \( d_w \) during the HD session across all patients. The values of \( d_w \) were significantly correlated with \( \Delta[K⁺] \) (median [interquartile range] correlation coefficient of 0.95[0.15]).

**Conclusions.** T-wave morphology changes, quantified by \( d_w \), exhibit high correlation with [K⁺] changes. The results of this study support the use of \( d_w \) to track changes in [K⁺] in ESRD patients undergoing HD.