ARCHIVES OF THE TURKISH SOCIETY OF CARDIOLOGY

Official journal of the TURKISH SOCIETY OF CARDIOLOGY

# Reply to the Letter: Frontal QRS-T Angle in Hemodialysis

## Editöre Mektup Yanıtı: Hemodiyalizde Frontal QRS-T Açısı

**LETTER TO THE EDITOR REPLY**
EDİTÖRE MEKTUP YANITI

To the Editor,

We sincerely thank the author for the valuable comments regarding our study on the prognostic value of the frontal QRS-T angle (fQRSTa) in hemodialysis patients.[1] The relationship between repolarization markers and long-term outcomes is an important area of research, and we welcome the opportunity to clarify several points.

First, we acknowledge the concern about using a single electrocardiogram (ECG) recording. Because our study was retrospective, serial or intradialytic ECGs were not available. We agree that repeated measurements would better reflect the rapidly changing electrical environment in hemodialysis.[2] Future prospective studies incorporating serial ECG recordings are essential to address this limitation. Second, although cause-specific mortality could provide more mechanistic information, reliable classification of arrhythmic versus non-arrhythmic death was not possible in our dataset. To avoid misclassification, we used all-cause mortality, as noted in our limitations. Still, we concur that analyses stratified by mortality mechanisms would meaningfully enhance future research. Evidence from previous studies in the literature also supports a broader interpretation of fQRSTa. Fragmented QRS, another conduction abnormality, has been shown in a previous study to predict ventricular arrhythmias in hemodialysis patients, reflecting the electrical vulnerability of this population.[3] These findings reinforce the concept that ventricular depolarization and repolarization markers may interact and collectively reflect structural-electrical remodeling. Similarly, in ischemic stroke patients, Usalp and Bağırtan demonstrated that an increased frontal QRS-T angle independently predicted five-year mortality, suggesting that its prognostic implications extend beyond dialysis-dependent populations.[4] In addition, a recent 36-month study in patients with type 2 diabetes mellitus showed that fragmented QRS independently predicted major cardiovascular events, linking it to myocardial fibrosis and chronic inflammation.[5] Together, these findings indicate that both fragmented QRS and the frontal QRS-T angle are simple, practical, and clinically useful tools for risk assessment.

In conclusion, we sincerely appreciate the constructive feedback. The points raised support our view that prospective studies with serial ECG recordings and cause-specific mortality data are needed to better define the prognostic role of fQRSTa in hemodialysis patients.

**Çağlar Kaya**[1]
**Mustafa Ebik**[1]
**Cihan Öztürk**[1]
**Merve Akbulut Çakır**[1]
**Emirhan Çakır**[1]
**İlhan Kılıç**[2]

[1]*Department of Cardiology, Trakya University, Edirne, Türkiye*
[2]*Department of Nephrology, Çanakkale Onsekiz Mart University, Edirne, Türkiye*

**Corresponding author:**
Çağlar Kaya
✉ caglarkaya2626@gmail.com

**Cite this article as:** Kaya Ç, Ebik M, Öztürk C, Akbulut Çakır M, Çakır E, Kılıç İ. Reply to the Letter: Frontal QRS-T Angle in Hemodialysis. *Turk Kardiyol Dern Ars.* 2026;54(1):78.

DOI: 10.5543/tkda.2025.97940



### References

1. Arslan GY. Frontal QRS-T Angle in Hemodialysis. *Turk Kardiyol Dern Ars*. 2026;54(1):76–77.
2. Kaya Ç, Ebik M, Öztürk C, Akbulut Çakır M, Çakır E, Kılıç İ. Frontal QRS-T Angle as a Prognostic Marker of Long-Term Mortality in Hemodialysis Patients. *Turk Kardiyol Dern Ars*. 2025;53(7):510-517. [CrossRef]
3. Kardaş F, Taylan G, Kaya Ç, Kurultak İ. Presence of Fragmented QRS may be Associated with Ventricular Arrhythmias in Hemodialysis Patients. *Eskisehir Med J*. 2022;3(2):92-100. [CrossRef]
4. Usalp S, Bağırtan B. A Novel Electrocardiographic Marker for Predicting Total Mortality in Ischemic Stroke: Frontal QRS-T Angle. *Turk Kardiyol Dern Ars*. 2025;53(1):29-34. [CrossRef]
5. Çetin Ş, Bayraktar A, Demiröz Ö, Karabay KÖ, Yalçınkaya E. Fragmented QRS as a Predictor of Cardiovascular Events in Patients with Type 2 Diabetes Mellitus: A 36-Month Follow-Up Data. *Anatol J Cardiol*. 2024;28(4):208-212. [CrossRef]