



## DIABETES/PREDIABETES/HYPOGLYCEMIA - LATE BREAKING ABSTRACTS

### Metabolic and Hepatic Phenotype Changes After Trikafta Initiation in Adults with Cystic Fibrosis



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**Background:** We evaluated associations between transient elastography and serum fibrosis indices, and examined longitudinal links between glycemic changes and hepatic markers following Trikafta initiation in adults with cystic fibrosis.

**Methods:** We retrospectively analyzed 68 adults with CF who underwent transient elastography with APRI and Fib-4 within 90 days. Pearson correlations assessed liver stiffness (kPa), CAP, and serum fibrosis indices. In 11 patients with pre- and post-Trikafta scans, annualized slopes evaluated changes in kPa and CAP. Associations between changes in HbA1c, BMI, and hepatic parameters were also examined.

**Results:** Among 68 adults (59 Trikafta-treated, 9 untreated), liver stiffness correlated with APRI overall ( $r=0.361$ ,  $p=0.005$ ) and in treated patients ( $r=0.337$ ,  $p=0.016$ ), confirming concordance between elastography and serum fibrosis indices. kPa and Fib-4 correlation was not significant ( $r=0.247$ ,  $p=0.066$ ). In untreated patients, CAP and Fib-4 showed a near-significant association ( $r=0.804$ ,  $p=0.053$ ). In 11 paired pre-/post-Trikafta patients, CAP declined peri-initiation ( $-11.103$  CAP/yr) and during follow-up ( $-8.581$  CAP/yr). Liver stiffness decreased before initiation ( $-0.125$  kPa/yr) but increased modestly afterward ( $0.195$  kPa/yr), indicating dynamic hepatic remodeling. Changes in HbA1c correlated with APRI ( $r=0.822$ ,  $p=0.023$ ) and Fib-4 ( $r=0.973$ ,  $p=0.002$ ); CAP correlated with HbA1c ( $r=0.624$ ,  $p=0.013$ ); BMI change correlated negatively with CAP ( $r=-0.668$ ,  $p=0.035$ ).

**Discussion/Conclusion:** In adults with CF, liver stiffness correlates with APRI, supporting noninvasive fibrosis monitoring. After Trikafta, CAP declined while stiffness showed dynamic changes. Worsening glycemia strongly correlated with increased serum fibrosis indices, suggesting metabolic changes may influence hepatic phenotype. These findings highlight the importance of glycemic and metabolic monitoring in CF care, and larger prospective studies are needed to clarify causal links and long-term hepatic outcomes.

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### Attention-Augmented Temporal Fusion Transformer for Short-Horizon Hypoglycemia Prediction in Type 1 Diabetes



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**Background:** Type 1 Diabetes Mellitus (T1DM) is a chronic condition where insulin deficiency and frequent hypoglycemia remain barriers to glycemic control. Clinical prediction tools like threshold detection underperform due to physiologic variability, and high false alarm rates causing alarm fatigue. Artificial intelligence (AI) advancements offer significant potential for improved hypoglycemia prediction.

**Methods:** The T1DiabetesGranada dataset includes continuous glucose measurements, biochemical parameters, and demographic information from 736 adults with T1DM, covering 257780 patient-days. A Temporal Fusion Transformer with attention mechanisms and temporal convolutional layers was trained to map multimodal signal features to short-term glucose trajectories. Machine learning optimization and cross validation enhanced predictive accuracy. Model performance assessed on unseen subjects and compared against glucose-only neural networks and clinical threshold methods for 30-minute hypoglycemia forecasting.

**Results:** The TFT model achieved a 30-minute hypoglycemia prediction accuracy of 91.2% (AUC = 0.94), outperforming existing glucose-only methods (AUC = 0.81,  $p < 0.001$ ) while reducing false alarms by 42%. Key predictive features included temporal patterns and cross-signal interactions captured by the attention mechanism. Compared to conventional glucose only deep learning models, the TFT showed greater sensitivity to early physiologic changes preceding hypoglycemia. Against clinical threshold based detection models, it achieved substantially fewer false positives and better detection during nocturnal and rapid glycemic fluctuations. Performance remained consistent across a clinically relevant range of glycemic control (HbA1c 6.5–8.5%). Real-time inference on a mobile device averaged 0.12 seconds per prediction, supporting continuous wearable deployment.

**Discussion/Conclusion:** The attention-augmented Temporal Fusion Transformer significantly improves short-horizon hypoglycemia prediction compared to existing methods. By drastically decreasing false alarm rate, while maintaining high prediction accuracy, our method offers a scalable solution for anticipatory glucose management in T1DM. These results highlight the potential of transformer-based AI models to provide clinically reliable, real-time decision support, reducing hypoglycemic burden while improving safety and reliability.

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### Euthyroid Sick Syndrome (Low T3 Without Thyroid Dysfunction) as a Predictor of Diabetic Kidney Disease Progression



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