PHENYLALANINE MEASUREMENT BIOSENSOR DESIGN FOR USE AS A BEDSIDE TESTER

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- ✓ Carbon nanotube
- ✓ Flower-like enzyme
- ✓ Phenylalanine

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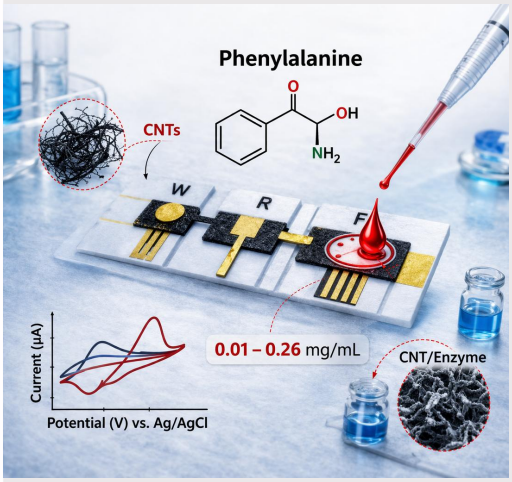

THESIS ABSTRACT

Phenylketonuria is an inherited metabolic disorder caused by impaired phenylalanine metabolism. Since elevated phenylalanine levels in the blood can lead to severe neurological damage, rapid and reliable measurement methods are of great clinical importance.

In this study, a strip-based electrochemical biosensor incorporating carbon nanotube-modified electrodes was developed. The sensor demonstrated a linear response within the range of 0.01–0.26 mg/mL, indicating its suitability for point-of-care applications.

APPLICATION AREAS OF THE THESIS RESULTS

The developed electrochemical biosensor provides rapid and reliable measurement for the diagnosis and monitoring of phenylketonuria, offering a platform suitable for clinical applications and point-of-care testing systems.

Furthermore, the proposed electrode design and enzyme immobilization strategy can be adapted for the detection of various biomolecules, contributing to the development of portable and personalized diagnostic systems.

ACADEMIC ACTIVITIES

- Özmen, S. Ü., Özarda, Y., Köseler, A., Sabırlı, R., Kaynak, D. S., & Koç, İ. (2025). Association of FV G1691A, FV H1299R, and FII G20210A variations with thrombosis and coronary artery disease (CAD): A population-based study. Journal of Medical Biochemistry.
- Altın, H., Özmen, S. Ü., & Türk, B. (2025). Can new laboratory parameters be added for clinical scoring systems to determine the severity of RSV bronchiolitis? Turkish Journal of Biochemistry.
- Koç, İ., Özmen, S. Ü., & Deniz, O. (2023). Vaccine effectiveness against the B.1.617.2 in the intensive care unit. Medicine.
- Koç, İ., Deniz, O., Özmen, S. Ü., & Bulut, S. (2023). Predicting acute pulmonary embolism in COVID-19. Medicine
- Koç, İ., Yıldız, Ö., Babalık, M., Işıgıbol, R. Ö., Özmen, S. Ü et al.. (2023). Diagnosis of COVID-19 in patients with acute pulmonary embolism. The Tohoku Journal of Experimental Medicine.
- Koç, İ., & Özmen, S. Ü. (2022). Eosinophil levels, neutrophil-lymphocyte ratio, and platelet-lymphocyte ratio in the cytokine storm period of patients with COVID-19. International Journal of Clinical Practice. Özmen, S. Ü., & Özarda, Y. (2021). Stability of hematological analytes during 48 hours storage at three temperatures using Cell-Dyn hematology analyzer. Journal of Medical Biochemistry.
- Özmen, S. Ü. (TÜBİTAK). Yoğun bakım hastalarında uygulanan konfor bakım paketinin hastaların konfor düzeyi ve fizyolojik parametrelerine etkisi. (Yardımcı araştırmacı)