



## Monitoring Selected Pregnancy Hormones during First Trimester using Electrochemical Biosensors

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### ABOUT THE STUDY

Monitoring pregnancy hormones is crucial during the first trimester of pregnancy for early detection of potential complications. These hormones include Human Chorionic Gonadotropin (hCG), progesterone (P4), and estradiol (E2), which play a critical role in the maintenance of pregnancy. Electrochemical biosensors have emerged as a promising technology for the detection and monitoring of these hormones due to their high sensitivity, selectivity, and rapid response time. This discusses a study article that aimed to provide an overview of the current state of electrochemical biosensors for monitoring selected pregnancy hormones during the first trimester.

The study provides a comprehensive overview of the recent developments in electrochemical biosensors for monitoring hCG, P4, and E2 during the first trimester of pregnancy. The study covers various types of electrochemical biosensors, including amperometric, potentiometric, and impedimetric biosensors, and their advantages and limitations. The study also discusses the different types of electrodes used in electrochemical biosensors, such as screen-printed electrodes, carbon nanotube electrodes, and graphene-based electrodes, and their impact on sensor performance. Finally, the study provides an overview of the different strategies for immobilizing biomolecules on the electrode surface, including physical adsorption, covalent attachment, and entrapment, and their influence on biosensor sensitivity and stability.

The study highlights several examples of electrochemical biosensors for monitoring hCG, P4, and E2 during the first trimester of pregnancy. For example, a screen-printed carbon electrode modified with gold nanoparticles and chitosan was used to detect hCG in urine samples with a limit of detection of 0.22 mIU/mL. A graphene-based electrochemical sensor was used to monitor P4 levels in saliva samples with a limit of detection of 0.001 ng/mL. An impedimetric biosensor based on

immobilized antibodies was used to monitor E2 levels in serum samples with a limit of detection of 0.1 pg/mL. The study also highlights the advantages and limitations of each type of electrochemical biosensor and the different immobilization strategies used to improve sensor performance.

One of the strengths of this article about the current state of electrochemical biosensors for monitoring pregnancy hormones during the first trimester. The study covers a wide range of electrochemical biosensors, electrodes, and immobilization strategies, providing a detailed understanding of their advantages and limitations. The study also highlights the potential applications of electrochemical biosensors for early detection of pregnancy complications, such as pre-eclampsia and gestational diabetes. However, the study has some limitations that need to be considered. First, the study only focuses on electrochemical biosensors and does not cover other types of biosensors, such as optical biosensors or surface plasmon resonance biosensors. Second, the study only covers a limited number of studies, and further studies are needed to validate the performance of electrochemical biosensors for monitoring pregnancy hormones.

The findings of this study suggest that electrochemical biosensors have great potential for monitoring pregnancy hormones during the first trimester of pregnancy. Electrochemical biosensors offer several advantages over traditional laboratory-based assays, including high sensitivity, selectivity, and rapid response time. Electrochemical biosensors could also be integrated into wearable devices, enabling continuous monitoring of pregnancy hormones and early detection of potential complications. The use of electrochemical biosensors could also reduce the need for frequent blood draws, which can be uncomfortable and time-consuming for patients. Future studies should investigate the performance of electrochemical biosensors in larger clinical studies to validate their potential for early detection of pregnancy complications.

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