Chip-Based Detection Of Diabetes Related Biomarkers

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Technology description

Researchers at UC San Diego have developed a disposable electrochemical chip platform for on-the-spot monitoring of multiple diabetes-relevant biomarkers found in human blood, saliva and interstitial fluid. In an exemplary embodiment, a dual-marker biosensor integrates enzyme and antibody-based assays for simultaneous electrochemical measurements of insulin (I) and glucose (G). Simultaneous G/I sensing was realized by addressing key fabrication and operational challenges associated with the different assay requirements and surface chemistry. The I immunosensor relies on a peroxidase-labeled sandwich immunoassay, while G is monitored through reaction with glucose oxidase. The dual diabetes biomarker chip offers selective and reproducible detection of picomolar I and millimolar G concentrations in a single microliter sample droplet within less than 30 min, including direct measurements in whole blood and saliva samples.
A major goal in disease screening, diagnosis, and control has been to develop bioassay platforms capable of simultaneous measurements of different analytes in a single assay. Significant advances toward multiplexed biomarker detection chips based on either immunoassays or enzymatic bioassays have thus been reported. However, the combination of enzymatic and immunoassay sensing into a single disposable system has hitherto not been addressed.

Related Materials

Eva Vargas, Hazhir Teymourian, Farshad Tehrani, Ece Eksin Esther Sánchez-Tirado, Paul Warren, Arzum Erdem, Eyal Dassau, Joseph Wang. "Enzymatic/Immunoassay Dual-Biomarker Sensing Chip: Towards Decentralized Insulin/Glucose Detection". Angew. Chem. Int. Ed. 58 (2019) 6376-6379 https://doi.org/10.1002/anie.201902664

Application area

Personalized, point-of-care multiplexed biomarker detection

Advantages

Inexpensive, wearable integrated enzymatic-immunoassay biosensor

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