Journal of Diabetes Science and Technology
Volume 1, Issue 2, March 2007

ORIGINAL ARTICLES

How to Design a Biosensor

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Abstract

Amperometric sensors for continuous glucose monitoring could prevent acute and chronic complications of diabetes, but research is needed to improve accuracy and stability. In designing sensors, interference from non-glucose analytes can be minimized by use of filtration membranes or electron transfer mediators that allow polarization at low potentials. If oxygen is required for the enzymatic reaction with glucose, then the outer permselective membrane must have substantial oxygen permeability. For this reason, during development of permselective membranes, permeability studies (such as performed by Tipnis and colleagues in this issue) can be used to measure transport of glucose and oxygen and optimize membrane structure. Tipnis and colleagues present a novel biosensor based with separate layers for glucose-oxygen permselectivity, enzymatic conversion, and avoidance of interference. They also address sensor stability, in part by comparing sensor function during ascending vs descending glucose levels. By measuring the difference, they were able to minimize this aspect of instability (hysterisis), which assisted them in selecting a promising permselective membrane based on iron and humic acid.

J Diabetes Sci Technol 2007;1(2):201-204

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Abbreviations: (PPD) poly(phenylene diamine)

Keywords: biosensor, glucose, diabetes, design

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