



US005139023A

# United States Patent [19]

[11] Patent Number: 5,139,023

Stanley et al.

[45] Date of Patent: Aug. 18, 1992

- [54] APPARATUS AND METHOD FOR NONINVASIVE BLOOD GLUCOSE MONITORING
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- [21] Appl. No.: 360,876
- [22] Filed: Jun. 2, 1989
- [51] Int. Cl.<sup>5</sup> ..... A61B 5/00
- [52] U.S. Cl. .... 128/637; 128/760; 128/763; 128/768; 604/289; 604/290
- [58] Field of Search ..... 128/760, 767, 632, 637, 128/763; 604/289, 290, 304, 307, 20, 896; 514/975

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[57] **ABSTRACT**

The present invention is directed to novel methods and apparatus for noninvasive blood glucose monitoring. Blood glucose is monitored noninvasively by correlation with amount of glucose which permeates an epithelial membrane, such as skin or a mucosal membrane, into a glucose receiving medium over a specified time period. The glucose receiving medium preferably includes a glucose permeation enhancer capable of increasing the glucose permeability across the epithelial membrane. The glucose receiving medium is positioned against the epithelial membrane so that the permeation enhancer alters the permeability of the membrane. After sufficient time delay, the glucose receiving medium is removed and analyzed for the presence of glucose using conventional analytical techniques.

The apparatus within the scope of the present invention includes means for supporting the glucose receiving medium. Such means for supporting the glucose receiving medium may include a housing defining a receiving chamber therein which holds the glucose receiving medium and an opening to the receiving chamber. The means for supporting the glucose receiving medium may also include a hydrogel. The apparatus also preferably includes means for temporarily positioning the glucose receiving medium against the epithelial membrane.

62 Claims, 19 Drawing Sheets

