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Development of a noninvasive technique for monitoring glucose levels in saliva by sequential injection determination

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Diabetes is a serious, chronic disease of public health concern, one of four priority noncommunicable diseases targeted for world action [1]. Overall, 422 million adults were estimated to live with diabetes with a prevalence of 8.5% in the adult population. WHO projects that diabetes will be the 7th leading cause of death in 2030 [2]. Both, diagnosis and monitoring can be accomplished through testing of blood sugar (glucose) levels. Saliva as a matrix to diagnose and surveillance of systemic illnesses and general health has been arousing great interest worldwide being a highly desirable goal in healthcare [3]. The main advantages of saliva is that is a noninvasive, stress-free, inexpensive, simple method. Moreover, sampling and handling of an oral fluid is safer for the operator and the patient, no special training or equipment is needed, and can be self-collect, if required. In this work, a colorimetric flow injection method is described for the fast screening of glucose in saliva samples. The method is based in the use of dinitrosalicylic acid reagent for determination of reducing sugar described by Miller [4]. The reaction involves the oxidation of the aldehyde functional group present in glucose. Simultaneously, 3,5-dinitrosalicylic acid (DNS) is reduced to 3-amino, 5-nitrosalicylic acid under alkaline conditions, and the colour development was measured at 575 nm. Salivary glucose levels of non-diabetic healthy and with diabetes mellitus individuals were determined and correlated with blood glucose concentrations obtained in clinical context. The developed method enabled the glucose determination in the dynamic range of 50 – 250 mg/L, with a determination rate of 28 h⁻¹. The results agreed with those obtained by the reaction colorimetric batch procedure, and recovery tests confirmed its accuracy.

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