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SYMPOSIUM

Increases in Whole Blood Glucose Measurements Using Optically Based Self-Monitoring of Blood Glucose Analyzers Due to Extreme Canadian Winters

George C. Cembrowski, M.D., Ph.D., Barbara Smith, M.L.T., and Ellen M. O'Malley, M.S.

Abstract

Background:

Temperature and humidity have been reported to influence the results of whole blood glucose (WBG) measurements.

Methods:

To determine whether patient WBG values were affected by seasonal variation, we conducted a retrospective analysis of 3 years' worth of weekly averages of patient WBG in five Edmonton hospitals.

Results:

In all five hospitals, the winter WBG averages were consistently higher than the summer WBG averages, with the differences varying between 5% and 9%. Whole blood glucose averages were negatively correlated with the outside temperature. This seasonal variation was not observed in weekly patient averages of specimens run in a central hospital laboratory.

Interpretation:

It is probable that the seasonal variation of WBG arises from the very low indoor humidities that are associated with external subzero temperatures. These increases in WBG in cold weather may be due to limitations in the WBG measuring systems when operated in decreased humidities and/or increased evaporation of the blood sample during the blood glucose measurement process. The implications of this seasonal variation are significant in that it (1) introduces increased variability in patient WBG, (2) may result in increased glucose-lowering therapy during periods of external cold and low indoor humidity, and (3) confounds evaluations of WBG meter technology in geographic regions of subzero temperature and low indoor humidity. To mitigate the risk of diagnosing and treating factitious hyperglycemia, the humidity of patient care areas must be strictly controlled.

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Author Affiliation: Department of Laboratory Medicine and Pathology, University of Alberta Hospital, Edmonton, Alberta, Canada

Abbreviations: (ADA) American Diabetes Association, (EGH) Edmonton General Hospital, (GNH) Grey Nuns Hospital, (HbA1c) glycohemoglobin A1c, (MGH) Misericordia General Hospital, (RAH) Royal Alexandra Hospital, (SD) standard deviation, (SMBG) self-monitoring of blood glucose, (UAH) University of Alberta Hospital, (WBG) whole blood glucose

Keywords: diabetes, environmental effects, humidity, whole blood glucose monitoring

Corresponding Author: George Cembrowski, M.D., Ph.D., University of Alberta Hospital, 4B1.24 Walter C. MacKenzie, 8440 112th St., Edmonton, AB, Canada T6G 2B7; email address *cembr001@cha.ab.ca*