



Artifactual Hypoglycemia: An Old Term for a New Classification

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The American Diabetes Association and The Endocrine Society workgroup on the 2013 classification of hypoglycemia (1) in patients with diabetes changed the previously used term “relative hypoglycemia” to “pseudo-hypoglycemia” while defining symptoms of hypoglycemia without confirmatory low glucose values and failing to include falsely low readings of glucose on capillary blood samples (1,2). In the past, pseudo-hypoglycemia was defined as a discrepancy between low capillary glucose and normal plasma glucose. We illustrate the current incongruity by reporting a case of a patient with Raynaud phenomenon with falsely low capillary blood glucose measured by finger stick.

A 75-year-old female with esophageal cancer post esophagectomy was found to have repeated asymptomatic low finger-stick blood glucose values varying from 11 to 53 mg/dL that were treated with D5 0.45% NaCl infusion and boluses of D5W. The patient denied history and symptoms of hypoglycemia in the past. She was not on any medications suspected to cause hypoglycemia.

She had a history of Raynaud phenomenon, and during episodes of “hypoglycemia” her hands were pale and cold on physical exam. Venous measurements of plasma glucose were normal at times when finger-stick glucose measurements were low. Warming of her hands resulted in reversal of vasoconstriction and normalization of her

Table 1—Classification of artifactual hypoglycemia

	Pathogenesis	Disease
Capillary glucose (in vivo)	Decreased capillary flow	Raynaud phenomenon Acrocyanosis Eisenmenger syndrome Critically ill patients with shock Peripheral vascular disease
Plasma glucose (in vitro)	Increased glycolysis	Polycythemia vera Leukemias
	Hyperviscosity	Waldenström macroglobulinemia

finger-stick glucose levels. Over the course of 30 min, her capillary blood glucose, measured by finger stick every 10 min, increased from 11 mg/dL to 28 mg/dL and then 51 mg/dL and finally 76 mg/dL, correlating with the venous specimen that remained invariant at 76 mg/dL.

Previously the term pseudo-hypoglycemia was used to describe the discrepancy between capillary glucose values and plasma glucose concentrations found in conditions including Raynaud phenomenon (3), acrocyanosis, Eisenmenger syndrome, critically ill patients with shock, and peripheral vascular disease. The pathophysiology of falsely low blood glucose in such patients is believed to be due to decreased capillary flow that leads to deceleration of glucose transit through tissues and consequently increased extraction by the tissues (4).

As there is uncertainty in the definition of hypoglycemia in such cases, we propose the term “artifactual hypoglycemia” for patients with discrepancy

between different laboratory measurement and actual blood glucose, regardless of symptoms. The terms artifactual hypoglycemia and pseudo-hypoglycemia were used interchangeably in the past. We propose a supplementary classification of artifactual hypoglycemia (Table 1). The term artifactual was introduced in 1961 to describe low glucose values in a patient with chronic myelogenous leukemia due to increased glycolysis by leukocytes following delayed preparation of a venous blood sample (5). To date, artifactual hypoglycemia is not included in any current classifications or guidelines on hypoglycemia, whether or not associated with diabetes. We believe that incorporating this classification will raise health care providers’ awareness of this phenomenon and consequently may prevent unnecessary workup and treatment. In particular, knowledge of this potential discrepancy may help to optimize management of patients with diabetes in whom

there may be unexplained divergence of A1C and capillary blood glucose measurements.

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and reviewed and edited the manuscript. V.D.T. is the guarantor of this work and, as such, had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

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