

Management Strategy for Steroid-Induced Malglycemia During Cancer Treatment

Diane De Vos-Schmidt, RN, MSN, OCN®, and Kris Dilworth, RN, MSN, FNP, CDE

Malglycemia is a temporary problem that has significant negative sequelae. This article attempts to clarify and educate oncology nurses about the impact and management of steroid-induced malglycemia on patients with cancer receiving treatment. A management algorithm is provided to aid in evaluation and treatment decisions.

Diane De Vos-Schmidt, RN, MSN, OCN®, is a clinical trials nurse manager at PCR Oncology in Pismo Beach and Kris Dilworth, RN, MSN, FNP, CDE, is a family nurse practitioner and diabetes educator at the office of Roger Steele, MD, in San Luis Obispo, both in California. The authors take full responsibility for the content of the article. The authors did not receive honoraria for this work. No financial relationships relevant to the content of this article have been disclosed by the authors or editorial staff. De Vos-Schmidt can be reached at research@pcroncology.com, with copy to editor at CJONEditor@ons.org.

Key words: malglycemia; education; blood glucose

Digital Object Identifier: 10.1188/14.CJON.41-44

A patient named J.K., who also is an RN, was diagnosed with a pancreatic neuroendocrine carcinoid tumor. As is common with diseases of the pancreas, J.K.'s blood sugars started to become elevated. She was concerned, but when she brought her concerns to her oncologist, he stated that it was a problem for the endocrinologist and to call him instead. After waiting six weeks for an appointment, the endocrinologist told her that her malglycemia was from the cancer treatments and a temporary problem. He advised her to "just leave it alone." J.K. declined physically with rapid tumor growth, increase in symptoms, and blood sugars as high as 500 mg/dL. She knew something had to be done, and she was frustrated by the "hot potato game." In response, her clinic nurse began researching ways to manage malglycemia.

Malglycemia

Healthcare professionals are well aware of the consequences of unmanaged hyperglycemia. The term *malglycemia* is used

to describe a hyperglycemic state in a patient that is not known to have diabetes. Cancers of the pancreas, either primary pancreatic cancers or neuroendocrine tumors of the pancreas, can result in glucose intolerance, insulin resistance, or failure of the pancreas to function properly (Wang, Larsson, & Herrington, 2003).

Use of Steroids

Corticosteroids and glucocorticoids are used for two main purposes in cancer treatments. The first is to increase the cell kill process in diseases such as multiple myeloma, lymphomas, and some solid tumors (Faiman, Bilotti, & Rogers, 2008). The steroid works by inhibiting the expression of cytokines such as interleukin, which is a major growth factor (Faiman et al., 2008). The suppression of the growth factor reduces the activity of other signaling systems, and natural cell death occurs. The second reason for the use of steroids in cancer treatments is for side-effect mitigation. The steroids work to suppress allergic and hypersensitivity responses, as well as decrease

inflammation and potentiate the effect of antiemetic medications.

Concerns With Steroids

Steroid-induced malglycemia is a temporary problem that can lead to poor patient outcomes. The pathophysiology of the steroid effects includes "down regulation of glucose transport in the muscle, so that more insulin is needed for the uptake of glucose in the cells" (Oyer, Shah, & Bettenhausen, 2006, p. 479). Steroids stimulate the release of glucose from the glycogen stores in the liver (gluconeogenesis), resulting in increased circulating glucose and, ultimately, development of insulin resistance (Mackay & Barrow, 2010). In insulin resistance, the insulin molecule has difficulty binding to the insulin receptor on muscle, fat, or liver

- Impaired cellular repair (delayed recovery from chemotherapy and impaired wound healing)
- Increased clotting of red blood cells (deep vein thrombosis, pulmonary embolism)
- Increased aggregation of platelets (hyperviscosity syndrome)
- Increased inflammation
- Decreased ability to fight infection
- Increased load on major organs (kidney, liver, and heart)
- Increased cellular proliferation (cancer cell growth)
- Increased mortality

FIGURE 1. Harmful Effects of Malglycemia

Note. Based on information from Faiman et al., 2008; Hammer & Voss, 2012; Stevens et al., 2011.