

# Preventing Tumor Lysis Syndrome: Two Case Studies of Unexpected Outcomes

Martha R. Sleutel, PhD, RN, CNS, William Brown, RPh, and Jo Nell Wells, PhD, RN-BC, OCN®



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**Background:** Tumor lysis syndrome (TLS) is a potentially fatal complication in patients with large, rapidly proliferating tumor cell cancers that may occur after chemotherapy. Patients with TLS are complicated to treat and often have an unpredictable trajectory.

**Objectives:** The purpose of this article is to report two cases with unusual clinical manifestations and unexpected outcomes during cancer treatment and to share best practices for this situation.

**Methods:** The authors described details from two unusual cases and outlined lessons learned. The authors described a newly developed clinical order set (protocol) to support optimal care for patients at risk for TLS.

**Findings:** Implementing best practices, the order set prompts early identification of TLS risk and provides step-by-step guidance to eliminate or control TLS.

Martha R. Sleutel, PhD, RN, CNS, is a nurse scientist and William Brown, RPh, is an oncology pharmacist and lead pharmacist, both in Texas Health Resources at Texas Health Arlington Memorial Hospital in Arlington; and Jo Nell Wells, PhD, RN-BC, OCN®, is a professor in the College of Nursing at Texas Christian University and a part-time nurse scientist at Texas Health Resources at Texas Health Alliance Hospital, both in Fort Worth. The authors take full responsibility for the content of the article. The authors did not receive honoraria for this work. The content of this article has been reviewed by independent peer reviewers to ensure that it is balanced, objective, and free from commercial bias. No financial relationships relevant to the content of this article have been disclosed by the authors, planners, independent peer reviewers, or editorial staff. Mention of specific products and opinions related to those products do not indicate or imply endorsement by the *Clinical Journal of Oncology Nursing* or the Oncology Nursing Society. Sleutel can be reached at marthasleutel@texashealth.org, with copy to editor at CJONeditor@ons.org. (Submitted May 2015. Revision submitted July 2015. Accepted for publication July 8, 2015.)

Key words: tumor lysis syndrome; nursing care; rasburicase; methemoglobinemia

Digital Object Identifier: 10.1188/16.CJON.195-200

**T**umor lysis syndrome (TLS) is caused by rapid cell lysis releasing intracellular contents and by-products (e.g., potassium, phosphate, calcium, nucleic acids) into the bloodstream, which the liver metabolizes into uric acid. Drugs used to treat lymphoid leukemias, non-Hodgkin lymphoma, and acute myelogenous leukemia often lead to the accumulation of toxic plasma levels of purine metabolites (i.e., uric acid). These high levels of uric acid and other electrolytes can cause acute renal failure, requiring dialysis, and lead to numerous metabolic disturbances (King, 2008; Wilson & Berns, 2014).

The incidence of TLS is unknown and can vary among different malignancies, with higher frequencies of TLS associated with bulky, aggressive, treatment-sensitive tumors (Fleming & Doukas, 1992). As advances are made in cancer treatment and high-dose regimens become more commonplace, TLS incidence may emerge in more malignancies (Ikeda, Krishnan, & Jaishankar, 2016; Wang et al., 2015). TLS occurs in all age groups; however, advanced age combined with impaired renal

function may predispose a patient to TLS because of a decreased ability to eliminate the by-products of tumor lysis (Ikeda et al., 2016). Signs and symptoms of TLS may occur as early as a few hours after the start of chemotherapy, but they typically occur within the first 24–48 hours and may persist for five to seven days (Lewis, Dirksen, Heitkemper, & Bucher, 2013). TLS occasionally may be present prior to the start of therapy in patients with high-grade (grade 3 or 4) hematologic malignancies (Wilson & Berns, 2014). Early symptoms include weakness, muscle cramps, diarrhea, nausea, and vomiting. The primary treatment is to increase urine production using (hyper) hydration therapy and decrease uric acid concentrations (Lewis et al., 2013) using allopurinol (Zyloprim®) and rasburicase (Elitek®) (Brant, 2002; Lehne, 2013).

## Diagnosis

TLS is diagnosed by laboratory tests and clinical signs and symptoms. Some healthcare teams follow the Cairo-Bishop