

Positive Quality Intervention: Use of Rasburicase (Elitek®) for Treatment of Tumor Lysis Syndrome

Description: The purpose of this PQI is to identify appropriate dosing of rasburicase based upon uric acid levels.

Background: Rasburicase is an FDA approved intravenous medication for the management of serum uric acid levels in the setting of anticancer therapy that is expected to result in tumor lysis.^{1,2} While rasburicase breaks down uric acid that has already formed in the body, allopurinol prevents the formation of additional uric acid. The two medications work concomitantly to actively decrease elevated uric acid levels while also preventing hyperuricemia in the future.³ In general, the risk of a patient developing TLS is higher with hematologic malignancies. Risk stratification can be found in the chart below, adapted from Coiffier and colleagues.⁵

Type of Malignancy	High Risk	Intermediate Risk	Low Risk
Non-Hodgkin lymphoma (NHL)	Burkitt lymphoma	DLBCL	Indolent NHL
Acute lymphoblastic leukemia (ALL)	WBC \geq 100,000	WBC 50,000 – 100,000	WBC < 50,000
Acute myeloid leukemia (AML)	WBC \geq 50,000, monoblastic	WBC 10,000 – 50,000	WBC < 10,000
Chronic lymphocytic leukemia (CLL)	Venetoclax (lymph node \geq 10 cm or ALC \geq 25,000 and lymph node \geq 5 cm)	WBC 10,000 – 100,000 Fludarabine Venetoclax (lymph node < 5-10 cm or ALC \geq 25,000)	WBC < 10,000 Venetoclax (all lymph nodes < 5 cm and ALC < 25,000)
Other hematologic malignancies (chronic myeloid leukemia, multiple myeloma) and solid tumors (small cell lung cancer)	---	Rapid proliferation with expected rapid response to therapy	Remainder of patients

While FDA approved dosing of rasburicase is weight-based (0.2 mg/kg daily for up to 5 days), several studies have been performed that evaluated the use of single, fixed doses of rasburicase.^{1,4,6,7,8,9} Trifilio and colleagues demonstrated that rasburicase 3 mg effectively lowered uric acid levels to \leq 7 mg/dL in 72% of patients at 24 hours; uric acid levels continued to decrease without additional doses of rasburicase. Of note, patients with higher baseline uric acid levels (defined as \geq 12 mg/dL) were found to be at risk of rasburicase failure. This patient population may require a higher initial dose of rasburicase at 6 mg, or a repeated dose of 3 mg if uric acid levels begin to rise again.⁶ McBride and colleagues found similar success with the 3 mg dose in their study. However, it is worth noting that patients who received 3 mg of rasburicase had lower baseline uric acid levels compared to the patients who received 6 mg of rasburicase.⁷

PQI Process:

- Confirm the patient has an order/prescription for allopurinol
- Confirm the patient is maintaining adequate oral hydration or initiated on IV hydration
- Baseline and follow-up TLS labs (potassium, serum creatinine, uric acid, phosphorus, calcium, lactate dehydrogenase) should be obtained pre- and post-rasburicase administration
- Rasburicase dosing may vary per institution guidelines/policies

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PQI Process Continued:

- Patients with malignancies that are classified as having a high risk for TLS may require upfront dosing of rasburicase
- Consider rasburicase 3 mg for patients with baseline uric acid <12 mg/dL
 - Encourage use of allopurinol and aggressive hydration prior to initiation of rasburicase
- Consider rasburicase 6 mg for patients with baseline uric acid ≥12 mg/dL OR consider an initial dose of 3 mg and monitor the patient's uric acid levels closely to determine if a repeat dose of 3 mg if warranted
- If warranted, repeated rasburicase dosing can be considered 24 hours after the initial dose
- Ensure uric acid levels obtained after rasburicase administration are immediately put on ice. If left at room temperature, the enzymatic activity of rasburicase will continue to break down uric acid and can result in a falsely low uric acid level

Patient Centered Activities:

- Patient Education
 - Although rare, hypersensitivity reactions have been reported with rasburicase
 - Methemoglobinemia can occur as a result of rasburicase administration
 - Hemolysis can occur after rasburicase administration in patients with G6PD deficiency
 - Counsel patients to maintain increased oral hydration

References:

1. Elitek® (rasburicase) [prescribing information]. Bridgewater, NJ: Sanofi-Aventis; July 2019.
2. Cairo MS, Coiffier B, Reiter A, et al. Recommendations for the evaluation of risk and prophylaxis of tumour lysis syndrome (TLS) in adults and children with malignant diseases: an expert TLS panel consensus. *Br J Haematol*. 2010;149:578-586.
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5. Coiffier B, Altman A, Pui C et al. Guidelines for the management of pediatric and adult tumor lysis syndrome: an evidence-based review. *J Clin Oncol*. 2008;26:2767-78.
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7. McBride A, Lathon SC, Boehmer L, et al. Comparative evaluation of a single fixed dosing and weight-based dosing of rasburicase for tumor lysis syndrome. *Pharmacother*. 2013;33(3):295-303.
8. McDonnell AM, Lenz KL, Frei-Lahr DA, et al. Single-Dose Rasburicase 6 mg in the Management of Tumor Lysis Syndrome in Adults. *Pharmacother*. 2006;26(6):806-12.
9. Yu X, Liu L, Nie X et al. The optimal single-dose regimen of rasburicase for management of tumour lysis syndrome in children and adults: a systematic review and meta-analysis. *J Clin Pharm Ther*. 2017;42:18-26.
10. Howard, N *Engl J Med* 2011; 364(19); 1844-54.

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Supplemental Information:

Table 1: Diagnosis of Tumor Lysis (Cairo-Bishop Classification)³

Laboratory Tumor Lysis	Clinical TLS
<p>Two or more of the following occurring in a patient with cancer within <u>3 days</u> prior to or <u>7 days</u> following initiation of cancer treatment:</p> <ul style="list-style-type: none"> • Uric acid ≥ 8 mg/dL or 25% increase from baseline • Potassium ≥ 6 mg/dL or 25% increase from baseline • Phosphate ≥ 4.5 mg/dL or 25% increase from baseline • Calcium ≤ 7 mg/dL or 25% decrease from baseline 	<p>Laboratory tumor lysis plus one of the following:</p> <ul style="list-style-type: none"> • Serum creatinine ≥ 1.5 x ULN • Cardiac arrhythmia/sudden death • Seizure

Table 2: Risk and Preventive Treatment of TLS with < 1 Abnormal Laboratory Value¹⁰

Risk	Negligible Risk		Low Risk		Intermediate Risk		High Risk	
Cancer Mass	Small/resected localized tumor	Medium Mass	Medium Mass	Large Mass	Medium Mass	Large Mass	Medium Mass	Large Mass
Cell Lysis Potential	--	Low	Medium	Low	Medium/Unknown	Medium/Unknown	High	High
Preexisting nephropathy, dehydration, acidosis, hypotension, or nephrotoxin exposure	--	None	None	--	Yes	--	--	--
Treatment	No Prophylaxis		<ul style="list-style-type: none"> • Allopurinol • IV Fluids • Daily labs 		<ul style="list-style-type: none"> • Allopurinol or Rasburicase • IV Fluids • Inpatient Monitoring • Labs every 8-12 hours 		<ul style="list-style-type: none"> • Rasburicase • IV Fluids • Cardiac Monitoring • Labs every 6-8 hours 	

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