

Volume & Vulnerability:

The Explosive Impact of Tumor Lysis Syndrome



Barb Hues RN, MSN, CON(C)
Nurse Educator: CancerCare Manitoba
September 30, 2016

Disclosure Slide

- **Speaker:** Barb Hues
- **Relationships with commercial interests:**
 - **Grants/Research Support:** none
 - **Speakers Bureau/Honoraria:** Celgene: 2014 related to funding for a workshop on Azacitidine
 - **Consulting Fees:** None
 - **Other:** Employee of CancerCare Manitoba

Objectives

At the end of this session, participants will be able to:

1. **Recognize** patients at high risk for Tumor Lysis Syndrome and put **preventative** measures in place
2. Identify signs and symptoms of Tumor Lysis Syndrome and know how to mount an appropriate and **timely** response
3. Describe the **process** of Tumor Lysis Syndrome, the short and long-term risks and the **management** options

HEADLINES

TODAY

Good News; Bad News

Cancer Cells Explode Releasing Massive Amounts of Potassium & Phosphate. Dramatic rise in LDH and Uric Acid. Devastating consequences!

Tumor lysis syndrome is the most common oncologic emergency among hematological malignancies. Results in kidney damage, seizures, coma and death. Those with huge tumor burden and disease-responsive treatment are cautioned to beware!!

Good news: We have effective treatments

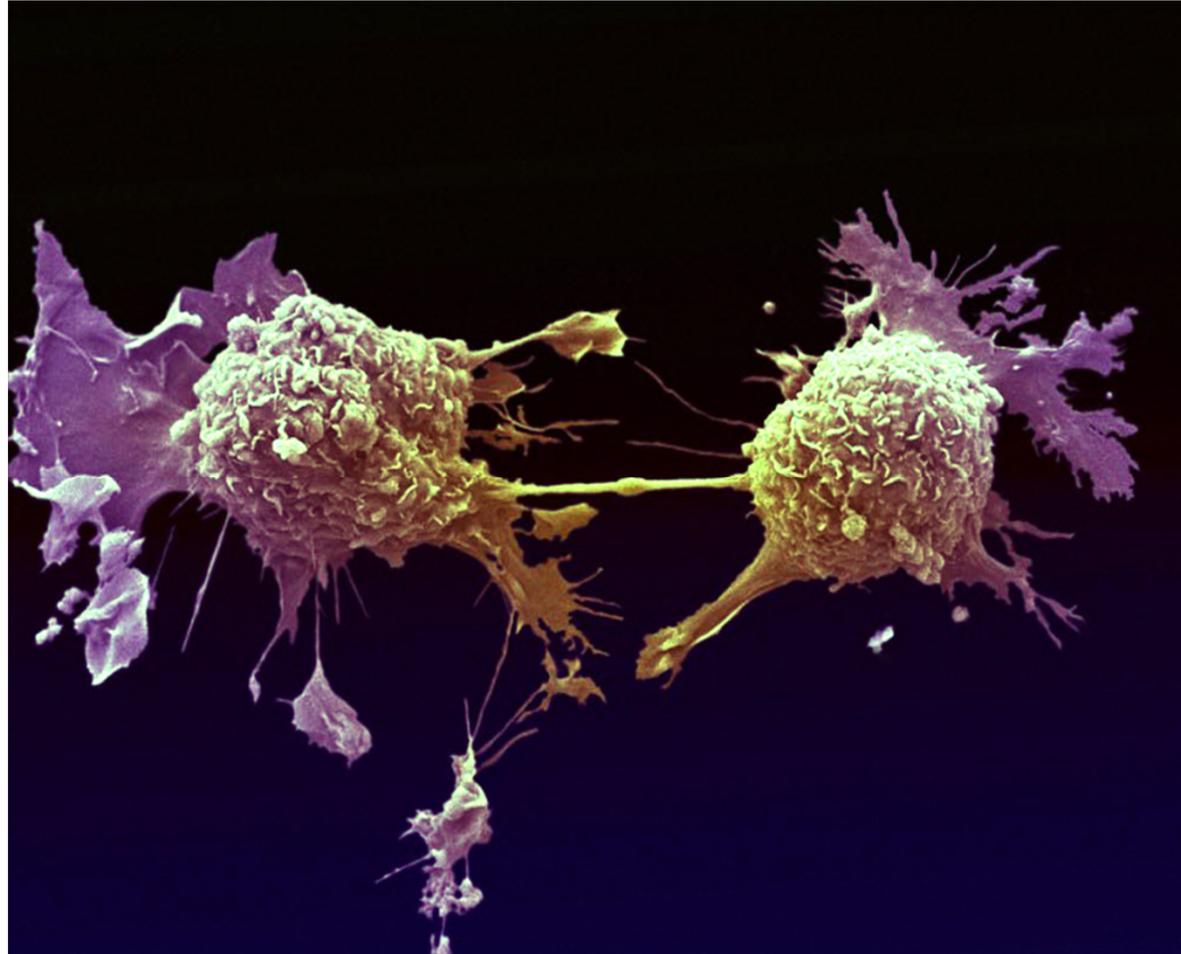
Bad news: The bigger the tumour burden the higher the risk

Who Should Beware?

- Hematology clinics
- All DSG's when there is bulky tumor & effective treatment
- When organs are infiltrated
- Bone marrow involved
- All treatment methods
- Urgent Cancer Care
- Community Oncology Programs

Big Tumor Burden





<https://www.google.ca/search?q=Exploding+cell&espv=2&biw=1366&bih=652&tbm=isch&imgil=qLpMcyAdP136iM%253A%253BI8GxT5M0FyOjmM%253Bhttp%25253A%25>

Case Study Scene 1@ 1600 hours

32 year old lady

No previous health concerns. Presents with platelet count of 3,800 on routine blood work. GP sends to Emergency on a Friday night.

Lab work from GP.

CBC: HB 119 $\times 10^9/L$, WBC 14 $\times 10^9/L$, Plat 3,800 $\times 10^9/L$,

LDH: 430 (n=100 to 200)

K+ 5.9 mmol/litre - other electrolytes normal

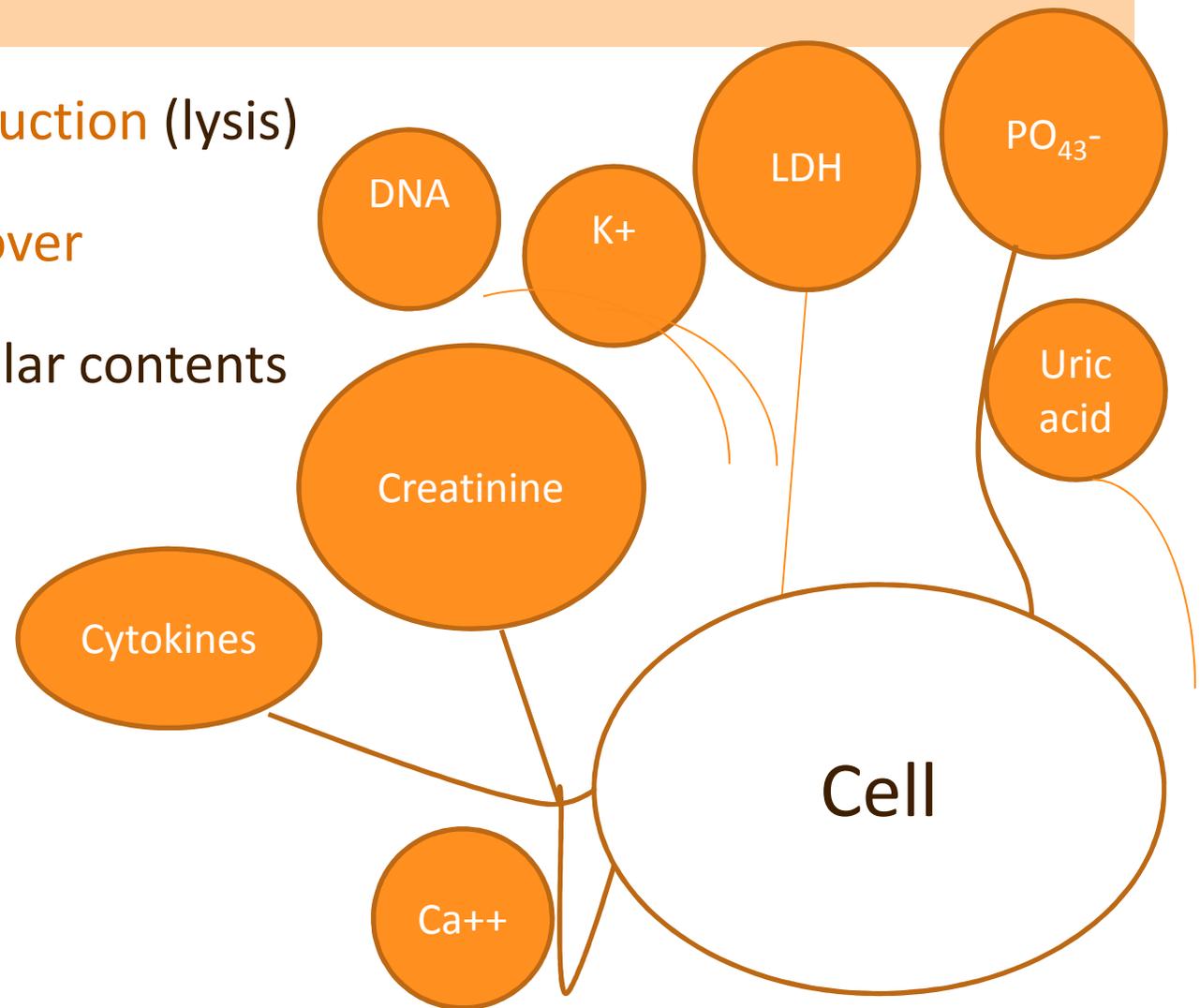
What other lab work should the ER order?



What is Tumour Lysis Syndrome?

- Rapid cell **destruction** (lysis)
- Rapid cell **turnover**
- Release of cellular contents

Learning Activity!



What is Dose Tumour Lysis Syndrome Do?

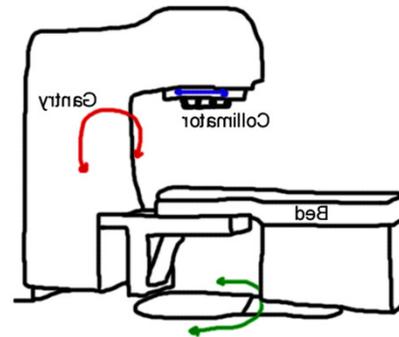
- Abdominal Pain / cramps
- Vomiting or nausea
- Weakness, fatigue
- Back, flank or joint pain,
- Ca⁺⁺
 - muscle cramps (or tetany)
- Electrolyte imbalances
 - Seizures
- Ascites
- Cytokines released
 - inflammation
- Ca⁺⁺ phosphate crystals:
 - kidney injury
 - cardiac dysrhythmias
- Uric acid crystals
 - kidney injury

Who Gets Tumor Lysis Syndrome?

Predisposed:

- B & T cell lymphomas
- Acute leukemia with >100 WBC
- Neuroblastoma
- Treatment -sensitive disease

Mass and vulnerability



Tumour Lysis Syndrome Defined

Laboratory TLS

- Uric acid over 476 micromol/L or **up** 25% from baseline
- Potassium \geq 6mmol/L or **up** 25% from baseline
- Phosphate \geq 2.1 mmol/L (pediatrics) or \geq 1.45 mmol/L (adults) or **up** 25% from baseline
- Calcium \leq 1.75mmol/L or **down** 25% from baseline

Clinical TLS

- Laboratory TLS and any of the following:
- Serum creatinine \geq 1.5 x baseline
- Cardiac arrhythmia
- Seizure

Case Study Scene 1@ 1600 hours--Revisited

Lab work from GP.

CBC: HB 119, WBC 14, Plat 3,800,

LDH: 430 (n=100 to 200)

K+ 5.9

What other lab work should the ER order?

CBC with differential



Uric Acid
400

Calcium
2.1
corrected

Creatinine
78

Urinalysis
No blood
Normal
PH

Phosphate
2.1

Onset of Tumour Lysis Syndrome

- Rapid
- Usually 14-48 hours after starting treatment
 - Steroids
 - Chemotherapy/immunotherapy/biotherapy
 - Radiation
- Can occur up to 7 days post treatment
- Spontaneous with high blood counts/ very bulky tumor



Clinical Exam & Lab work

- Vital signs--hypotension
- Mental status
- Spleen
- Masses
- Nodes
- CBC
- Full chemistry including sodium, potassium, phosphate, creatinine, LDH, uric acid
- Urinalysis –hematuria, acidic
- Current & recent medications
- Urine output
- ? EKG



Prevention

- Be aware of those at risk
- Provide patient education
- Hydrate well (at least 2-3 L per day)
- Medications as ordered →
Allopurinol most likely



Case Study Scene 2 @ 2400 Hours

The lady is seen by the “on-call” hematologist at 2330 same day.

Suspected diagnosis of either CML or Essential thrombocytosis.

Blood work sent for BCR-ABL and JAK -2 .

Discharge orders written with a prescription for hydroxyurea 500 mg three times per day.

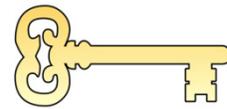
You are the nurse who needs to do discharge teaching.

Tumour lysis syndrome

What are you concerned about ?

Early Recognition

- High index of suspicion
- Rising LDH
- Rising uric acid
- Elevated K⁺
- Low Ca⁺⁺
- Elevated phosphate
- Elevated creatinine



Treatment **pre-phase** for those at high risk –hydration & allopurinol



Treat Quickly

- Hydration (2 to 3L per square m per day)
- Restrict potassium
- Monitor urine output
- Monitor patient weight
 - Watch for fluid retention
- May require dialysis
- Medication as ordered → Allopurinol, Rasburicase

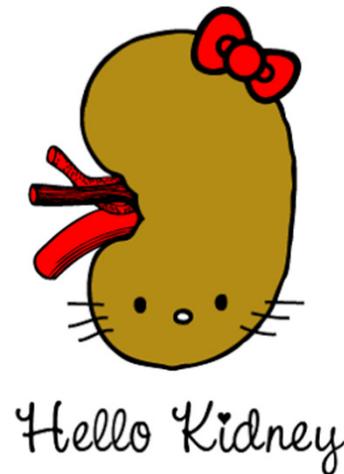
Act Fast: Untreated
TLS can lead to renal
failure, seizures and
death !



Allopurinol

- Oral (in Canada)
- Lowers uric acid levels —but not directly
- Prophylaxis or treatment
- Side effects:
 - Skin rash
 - Diarrhea
 - Nausea
- May cause allergic reaction

Protects Kidneys



Rasburicase

- Requires approval
- Single dose
 - Weight-based
 - Intravenously over 30 minutes
- Lowers uric acid directly
 - Urate oxidase enzyme
 - uricolytic agent
- Side effects
 - Nausea, vomiting, stomach pain
 - Diarrhea, constipation
 - Anxiety
 - Fever
 - Swelling of hands or feet
 - Severe allergic reaction possible

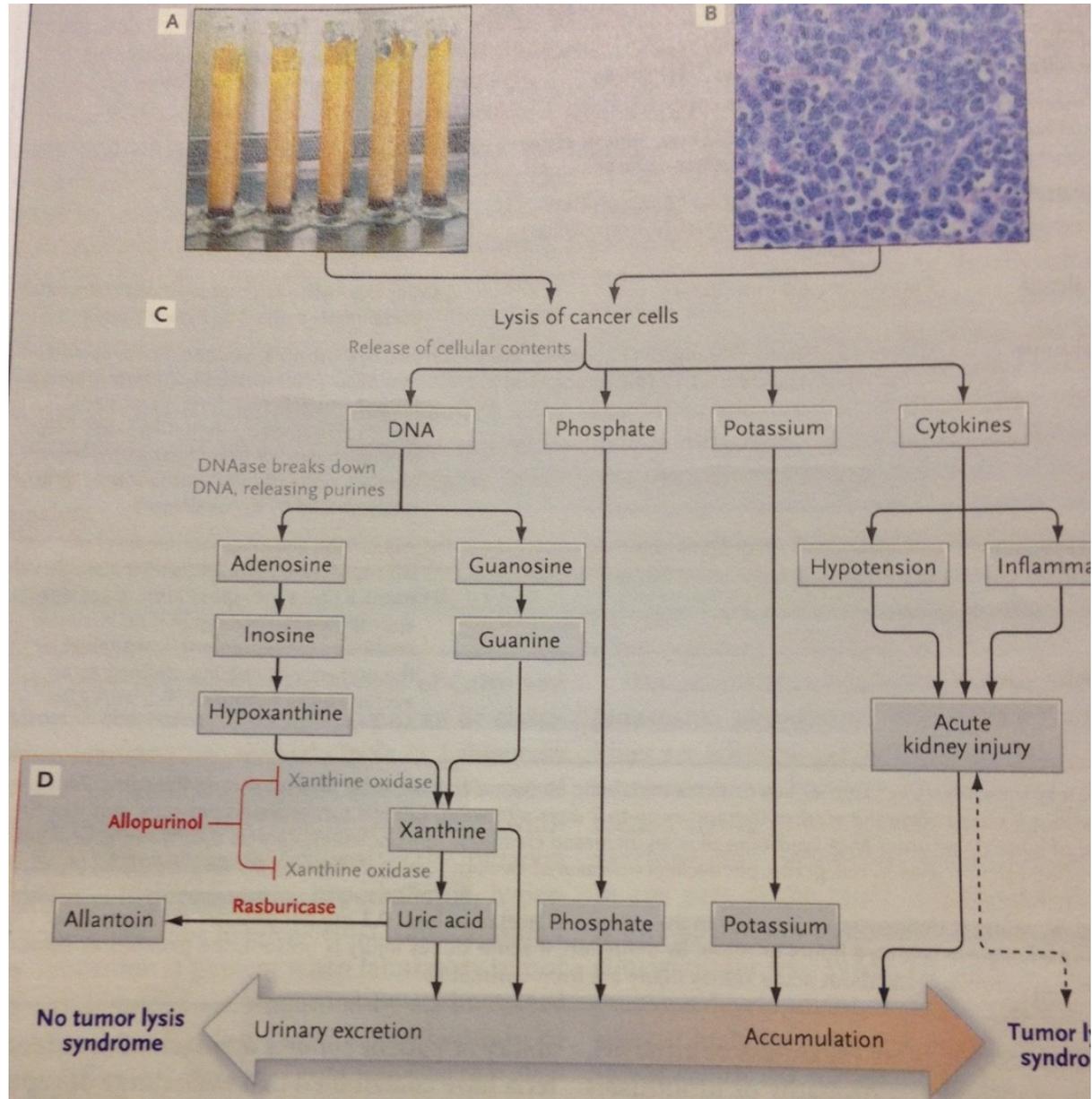
Rasburicase Approval

CCMB (2016) *Provincial Oncology Drug Formulary*

- **ALL** approved with any of the following:
 - Clinical tumor lysis syndrome
 - WBC > 100
 - Lymphomatous presentation /high tumor burden
- **AML** with either of the following
 - Clinical tumor lysis syndrome
 - WBC > 50
- Any **malignancy** with 25% rise in uric acid or creatinine despite hydration for 12 hours + allopurinol
- **DO NOT USE WITH G6PD** deficiency

Rasburicase Approval (Continued)

- Aggressive **NHL** with any of the following:
 - Clinical tumor lysis syndrome
 - Stage III or IV disease
 - LDH > 2X Normal or Uric acid over 476 micromol/L
- **Germ Cell** tumor with any of the following:
 - Clinical tumor lysis syndrome
 - Stage III or IV disease
 - LDH > 2X Normal or Uric acid over 476 micromol/L



Howard et. al. (2011)

Case Study Scene 2 @ 0030 Hours

Based on your concern about Tumour Lysis Syndrome? What do you suspect is missing in the discharge prescription?

Allopurinol

Thankfully the hematologist has been chatting with the residents and drinking a “Timmies”. Clever Nurse that you are now, you have approached and asked “does this lady need allopurinol?”

The hematologist is impressed and you feel validated. RX for Allopurinol 300 mg daily for 1 month is written.

Learning Activity: Prepare your patient education!!

Take Home Messages

- Recognition of risk & **prevention** are key
- Remember the concepts of **EFFECTIVE TREATMENT** & large **TUMOUR BURDEN**
- Empower your patients by helping them understand their role in prevention & **self-care**
- What goes up? K⁺, Phosphate, uric acid, LDH, creatinine
- What goes down? Ca⁺⁺

References

1. CCMB (2016). Provincial Oncology Drug Formulary.
2. Held-Warmkessel, J. (2012). A patient with tumor lysis syndrome. *Oncology Nurse Edition*, 26 (8). Retrieved:
<http://www.cancernetwork.com/display/article/10165/2096313>.
3. Howard, S., Jones, D., & Chang-Hon, P. (2011). The tumor lysis syndrome. *New England Journal of Medicine*, 364, (19), 1844-1854.
4. Oncology Nursing Society. Understanding and managing oncologic emergencies : a resource for nurses. Pttsburg:ONS