

Created: May 2018
Reviewed: May 2021
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ROTEM

Purpose: To provide a guideline for Rotational Thromboelastometry (ROTEM)

Definitions:

ROTEM is a method of measuring hemostasis quality via the viscoelastic properties of a blood clot and is designed for patient blood management.

ROTEM provides a rapid assessment of clot development from secondary hemostasis to clot lysis by evaluating clot formation, clot firmness, and clot fibrinolysis.

ROTEM provides a global assessment of hemostasis by using a whole blood sample to demonstrate how platelets, coagulation factors, RBCs, and other elements are working together to 1) initiate a clot; 2) determine clot strength; and 3) investigate if there is any fibrinolysis.

Guidelines:

- A. In the event a trauma patient requires Massive Transfusion Protocol (MTP), a ROTEM may be ordered at any time for evaluation of hemostasis. It is recommended to order a ROTEM after the MTP is completed.
 - a. ROTEM trauma panel will include EXTEM and TIBTEM

- B. Specimen collection
 - a. Specimen must go in a blue top tube and cannot be added on to coagulation studies
 - i. Specimen can be collected via stick or draw
 - 1. Stick must be with a 23 gauge needle or larger
 - a. Waste at least 2 ml of blood
 - 2. Draw from line with no heparin
 - a. Waste at least 2 ml of blood
 - b. Specimen must be hand delivered to lab
 - i. Cannot use tube system

- C. View results remotely in real time using the ROTEM link on the Epic Dashboard
 - a. Test will be viewable remotely for 60 minutes until test is completed
 - b. Login and Password for the system are the same as the Epic Login/Password

- c. Once test is completed, image will be printed and scanned into EPIC in Results Review where labs are located

D. Refer to Appendix A for ROTEM TEMOGRAM

E. Refer to Appendix B for ROTEM Algorithm

References:

- American College of Surgeons (ACS). (2022). Resources for Optimal Care of the Injured Patient.
- Leemann, H., Lustenberger, T., Talving, P., Kobayashi, L., Bukur, M., Brenni, M., Bruesh, M., Spahn, D. R., & Keel, M. J. (2010). The role of rotation thromboelastometry in early prediction of massive transfusion. *The Journal of Trauma, Injury, Infection, and Critical Care*, 69, 1403-1409. doi: 10.1097/TA.0b013e3181faaa25
- Lier, H., Bottiger, B., Hinkelbein, J., Krep H., & Bernhard. (2011). Coagulation management in multiple trauma: A systematic review. *Intensive Care Medicine*, 37, 572-582. doi: 10.1007/s00134-011-2139-y
- ROTEM rep PowerPoint. (2018). ROTEM 101: Basics of interpretation and clinical application
- ROTEM at Parkland Trauma. (2018). Trauma algorithm. Retrieved from <http://rotatetrial.com/rotemPMH.html>
- Tanaka, K., Bollger, D., Vadlamudi, R., & Nimmo, A. (2012). Rotational thromboelastometry (ROTEM)-based coagulation management in cardiac surgery and major trauma. *Journal of Cardiothoracic and Vascular Anesthesia*, 26, 1083-1093. doi: 10.1053/j.jvca.2012.06.015

Basic Principles of Temogram:

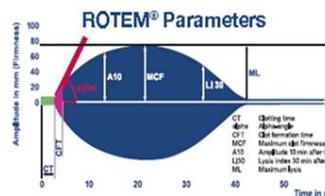
ROTEM® CHECKPOINT

What's the Temogram Shape?

- Wine Glasses → Good
- Bullets → Bad
- The Greater the Amplitude the Firmer the Clot

Evaluate

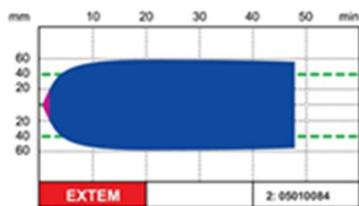
- **ML** – Clot Stability / Lysis (consider TXA)
- **A10** – Amplitude for Clot Strength (consider Pits & Fibrinogen)
- **CT** – Thrombin Generation (consider FFP, PCCs Protamine)



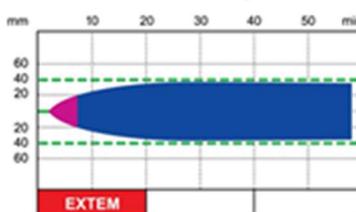
Assay Panels

- **EXTEM** – Extrinsic
- **INTEM** – Intrinsic
- **FIBTEM** – Fibrin Contribution
- **HEPTEM** – Heparin Effect?
- **APTEM** – Pathologic Lysis?

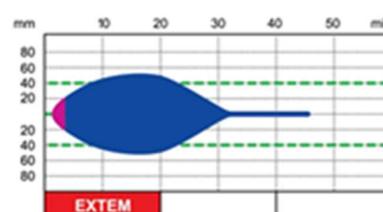
Overview of Temogram Shapes:



Firm & Stable
(Wine Glass Shape)



Relatively Weak
(Bullet Shape)



Unstable
(Fish Shape)

Normal Factors:

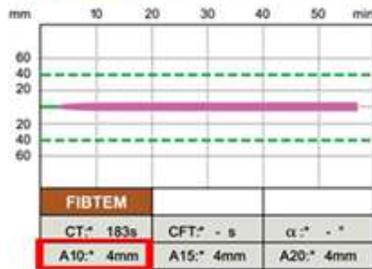
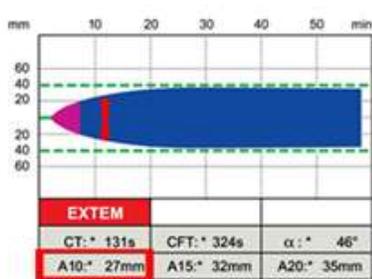
Factors	EXTEM	FIBTEM
CT	43 – 82 seconds	
A10	40 – 60 seconds	7 – 10 mm
A20	50 – 70 seconds	7 – 24 mm
ML	15% or less	

- CT: Coagulation Time (in seconds)
- A10, A20: Amplitude 10 minutes and 20 minutes after CT (in mm)
- ML: Maximum Lysis (percentage of lysis at any time)

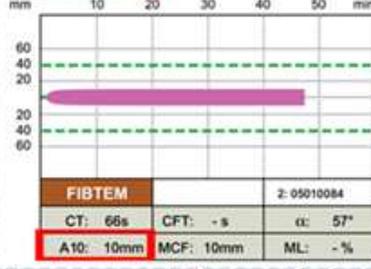
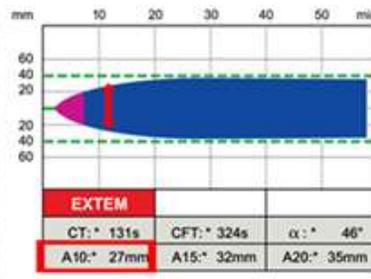
Observe the ROTEM TEMOGRAM:

- A. Look at the CT in the EXTEM
 - a. If the CT is greater than 80 seconds, the patient needs FFP
- B. Look at the A10 in the EXTEM
 - a. If the A10 in the EXTEM is less than 40mm, look at the A10 in the FIBTEM
 - i. If the A10 in the FIBTEM is less than 10mm, the patient needs Cryoprecipitate (Cryo)
 - ii. If the A10 in the FIBTEM is 10mm or greater, the patient needs platelets
- C. Look at the ML in the EXTEM
 - a. If the ML is 15% or greater, look at the shape
 - i. If there is a “fish shape” in *both* EXTEM and FIBTEM, the patient needs TXA

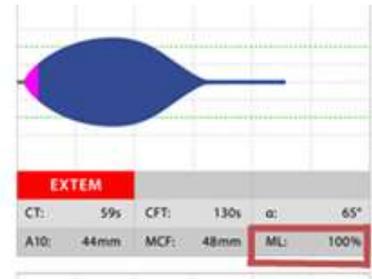
Three Examples:



Suggests inadequate fibrin contribution to clot firmness. Pt needs cryo.

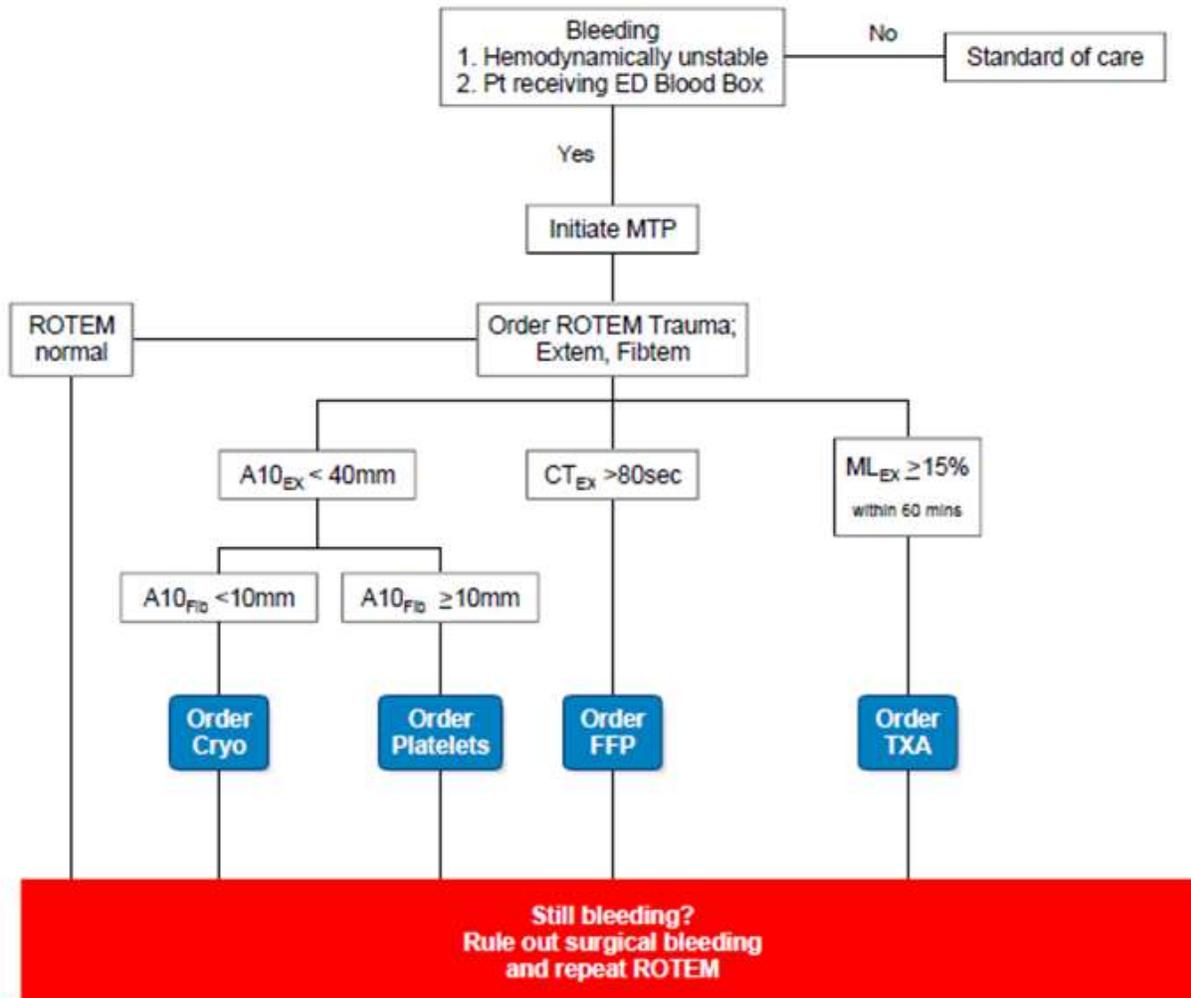


Suggests adequate fibrin contribution to clot firmness. Pt needs platelets.



Suggests hyperfibrinolysis. Pt needs TXA.

ROTEM Algorithm



NOTES:
 Specimen goes in a blue top.
 Do not use tube system.
 Hand deliver to lab.