

Frequently Asked Questions (FAQs) AND Standard Operating Procedure (SOP) for: Thromboelastography (TEG) use in Trauma / Massive Haemorrhage

FAQs

What is TEG?

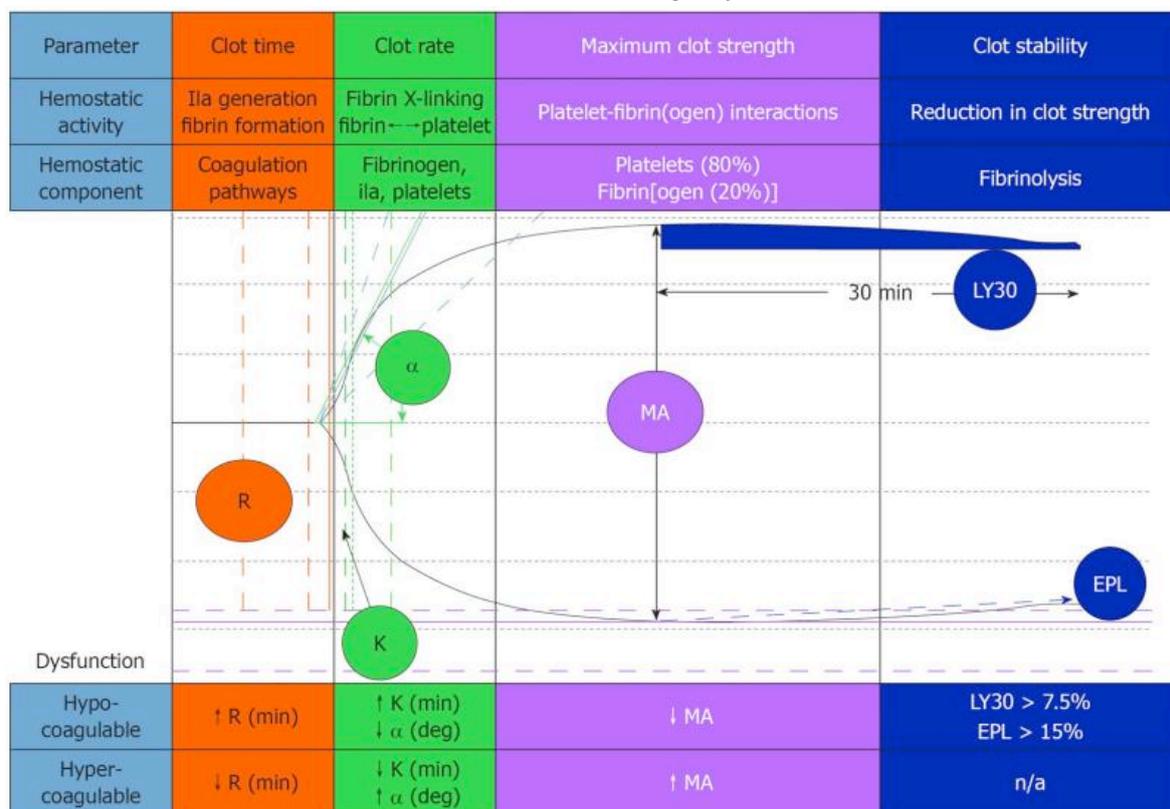
TEG is a near patient, assessment of whole blood, coagulation and fibrinolysis. There are machines in GICU, CTICU and Cardiac Theatres.

When might a TEG be useful OR what are the indications for running a TEG?

A TEG should be performed on every patient with any of the following conditions, in whom treatment of the apparent problem is being contemplated and to measure the response to therapy:

- Haemorrhagic shock
- Post massive (“code red”) transfusion
- A bleeding patient with a clinical diagnosis of an apparent hypocoagulable state (any cause, including iatrogenic e.g. heparin, anti-platelet therapy etc)
- Suspected or proven Disseminated Intravascular Coagulation (DIC)
- Suspected or proven hypercoagulable state

What does a normal TEG look like / what information does it give you?



What “assumptions” does the TEG make OR what factors that contribute to clotting DOESN'T it assess?

- ASSUMPTIONS - core temperature 37°C / pH of 7.35-7.45 / haematocrit 0.3-0.5 / Ca²⁺ 1.0-1.3mmol/l
- TEG cannot detect the in vivo contribution of endothelial cells or shear forces of blood flow on local clot formation and fibrinolysis.

What do you need to perform a TEG?

- 1.5ml of blood in **PLAIN** 2ml syringe NOT a blood gas syringe
- The sample **MUST** be prepared and running on the machine in **LESS** than 4 mins
- A trained operator **AND** an educated interpreter

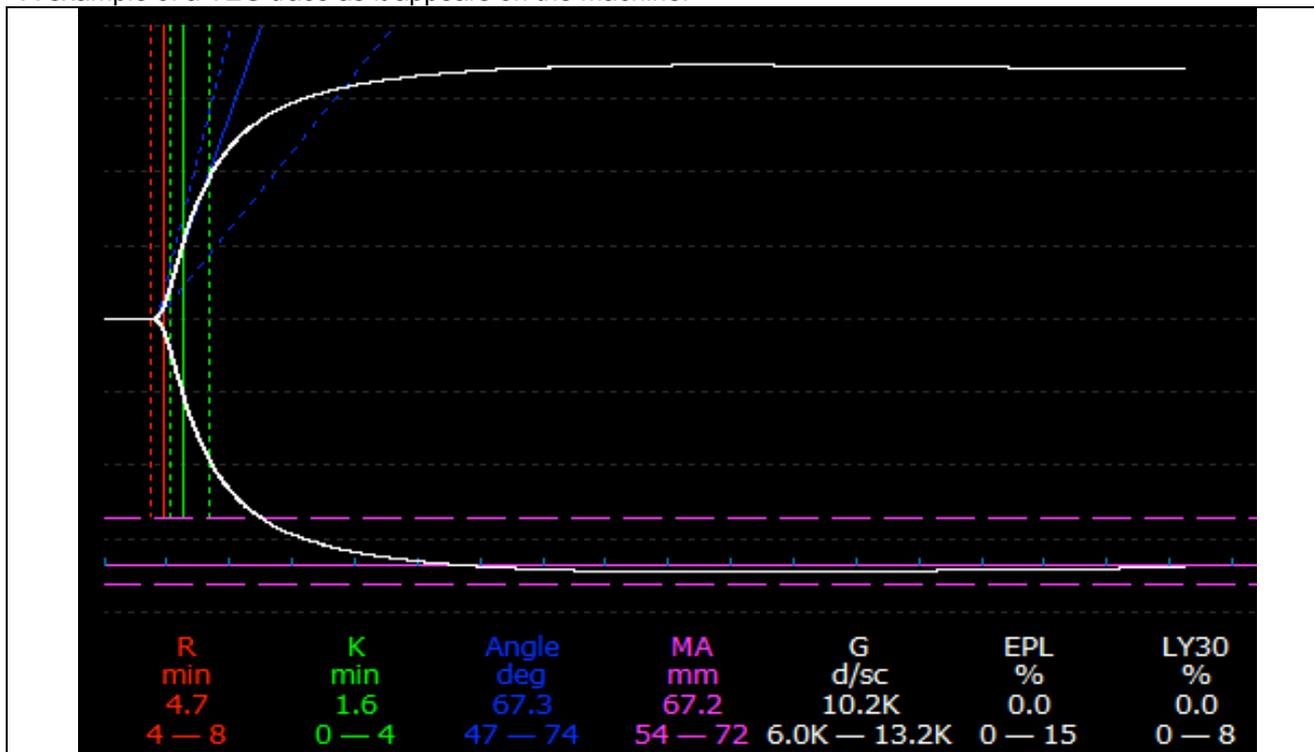
How might a TEG influence patient management?

- IF “normal coagulation” - **NO CLOTTING PRODUCTS REQUIRED**
- IF “hypocoagulable” - **SUGGESTS** whether FFP +/- cryoprecipitate +/- platelets will improve clotting
- IF “hypercoagulable” - **SUGGESTS** a patient is at especially high risk of thromboembolism

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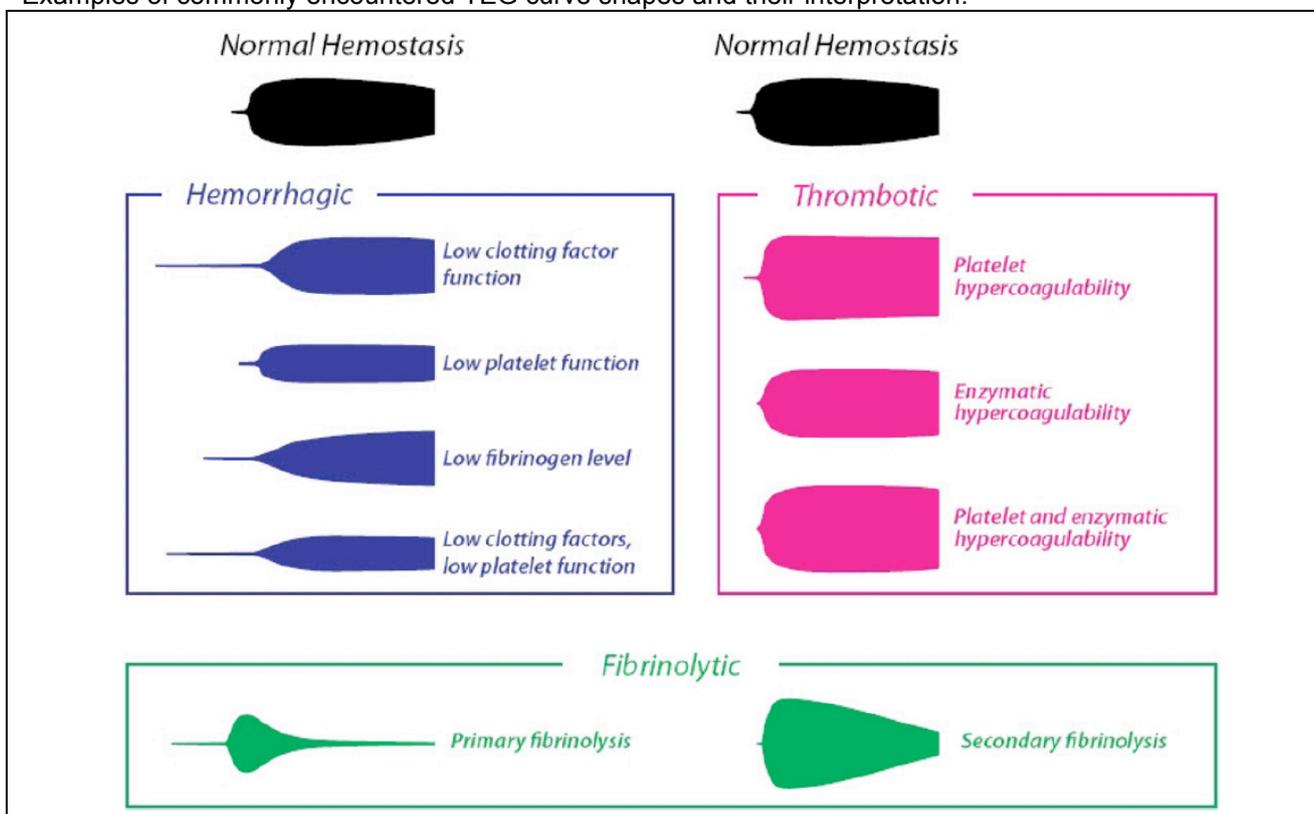
A basic guide to TEG interpretation

An example of a TEG trace as it appears on the machine.



The white trace is the sample curve. The dotted coloured lines indicate the lower and upper limits of normal. The solid coloured lines indicate the value for the sample. The numbers are the values. The normal ranges are shown below the values for this sample.

Examples of commonly encountered TEG curve shapes and their interpretation.



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SOP: Suggested management algorithm based upon TEG abnormalities

In a patient who appears to be, or is at risk of, bleeding (e.g. about to undergo a surgical procedure).

TEG values	Probable cause BUT consider "assumptions"	Suggested treatment
R time > 8mins	Inadequate clotting factors	FFP 12-15ml/kg
$\alpha^\circ < 47^\circ$ (K time > 4mins)	Hypofibrinogenaemia	Cryoprecipitate x2
MA < 54mm	Inadequate platelet function (&/or numbers) ~80% + / - Hypofibrinogenaemia ~20%	Platelets x1 AND CONSIDER Cryoprecipitate x2
LY30 \geq 8%	Primary hyperfibrinolysis	Tranexamic acid 1g IV bolus then 1g IV infusion over 8 hours

Notes

- If R time 4-8mins **AND** α° 47-74° **AND** MA 54-72mm and the patient **IS** bleeding, the cause is NOT a lack of clotting factors / functioning platelets. Consider, core temperature, pH and ionised Ca^{2+} level (blood gas), NOT FORGETTING occult vascular / organ injury.
- If R time > 8mins **AND** $\alpha^\circ < 47^\circ$ **AND** MA < 54mm **GIVE** FFP 12-15ml/kg **AND** Platelets x1. **EXPLANATION** - FFP contains some fibrinogen hence cryoprecipitate **MAY NOT** be necessary. However, in massive transfusion, recent data **SUGGEST** an advantage to the early use of cryoprecipitate.
- In primary fibrinolysis **EXPECT** R time > 8mins **AND** $\alpha^\circ < 47^\circ$ **AND** MA < 54mm. If R time, α° and MA are normal **OR** (more commonly) R time < 4mins **AND** $\alpha^\circ > 74^\circ$ **AND** MA > 72mm, then a state of secondary hyperfibrinolysis exists and tranexamic acid is contra-indicated.
- If R time < 4mins **AND / OR** $\alpha^\circ > 74^\circ$ **AND / OR** MA > 72mm the patient is hypercoaguable and maximal mechanical + / - chemical thromboembolic prophylaxis should be a priority.
- For expert advice please call the on-call Haematology SpR (bleep 6068 or via switchboard) or Consultant (via switchboard).

For more information see:

- The TEG section of the GICU "CHAOS book. <http://www.gicu.sgul.ac.uk/resources-for-current-staff>
- For animation of normal clotting goto <http://www.hemophilia.org/> then hover over, "Researchers and Healthcare Providers" tab then select "Cell based Coagulation Animation" from the menu, then follow the on-screen instructions.
- Bolliger D, Seeberger MD, Tanaka KA: Principles and Practice of Thromboelastography in Clinical Coagulation Management and Transfusion Practice. Transfus Med Rev 2011. <http://www.ncbi.nlm.nih.gov/pubmed/21872428>
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