# ONLY CHANGE IS SCANNNING INTO SOFT MEDIA

**TITLE: Basic TEG Testing**

**PRINCIPLE:** The Thrombelastograph (TEG) analyzer is a non-invasive diagnostic instrument designed to monitor and analyze the coagulation state of a blood sample in order to assist in the assessment of patient clinical hemostasis conditions. The TEG analyzer measures a clot’s properties using a small cup that holds the blood and slowly oscillates. A pin, held by a thin wire is suspended in the blood. When a clot forms, it links the pin and cup together and the movement of the pin is converted to electrical signals which are monitored by a computer.

**CLINICAL SIGNIFICANCE:**

###### The Thrombelastograph (TEG) Hemostasis Analyzer TEG-5000 series is a non-invasive diagnostic instrument designed to monitor and analyze the hematological state of a blood sample in order to assist in the assessment of patient clinical hemostasis conditions.

The TEG Hemostasis System is indicated for use with adult patients where an evaluation of their blood hemostatic properties is desired.

Hemostasis evaluations are commonly used to assess clinical conditions such as post-operative hemorrhage and/or thrombosis during and following cardiovascular surgery, organ transplantation, trauma, and cardiology procedures.

**PERSONNEL:**

###### Medical Technologists

### EQUIPMENT AND REAGENT PREPARATION

1. Teg Analyzer/Computer

* 1. Plain cups and pins
  2. Heparinased cup and pins
  3. Kaolin
  4. 340/360 Pipette
  5. 20 Pipette

**COLLECTION OF SAMPLE**

Specimen Collection

No special preparation of the patient is required prior to specimen collection. Blood should be drawn by an aseptic technique and the serum or plasma should be tested as soon as possible.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Teg Sample Type | CK  Citrated Kaolin | CKH  Citrated Kaolin  Heparinase | K  Kaolin | KH  Kaolin Heparinase |
| Blood Draw | Citrate Tube  2-5mL | Citrate Tube  2-5mL | Syringe Blood  (in polypropylene tube) 3-5 mL | Syringe Blood  (in polypropylene tube) 3-5 mL |
| Time to Test | 15 min – 2 hours | 15 min – 2 hours | <4 min | <4 min |
| Cup and Pin | Clear | Blue | Clear | Blue |
| Kaolin Vial | 1 mL | 1 mL | 1mL | 1mL |
| Additional Reagents | 20µL of  0.2 CaCl₂ | 20µL of  0.2 CaCl₂ | \_\_ | \_\_ |
| Blood | 340µL  from kaolin vial | 340µL  from kaolin vial | 360µL  from kaolin vial | 360µL  from kaolin vial |

***Syringe Samples***

Draw blood by venipuncture with using a two-syringe technique. Discard the first 2-3 mL to prevent contamination with tissue. Attach a clean plastic syringe and draw an additional 3-5mL. Start a stopwatch when blood first enters the second syringe.

For drawing blood during surgery, use the side port of the central venous catheter to approximate results obtained with peripheral blood.

Specimen Processing

Carefully transfer blood from the syringe to the small non-wettable surface (e.g., polypropylene test tube). Avoid air bubbles and frothing. Do not shake. Within 4 minutes, pipette 360 µL into a disposable TEG® cup. You can also use a pretreated TEG® cup containing specific reagents (e.g., heparin neutralizers, activators, platelet blockers, etc).

For accurate results, samples must be tested at 37 º C and within 4 minutes from blood draw unless treated with heparin or sodium citrate.

***Citrated Samples***

### Draw one sodium citrate solution, buffered 3.2% (blue top) tube. Tube must incubate for 15 minutes from collection at room temperature.

### Citrated Sample usable for two hours only.

## QUALITY CONTROL:

Negative and positive controls should be run to check on the performance of all testing and on the instrument operation. Controls are run every eight (8) hours when testing is performed and/or per manufacturer’s recommendation in the same manner and by the same personnel as the patient testing.

Testing controls provides confidence that all reagents are reacting and being read properly. Errors resulting from user techniques can also be detected.

### STEPWISE PROCEDURE

###### Patient and sample information should be entered before a sample is run. If this information is not available, you can enter it after you start the sample.

Enter Patient Information

To enter a new patient, select a channel, and click on the Case icon (1) in the Main toolbar.



This brings up the Select case mode dialog box. Since the option is pre-set to Add case, click Done (1)



The patient detail screen (Figure 9) is displayed.

Enter the Patient ID (medical record) (1), last name (2), and first name (3) Gender, Age. Click on Done (4) when finished.



Alternatively, to select a patient entered earlier, in the TEG screen, select a channel and click on the pull down arrow (1) for the patient name field.



Select a name from the list. To quickly find a name, type the first letter of the last name and scroll from there to find the name. Click to automatically fill in the name field.

*Enter sample information*

**Sample type**

Click the pull down arrow in the TEG screen to show the list of sample types. Click on the appropriate choice.

Click on the pull down arrow in the TEG screen to show the list of sample descriptions. You can type in your own description if none of the choices is appropriate.

*Start Sample*

To start a sample, either before or after you have entered the patient information, in the TEG screen, click on the Start icon (1) in the Main toolbar (Figure 11) or press F10 on the keyboard.



You will know that the sample has started when the background for the channel number changes to green, and the cursor moves to the next channel.

**Channel colors**

The background color of the channel on the TEG screen indicated the channel’s status:

|  |  |
| --- | --- |
| **Color** | **Indicates that the channel is…..** |
| Yellow  (Pending) | Available for activation |
| Blue  (Selected) | Selected for activation, data entry, or data acquisition |
| Green  (Active) | Is running an active sample and data is being collected for the sample |

**Selecting an active channel**

If you select a channel that is running, the background for the channel number field remains green and the background for the accompanying fields changes to blue.

Click Done to return to the Main screen.

*Loading Cups and Pins*

Disposable cups and pins have crush lines built into them so that they fit snugly into the cup wells and onto the spindle tip. The disposable cups and pins are for single use only because the crush lines are spent after the first use.

For each channel:

1. With lever in Load position, slide the carrier

Down to the platform

1. Pick up a disposable cup and pin from the

tray and place the cup with the pin still inside in the cup well (a).

1. Carefully slide the carrier all the way up (B),

Making sure that the disposable pin is standing

Straight up in the cup so that the spindle tip (C)

can enter smoothly.

1. When the top of the carrier is flush with the

bottom of the column; counterbalance the analyzer by holding your hand on top, and push the pin firmly into place using the plastic pusher (D) located at the bottom of the carrier. Make sure the pin is correctly loaded by checking that the bottom of the spindle is touching the inside of the disposable pin.

1. Slide the carrier back down to the platform and push the cup firmly into the cup well (E). The cup should rest flush with the carrier and should not pop up.
2. Pipette the native or modified blood sample into the cup. Use proper precautions (e.g., gloves) when handling blood.
3. Lift the carrier carefully to the pin with the lever still in Load position.
4. Firmly push the carrier up against the column.
5. Move the lever into Test position, resting your hand on top of the analyzer to prevent tipping.
6. Click the start icon or press F10 on the computer keyboard to start data collection.

*Ending the Run*

A sample will terminate automatically when the end-of-run conditions specified for the program have been met (see your Site Administrator for more information). If you need to end a sample earlier, select a channel from the Main toolbar (Figure 11) in either the Main screen or TEG screen, and click the Stop icon (1) or press F11 on the keyboard.



You are prompted to end or continue running the sample. If you have not entered the patient and sample information, you are prompted now to do so.

Do not remove the sample before the sample is terminated on the computer, either manually or according to the options settings. Since the software is still calculating values, removal of sample may cause spurious values to be written to the database

1. If the test has not already been terminated by the

Software, end the test on the computer as described above

1. Return the lever to Load position and press down to the Eject position.
2. Slide the carrier down to the platform. Be sure the pin has dropped into the cup
3. Press the carrier down firmly against the platform so that the plastic pusher located at the bottom of the carrier pushes the disposable cup out of the cup well. (F)
4. When the cup pops up, lift it out of the cup well

and dispose of it properly

**Print Report**

You can print two types of report from the TEG software. One type of report is the “quick report” that prints the selected tracing(s) and corresponding test values, and the other is the “full report” that prints all sample information, including interpretation and notes, and is appropriate for patient files.

*Quick Report*

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To generate the “quick report” either click on the Print icon (1) in the Main toolbar (Figure 13) or press F6 on the keyboard.

Pressing F6 bypasses print preview and printer selection screens.

*Full Report*

To generate “full report,” click on the Report icon (1) in the Main toolbar (Figure 14)



### Calculations:

### E-testing is done each day the Teg instrument is used.

### See procedure no 4840-TEG-100, Preventive Maintenance for the TEG, for more information

**INTERPRETATION:**

Reference Normal Ranges

Reference normal ranges for different sample types are provided in the Teg® software. They are reproduced in the following table.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Sample  Type | R (min) | K (min) | Angle (º) | MA (mm) | Sample  Size\* |
| Kaolin | 3.7-8.3 | .5-3.7 | 46.8-73.6 | 54.5-72.5 | 132 |
| Sodium Citrate  Kaolin | 2.5-7.5 | .8-2.8 | 55.2-78.4 | 50.6-69.4 | 98 |
| Native | 12.1-26.5 | 3.2-12.8 | 13.6-46.4 | 41.8-63.0 | 132 |
| Sodium Citrate Native | 9.4-27.4 | 1.9-8.9 | 22.0-58.0 | 44.4-63.6 | 132 |
| Tissue Factor (TF) | 1.3-3.3 | .8-2.8 | 57.0-77.8 | 54.6-75.4 | 178 |

|  |  |
| --- | --- |
| Parameter | Description |
| R | Reaction or clotting time representing the length of time for the initial clot to form |
| K | Time that it takes for the tracing to reach 20mm. This is considered clot formation time |
| Angle | Rate of clot growth |
| MA | Maximum amplitude representing the clot’s full strength |
| LY30 | Clot breakdown 30 minutes after the MA is reached |

You can specify which tests you want and customize the order in which they appear.

**REPORTING RESULTS:**

After the case is completed, report results in the follow manner:

1. Click on the patient’s tracing
2. Go to the case icon

Chose patient by name

Click on the edit case button

Click done

Enter:

Patient ID (medical records number)

Patient Name

Gender

Age

(if not already entered)

1. Under the “ other” tab, enter date of birth
2. Under “clinicians” tab, enter surgeon, pathologist and perfusionist, if known
3. Click done
4. Go to detail icon, sample tab:
5. Enter:

Description (if not already entered)

Accession Number- Enter Teg order number

Ordered By-Enter ordering physician’s name

Leave Bleeding State and patient temperature blank

Reported: Leave blank

Reported By: Your Initials

Report Date: Today’s Date

1. Print Report

Go to Print Icon

Click continue

Select all of the graphs

Print

Print on Lab Color Printer

1. Enter “See TEG Results” and verify the LIS order
2. Scan Graph into SoftMedia via Order Entry. See Soft Procedure Book for more information.

**NOTES:**

### Operator Time out and Logout

If no keyboard or mouse activity occurs for the first time period set by your Site Administrator, the screen blacks out and displays the Operator Login screen. This prevents unauthorized access to patient information. During this time any samples that are running continue to run without interruption, but any other activity requires logging back in as describes under Operator Login.

### TIPS

For TEG operators, the following icons may also prove useful:

|  |  |
| --- | --- |
| Icon | Use |
|  | Allows selection of a specific patient and suppresses other patient data. |
|  | Allows selection of multiple trackings to be viewed simultaneously. Click, select tracings, then click Done. |
|  | Zooms in on the selected tracing. You can also zoom in by double-clicking a tracking. Double-click again or click on Main icon to return to the Main screen. |
|  | Accesses all information for a sample, including notes and interpretation entries, if any. |

### Measurement capability and performance

The testing accuracy of the TEG ® analyzer is affected by operating and storage conditions.

*Operating conditions*

Place the analyzer on a level dust-free surface (pollution degree 2) where it is not exposed to sources of heat, air or vibration.

Maintain room temperature at 10-35º and relative humidity at 20-80% (noncondensing). Use a surge protector to keep power supply fluctuations with a ± 10% of nominal voltage.

Sensitivity is reduced at altitudes above 3000 meters.

*Storage conditions*

When not in use, store the analyzer where it is protected from dust, at temperatures of 30-50ºC, and relative humidity of 5-95% (non-condensing)

*Interference*

To ensure accuracy of test results:

* Use and store the TEG® analyzer only under optimal conditions
* Avoid trauma during blood draw and remember to discard the initial sample
* Run non-anticoagulated whole blood samples within 6 minutes of blood draw
* Use heparinase (lyophilized heparinase cups) to avoid contaminating samples with heparin
* Use the same time interval for loading samples into the analyzer

**REFERENCE:**

Haemoscope

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[www.haemonetics.com](http://www.haemonetics.com)

S:Laboratory P&P/Blood Bank/TEG/4840TEG-103/ch03/05/12