

GEM 5000 Quick Reference Resource Guide

Location: _____

IL Technical Support – 24/7
1-800-678-0710

POCT Coordinator
Stella Howard – stella.howard2@ucsf.edu
Office: 628.206.3057 (x63057)
POCT Main Phone x63493
Fax: 415.206.3045



Official policy and procedure at <https://www.sfgh-poct.org/blood-gas-gem-5000/>

See section **Issues with Patient ID, Sample, Specimen Type** for questions on trouble samples and what to do if a wrong patient ID or wrong specimen type was used. If Stella is out of the office, contact Matthew Lam matthew.lam@ucsf.edu at x66215, or Shannon Kastner Shannon.kastner@ucsf.edu x63544

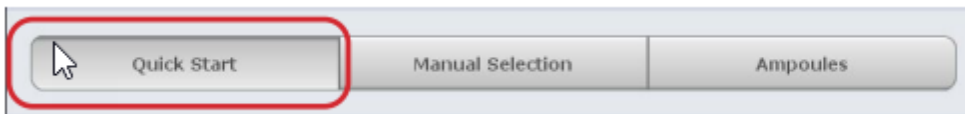
Biggest Differences from the Previous GEM 4000s

CVP Quality Control is built into cartridge warmup, end users no longer need to run CVP

Sample type (venous, arterial, etc.) is built into the Quick Start Menu Panels, so be careful of what panel you chose before sampling, ensure the correct sample type is on the bottom of the panel. Example of a Venous sample with sample type Venous.



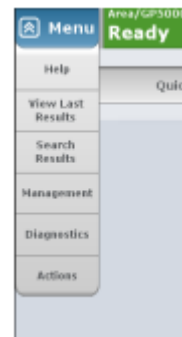
Use **Quick Start panels**, do not use Manual Selection (except NICU).



View Last Result is under Menu → View Last Results; no longer on its own tab on Home screen

Barcode scanner is USB wired, does not need to be charged; must be seated to scan automatically, otherwise pick up and push button to scan.

Cartridge warmup time – 60 minutes, 20 minutes more due to built-in CVP QC.



Sample Analysis on the GEM 5000

Specimen/Sample Stability and Storage

Plastic lithium heparin syringe samples should be analyzed within 15 minutes of draw.

Capillary samples in the NICU should be analyzed in 5 minutes.

Minimum volume is 150 uL for most panels, shows volume requirement on screen. Discard after running.

Sample Preparation

Mix well for 15 seconds after collection (3-5 inversions and roll between palms for 15 seconds) expel any excess air, walk to analyzer, mix well for 15 seconds again

Check for clotting by expelling a small amount of blood on a gauze before sampling.

Unacceptable samples: any degree of clotting, insufficient volume, incorrect drawn or samples contaminated with line fluid, incorrect anticoagulant (lithium heparin only). If results on these sample types posted, please contact POCT/Stella to credit and note error.

Analyzing Samples on the GEM

Select desired Panel from Quick Start menu only (except for NICU who can use Manual Selection). Sample type (venous, arterial, cord arterial, etc.) is built into the panel (different than GEM 4000's), **so be careful of what panel you chose** before sampling

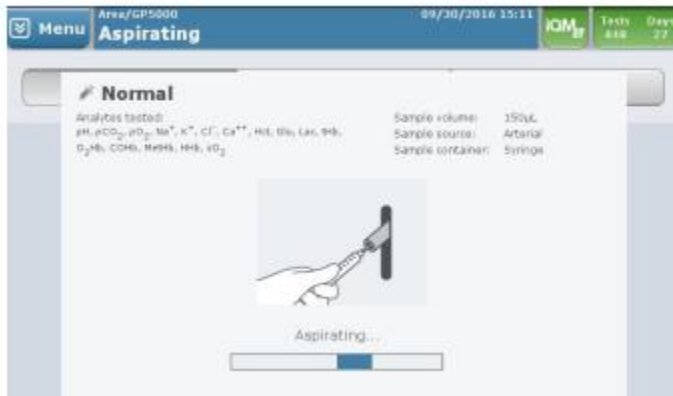
Scan your barcode or manually type in password – do not share barcodes!

Before sampling, notice what panel (a demo “Normal” panel shown here), panel analytes and sample type (Arterial shown here) you have chosen. **If it is wrong, hit Cancel.** Wait and let it process until it returns to the Quick Start menu and try again, approximately a 1 min wait time.

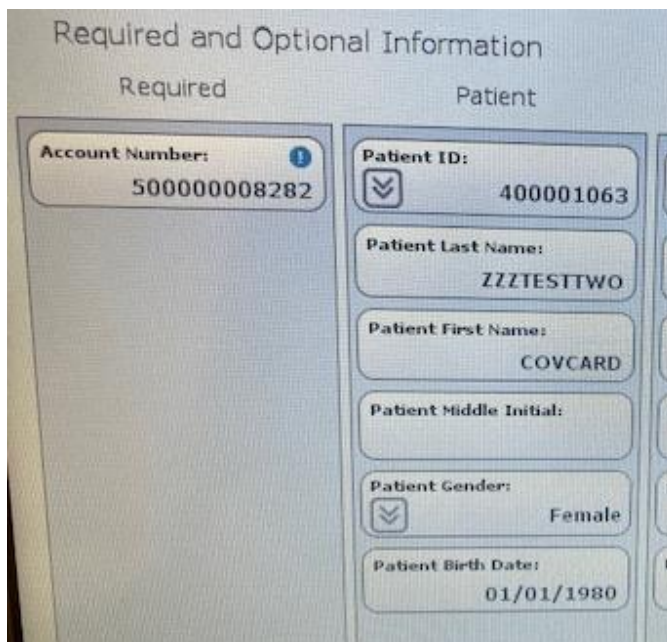
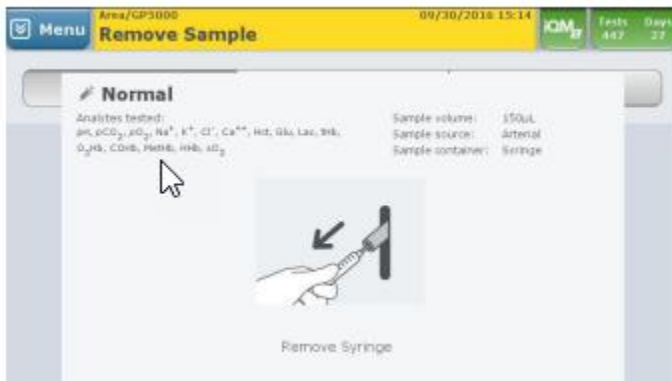


The GEM prompts “Hold Syringe over end of sampler”, insert blood syringe over lighted probe, and hit Start Aspiration.

The GEM will aspirate sample displaying a Message on the blue menu bar “Aspirating Sample”



Remove the sample when prompted on screen, the light flashes and you hear a beep-beep.



The **only required field is the CSN/account number**, scan in from sample. Demographics should query on screen. See Troubleshooting section below if they do not.

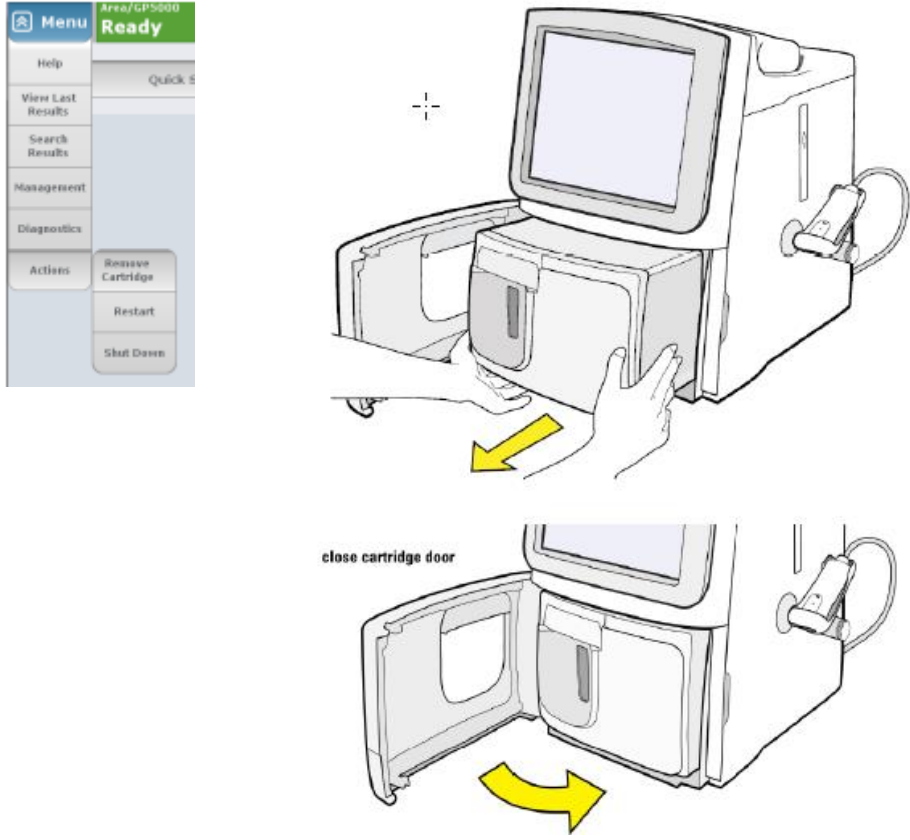
Verify the patient’s information using PPID – positive patient ID. MRN, full name, DOB should match label on specimen!

Results will auto verify and post into Epic If wrong patient ID/MRN or wrong sample type was used, please contact POCT/Stella after reviewing the Issues with Patient ID, Specimen Type section below.

Print results if needed. You can also return to that result if it returned to the home screen by going to **Menu → View Last Result**

Daily Operation

Equipment	<p>GEM 5000 cartridge – 75, 300, 450 test counts, good for 30 days</p> <ul style="list-style-type: none"> • Room temp storage. • 40-minute warmup, 10-20 minutes for built-in CVP QC. • 60-minute total wait until use after inserting. • Main screen with panels and green analytes will be seen when ready. See cartridge failures below if not. <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th style="width: 25%;">Location</th> <th style="width: 45%;">Cartridge type</th> <th style="width: 30%;">Werfen Part number PeopleSoft ID</th> </tr> </thead> <tbody> <tr> <td>NICU H24</td> <td>BG HCT LYTES GLU LACT COOX 300 test count</td> <td>000554-300-10 H7005791</td> </tr> <tr> <td>ED H10/H16 OR HG706 ICU H34</td> <td>BG HCT LYTES GLU LACT COOX 450 test count</td> <td>000554-450-10 H7005793</td> </tr> <tr> <td>ICU H32 ICU H36 ICU H38</td> <td>BGHCT COOX 450 test count</td> <td>000554-450-04 H7005795</td> </tr> <tr> <td>ORHG732</td> <td>BG HCT LYTES GLU LACT COOX 75 test count</td> <td>000554-075-10 H7005794</td> </tr> </tbody> </table> <p>Barcode reader</p> <ul style="list-style-type: none"> • Does not need to be charged, is USB connected, must be seated to scan automatically. • Pick up and push button if will not scan seated. 	Location	Cartridge type	Werfen Part number PeopleSoft ID	NICU H24	BG HCT LYTES GLU LACT COOX 300 test count	000554-300-10 H7005791	ED H10/H16 OR HG706 ICU H34	BG HCT LYTES GLU LACT COOX 450 test count	000554-450-10 H7005793	ICU H32 ICU H36 ICU H38	BGHCT COOX 450 test count	000554-450-04 H7005795	ORHG732	BG HCT LYTES GLU LACT COOX 75 test count	000554-075-10 H7005794
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Cartridges	<p>Loading is the same as the 4000's. New cartridges will need to be loaded when:</p> <ul style="list-style-type: none"> • The onboard one has expired. • The analyzer has been shut down for over 60 minutes. • When a “key” analyte such as pO2 cannot correct itself through IQM processes (built in QC/monitoring) and prompts for new cartridge. • When prompted by user via Menu → Actions → Remove Cartridge. • Place in large biohazard bin, wrapped in extra red bag if available. <p>See Image on next page</p>															

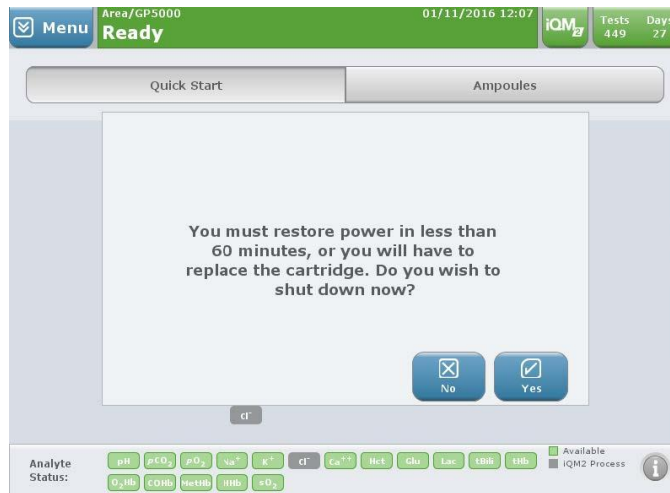
	 <p>The top diagram shows a hand closing the cartridge door, indicated by a yellow arrow pointing left. The bottom diagram shows the door being pushed shut, indicated by a yellow arrow pointing right. The text 'close cartridge door' is written above the second diagram.</p>
Screen and Probe	If screen or probe looks visibly soiled, wipe with a wet gauze or Kim wipe.
Quality Control/iQM	<p>CVP quality control sampling is built-in and ran after 40 min cartridge warm-up.</p> <ul style="list-style-type: none"> • Times vary from 10-20 minutes depending on analytes on board. • CVP1/2 is run for all analytes except for Hct which uses CVP3/4. <p>iQM2 - Intelligent Quality Control Management - will detect clots, micro-clots, interfering substances (see troubleshooting below). It's an active quality process control program designed to provide continuous monitoring of the analytical process</p> <ul style="list-style-type: none"> • Monitors performance of the system in real-time before, during, and after sample measurement. • Identifies potential failure patterns. • Real-time, automatic error detection with correction actions. • Documents the failure of the corrective action automatically. • Allows the replacement of traditional external quality controls (QC).
Cartridge Removal	<p>Should only be done if current cartridge has failed or is expired, when requested by tech support or POCT.</p> <ul style="list-style-type: none"> • Menu → Remove Cartridge → will be prompted for password. • Follow instructions on screen.
Shutting Down	Should only be used if requested by POCT, IL Technical Support, or during troubleshooting software/hardware failure.

Menu → Actions → Shut Down

Prompt for shutdown, do not ever pull plug out first.

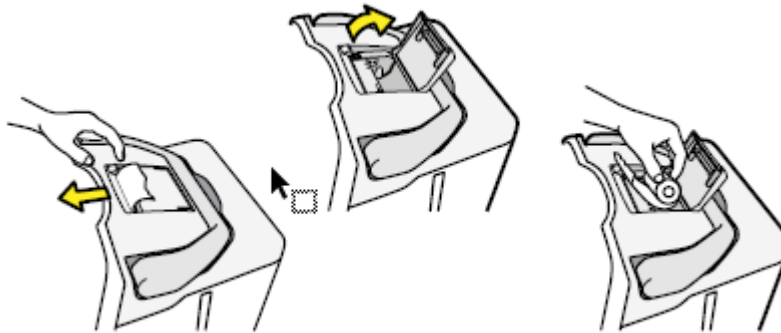
Once shutdown, there is a 60-minute window before the cartridge will go bad and will need to be replaced.

If the analyzer is not turned back on within 60 minutes / 1 hour of being shut down, the cartridge will be lost.



Installing paper

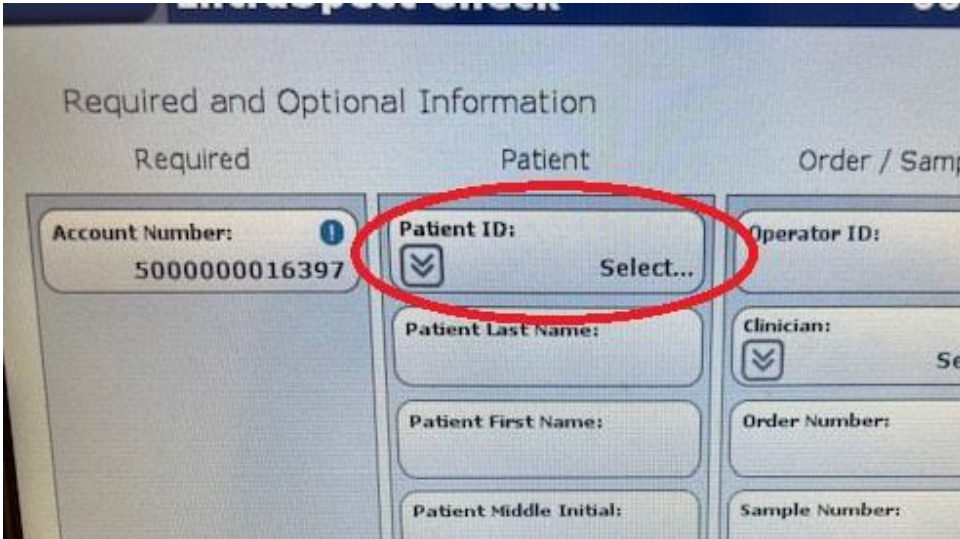
Same as the GEM 4000's. Press the tab at the top of the analyzer to release the door. Open door, remove old roll, and place new roll in the compartment so the paper unfurls to the front of the analyzer and up.



Troubleshooting

Issue	Action																												
<p>Cartridge or Analyte Failures</p>	<p>Specific analytes failing CVP warmup, or going out later:</p> <ul style="list-style-type: none"> After warmup, single analytes can fail internal QC and the analyte will be red on screen and red in the panel they are a part of in the Quick Start menu. The analyzer/cartridge is still usable, you will not get results on the failed analyte, and nothing will cross into Epic for that analyte. Notify Stella/POCT of failed cartridge and serial number – we get a replacement shipped for free. If an analyte goes out later, hours or days after being put in use, they will also turn red on screen and red in the panel they are a part of in the Quick Start menu. The earlier patient results released prior when the analyte was still working are still valid because of the continuous monitoring of iQM processes. Notify Stella/POCT of failed cartridge – there possibly can be a credit depending on the scenario. <p>Key analytes that must pass CVP/iQM for cartridge to remain usable:</p> <ul style="list-style-type: none"> pH, pCO₂, pO₂ <p>Analytes that can fail CVP/iQM and will not provide results, but remaining analytes still available and cartridge remains usable:</p> <ul style="list-style-type: none"> Na/K, iCA++, Glucose, Lactate, Hct, COOX panel (tHb, COHb, O2Hb, MetHb) <p>** It is up to the discretion of the department when they will need to change a cartridge with failed analytes. For example, if glucose went out, could keep using cartridge and use a glucometer.</p>																												
<p>GEM Exception Flags:</p> <p>Incalculable Results</p> <p>Interfering Substances</p>	<p>Incalculable Results:</p> <p>If the COOX and/or a single analyte shows Incalculable results, it <u>will post to Epic</u> as Result Not Valid. If many analytes are Incalculable, all results should not post to Epic.</p> <p>All other exception flags (except for any that say Result Corrected):</p> <p><u>Results will NOT cross into Epic</u>, even the analytes that did not show any exceptions. The COOX panel showed Interference Detected, so the blood gas will not post to Epic. Please contact Stella/POCT to manually enter the valid results.</p> <div style="border: 1px solid gray; padding: 5px; margin: 10px 0;"> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center; border-bottom: 1px solid gray;">Measured at 37.0°C</td> <td style="text-align: center; border-bottom: 1px solid gray;">CO-Oximetry</td> <td style="text-align: center; border-bottom: 1px solid gray;">Derived</td> </tr> <tr> <td style="border: 1px solid gray;">pH 7.53</td> <td style="border: 1px solid gray;">O₂Hb 83.2 ▽ %</td> <td style="border: 1px solid gray;">BE_{ecf} -3.5 mmol/L</td> </tr> <tr> <td style="border: 1px solid gray;">pCO₂ 23 mmHg</td> <td style="border: 1px solid gray;">COHb 12.6 ▽ %</td> <td style="border: 1px solid gray;">HCO₃⁻(c) 19.2 mmol/L</td> </tr> <tr> <td style="border: 1px solid gray;">pO₂ 514 mmHg</td> <td style="border: 1px solid gray;">MetHb 2.7 ▽ %</td> <td></td> </tr> </table> </div> <p>Exception Flags on Results Screen and on Printed Reports</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #4a86e8; color: white;"> <th style="width: 20%;">Exception Flag</th> <th>Exception Flag Description</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">incalculable</td> <td>Result Incalculable</td> </tr> <tr> <td style="text-align: center;">⚠</td> <td>Absorbance Error</td> </tr> <tr> <td style="text-align: center;">S</td> <td>Result Corrected for Sulphaemoglobin</td> </tr> <tr> <td style="text-align: center;">⚠</td> <td>High Turbidity Detected</td> </tr> <tr> <td style="text-align: center;">▽</td> <td>Interference Detected</td> </tr> <tr> <td style="text-align: center;">⚠</td> <td>Micro Clot Detected</td> </tr> <tr> <td style="text-align: center;">⚠</td> <td>Temporary Sensor Error</td> </tr> </tbody> </table>	Measured at 37.0°C	CO-Oximetry	Derived	pH 7.53	O ₂ Hb 83.2 ▽ %	BE _{ecf} -3.5 mmol/L	pCO ₂ 23 mmHg	COHb 12.6 ▽ %	HCO ₃ ⁻ (c) 19.2 mmol/L	pO ₂ 514 mmHg	MetHb 2.7 ▽ %		Exception Flag	Exception Flag Description	incalculable	Result Incalculable	⚠	Absorbance Error	S	Result Corrected for Sulphaemoglobin	⚠	High Turbidity Detected	▽	Interference Detected	⚠	Micro Clot Detected	⚠	Temporary Sensor Error
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Issues with Patient ID, Sample, Specimen Type

Error	Action
<p>Scanned in the wrong patient ID and results posted to Epic</p> <p>Used the wrong sample type</p>	<p>Immediately notify the provider of the wrong patient sample date/time. Recollect and re-test correctly.</p> <p>Notify Stella via email (stella.howard2@ucsf.edu) or office message x63057 with the following so it can be corrected in Epic:</p> <ul style="list-style-type: none"> • Your name, and provider’s name you alerted • GEM location • MRN, patient name • Date/time sample ran on GEM • Briefly how error occurred <p>If outside of regular POCT business, notify Hematology at x66215 for wrong patient ID and ask them to credit as wrong, and then follow up with notifying Stella.</p>
<p>Demographics not querying</p> <p>Epic downtime</p> <p>Results not posting in Epic</p>	<p>Demographics may not query if there is Epic downtime, meaning after scanning in the patient account, the patient’s information does not display. If manually typed, double check that you entered the number correctly.</p> <ul style="list-style-type: none"> • The GEM is still functional, but results won’t be in Epic • Scan in account number to the account number field • Manually type in MRN into the Patient ID field • Verify information correct patient with PPID positive patient ID <p>Test/dummy account number example:</p> 

Use downtime forms at each GEM location for reference ranges with analyzer printout or to place in paper charts, found at <https://www.sfgh-poct.org/blood-gas-gem-5000/>, and scroll down to reference range sheets; or use these links:

ICU, OR, ED: <<http://www.sfgh-poct.org/wp-content/uploads/2019/06/GEM4000-POCT-Results-and-Reference-Range-Sheet06172019112058.pdf>>

NICU: <<http://www.sfgh-poct.org/wp-content/uploads/2019/06/NICU-POCT-Ref-Ranges06172019171533.pdf>>

Once a connection is reestablished, results should be able to post with those two patient identifiers.

If you are having this issue with multiple different patients and it's not scheduled Epic downtime, please email Stella (or Matt Lam if Stella is out). Submit an Epic ticket if outside of regular business hours as well.

Connection to Epic for results to post can be lost due to:

- Monthly maintenance - there is scheduled Epic downtime 2-3 hours every month, generally between 1a-7a – POCT notifies superusers of downtime
- Network cord unplugged from wall or analyzer
- IT/LIS connection issues

Suspect results

Either repeat with a new sample or send a new sample to the Clinical Lab.
Things to consider:
Did you mix the sample well, according to the procedure? Did you check for a clot prior to analyzing the sample? Are you analyzing it within the allowed timeframe?