Welcome to eSessions

This session contains audio.
Review the information on each slide before continuing.
TROUBLESHOOTING THERAPEUTIC PLASMA EXCHANGE (TPE) PROCEDURES

COBE® SPECTRA APHERESIS SYSTEM
Getting Around

Click on these **TABS** to change the view of the left sidebar:

- **OUTLINE** shows links to each slide.
- **SEARCH** allows you to search the module by keyword(s).
- **THUMBNAILS** shows a small image of each slide.
- **NOTES** displays a transcript of the narration for modules that include audio.

This button toggles between **PLAY** and **PAUSE**. Click the **PLAY** button to continue.

Go to **PREVIOUS** screen.

Click this icon to toggle between **FULL SCREEN** and **STANDARD** view.

Go to **NEXT** screen.
TPE Procedure Considerations

- Operator’s knowledge of the COBE Spectra system
- COBE Spectra system operator’s manual
- Electrolyte imbalances
- Citrate reactions
- Fluid shifts
- Platelet loss
- Patient’s hematocrit (Hct) and total blood volume (TBV)
  - Blood prime/Extracorporeal volume (ECV)
    - Shock
    - Hypotension
    - ECV
Presentation Overview

Preventive measures:
- Know your patient
- Know the diseases
- Know the COBE Spectra system
- Know your TPE procedure resources
KNOW YOUR PATIENT
Coagulation proteins (e.g., fibrinogen)
Urea, creatine
Clotting factors
Electrolytes
Plasma protein bound drugs
## Alteration in Blood Constituents Table

 Alteration in Blood Constituents by a Single-Plasma Volume Exchange

<table>
<thead>
<tr>
<th>Constituents</th>
<th>% Decrease (from baseline)</th>
<th>% Recovery (48 hrs post TPE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clotting Factors</td>
<td>25–50</td>
<td>80–100</td>
</tr>
<tr>
<td>Fibrinogen</td>
<td>63</td>
<td>65</td>
</tr>
<tr>
<td>Immunoglobulins</td>
<td>63</td>
<td>~45</td>
</tr>
<tr>
<td>Paraproteins</td>
<td>30–60</td>
<td>Variable</td>
</tr>
<tr>
<td>Liver Enzymes</td>
<td>55–60</td>
<td>100</td>
</tr>
<tr>
<td>Bilirubin</td>
<td>45</td>
<td>100</td>
</tr>
<tr>
<td>Platelets</td>
<td>25–30</td>
<td>75–100</td>
</tr>
</tbody>
</table>

*Replacement fluid consisting of 4% to 5% albumin in 0.9% sodium chloride.
KNOW THE DISEASES
Disease Complications

- Hyperviscosity
- Hemolysis, lipemia
- Bleeding
- Patient’s medications
- Hypotension
- Coagulation complications
KNOW THE COBE SPECTRA SYSTEM: Refer to Your Operator’s Manual
Troubleshooting MNC Collection Procedures

System Maintenance

- General
  - Clean up spills

- Weekly
  - Clean the sensors
  - Clean the door tracks

- Monthly
  - Clean the front door sensor
  - Change the pressure pod seals

Essentials Guide: Ch. 10, “General Maintenance.”
Troubleshooting Warnings and Alarms

Safety system:
- Shutdown alarms
  - Red LED flashes
- Warning and operator-attention alarms
  - Yellow LED flashes
- Multiple alarms
  - Asterisk (*) appears on the display screen
- Clearing of alarms
  - Pause LED flashes and “Continue” appears on the display screen

*Essentials Guide*: Ch. 12, “General Alarms and Troubleshooting.”
Example Warning Message

This warning appears if the **RBC detector** does not detect RBCs after the prime saline has been diverted.

- Line placed in the RBC detector?
- Patient has a low Hct?
- Access saline line not fully closed for the run?
Data Relationships

Sex, height, & weight

Hct & TBV &

Plasma volume

Plasma pump

RBC/Plasma interface

Replacement fluid

AC infusion rate

AC pump

Fluid balance

Replace pump

Inlet:AC ratio

Inlet pump

Inlet:AC ratio

AC pump

Inlet pump
Changing the Inlet Flow Rate

↑ Blood processed

↑ Inlet flow rate

↑ Time

↑ AC infusion rate

↑ Citrate reactions
AC Infusion Rate

AC added to the extracorporeal circuit from:
- ACD-A bag
- Replacement fluid

Minus: AC going to the plasma waste bag

Equals: AC delivered to the patient
Changing the Inlet Flow Rate

<table>
<thead>
<tr>
<th>AC</th>
<th>INLET</th>
<th>PLASMA</th>
<th>COLLECT</th>
<th>REPLACE</th>
<th>INLET:AC RATIO</th>
<th>RPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.0</td>
<td>60.0</td>
<td>XX.X</td>
<td>XX.X</td>
<td>10.0</td>
<td>1840</td>
<td>TPE</td>
</tr>
</tbody>
</table>

| 7.0| 70.0  | XX.X   | XX.X    | 10.0    | 2260           | TPE    |

Press MENU, 1 for Data entry, 4 for AC data: AC infusion = 0.9

† Inlet pump flow rate
† AC pump flow rate
† AC infusion rate
Citrate Reactions

Cause:

- Citrate is being infused faster than the patient can metabolize it
  - What is the patient’s ionized calcium level?
  - What is their kidney and liver function?
Citrate Reactions (continued)

- Pause the procedure
- Decrease the inlet pump flow rate
21 Troubleshooting MNC Collection Procedures

- The AC infusion rate of 1.2 mL/min/L TBV was exceeded
- Press MENU, 1 for Data entry, 4 for AC data

**CAUTION:** AC infusion exceeds limit. Reduce inlet flow? YES/NO

- Consider calcium replacement if rate exceeds 1.2 mL/min/liter TBV

**Warning Message**

AC infusion rate: 1.4 ml/min/liter TBV
ml AC in bags: collect:___, plasma:___
Increasing the Inlet:AC Ratio

- Increased Inlet pump rate
- Increased Inlet:AC ratio
- Same AC infusion rate
- Time decreases
- Clumping
If you ↑ the Inlet:AC ratio, there is a ↓ in the concentration of AC in the circuit, which ↓ the anticoagulation effect.
Alarm Messages

- Pumps stop
- Centrifuge stops
- Return line valve closes

Causes:
- Kinked or twisted tubing
- High plasma viscosity

Actions:
- Check tubing
- Reduce inlet pump flow rate
RETURN PRESSURE HIGH!
Check return line and needle.  CONTINUE

- Pressure in return pressure sensor measures above specified limit
- Pumps stop

Causes:
- Return line/needle occluded
- Centrifuge stops due to alarm condition

Actions:
1. Clamp return needle
2. Open return saline
3. Open return line valve
4. Close return saline
5. Open return needle
Interface Too High (RBC Accumulation in the Channel)

**Causes:**
- Entered Hct is too low
- Fluid shifting (usually caused by the replacement fluid)
- Hyperviscosity

**Actions:**
- Increase Hct by 3% (up to 3 times)
- Increase the rpm by 10% to 20%
- If rpm is 2,400, first reduce the inlet flow, then increase the rpm
Warning Messages

Plasma line contamination detected!
Check interface and plasma.

Causes:
- Interface is too high
- Clinical condition of the patient produces contamination
  - Hemolysis
  - Lipemia
  - Bilirubinemia

Actions:
- Increase Hct by 3% (up to 3 times)
- Clear the warning every 4 minutes
- Remove the cuvette from the CCM
- Disable the CCM
Warning Messages (continued)

- The COBE Spectra system automatically increased the patient’s Hct by 3%; when the interface moves to the correct position, press ENTER.
- The target values change and need to be adjusted (unless incorrect Hct was entered).

Excessive plasma line contamination!
Start TPE Spillover Recovery? (YES/NO)

Press YES.

Spillover Recovery: Hematocrit increased
Press ENTER when RBCs clear.

- The COBE Spectra system automatically increased the patient’s Hct by 3%; when the interface moves to the correct position, press ENTER.
- The target values change and need to be adjusted (unless incorrect Hct was entered).
KNOW YOUR TPE PROCEDURE RESOURCES
TPE Procedure Resources

- **COBE® Spectra Apheresis System Operator’s Manual**
- Terumo BCT 24-hr support line 1.877.339.4228
- Other COBE Spectra system operators
- Apheresis resources:
  - *Apheresis Principles and Practice* (text)
  - *Transfusion* (journal)
  - *Journal of Clinical Apheresis* (journal)
  - *Principles of Apheresis Technology* (ASFA)
References

Questions?