

ASFA 2017 Annual Meeting

Apheresis Review Session

PATIENT CARE

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Disclosures

- No relevant disclosures

Summary

- Assessment / Monitoring
- Replacement Fluids
- Anticoagulation
- Medications / Drug Interactions
- Venous Access
- Fluid Balance
- Age-Related Considerations
- Adverse Reactions

Objectives

- ① **Identify areas for pre-procedure assessment**
- ② **Understand the impact of fluid shift and fluid balance**
- ③ **Consider the impact of medications, replacement fluids and anticoagulant**
- ④ **Identify common adverse events**
- ⑤ **List age-related issues**

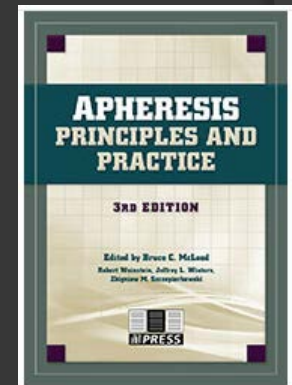
Therapeutic Apheresis

“Although it has become almost routine clinically, it is an invasive procedure that can have significant physiologic consequences”.³

Patient Care Principles: 1

Know basic science and patient care fundamentals

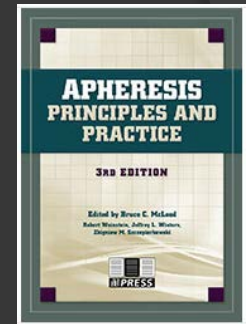
- ABO/HLA compatibility
- Coagulation
- Lab values
- Signs and symptoms of cardiopulmonary distress and electrolyte imbalances
- Responses to adverse reactions



Patient Care Principles: 2

Know disease pathology and treatment indications

- Disease and related therapy profiles
- Apheresis treatment efficacy
 - Guidelines on the Use of Therapeutic Apheresis in Clinical Practice¹
 - Risk / benefit ratio and priority
- Concurrent therapies



Disease name	TA Modality	Indication	Category	Grade	Page
Acute disseminated encephalomyelitis	TPE	Steroid Refractory	II	2C	163
Acute inflammatory demyelinating polyradiculoneuropathy/Guillain-Barre syndrome	TPETPE	Primary Treatment After IVIG	I	1A	165
			III	2C	
Acute liver failure	TPE		III	2B	167
	TPE-HV		I	1A	
Age related macular degeneration, dry	Rheopheresis		I	1B	169
Amyloidosis, systemic	β_2 microglobulin column		II	2B	171
	TPE		IV	2C	
ANCA-associated rapidly progressive glomerulonephritis (Granulomatosis with polyangiitis; and Microscopic Polyangiitis)	TPE	Dialysis dependence	I	1A	173
	TPE	DAH	I	1C	
	TPE	Dialysis independence	III	2C	

Flow of Care

PRE

- Indication + Patient suitability
- Treatment Plan

DURING

- Patient Care

POST

- Patient Care
- Hand-off Communication

Pre-Procedure

Intake Patient Assessment

A thorough assessment allows for a safe treatment plan

- History & Physical
- Lab results
- Medications
- Vascular Access

Assessment: H & P

Comorbidities can create APH complications¹

- ⦿ **Cardiopulmonary**
 - Risk of hypotension
- ⦿ **Renal / Hepatic**
 - Poor citrate metabolism
- ⦿ **Hematologic**
 - Risk of bleeding
 - Intolerance to fluid shifts



Assessment: Lab Results

Assess to determine disease progression, therapeutic response and the patient's suitability for apheresis.

- ⦿ **CBC** – ability to tolerate ECV, platelet loss
- ⦿ **Renal / Liver** – ability to metabolize citrate
- ⦿ **Electrolytes** – APH removes and chelates

Assessment: Medications

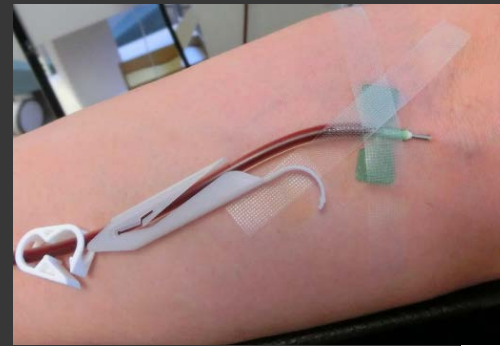
- ⦿ Drugs with a low volume of distribution and high plasma protein binding are highly removed.²
- ⦿ Drug Timing and Apheresis
 - Hold medication
 - Have extra dose on hand
 - Delay procedure
 - Concurrent IV meds – titrate
- ⦿ **ASFA Webinar: Medications and Apheresis – April 2013, Dr. Yanyun Wu**



Assessment: Vascular Access

◎ **What is needed for optimal therapy?**

- Procedure flow rate
- Impact of flow interruptions
- Sterility



◎ **What can the patient sustain?**

- Length of therapy
- Hx. venous thrombosis, immune status, skin integrity, physical limitations, life style, self-image, needle-phobia



Treatment Plan

- ⦿ **Frequency**
- ⦿ **Total Blood + Extracorporeal Volume Limit**
- ⦿ **Replacement Fluids**
- ⦿ **Fluid Balance**
- ⦿ **Anticoagulation**
- ⦿ **Vascular Access**
- ⦿ **Medications**
- ⦿ **Blood Product Prime**

Patient Preparation: Pre-Treatment

- ⦿ **Informed Consent**

- ⦿ **Education**

- **What to expect**

- How it feels, how long it takes, response

- **How to prepare**

- Hydration, medications, food

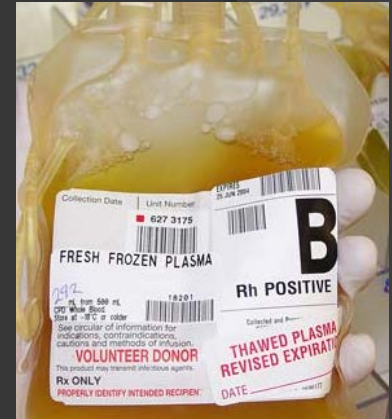
Patient Assessment: Day-Of

- ◎ **Current labs**
 - replacement needs
- ◎ **Changes in medications**
- ◎ **Changes in clinical status**
- ◎ **CVC inspection**
 - Perform PRIOR to loading procedural kit!!
 - Radiographic confirmation of correct placement

Intra-Procedure

Replacement Fluids

- Albumin
- Fresh Frozen Plasma
- Cryoprecipitate-poor Plasma
- Saline
- Red Blood Cells



Replacement Fluids

Advantages / disadvantages²

- ⦿ Citrate reactions
- ⦿ Risk of allergic reaction
- ⦿ Risk of disease transmission
- ⦿ Coagulation factors / plasma proteins
- ⦿ Oncotic properties
- ⦿ Cost

Fluid Balance

◎ **Project fluid balance pre-procedure!**

- Net positive or Net Negative

◎ **Consider**

- Orders to leave dry or wet
- Impact to patient
- Rinseback
- Collect Pump speed



Anticoagulation: ACD-A

- ◎ **Monitor for electrolyte imbalances**

- hypocalcemia, hypomagnesemia, hypokalemia, metabolic alkalosis²

- ◎ **Citrate toxicity**

- Easily managed when planned for
- Consider anticoagulant in blood products

- ◎ **Can aggravate cardiac conditions**

- Cardiac monitor
- Frequent ionized calcium testing

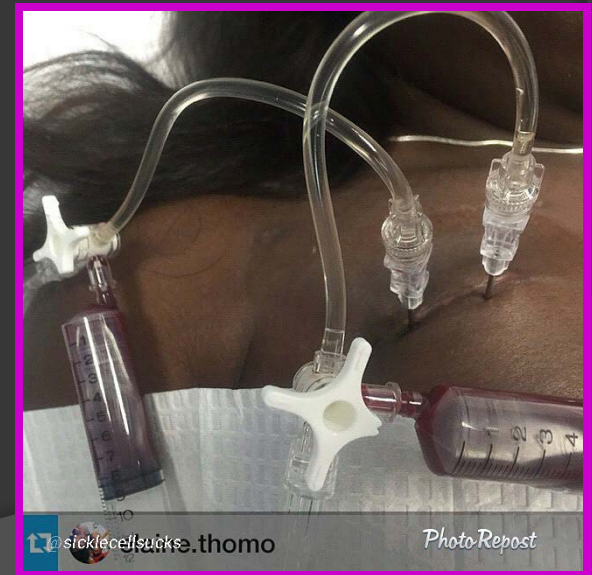
Venous Access: peripheral

- ① Patient preparation
- ① Site selection
- ① Site preparation
- ① Arm immobilization
- ① Secure cannula
- ① Limit manipulation
- ① Apply pressure after removal



Venous Access: central

- ◎ **Use proper care and feeding of CVC device to diminish patient anxiety and deliver successful therapy**
 - Right device, patency, site condition
 - Before preparing instrument!
- ◎ **Limit manipulation**
 - Infection risk



Monitoring

⦿ **Vitals Signs**

- BP, HR, R, T
- Typically every 15-30”
- More frequently with blood products

⦿ **Oxygen saturation**

⦿ **Cardiac monitoring**

- IV calcium, unable to communicate

⦿ **Visual and verbal assessment**

Adverse Events – Top 5

Overall Rate 4-5%³

- Transfusion reactions
- Citrate-related nausea/vomiting
- Hypotension
- Vasovagal
- Pallor



Adverse Events¹

MILD	MODERATE	SEVERE
Parasthesia, pallor, dizziness, sweating, n/v, transient hypotension	Hives, hypocalcemia, wheezing, tongue/facial swelling, SOB	Convulsions, tetany, laryngeal edema, cardiopulmonary arrest
Responds to nursing intervention	Mild reactions that don't respond to nursing intervention, Required Physician Presence	Requires significant medical intervention
Medication, pause procedure, resume	Medication, pause or stop procedure, may or may not resume	Medication + Rapid Response, terminate procedure

Adverse Events

Allergic Reactions

⦿ Blood products

- Transfusion reaction (acute or delayed)
- TRALI
- TACO

⦿ Hydroxyethyl Starch (HES)

⦿ Ethyleneoxide (ETO)

Citrate Toxicity

◎ **Signs and Symptoms²**

- Parasthesias (perioral and systemic)
- Light-headedness
- Shivering
- Pallor
- Twitching, muscle cramps, tetany

Citrate Toxicity: Management

- ◎ **Calcium replacement**
 - Prophylactic or as needed
 - Oral or IV
- ◎ **Routine or as needed iCa testing**
- ◎ **Use slower flow rates**
- ◎ **Combination anticoagulant**
 - Heparin + ACD-A

Adverse Reactions: Volume

⊙ Hypotension

- ↑ HR, ↓ BP¹

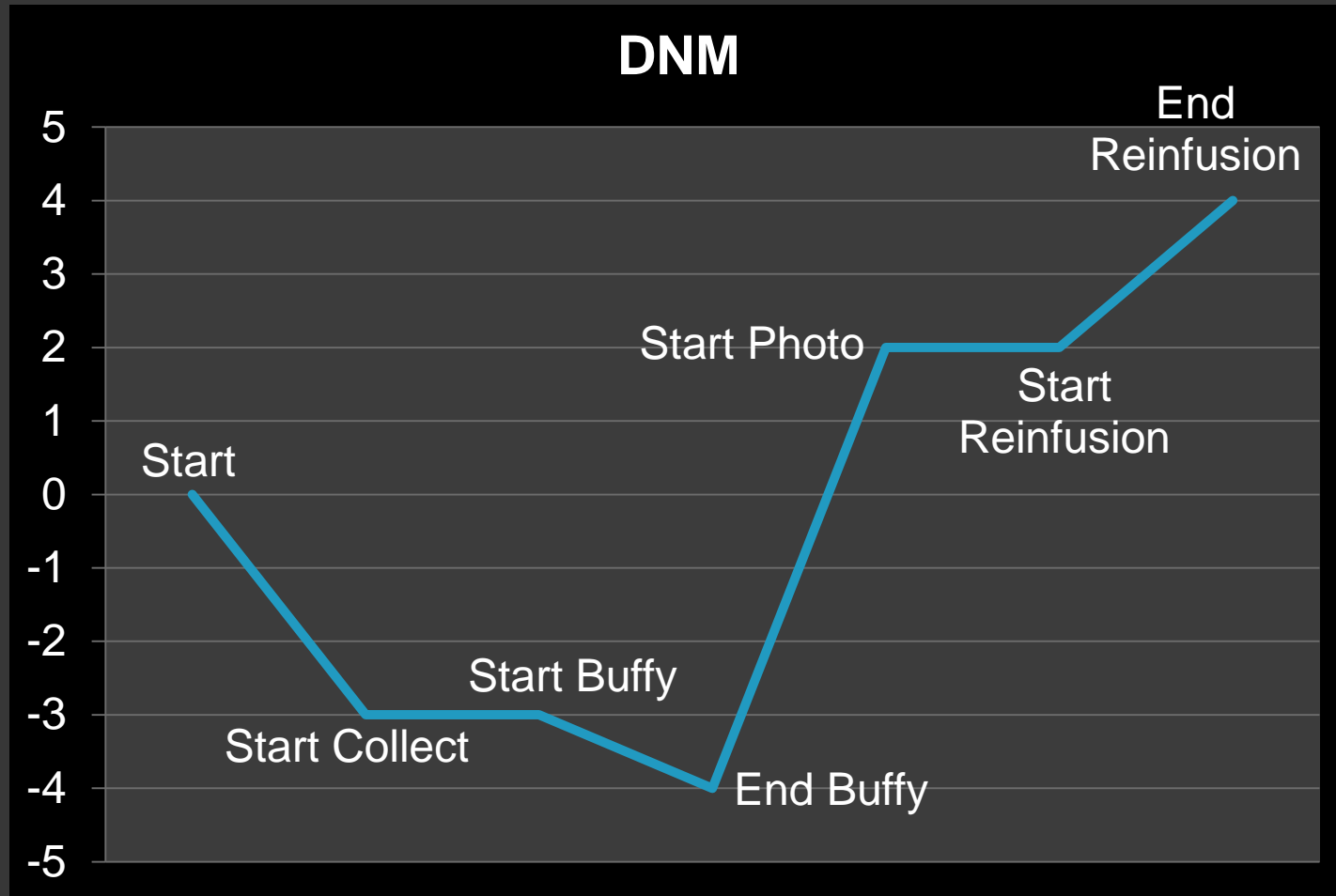
⊙ Vasovagal

- ↓ HR, ↓ BP¹

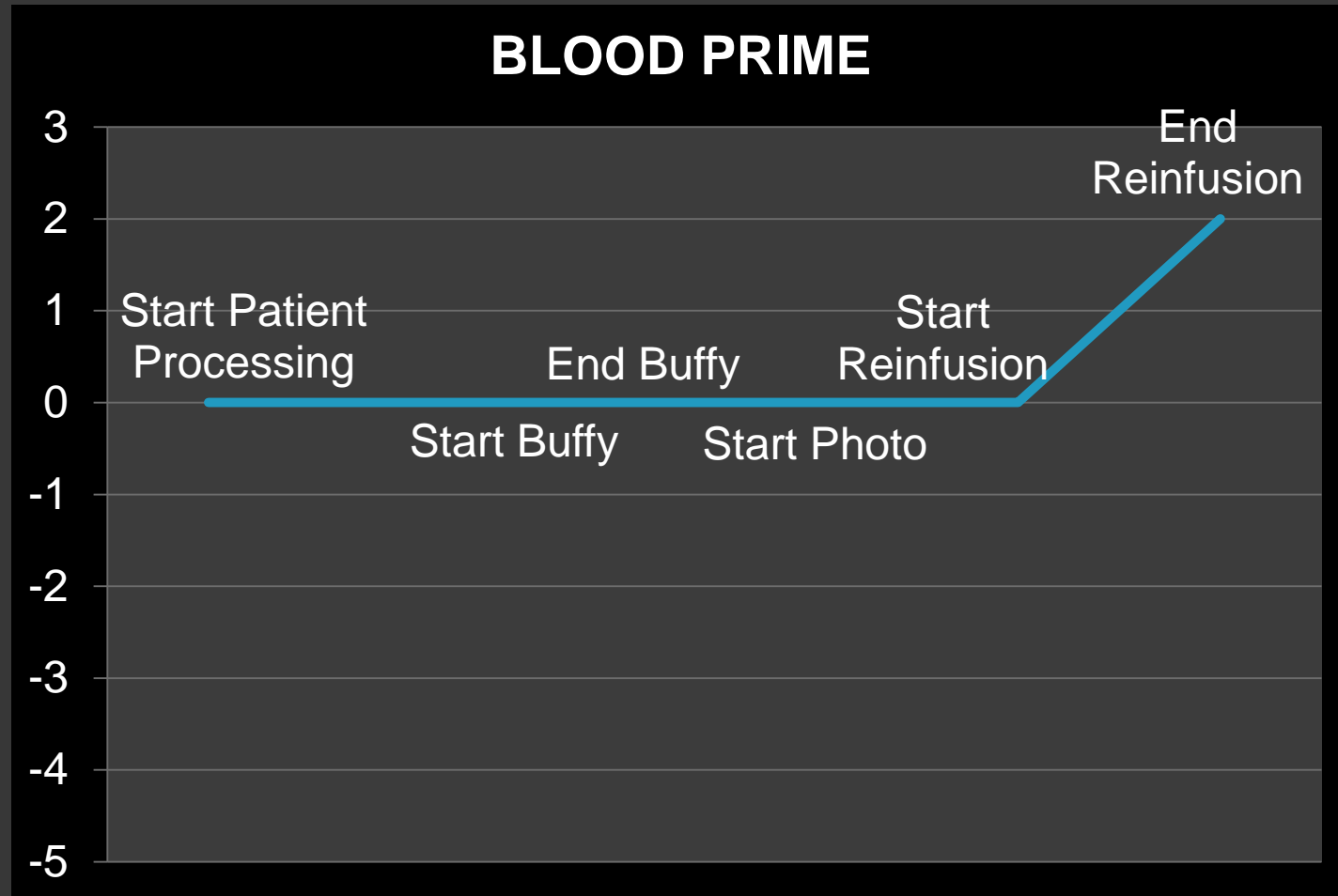
⊙ Consider

- Use slow initial flow rate
- Use slower rates with fragile populations
- Pregnant – left side positioning

Fluid Shift: Photopheresis



Fluid Shift: Photopheresis



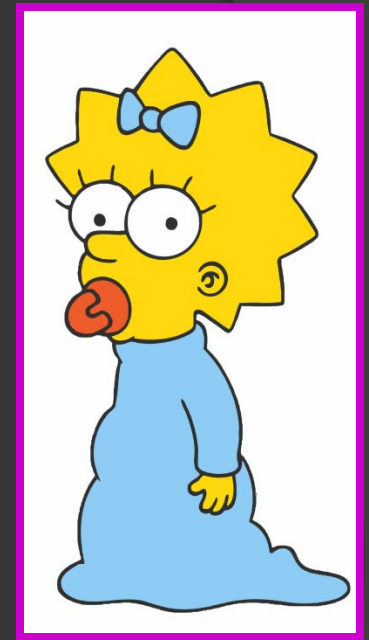
Disease-Related Issues

- ⦿ GCSF / chemo mobilization
- ⦿ Pathologic pain
- ⦿ Emotional State
- ⦿ Electrolyte imbalance
- ⦿ Blood Product dependency
- ⦿ Immune system status
- ⦿ Temperature regulation: CAD

Pediatric Considerations

Wee people are not small adults!

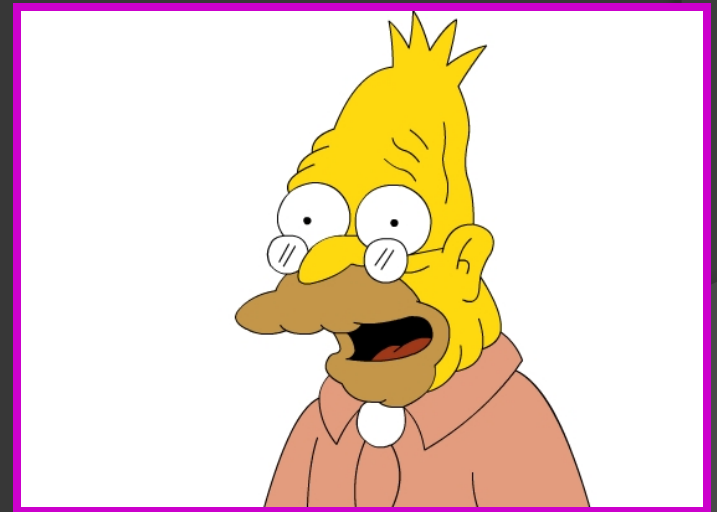
- ⦿ Vital signs vary by age and sex^{4,5}
- ⦿ ECV is relative to size:
 - kit volume is static
 - total blood volume varies
- ⦿ Blood volume calculations vary with age²
- ⦿ Developmental stage
- ⦿ Vascular access is challenging



Older Adults

How will the older adult tolerate ECV, fluid shifts, citrate toxicity and adverse events?

- ⦿ Diminished renal function and metabolism⁸
- ⦿ Poor vascular access
- ⦿ Increased comorbidities⁸
- ⦿ Diminished reserve⁸



Instrument / Kit Malfunction

- ⦿ **Instrument Malfunction**
- ⦿ **Loss of kit integrity**
- ⦿ **Prime concern is the patient!**
 - Minimize patient impact
 - Provide reassurance
- ⦿ **Consider**
 - Infection risk, blood loss
 - Sub-optimal treatment or no treatment



Post-Procedure

Final Assessment

- ⦿ **Vital Signs**
- ⦿ **Final Fluid Balance**
- ⦿ **Post Labs: CBC, fibrinogen, INR,**
- ⦿ **Concise hand-off**
 - May need to explain implication of final assessment to receiving provider!

Patient Education

- ⦿ **Call for immediate and delayed reactions**
- ⦿ **Self-assess for**
 - Bleeding
 - Syncope
 - Respiratory + cardiac symptoms
- ⦿ **What to expect**
 - Fatigue, photosensitivity, bone pain, cytopenia
 - Improved clinical status (hopefully!)

Be Prepared!

Know what to expect

Know your response plan

Know your exit strategy



Citations

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3. McLeod BC, Crookston K, Eder A, eds. Therapeutic Apheresis *A Physician's Handbook*. 1st ed. Bethesda, MD: AABB , 2005:13-32.
4. Fourth report on the diagnosis, evaluation, and treatment of high blood pressure in children and adolescents. National Heart, Lung and Blood Institute. National Institutes of Health. May 2004.
5. Fleming S, Thompson M, Stevens R, et al. Normal ranges of heart rate and respiratory rate in children from birth to 18 years of age: a systematic review of observational studies. *Lancet* 2011; 377:1011
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Thank You!