



Module 4: Acute Care Therapeutic Apheresis Orientation Manual and Assessment Tools

Anatomy and Physiology

It is essential that the nurse working in apheresis has a basic understanding of the anatomy and physiology of the immune system. The immune system is responsible for protecting the body against invaders such as viruses, bacteria and other threats to health such as cancer. The immune system also plays a major role in accepting or rejecting a transplanted organ. Abnormalities of this complex system may lead to immunodeficiency or autoimmune diseases. Since most of the diseases treated with therapeutic apheresis have immunologic pathogenesis, it is important for the nurse performing apheresis therapies to understand the impact of these procedures on the patient's immune system function. This essential knowledge will aid in evaluating the patient's response to apheresis and the execution of an appropriate treatment plan.

Goals

Upon completion of this chapter, the nurse in the acute care setting will be able to:

- Identify the gross anatomy of the organs of the immune system and their functions.
- Identify the main immune system cells and their primary function.
- Identify the ways that immune cells communicate with each other.
- Define the innate immune response.
- Define the acquired immune response.
- Define the classifications of other immune cells.

_____ has met the skills and requirements of this chapter.

Date: _____ Preceptor: _____

Additional Readings

- Parsons, J. (2014). Basic science. In W. Linz (Ed), *Principles of apheresis technology: Technical principles of apheresis medicine* (5th ed., pp. 1-21). Vancouver, BC: American Society For Apheresis.
- Sung, A., Kang, Y., & Chao, N. (2015). Immune reconstitution. In J. Wingard, et al (Eds), *Hematopoietic stem cell transplantation: A handbook for clinicians* (2nd ed., pp. 273-275). Bethesda, MD: AABB.
- Understanding the immune system: How it works (September 2003). NIH Publication No. 03-5423. Retrieved from www.nci.nih.gov, www.niaid.nih.gov, US Dept of Health and Human Services, National Institutes of Health, National Institute of Allergy and Infections Disease, National Cancer Institute.



Anatomy and Physiology Skills Checklist

The orientee is able to:

Self-Assessment	Topic	Date Introduced/ Reinforced	Date Met	Method	Orientation Level Achieved	Preceptor Initials
	Identify the Gross Anatomy of the Organs of the Immune System and Their Functions					
	Tonsils					
	Skin					
	Thymus					
	Spleen					
	Bone Marrow					
	Lymph Nodes					
	Peyer's Patches					
	Identify the Main Immune System Cells and Their Primary Functions					
	T-Lymphocytes					
	B-Lymphocytes					
	Plasma Cells					
	Macrophages					
	Dendritic Cells					
	Neutrophils					
	Mast cells					
	Eosinophils					
	Basophils					
	Identify the Ways That Immune Cells Communicate With Each Other					



Anatomy and Physiology Skills Checklist

The orientee is able to:

Self-Assessment	Topic	Date Introduced/ Reinforced	Date Met	Method	Orientation Level Achieved	Preceptor Initials
	Cytokines					
	Cell to cell contact					
	Define the Innate Immune Response					
	Physical barriers					
	Inflammation					
	Complement system					
	Natural Killer Cells					
	Define the Acquired Immune Response					
	Lymphocytes					
	Killer T-Cells					
	Helper T-Cells					
	B-Lymphocytes and Antibodies					
	Immunologic memory					
	Define the Classifications of Other Immune Cells					
	Immunodeficiency – Primary and Acquired					
	Autoimmunity					
	Hypersensitivity					
	Define humoral immunity					
	Define Cellular immunity					



Keys		
Key for Self-Assessment 0 = Have not performed and/or unfamiliar with item 1 = Performed less than 5 times or have some knowledge and need additional instruction 2 = Performed more than 5 times and/or have sufficient knowledge and feel confident to perform independently	Key for Method CR = Chart Review Ex = Written Exam O = Observation S = Simulation V = Verbalization RD = Return Demonstration	Key for Orientation Level Achieved N = Novice AB = Advanced Beginner C = Competent P = Proficient E = Expert
Note: This checklist may be adapted and reproduced for the sole purpose of internal use within the purchaser's facility.		



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Principles

Therapeutic apheresis is a disease-modifying and often a life-saving therapy. It must be done safely, accurately and with the adjustment of treatment parameters to treat the specific needs of each patient. The apheresis/nephrology nurse must understand the basic principles of blood component separation to provide safe and effective treatment or collection of blood products. There are two basic ways to separate blood components: filtration and centrifugation. The techniques may vary depending on the type of separation device used but the basic principles remain the same. A comprehensive understanding of those principles are essential for choosing the best device and for delivering safe, effective, high quality care.

Goals

Upon completion of this chapter, the nurse in the acute care setting will be able to:

- Discuss and describe the principles of filtration separation.
- Discuss and describe the principles of centrifugal separation.

_____ has met the skills and requirements of this chapter.

Date: _____ Preceptor: _____

Additional Readings

- Crookston, K., & Novak, D., (2010). Physiology of apheresis. In B. McLeod, Z. Szczepiorkowski, & R. Weinstein (Eds.). *Apheresis: Principles and practice*, (3rd ed., pp. 45-69). Bethesda, MD: AABB Press.
- Karr, E., & Padmanabhan, A. (2014). Therapeutic apheresis procedures. In W. Linz, W. (Ed.), *Principles of apheresis technology: Technical principles of apheresis medicine* (5th ed., pp. 43-50). Vancouver, BC: American Society For Apheresis.
- Kiprof, D., Sanchez, A., & Pusey, C. (2015). Therapeutic Apheresis. In J. Daugirdas, P. Blake, & T. Ing (Eds.), *Handbook of dialysis* (5th ed., pp. 333-359). Philadelphia, PA: Wolters-Kluwer.
- Rohe, R. (2015). Therapeutic apheresis. In Counts, C. (Ed.), *Core curriculum for nephrology nurses* (6th ed. pp. 219-225). Pitman, NJ: American Nephrology Nurses Association.
- Weinstein, R. (2010). Basic principles of therapeutic blood exchange. In B. McLeod, Z. Szczepiorkowski, & R. Weinstein (Eds.). *Apheresis: Principles and practice*, (3rd ed., pp. 269-294). Bethesda, MD: AABB Press.



Principles Skills Checklist

The orientee is able to:

Self-Assessment	Topic	Date Introduced/ Reinforced	Date Met	Method	Orientation Level Achieved	Preceptor Initials
	Discuss and Describe the Principles of Filtration Separation					
	Movement of plasma across a semi-permeable membrane					
	Separation based on size vs. weight					
	Specific gravity of plasma					
	Hematocrit of cellular components exiting the membrane separator					
	The purity of plasma exiting the membrane separator					
	Addition of replacement fluids					
	Effect on patients taking ACE Inhibitors					
	Anticoagulation					
	Minimum blood flow rates needed					
	Venous access requirements					
	Limitation of clinical application					
	Efficiency of filtration separation					
	Advantages of separating cell-free plasma					
	Disadvantages of filtration separation					
	Discuss and Describe the Principles of Centrifugal Separation					



Principles Skills Checklist

The orientee is able to:

Self-Assessment	Topic	Date Introduced/ Reinforced	Date Met	Method	Orientation Level Achieved	Preceptor Initials
	Separation based on weight vs size					
	Specific gravity of cellular blood components					
	Specific gravity of plasma					
	Components of the buffy coat					
	Separation/packing factor					
	Addition of replacement fluid					
	Anticoagulation – extracorporeal vs systemic					
	Anticoagulation – amount in collected component vs. amount infused into patient					
	Anticoagulation – citrate vs. heparin					
	WBC and platelet contamination of separated plasma					
	Efficiency of centrifugation separation					
	Advantages of centrifugation separation					
	Disadvantages of centrifugation separation					
	Trace the flow path of whole blood and the separated blood components through the disposable set					



Keys		
Key for Self-Assessment 0 = Have not performed and/or unfamiliar with item 1 = Performed less than 5 times or have some knowledge and need additional instruction 2 = Performed more than 5 times and/or have sufficient knowledge and feel confident to perform independently	Key for Method CR = Chart Review Ex = Written Exam O = Observation S = Simulation V = Verbalization RD = Return Demonstration	Key for Orientation Level Achieved N = Novice AB = Advanced Beginner C = Competent P = Proficient E = Expert
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