

## University of Minnesota Lab Medicine and Pathology

### Blood Banking and Transfusion Medicine Rotation with Integrated Coagulation Rotation

<b><u>Location:</u></b>	D242 Mayo
<b><u>Duration:</u></b>	Three months; additional training available as advanced elective
<b><u>Rotation Director:</u></b>	Andrew Johnson, MD - phone 612-626-2686 (pager 899-3832)
<b><u>Other Faculty:</u></b>	David McKenna, Jr., MD (899-7375), Claudia Cohn, MD (899-4198) Nicole Zantek, MD (899-5418)

#### General Description:

As part of the clinical pathology (CP) requirements residents are required to complete a three month rotation in blood banking and transfusion medicine with time spent at the University of Minnesota Medical Center, Fairview (UMMC, FV) and the Minneapolis VA Medical Center (first 2 weeks of rotation, basics of transfusion medicine and hands on lab benchwork). This rotation in Transfusion Medicine prepares a person to provide laboratory and clinical transfusion services at a variety of medical centers. Further, it prepares a person for additional training for career specializing in clinical transfusion medicine, transfusion medicine research, blood center operations. .

Residents will be knowledgeable and experienced with red cell antigens, compatibility testing, component therapy, adverse effects of transfusion, transfusion appropriateness review, blood donor evaluation and donation, therapeutic apheresis, peripheral blood stem cell collection, and coagulation testing and principles. The goal of training during the initial experience with coagulation is to gain basic understanding of the pathophysiology of congenital and acquired bleeding and thrombotic disorders and the laboratory tests used to diagnose these disorders. *Goals and objectives are adapted from B.R. Smith et al. Clinical Chemistry 2006;52:917-949*

#### Goals and Objectives:

Upon completion of this rotation, the resident will gain:

- Introduction to the different roles of a pathologist as it relates to blood banking and transfusion medicine.
- Provide excellent patient care and work as a member of the clinical team.
- Gain experience with the functions and testing of the coagulation laboratory

The learning objectives below reference the corresponding ACGME core competencies: Patient Care (PC), Medical Knowledge (MK), Professionalism (Prof), Communication Skills (CS), Practice Based Learning and Improvement (PBLI), and Systems-Based Practice (SBP).

Throughout the introductory rotation, residents will be given graduated responsibilities based on evaluations from faculty. Residents will be asked to carry the night call pager (with back-up from Fellows and Attendings) for blood bank when they have achieved a recognized level of independence in the rotation.

Upon completion of the introductory blood banking and transfusion rotation, residents are expected to:

- Work with consultant physicians to ensure that blood components are used appropriately balancing risk, benefit and availability (**PC, MK, SBP, CS**).
- Evaluate transfusions and transfusion requests that are out of established guidelines (**PC, MK**).
- Advise about difficult crossmatches, antibody problems and selection of compatible red cells (**PC, MK**).
- Approve release of least-incompatible blood, when fully compatible red cells are unavailable and assures that clinician is aware of risk for a risk-benefit analysis (**PC, MK, SBP, PBLI**).
- Approve use of granulocyte transfusion and ensures availability of high-dose (G-CSF) granulocytes when needed (**PC, MK, SBP**).
- Work with clinical team to support patients refractory to platelet transfusions, (**PC, MKCS, PBLI**)
- Understand major methods to manage blood shortages (ABO, Rh switches) (**PC, MK**).
- Ensure appropriate recognition and management of transfusion adverse outcomes (**PC, MK**).

**Immunohematology:**

- Understand the ABO and other carbohydrate antigens **(PC, MK)**
- Understand Rh and other protein antigens **(PC, MK)**
- Understand patterns of inheritance of blood antigens **(PC, MK)**
- Understand the clinical significance of blood antigens in transfusion or pregnancy **(PC, MK)**
- Understand the major methods of resolution of typing problems **(PC, MK)**
- Perform pre-transfusion testing **(PC, MK)**.
- Understand the types of red cell serological studies **(MK, PC)**
- Understand platelet serology **(MK, PC)**
- Understands platelet antibody testing including HLA- and HPA-antibody testing and antigen capture assays (MAIPA) **(PC, MK)**.

**Clinical Transfusion:**

- Understand the major aspects of administration of blood component therapy including storage, identification, pooling and issuing **(PC, MK, SBP)**.
- Understand the uses of various blood components including red blood cells, platelet concentrates, apheresis platelets, plasma, cryopoor plasma, cryoprecipitate, and granulocytes **(PC, MK, SBP)**.
- Conduct blood appropriateness review **(PC, MK, SBP)**.
- Understand the use of modified components including: washed, irradiated, leukocyte-reduced, frozen/thawed deglycerolized red cells, HLA-matched platelets, cross-matched platelets **(PC, MK, SBP)**.
- Recognize, treat, and prevent (when possible) the following transfusion reactions: febrile, allergic, acute hemolytic, delayed hemolytic, anaphylactic, septic, transfusion-associated graft-versus-host disease, transfusion-related acute lung injury, and circulatory overload **(PC, MK, PBLI)**
- Manage massive transfusion including the appropriate and timely ordering of laboratory tests for monitoring the patient **(PC, MK)**
- Oversee orders for HLA- or XM compatible platelets for refractory patients.
- Recognize the metabolic and hemostatic consequences of massive transfusion **(PC, MK)**
- Understand safety check prior to transfusion **(PC, SBP)**
- Watch two transfusions; audit safety check protocol **(PC, SBP)**

**American Red Cross/Veterans Administration Hospital:**

- Understand the process of decision-making for the donor center regarding blood donors with medical suitability conditions out of established guidelines **(PC, MK, PBLI)**.
- Provides medical management of donors experiencing adverse reactions and complications due to blood donation **(PC, MK)**.
- Understand the major issues in blood donor testing and screening **(PC, MK)**
- Understand and follow the confidentiality requirements for reporting infectious disease markers to public health agencies **(PC, Prof, SBP)**

**Apheresis:**

- Understand the basic concepts of various apheresis procedures and stem cell collection **(PC, MK, SBP)**.
- Understand the appropriate indications for therapeutic Apheresis and the appropriate replacement fluids to be used in various situations **(PC, MK)**.
- Demonstrate proficiency in evaluating and preparing patients for therapeutic apheresis, including discussion with the patient of the risks and benefits associated with apheresis procedures. **(PC)**
- Communicate effectively with clinicians and housestaff regarding emergent or scheduled therapeutic apheresis procedures through conversations and writing of consult notes. **(PC, CS, SPB)**
- Evaluate the patient before, during and after apheresis **(PC, MK)**.

- Develop a treatment plan and write physician orders for apheresis procedures including appropriate selection of replacement solutions as applicable **(PC, MK)**.
- Demonstrate proficiency in evaluating and treating adverse reactions associated with therapeutic apheresis and peripheral blood hematopoietic stem cell collections **(PC, MK)**.

#### **Cell Therapy Laboratory:**

- Demonstrate an understanding of the basic principles of hematopoietic progenitor cell transplant from the perspectives of collection, processing, and storage/cryopreservation. **(MK)**
- Demonstrate a basic understanding of the concepts and importance of current good manufacturing practices (cGMPs), as they apply to cell therapies. **(MK)**
- Demonstrate an understanding of the breadth of emerging cell therapies. **(MK)**
- Demonstrate proficiency in patient care and management as they apply to handling adverse reactions associated with collection and infusion of hematopoietic progenitor cell products. **(PC, SBP)**

#### **Coagulation:**

- Understand the key components of a bleeding and thrombosis history **(MK)**
- Understand general principles of platelet function testing **(MK)**
- Understand the function of von Willebrand factor **(MK)**
- Recognize expected laboratory results patterns for the common subtypes of von Willebrand disease. **(MK)**
- Understand the basic principles of screening coagulation tests (thrombin time, prothrombin time, partial thromboplastin time, and fibrinogen) **(MK)**
- Understand how the International Normalized Ratio (INR) is calculated **(MK)**
- Understanding of basic hemostatic and thrombotic disorders including liver disease, disseminated intravascular coagulation (DIC), vitamin K deficiency, and hemophilia **(MK)**
- Understand mixing studies and factor assays **(MK)**
- Understand the pathophysiology of antiphospholipid antibodies and tests used to identify lupus anticoagulants **(MK)**
- Understand the mechanism of action of anticoagulants. **(MK)**
- Recognize the impact of anticoagulants on common laboratory tests **(MK)**

#### **Assigned Reading:**

- Transfusion Medicine milestones
- Guidelines for Transfusion Therapy 8<sup>th</sup> Edition – Fairview Laboratory Services
- Practical Guide to Transfusion Medicine
- Reading list for the coagulation portion of the rotation

#### **Other References:**

- [www.bbguy.org](http://www.bbguy.org)
- Technical Manual, current edition
- List of transfusion medicine articles from important studies
- Additional reading options based on clinical questions encountered during the rotation.

**Call Duties:** Graduated responsibility over the course of the rotation, carry the service pager an increasing amount of time, 1 week of overnight call towards the end of the rotation with an attending.

#### **During the rotation, the trainee is expected to join the following conferences:**

- Clinical Pathology Conference: Tues 12-1 PM (weekly)
- Transfusion Medicine Lecture Series: Tues 1-2 PM (weekly)
- Lab Medicine/Pathology Grand Rounds: Wed 8-9 AM (weekly)
- Coagulation Lecture: Wed 10:15-12:00 (weekly)
- Immunohematology Conference: Wed 3-4 PM (bi-monthly)

- Transfusion Medicine Breakfast Meeting: Thurs 830-10 AM (weekly)
- Medicine Morbidity and Mortality Conf, encouraged: Friday 12:10-1 PM (weekly)

**Other Requirements:**

- CP case logs should be emailed to the corresponding attending throughout the rotation to meet program requirements. The attending will review the cases during the rotations and email feedback to residents. Resident is responsible to upload to the case log repository (available through the resident intranet).
- After the 1<sup>st</sup> two weeks of the rotation, Wednesdays will have a focus on coagulation, including the Didactic session (10:15-noon) and subsequent sign out session of the clinical cases.

**Assessment methods:**

Resident performance on this rotation will be assessed by:

- Formative feedback provided by attending physicians throughout the rotation
- Performance evaluation completed by attending physicians at the end of the rotation
- Feedback provided by laboratory, nursing and administrative staff
- Residents performance will be scored based on the transfusion medicine milestones