



*Division of Hematology and Hematologic Malignancies*

## **Adult Hematology Residency Training Program**

### **Goals & Objectives Hematopoietic Stem Cell Transplantation Rotation**

Revised: February 2015

**Program Director**

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## **Hematopoietic Stem Cell Transplantation Rotation**

### **Introduction**

This rotation will provide the resident with knowledge, experience and skills pertaining to the use of hematopoietic stem cell transplantation procedures in the care of patients with hematologic disease. The rotation consists of 3 main components – a short laboratory course relevant to hematopoietic stem cell transplantation, an inpatient ward rotation on the BMT service on Unit 57 at the Foothills Medical Centre, and an outpatient BMT clinic rotation at the Tom Baker Cancer Centre.

### **Rotation Coordinators**

Dr. M. Shafey, Dr. M. Geddes

### **Preceptors**

Dr. N. Bahlis, Dr. C. Brown, Dr. A. Daly, Dr. P. Duggan, Dr. M. Geddes, Dr. L. Savoie, Dr. M. Shafey, Dr. D. Stewart, Dr. J. Storek, and Dr. V. Zepeda.

### **Preceptor responsibilities**

1. Direct supervision of resident based patient care. The Preceptor should gauge the level of competence of the resident and allow graduated responsibility for care and graduated degree of direct supervision of clinical decision making on a day to day basis.
2. Faculty is required to make daily rounds and be immediately available to support resident needs.
3. Direct patient care coverage to allow the resident to attend to their educational and outpatient clinic responsibilities.
4. Resident teaching and direct observation of resident performance in the form of bedside clinical rounds and consultation review.
5. Provide verbal and written feedback on resident performance.
6. All teaching faculty are required to contribute to educational rounds covering the topics outlined in the document on curriculum

### **Resident Responsibilities**

1. The resident will participate in the BMT First Call Schedule at the FMC. Residents will be exempt from participation in the Hematology First call Schedule for the duration of the BMT rotation to maximize their exposure to transplantation based patient care issues.
2. The resident will be assigned to provide primary care to both in and outpatients on the transplant service and will take first call for inpatient and outpatient areas regarding marrow transplant patients. They will be expected to discuss treatment decisions with the preceptor at daily rounds and clinics.

3. The resident will attend a short mandatory laboratory course relevant to hematopoietic stem cell transplantation (see separate objectives for this course).
4. The resident is expected to attend and participate in all teaching sessions related to this rotation. He/she will present at least one relevant hematopoietic stem cell transplantation topic at the weekly BMT/Lymphoma Educational Rounds if they are occurring or at the weekly BMT Clinical Committee rounds.
5. Participate in at least one bone marrow harvesting procedure when possible.
6. Participate in removal of a tunnelled central line.
7. Participate in the supervision of stem cell collection by apheresis.

### **Rotation Specific Objectives**

#### **MEDICAL EXPERT**

##### Basic Knowledge

1. The resident will demonstrate understanding of the biology and immunology of the HLA system and how this impacts donor selection, including a working knowledge of donor-recipient compatibility testing. Work through cases involving donor selection. Understand rationale for non-HLA criteria important in donor selection
2. Demonstrate an understanding of the rationale for autologous transplantation in malignant and non-malignant diseases
3. Understand the rationale for allogeneic transplantation for hematologic diseases including myeloablative and immunoablative therapy and graft vs. disease effects
4. Pharmacology of agents used in conditioning therapy and immunosuppression, and supportive care (e.g. chemotherapeutic agents commonly used, total body irradiation, immunosuppressive drugs (antithymocyte globulin, cyclosporine, mycophenolate mofetil, tacrolimus, sirolimus, prednisone), antibiotics, antivirals, antifungals, antiemetics.
5. Understand dose-limiting toxicities for many of the chemotherapy drugs used in transplantation, means used to prevent toxicities, and use of therapeutic drug monitoring in transplantation.
6. Immunosuppression and its consequences (infections, second malignancies, myelosuppression, organ dysfunction) including the kinetics of immune reconstitution post transplantation.
7. Understand the pathology and pathophysiology of graft vs. host disease and rationale for treatment.

## Clinical Knowledge

The resident will be able to discuss:

1. The indications, role and relative merits of allogeneic and autologous marrow transplantation in the treatment of malignant and non-malignant hematologic disease with particular reference to
  - a. Disease states
  - b. Prognosis and Outcome
  - c. Predictive factors (e.g. patient disease, stage, response to previous treatment, age, donor type)
  - d. Choice of modality
  - e. Complications (Short and Long-term) Alternative nontransplant treatment modalities
2. Understand and be able to perform patient assessment to determine fitness for transplant and appropriate post transplant followup to minimize long term complications including second malignancy screening and cardiac disease/organ toxicities.
3. The nature of the supportive care required for bone marrow transplantation with respect to medical, psychological, nutritional, social, economic realms
  - a. Includes impact of transplant on transfusion practices, infection prophylaxis and treatment, use of growth factors, issues in iron overload, secondary malignancy surveillance and management of long term complications of conditioning.
4. Describe the commonly used conditioning agents and regimens for transplantation procedures.
5. Compare and contrast the early complications of both autologous and allogeneic transplantation.
  - a. Includes organ-specific toxicities, infection, failed engraftment, late graft rejection
6. Pathogenesis, clinical presentation, investigation, prevention and treatment of both acute and chronic graft vs. host disease.
7. Describe the relative merits of alternative donors to histocompatible siblings with emphasis on clinical outcomes, speed of transplant and economic impact.
8. Discuss the relative merits of peripheral blood stem cells and umbilical cord blood compared with autologous or donor marrow as a source of hematopoietic stem cells.
9. List the requirements of allogeneic donors. Be familiar with the registries available for the related marrow, blood cell and cord blood transplants and be familiar with the means of access to these resources.
10. Describe the technical procedures related to the harvesting and storage of hematopoietic stem cells including leukapheresis and stem cell

cryopreservation.

- a. Describe various means for enhancing stem cell collection and identify patients at risk for poor stem cell mobilization.
  - b. Be able to diagnose and manage complications of apheresis, including citrate toxicity, poor cell yield, fluid balance, and problems around venous access.
11. Be familiar with the role of flow cytometry in evaluating stem cell products.
  12. Describe the techniques available for evaluating allogeneic engraftment including DNA technology, cytogenetic examination, and investigation to tissue types and blood groups.
  13. Describe the complications for the donor of marrow harvesting and stem cell collection procedures and give the rationale for their use

### Procedural Skills

The Resident will

1. Be able to take a history and perform a physical examination on an autologous or allogeneic transplant recipient with particular emphasis on the detection of relevant complications such as infection, graft vs. host disease.
2. Be able to counsel donor and recipient with respect to the risks and benefits of transplantation
3. Become familiar with the technical aspects of apheresis procedures and be able to supervise apheresis as used for stem cell collection
4. Be able to perform a bone marrow harvest
5. Be able to remove a right atrial line catheter.

### **COMMUNICATOR**

1. The resident will be able to elicit relevant information with respect to the patient's medical history, hematologic problems, indications for transplantation. The resident will be able to provide a verbal and written summary evaluation of the patient's history and physical examination, and provide accurate records of daily inpatient and outpatient care.
2. The resident will be able to gather information about the patient's beliefs concerns and expectations about transplantation and consider the impact of factors such as the patients' age, gender ethnic, cultural and socioeconomic background and spiritual values.
3. Deliver information to the patient and family regarding the process of transplantation, prognosis, complications, and impact on quality of life in a manner which is understandable, encourages discussion and promotes patient's participation in the decision making process.
4. Participate in the weekly transplant planning rounds and understand the importance of cooperation and communication among the varied and numerous health care professionals involved in the care of transplant patients.

5. Provide information to the donor regarding procedures, complications, costs and alternatives of marrow or stem cell donation in an ethical and confidential manner. The resident must take into account the potential factors influencing donor decision making about participation in the procedure including donors age, gender, ethnic, spiritual, cultural, socioeconomic. The resident must be able to anticipate and explore potential interpersonal conflict between the donor and recipient in the case of related donor donation in a sensitive, ethical, confidential and respectful manner.
6. Apply the general CanMEDS Communicator objectives as outlined in Section to the care of transplant patients where appropriate

## **COLLABORATOR**

1. Participate in the weekly Transplantation care planning rounds with the interdisciplinary team members to develop comprehensive care planning for the transplant patients.
2. Coordinate specialist consultation referrals where appropriate
3. Effectively communicate with the members of the interdisciplinary team in the resolution of conflicts, provision of feedback and where appropriate be able to assume a leadership role.
4. Participate in the Coordination of transitional care from inpatient to outpatient facilities including notification of the appropriate interdisciplinary team members, appointment planning and home care support.
5. Describe how the bone marrow transplant program is governed at a local, regional, provincial, national and international level.
6. Participate in the care of both donors and patients from outside of the Calgary region communicate and collaborate with the care teams in the patient's home city.
7. Collaborate with the National and International marrow donor registries in the procurement of marrow and stem cell products to be used elsewhere.

## **MANAGER**

1. The resident will use current evidence based criteria for the selection of candidates eligible for bone marrow transplant procedures.
2. The resident will understand how evidence based selection criteria will allow sustainable resource allocation for this program and may participate in their development as appropriate.
3. Understand the structure, financing and operation of the Province Wide Services Program as it applies to the Bone Marrow transplantation program's funding and mandate for Bone Marrow Transplantation care within Alberta.
4. Effectively utilize the information technology available to optimize transplantation care (e.g. Electronic medical records, TBCC and Hematology tumor group patient data bases, accessing learning materials)

5. The resident will be able to manage both inpatient and outpatient problems according to the level of acuity and triage investigation and delegate responsibility where appropriate.

### **HEALTH ADVOCATE**

1. The resident will demonstrate an understanding of how the basic determinants of health will affect outcome of bone marrow transplant patient e.g. employment status, social support systems
2. The Hematology resident will identify those patients groups that will benefit the most from bone marrow transplantation.
3. Participate in the weekly transplant planning rounds and understand the importance of cooperation and communication among the varied and numerous health care professionals involved in the care of transplant patients.

### **SCHOLAR**

1. The resident will develop and implement a personal continuing education strategy with respect to the changing indications, modalities, improvements in care and treatment of complications of bone marrow transplantations
2. The resident will use the principles of evidence based medicine and critical appraisal in the evaluation of literature pertaining to bone marrow transplantation in the treatment of hematological disease.
3. The resident will participate in ongoing clinical trials assessing bone marrow transplantation procedures in the treatment of hematologic disease.
4. The resident will participate in the teaching of junior residents and clinical clerks when they are participating in the bone marrow transplant program
5. The resident will attend and participate in the presentation of clinical teaching rounds on the bone marrow transplantation service.

### **PROFESSIONAL**

1. The resident will deliver the highest quality care with integrity, honesty and compassion and will display professional attitudes and behaviors in the care of bone marrow transplant patients. This will include an awareness of racial cultural and societal issues that impact on the delivery of care.
2. The resident will use ethical codes of practice when dealing with ethical issues related to bone marrow transplantation e.g. end of life care, consent, conflict of interest, research ethics, resource allocation.
3. The resident will recognize, analyze and develop strategies for dealing with unprofessional behaviours in clinical practice.



*Department of Pathology and Laboratory Medicine  
Division of Hematology and Transfusion Medicine*

## Hematopathology Training Program

### **Cellular Therapy Lab (CTL) 5 Day Course**

#### Goals, Objectives & Training Schedule

Revised February 2015

**For:**

**Contact:**

**Supervisor/Preceptor:**

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## **GOALS & OBJECTIVES**

### **DEFINITION:**

The CLS Cellular Therapy Laboratory (CTL) processes all products for paediatric and adult transplant performed by the Alberta Blood and Marrow Transplant Program (BMT Program). CTL, in conjunction with the Alberta BMT Program, is internationally accredited through the Foundation of Accreditation of Cellular Therapy (FACT). The Cellular Therapy Lab is in the Division of Hematology and Transfusion Medicine at Calgary Laboratory Services (Foothills Medical Centre).

Blood and marrow cell transplantations (commonly referred to as blood stem cell transplants) are employed to cure various malignancies and genetic disorders. CTL plays a critical central role by ensuring all products (peripheral blood stem cells, bone marrow, cord blood) used in the transplant are of ultimate quality and consistency.

### **GENERAL OBJECTIVES:**

This one week long CTL module is designed to familiarize the trainee with the technical and theoretical aspects of blood and marrow transplant product processing, manipulation, and quality. The trainee will develop a clear and detailed understanding of the processing, manipulation, and quality control involved in the processing of transplant products. Learning tools will include direct observation and hands-on experience in product preparation/processing, quality control, clinical and quality indicator analysis, and overall quality assurance. The trainee will review selected product processing files, plus current products, with the Laboratory Director and/or MLT III. *At the completion of the module the trainee will be able to assess and recommend product processing procedures, interpret and utilize CTL product reports, and evaluate clinical and laboratory indicators of product quality.*

### **General Expectations:**

1. Attendance at scheduled training & learning sessions.
2. Attendance at the weekly BMT clinical meeting.
3. Self study of relevant talks/lectures, papers, and texts.
4. Professional interaction with laboratory staff.
5. Participate in quality assurance activities in the lab.
6. Complete the end-of-module test.
7. Participate in module/preceptor evaluation.

### **Recommended Reading:**

- *Hematopoietic Stem Cell Transplantation in Clinical Practice*. Ed. J. Treleaven and A. J. Barrett. Elsevier, Toronto 2009
- *Cellular Therapy: A Physician's Handbook*, 1<sup>st</sup> Edition. E. Snyder, MD and N.R. Hale, MD. AABB 2004

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- *Cellular Therapy: Principles, Methods and Regulations*. Ed E. M. Areman & K. Loper. AABB 2009.
- *Cord Blood: Biology, Immunology, Banking and Clinical Transplantation*. Ed. H.E. Broemeyer AABB 2011
- *FACT-JACIE International Standard*. Foundation for Accreditation of Cellular Therapies,. [www.factwebsite.org](http://www.factwebsite.org)
- *Hematopoietic Cell Transplantation*, 3rd Ed. Thomas, Blume & Forman, Blackwell Science 2004
- *Cord Blood Characteristics: Role in Stem Cell Transplantation*. Cohen, Gluckman, Rubinstein & Madrigal (eds). Blackwell Science, Inc. 2000
- *Essentials of Stem Cell Biology* 1<sup>st</sup> Ed. Lanza, Thomas, Thomson, Pedersen, Gearhart, Hogan, Melton, and West Eds. Academic Press, 2005.

### **SPECIFIC OBJECTIVES:**

At the completion of the training week, the trainee will be familiar and will have acquired an understanding of the following competencies:

#### **Medical Expert/Clinical Decision-Maker**

##### *General Requirements*

- Demonstrate understand of the clinical relevance of Cellular Therapy Product (CTP) processing in human stem cell transplants
- Demonstrate ability to apply relevant information to clinical practice
- Demonstrate effective communication of product processing needs

##### *Specific Requirements*

- Demonstrate an understanding of the sources of hematopoietic stem/progenitor cells for transplant and their unique properties
- Demonstrate knowledge of hematopoietic stem/progenitor cell biology
- Demonstrate an overall understanding of the principles and technical aspects of processing CTPs (Peripheral Blood Stem Cells (Apheresis), Bone Marrow, and Cord Blood)
- Display knowledge of the key quality indicators of CTPs and their impact on clinical outcome
- Appreciate the role of donor lymphocyte infusions and other therapeutic cells in disease treatment
- Demonstrate ability to advise and consult on appropriate transfusion requirements for patients undergoing ABO/Rh incompatible allogeneic transplants
- Demonstrate ability to advise and consult necessary processing for autologous and allogeneic transplant products, including processing of ABO/RH incompatible products.
- Demonstrate ability to effectively order the collection, processing and infusion of CTPs

## **Communicator**

### ***General Requirements:***

- Establish effective working relationships with CTL staff, CTL Director and BMT Program partners
- Listen and respond effectively to concerns and needs of transplant partners
- Discuss appropriate information with the health care team

### ***Specific Requirements:***

- Understand the role of CTL in transplants
- Understand the role CTP quality indicators play in clinical outcome
- Understand how effective and timely communication of adverse events and engraftment variances to CTL ensures ongoing quality and ultimate patient care
- Assist in the continuing education of other members of the health care team
- Communicate information regarding CTPs effectively with patients, medical colleagues, nursing and technical staff verbally and through written reports

## **Collaborator**

### ***General Requirements:***

- Work effectively with BMT Program partners
- Contribute effectively to other interdisciplinary team activities

### ***Specific Requirements:***

- Experience in CTP processing is essential to achieve a sound understanding of the effects of CTP selection and processing on clinical management
- Demonstrate the ability to advise on the appropriateness of processing procedures, non-conforming product issues, and transfusion requirements for transplant patients

## **Manager**

### ***General Requirements:***

- Utilize resources effectively to balance patient care, turnaround time, and educational/research needs
- Allocate finite health care resources wisely
- Work effectively and efficiently in a health care organization
- Utilize information technology to optimize patient care, life-long learning and other activities

### ***Specific Requirements:***

- Demonstrate knowledge of the principles of laboratory management and administration
- Demonstrate knowledge of the methods of quality control in CTL processing
- Demonstrate knowledge of the methods for quality assurance as applied to CTL Processing
- Demonstrate knowledge of national and international standards for CTP processing laboratories
- Demonstrate competence in basic computer skills with emphasis on electronic reporting, electronic communication and search strategies

### **Health Advocate**

#### ***General Requirements:***

- Contribute effectively to improved health of patients and communities
- Recognize and respond to those issues where advocacy is appropriate
- Understand the role CTL plays in patient's care

#### ***Specific Requirements:***

- As members of an interdisciplinary team of professionals responsible for individual and population health care, the clinician will endeavour to ensure that laboratory practices are regularly evaluated to determine that they meet these community needs
- Reinforce to the public and to the profession the essential contribution of laboratory medicine health

### **Scholar**

#### ***General Requirements:***

- Develop, implement and monitor a personal continuing education strategy
- Critically appraise sources of medical information
- Facilitate learning of patients, house staff/students and other health professionals
- Contribute to development of new knowledge

#### ***Specific Requirements:***

- Propose a research question relevant to CTP processing and/or CTP utilization in transplant

### **Professional**

#### ***General Requirements:***

- Deliver highest quality patient care
- Exhibit appropriate personal and interpersonal professional behaviours
- Practise medicine ethnically consistent with obligations of a physician

- Demonstrate the knowledge, skills and attitudes relating to gender, culture, and ethnicity

***Specific Requirements:***

- Act as an appropriate role model for students and others
- Demonstrate a professional attitude to colleagues and other laboratory staff
- Have an appreciation of the crucial role CTL has in providing quality patient care
- Develop the necessary knowledge to understand limitations and the necessity of seeking appropriate second opinions

CTL Rotation Schedule For:

**For:  
Contact:**

<b>Date</b>	<b>Time</b>	<b>Description of Activities</b>	<b>Assigned To</b>
<i>Mon</i>	0900 – 0930	Overview of rotation, assignments, resources	Dr. Prokopishyn
	0930 – 1000	Lab Tour Orientation to blood and marrow products for transplant Overview of CTP Processing and Crypreservation	
	1000 – 1200	Lab Rotation: CTP Sources & Collection Protocols Collection of HPC, Apheresis Product (SSB) Enumeration of CTPs by Flow Cytometry	
<i>Tues</i>	0830 – 1400	Lab Rotation: CTP Cryopreservation CTP storage CTP thaw and infusion	Dr. Prokopishyn/ Susan Berrigan/ MLT II
	1400-1430	Review of CTP evaluation	
	1430 – 1600	Attend BMT Clinical Meeting	Dr. Prokopishyn
<i>Wed</i>	0800 – 1000	Review of Select Patient Files	Dr. Prokopishyn
	1000 – 1100	Overview of CTP Manipulation	Dr. Prokopishyn
	1100 – 1500	Lab Rotation: Processing of Incompatible CTPS Transfusion requirements for Allogeneic transplant patients	Susan Berrigan/MLT II
<i>Thurs</i>	0900 – 1000	Overview of CTP Thaw & Infusion	Dr. Prokopishyn
	1000 – 1400	Lab Rotation: Overview of CTP Distribution, Thaw & Infusion Adverse reactions/DMSO toxicity Transfusion requirements for incompatible patients Thaw of Cord Blood Products	Susan Berrigan/MLT II
	1400 – 1430	Overview of Other Therapeutic Stem Cells used in Disease Treatment	Dr. Prokopishyn
	1430 – 1600	Lab Rotation: Overview of Clinical Trials Therapeutic Cell preparation, infusion and review	Susan Berrigan/ MLT II
<i>Fri</i>	0900 – 1000	Overview of CTL Quality Assurance	Dr. Prokopishyn
	1000 – 1400	Lab Rotation: Review of quality control and quality assurance in the lab Review of select patient files & quality/conformance issues Review of critical indicators of CTL quality	Dr. Prokopishyn
	1400 – 1600	End-of Module Testing & Evaluation	Dr. Prokopishyn