FACULTY OF MEDICINE | UNIVERSITY OF CALGARY

Alberta Health Services | Calgary Laboratory Services

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

Transfusion Medicine Residency Training Program

TISSUE TYPING

Goals & Objectives

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Supervisor/Preceptor:

Dr. Noureddine Berka, Ph.D., D(ABHI)
Clinical Director, Tissue Typing Laboratory
Calgary Laboratory Services
Diagnostic and Scientific Centre
9-3535 Research Rd NW
Calgary, Alberta, Canada, T2L2K8
Office: 403-770-3655
Fax: 403-770-3738
Noureddine.berka@cls.ab.ca

Facilitators:

Luz Stamm, CHS, MLT, BsC
Scientist and Supervisor, Tissue Typing Laboratory
Calgary Laboratory Services
Diagnostic and Scientific Centre
9-3535 Research Rd NW
Calgary, Alberta, Canada, T2L2K8
Office: 403-770-3593
Fax: 403-770-3738
Luz.stamm@cls.ab.ca

Iwona Galazkiewicz, MLT, BsC
Tech III, Tissue Typing Laboratory
Calgary Laboratory Services
Diagnostic and Scientific Centre
9-3535 Research Rd NW
Calgary, Alberta, Canada, T2L2K8
Office: 403-770-3593
Fax: 403-770-3738

Iwona Galazkiewicz@cls.ab.ca

GOALS & OBJECTIVES

The CLS Tissue Typing Laboratory (TTL) was founded about 30 yeas ago to serve the transplant community in Southern Alberta. Tissue typing and cross matching between recipient serum and donor white cells ensures successful transplantation and prolonged kidney engraftment. In addition, tests for living related kidney donors and for other organs are done in the laboratory.

Bone-Marrow Transplantations cure Malignancies, various Leukemias and certain genetic disorders. A key element in successful transplants is to ensure tissue-typing identity between donor and recipient by accurate classification of the Histocompatibilty genes. The closer the genetic similarity between two individuals, the higher the chances of identical tissue typing and survival of a graft between them.

The tissue Typing laboratory at CLS performs testing for approximately 75 paediatric and adult bone marrow transplants per year and similar numbers of solid organ transplants. The task of genotyping the donors within the context of the family or donors in the international registries lies with the laboratory. The laboratory is internationally accredited by the American Society of Histocompatibility and Immunogenetics (ASHI) in the following areas:

HSC/BM Transplantation: Related and Unrelated Donor
Solid Organ Transplantation: Live and Deceased Donor
Transfusion Support
Testing for Non-Transplant Clinical Purposes
Serology Typing
Molecular Typing
Solid Phase Typing

In this one-week rotation, the resident will gain a clear understanding of technical aspects of Tissue Typing as it applies to transplantation with the emphasis on hematopoietic stem cell transplantation (HSCT). The resident will spend time in the laboratory observing specimen testing conducted in the above listed area of preparation. The resident will review laboratory procedures and will get acquainted with the quality assurance program adopted in the Tissue Typing Laboratory. The resident will review selected cases, plus current cases, with the Laboratory Director and/or Scientist.

SPECIFIC OBJECTIVES:

At the completion of each training week, the trainee will be familiar and will acquire understanding of the following competencies:

Medical Expert/Clinical decision-Maker competencies include:

The resident will have:

1. Understanding of the Human Leukocyte Antigens (HLA) System
2. Knowledge of the principles and technical aspects of Tissue Typing
3. Knowledge of the role of HLA in HSC and Solid Organ Transplantation
4. Learn how to integrate the results from different testing methods.
5. Understand the role of HLA in disease association.
6. Introduction to the comprehensive quality assurance systems in a clinical laboratory setting with emphasis on indicators of quality pertinent to a Tissue Typing Laboratory.
7. Introduction to some safety and management aspects in clinical laboratory setting.

Talks/lectures available on G drive:

1. Fellows MHC Lecture December 2008.ppt
2. Fellows Luminex Molecular Typing by Tepnel Life Match.ppt
3. Fellows Organ Rejection Lecture 01312008.ppt
4. Fellows HLA Haplotype matching: a New Paradigm in HCT.ppt
5. Fellows cytokine polymorphism in renal tx Il-10.ppt

Specific Objectives: Communicator:

General Requirements:

a. Establish effective working relationships with consulting hematologists/ oncologists/pathologists and surgeons.
b. Obtain and synthesize relevant clinical history from physicians, electronic and written health records.
c. Listen and respond effectively.
d. Discuss in a timely fashion appropriate information with the health care team.

Specific Requirements:

a. Understand the role of a TTL Director
b. Act as a consultant to clinical colleagues on the interpretation and relevance of TTL findings, with particular regard to their significance in the management of the patient.
c. Act as a TTL technical supervisor and learn how to troubleshoot an assay.
d. Understand the role TTL findings should provide in a given clinical situation and be able to communicate it effectively and in a timely fashion in an oral and written form.
e. Assist in the continuing education of clinicians/pathologists and other members of the health care team.

Specific Objectives: Collaborator

General Requirements

a. Consult effectively with other pathologists/clinicians and health care professionals.
b. Contribute effectively to other interdisciplinary team activities.

Specific Requirements:

a. Must have experience in basic immunology, genetics, protein chemistry, and transplantation sufficient to achieve a sound understanding of the effects of disease and the role of pathology in clinical management.
b. Demonstrate knowledge of basic molecular biology methods (PCR, probe hybridization, etc)
c. Demonstrate knowledge of serological and flow cytometry methods.
d. Demonstrate knowledge of basic HLA nomenclature.
e. Demonstrate knowledge of normal anatomy and physiology of solid organs.
f. Demonstrate a basic knowledge of light microscopic appearance of cells.
g. Understand the basic principles of celluar rejection and humoral rejection of renal transplant.
h. Understand the adverse outcome of hematopoetic stem cell transplant (GVHD, Rejection, Infection, etc).
i. Understand the principles of immunohistochemicalchemical stains in solid organ transplant (Banff scoring)
j. Demonstrate the ability to integrate the different histocompatibility testing results and correlate them with other pathologies and chemistry measures.

Specific Objectives: Manger

General Requirements:

a. Possess basic knowledge of HR function.
b. Utilize resources effectively to balance patient care, turn around time, and educational/research needs.
c. Allocate finite health care resources wisely.
d. Work effectively and efficiently in a health care organization.
e. Utilize information technology to optimize patient care, life-long learning and other activities.

Specific Requirements:

a. Demonstrate knowledge of the principles of laboratory management and administration.
b. Demonstrate knowledge of the methods of quality assurance and quality control in histocompatibility.
c. Demonstrate knowledge of accreditation needs and external proficiency requirement.
d. Demonstrate competence in basic computer skills with emphasis on web based HLA resources, automated electronic reporting, electronic communication, and search strategies.

Specific requirements: Health Advocate

General Requirements:

a. Contribute to optimal outcome of replacement therapy by providing the patient with the latest methods of histocompatibility and immunogenetics laboratory testing.
b. Recognize and respond to those issues where advocacy is appropriate.
c. Understand the role of a TTL director in patient's care

Specific Requirements:

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

Specific requirements: Scholar

General Requirements:

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

Specific Requirements:

a. The fellow/residents are expected to attend available Histocompatibilty teleconferences and transplant rounds.
b. The fellow/resident is expected to be able to propose a research question relevant to transplant immunology, transplant pathology and/or histocompatibility.

Specific requirements: Professional

General Requirement:

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

Specific Requirements

a. Act as an appropriate role model for students and others.
b. Demonstrate a professional attitude to colleagues and other laboratory staff.
c. Understand individual professional limitations and the necessity of seeking appropriate second opinions.

Learning Outcomes:

At the end of this rotation a resident will be able to:

1. Possess a general understanding of the HLA system.
2. Request appropriate testing for HSC and Solid Organ Transplantation.
3. Make a decision regarding compatible and non-compatible HSC and Solid Organ Transplant
4. Understand Tissue Typing Laboratory reports.
5. Value the importance of QA systems in clinical testing
6. Understand the limitations of different Tissue Typing Methods and their quality controls.
7. Ability to construct and report by integrating results of different Tissue Typing methods.

Suggested reading:

The Tissue Typing Laboratory is involved with a variety of Histocompatibility and Immunogenetics testing methods and the reading requirement is vast, but must include selected reading from the following listed categories.

Tissue Typing Standards

- ABHI Statements of Competence for Histocompatibility Personnel, 1998
- ASHI Standards for Histocompatibility Testing, 2005
- UNOS Standards for Histocompatibility, 2005
- ASHI Laboratory Accreditation Inspection Checklist, 2005
- CAP Laboratory General Checklist, 2005
- CAP Histocompatibility Checklist, 2005

General Laboratory Skills and Safety

- OSHA Guidelines, Federal Register, 56 (No235): pp 64175-64182, 1991
- CMS CLIA Regulations, Federal Register, 68 (No16): pp 3639-3714, 2003
- *Laboratory Safety: Principles and Practices* (1995) Am Society Micro, Washington, DC
- *ASHI Laboratory Manual*, 4th Ed. 2001, updates 2005

Laboratory Management

- *Clinical Laboratory Medicine*, K. McClatchey (ed), Lippincott, Williams & Wilkins, 2001
- *Management: Theory, Process and Practice*, RM Hodgetts
- *Clinical Laboratory Management Review*. Bi-monthly from CLMA, Williams & Wilkins

Basic Immunology

- *Cellular and Molecular Immunology*, 5th Ed. A. Abbas (ed). Saunders 2005
- *Essential Immunology*, 6th Ed. Roitt, Brostoff & Male. Mosby 2001
- *Immunology: The Immune System in Health and Disease*, 6th Ed. C. Janeway (ed) Garland Publishing, 2004
- *The Immune System*. P. Parham, Garland Publishing, Elsevier Science, 2004
- *Illustrated Dictionary of Immunology*, JM Cruse & RE Lewis. CRC Press, 2002

Histocompatibility and Immunogenetics

- *HLA Facts Book*, Marsh, Parham, & Barber, Academic Press, 2005
- *HLA in Health and Disease* 2nd Ed., Academic Press, 2000
- *HLA Beyond Tears*, 2nd Ed. GE Rodey DeNovo, Inc. 2000
- *The HLA Dictionary 2004*, Schreuder, Hurley, Marsh, etal: Tissue Antigens (2005) 65,1-55; or Human Immunology (2005) 66,170-210; or International Journal of Immunogenetics (2005) 32,19-69.

Transplantation

- *Primer on Transplantation*, 2nd Ed. Norman & Suki, AST, 2001
- *Clinical Transplants*, published yearly 1988-present, Cecka & Terasaki, (eds) UCLA Tissue Typing Laboratory, Los Angeles, CA
- *Hemopoietic Cell Transplantation,* 3rd Ed. Thomas, Blume & Forman, Blackwell Science
- *Cord Blood Characteristics: Role in Stem Cell Transplantation.* Cohen, Gluckman, Rubinstein & Madrigal (eds). Blackwell Science, Inc. 2000

Flow Cytometry

- *Immunophenotyping*, Stewart & Nicholson (eds) Wiley-Liss, Inc, 2000
- *Flow Cytometry in Clinical Diagnosis.* Keren (ed) ASCP Press 3rd Ed, 2001
- *Practical Flow Cytometry,* 4th Ed. Shapiro (ed) Wiley-Liss, Inc. 2003

Molecular Biology

- *DNA: The Secret of Life.* Barry & Watson, Knopf Publishing, 2003.
- *Genes VIII*. Lewin, 8th Ed, Wiley & Sons, 2003.
- *PCR Technology*: *Current Innovations*, Library of Congress, Cataloging-in-Publication Data, 2nd Ed, 2003.
- *Molecular Biology of the Cell,* 4th Ed. Alberts, Garland Publishing, 2002.
- *Human Molecular Genetics,* 3rd Ed. Strachan, AP Read, 2003.
- *Molecular Typing 2000: A Technical Manual for Histocompatibility Laboratories,* SEOPF