



UNIVERSITY OF  
CALGARY



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

# Hematopathology Training Program

## **CANCER CYTOGENETICS** Goals & Objectives and Training Schedule

**Fellow/Resident:**

**Date:**

**Supervisor:**

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## **CYTOGENETICS GOALS & OBJECTIVES**

### **GENERAL OBJECTIVES:**

#### **Objectives of Training**

##### **Definition**

Cytogenetics is that branch of laboratory medicine concerned with the study of numerical and structural changes in the chromosome complement. Cancer cytogenetics specifically includes conventional chromosome analysis and fluorescence in situ hybridization (FISH) analysis of tissue suspected of having a hematolymphoid or other malignancy.

In this one-week rotation, the resident will gain a clear understanding of technical aspects of chromosome and FISH analysis, and the clinical application of results to haematopathology. The resident will spend time in the laboratory, interpret archival and current cytogenetic cases, and become familiar with sources of clinical cytogenetic information.

##### **Specific Objectives**

At the completion of training, the resident/fellow will have acquired the following competencies and will function effectively as:

##### **Medical Expert/Clinical Decision-maker:**

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

- Demonstrate diagnostic and therapeutic skills for ethical and effective patient care.
- Access and apply relevant information to clinical practice.
- Demonstrate effective consultation services with respect to patient care, education and legal opinions

###### **Specific requirements:**

- Demonstrate knowledge of the normal structure and function of chromosomes, and of the normal cell cycle.
- Demonstrate knowledge of the principles and technical aspects of chromosome and FISH preparation and analysis, including turnaround time and workload.
- Demonstrate knowledge of the limitations of cytogenetic and FISH analysis.
- Demonstrate understanding of quality control and quality assurance in cytogenetics.
- Demonstrate knowledge of the correlation between clinical, pathologic and cytogenetic information, and their impact on diagnosis and prognosis.
- Understand the importance of genetic information in the WHO classification of tumours of hematopoietic and lymphoid tissue.
- Demonstrate knowledge of appropriate specimens for cytogenetic and FISH analysis.
- Select appropriate FISH and other genetic tests to determine the diagnosis in a specific clinical situation.
- Recognize normal and abnormal karyotypes, and relate them to various disease states.

- Understand clinical cytogenetic reports.

**Study Material Available:**

1. Study questions and karyotype file.
2. Jaffe E.S. et al (2001) Pathology and Genetics. Tumours of Haematopoietic and Lymphoid Tissues. IARC Press.
3. Fletcher C.D.M et al (2002) Pathology and Genetics. Tumours of Soft Tissue and Bone. IARC Press. (for Pathology Residents)
4. Atlas of Genetics and Cytogenetics in Oncology and Haematology.  
<http://atlasgeneticsoncology.org/>

**Communicator:**

**General Requirements:**

- Establish effective working relationships with consulting physicians and surgeons.
- Obtain and synthesize relevant clinical history from physicians, electronic and written health records.
- Listen and respond effectively.
- Discuss appropriate information with the health care team.

**Specific Requirements:**

- Understand the role of a cytogenetics consultant
- Act as a consultant to clinical/pathologic colleagues on the interpretation and relevance of cytogenetic findings, with particular regard to their significance in the diagnosis and management of the patient.
- Understand the role cytogenetic findings may provide in a given clinical situation and be able to communicate it effectively and in a timely fashion in oral or written form.
- Assist in the continuing education of clinicians, pathologists and other members of the health care team.

**Collaborator:**

**General Requirements**

- Consult effectively with pathologists, clinicians and other health care professionals.
- Contribute effectively to interdisciplinary team activities.

**Specific Requirements:**

- Demonstrate the ability to advise on the appropriateness of obtaining specimens for cytogenetics/FISH; following examination of these, advise on further appropriate investigations and patient management.

**Manager:**

**General Requirements:**

- Use resources effectively to balance patient care, turn around time, and educational/research needs.
- Allocate finite health care resources wisely.
- Work effectively and efficiently in a health care organization.
- Use 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 cytogenetics.
- Demonstrate knowledge of the methods of quality assurance in cytogenetics.
- Demonstrate competence in basic computer skills with emphasis on electronic communication and literature/database 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 of consult pathology and cytogenetics in patient's care

#### **Specific Requirements:**

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

- Critically read cytogenetic literature related to hematopathology.
- Facilitate the cytogenetic learning of health professionals.

### **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 pertinent to anatomical pathology.

#### **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 roles of the pathologist and cytogeneticist in providing quality patient care.
- Demonstrate awareness of individual professional limitations and the necessity of seeking appropriate second opinions.

## Cancer Cytogenetics Rotation Schedule

<b>Date</b>	<b>Time</b>	<b>Description of Activities</b>	<b>Assigned To</b>
<b>Monday,</b>	0900	Overview of rotation, assignments, resources	Dr. on service
	1000	Orientation to Lab	Tech II
	1300	Observe bone marrow set-up	Lab staff
	1500	Cytogenetic nomenclature, case review	Dr. on service
	1600	Independent study	
<b>Tuesday</b>	0800	Observe bone marrow harvest, slide preparation, analysis, karyotyping; view G-banded slide	Lab staff
	1300	Observe FISH set-up	Lab staff
	1500	Cytogenetics QA, FISH sensitivity, specimen case review	Dr. on service
	1600	Independent study	
<b>Wednesday</b>	0900	Observe FISH washing, view FISH slide	Lab staff
	1300	Case review	Dr. on service
	1400	Independent study	
<b>Thursday</b>	0900	Observe any procedures not yet completed.	Lab staff
	1200	Hematology Rounds	TBCC Rm CC104
	1330	Review of assignments	Dr. on service
	1500	Independent study	
<b>Friday</b>	0830	Attend Cytogenetics abnormal case review (optional)	ACH
	1130	15-20 min presentation for lab staff (case, article)	Conference room
	1300	Complete review of assignments. Written quiz.	Dr. on service