CLINICAL FELLOWSHIP PROGRAM IN COAGULATION

The Department of Pathology and Laboratory Medicine
University of Alberta, Faculty of Medicine and Dentistry and
Alberta Health Services
CLINICAL FELLOWSHIP IN COAGULATION

INTRODUCTION and BACKGROUND

The Fellowship Program in Coagulation at the University of Alberta is tailored to the needs of the individual fellow. The Alberta Health Services – Edmonton Zone Coagulation service is a reference service for all of Northern Alberta with expertise in a wide spectrum of coagulation disorders support for a wide variety of clinical specialties including pediatric and adult hematology/oncology, solid organ transplant, critical care, obstetrics/gynecology, trauma, and cardiovascular surgery. In addition to routine coagulation testing, the fellow will be exposed to the management and investigation of inherited and acquired bleeding disorders; platelet abnormalities (platelet aggregation, thromboelastography & platelet mapping, platelet electron microscopy), thrombophilic investigations and lumiaggregometry for heparin induced thrombocytopenia. For the typical fellow involved in the program, there will be rotations through the reference special coagulation laboratory as well as smaller routine coagulation facilities and involvement with specialty clinics in both adult and pediatric Hemostasis and Thrombosis. During the one year program the fellow will be exposed to work up of a wide variety of coagulation disorders.

The faculty within the Division of Hematopathology, our laboratory scientists and technical staff will provide expertise in all aspects of coagulation. Fellows are supervised, in rotation, by all participating staff and faculty members for the benefit of the subspecialty expertise that is available in the region, and to be exposed to different points of view. They will participate in clinical consulting activities and teaching activities in which the coagulation service provides. Fellows will also participate in the teaching programs of the University during which they may supervise residents, undergraduate medical students and medical laboratory science students. Clinical research is also a requirement and time allotment is provided.

PROGRAM CURRICULUM

The Coagulation Fellowship program curriculum will include a wide variety of exposures to coagulation studies. The fellow will be primarily located at University of Alberta Hospital site with rotations in the other coagulation laboratories across Alberta Health Services. There will be mandatory rotations through the John Akabutu Bleeding Disorders Clinic, Adult Hematology thrombosis clinics and the Pediatric thrombosis and hemostasis service.

Rotations:
Rotations are arranged in a flexible way to avoid duplication of areas in which the fellow may have had significant previous experience and to strengthen weak areas. The rotation schedule may also be adjusted depending on the fellows’ progress. A minimum of one month is devoted to research.

Seminars, Rounds and Teaching Sessions
Numerous rounds and teaching sessions will be available to participating fellows. These include weekly Joint Hematology rounds, daily coagulation sign out rounds and weekly Hematopathology / Hematology academic half days.

Clinical/On Call Experience

Coagulation rounds are held daily at 1100h in the reading room. These are working rounds where case sign out occurs and where pre analytic, analytic and post analytic laboratory issues are discussed. Fellows in the coagulation program are expected to attend these rounds daily.

The fellow will also be expected to be on a call rotation for coagulation case sign out during regular shift hours. In addition, there may be some after hours call while participating in the clinical hemostasis and thrombosis rotations.

Quality Management
The fellow will be broadly exposed to the Quality system operations and accreditation requirements for running a coagulation laboratory. A major focus will be developing an understanding and approach to dealing with proficiency testing of coagulation studies – CAP, NASCOLA, etc. The fellow will be expected to participate as opportunities arise in coagulation oversight committees such as the weekly Hematology Operations meeting; Edmonton Zone Hematology Optimization committee and potentially the Provincial Hematology Network.

Research and Development
The fellow will be expected to be involved with any R&D activities occurring in the coagulation laboratory during their training period. A minimum of a one month rotation to focus on a specific research or validation project is mandatory.

**PROGRAM OBJECTIVES**

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<th>Role</th>
<th>Key Competencies</th>
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<td>Medical expert / clinical decision maker</td>
<td>1. Have expert knowledge of coagulation studies in health and in disease states.</td>
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<td>2. Have expert knowledge of the basic principles underlying general coagulation laboratory tests.</td>
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<td>3. Have expert knowledge of the physiology of blood clotting, the pathology of hemostatic and thrombotic disorders, and the principles of laboratory tests for the diagnosis of these disorders.</td>
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<td>4. Have expert knowledge of the disorders and tests performed in coagulation laboratories as outlined in the coagulation tests and disorders list below.</td>
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<td>Communicator</td>
<td>1. Communicate effectively with medical colleagues, nursing and technical staff and patients, both verbally and in written reports.</td>
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<td>2. Function as a consultant to colleagues in appropriate role.</td>
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### Collaborator

1. Work as part of a multidisciplinary team in the diagnosis, management and therapy of patients and their coagulation disorders.

2. Ensure that reports are generated in a timely fashion for optimal patient management/treatment.

3. Participate in or provide support for clinical trials/research studies to improve the practice of hemostasis or thrombosis.

4. Assist in the development of patient care programs or testing algorithms as they pertain to coagulopathic processes.

5. Participate in relevant committees such as the Hematology operations committee and Coagulation rounds.

### Manager

1. Utilize time and resources effectively to balance patient care and budget requirements.

2. Have in-depth knowledge of quality systems and how they pertain to running a coagulation service.

4. Understand the value of utilization reviews and continual monitoring of laboratory process review to improve practice.

5. Participate in the development and review of performance indicators through participation in relevant committees and work rounds.

6. Contribute to the follow up and resolution of incidents errors and accidents.

### Health advocate

1. Recognize how technologic advances may apply to improvement in coagulopathy diagnosis, and advocate introducing those technologies locally.

2. Advocate against unnecessary, outdated or repetitive testing.

3. Participate in laboratory test utilization review discussions and in the evaluation of utilization improvement initiatives.

4. Participate in internal audit activities to evaluate laboratory processes at laboratories and hospitals of various sizes and with various scope of practice.

### Scholar

1. Develop and implement a personal continuing educational...
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<th>Professional</th>
<th>1. Deliver the highest quality of care with integrity, honesty and compassion.</th>
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<td>2. Practice medicine in an ethical manner.</td>
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<td>3. Exhibit appropriate professional behavior.</td>
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<td>4. Be cognizant of one’s limitations of professional competence.</td>
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<td>5. Understand the obligations of the Laboratory Director and Laboratory physicians to act as stewards of Medical Information.</td>
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**Coagulation Disorders and Topics:**

Topics/disorders/disease processes to be covered during this fellowship include:

1. Basic concepts of hemostasis and thrombosis, including
   - Role of vessel wall, platelets and humoral coagulation factors
   - Pathways of coagulation
   - Natural inhibitors of coagulation
   - Platelet function
   - Role of fibrinolytic system

2. Pathophysiology and classification of thrombocytopenic disorders

3. Diagnostic approach to bleeding disorders

4. Hereditary coagulation disorders, including treatment and complications
5. Acquired bleeding disorders, including liver disease, disseminated intravascular coagulation, renal failure, and primary fibrinolysis

6. Circulating anticoagulants, including acquired Factor VIII inhibitors (and other inhibitors) in non-hemophilic patients, lupus anticoagulants and antiphospholipid antibodies

7. Congenital and acquired disorders of platelet function

8. Bleeding caused by vascular abnormalities

9. Hereditary hypercoagulable states, their diagnosis and management

10. Acquired hypercoagulable states

11. Diagnosis of thromboembolism and management

12. Anticoagulant therapy, including prophylactic therapy, treatment of established thrombosis, monitoring of heparin and oral anticoagulant therapy, determination of a PTT therapeutic range for heparin monitoring, determination of ISI for INR reporting, antithrombin and agents, complications of anticoagulant therapy

13. Antiplatelet drugs, including GPIIb-IIIa inhibitors

14. Thrombolytic therapy

15. Antifibrinolytic therapy

16. Basic principles of coagulation assays and instrumentation

17. Quality control

18. Point-of-care coagulation testing

For each of the following assays, the resident will understand:

(a) the principle of the assay

(b) indications for the assay

(c) test requirements, including special precautions/specimen handling

(d) interpretation of results

(e) limitations of the assay (including interferences, false positives and false negatives)

(f) quality control
(g) common alternative methods of performing the assay

Assays:

1. Partial thromboplastin time
2. Prothrombin time
3. Fibrinogen
4. D-Dimer (qualitative)
5. D-Dimer (quantitative)
6. Thrombin time
7. Factor XIII screen
8. Bleeding time/PFA 100
9. Platelet aggregation studies
10. Plasminogen assay
11. Euglobulin lysis time
12. PTT inhibitor screen
13. PT inhibitor screen
14. PTT-based factor assays
15. PT-based factor assays
16. von Willebrand factor antigen
17. Ristocetin cofactor assay
18. Factor VIII inhibitor titre
19. Reptilase time
20. Lupus anticoagulant detection
21. Dilute Russell’s Viper Venom time
22. Antiphospholipid assays
23. Antithrombin assay
24. Protein C assay
25. Protein S assay
26. APC resistance (clot-based)
27. Factor V Leiden molecular studies
28. Prothrombin 20210 molecular studies
29. Heparin-induced thrombocytopenia assay
30. Heparin assay

**SPECIALTY TRAINING REQUIREMENTS**
A minimum of 4 years of hematological pathology or 5 years of general pathology, OR internal medicine residency plus 1 year of clinical hematology, OR pediatric residency plus 1 year of clinical hematology is required.

**DURATION AND LOCATION**
Twelve months of approved training in adult and pediatric coagulation, but duration may be adjusted depending on previous experience. The fellow will be primarily located at University of Alberta Hospital site with rotations in the other coagulation laboratories across Alberta Health Services. There will be mandatory rotations through the John Akabutu Bleeding Disorders Clinic, Adult Hematology thrombosis clinics and the Pediatric thrombosis and hemostasis service.

**EVALUATION & SUPERVISION**
Although coordinated through the Hematopathology Divisional Director, the faculty member assigned to the coagulation service for each rotation will be responsible for fellow supervision and rotation evaluation. As part of the fellowship, there will be case based practical examinations that will be coordinated on a 6 monthly basis. The performance of fellows is noted on the formal evaluation, which is done every six months. The fellows will also provide evaluations of each rotation.

**RESOURCES AND PERSONNEL**

**Space and Workload**
Space for the coagulation fellow will be shared with the trainees involved in the Hematopathology residency training program.

**Funding**
Funding for the successful fellowship training candidate will be provided by the Department of Laboratory Medicine and Pathology, University of Alberta commensurate to training level on the PARA scale.
Staff Responsible for Supervision and Instruction
Coordination of the Coagulation Fellowship program will be through the Hematopathology Divisional Director’s office but the primary supervisor will be Dr. Artur Szkotak. Various clinical and technical staff will supervise the fellow during their rotation in order to get the benefit of the subspecialty expertise that is available in the province and to allow the fellow to be exposed to different points of view. In addition, there will be significant interaction with Ms. Linda Stang, the laboratory scientist with oversight of the coagulation laboratory R&D activities.

The primary medical staff involved in the fellowship program will include, but are not limited to:
AHS – Edmonton Zone: Artur Szkotak MD, FRCPC; Kathleen Wong MD, FRCPC; Susan Nahiriak MD, FRCPC; Gwendolyn Clarke MD, FRCPC; Rodrigo Onell MD, FRCPC; Melanie Bodnar MD, FRCPC; Dean Tung MD, FRCPC

ACCREDITATION AND CERTIFICATION
Upon successful completion the fellow will be issued a certificate from the office of Post Graduate Medical Education, Faculty of Medicine, University of Alberta, affirming that subspecialty training in Coagulation has been successfully completed.

RECOMMENDED READING and EDUCATION RESOURCES
A detailed reading package will be provided at the commencement of the fellowship program but some useful online resources include:

- Website links
  - Association of Hemophilia Clinic Directors of Canada (AHCDC)
  - International Society on Thrombosis and Haemostasis (ISTH)
  - North American Specialized Coagulation Laboratory Association (NASCOLA)
  - Thrombosis Interest Group of Canada (TIGC)