



McGill University Genetics in Maternal Fetal Medicine Fellowship

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1. Introduction

As defined by the Royal College of Physicians and Surgeons of Canada (RCPC) and the Collège des Médecins du Québec, Maternal-Fetal Medicine specialists are physicians trained in the prevention, diagnosis and treatment of those conditions implicated in the morbidity and mortality of the mother, fetus and early newborn. These physicians have special training in the identification and management of high-risk obstetrical problems. Specialists in maternal-fetal medicine are viewed primarily as consultants to the practicing obstetrician and other health care providers. During their clinical rotations and calls, trainees are expected to acquire competencies in the different CanMEDS domains.

Fetal Medicine deals with aspects of prenatal fetal diagnosis and treatment. This incorporates prenatal screening (ultrasound, serum and genetic based testing) and prenatal diagnosis (imaging and invasive testing based). A significant component of prenatal diagnosis deals with screening for fetal aneuploidy as well as evaluation of various genetic syndromes or genetically mediated conditions. Although many prenatal diagnostic centers work in conjunction with clinical geneticists it is still of value for the maternal fetal medicine specialist to understand the core principles of genetic diagnosis and testing. A component of this is included within the core modules of the MFM fellowship programs but there are some trainees who wish to expand their knowledge of genetics, prenatal screening, prenatal diagnosis and prenatal counseling and this 1 year program is designed to increase their exposure to clinical medical genetics and genetic counseling to enhance the skills gained during the MFM fellowship.

This document describes the rotation specific objectives of the **Genetics in Maternal Fetal Medicine Fellowship** at McGill University. The program is structured to train individuals who have successfully completed a Royal College accredited Maternal Fetal medicine fellowship or International Graduates of other approved and equivalent Maternal-Fetal Medicine fellowship programs. This is a one-year program leading to certification in **Genetics in Maternal Fetal Medicine**.

The objectives are delineated according to the CanMEDS Framework. The CanMEDS framework was created by the Royal College of Physicians and Surgeons of Canada (RCPC) to clearly define the essential competencies required of a physician.

Clinical Training

In order to gain increased clinical genetic and counseling expertise the candidate will manage patients in the Maternal Fetal Medicine service at the MUHC (Royal Victoria Hospital) and the department of Medical Genetics at the MUHC (Montreal Children's Hospital).

The trainee will also become increasingly acquainted and competent in the management of fetal abnormalities, ultrasound, diagnostic techniques and invasive procedures. The trainee will be an active participant in the academic activities of the maternal-fetal medicine division including regular rounds, seminars and journal clubs. In addition, throughout the course of the one-year training program, the trainee will design and execute a research protocol in a clinical or basic science area under the supervision of an attending staff member.

General Educational Goals & Objectives

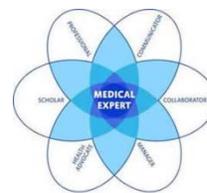
The **Genetics in Maternal Fetal Medicine** is designed to further increase the depth of knowledge and clinical expertise in fetal medicine and clinical genetics as well as to continue to refine research goals and develop consultative, leadership and managerial skills for the wider obstetrical and maternal fetal medicine community. Candidates entering the **Genetics in Maternal Fetal Medicine** Fellowship at McGill must have successfully completed at least five years of an accredited Obstetrics & Gynecology residency leading to a Royal College of Physicians and Surgeons specialist certification or equivalent and in addition have completed a Maternal Fetal Medicine subspecialty training program.

Upon completion of the Genetics in Maternal Fetal Medicine Fellowship the trainee will:

- A. Possess a detailed knowledge and understanding of the
 - 1) Basic sciences (particularly physiology, embryology and biochemistry) pertinent to fetal development and fetal disease.
 - 2) Diagnosis, evaluation and treatment of fetal problems
 - 3) Research skills and critical appraisal of the medical literature.
- B. Be able to diagnose, evaluate and treat perinatal and fetal problems using the various techniques and modalities currently available and counsel the parents regarding these.
- C. Conduct research, including statistical and critical appraisal of the medical literature, design of a research protocol, data recording and analysis, computer-based study and publication in a peer-reviewed journal.
- D. Establish and maintain an effective doctor-patient relationship
- E. Act as a consultant to other obstetrician-gynecologists (including MFM specialists), family physicians and other health care professionals
- F. Function as an educator to patients, medical students, residents, colleagues and other health care professionals
- G. Be a leader and role model in the quality assurance and maintenance of obstetrical care and in the establishment of practice guidelines and protocols for the institution and the community.

Specific Objectives and CanMEDS competencies

On completion of the **Medical Genetics elective**, the trainee will have acquired the following competencies that will aid their practice in a high-risk pregnancy referral centre that has an emphasis on fetal medicine, in particular, the prenatal diagnosis of congenital malformations and their genetic implications and the pre- and postnatal management of these babies.



1. Medical Expert

- a) Demonstrates the basic scientific and clinical knowledge relevant to prenatal genetics, specifically to embryology and fetal development, as well as maternal-fetal health and teratology
- b) Demonstrates a detailed understanding of the techniques of fetal health assessment.
- c) Obtains individual medical and family histories that are appropriate, accurate and well organized; construct a pedigree
- d) Recognize the various patterns of inheritance including, Mendelian, multifactorial, and new mutations, as well as more complex modes such as, mitochondrial and uniparental disomy; analyze pedigrees, and calculate genetic risks
- e) Demonstrates an understanding of the mechanisms for risk evaluation of aneuploidy in pregnancy including maternal serum screening, ultrasound findings and medical and family history
- f) Demonstrates an in-depth understanding of the diagnosis, classification and investigation of fetal anomalies.
- g) When indicated in the context of a prenatal genetic evaluation, performs physical examinations that are appropriate, accurate and well organized
- h) Follow a logical approach in syndrome identification including the use of diagnostic aids (e.g. computer assisted diagnosis, literature searches), especially in the context of the fetus/neonate with multiple anomalies
- i) Have an understanding of the genetic implications of identifying fetal malformations on ultrasound; plan a course of investigation; this includes making appropriate referrals for perinatal management or for fetal pathology, the collection of appropriate fetal tissues for later studies, and planning/providing follow-up of patients, especially in cases of fetal demise or pregnancy termination.
- j) Have an in-depth knowledge of chromosomal abnormalities (aneuploidy and structural rearrangements), mechanisms of origin and clinical implications, including recurrence risk.
- k) Recognize the indications, limitations and turn-around-time of laboratory investigations that pertain to genetic disease, including prenatal screening, ethnic screening, cytogenetics and molecular diagnosis; specifically have an in depth knowledge of the indications, contraindications and complications of the various prenatal diagnostic procedures including amniocentesis, chorionic villous sampling and cordocentesis, fetal echocardiogram, as well as preimplantation genetic diagnosis (PIGD) and ICSI.
- l) Evaluate a history of teratogen exposure , including the use of appropriate databases
- m) Understand the impact of maternal disease on fetal development (e.g. maternal PKU)

2. Communicator

- a) Identify the concerns of the patient/family with respect to a specific genetic condition/risk.
- b) Communicate effectively and empathetically with patients and their families; help them choose an appropriate course of action for themselves, provide support during bereavement, and advise them regarding support agencies

- c) Communicate clearly and effectively, verbally and in writing, with other physicians and health care providers,
- d) Writes accurate, concise and timely genetics consultation letter and documentation to referring physicians containing information concerning the diagnosis, medical implications and prognosis, the reproductive risks, and the management options available

3. Collaborator

- a) Interact and consult effectively with colleagues and allied health professionals, ensuring respect and courtesy
- b) Recognize the limitations of his/her skills and expertise and be willing to seek consultation whenever indicated
- c) Appreciate the role of genetics in the multidisciplinary management of high risk pregnancy

4. Manager

- a) Demonstrate successful case management skills; including the writing of chart notes, consultation reports, letters to families, requesting and arranging any follow-up testing, appointments, etc.
- b) Recognizes critical aspects of the timing of investigations and management in the context of a prenatal genetics consultation.
- c) Participate in the coordinated care of individuals with complex, chronic disorders, offered by a multidisciplinary team

5. Health advocate

- a) Access information regarding community support groups as well as national and international resources to which patients can be referred
- b) Access information regarding new services and testing as they become available; e.g. through on-line computer programs
- c) Understand the need for promotion of public awareness of genetic disease, and potential for prevention of birth defects (e.g. preconception use of folate)

6. Scholar

- a) Make presentations at formal and informal educational settings
- b) Appreciate the role of research in genetic practice
- c) Critically analyze current scientific developments related to the specialty

7. Professional

- a) Have an understanding of the social, ethical, legal and cultural issues which are particular to genetics and genetic testing
- b) Understand his/her own ethical standards and appreciate those of the patient; recognize the views and beliefs of the patient, be non-directive in most instances but be prepared to advise in certain situations

2. Overview of Rotations

Year	Rotation	Duration (blocks)	Teaching Site(s)
First	Clinical Genetics – Prenatal	5	RVH
	Laboratory Genetics – Molecular and cytogenetic	1	MCH
	Clinical Genetics – paediatric inpatient	1	MCH / RVH
	Clinical Genetics – paediatric outpatient	1	MCH
	Clinical Genetics – adult	1	MGH
	Ultrasound – Advanced	1	RVH / MCH
	Research	2	RVH
	<i>Electives:</i> Paediatric & Perinatal Pathology	1	RVH/MCH
	Sub-total	12	
	TOTAL	12	

NOTE: One block is comprised of 4 weeks; hence the 1 year program is comprised of 13 blocks (1 vacation period)

MUHC sites - RVH Royal Victoria Hospital: MCH Montreal Children's Hospital: MGH Montreal General Hospital

3. Rotation-Based Objectives of Training

The Objectives of Training for each rotation of the McGill **Genetics in Maternal Fetal Medicine Fellowship** program were developed with the specialists involved in the training. **The objectives of this 12 month program are based on :**

Subspecialty Training Requirements in Maternal Fetal Medicine and Medical Genetics

The Objectives of Training have been reviewed and updated in 2014.

Residency Training Program Directors

- **Obstetrics Maternal Fetal Medicine** Dr Angela Mallozzi
- **Medical Genetics** Dr Laura Russell

Fellowship Training Program Director:

- **Obstetrics Maternal Fetal Medicine** Dr Richard Brown

Fellowship Training Program co-director

- **Medical Genetics** Dr Isabelle De Bie



McGill University
Subspecialty Training Program in Maternal-Fetal Medicine
Objectives of Training

Medical Genetics - Prenatal

Montreal Children's Hospital and Royal Victoria Hospital

Orientation to Rotation

Rotation duration: Four 4-week blocks

Rotation supervisor:

- Dr Isabelle De Bie, Geneticist

Medical Genetics staff

- Dr Laura Russell, Geneticist (laura.russell@muhc.mcgill.ca)
- Dr Serge Melancon, Geneticist (serge.melancon@muhc.mcgill.ca)
- Dr Isabelle De Bie, Geneticist (isabelle.debie@muhc.mcgill.ca)
- Lola Cartier, MSc, Genetics Counselor coordinator (lola.cartier@muhc.mcgill.ca)
- Stella Drury, MSc, Genetic Counselor (stella.drury@muhc.mcgill.ca)
- Marilyn Richard, MSc, Genetic Counselor (marilyn.richard@muhc.mcgill.ca)
- Rachel Vanneste, MSc, Genetics Counselor (rachel.vanneste@muhc.mcgill.ca)

Service Requirement: Night call from home will be shared with other MFM Fellows, for patients admitted to the RVH and transport calls.

Rotation Schedule

During the four-week rotation in Medical Genetics, the trainee will spend time in the clinic setting of prenatal diagnosis with the genetics counselors and geneticist

Academic Half-day sessions take place on Fridays at the MCH:

- **8:00 -9:00 am:** Fetal Diagnosis and Treatment Group rounds (RVH, MCH & JGH videoconference)
- **9:00 am - 12:00 pm:** Medical Genetics Teaching sessions (MCH Room C417)
- Wenesday at RVH
- **12.00-13.00 pm:** Ultrasound Rounds (RVH F4)

Rotation Overview

Emphasis will be placed on genetics and pregnancy (prenatal diagnosis, teratogens, and embryo-fetopathology). The trainee should keep a logbook of cases.

Educational Strategies

The trainee will be expected to:

1. Attend assigned clinics; review patient charts and relevant literature prior to clinic
2. Complete chart notes and consultation letters, which must be reviewed by supervisor
3. Participate actively in genetics counseling at the RVH clinic and case review. Cases are reviewed individually by Genetics Counselors with the Geneticist covering the clinic, as well as at the, bi-weekly fetal diagnosis and treatment meeting.
4. Complete a research project in the form of a multidisciplinary management protocol which will be presented formally at the Friday session of the Fetal Diagnosis and Treatment Group (see below)

Evaluation

Evaluation of the trainee during the medical genetics rotation is based on day-to-day performance, including history-taking and physical examination skills, case reviews and participation during genetics rounds. The trainee will be informally assessed throughout the rotation by faculty, and will be given feedback. A mid-rotation evaluation will be completed by the rotation supervisor in consultation with other staff members, discussed with the trainee and communicated to the MFM Program Director. At the end of the rotation, rotation specific ITER will be completed on MRESone45 and discussed with the trainee.

As part of their training, the fellow is expected to complete and presents for review to the Fetal Diagnosis and Treatment Group a clinical research project in the form of an inter-professional protocol aimed at the multidisciplinary evaluation and management of fetal anomaly (subject to be chosen at the beginning of the rotation after discussion between the trainee and fellowship training supervisor. The trainee will have to periodically update the fellowship training supervisor on the progression of his/her work, and complete the protocol following the format currently used at the MUHC

(See: [http://www.emuhc.muhc.mcgill.ca/?q=clinical_care/pediatric_reference/menu:Tools/Templates for Development of Protocols and Policies](http://www.emuhc.muhc.mcgill.ca/?q=clinical_care/pediatric_reference/menu:Tools/Templates%20for%20Development%20of%20Protocols%20and%20Policies))

Suggested Reading

Genetics in Obstetrics and Gynecology, 3rd ed by Joe Leigh Simpson and Sherman Elias. Philadelphia: Saunders, 2002.

Smith's Recognizable Patterns of Human Malformation, by Kenneth Lyons Jones. 6th Ed Philadelphia: Saunders, 2006

Structural Fetal Abnormalities: the total picture, by Roger C Sanders 2nd Ed 2002

Prenatal Diagnosis. The human side . 2nd edition. Ed. By Lenore Abramsky and Jean Chapple

Prenatal test procedures

Eisenberg Barbara and Wapner Ronald J. Clinical procedures in prenatal diagnosis. 2002. Best Practice & Research Clinical Obstetrics and Gynaecology Vol.16, No.5, pp.611-627,

Canadian Collaborative CVS-Amniocentesis Clinical Trial Group. Multicentre Randomised Clinical Trial of Chorion Villus Sampling and Amniocentesis. The Lancet Saturday, 7 January 1989.

The Canadian Early and Mid-Trimester Amniocentesis Trial (CEMAT) Group. Randomised trial to assess safety and fetal outcome of early and midtrimester amniocentesis. The Lancet, Vol.351, January 24, 1998.

Prenatal diagnosis and twin pregnancies

Bryan E. Psychological aspects of prenatal diagnosis and its implications in multiple pregnancies. 2005 Prenatal Diagnosis 25: 827-834.

Dommergues Marc Prenatal diagnosis for multiple pregnancies 2002 Current Opinion in Obstetrics and Gynecology 14:169-175

Rustico M.A., et al. Managing twins discordant for fetal anomaly 2005 Prenatal Diagnosis 25 :766-771

Evans M. et al. Update on selective reduction 2005 Prenatal Diagnosis 25:807-813

Cytogenetics and prenatal sampling

Crane James P and Cheung Sau W. An Embryogenic model to explain cytogenetic inconsistencies observed in chorionic villus versus fetal tissue.1988 Prenatal Diagnosis, Vol.8, 119-129.

Screening for Down syndrome

Malone F. et al (FASTER Research Consortium) First-Trimester or Second-Trimester Screening, or Both, for Down's Syndrome. The New England Journal of Medicine, Vol.353, No.19, November 10, 2005.

Wald N.J., Rodeck C., Hackshaw A.K. and Rudnicka A. SURUSS in Perspective. Seminars in Perinatology 2005

SOGC Clinical Guidelines: Fetal Soft Markers in Obstetric Ultrasound. www.sogc.org

Fetal Medicine Foundation. www.fetalmedicine.com

Termination of Pregnancy

Patient pamphlet: A Time to Decide, A Time to Heal: making difficult decisions about the babies we love.

Reproductive Technologies

Kearns W.G. et al. Preimplantation Genetic Diagnosis and Screening. Seminars in Reproductive Medicine Volume 23, Number 4 2005

Van Voorhis Bradley J. Outcomes From Assisted Reproductive Technology. Obstetrics & Gynecology Vol.107, No. 1, January 2006

Persson Jeffrey The ART of assisted reproductive technology. Australian Family Physician Vol.34, No. 3, March 2005

Joint SOGC-CFAS guideline. Pregnancy Outcomes After Assisted Reproductive Technology. No.173, March 2006,

Hemoglobinopathies & Thrombophilias

ACOG Practice Bulletin: Clinical Management Guidelines for Obstetrician-Gynecologists. Hemoglobinopathies in Pregnancy. Obstetrics & Gynecology Vol.106, No.1, July 2005

Old J.M. Screening and genetic diagnosis of haemoglobin disorders. (2003) Blood Reviews 17, 43-53

Pabinger I and Vormittag R. Thrombophilia and pregnancy outcomes. 2005 Journal of Thrombosis and Haemostasis 3: 1603-1610

Buchanan G.S., Rodgers G.M., Branch Ware D. The inherited thrombophilias: genetics, epidemiology, and laboratory evaluation. 2003 Best Practice & Research Clinical Obstetrics & Gynecology Vol.17 No.3, pp397-411.

Reich L.M., Bower M., Key N.S. Role of the geneticist in testing and counseling for inherited thrombophilia. Genetics in Medicine Vol.5 No



McGill University
Subspecialty Training Program in Maternal-Fetal Medicine
Objectives of Training

Medical Genetics – Paediatric - inpatient
Montreal Children's Hospital

Orientation to Rotation

Rotation duration: One 4-week rotation

Rotation supervisor:

- **MCH:** Dr Isabelle De Bie, Geneticist

Medical Genetics staff

- Dr Laura Russell, Geneticist (laura.russell@muhc.mcgill.ca)
- Dr Walla Al Hertani, Geneticist
- Dr Daniela Buhas, Geneticist
- Dr Nancy Braverman, Geneticist
- Dr Isabelle De Bie, Geneticist
- Laura Whelton, Genetic Counselor
- Stephanie Fox, Genetic Counselor

Service Requirement: Night call from home will be shared with other MFM Fellows, for patients admitted to the RVH and transport calls.

Rotation Schedule

During the four-week rotation in Medical Genetics, the trainee will spend time covering the paediatric and neonatal units at the MCH and RVH, participate in the consultative genetics service evaluating children with genetic conditions and neonates with confirmed and suspected genetic conditions together with the geneticist.

Academic Half-day sessions take place on Fridays at the MCH:

- **8:00 -9:00 am:** Fetal Diagnosis and Treatment Group rounds (RVH, MCH & JGH videoconference)
- **9:00 am - 12:00 pm:** Medical Genetics Teaching sessions (MCH Room C417)

Rotation Overview

Emphasis will be placed on the paediatric evaluation of genetic disorders and the presentations of genetic conditions in the child. The trainee should keep a logbook of cases.

Educational Strategies

The trainee will be expected to:

1. Attend the wards when consulted; review patient charts and relevant literature
2. Obtains individual medical and family histories that are appropriate, accurate and well organized
3. Demonstrate understanding of pathophysiology, assessment and treatment modalities
4. Demonstrates expertise in the recognition of phenotypic variation
5. Develop a differential diagnosis, a plan of investigations and preliminary management plans
6. Complete chart notes and consultation letters, which must be reviewed by supervisor
7. Where appropriate and with supervision, provide genetic counselling
8. Complete assigned reading and instruction on the use of various databases (OMIM, POSSUM, GeneTests etc)

Evaluation

Evaluation of the trainee during the medical genetics rotation is based on day-to-day performance, including history-taking and physical examination skills, case reviews and participation during genetics rounds. The trainee will be informally assessed throughout the rotation by faculty, and will be given feedback. A mid-rotation evaluation will be completed by the rotation supervisor in consultation with other staff members, discussed with the trainee and communicated to the MFM Program Director. At the end of the rotation, rotation specific ITER will be completed on MRESone45 and discussed with the trainee.



McGill University
Subspecialty Training Program in Maternal-Fetal Medicine
Objectives of Training

Medical Genetics – Paediatric - outpatient

Montreal Children's Hospital

Orientation to Rotation

Rotation duration: One 4-week rotation

Rotation supervisor:

- **MCH:** Dr Isabelle De Bie, Geneticist

Medical Genetics staff

- Dr Laura Russell, Geneticist (laura.russell@muhc.mcgill.ca)
- Dr Walla Al Hertani, Geneticist
- Dr Daniela Buhas, Geneticist
- Laura Whelton, Genetic Counselor
- Stephanie Fox, Genetic Counselor

Service Requirement: Night call from home will be shared.

Rotation Schedule

During the four-week rotation in Medical Genetics, the trainee will attend paediatric genetic clinics at the MCH and participate in the consultative genetics service evaluating children with genetic conditions and neonates referred or followed with confirmed and suspected genetic conditions together with the geneticist. Particular emphasis will be put on cases requiring Genetic counseling

Rotation Overview

Emphasis will be placed on the paediatric evaluation of genetic disorders and the presentations of genetic conditions in the child. The trainee should keep a logbook of cases.

Educational Strategies

The trainee will be expected to:

1. Attend assigned clinics; review patient charts and relevant literature prior to clinic
2. Complete chart notes, letter to patient and consultation reports, which must be reviewed by immediate supervisor; plan follow-up; organize testing, as needed

3. Participate actively in genetics counseling at the MCH clinic and case review. Cases are reviewed individually by Genetics Counselors with the Geneticist covering the clinic.
4. Complete a set of problems (dysmorphology cases, pedigree-solving, etc)
5. Complete assigned reading and instruction on the use of various databases (OMIM, POSSUM, GeneTests etc)

Evaluation

Evaluation of the trainee during the medical genetics rotation is based on day-to-day performance, including history-taking and physical examination skills, case reviews and participation during genetics rounds. The trainee will be informally assessed throughout the rotation by faculty, and will be given feedback. A mid-rotation evaluation will be completed by the rotation supervisor in consultation with other staff members, discussed with the trainee and communicated to the MFM Program Director. At the end of the rotation, rotation specific ITER will be completed on MRESone45 and discussed with the trainee.

Suggested Reading



McGill University
Subspecialty Training Program in Maternal-Fetal Medicine
Objectives of Training

Medical Genetics - Laboratory
Montreal Children's Hospital

Orientation to Rotation

Rotation duration: One 4-week rotation

Rotation supervisors:

- **MCH:** Dr Alessandra Duncan, Cytogeneticist
Dr Miriam Blumencrantz, Pathologist, Cytogeneticist
Dr Josee Lavoie, Cytogenetics, (Jlavoie@muhc.mcgill.ca)
Dr Andrea F. Ruchon, Molecular Geneticist
Dr Ron Agatep, Molecular Geneticist
Dr Isabelle De Bie, Clinical and Molecular Geneticist

Medical Genetics staff

Isabelle De Bie, Medical and Molecular Geneticist

Rotation Schedule

During the four-week rotation in Medical Genetics – Laboratories, two weeks of the rotation are spent in the Cytogenetics Laboratory and two weeks in the Molecular Genetics Laboratory, under the supervision of the laboratory directors and technologists.

Academic Half-day sessions take place on Fridays at the MCH:

- **8:00 -9:00 am:** Fetal Diagnosis and Treatment Group rounds (RVH, MCH & JGH videoconference)
- **9:00 am - 12:00 pm:** Medical Genetics Teaching sessions (MCH Room C417)

Rotation Overview

Emphasis will be placed on the prenatal diagnostic cytogenetic and molecular testing for suspected genetic disorders.

Educational Strategies

The trainee will be expected to:

1. Acquire knowledge of the technical aspects and interpretation of cytogenetic and molecular tests
2. Become familiarized with the pre-analytical, analytical, and post-analytical processing of patient samples
3. Understand the theoretical principles underlying common technologies and the role of computational tools used to detect genetic variation and attain technical familiarity through observation
4. Gain knowledge of association of chromosomal and molecular abnormalities with specific diseases and of clinical utility of tests/technologies for prenatal diagnosis of the disorders associated with these abnormalities
5. Get exposure to a variety of clinical cases, both current and archived, with particular emphasis on those requiring prenatal diagnosis; this will occur through weekly discussion of current cases with the cytogeneticist or molecular geneticist on service, or through structured select readings, problem sets, and relevant teaching cases from the teaching collection followed by discussion
6. Be able to describe and discuss the indications, contraindications, limitations, sensitivities and specificities of various cytogenetic and molecular testing technologies used in prenatal diagnosis
7. Be able to describe and discuss testing requirements for prenatal diagnosis, quality control and assurance, including the detection of maternal cell contamination, confined placental mosaicism, and differentiation of pseudo from true mosaicism
8. Participate in the activities of the service and laboratory meetings
9. Participate in the academic activities of the Department of Medical Genetics

Evaluation

The evaluation of the trainee is formalized by completing the Evaluation Report. In general, this is done at the end of the rotation, however, if there are any problems in performance identified in the course of regular meetings between supervisor and residents, these will be discussed with the resident.

Suggested Reading

- GeneTests Reviews
- CCMG/ACMG Standards & Guidelines
- CCMG/ACMG Practice Guidelines
- Human Molecular Genetics, Strachan & Read
- Genetics in Medicine, Thompson & Thompson



McGill University
Subspecialty Training Program in Maternal-Fetal Medicine
Objectives of Training

Medical Genetics - Adult

Montreal General Hospital

Orientation to Rotation

Rotation duration: One 4-week rotation

Rotation supervisor:

- **MGH:** Dr Laura Russell

Medical Genetics staff

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Rotation Schedule

During the four-week rotation in adult Medical Genetics, the trainee will be assigned 2 clinics per week, with particular emphasis on genetic counseling cases that can be conducted under the direct supervision of a genetics counselor, according to the schedules of the medical geneticists.

The trainee is expected to

1. Attend assigned clinics; review patient charts and relevant literature prior to clinic
2. Complete chart notes and consultation letters, which must be reviewed by supervisor
3. Participate actively in genetics counseling. Cases are reviewed individually by Genetics Counselors with the Geneticist covering the clinic.

Academic Half-day sessions take place on Fridays at the MCH:

- **8:00 -9:00 am:** Fetal Diagnosis and Treatment Group rounds (RVH, MCH & JGH videoconference)
- **9:00 am - 12:00 pm:** Medical Genetics Teaching sessions (MCH Room C417)

Rotation Overview

Emphasis will be placed upon the counseling related to the prenatal diagnosis of adult onset conditions. Exposure to the counseling of adults regarding genetic conditions (related to medical disorders including fertility issues as well as cancer) will also broaden the trainees exposure to the processes and

techniques used in patient counseling that may also then be of value when applied to counseling of prenatal disease.

Educational Strategies

The trainee will be expected to:

10. Complete assigned reading and instruction on the use of various databases (OMIM, POSSUM, GeneTests etc)

Evaluation will be performed through pre and post clinic case review as well as direct observation of selected sessions



McGill University
Subspecialty Training Program in Maternal-Fetal Medicine
Objectives of Training

Advanced Ultrasound Rotations

Royal Victoria Hospital

Orientation to Rotation

Rotation duration: One 4-week blocks

Rotation supervisors:

Dr Richard Brown (richard.brown@muhc.mcgill.ca)

Service Requirement: Night call from home will be shared with other MFM Fellows, for patients admitted to the RVH or JGH MFM Service and transport calls.

Rotation Environment and Expectations

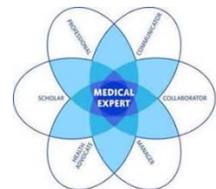
The program is dedicated to advanced ultrasound training. Attending supervision at all sessions will allow direct and regular feedback.

Academic Half-day sessions take place on Fridays at the MCH:

- **8:00 -9:00 am:** Fetal Diagnosis and Treatment Group rounds (RVH, MCH & JGH videoconference)
- **12.00-13.00 pm:** Ultrasound Rounds (RVH F4)

Specific Objectives and CanMEDS competencies

On completion of the **Advanced Ultrasound Rotation**, the MFM trainee will have acquired the following competencies that will assist him in his/her future role as a consultant in maternal-fetal medicine.



1. Medical Expert

A. KNOWLEDGE

1. To have a detailed understanding of the physics underlying ultrasound imaging including Doppler, in order to obtain an optimal image.
 - a) Effects on human tissues of pulsed- and continuous-wave ultrasound beams

- b) Principles of attenuation, absorption, reflection, speed of sound, and thermal and non-thermal biologic effects
 - c) Interpretation of acoustic output information (including Doppler) and its clinical relevance
 - d) Flow mapping (colour Doppler)
 - e) Signal processing (gray scale, time gain compensation, dynamic range, focus)
 - f) Artifacts: interpretation and avoidance
 - g) Reverberation, side lobes, edge effects, shadowing, enhancement
2. Understand and utilize Doppler methodology appropriate to obstetrical investigation.
 - a) Evaluation of fetal and utero-placental blood flow
 - b) Appreciation of problems in blood flow and velocity measurements and waveform analysis in normal and complicated pregnancies
 - c) Clinical applications in the prediction of intrauterine growth retardation and preeclampsia
 - d) Clinical applications in monitoring the small-for-dates fetus and pregnancies complicated by Rh isoimmunization, diabetes, postmaturity, and fetal cardiac arrhythmias
 - e) Use of detailed fetal arterial and venous Doppler in evaluating high risks pregnancies including intrauterine growth restriction, fetal anaemia, fetal cardiac malformations, monochorionic twin gestations (twin-twin transfusion and twin anaemia-polycythemia sequence)
 3. Demonstrate comprehensive knowledge of sonoembryology and fetal development.
 4. Demonstrate comprehensive knowledge of sonographic pelvic anatomy.
 5. Understand feto-maternal physiology as applicable to ultrasound, for example, basic understanding of amniotic fluid dynamics and fetal biophysical parameters as well as vascular changes in states of normal fetal wellbeing and stress.
 6. To understand both fetal pathology and the pathophysiology of varied fetal conditions including but not limited to
 - a) Fetal aneuploidy
 - b) Genetic conditions recognizable sonographically. To understand the inheritance of genetic syndromes and have an understanding of the place and limitations of ultrasound in the diagnosis of single gene disorders
 - c) Structural defects and their implications, including:
 - Cranial
 - Anencephaly
 - Holoprosencephaly
 - Ventriculomegaly
 - Posterior Fossa and Cerebellar abnormalities
 - Neural tube defects
 - Intracranial haemorrhage, causes and evaluation
 - Facial
 - Clefting
 - Facial hypoplasia
 - Hypotelorism/ hypertelorism
 - Thorax
 - Skeletal dystrophy
 - Cardiac abnormalities (Transposition, Fallot's, hypoplastic left heart etc)

- CCAM / CPAM
 - Pleural effusions; causes, investigation and therapy
 - Abdomen
 - Diaphragmatic hernia; prognostic assessment, neonatal outcomes and interventions
 - Hydronephrosis / urinary obstruction; etiologies, assessment, invasive testing and management
 - Ascites
 - Spine
 - Neural tube defects
 - Vertebral anomalies
7. To develop an understanding of the impact of maternal disease on the fetus and evaluation of the fetus in such circumstances, including maternal drug exposure.
 8. To develop the ability to counsel patients regarding the risks of fetal abnormalities and the findings of a sonographic evaluation.
 9. To understand the principles of invasive diagnostic and therapeutic procedures
 - a) Amniocentesis - Indications and complications
 - b) Chorionic villus sampling - Indications and complications
 - c) Cordocentesis - Indications and complications
 - d) Fetal Transfusion – peritoneal, vascular, intra-hepatic
 - e) Blood, platelets
 - f) Drainage and shunting of fetal body cavities
 - g) Fetoscopy – its role in treatment of twin-twin transfusion syndrome, congenital diaphragmatic hernia and fetal diagnosis
 - h) EXIT procedures – the indications and understanding of the procedure
 - i) Open fetal surgery – role, benefits and limitations
 10. To develop an understanding of medical and surgical aspects of fetal therapy, including but not limited to
 - i. Medical treatment of fetal thyroid disorders
 - ii. Medical treatment of fetal cardiac arrhythmias
 - iii. Medical treatment of metabolic genetic syndromes – eg congenital adrenal hyperplasia

B. SKILLS - Ultrasound

1. Demonstrate competency in obtaining fetal and pelvic views and optimize the ultrasound image by adjusting the machine settings.
2. Perform a first trimester scan which involves identifying and documenting locations of the gestational sac, yolk sac, fetal number and determination of twin chorionicity, crown-rump length, presence or absence of cardiac activity, evaluation of the uterus and adnexa. Identify fetal number and viability. Obtain nuchal translucency (NT) measurements that fulfill the standard criteria and obtain the FMF certification for NT assessment.
3. Demonstrate competence in first trimester assessment of pathology, including abnormal NT, cranial and cerebral defects (e.g. exencephaly, holoprosencephaly), lower urinary tract obstruction, limb abnormalities, GI tract anomalies etc.

4. Demonstrate competence in first trimester attainment and assessment of Doppler studies (uterine artery, umbilical cord, ductus venosus, tricuspid regurgitation)
5. Identify pathologies within the first trimester, early pregnancy failure, ectopic pregnancy, gross fetal abnormality e.g., cystic hygroma, clearly abnormal nuchal translucency, megacystis, genetic syndromes (such as Meckel Gruber) etc.
6. During second and third trimester examinations to be able to identify: fetal number and viability, fetal presentation and position, the grade of placenta, fetal heart rate and rhythm, and assess amniotic fluid volume
7. Perform first and second trimester anatomical evaluations, assessing the following fetal structures at appropriate gestations:
 - a) Head
 - Facial profile and facial anatomy
 - Brain
 - Cerebral cortex and cerebral ventricles, including corpus callosum
 - Posterior fossa and cerebellum
 - Cisterna magna
 - Nuchal skin fold
 - b) Spine
 - Longitudinal
 - Transverse
 - c) Limbs
 - Number
 - Movement
 - Hands and feet
 - d) Thorax
 - Heart Rate and rhythm
 - Four-chamber view
 - Cardiac axis and situs
 - Origins of the great vessels, the aortic arch
 - Lungs
 - e) Abdomen
 - Situs
 - Stomach
 - Liver, gall bladder and GI tract
 - Kidneys and urinary bladder
 - Abdominal wall and umbilicus
 - f) Examination of the placenta and cord
 - Placental location and morphology
 - Number of cord vessels
 - g) Doppler Evaluation (Pulsed wave and colour)
 - Umbilical artery and vein

- Uterine arteries
 - Middle Cerebral artery
 - Other vessels, including thoracic aorta, renal arteries, ductus venosus and cardiac Doppler (for example assessment of cardiac morphology and valvular function)
8. Perform biophysical profile with clear knowledge of standard criteria and interpretive skills
 9. Assess not only the principle biometric parameters including: CRL, BPD, OFD, HC, AC, FL, humerus length but also detailed biometry of the face, skeleton, brain and heart. To be able to assess the significance of these findings.

The following CanMEDS competencies apply to the Basic and the Advanced ultrasound rotations

2. Communicator

- a) Demonstrate good interpersonal skills when working with all members of the health care team
- b) Gather pertinent information about the patient, including the family's beliefs, concerns and expectations about the illness. Listen effectively
- c) Demonstrate sensitivity in the communication of the findings of ultrasound examinations, being especially mindful of impact of psychological, social, and ethical problems associated with the diagnosis of fetal abnormality
- d) Be able to obtain informed consent.
- e) Be able to deliver a patients case presentation clearly and concisely.
- f) Be able to produce timely, meticulous and correct documentation, including ultrasound reports, consultation notes, and letters.

3. Collaborator

- a) Demonstrate the ability to work effectively with a multidisciplinary team and respect the opinions of other team members.
- b) Contribute effectively at multidisciplinary group meetings (e.g. Weekly Ultrasound rounds, Fetal Diagnosis and Treatment Group meetings)
- c) Understand the role of other healthcare professionals in the provision of comprehensive patient care.
- d) Effectively work with other health professionals to prevent, negotiate and resolve interprofessional conflict.

4. Manager

- a) Coordinates and/or presents at the weekly Ultrasound Rounds
- b) Effectively utilize the information systems (Telehealth, OACIS, Viewpoint, RadImage, PACS) required for optimal patient care and communication of ultrasound findings
- c) Demonstrates organization of work and time management
- d) Delegates clinical responsibilities appropriately
- e) Executes appropriate allocation of ultrasound resources within the region and remote communities, including community hospitals, private clinics and remote outposts
- f) Understand the principles of quality assurance and administration of an ultrasound unit

5. Health Advocate

- a) Identify the important determinants of health in an individual patient
- b) Utilize the network of resources to facilitate patient access to care in a timely manner
- c) Provide advocacy for patients with abnormal ultrasound findings by coordinating and expediting consultation with the necessary specialists, such as genetics, pediatric cardiology, pediatric radiology, pediatric surgery etc.
- d) Enable patients to remain in their own communities without compromising quality of care through the use of Telehealth services coordinated by the MUHC, which includes both the review and reporting of ultrasound studies from remote areas in real and deferred time.

6. Scholar

- a) Maintain a personal continuing education strategy.
- b) Complete ARDMS requirements for examination and certification
- c) Complete FMF certification for NT measurement
- d) Critically appraise sources of medical information and apply evidence-based medicine in ultrasound
- e) Facilitate learning for patients, medical students, residents and other health professionals

7. Professional

- a) Deliver the highest quality care with integrity, honesty and compassion; including recognizing limitations of their own professional competence and seeking advice as needed
- b) Exhibit appropriate professional behaviors
 - i. Punctuality
 - ii. Respond to calls in a timely and respectful fashion
 - iii. Show appropriate demeanour with respect to appearance and language
- c) Practice medicine consistent with the ethical obligations of a physician, such as maintaining patient confidentiality
- d) Sensitive to ethical issues specific to MFM, such as termination of pregnancy, fetal reduction; arranges ethical consultation and discussion, as required.

Evaluation:

Evaluation of the MFM trainee regarding the acquisition of ultrasound skills is performed on an on-going basis during the training periods. The MFM attending supervising the ultrasound session and the sonographers/technicians directly observe the trainee performing every ultrasound examination in the first four weeks of the first MFM block. After this, if the trainee's performance is deemed satisfactory, the trainee is allowed to perform the ultrasound examination alone. However, the attending reviews every examination. The trainee is thus given direct feedback on every patient.

At the end of every block, an evaluation based on CanMeds roles is completed by the MFM faculty on MRESone45.

By the end of the first three Ultrasound blocks, the MFM trainee will be expected to have obtained **FMF Certification** in the measurement of the fetal nuchal translucency. By the end of the 1-year program the

trainee is expected to have completed the **ARDMS** examinations in Obstetrics/Gynecology and ultrasound physics.

Suggested Reading for Ultrasound Rotation

Diagnostic Imaging of Fetal Anomalies, by David A. Nyberg, John P. McGahan, Dolores H. Pretorius and Gianluigi Pilu. Philadelphia: Lippincott, Williams & Wilkins, 2003.

Fetology : diagnosis and management of the fetal patient / / Diana W. Bianchi ... [et al.]. -- New York: McGraw-Hill; McGraw-Hill Medical, 2010.2nd ed. (*Book*) WQ 211 F42.2 2010 RVH - Women's Pavilion Library.

Ultrasonography in obstetrics and gynecology / Callen, Peter W. -- Philadelphia, PA: Elsevier Saunders, 2008.5th ed. (*Book*) WQ 100 U47.5 2008 Reserve RVH -

The Unborn Patient: The Art and Science of Fetal Therapy Michael R. Harrison MD FACS FAAP (Author), Mark Evans MD (Author), N. Scott Adzick MD (Author), Wolfgang Holzgreve MD MS Drhc (Author)

A Practical Guide to Fetal Echocardiography (Abuhamad, A Practical Guide to Fetal Echocardiography) Alfred Z. Abuhamad MD (Author), Rabih Chaoui (Author)

A Practical Guide to Fetal Echocardiography: Normal and Abnormal Hearts [Hardcover] Alfred Z. Abuhamad (Author), Rabih Chaoui (Author) Lippincott Williams and Wilkins; 2nd Revised edition edition (1 Dec 2009) ISBN-10: 0781797578

Fetal Therapy: Scientific Basis and Critical Appraisal of Clinical Benefits by Kilby, Mark D., Johnson, Anthony and Oepkes, Dick (Jan 16, 2013)

Fetal Therapy: Invasive and Transplacental by Nicholas M. Fisk, Kenneth J. Moise and G. C. Liggins (Jan 28, 1997)

Atlas of Ultrasound in Obstetrics and Gynecology Lippincott Williams & Wilkins; 2 edition (1 Jan 2011) Language: English ASIN: B005GETBSM

Clinical sonography : a practical guide / Sanders, Roger C; Miner, Nancy Smith. -- Philadelphia: Lippincott-Raven, 2007.4th ed. (*Book*) WN 208 C64.4 2007 Reserve RVH - Women's Pavilion Library.

Donald school textbook of ultrasound in obstetrics and gynecology -- New Delhi: Jaypee Brothers, 2011.3rd ed. (*Book*) WQ 209 D65.3 2011 RVH - Women's Pavilion Library.

Doppler Ultrasound in obstetrics and gynecology / Maulik, Dev. -- Berlin: Springer-Verlag, 2005.2nd ed. (*Book*) WQ 209 D69.2 2005 RVH

Embryo and fetal pathology: color atlas with ultrasound correlation / Gilbert-Barness, Enid; Debich-Spicer, Diane. -- Cambridge: University Press, 2004. (*Book*) WQ 17 G46e 2004 Reserve RVH - Women's Pavilion Library.

Fetal anomalies: ultrasound diagnosis and postnatal management / Maizels, Max; Cuneo, Bettina F; Sabbagha, Rudy E. -- New York: Wiley-Liss, 2002. (*Book*) WQ 209 F41 2002 RVH - Women's Pavilion Library.

Fetal Echocardiography: A Practical Guide Lindsey D. Allan Andrew C. Cook Ian C. Huggon Cambridge University Press; 1 Har/Dvdr edition (2 July 2009) ISBN-10: 0521695201

Obstetric and gynaecological ultrasound made easy / Smith, N. C.; Smith, A. Pat M. -- New York: Churchill Livingstone, 2006.2nd ed. (*Book*) WQ 209 S4.2 2006 Reserve RVH - Women's Pavilion Library.

Sonography in Obstetrics and Gynecology: Principles and Practice, by Arthur C. Fleischer, Frank A. Manning, Philippe Jeanty and Roberto Romero. (6th Ed.) New York: McGraw-Hill, 2001.

Textbook of Fetal Abnormalities Peter Twining Josephine M. McHugo David W. Pilling Churchill Livingstone; 2nd Revised edition edition (4 Dec 2006) ISBN-10: 044307416X

The fetus in three dimensions / Kurjak, Asim.; Azumendi, Guillermo. -- Boca Raton, FL: Informa Healthcare, 2007. (*Book*) WQ 209 K95 2007

Transvaginal Sonography of the Normal and Abnormal Fetus, by Moshe Bronshtein and Etan Z. Zimmer. New York: Parthenon

Ultrasound in obstetrics and gynecology / edited by Frank A. Chervenak, Glenn C. Isaacson, Stuart Campbell. -- -- Boston: Little, Brown, 1993. (*Book*) WQ 209 U468 1993 RVH - Women's Pavilion Library.

Ultrasound in Obstetrics and Gynecology: Vol 1 - Eberhard Merz TIS; 2 edition

Ultrasound markers for fetal chromosomal defects / Snijders, Rosalinde J. M; Nicolaidis, Kypros H. -- New York: Parthenon, 1996. (*Book*) QS 677 S67 1996 RVH - Women's Pavilion Library.

Ultrasound of fetal syndromes / Benacerraf, Beryl R. -- Philadelphia: Churchill Livingstone / Elsevier, 2008.2nd. (*Book; CD-ROM*) WQ 211 B43.2 2008 RVH

Refer to the Websites of

- SOGC (clinical practice guidelines for 2nd trimester assessment and aneuploidy screening)
- ISUOG, RCOG, AIUM, BMUS, EFSUMB (for international standards and guidelines in ultrasound)

Journals

- Ultrasound in Obstetrics & Gynecology
- Journal of Ultrasound in Medicine
- Prenatal Diagnosis
- Fetal Diagnosis and therapy



McGill University
Subspecialty Training Program in Maternal-Fetal Medicine
Objectives of Training

Research Rotations

Royal Victoria Hospital

Overview

During his/her training, the trainee will undertake an independent research project. The project may focus on issues of basic science or on issues of more direct clinical relevance. Basic science research is done in the laboratory under the direction of a member of the Reproductive Biology Division of the department or in collaboration with a scientist from another department. Clinical research is done under the supervision of the MFM faculty.

The Royal College (RCSPC) stipulates that one research project should be completed and a publishable manuscript should be prepared. This represents the minimal requirement; many aspects of research activities are strongly encouraged, widely supported and tailored to individual career plans.

Schedule

Six 4-week blocks will be devoted to research within the 24 month fellowship: One month should be scheduled early on in the fellowship during which:

- i) Research interests of the fellow are explored;
- ii) Plans for project and future course work are made;
- iii) An abstract to an upcoming meeting is prepared and submitted; and
- iv) The other 5 months will be scheduled in 1, 2 or 3 month blocks according to project needs and availability of other electives.

Supervision

Supervision or co-supervision of MFM related projects may be undertaken under any of the Faculty over the course of the Fellowship.

Supervision of the Research Rotation, including early planning of project(s) and establishing deadlines, ensuring objectives are being met will be done by either

- o **RVH:** Dr Richard Brown

Nature of the research project

Fellows can acquire good research experience in several ways:

- i) **Databases** that could be utilized for many clinical questions:
 - o US Birth Linked Database - All births certificates in the US; data from births linked to deaths within 1st year; database accrues about 40 M births/ 10yrs (60,000 SB)
 - o HCUP –NIS - 15% sample of all admissions to US hospitals; 15 ICD-9 codes and 15 procedural codes; demographic data and regional data

- Viewpoint ultrasound database
- GE Perinatal Information System will be installed shortly at the MUHC birthing centre and will eventually be linked with MOND
- IRNPQEO will eventually provide a wealth of info on exposures/outcomes from the pregnancy and postpartum biobank it is building on mothers, fathers, infants and children
- Other data sources:
 - Dr Phylis Zerkowitz – Cohort on psychological parameters and obstetrical outcomes
 - Dr N Chaillet – Quarisma Cohort (180k births in Quebec)
 - Medical Records – Case Room - Chartmaxx

Fellows will have access to codebooks for databases - in order to grasp the wealth of data and their definitions - available for research projects.

ii) Writing a review article or a book chapter

- iii) Develop research question involving a small survey or questionnaire** which could be implemented relatively easily, by applying feasible research ideas or hypotheses from:
- Discussions arising with staff in clinical setting
 - Personal interest (biomedical / ultrasound / different practice style)
 - Reading the Green Journal or other relevant peer review journals

Research project resources

Numerous resources will facilitate the MFM fellow's research experience.

- i) Epidemiology coursework** through McGill dept of Epidemiology, Biostatistics and Occupational Health will be scheduled depending on previous formal coursework of individual trainees. McGill courses include:
- Clinical epidemiology or Reproductive Epidemiology (Dr. Olga Basso)
 - Basic Biostatistics
- ii) Epidemiology seminars:**
- RVH Thursdays 9:30 - 10:30 in Ross Pavilion R4.02 (<http://www.clinepi.mcgill.ca/>)
 - McGill seminars: *Epidemiology* on Mondays 4-5 pm in Purvis Hall room 25; *Biostatistics* on Tuesdays 4-5 pm in Purvis Hall Room 24.
- iii) McGill Department of Obstetrics and Gynecology Clinical Research division**
This recently created division headed by Epidemiologist Dr Olga Basso, will provide the infrastructure and guidance for research projects of Faculty and Trainees alike. Support offered will include epidemiological and statistical consultation, and guidance with Research Ethics Board submissions.
- iv) Funding of Fellows Research Projects**
- MUHC's Academic Enrichment Fund (AEF) Can provide up to \$5000 for study support for projects which involve a MUHC ObGyn faculty member. For more information, including application form, go to : www.mcgill.ca/obgyn/funding
 - Canadian Foundation for Women's Health (CFWH) provides annual awards to the best resident research projects in women's health (www.cfwh.org). Deadline in Feb or March

Research presentation and publication

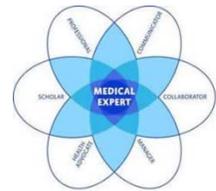
With faculty help and supervision a research topic will be identified for which fellows will write, submit and present an **abstract** (poster or oral presentation) at a professional scientific meeting over the course of their 2 year program. Meetings and abstract deadlines to consider:

- a. SMFM meetings in February, abstracts due August <https://www.smfm.org/>
- b. SOGC meeting in June, abstracts due in January <http://www.sogc.org/>
- c. IUSOG meeting <http://www.isuog.org/Events/>

This abstract may be the basis of one of the Fellow's **manuscripts** which will be prepared and submitted to a peer-review journal for publication.

Specific Objectives and CanMEDS competencies

On completion of the Research Rotations, the trainee will have acquired the following competencies that will assist him in his/her future role as a consultant in maternal-fetal medicine.



1. Medical Expert

- a) Understand and demonstrate the process involved in conducting a thorough review of medical literature
- b) Evaluate the quality of the scientific and medical literature relevant to the research project.
- c) Formulate a clear hypotheses

2. Communicator

- a) Clearly explain study to patients if applicable, ethically and without coercion
- b) Establish a good rapport with study participants.
- c) Prepare clear concise documentation related to study, such as for informed consent, protocol submission of ethics, funding, etc.

3. Collaborator

- a) Recognize his/her own limitations
- b) Collaborate with others involved in research project - such as a statistician, assistants, clinic staff, advisor

4. Manager

- a) Manage time well in conducting research, setting goals and meeting deadlines as needed
- b) Be able to write a research protocol including completing forms for the Research Ethics Board.
- c) Record data thoroughly and in a systematic fashion
- d) Carry out study (data collection, patient recruitment etc) in an organized manner according to protocol

5. Health Advocate

- a) Advocate for ethical conduct of research.
- b) Advocate against plagiarism.

6. Scholar

- a) Understand the limitations of research and evidence-based findings
- b) Describe the principles of research ethics
- c) Understand the importance of careful and complete data gathering
- d) Execute study protocol
- e) Know how to perform basic statistics and apply to own dataset, seeking help with functions and interpretation as needed
- f) Write the manuscript and respond to journal queries.

7. Professional

- a) Write an abstract for presentation.
- b) Present the results of their research at a national or international scientific meeting.
- c) Write a manuscript for publication in a peer-reviewed journal.

Evaluation

Evaluation of the Maternal-Fetal Medicine trainee during the Research rotation rotation is based on the process and execution of a research project. The trainee will be informally assessed throughout the rotation by faculty involved, and will be given feedback. Evaluations will be completed by the rotation supervisor in consultation with other staff members, discussed with the trainee and communicated to the MFM Program Director. At the end of the rotation, rotation specific ITER will be completed on MRESone45 and discussed with the trainee.

Suggested Reading

Introduction to the Practice of Statistics 5th ed. by D.S., and G.P. McCabe. New York: W.H. Freeman, 2005.

[Life Sciences](#)

Humanities and Social Sciences

Schulich Science & Engineering

Statistical Methods in Medical Research 4th ed. by P. Armitage and G. Berry. Malden: Blackwell Science Inc., 2002.

Life sciences

[Montreal Children's – Library](#)

[Jewish General - Health Sciences Library](#)

Designing Clinical Research – An Epidemiologic Approach Ed. by SB Hulley, SR Cummings, Baltimore: Williams & Wilkins, 1988.

Life sciences

[Montreal Children's – Library](#)

e-book, through McGill

Evidence-based practice manual: research and outcome measures in health and human services Edited by Albert R. Roberts, Kenneth R. Yeager. Oxford ; New York : Oxford University Press, c2004.

[Humanities and Social Sciences - McLennan Bldg](#)

Epidemiology: An Introduction. By KJ Rothman. Oxford University Press; 1 edition, 2002



McGill University
Subspecialty Training Program in Maternal-Fetal Medicine
Objectives of Training

Electives – Perinatal Pathology

Montreal Children's Hospital

Orientation to Rotation

Rotation duration: Elective rotation – ad hoc during program

Rotation supervisor:

- **MCH:** Dr Moy-Fong Chen

Perinatal Pathology Staff

- Dr Moy-Fong Chen
- DR Miriam Blumencrantz
- Dr Chantal Bernard

Elective Schedule

When fetal abnormalities result in fetal demise, neonatal death or end with termination of the pregnancy and fetal autopsy examination is to be conducted it is expected that the trainee will attend the autopsy examination to gain experience in the processes and techniques involved in the post-mortem evaluation of fetal disease. Furthermore the trainee may make arrangements to attend the department of pathology for a period of time to observe routine histological evaluations of the placenta and other tissue samples again to better understand the processes involved and therefore to be better able to interpret and utilize the information provided by such examinations.

Academic Half-day sessions take place on Fridays at the MCH:

- **8:00 -9:00 am:** Fetal Diagnosis and Treatment Group rounds (RVH, MCH & JGH videoconference)
- **12.00-13.00 pm:** Ultrasound Rounds (RVH F4)
- **Monthly clinico-pathological conferences (perinatal mortality) rounds**