

Bone & Mineral Metabolism Fellowship

<i>Name of Institution</i>	McGill University Health Centre (MUHC)
<i>Primary Location</i>	MUHC Royal Victoria Hospital (RVH) Site 687 Pine Avenue West, Montreal, QC, H3A 1A1
<i>Type of Fellowship</i>	<p>Primarily a basic research fellowship (80%), with clinical (20%) and teaching opportunities in bone & mineral metabolism. The fellowship will include exposure to the following areas of interest:</p> <ul style="list-style-type: none">• Bone and cell biology<ul style="list-style-type: none">○ Vitamin D metabolism○ Calcium Homeostasis• Bone and mineral disorders<ul style="list-style-type: none">○ hyperparathyroidism○ osteoporosis○ hypocalcemia• Skeletal manifestations of cancer<ul style="list-style-type: none">○ PTHrp○ Bone metastases○ Myeloproliferative disorders• Genetic disorders of bone and mineral metabolism<ul style="list-style-type: none">○ rickets○ Paget disease○ Osteomalacia○ Osteogenesis imperfecta• other metabolic bone diseases
<i>Duration</i>	1 year
<i>Number of Positions</i>	One fellow per year.

Program Information

Mission To complement the fellow's exposure to bone and mineral metabolism during the course of his or her residency with further sub-specialization in relevant disciplines. Ultimately, to foster superior patient care, outstanding teaching, and original research. It is expected that fellows completing this program will go on to pursue academic medical careers.

Number of Fellowship Positions

One fellow per year. Every fellowship will be reviewed to ensure that there are appropriate resources for the fellow.

Training Sites

McGill University Health Centre (MUHC)

Hospitals Involved in Training

The Royal Victoria Hospital (RVH) of the MUHC will be the primary site. After discussion with the Fellowship Director, fellows may also make use of other facilities within the MUHC network of hospitals.

Requirements

Applicants should have completed Royal College of Physician and Surgeons certified (or equivalent) training in Internal Medicine or its subspecialties, Pediatrics, Medical Biochemistry, Endocrinology, Clinical Genetics or Pathology.

Enrolment in either a Master or PhD program is encouraged. Possible options include McGill's Experimental Medicine or Epidemiology programs.

Research Activities

The primary focus of the fellowship will be basic and/or clinical research in the field of bone and mineral metabolism. Fellows will design and execute at least one research project in a relevant sub-discipline. They will be expected to present their research at both local (e.g. McGill Endocrine Retreat) and international conferences (e.g. American Society for Bone and Mineral Research, The Endocrine Society), and will publish their findings in established, peer-reviewed journals.

Areas of research experience to be emphasized

Basic Research

Basic and advanced laboratory techniques according to the abilities of the fellow and the needs of the project (including cell culturing, PCR, Western blotting, gene arrays, animal models, mass spectrometry, chromatography, electrophoresis, FISH, flow cytometry, immunoassays, genetic and genomic studies with appropriate bioinformatic analyses), protocol design, data acquisition and statistical analyses. In order to attain the necessary proficiencies with these techniques, the fellow will become an integral member of an active basic research laboratory.

Clinical Research

Cohort based studies of patient populations can be conducted in collaboration with the Division of Epidemiology, Biostatistics and Occupational Health. Techniques will include protocol design, recruitment techniques, data acquisition and analysis. Exposure to clinical trials can be arranged. More detailed statistical and epidemiological analyses can be conducted in the context of a Master's degree in epidemiology.

How fellowship Will Enhance Residency Training

The Bone and Mineral Metabolism Fellowship will complement the fellow's exposure to bone and mineral metabolism and related disorders during the course of his/ her residency. It will enrich the existing residency curriculums by exposing current residents to fellows with complementary training in these disorders. Fellows will be expected to take on both formal and informal teaching roles. One component of the teaching responsibilities will be to lead medical student teaching seminars within the McGill Undergraduate Medicine Unit 5 (musculoskeletal disorders).

Clinical Activities

The fellow will have the opportunity to be exposed to the clinics organized at the MUHC's Center for Bone and Mineral Disease at the RVH site. Fellows will be expected to spend one day per week in clinic. Clinics are held on a daily basis by physicians associated with the Department of Medicine, primarily in the division of endocrinology as well as the divisions of internal medicine, hematology-oncology and nephrology. The clinics include large cohorts of diverse patient populations:

- **Osteoporosis** - (both primary and secondary, male and female). Including individuals with male hypogonadism, Crohn's disease, musculodegenerative disorders, iatrogenic-induced (e.g. secondary to chemo and cortico therapies).
- **Calcium Metabolism Disorders** - Hyperparathyroidism, hypoparathyroidism, pseudohypoparathyroidism, vitamin D dependent Ricket's, osteomalacia, Paget's disease.
- **Genetic Disorders** - X-linked hypophosphatemic Ricket's, osteogenesis imperfecta, fibrous dysplasia.
- **Skeletal Manifestations of Cancer** - ultiple myeloma, bone metastases, treatment induced hypogonadism and osteoporosis.

Name of the Fellowship Program Director

Dr. Richard Kremer, MD, PhD.
Professor of Medicine, McGill University
Director, Bone and Mineral Unit
Research Laboratory Director, Department of Medicine
Calcium Research Laboratories
Co-Director Musculoskeletal Axis
McGill University Health Center

Names of the Teaching Faculty

- **Richard Kremer, MD, PhD (Endocrinology & Medical Biochemistry)**
Research Focus - Role of vitamin D in osteoporosis, cancer progression & skeletal metastasis
Clinical Roles - Endocrinology Service, Medical Biochemistry, Bone and Mineral Metabolism Clinic

- **David Goltzman, MD (Endocrinology)**
Research Focus - Hormonal regulation of calcium and skeletal homeostasis
Clinical Roles - Endocrinology Service, Bone and Mineral Metabolism Clinic

- **Michael Sebag, MD, PhD (Hematology)**
Research & Clinical Focus - Myeloma bone disease

- **Catalin Mihalcioiu, MD (Oncology)**
Clinical Focus - Lung Cancer; Melanoma, Breast Cancer, Brain Metastases
Research Focus - Circulating tumor cells; cancer therapies

- **Suzanne Morin, MD (Internal Medicine)**
Research Focus - Health outcomes and health services in the area of osteoporosis and fractures
Clinical Roles - Bone and Mineral Metabolism Clinic

- **Nancy Mayo, PhD (Epidemiology & Biostatistics)**
Research Focus - Health outcomes, health services, and population health

- **George Tsoukas, MD (Endocrinology)**
Clinical Roles - Bone and Mineral Metabolism Clinic

- **Ramsey Sabbagh, MD (Nephrology)**
Clinical Roles - Bone and Mineral Metabolism Clinic, kidney related bone diseases

- **David Grunbaum, MD (Endocrinology)**
Clinical Role - Bone and Mineral Metabolism Clinic

- **Andrew Karaplis, MD, PhD (Endocrinology)**
Clinical Role - Endocrinology Service
Research Focus - Metabolic bone disease; PTHrP; FGF23
- **Line Vautour, MD (Endocrinology)**
Clinical Roles - Endocrinology Service, Bone and Mineral Metabolism Clinic
- **Geoff Hendy, PhD (Endocrinology)**
Research Focus - The parathyroid gland and its two major secretory products: parathyroid hormone (PTH) and chromogranin A (CgA)
- **Shaffat Rabbani, MD (Endocrinology)**
Research Focus - The molecular mechanisms involved in the progression of hormone dependent malignancies (breast and prostate cancer), including the role of urokinase (uPA) in the process of tumor invasion, growth and metastasis.

Academic Facilities

Basic Research

The Calcium Research Lab based at the Royal Victoria Hospital of the MUHC has gained international recognition for its contributions in the field of bone and mineral research. There are currently four full-time and a host of part-time principal investigators collaborating under its auspices.

Core Laboratories

The Center for Bone and Periodontal Research Core Laboratories (biochemistry and immunoassays, bone histomorphometry, bone imaging) at the RVH site and on McGill's downtown campus.

Clinical Research

The Bone and Mineral Unit at the RVH in conjunction with the Department of Epidemiology, Biostatistics and Occupational Health and the CAMOS (Canadian Multicentre Osteoporosis Study) program.

Clinical Activities

The Center for Bone and Mineral Metabolism at the RVH site.

Support staff, including the laboratory program coordinators, research coordinators, laboratory personnel and secretarial staff will be made available to the fellows.

The MUHC and McGill libraries are well-stocked with a variety of both print and online resources. There is unlimited Internet access within the laboratories, and a host of specialized online research tools and support are available to the lab personnel. Full audiovisual facilities are available for formal presentations.

Fellow Duties and Responsibilities

- Fellows may provide service call coverage alongside their research supervisor.
- Fellows will take an active part in outpatient clinics (including diagnosis, management and health advocacy).
- Fellows will have teaching responsibilities towards students and residents and will chair journal clubs and medical rounds.
- Proposed meetings to be attended: American Society for Bone and Mineral Research, McGill Endocrine Retreat, The Endocrine Society.
- After discussion with the Fellowship Director, fellows will be encouraged to enrol in appropriate graduate-level University courses in order to enrich their clinical and research interests (e.g. Bioanalytical Separation Methods, Advanced Endocrinology, Biostatistics, Clinical Epidemiology).

Curriculum

In-line with the diverse interests of the clinical and research staff, fellows will be exposed to a variety of bone and mineral and related disorders during both clinic and research activities. Classic textbooks, various journal and reading materials in the related fields will be recommended and made available in the laboratory library and online.

Conferences and weekly schedules

- Bi-weekly Laboratory Research Meeting – RVH - H4
- Weekly Medical Grand Rounds – RVH - M3
- Weekly Endocrinology Grand Rounds – RVH / MGH
- Weekly Journal Club – RVH - M9
- Monthly Bone Rounds – RVH - H4
- Annual Endocrinology Retreat
- Annual Musculoskeletal Retreat

The applicant will have the opportunity to attend, present, supervise and organize some of these activities.

Evaluation and feedback

Fellows will be evaluated at regular intervals on their performance at both the clinical and research levels. Research evaluations and feedback will be provided by the Research Supervisor in the form of one-on-one sessions every 4 weeks at which time the fellow will present his/her research progress and results as well as discuss problems and future directions. Clinical evaluations and feedback will be provided by the attending physicians of the Center for Bone and Mineral Disease, both informally during and after each clinic and formally at 3 month intervals. Formal evaluations include one-on-one verbal sessions and written evaluations. For

more detailed information regarding evaluations and promotions, please consult McGill's Post Graduate Medical Education policy available at http://www.medicine.mcgill.ca/postgrad/welcometopostgrad_evaluationpromotions.htm