

Mathieu Ferron

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Spoken languages: French and English

PRESENT OCCUPATIONS

Director, Integrative and Molecular Physiology Research unit, IRCM, Montréal, QC, Canada

Assistant IRCM Research Professor, IRCM, Montréal, QC, Canada

Assistant Professor, Department of Medicine, Faculty of Medicine, University of Montreal, Montreal, QC, Canada

EDUCATION

2006: **Ph.D., Molecular Biology**, University of Montreal, Montréal, Canada

Thesis Title: “Role of Inositol polyphosphate 4-phosphatase type II (Inpp4b) in osteoclasts differentiation and activity”

Mentor: Dr Jean Vacher, Clinical Research Institute of Montréal (IRCM)

1998: **B.Sc., Biochemistry**, University of Montréal, Montréal, Canada

ACADEMIC APPOINTMENTS

2013-today: **Director**, Integrative and Molecular Physiology Research unit; **Assistant IRCM Research Professor**, IRCM, Montreal, QC, Canada

2013-today: **Assistant Professor**, Department of Medicine, Faculty of Medicine, University of Montreal, Montreal, QC, Canada

2011-2013: **Associate Research Scientist**, Department of Genetics and Development, Columbia University, New York, USA.

2006-2011: **Postdoctoral research scientist**, Department of Genetics and Development, Columbia University, New York, USA

Field of Study: Glucose Metabolism, Molecular and Cellular Biology, Signal Transduction, Biochemistry, Mouse Genetic and Physiology.

Research scope: Elucidation of the mechanisms by which bone regulates energy metabolism. Role of insulin signaling in bone. Transcriptional control of bone resorption.

Principal Investigator: Dr. Gerard Karsenty

CURRENT GRANT AND SALARY SUPPORT

2013: Canadian Foundation for Innovation

Title: Role of Vitamin K and gamma carboxylation in energy and bone metabolism

Total amount from CFI and partners: 561,750 CAD

2013-2018: Canadian Research Chair (Tier 2) in Bone and Energy Metabolism

Duration: 5 years.

Total amount: 100,000 CAD/year

DECLINED GRANT SUPPORT

2013-2016: R00, National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK)

Title: Regulation of glucose metabolism by bone resorption and gamma-carboxylation

Duration: 3 years.

Total amount: 250,000 USD/year

Declined because this grant was not transferable to Canada

FELLOWSHIPS

2012-2013: National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), K99

Title: *Regulation of glucose metabolism by bone resorption and gamma-carboxylation*

Duration: 1 year

Total amount: 90,000 USD.

2011-2012: American Diabetes Association and Canadian Diabetes Association Fellowship, Canada/USA

Title: *Regulation of glucose metabolism by bone resorption*

Duration: 2 years (second year declined)

Total amount: 83,000 CAD.

2007-2010: Fond de la recherche en Santé du Québec (FRSQ) Fellowship, Canada

Title: *Mechanisms controlling osteocalcin endocrine function.*

Duration: 3 years

Total amount: 120,000 CAD.

2003-2006: Canadian Institutes of Health Research (CIHR) Doctoral Research Scholarship, Canada

Title: *Functional analysis of inositol polyphosphate 4-phosphatase B in bone homeostasis.*

Duration: 3 years

Total amount: 63,000 CAD.

2001-2003: Fond de la recherche en Santé du Québec (FRSQ) Doctoral Research Scholarship, Canada

Title: *Role of inositol polyphosphate 4-phosphatase B in osteoclast differentiation.*

Duration: 2 years

Total amount: 40,000 CAD.

- 2001: **Institut de Recherche Clinique de Montréal (IRCM) Doctoral Research Scholarship, Canada**
Title: *Role of Inositol Polyphosphate 4-Phosphatase Type II in Osteoclast Cytoskeletal Organization and Activity.*
Duration: 1 year
Total amount: 17,000 CAD.
- 2001: **University of Montreal Doctoral Scholarship, Canada**
Total amount: 4,000 CAD.
- 2000: **Institut de Recherche Clinique de Montréal (IRCM) Scholarship, Canada**
Total amount: 7,000 CAD.
- 2000: **University of Montreal Scholarship, Canada**
Total amount: 3,200 CAD.

AWARDS

- 2013: **The Endocrine Society Outstanding Abstract Award.**
The Endocrine Society, 95th ENDO Meeting, San Francisco, CA, USA.
- 2011: **ASBMR John Haddad Young Investigator Award.**
American Society for Bone and Mineral Research, Advances in Mineral Metabolism Meeting, Snowmass, CO, USA.
- 2009: **ASBMR Young Investigator Award. Poster Presentation.**
American Society for Bone and Mineral Research, Frontiers in Skeletal Research, Bone, Fat and Brain Connections, Bethesda, MD, USA.
- 2004: **ECTS Young Investigator Award. Oral Presentation.**
31st European Calcified Tissue Society Meeting, Nice, France.
- 2003: **AstraZeneca R&D Award. Oral Presentation.**
9th Molecular Biology Program Meeting, University of Montreal, Montreal, Canada.
- 2003: **Faculty of Medicine Award, University of Montreal. Poster Presentation.**
IRCM Research Day, Montreal, Canada.
- 2002: **IRCM Award. Poster Presentation.**
8th Molecular Biology Program Meeting, University of Montreal, Montreal, Canada.
- 2001: **Roger-Boucher Award. Poster Presentation.**
IRCM Research Day, Montreal, Canada.
- 2000: **Roche-Diagnostics Award. Poster Presentation.**
6th Molecular Biology Program Meeting, University of Montreal, Montreal, Canada.
- 1999: **Roger-Boucher Award. Poster Presentation.**
IRCM Research Day, Montreal, Canada.

LIST OF PUBLICATIONS

1. Nohara, K., Waraich, R., Liu, S., **Ferron, M.**, Waget, A., Meyers, M., Karsenty, G., Burcelin, R., and Mauvais-Jarvis, F. Developmental androgen excess programs sympathetic tone and adipose tissue dysfunction and predisposes to a cardiometabolic syndrome in female mice. *Am J Physiol Endocrinol Metab.* **Online.**
2. Kajimura, D., Lee, H.W., Riley, K.J., Artega-Solis, E., **Ferron, M.**, Zhou, B., Clarke, C.J., Hannun, Y.A., Depinho, R.A. Guo, E.X., Mann, J.J., Karsenty, G. Adiponectin exerts, through FoxO1, two opposite influences on bone mass accrual in animals fed a normal diet. *Cell Metab.* **17**, 901-15.
3. Oury, F., **Ferron, M.**, Xu, L., Confavreux, C., Srinivas, P., Lacombe, J., Huizhen, W., Lugani, F., Lejeune, H., Kumar, T.R., Plotton, I., Karsenty, G. Evidence for a pancreas-bone-testis axis favoring male fertility. *J Clin Invest.* **123**, 2421-33.
4. **Ferron, M.** Settembre, C., Shimazu, J., Lacombe, J., Kato, S., Rawlings, D.J., Ballabio, A., Karsenty, G. A RANKL-PKC β -TFEB signaling cascade is necessary for lysosomal biogenesis in osteoclasts. (2013) *Genes & Dev.* **27**, 955-69.
5. Settembre, C., Zoncu, R., Medina, D.L., Vetrini, F., Erdin, S., Erdin, S.U., Huynh, T., **Ferron, M.**, Karsenty, G., Vellard, M.C., Facchinetti, V., Sabatini, D., Ballabio, A. (2012) A Lysosome-to-Nucleus Signaling Mechanism Senses and Regulates the Lysosome via mTOR and TFEB. *EMBO J.* **31**, 1095-108.
6. Kode, A., Mosialou, I., Silva, B.C., Joshi, S., **Ferron, M.**, Rached, M.T., Kousteni, S. (2012) FoxO1 Cooperates With ATF4 in Osteoblasts to Control Glucose Homeostasis. *J Biol Chem.* **287**, 8757-68.
7. Karsenty, G., **Ferron, M.** (2012) Whole-organism Physiology and the Skeleton: Bone Mass and Beyond. *Nature.* **481**, 314-320. [Review article]
8. **Ferron, M.**, McKee, M.D., Levine, R.L., Ducy, P., Karsenty, G. (2012) Intermittent Injections of Osteocalcin Improve Glucose Metabolism and Prevent Type 2 Diabetes in Mice. *Bone.* **50**, 568-575. [This article is part of a Special Issue entitled: *Interactions Between Bone, Adipose Tissue and Metabolism*]
9. **Ferron, M.**, Boudiffa, M., Arsenault, M., Rached, M., Pata, M., Giroux, S., Elfassihi, L., Kisseleva, M., Majerus, P.W., Rousseau, F., Vacher, J. (2011) Inositol Polyphosphate 4-Phosphatase B as a Regulator of Bone Mass in Mice and Humans. *Cell Metab.* **14**, 466-477.
10. Yoshikawa, Y., Kode, A., Xu, L., Mosialos, I., Silva, B., **Ferron, M.**, Clemens, T.L., Economides, A.N., Kousteni, S. (2011) Genetic Evidence Points to an Osteocalcin-independent Influence of Osteoblasts on Energy Metabolism. *J Bone Miner Res.* **26**, 2012-25.
11. Kajimura, D., Hinoi, E., **Ferron, M.**, Kode, A., Riley, K.J., Zhou, B., Guo, X.E., Karsenty, G. (2011) Genetic Determination of the Cellular Basis of the Sympathetic Regulation of Bone Mass Accrual. *J. Exp. Med.* **208**, 841-51.

12. Oury, F., Sumara, G., Sumara, O., **Ferron, M.**, Chang, H., Smith, C.E., Hermo, L., Suarez, S., Roth, B.L., Ducy, P., Karsenty, G. (2011) Endocrine Regulation of Male Fertility by the Skeleton. *Cell*. **144**, 796-809.
13. **Ferron, M.**, Wei, J., Yoshizawa, T., Del Fattore, A., DePinho, R.A., Teti, A., Ducy, P. and Karsenty, G. (2010) Insulin Signaling in Osteoblasts Integrates Bone Remodeling and Energy Metabolism. *Cell*. **142**, 296-308.
14. **Ferron, M.**, Wei, J., Yoshizawa, T., Ducy, P. and Karsenty, G. (2010) An ELISA-Based Method to Quantify Osteocalcin Carboxylation in Mice. *Biochem. Biophys. Res. Commun.* **397**, 691-696.
15. Yoshizawa, T., Hinoi, E., Jung, D.Y., Kajimura, D., **Ferron, M.**, Seo, J., Graff, J.M., Kim, J.K., Karsenty, G. (2009) The Transcription Factor ATF4 Regulates Glucose Metabolism in Mice Through its Expression in Osteoblasts. *J. Clin. Invest.* **119**. 2801-17.
16. **Ferron, M.**, Karsenty, G. (2009). The Gutsy Side of Bone. *Cell Metab.* **10**, 7-8. [Preview article]
17. **Ferron, M.**, Hinoi, E., Karsenty, G., Ducy, P. (2008) Osteocalcin Differentially Regulates β -Cell and Adipocyte Gene Expression and Affects the Development of Metabolic Diseases in Wild-Type Mice. *Proc. Natl. Acad. Sci.* **105**, 5266-70
18. Confavreux, C., **Ferron, M.** (2008) [Diabetes is Buried Under a Bone] *Medecine/Science.* **24**, 21-23. [Review Article in French]
19. Lee, N.K., Sowa, H., Hinoi, E., **Ferron, M.**, Ahn, J.D., Confavreux, C., Dacquin, R., Mee, P.J., McKee, M.D., Jung, D.Y., Zhang, Z., Kim, J.K., Mauvais-Jarvis, F., Ducy, P., Karsenty, G. (2007) Endocrine Regulation of Energy Metabolism by the Skeleton. *Cell*. **130**, 456-469.
20. **Ferron, M.**, Vacher, J. (2006) Molecular Cloning and Expression Analysis of Mouse Inositol Polyphosphate 4-Phosphatase Type II; Identification of a Novel Spliceform. *Gene*. **376**, 152-61.
21. **Ferron, M.**, Vacher, J. (2005) Targeted Expression of Cre Recombinase in Macrophages and Osteoclasts in Transgenic Mice. *Genesis*. **41**, 138-45.
22. Chalhoub, N., Benachenhou, N., Rajapurohitam, V., Pata, M., **Ferron, M.**, Frattini, A., Villa, A., Vacher, J. (2003) Grey-Lethal Mutation Induces Severe Malignant Autosomal Recessive Osteopetrosis in Mouse and Human. *Nature Medicine.* **9**, 399-406.

BOOK CHAPTERS

1. Riddle, R.C., **Ferron, M.**, Clemens, T.L. Skeletal Actions of Insulin. In: Edited by Gerard Karsenty, Translational Endocrinology of Bone: Reproduction, Metabolism, and the Central Nervous System. London, UK: Academic Press, 2012; chapter 8.
2. **Ferron, M.**, Oury, F., Karsenty, G. Energy Homeostasis and Neuronal Regulation of Bone Remodeling. In: Edited by Rajesh V. Thakker, Genetics of Bone Biology and Skeletal Disease. San Diego, CA, USA: Elsevier, 2012; chapter 5.

INVITED PRESENTATION IN INTERNATIONAL MEETINGS

1. **Ferron, M.** Osteocalcin a Metabolically Active Hormone. **Molecular, Structural and Clinical Aspects of Vitamin K and Vitamin K-Dependent Proteins.** FASEB Summer Research Conference, Carefree, AR, USA, June 30, 2011.

PRESENTATIONS IN INTERNATIONAL MEETINGS

1. **Ferron, M.** and Karsenty, G. (2012) Contribution of Bone Resorption to the Control of Glucose Metabolism. *J. Bone Miner. Res.* **27**, (Suppl.1) 1157. 34th Annual Meeting of the American Society for Bone and Mineral Research (ASBMR). Minneapolis, USA, October 12-15, 2012. **Oral Presentation.**
2. **Ferron, M.** and Karsenty, G. (2012) γ -Glutamyl Carboxylase Regulates Whole Body Energy Metabolism Through Its Expression In Osteoblasts. *Diabetes.* **61**, (Suppl.1A) 105-LB. 72nd Annual Meeting of the American Diabetes Association (ADA). Philadelphia, USA, June 8-12 2012. **Poster Presentation.**
3. **Ferron, M.**, McKee, M.D. Ducy, P. and Karsenty, G. (2011) Intermittent Injection of Osteocalcin Improves Glucose Metabolism and Prevent Type 2 Diabetes in Mice. *J. Bone Miner. Res.* **26**, (Suppl.1) SA0209. 33rd Annual Meeting of the American Society for Bone and Mineral Research (ASBMR). San Diego, USA, September 16-20, 2011. **Oral and Plenary Poster Presentation.**
4. **Ferron, M.** and Karsenty G. Regulation of Glucose Metabolism by Bones. Advances in Mineral Metabolism Meeting, Snowmass, CO, USA, April 2011. **AIMM/ASBMR John Haddad Young Investigator Award. Oral presentation.**
5. **Ferron, M.** and Karsenty G. γ -glutamyl carboxylase regulates energy metabolism through its expression in osteoblasts. Mouse Development, Genetics & Genomics Meeting. Cold Spring Harbor Laboratory, USA, October 2010. **Oral presentation.**
6. **Ferron, M.**, Wei, J., Yoshizawa, T., Ducy, P. and Karsenty, G. (2010) Insulin Signaling in Osteoblasts is a Positive Regulator of Bone Resorption. *J. Bone Miner. Res.* **25**, (Suppl.1) SA0235. 32nd Annual Meeting of the American Society for Bone and Mineral Research (ASBMR). Toronto, Canada, October 2010. **Plenary Poster Presentation.**
7. **Ferron, M.**, Karsenty, G. and Ducy, P. Intermittent Injection of Recombinant Osteocalcin Improves Glucose Tolerance and Insulin Sensitivity. American Society for Bone and Mineral Research, Frontiers in Skeletal Research, Bone, Fat and Brain Connections, Bethesda, MD, USA, April 2009. **ASBMR Young Investigator Award. Poster presentation.**
8. **Ferron, M.**, Karsenty, G. and Ducy, P. Intermittent Injection of Recombinant Osteocalcin Improves Glucose Tolerance and Insulin Sensitivity. *J Bone Miner Res.* **23**, (Suppl 1) S168. 30th Annual Meeting of the American Society for Bone and Mineral Research (ASBMR). Montreal, Canada, September 2008. **Plenary Poster Presentation.**
9. **Ferron, M.**, Pata, M. and Vacher, J. Role of Inositol Polyphosphate 4-Phosphatase Type II in Osteoclast Cytoskeletal Organization and Activity. *Calcified tissue int.* **74**, S1, 34. 31st European

Calcified Tissue Society Meeting, Nice, France, June 2004. **ECTS Young Investigator Award. Oral Presentation.**

10. **Ferron, M.** and Vacher, J. The Inositol Polyphosphate 4-Phosphatase B Is Down-Regulated In The Osteopetrotic Grey Lethal Mutant Mouse. *Exp. Hematology*. **30**, S1, 79. 31st International Society for Experimental Hematology annual meeting, Montreal, Canada, July 2002. **Oral presentation.**
11. **Ferron, M.**, Bernard, H., and Vacher, J. (1999) Molecular characterization of *glas1*, a novel gene implicated in osteoclast differentiation. 13th International Mouse Genome Conference, Philadelphia, PA, USA, November 1999. **Poster presentation.**