

## Fundamental research : physiological and pathological functions of proteins encoded in non-canonical open reading frames

**Vanderperre laboratory, for the functional study of alternative proteins**  
Centre d'excellence de recherche sur les maladies orphelines – Fondation Courtois  
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**Our research :** Our laboratory is interested in a largely under-studied portion of the eukaryotic proteome : alternative proteins. The current dogma of eukaryotic gene expression states that only one protein is encoded in each mature mRNA. However, we demonstrated that in addition to this “reference protein”, many mRNAs allow the expression of one or several additional distinct proteins, by the use of alternative open reading frames during translation. In addition, a significant proportion of so-called long “non-coding” RNAs are translated into proteins. These sources of non-canonical proteins increase the complexity of eukaryotic proteomes considerably. Nevertheless, the vast majority of these alternative proteins have never been studied before, and their functional characterization opens a whole new field of research.

What are the functions of these new proteins at the molecular, cellular and whole organism levels in various contexts ? How does this multi-coding potential of eukaryotic genes affect our understanding of their physiological and pathological functions ? What are the relationships between the distinct proteins encoded in the same gene ? To answer these questions, we combine genetic engineering, functional genomics (genome wide CRISPR/Cas9 screening, transcriptomics, proteomics), and biochemical approaches, in cultured cells and model organisms (mice, worm). Our discoveries generate new knowledge in molecular genetics and could pave the way for innovative therapeutic strategies for various diseases.

**Our need :** We are looking for a PhD student and a postdoctoral researcher to characterize new alternative proteins, using candidate gene or genome scale approaches, mainly using cultured cells and/or mice. The research project will require the use of a large panel of state-of-the-art techniques in molecular and cellular biology, as well as “omics” approaches.

**Pre-requisites :** Experience in a relevant field with first-author publications, and a strong interest in taking up challenges associated with a new research field. Expertise in molecular biology, cellular biology and/or genomics is an asset. The selected individuals will be independent, proficient in teamwork, and proactive. Our lab promotes equity, diversity and inclusion: all profiles will be considered.

**Workplace :** The laboratory is located in the Pavillon des Sciences Biologiques of UQAM, in downtown Montreal, a city renowned for its quality of life. Recently integrated in the Biological Sciences department and affiliated with CERMO-FC, our new laboratory has privileged access to many state-of-the-art facilities and promotes local, national and international collaborations. The work spirit is respectful and dynamic.

**How to apply ?** By email at [vanderperre.benoit@uqam.ca](mailto:vanderperre.benoit@uqam.ca). The full application must contain your complete CV, academic transcripts, a motivation letter and the name and email of two references.

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### **Selected publications :**

- Vanderperre B, Lucier JF, Bissonnette C, Motard J, Tremblay G, Vanderperre S, Wisztorski M, Salzet M, Boisvert FM, Roucou X. *Direct detection of alternative open reading frames translation products in human significantly expands the proteome.* [PLoS One](#). 2013 Aug 12;8(8):e70698.
- Vanderperre B, Herzig S, Krznar P, Hörl M, Ammar Z, Montessuit S, Pierredon S, Zamboni N, Martinou JC. *Embryonic Lethality of Mitochondrial Pyruvate Carrier 1 Deficient Mouse Can Be Rescued by a Ketogenic Diet.* [PLoS Genetics](#). 2016 May 13;12(5):e1006056.
- Vanderperre B, Cermakova K, Escoffier J, Kaba M, Bender T, Nef S, Martinou JC. *MPC1-like Is a Placental Mammal-specific Mitochondrial Pyruvate Carrier Subunit Expressed in Postmeiotic Male Germ Cells.* [Journal of Biological Chemistry](#). 2016 Aug 5;291(32):16448-61.
- Samandi S, Roy AV, Delcourt V, Lucier JF, Gagnon J, Beaudoin MC, Vanderperre B, Breton MA, Motard J, Jacques JF, Brunelle M, Gagnon-Arsenault I, Fournier I, Ouangraoua A, Hunting DJ, Cohen AA, Landry CR, Scott MS, Roucou X. *Deep transcriptome annotation enables the discovery and functional characterization of cryptic small proteins.* [Elife](#). 2017 Oct 30;6:e27860.