

# LAURENT CHATEL-CHAIX

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## Training and Academic Employment

2016-...: **Assistant Professor**: Institut National de la Recherche Scientifique, Institut Armand-Frappier, Laval, Québec, Canada.

2013-2016: **Post-doctoral Researcher**: University of Heidelberg, Department of Infectious diseases (Molecular Virology), Heidelberg, Germany.  
 Laboratory of **Prof. Ralf Bartenschlager (Recipient of the 2016 Lasker Award)**

2007-2012: **Post-doctoral Researcher**: Institute for Research in Immunology and Cancer, Montréal, Canada  
 Laboratory of **Prof. Daniel Lamarre**

In the context of my postdoctoral training, I was the **HCV Biology Group Leader** for **IRICoR** (Montréal, Canada) of the anti-HCV drug development program in 2010-2011.

2000-2007: **Ph.D. of Biochemistry**, Dept. of Biochemistry, University of Montréal, Montréal, Canada.  
 Supervisors: **Profs. Luc DesGroseillers and Andrew J. Mouland** (McGill University)  
 Thesis title: Study of the host protein Staufen1 role during human immunodeficiency virus type 1 life cycle.

1999-2000: **Master of Cellular Biology and Physiology**, Joseph Fourier University, Grenoble, France.  
 This diploma has been prepared at the University of Montréal in exchange with Joseph Fourier University (CREPUQ program), including a 4-month-training in Prof. Léa Brakier-Gingras' laboratory (University of Montréal).

1998-1999: **Licence of Cellular Biology and Physiology**, Joseph Fourier University, Grenoble, France.  
 Included a 1-month training in Prof. Alain Jacquemin-Sablon's laboratory (Institut Gustave Roussy, France)

1995-1998: **Diploma of General Academic Studies (D.E.U.G) of Cellular Biology and Physiology**, Joseph Fourier University, Grenoble, France.

1994-1995: **Scientific Baccalauréat**, Lycée Berthollet, Annecy, France.

## Grants

2018-2019: **Infrastructure funds for early-career professors from the Armand-Frappier Foundation (Antiviral funds) and the Institut National de la Recherche Scientifique (INRS); 213,519\$**

Title: The modulation of mitochondrial activity by dengue and Zika viruses as a novel antiviral target.

NB: This grant is strictly dedicated to the acquisition of equipment including a 50% contribution for the Seahorse XFe96 analyzer (Agilent)

2017-2022: **“Project” grant from the Canadian Institutes of Health Research (CIHR); 587,275\$**

Title: Functional and morphological remodeling of mitochondria and associated endoplasmic reticulum by flaviviruses

2017-2018: **Bhagirath Singh Early Career Award in Infection and Immunity from the CIHR; 25,000\$**

2017-2019: **“Établissement de nouveaux chercheurs universitaires” from Fonds de Recherche Nature et Technologies du Québec (FRQNT) ; 86,008\$**

Title: Identification et dissection moléculaire de nouveaux facteurs viraux et cellulaires impliqués dans le contrôle spatio-temporel du métabolisme de l'ARN des *Flaviviridae*

2016-2021: **“Discovery” grant from the Natural Sciences and Engineering Research Council of Canada (NSERC); 155,000\$**

Title: Identification and molecular dissection of novel host and viral factors for the spatiotemporal control of *Flaviviridae* RNA metabolism

2016-2020: **Start-up funds from INRS-Institut Armand-Frappier; 168,000\$**

2011-2014: **Operating grant from the Canadian Institutes of Health Research (CIHR); 338,840\$**

Title: Molecular dissection of HCV life cycle through the study of virus/host interactome

Granted to LCC as co-investigator with Prof. Daniel Lamarre.

## Fellowships and Awards

2017: **Bhagirath Singh Early Career Award in Infection and Immunity** for the highest ranked new investigator in the field of infection and immunity in the 2016 Project Grant competition of the **Canadian Institutes of Health Research**. It comes with 25,000\$ included in my CIHR Project grant.

2010: **Travel award** (registration fees exemption) by the organizing committee of the 17<sup>th</sup> International Meeting on Hepatitis C Virus and Related Viruses (Yokohama, Japan)

2009: **Award for the best postdoctoral oral presentation**; 11<sup>ème</sup> Journée Scientifique des Étudiants et Stagiaires du Centre de Recherche du CHUM (Montréal, Canada).

2007-2008: **Michel-Saucier post-doctoral fellowship** by the Canadian Louis Pasteur Foundation and Michel Saucier.

2003: **Simon-Pierre Noël Award for the best oral presentation** of the Simon-Pierre Noël Day (Annual presentation competition of the Biochemistry Department, University of Montréal)

2002-2005: **Excellence doctorate fellowship** obtained annually (Faculty of Graduate Studies, University of Montréal)

1999-2000: Rhône-Alpes region fellowship for university exchange outside France (BRFE).

## Scientific Community Activities

2018/05: **Reviewing committee member (VVP panel) for the Winter 2018 CIHR Project grants competition**

2018/05: Organization of the **BioMed-Pharmaqam Joint Symposium on Biomedical and Biopharmaceutical research**

2017-2020: **Member of the College of Reviewers of the CIHR**

2017-...: 3-hour lecture about flaviviruses for the BSc of microbiology and immunology of Université de Montréal (MCB3094). Involves the preparation/correction of an exam.

2017-...: Selection committee member for MSc fellowships of the Armand-Frappier Foundation.

2017/06: Jury member for the poster awards of the annual Journée de la Recherche of the research center of Hôpital Maisonneuve-Rosemont.

2017/05: Lecture to graduate students of Institut Armand-Frappier about to improve abstract writing for conferences.

2017/04: **Chair** of the grant review committee for the 2017 Research Program for College Researchers of the **Fonds de Recherche du Québec-Nature et Technologies** (FRQNT)

2016-...: Evaluator of MSc-PhD seminars, INRS-Institute Armand Frappier. Once/twice per semester, I evaluate the graduate students during their annual public seminar in which they present their research project.

2017/03: External reviewer for the New Initiative Grant Program of the centre de recherche en infectiologie porcine et avicole (CRIPA, Faculty of veterinary medicine, Université de Montréal).

2017-2018: **External reviewer** for the 2017 and 2018 Discovery grant program of the **Natural Sciences and Engineering Research Council of Canada (NSERC)**.

2016-...: 3-hour lecture about flaviviruses for the Master of virology and immunology of INRS (VIM6012). Involves the preparation/correction of an exam, correcting grant proposals and evaluation of oral presentations.

Fall 2016: 3-hour lecture for the Master of Experimental Medicine of McGill University about emerging viruses (EXMD632). Also involves the preparation and the correction of an exam.

## Supervision activities

2018/02-2018/06: Mrs. Aïssatou Aïcha Sow, internship

2018/01-2018/04: Mr. Behnam Azadi, internship

2018/01-...: Mrs. Anaïs Anton, MSc student (in progress)

2017/05-...: Mr. Wesley Freppel, PhD student (in progress)  
 2017/05-...: Mr. Clément Mazeaud, PhD student (in progress)  
 2017/05-2017/08: Mrs. Anaïs Anton, BSc internship  
 2017/03-2017/04: Mr. Wesley Freppel, internship  
 2017/02-2017/04: Mr. Clément Mazeaud, internship

## Publications

- 23- Cortese M, Goellner S, Acosta EG, Neufeldt CJ, Oleksiuk O, Lampe M, Haselmann U, Funaya C, Schieber N, Ronchi P, Schorb M, Pruunsild P, Schwab Y, **Chatel-Chaix L**, Ruggieri A, Bartenschlager R.  
 Ultrastructural Characterization of Zika Virus Replication Factories.  
**Cell Reports** (2017) 18(9):2113-2123.
- 22- **Chatel-Chaix L**.  
 The Remodeling of the Cytoplasm by Dengue Virus.  
**Journal of Bacteriology and Mycology** (2016) 3(5):id1039.
- 21- **Chatel-Chaix L\***, Cortese M, Romero-Brey I, Bender S, Neufeldt CJ, Fischl W, Scaturro P, Schieber N, Schwab Y, Fischer B, Ruggieri A, Bartenschlager R\*.  
 Dengue Virus Perturbs Mitochondrial Morphodynamics to Dampen Innate Immune Responses.  
**Cell Host & Microbe** (2016) 20(3):342-56 (\* **Co-corresponding authors**)
- 20- Tremblay N, Baril M, **Chatel-Chaix L**, Es-Saad S, Park AY, Koenekoop RK, Lamarre D.  
 Spliceosome SNRNP200 Promotes Viral RNA Sensing and IRF3 Activation of Antiviral Response.  
**PLoS Pathogens** (2016) 12(7):e1005772.
- 19- Scaturro P, Cortese M, **Chatel-Chaix L**, Fischl W, Bartenschlager R.  
 Dengue Virus Non-structural Protein 1 Modulates Infectious Particle Production via Interaction with the Structural Proteins.  
**PLoS Pathogens** (2015) 11(11):e1005277.
- 18- **Chatel-Chaix L\***, Fischl W\*, Scaturro P, Cortese M, Kallis S, Bartenschlager M, Fischer B, Bartenschlager R.  
 A Combined Genetic-Proteomic Approach Identifies Residues within Dengue Virus NS4B Critical for Interaction with NS3 and Viral Replication.  
**Journal of Virology** (2015) 89(14): 7170-86. (\* *Equal contributions*)
- 17- Metz P, Chiramel A, **Chatel-Chaix L**, Alvisi G, Bankhead P, Mora-Rodríguez R, Long G, Hamacher-Brady A, Brady NR, Bartenschlager R.  
 Dengue virus inhibition of autophagic flux and dependency of viral replication on proteasomal degradation of the autophagy receptor p62.  
**Journal of Virology** (2015) 89(14): 7170-7186.
- 16- **Chatel-Chaix L**, Bartenschlager R.  
 A monocytic detour to replicate patient-derived hepatitis C virus in hepatoma cells and its use for phenotypic analyses. **Hepatology**. (2015) 61(4):1112-4. (*Editorial*)
- 15- **Chatel-Chaix L**, Bartenschlager R.  
 Dengue virus- and hepatitis C virus-induced replication and assembly compartments: the enemy inside: Caught in the web.  
**Journal of Virology** (2014) 88(11):5907-11. (*Review*)
- 14- Germain MA, **Chatel-Chaix L**, Gagné B, Bonneil É, Thibault P, Pradezynski F, de Chasse B, Meyniel-Schicklin L, Lotteau V, Baril M, Lamarre D.  
 Elucidating novel hepatitis C virus-host interactions using combined mass spectrometry and functional genomics approaches.  
**Molecular and Cellular Proteomics** (2014) 13(1):184-203.
- 13- **Chatel-Chaix L**, Germain MA, Motorina A, Bonneil É, Thibault P, Baril M, Lamarre D.  
 A host YB-1 ribonucleoprotein complex is hijacked by hepatitis C virus for the control of NS3-dependent particle production.  
**Journal of Virology** (2013) 87(21):11704-20.
- 12- Baril M, Es-Saad S, **Chatel-Chaix L**, Fink K, Pham T, Raymond VA, Audette K, Guenier AS, Duchaine J, Servant M, Bilodeau M, Cohen E, Grandvaux N, Lamarre D.  
 Genome-wide RNAi screen reveals a new role of a WNT/CTNNB1 signaling pathway as negative regulator of virus-induced innate immune responses.

**PLoS Pathogens** (2013) 9(6):e1003416.

11- **Chatel-Chaix L**, Germain MA, Götte M, Lamarre D.

Direct-acting and host-targeting HCV inhibitors: current and future directions.

**Current Opinion in Virology** (2012) Oct;2(5):588-98. (Review)

10- Jouan L, **Chatel-Chaix L**, Melançon P, Rodrigue-Gervais IG, Raymond VA, Selliah S, Bilodeau M, Grandvaux N, Lamarre D.

Targeted impairment of innate antiviral response in liver of chronic hepatitis C patients.

**Journal of Hepatology** (2012), 56(1), 70-7

9- **Chatel-Chaix L**, Melançon P, Racine ME, Baril M, Lamarre D.

Y-box-binding protein-1 associates with hepatitis C virus NS3/4A and influences the equilibrium between viral RNA replication and infectious particle production.

**Journal of Virology** (2011), 85(21), 11022-37

8- **Chatel-Chaix L\***, Baril M\*, Lamarre D.

Pharmacology and mechanisms of action of antiviral drugs: Protease inhibitors.

**Advanced Therapy for Hepatitis C** (2011), 53-59 (Book chapter)(\* Equal contributions)

7- **Chatel-Chaix L\***, Baril M\*, Lamarre D.

Hepatitis C virus NS3/4A protease inhibitors: A light at the end of the tunnel.

**Viruses** (2010), 2(8), 1752-1765 (Review)(\* Equal contributions)

6- Abrahamyan LG, **Chatel-Chaix L**, Ajamian L, Milev MP, Monette A, Clément JF, Song R, Lehmann M, DesGroseillers L, Laughrea M, Boccaccio G, Mouland AJ.

Novel Staufen1 ribonucleoproteins prevent formation of stress granules but favour encapsidation of HIV-1 genomic RNA.

**Journal of Cell Science** (2010) 123(Pt3), 369-383

5- **Chatel-Chaix L**, Boulay K, Mouland AJ, DesGroseillers L.

The host protein Staufen1 interacts with the pr55Gag zinc fingers and regulates HIV-1 assembly via its N-terminus.

**Retrovirology** (2008) 5, 41

4- **Chatel-Chaix L**, Abrahamyan L, Fréchina C, Mouland AJ, DesGroseillers L.

The host protein Staufen1 participates in HIV-1 assembly in live cells by influencing pr55<sup>Gag</sup> multimerization.

**Journal of Virology** (2007) 81, 6216-6230

3- Levesque K, Halvorsen M, Abrahamyan L, **Chatel-Chaix L**, Poupon V, Gordon H, DesGroseillers L, Gatignol A, Mouland AJ.

Trafficking of HIV-1 RNA is mediated by heterogeneous nuclear ribonucleoprotein A2 expression and impacts on viral assembly.

**Traffic** (2006) 7, 1177-1193

2- Dugre-Brisson S, Elvira G, Boulay K, **Chatel-Chaix L**, Mouland AJ, DesGroseillers L.

Interaction of Staufen1 with the 5' end of mRNA facilitates translation of these RNAs.

**Nucleic Acids Research** (2005) 33, 4797-4812.

1- **Chatel-Chaix L**, Clement JF, Martel C, Beriault V, Gatignol A, DesGroseillers L, Mouland AJ.

Identification of Staufen in the human immunodeficiency virus type 1 Gag ribonucleoprotein complex and a role in generating infectious viral particles.

**Molecular and Cellular Biology** (2004) 24, 2637-2648.

## Invited Seminars and Selected Communications

Morphological and functional remodeling of the cytoplasm by flaviviruses.

Invited to the **TRR179 International Hepatitis Symposium/Ralf Bartenschlager's 60<sup>th</sup> Birthday Symposium**, Heidelberg, Germany, 2018 May 16-18<sup>th</sup>.

Freppel W, Anton A, Mazeaud C, **Chatel-Chaix L**.

Zika virus protein NS4B modulates mitochondrial morphodynamics during the infection.

**Keystone Symposium on Mitochondrial Biology**, Kyoto, Japan, 2018 April 22-26<sup>th</sup>. (Poster presentation)

Mazeaud C, Freppel W, Anton A, **Chatel-Chaix L**.

The interplay between Zika virus and host valosin-containing protein (VCP/p97).

**Viruses 2018-Breakthroughs in Viral Replication**, Barcelona, Spain, 2018 Feb 7-9<sup>th</sup>. (Poster presentation)

Morphological and functional remodeling of the cytoplasm by flaviviruses.

Invited to give a seminar by the **Centre de Recherche du Centre Hospitalier de l'Université de Montréal (CR-CHUM)**, Montréal, Canada, 2017 Oct 20<sup>th</sup>.

Le remodelage morphologique et fonctionnel du cytoplasme par les virus de la dengue et Zika

**Colloque Interactions hôtes-agents pathogènes**, INRS-Institut Armand-Frappier, 2017 Oct 16-17<sup>th</sup>.

Le remodelage morphologique et fonctionnel du cytoplasme par les flavivirus.

Invited to give a seminar by the **Centre de recherche BioMed**, Université du Québec à Montréal, Montréal, Canada, 2017 Sept 26<sup>th</sup>.

Virus-host interactions during the infection by dengue and Zika viruses.

**7<sup>th</sup> New Investigator Forum of the institute of infection and immunity from the Canadian Institutes of Health Research**, Lac Delage, Canada, 2017 May 26-28<sup>th</sup>. (Poster presentation)

Le remodelage morphologique et fonctionnel du cytoplasme par les virus de la dengue et Zika.

**85<sup>th</sup> Symposium of the Association Francophone pour le Savoir (ACFAS)**, Montréal, Canada, 2017 May 12<sup>th</sup>.

Host organelle remodeling as a flaviviral countermeasure against innate immunity.

Invited to give a seminar at the Monthly **Montréal Immunology Meetings (MIM)**, Montréal, Canada, 2017 March 27<sup>th</sup>.

Morphological and functional remodeling of the cytoplasm by flaviviruses.

Invited to give a seminar at the **Paul-Ehrlich Institut**, Langen, Germany, 2017 February 17<sup>th</sup>.

Remodelage morphologique et fonctionnel du cytoplasme par le virus de la dengue.

**Invited to give a seminar by the Faculté de Médecine Vétérinaire, Université de Montréal**, Saint-Hyacinthe, Canada, 2017 January 25<sup>th</sup>.

Morphological and functional remodeling of the cytoplasm by dengue virus.

**Invited to give a seminar by the Department of Microbiology & Immunology, McGill University**, Montréal, Canada, 2016 October 13<sup>th</sup>.

**Chatel-Chaix L**, Cortese M, Romero-Brey I, Bender S, Fischl W, Scaturro P, Schieber N, Fischer B, Ruggieri A, Bartenschlager R.

Dengue virus manipulates mitochondrial morphodynamics through inhibition of DRP1 to dampen innate immune response.

**Positive-strand RNA viruses Keystone symposium**, Austin, USA, 2016 May 1-5<sup>th</sup>. (Poster presentation)

Remodelage morphologique et fonctionnel du cytoplasme par le virus de la Dengue au profit de la réplication virale.

**Invited to give a seminar by the Institut Armand Frappier/INRS, Laval**, Canada, 2015 July 8<sup>th</sup>.

**Chatel-Chaix L**, Fischl W, Cortese M, Romero-Brey I, Scaturro P, Fischer B, Bartenschlager R.

Dengue virus NS4B influences mitochondria morphology through inhibition of DRP1 for the benefit of viral replication.

**SFB638 international symposium on macromolecular complexes and biosynthetic transport**, Heidelberg, Germany, 2014 Oct 6-7<sup>th</sup> (Poster presentation)

**Chatel-Chaix L**, Germain MA, Motorina A, Bonneil É, Thibault P, Lamarre D.

Evidence of an HCV-induced ribonucleoparticle that modulates virus replication and particle production.

**19<sup>th</sup> international symposium on hepatitis C virus and related viruses**, Venice, Italy, 2012 Oct.5-9<sup>th</sup>. (Poster presentation)

The hijacking of host RNA-binding proteins during hepatitis C virus life cycle.

**Invited to give a seminar by the Molecular Virology Department of the University of Heidelberg**, Heidelberg, Germany, 2012 July 27<sup>th</sup>.

**Chatel-Chaix L**, Germain MA, Motorina A, Bonneil É, Thibault P, Lamarre D.

Y-box-binding protein-1-containing ribonucleoparticle hijacking during hepatitis C virus life cycle.

**1<sup>st</sup> Canadian Symposium on Hepatitis C Virus**, Montréal, Canada, 2012 Feb. 23<sup>th</sup>. (Oral presentation)

**Chatel-Chaix L**, Melançon P, Bonneil É, Racine MÈ, Baril M, Thibault P, Lamarre, D.

YB-1 ribonucleoparticle remodelling and core-dependent hijacking towards lipid droplets during HCV infection.

**17<sup>th</sup> international symposium on hepatitis C virus and related viruses**, Yokohama, Japan, 2010 Sept.10-14<sup>th</sup>.

(Oral presentation) **N.B.: The abstract of this presentation won a travel award and has been described in the meeting report published by Wakita et al. in Gastroenterology (2011) 141(5), e1-5.**

**Chatel-Chaix L**, Melançon P, Lamarre D.

La protéine YB-1 régule la réplication du virus de l'hépatite C.

**11<sup>ème</sup> congrès annuel des étudiants et stagiaires du CR-CHUM**, Montréal, Canada, 2009 March 19<sup>th</sup>.  
(Oral presentation) **N.B.: This presentation won a 500\$CAN award for the best post-doc presentation.**

**Chatel-Chaix L**, Melançon P, Lamarre D.

The elucidation of NS3/4A proteome reveals a role of Y-box binding protein-1 in HCV life cycle.

**15<sup>th</sup> international symposium on hepatitis C virus and related viruses**, San Antonio, TX, 2008 Oct. 5-9<sup>th</sup>. (Oral presentation) **N.B.: This presentation has been described in the meeting report published by Lanford et al. in *Gastroenterology* (2009) 136 9-16.**

**Chatel-Chaix L**, Fréchina C, Abrahamyan L, Mouland AJ, DesGroseillers L.

The host protein Staufen1 participates in HIV-1 assembly in live cells by influencing pr55<sup>Gag</sup> multimerization.

**American Society for Cell Biology (ASCB) 2006 summer meeting on the cell biology of HIV-1 and other retroviruses**, Atlanta, GA, 2006 July 20-23<sup>d</sup>. (Poster presentation)

**Chatel-Chaix L**, Mouland AJ, DesGroseillers L.

The host protein Staufen participates to the NC-mediated Gag multimerization during HIV-1 assembly in live cells. **5<sup>th</sup> international retroviral NC symposium**, Montréal, 2005 Sept. 18-20<sup>th</sup>. (Poster presentation)

**Chatel-Chaix L**, Martel C, Gagnon A, DesGroseillers L, Mouland AJ.

Staufen specifically interacts with HIV-1 pr55<sup>Gag</sup> *in vivo*: Evidence for an association early in assembly. **28<sup>th</sup> annual retroviruses meeting**, Cold Spring Harbor, USA, 2003 May 20-25<sup>th</sup>. (Poster presentation)

## Patents

Mammalian Staufen and use thereof (2004) Number # US20040241845

Inventors: Luc DesGroseillers, Andrew J. Mouland, **Laurent Chatel-Chaix**, Jean-François Clément