

NAME: Laurence RIS

POSITION TITLE: Full Professor

EDUCATION/TRAINING:

INSTITUTION AND LOCATION	DEGREE (if applicable)	Completion Date MM/YYYY	FIELD OF STUDY
UMONS, Belgium	BA	06/1990	Biology
UMONS, Belgium	MA	06/1994	Biology, Animal Physiology
UMONS, Belgium	PhD	11/1997	Neuroscience
Collège de France, PARIS	Post-doctoral	1998	Neuroscience
UMONS, Belgium	higher education aggregation	12/2002	Neurophysiology
University College London	Post-doctoral	2003	Neuroscience

**A. Personal Statement**

My research group *Neuroscience* is embedded within the Biosciences Research Institute at UMONS (<http://portail.umons.ac.be/en2/universite/facultes/fmp/services/neurosci/pages/default.aspx>). My research focuses on the cellular and molecular mechanisms of synaptic plasticity in the hippocampus in health and disease. Our approach consists of a combination of electrophysiological, molecular and cellular approaches. We develop and apply state-of-the-art electrophysiological techniques in vivo, ex-vivo in acute slices and in vitro in primary and organotypic cultures. We combine this physiological read-out with behavioral measurements, immunohistochemistry and proteome analysis. We worked on normal mice and on animal models of disease, such as Alzheimer's disease and auto-immune diseases.

**B. Positions and Honors**

***Positions and Employment***

<b>1998-2003</b>	<b>Postdoctoral fellow F.R.S.-FNRS</b>
2003-2007	Research Associate F.R.S.-FNRS, laboratory of Neuroscience, UMONS
2007-2011	Senior Research Associate, laboratory of Neuroscience, UMONS
2011-2015	Lecturer, UMONS
Since 2015	Full Professor, UMONS
Since 2012	Head of the Research Group 'Neurosciences', UMONS
Since 2014	Vice-dean of the Faculty of Medicine and Pharmacy

***Professional Experiences:***

Scientific Societies:

- President of the Belgian Society for Neuroscience 2015-2017
- Member of the board of the European Federation of Neuroscience Societies (FENS)
- Member of the board of the Neuroscience Doctoral School
- Member of Expert Panels : Agence Nationale Française pour la Recherche (ANR)
- Fondation Médicale Reine Élisabeth
- Fondation Désiré Jaumain
- Fonds National de la Recherche Scientifique F.R.S.-FNRS
- Fondation Recherche Alzheimer Belgique – SAO/FRA
- Ad hoc reviewer for Journal of Psychiatry and Neurosciences; Neurobiology of Aging; Journal of Neuroscience Methods; Acta Neurologica Belgica; Neuropharmacology; Brain and behaviour...

### Memberships

- American Society for Neuroscience; American Physiological Society; Federation of European Neurosciences; Belgian Society of Physiology and Pharmacology; Belgian Society for Neuroscience.

### Honors

- PhD, Greatest Distinction (maxima cum laude) and felicitations of the Jury, November 1997.
- WBI travel grant - 1998
- UK research Council Travel Grant - 2003

### Supervision of students/junior scientists

I have trained more than 20 MSc students, about 10 PhD students. Currently I am mentoring 6 PhD and 2 postdoctoral students.

### Teaching activities:

- Bachelor level: General Neurophysiology; Systems Neurophysiology; Physiology; Neurobiology; Faculty of Medicine and Pharmacy and Faculty of Sciences.
- Master level: Neurobiology of Ionic channels; Neuroscience internship.
- Creation of a Master specialized in Neuroscience

### Experience with managing medium-sized research infrastructures

- Founder and president of the interfaculty research center of electrophysiology (CiPsE) of UMONS

### Contribution to value: Development activities

- Co-promotor of two Strategic Basic Research Projects : 'Confocal microscopy' and 'Mass Spectrometry'
- Coordinator of a development cooperation project in RD Congo (3 Belgian universities, one RDC university, 5 PhD)

## **C. Contributions to Science – Selection of 10 publications**

My scientific output consists of 53 research papers in peer-reviewed international journals, many of which in the field of hippocampal synaptic plasticity and Alzheimer's disease. Citations (Google Scholar): 1995, h-index (March 2019): 24. See complete publication list provided at:

<http://staff.umons.ac.be/laurence.ris/pubsen.html>

- 1) During my PhD thesis and my first post-doctoral stay in the laboratory of prof. Vidal at Collège de France, Paris, I worked on neuronal plasticity in the brainstem using the model of vestibular compensation. Between 1995 and 2003, 14 research papers have been published. The methodologies used was in vivo electrophysiology in awake animals and in vitro intracellular recording in acute brainstem slices. I showed that vestibular neurons were able to recover a spontaneous normal electrical activity after the lesion of the ipsilateral vestibular system. Then intracellular recordings allowed us to study the membrane properties of these neurons which are able to respond without any adaptation to very high velocity stimulation.

**10. Neuronal activity in the ipsilateral vestibular nucleus following unilateral labyrinthectomy in the alert guinea pig.** **Ris L, de Waele C, Serafin M, Vidal PP, Godaux E. J Neurophysiol. 1995 Nov;74(5):2087-99. 168 citations**

**9. Neuronal activity in the vestibular nuclei after contralateral or bilateral labyrinthectomy in the alert guinea pig.** **Ris L, Godaux E. J Neurophysiol. 1998 Nov;80(5):2352-67. 137 citations**

2) During my second post-doctoral stay in the laboratory of Prof. Giese at the King's College of London, I started working on synaptic plasticity in the hippocampus and on the role of alpha-CaMKII and p25 protein. During this period, I develop expertise in molecular biology, biochemistry and animal behavior analysis. 8 research papers were published in collaboration with K.P. Giese. We showed that the role these proteins was dependent on the sex on the animal and that the molecular mechanisms underlying memory consolidation and synaptic plasticity were different male and female mice. We also showed that in the absence of CaMKII, a protein known to be strongly related to long-term potentiation, different forms of synaptic plasticity could occur in the hippocampus.

**8. Sexual dimorphisms in the effect of low-level p25 expression on synaptic plasticity and memory.** **Ris L, Angelo M, Plattner F, Capron B, Errington ML, Bliss TV, Godaux E, Giese KP.** *Eur J Neurosci.* 2005 Jun;21(11):3023-33. 46 citations

**7. Loss of Ca<sup>2+</sup>/calmodulin kinase kinase beta affects the formation of some, but not all, types of hippocampus-dependent long-term memory.** **Peters M, Mizuno K, Ris L, Angelo M, Godaux E, Giese KP.** *J Neurosci.* 2003 Oct 29;23(30):9752-60. 81 citations

3) In the laboratory of neuroscience of the University of Mons, I developed in vitro extracellular and intracellular recording in hippocampal acute slices. The aim of my research was to study the role of protein synthesis in synaptic plasticity and more precisely in long-term potentiation. We demonstrated that it was possible to induce and maintain long-term plasticity in vitro while inhibiting protein synthesis suggesting that receptor trafficking in and out the membrane could be induced without the synthesis a new synaptic-related proteins. We also demonstrated thanks to proteomic studies that learning and memory was dependent on protein regulation in oligodendrocytes (submitted paper).

**6. Long-lasting LTP requires neither repeated trains for its induction nor protein synthesis for its development.** **Villers A, Godaux E, Ris L.** *PLoS One.* 2012;7(7):e40823. doi: 10.1371/journal.pone.0040823. 33 citations

**5. Synapse specificity of long-term potentiation breaks down with aging.** **Ris L, Godaux E.** *Learn Mem.* 2007 Mar 8;14(3):185-9. 25 citations

4) The expertise developed in MONS was applied to the study of synaptic plasticity in different pathologies such as Alzheimer's disease. ABeta toxicity was evaluated in different rodent models of AD in collaboration with the laboratory of Prof. Van Leuven at KULeuven. Then more recently we focused on Tau aggregation and on the mechanisms of its propagation. We demonstrated the role of prion-like seeding in the propagation of Tau pathology in mice and the interactions between amyloid and tau pathologies. We developed for these studies the organotypic slices preparation and the techniques allowing the study of long-term potentiation in this preparation.

**4. Templated misfolding of Tau by prion-like seeding along neuronal connections impairs neuronal network function and associated behavioral outcomes in Tau transgenic mice.** **Stancu IC, Vasconcelos B, Ris L, Wang P, Villers A, Peeraer E, Buist A, Terwel D, Baatsen P, Oyelami T, Pierrot N, Casteels C, Bormans G, Kienlen-Campard P, Octave JN, Moechars D, Dewachter I.** *Acta Neuropathol.* 2015 Jun;129(6):875-94. doi: 10.1007/s00401-015-1413-4. 55 citations

3. *Tauopathy contributes to synaptic and cognitive deficits in a murine model for Alzheimer's disease.* Stancu IC, **Ris L**, Vasconcelos B, Marinangeli C, Goeminne L, Laporte V, Haylani LE, Couturier J, Schakman O, Gailly P, Pierrot N, Kienlen-Campard P, Octave JN, Dewachter I. *FASEB J.* 2014 Jun;28(6):2620-31. doi: 10.1096/fj.13-246702. 24 citations
2. *Neuronal deficiency of presenilin 1 inhibits amyloid plaque formation and corrects hippocampal long-term potentiation but not a cognitive defect of amyloid precursor protein [V717I] transgenic mice.* Dewachter I, Reversé D, Caluwaerts N, **Ris L**, Kuipéri C, Van den Haute C, Spittaels K, Umans L, Serneels L, Thiry E, Moechars D, Mercken M, Godaux E, Van Leuven F. *J Neurosci.* 2002 May 1;22(9):3445-53. 240 citations
1. *Mutant presenilins disturb neuronal calcium homeostasis in the brain of transgenic mice, decreasing the threshold for excitotoxicity and facilitating long-term potentiation.* Schneider I, Reverse D, Dewachter I, **Ris L**, Caluwaerts N, Kuiperi C, Gilis M, Geerts H, Kretzschmar H, Godaux E, Moechars D, Van Leuven F, Herms J. *J Biol Chem.* 2001 Apr 13;276(15):11539-44. 130 citations

#### D. Research Support

##### Research Support (past 3 years)

- ERANET Neuron: 2019-2021 (792.800 euros) Role: PI  
*UNveiling the MEchanism(s) of antidepressant-Induced mania: The role of glutamate*
- Win2Wal : 2019-2022 (1198457 euros) Role: PI  
*Développement d'un essai basé sur une nouvelle cible, Prdm12, pour le développement de nouvelles approches thérapeutiques de la douleur chronique*
- Belgian Alzheimer Foundation : 2018-2019 (150000 euros) Role: PI  
*Trace amine associate receptor 1 (TAAR1) as a new target for the treatment of cognitive dysfunction in Alzheimer disease.*  
Goal: This project proposed to study the potential beneficial role of TAAR-1 receptor activation in the development of Alzheimer's disease.
- FNRS: 2016 -2017 (48.000 euros) Role: PI  
*Study of the relationship linking glucose metabolism to Amyloid Protein Precursor expression*  
Goal: The aim of this project was to evaluate the brain metabolism of mice depending of the level of expression of the precursor of amyloid peptide (APP).
- Belgian Alzheimer Foundation: 2016-2017 (150000 euros) Role: PI  
*Study of the relationship linking glucose metabolism to Amyloid Protein Precursor expression and processing.*  
Goal: This project proposed to use electrophysiology and metabolomics to analyze the role of APP in the homeostasis of the principal neurotransmitters in relation to glucose metabolism.
- Ares-CCD: 2016-2017 and 2018-2022 (680000 euros) Role: PI  
*Renforcement de la capacité opérationnelle et de la formation en neuropsychiatrie par l'étude des effets neurotoxiques de métaux dans la région minière du Katanga*  
Goal: The goal of this development cooperation project was to study the impact of heavy metals on nervous system in the mining area of RDC.
- Charcot Foundation: 2017-2018 (25000 euros) Role: Promotor  
*Etude des effets de la neuroinflammation développée au cours de l'EAE sur la plasticité synaptique de l'hippocampe et la cognition*  
Goal: The aim of this research was to better understand the role of neuroinflammation in the development of cognitive impairment in multiple sclerosis.
- Extraordinary budget UMONS: 2015-2017 (125000 euros)  
Acquisition of a complete EEG system (128 channels) with physiological measures in collaboration with the Faculty of Psychology
- FNRS – PhD 2013-2017 Role: Promotor

*Study of the ambivalent role of the amyloid precursor protein (APP) in the regulation of the glucose metabolism in transgenic mice*

- FNRS – PhD 2014-2018 Role: Promotor

*Study of the role of neuroinflammation in synaptic plasticity of the hippocampus*

- FNRS – PhD 2015-2019 Role: Promotor

*Study of intra- and extracellular traffic of phosphorylated and nonphosphorylated monomeric Tau protein within cortical cultures and synaptic toxicity associated.*

- FNRS – PhD 2015-2019 Role: Promotor

*Evaluation of the in vitro and in vivo effects of anti-glutamate decarboxylase 65 antibodies on the hippocampus*

- FNRS – PhD 2018-2021 Role: Promotor

*Study of the role of neuroinflammation in traumatic brain injury*

## **E. Scientific Collaborations**

Guy Cheron, Unit of electrophysiology, UMONS: study of the bidirectional connection between the cerebellum and the hippocampus.

Karl Peter Giese, MRC Centre for Neurodegeneration Research, King's College of London: Study of the role of CaMKII in long-lasting long-term potentiation.

Ruddy Wattiez, Department of Proteomy and Microbiology, UMONS: Study of the role of protein synthesis and phosphorylation in long-term memory and synaptic plasticity.

Ilse Dewachter, Group of Cellular and Molecular Neuroscience – IoNS, University of Leuven: Study of the modifications of synaptic plasticity in Alzheimer's disease.

Cathy Jensen, C4N, Vrij Universiteit Brussel: Study of the role of astrocytes in synaptic plasticity

Sylvain Gabriele, Soft Matter and Mechanobiology group, UMONS: role of the substrate on neuronal function

Denis Nonclercq, Histology, UMONS: Study of the toxicity of nanoparticles in the brain.

Fadel Tissir, Developmental Neurobiology, IoNs, Université catholique de Louvain ([Mol Psychiatry](#). 2017 Dec 19. doi: 10.1038/mp.2017.236.)