Team Synaptic Plasticity and Neural Networks

Inserm UMR1266 Institute of Psychiatry and Neuroscience of Paris; Team Synaptic Plasticity and Neural Networks; Université de Paris; GHU Paris Psychiatrie et Neuroscience

Vivien Chevaleyre
Born January 14th 1973
vivien.chevaleyre@parisdescartes.fr
married, 1 child

Rebecca Ann Piskorowski
Born August 12th 1976
rebecca.piskorowski@parisdescartes.fr
married, 1 child

EDUCATION / SCIENTIFIC TRAINING:

2017-present: Co-team leader, CNRS DR2, Inserm U894, "Synaptic Plasticity and Neuronal Networks" Paris Descartes University
2011-2016: Co-team leader, CNRS CR1, CNRS UMR8118, "Synaptic Plasticity and Neuronal Networks" Paris Descartes University
2008-2010: Research Specialist, Howard Hughes Medical Institute, Columbia University, New York.
2001-2007: Research Associate, Albert Einstein College of Medicine, Bronx, New York.
1998-2001: PhD in Neurophysiology, CNRS UMR 5101, Montpellier.
1997-1998: Post-graduate predoctoral diploma, CNRS UMR 5101, Montpellier.
1997: Master in Cellular Physiology. CNRS UMR 5101, Montpellier.

2017-present: Co-team leader, INSERM CR1, Inserm U894, "Synaptic Plasticity and Neuronal Networks" Paris Descartes University
2012-2016: Co-team leader, INSERM CR1, CNRS UMR8118, "Synaptic Plasticity and Neuronal Networks" Paris Descartes University
2011-2012: Researcher, CNRS UMR8118 "Synaptic Plasticity and Neuronal Networks"
2006-2011: Postdoctoral Fellow, Columbia University Medical Center
2005-2006: Postdoctoral Fellow, University of California at San Francisco
1998-2005: PhD in Biophysics, Stanford University
1994-1998: Bachelors of Science in Honors Biochemistry and Honors Biology, Purdue University.

AWARDS:

2016: CNRS National Competition for Tenured Director of Research Position, DR2.
2011: CNRS National Competition for Tenured Research Position, CR1: ranked 1st.
2004: Outstanding Postdoctoral Research Prize (Albert Einstein College of Medicine, New York City).
2004: Society for Neuroscience Postdoctoral Award.
2004: Postdoctoral fellowship from the Epilepsy Foundation.
2001-03: Posdoctoral fellowship: Einstein Scholar Award (Albert Einstein College of Medicine, New York City).
1998-2001: Doctoral fellowship from Research Ministry.

2012: INSERM National Competition for Tenured Research Position, CR1; Ranked 5th.
2009-2011: Postdoctoral Fellowship: National Institute of Health Ruth L. Kirschstein National Research Service Award (NIH F32).
2002-2004: Pre-Doctoral Fellowship: American Heart Association Pre-Doctoral Fellowship
1998: Undergraduate Scholarships and Awards: Phi Beta Kappa, Purdue University
1998: Outstanding Biological Sciences Senior Student Award, Purdue University School of Science
1995-1996: Purdue University School of Science Summer Undergraduate Research Fellowship
1994-1998: Purdue University School of Science Scholarship Recipient
1994: National Merit Finalist

AWARDS AND GRANTS OBTAINED BY THE TEAM:

2021-2024 : Équipes Fondation pour la Recherche Medicale
2018-2022 : L'Agence Nationale de la Recherche Project PlasticAdo (V.C.)
2018-2023 : L'Agence Nationale de la Recherche Project WhoRU (R.P.)
2018: Targeted Charitable donation from Schizo-Oui (For the thesis project of V. Robert)
2017-2019: NARSAD Independent Investigator Grant (R.P.)

2017-2018: Fondation pour la Recherche Medicale, 4th year PhD funding (V. Robert, student of R.P.)
2014: ATIP plus laureate (V.C.)
2013-2017: Laureate Ville de Paris Program *Emergence(s) Recherche medical et santé* (R.P.)
2013-2018: ANR Program JCJC SVSE 4. Project HYPO-HIPPO (R.P.)
2012-2016: ANR Blanc "CA2 Gate" (V.C.)
2010-2013: ATIP laureate (V.C.)

PUBLICATIONS:

Journal Articles:

Robert V, Therreau L, Chevaleyre C, Lepicard E, Viollet C, Cognet J, Huang AJY, Boehringer R, Polygalov D, McHugh T, Piskorowski RA. "Local circuit allowing hypothalamic control of hippocampal area CA2 activity and consequences for CA1." (2021). *eLife*. 2021;10:e63352 doi: 10.7554/eLife.63352

Chen S, He L, Huang AJ, Boehringer R, Robert V, Wintzer M, Polygalov D, Weitemier AZ, Tao Y, Gu M1, Middleton SJ, Namiki K, Hama H, Therreau L, Chevaleyre V, Hioki H, Miyawaki A, Piskorowski RA, McHugh TJ. "A Hypthalamic Novelty Signal Modulates Hippocampal Memory." (2020) *Nature.* 586, 270-274. Doi: 10.1038/s41586-020-2771-1

Lepicard E, RA Piskorowski. "La puissance de calcul des dendrites du cortex cérébral humain." (2020) *mécecine/sciences* no. 6-7, 36:22-24. doi : 10.1051/medsci/2020100.

Robert V, Ludivine T, Davatolhagh MF, Bernardo-Garcia FJ, Clements KN, Chevaleyre V, Piskorowski RA. "The Mechanisms Shaping CA2 Pyramidal Neuron Action Potential Bursting Induced by Muscarinic Acetylcholine Receptor Activation." (2020) *Journal of General Physiology.* 152(4). Apr 6. doi: 10.1085/jgp.201912462.

Domínguez S, Rey CC, Therreau T, Fanton A, Massotte D, Verret L, Piskorowski RA and V Chevaleyre. "Maturation of PNN and ErbB4 signaling in area CA2 during adolescence underlies the emergence of PV interneuron plasticity and social memory." (2019) *Cell Reports*. 2019 Oct 29;29(5):1099-1112.e4. doi: 10.1016/j.celrep.2019.09.044.

Nasrallah K, Therreau L, Robert V, Huang A, McHugh T, Piskorowski* RA and V Chevaleyre*. "Routing hippocampal information flow throught Parvalbumin interneuron plasticity in area CA2." (2019) *Cell Reports*. *27*, 86-98. *Co-last and corresponding author.

Piskorowski RA, Chevaleyre V. "Memory Circuits: CA2" *Curr Opin Neurobiol.* (2018). Apr 26;52:54-59. doi: 10.1016/j.conb.2018.04.015.

Robert V, Cassim S, Chevaleyre V and R Piskorowski. "Hippocampal Area CA2: Properties and Contribution to Hippocampal Function." *Cell and Tissue Research.* (2018). Jan 15. doi: 10.1007/s00441-017-2769-7.

Palacio S, Chevaleyre V, Brann DH, Murray KD, Piskorowski RA and Trimmer JS. (2017) "Heterogeneity in Kv2 Channel Expression Shapes Action Postential Characteristics and Firing Patterns in CA1 versus CA2 Hippocampal Pyramidal Neurons." *eNeuro*, 18 August, 4 (4) (4) ENEURO.0267-17.2017; DOI: https://doi.org/10.1523/ENEURO.0267-17.2017.

Boehringer R, Polygalov D, Huang AJY, Middleton SJ, Robert V, Wintzer ME, Piskorowski RA, Chevaleyre V, and McHugh TJ. (2017) "Chronic loss of CA2 transmission leads to hippocampal hyperexcitability." *Neuron*, May 3;94(3):642-655.e9. doi: 10.1016/j.neuron.2017.04.014.

Nasrallah K, Piskorowski RA, Chevaleyre V. "Bi-directional interplay between proximal and distal inputs to CA2 pyramidal neurons." *Neurobiol Learn Mem.* 2017. Feb; 138:173-181. doi: 10.1016/j.nlm.2016.06.024.

RA Piskorowski, Nasrallah K., Diamantopoulou A., Mukai J, Hassan S.I., Siegelbaum SA, Gogos JA, Chevaleyre V. "Age-dependent specific changes in area CA2 of the hippocampus and social memory deficit in a mouse model of the 22q11.2 deletion syndrome." *Neuron.* 2016. Jan 6;89(1)163-176.

K Nasrallah, Piskorowski RA, Chevaleyre V. "Inhibitory plasticity permits the recruitment of CA2 pyramidal neurons by CA3." *eNeuro.* Jul 2015. DOI: 10.1523/ENEURO.0049-15.2015

Y Maury, Côme J, Piskorowski RA, Salah-Mohellibi N, Chevaleyre V, Peschanski M, Martinat C and Nedelec S. "Combinatorial analysis of developmental cues efficiently converts human pluripotent stem cells into multiple neuronal subtypes." *Nature Biotechnology.* 2016. Jan; 33(1):89-96. doi: 10.1038/nbt.3049.

RA Piskorowski and V Chevaleyre. "Delta-opioid receptors mediate unique plasticity onto parvalbumin-expressing interneurons in area CA2 of the hippocampus." *J. Neuroscience.* 2013. Sept 4;33(36):14567-78.

Younts T.J. Chevaleyre V., Castillo P.E. "CA1 pyramidal cell theta-burst firing triggers endocannabinoid-mediated long-term depression at both somatic and dendritic inhibitory synapses." *J. Neuroscience.* 2013. 33(34) :13743-57.

Pavlopoulos E; Trifilieff P; Chevaleyre V; Zairis S; Fioriti L; Malleret G; Kandel E.R. “Non-Proteolytic Ubiquitination by Neuralized1 Leads to Activation of CPEB3: A Novel Function of the Ubiquitin System in Synaptic Plasticity and Memory Storage.” *Cell*. 2011. 147(6): 1369-83.

P Trifilieff, Rives ML, Urizar E, Piskorowski RA, Vishwasrao H, Castrillon J, Schmauss C, Slättman M, Gullberg M and Javitch JA. “Detection of antigen interactions *ex vivo* by proximity ligation assay: endogenous dopamine D2-adenosine A2A receptor complexes in the striatum.” *Biotechniques*. 2011. Aug; 51(2):111-8.

R Piskorowski, Santoro B, Siegelbaum SA “TRIP8b splice forms act in concert to regulate the localization and expression of HCN1 channels in CA1 pyramidal neurons.” *Neuron*. 2011. May 12; 70(3):495-509.

B Santoro, Hu L, Liu H, Saponaro A, Pian P, Piskorowski RA, Moroni A, Siegelbaum SA. “TRIP8b regulates HCN1 channel trafficking and gating through two distinct C-terminal interaction sites.” *Journal of Neuroscience.* 2011. March 16; 31(11):4074-86.

Chevaleyre V. and Siegelbaum S.A. “Strong CA2 pyramidal neuron synapses define a powerful disynaptic cortico-hippocampal loop.” *Neuron.* 2010. 66(4):560-72.

B Santoro, Lee JY, Englot DJ, Gildersleeve S, Piskorowski RA, Siegelbaum SA, Winawer MR, Blumenfeld H. “Increased seizure severity and seizure-related death in mice lacking HCN1 channels.” *Epilepsia.* 2010. Aug; 51(8):1624-7.

B Santoro, Piskorowski RA, Pian P, Hu L, Liu H and Siegelbaum SA. “TRIP8b splice variants form a family of auxiliary subunits that regulate gating and trafficking of HCN channels in the brain.” *Neuron*. 2009. Jun 25; 62(6):747-50.

Lebesgue D, Chevaleyre V, Zukin RS, Etgen AM. “Estradiol rescues neurons from global ischemia-induced cell death: multiple cellular pathways of neuroprotection.” *Steroids.* 2009. 74(7): 555-61.

Kaeser P.S., Kwon H., Blundell J., Chevaleyre V., Morishita W., Malenka R.C., Powell C.M, Castillo P.E., Südhof T.C. “RIM1 alpha Phosphorylation at Serine 413 by Protein Kinase A is Not Required for Presynaptic Long-Term Potentiation and Learning.” *PNAS* 2008. 105(38): 14680-5.

Heifets B.D., Chevaleyre V., Castillo P.E. “Interneuron activity controls endocannabinoid-mediated presynaptic plasticity through calcineurin.” *PNAS.* 2008. 105(29):10250-5.

Lee A., Kyrozis A., Chevaleyre V., Kow L.M., Devidze N., Zhang Q., Etgen A., and Pfaff D. “Estradiol modulation of phenylephrine-induced excitatory responses in ventromedial hypothalamic neurons of female rats.” *PNAS.* 2008. 105(20):7333-8.

Lee A., Kyrozis A., Chevaleyre V., Kow L.M., Zhou J., Devidze N., Zhang Q., Etgen A., and Pfaff D. “Voltage-Dependent Calcium Channels in Ventromedial Hypothalamic Neurons of Postnatal Rats: Modulation by Estradiol and Phenylephrine.” *J. Neuroendocrinology.* 2008. 20(2):188-98.

R Piskorowski, Haeberle H, Panditrao MV and Lumpkin EA. “Voltage-activated ion channels and Ca(2+)-induced Ca (2+) release shape Ca (2+) signaling in Merkel cells.” *Pflugers Archiv-European Journal of Physiology.* 2008. Oct; 457(1):197-209.

Chevaleyre V., Heifets B.D., Kaeser P., Sudhof T.C., Castillo P.E. “Endocannabinoid-mediated long-term plasticity requires cAMP/PKA signalling and RIM1□.” *Neuron.* 2007. *54 (5): 801-12.*

J Siemens, Zhou S, Piskorowski R, Nikai T, Lumpkin EA, Basbaum AI, King D and Julius D. “Spider toxins activate the capsaicin receptor to produce inflammatory pain.” *Nature.* 2006. 444(7116): 208-12.

Schoch S., Mittelstaedt T., Kaeser P.S., Padgett D., Feldmann N., Chevaleyre V., Castillo P.E., Hammer R.E., Han W., Schmitz F., Lin W., Sudhof T.C. “Redundant functions of RIM1□ and RIM2□ in Ca^{2+}-Triggered Neurotransmitter Release.” *EMBO* 2006. 25(24):5852-5863.

Skeberdis V.A*., Chevaleyre V*., Lau G.C*., Goldberg J.H., Pettit D, Suadicani S.O., Bennett M.V.L., Yuste R., Castillo P.E. and Zukin R.S. “Protein kinase A regulates calcium permeability of NMDA receptors.” **equal contribution*. *Nature Neuroscience.* 2006. 9(4):501-10.

RA Piskorowski and Aldrich RW. " Relationship between pore occupancy and gating in BK potassium channels." *Journal of General Physiology*. 2006. 127:557-576.

Chevaleyre V., Castillo P.E. “Endocannabinoid-mediated metaplasticity in the hippocampus.” *Neuron* 2004. 43 (6):871-81.

Mato S*., Chevaleyre V*., Robbe D., Pazos A., Castillo P.E., and Manzoni O.J. “A single in-vivo exposure to 9THC blocks endocannabinoid-mediated synaptic plasticity.” **equal contribution*. *Nature Neuroscience.* 2004. 7(6): 585 – 586.

Chevaleyre V., Castillo P.E. “Heterosynaptic LTD of hippocampal GABAergic synapses: a novel role of endocannabinoids in regulating excitability.” *Neuron.* 2003. 38 (3):461-472.

Chevaleyre V., Castillo P.E. “Assessing the role of Ih in synaptic transmission and mossy fiber LTP.” *PNAS.* 2002. 99(14): 9538-43.

R Piskorowski and Aldrich RW. “Calcium Activation of BK(Ca) Potassium Channels Lacking the Calcium Bowl and RCK Domains.” *Nature.* 2002. 420:499-502.

Chevaleyre V., Moos F.C. and Desarménien M.G. Interplay between pre- and post-synaptic activities is required for dendritic plasticity and synaptogenesis in the supraoptic nucleus. *J. Neuroscience.* 2002. 22(1):265-273.

Chevaleyre V., Moos F.C., Desarménien M.G. “Correlation between electrophysiological and morphological characteristics during maturation of Rat supraoptic neurons.” *Eur. J. Neuroscience.* 2001. 13: 1136-1146.

Joux N., Chevaleyre V., Alonso G,. Boissin-Agasse L., Moos F.C., Desarménien M.G. and Hussy N. “High voltage activated Ca^{2+} currents in rat supraoptic neurons: biophysical properties and expression of the various channel α1 subunits.” *J. Neuroendocrinology.* 2001. 13: 638-649.

Chevaleyre V., Dayanithi G., Moos F.C. and Desarménien M.G. “Developmental regulation of a local positive autocontrol of supraoptic neurons.” *J. Neuroscience.* 2000*. 20(15): 5813-5819.*

GM Soriano, Ponamarev MV, Piskorowski RA and Cramer WA. “Identification of the Basic Residues of Cytochrome *f* Responsible for Electrostatic Docking Interactions with Plastocyanin in Vitro: Relevance to the Electron Transfer Reaction in Vivo.” *Biochemistry.* 1998. 37:15120- 1512.

Reviews and Book Chapters:

Piskorowski RA, Chevaleyre V. “Memory Circuits: CA2” *Curr Opin Neurobiol.* (2018). Apr 26;52:54-59. doi: 10.1016/j.conb.2018.04.015.

Robert V, Cassim S, Chevaleyre V and R Piskorowski. “Hippocampal Area CA2: Properties and Contribution to Hippocampal Function.” *Cell and Tissue Research.* (2018). Jan 15. doi: 10.1007/s00441-017-2769-7.

Piskorowski RA and Chevaleyre V. “Interneurons in Synaptic Plasticity and Information Storage.” *Learning and Memory: A Comprehensive Reference.* (2017). Chapter 7; Volume 4. Mechanisms of Memory. Elsevier Press. Oxford. Pages 179-198. ISBN: 9780128051597

Chevaleyre V, Piskorowski RA. “Hippocampal Area CA2: An Overlooked but Promising Therapeutic Target.” ***Trends Mol Med.*** 2016 Aug;22(8):645-55. doi: 10.1016/j.molmed.2016.06.007.

Vivien Chevaleyre and **Rebecca Piskorowski**, « Schizophrénie: une nouvelle piste dans la compréhension des déficits de mémoire sociale.» *Biofutur*, No 375 (April 2016) pp48-51.

Chevaleyre V, **Piskorowski R**. “Modulating excitation through plasticity at inhibitory synapses.” ***Front Cell Neurosci****.* 2014. Mar 28;8:93.

RA Piskorowski and V Chevaleyre. “Synaptic integration by different dendritic compartments of hippocampal CA1 and CA2 pyramidal neurons.” ***Cellular and Molecular Life Sciences***. 2012. Jan; 69 (1):75-88.

Chevaleyre V., Takahashi K.A., Castillo P.E. “Endocannabinoid-mediated synaptic plasticity in the CNS.” ***Annual Review of Neuroscience***. 2006*. 29: 37-75.*

Castillo P.E., **Chevaleyre V.** “Transynaptic dialogue between excitatory and inhibitory hippocampal synapses via endocannabinoids.” Book Chapter: *Synaptic plasticity and transsynaptic signalling.* 2005. Springer Science*.*

INVITED CONFERENCES AND SEMINARS:

Conferences:

2020: Federation of European Neuroscience Societies (FENS).

2019: Spring Hippocampal Research Conference. Taormina, Italy. June 2-7, 2019.

2017: Annual Meeting of the Society for Neuroscience, Symposium speaker, Washington D.C., November 11-15th, 2017. (R.P.)

2017: Neurofrance 2017, Biannual meeting of the French Society of Neuroscience. Symposium speaker, May 17-19th 2017. Bordeaux, France. (R.P.)

2016: Journée du Club Développement des Réseaux Neuronaux, June 17th, Paris France. (V.C.)

2016: 5éme Colloque du GDR Neuromem. Lacanau, France. **“**CA2 : Bridging the hypothalamus and the hippocampus**.”** May 17-20th, 2016. (R.P. & V.C.)

2015: Annual Meeting of the Japanese Society for Neurochemistry. (R.P. & V.C.)

2015: Spring Hippocampal Research Conference. (R.P. & V.C.)

2014: INC Day: Neurodevelopmental Disorders. (R.P.)

2014: Federation of European Neuroscience Societies (FENS). (R.P. invited speaker, V.C. chair)
2005: Gordon Research Conference on Cannabinoid function in the CNS. Lewiston, USA. (V.C.)
2001: Meeting of the French Neuroscience Society. Toulouse, France (V.C.)
2000: Meeting of the Neuroendocrinology Society. Poitiers, France (V.C.)
1999: Ion Channel Congress. La Londe les Maures, France (V.C.)

Seminars:

2018 : Université Catholique de Louvain, Faculté de Médicine, July 5th, 2018 (RP).
2017: Center of Neuroscience of Lyon, Faculté of Médicine Laënnec, December 12th, 2017 (RP).
2017: Groningen University Research School of Behavioural and Cognitive Neurosciences. November 24th, 2017 (RP).
2017: Columbia University Medical Center, November 15th, 2017 (RP)
2017: New York University Department of Neuroscience. November 12th, 2017 (RP).
2017: Magdeburg University, Germany (V.C.)
2015: RIKEN Brain Science Institute, Wako, Japan. (R.P. & V.C.)
2015: College de France, Paris, France (R.P. & V.C.)
2015: Institut du Fer à Moulin, Paris, France (R.P.)
2014: Université Aix Marseille, campus nord, Marseille, France (V.C.)
2014: Centre de Psychiatrie et Neuroscience, Paris, France (V.C.)
2013: Institut de Neurobiologie de la Méditeranée, Montpellier, France (V.C.)
2012: Institut du cerveau et de la moelle épinière, Paris, France (V.C.)
2012: Institut de Génétique et de Biologie Moléculaire et Cellulaire. Strasbourg, France (R.P.)
2011: Institut du Fer a Moulin. Paris, France (V.C.)
2011: Institut de Génomique Fonctionnelle. Montpellier, France (V.C.)
2010: University of North Carolina Wilmington, Wilmington, USA (R.P.)
2010: Albert Einstein College of Medicine. New York, USA (V.C.)
2009: Cornell University. New York, USA (V.C.)
2007: Hunter College. New York, USA (V.C.)

TEACHING EXPERIENCE AND SUPERVISION:

Rebecca Piskorowski:

Since 2018 – Instructor for the Electrophysiology Module of the Neurobiology Course at the Marine Biological Laboratory at Woods Hole.
Since 2021 Supervision of PhD Student Eude Lepicard
2016 – 2020 Supervised PhD Student Sadiyah Cassim
2014-2018: Supervised PhD Student, Vincent Robert. Awarded “Best Thesis” Neurofrance 2019
2015 – 2017: Supervised Postdoctoral Researcher Assia Fafouri
2012 – 2015: Experimental Instructor of Electrophysiology, Ecole Neurosciences à Paris spring course, “Optical Imaging and Electrophysiological Recording in Neuroscience” 17-27 April 2012, 18-28 June 2013 and 9-19 June 2015.
2015: Lecturer / Instructor. *L’ecole de l’Inserm Liliane Bettencourt*, L’ecole de février, 30 janvier 2015.
2015-2016: Lecturer / Instructor. Université Jussieu UENB Module M2 Hippocampe, Physiology of Cells and Synapses.
2006 – 2011: Supervised 4 PhD rotation students and two undergraduate students.
2003: Teaching Assistant Stanford University. Molecular and Cellular Physiology: Molecular and Membrane Physiology.
2002: Teaching Assistant Stanford University. Principles of Cell Physiology Biochemistry/ Biological Macromolecules.
2000: Teaching Assistant Stanford University. Molecular and Cellular Physiology.

Vivien Chevaleyre:

2012 – present: Supervision of three PhD students.
2013 – present: Supervision of one Postdoctoral Fellow.

2016 – Lecture for Neurodevelopment Course at University Jussieux
2014 – 2015: Lecture on plasticity at inhibitory synapses for the Master Degree program at University Jussieux
2011-2015: Lecture on excitatory transmission for the Master Degree program at University Paris Descartes.
2013: Woods Hole Lecture on synaptic plasticity
2011– 2015: Teaching for the experimental part for International Course on imaging and electrophysiological recording in neuroscience organized by the Neuroscience School of Paris.
2002–2009: Supervision of 9 graduate students during their rotation year.
2005–2007: Supervision of one PhD student.