Edouard Duchesnay

Research Director in Statistical Machine Learning for Neuroimaging

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Design of machine learning and statistical models to discover brain predictive signatures of psychiatric disorders

As a leader of the team "Signatures of brain disorders" at NeuroSpin, CEA, Paris-Saclay University, France, I supervise the design of machine learning and statistical models to uncover neural signatures predictive of clinical trajectories in psychiatric disorders. To unlock the access to data required by learning algorithms, I oversee the data management, calculation, and regulation (GDPR) of large-scale national and European initiatives.

Keywords: Machine/Deep Learning − AI - Statistics − Neuroimaging − Scientific computing − Data management

Positions

2021–now	**Research Director**, *NeuroSpin, CEA, Paris-Saclay University, France*, ML & Neuroimaging
2008–2021	**Research Scientist**, *NeuroSpin, CEA, Paris-Saclay University, France*, ML & Neuroimaging
2005–2008	**R&D Engineer**, *INSERM Unit "Neuroimaging and Psychiatry", Orsay, France*, ML & Neuroimaging
2003–2004	**Postdoc**, *CEA, Orsay, France*, ML & Neuroimaging
2002	**Software Engineer**, *MBD.A (Matra BAe Dynamics) Velizy, France*, Object-oriented prog., C++
2001-2002	**Teaching and Research Assistant**, *Rennes 1 University, France*, Signal & Image processing, Object-oriented programming, Java

Education

2020	**Habilitation (for full professorship)**, *Paris-Saclay University, France*, ML & Neuroimaging
1999–2001	**Ph.D.**, *LTSI (lab. of signal and image processing). Rennes 1 University, France*, AI in medical imaging
1997–1998	**Master's degree**, *Rennes 1 University, France*, Signal & Image Processing
1994–1997	**Master's degree**, *EPITA, France*, Software Engineering

Projects

2024–2029	**Work Package (WP) leader of data analysis, computing and data management**, *IHU ICE: Institut Hospitalo-Universitaire-Institut du Cerveau de l'Enfant Robert* , Leaders: R Delorme, G Dehaene, T Bourgeron, Team budget: 2M€
2023–2028	**WP leader of data analysis, large-scale computing and datamanagement**, *PEPR Santé Mentale PROPSY: PROgram-project in Precision pSYchiatry*, Leader: M Leboyer, Team budget: 4.6M€
2022–2026	**WP leader of data analysis**, *RHU FAME: Improving FAMily members' Experience in the ICU*, Leader: E Azoulay, Team budget: 547k€
2020–2024	**Leader of Artificial Intelligence (AI) Chair**, *ANR Big2small, Transfer Learning from Big Data to Small Data: Leveraging Psychiatric Neuroimaging Biomarkers Discovery*, Budget: 543k€
2019–2026	**WP leader of data analysis**, *RHU PsyCARE. Preventing psychosis through personalized care*, Leader: MO Krebs, Team budget: 715k€
2018–2023	**WP leader of data analysis, computing and management**, *Horizon Europe R-LiNK. Optimizing response to Li treatment through personalized evaluation of individuals with bipolar I disorder*, Leader: F Bellivier, Team budget: 800k€
2014–2018	ANR BIP-Li7 (ANR-14-CE15-0003) Therapeutic Lithium response in Bipolar Disorders and brain Lithium-7 NMR Spectroscopy Imaging at 7 Tesla, Leader: F Bellivier, WP leader:F Boumezbeur, Team budget: 280k€
2011–2015	**WP leader of data analysis**, *EU FP6-ERA-NET-NEURON MESCOG: Mechanisms of Small Vessel-Related Brain Damage and Cognitive Impairment: Integrating Imaging Findings from Genetic and Sporadic Disease*, Leader: M Dichgans, Team budget: 195k€
2012–2016	**WP leader of image analysis**, *BRAINOMICS (ANR-10-BINF-04) Methodological and software solutions for the integration of neuroimaging and genomic data*, Leader: V Frouin, 800k€
2010–2013	**Leader (with A Roche)**, *ANR Karamétria (ANR-09-BLAN-0332): A unified framework for feature-based morphometry of the brain*, Team budget: 200k€
2007–2010	**WP Leader of data analysis**, *ANR AGIR (ANR-07-NEUR-0001): Autism: Genetic and Imaging Research*, Leader: M. Zilbovicius, Team budget: 150k€

2007–now	Contribution to the CATI platform, *a national platform created by the French Alzheimer plan in 2011 to support multicenter neuroimaging studies* (9M€ grant), sLeader: JF Mangin

Teaching

I wrote a course on Statistics and Machine Learning in Python, github: Jupyter notebooks and python sources and pdf. I deliver lectures on machine learning/statistics in:

2019–now	*Introduction to AI: main algorithms of machine learning* in **Master 2** radiophysique médicale Paris-Saclay University
2015-now	Machine learning in **Master 2** Innovation, marché et science des données IMSD, Paris-Saclay University, head: Ekaterina Kalugina
2018-now:	Machine learning in **Master 2** Modelisations Statistiques Economique & Financières MoSeF, Panthéon Sorbonne Paris 1 University, head: Rania Hentati Kaffel
2017-2020	Biostatistics **3rd year of CentralSupelec**, Paris-Saclay University, head: Arthur Tenenhaus
2019-2020	Machine learning in **2nd & 3rd years of EPITA**, Kremlin-Bicêtre, Image processing option, head: Elodie Puybareau and Guillaume Tochon
2016-2017	Data analysis in **Master 1** Mathématiques et applications, option "Ingénierie mathématique pour les sciences du vivant", Paris Descartes University, head: Etienne Birmele

Supervision experience

Ph.D.s

2022-now	Thibault Dupont together with Elie Azoulay
2022-now	Sara Petiton together with Antoine Grigis
2022-now	Pierre Auriau together with Pietro Gori, Antoine Grigis, and Jean-François Mangin
2020-now	Robin Louiset together with Pietro Gori and Antoine Grigis
2019-2022	Benoit Dufumier, together with Arthur Tenenhaus, Pietro Gori and Antoine Grigis
2019-2021	Anton Iftimovici, together with Marie-Odile Krebs
2016-2019	Amicie de Pierrefeu, together with Philippe Ciuciu
2008-2012	Edith Lefloch together with V Frouin
2009-2011	Cecilia Damon together with JB Poline

Post-docs

2017-2019	Pauline Favre, Post-doc, together with JF Mangin and J. Houenou
2016	Pietro Gori, Post-doc together with JF Mangin and J. Houenou
2013-2015	Fouad Hadj Selem
2013-2015	Tommy Lofstedt

Engineers

2023-now	Raphael Vock together with Antoine Grigis
2022-now	Bérangère Dollé together with Antoine Grigis
2021-now	Loic Dorval together with Antoine Grigis
2019-2022	Julie Victor together with Antoine Grigis
2013-2014	Mathieu Dubois
2014	Clémence Pinaud
2013-2014	Jinpeng Li

Bibliometry

Publications	94(a), 131(b). (a) Web of Science, (b) Google scholar
Citations	38,291(a), 86,070(b)
H-Index	26(a), 34(b)

Publications

Journals

[Dup+24] T. Dupont, N. Kentish-Barnes, F. Pochard, E. Duchesnay, and E. Azoulay. "Prediction of post-traumatic stress disorder in family members of ICU patients: a machine learning approach". In: *Intensive Care Medicine* 50.1 (Jan. 1, 2024), pp. 114–124.

[Poi+24] C. Poiret, A. Bouyeure, S. Patil, C. Boniteau, E. Duchesnay, A. Grigis, F. Lemaitre, and M. Noulhiane. "Attention-gated 3D CapsNet for robust hippocampal segmentation". In: *Journal of Medical Imaging (Bellingham, Wash.)* 11.1 (Jan. 2024), p. 014003.

[Ela+23] Y. Elandaloussi, D. L. Floris, P. Coupé, E. Duchesnay, A. Mihailov, A. Grigis, I. Bègue, J. Victor, V. Frouin, M. Leboyer, J. Houenou, and C. Laidi. "Understanding the relationship between cerebellar structure and social abilities". In: *Molecular Autism* 14.1 (May 15, 2023), p. 18.

[Fra+23] J. Fraize, C. Fischer, M. Elmaleh-Bergès, E. Kerdreux, A. Beggiato, A. Ntorkou, E. Duchesnay, D. Bekha, O. Boespflug-Tanguy, R. Delorme, L. Hertz-Pannier, and D. Germanaud. "Enhancing fetal alcohol spectrum disorders diagnosis with a classifier based on the intracerebellar gradient of volumetric undersizing". In: *Human Brain Mapping* 44.11 (2023). _eprint: https://onlinelibrary.wiley.com/doi/pdf/10.1002/hbm.26348, pp. 4321–4336.

[Ift+23a] A. Iftimovici, J. Bourgin, J. Houenou, O. Gay, A. Grigis, J. Victor, B. Chaumette, M.-O. Krebs, E. Duchesnay, and ICAAR-plus Study Group. "Asynchronous neural maturation predicts transition to psychosis". In: *Psychiatry and Clinical Neurosciences* (Oct. 30, 2023).

[Ift+23b] A. Iftimovici, Q. He, C. Jiao, E. Duchesnay, M.-O. Krebs, O. Kebir, and B. Chaumette. "Longitudinal MicroRNA Signature of Conversion to Psychosis". In: *Schizophrenia Bulletin* (Aug. 22, 2023), sbad080.

[Poi+23] C. Poiret, A. Bouyeure, S. Patil, A. Grigis, E. Duchesnay, M. Faillot, M. Bottlaender, F. Lemaitre, and M. Noulhiane. "A fast and robust hippocampal subfields segmentation: HSF revealing lifespan volumetric dynamics". In: *Frontiers in Neuroinformatics* 17 (2023).

[Duf+22] B. Dufumier, A. Grigis, J. Victor, C. Ambroise, V. Frouin, and E. Duchesnay. "OpenBHB: a Large-Scale Multi-Site Brain MRI Data-set for Age Prediction and Debiasing". In: *NeuroImage* (Sept. 17, 2022), p. 119637.

[Fov+22] T. Fovet, P. Yger, R. Lopes, A. de Pierrefeu, E. Duchesnay, J. Houenou, P. Thomas, S. Szaffarczyk, P. Domenech, and R. Jardri. "Decoding Activity in Broca's Area Predicts the Occurrence of Auditory Hallucinations Across Subjects". In: *Biological Psychiatry*. Biomarkers of Psychosis 91.2 (Jan. 15, 2022), pp. 194–201.

[Ift+22] A. Iftimovici, B. Chaumette, E. Duchesnay, and M.-O. Krebs. "Brain anomalies in early psychosis: From secondary to primary psychosis". In: *Neuroscience & Biobehavioral Reviews* (June 1, 2022), p. 104716.

[Lai+22] C. Laidi, D. L. Floris, J. Tillmann, Y. Elandaloussi, M. Zabihi, T. Charman, T. Wolfers, S. Durston, C. Moessnang, F. Dell'Acqua, C. Ecker, E. Loth, D. Murphy, S. Baron-Cohen, J. K. Buitelaar, A. F. Marquand, C. F. Beckmann, V. Frouin, M. Leboyer, E. Duchesnay, P. Coupé, and J. Houenou. "Cerebellar atypicalities in autism?" In: *Biological Psychiatry* (May 22, 2022).

[Fov+21] T. Fovet, P. Yger, R. Lopes, A. de Pierrefeu, E. Duchesnay, J. Houenou, P. Thomas, S. Szaffarczyk, P. Domenech, and R. Jardri. "Decoding Activity in Broca's Area Predicts the Occurrence of Auditory Hallucinations Across Subjects". In: *Biological Psychiatry* (Sept. 8, 2021), S0006–3223(21)01569–9.

[Pig+21] C. Piguet, A. Mihailov, A. Grigis, C. Laidi, E. Duchesnay, and J. Houenou. "Irritability Is Associated With Decreased Cortical Surface Area and Anxiety With Decreased Gyrification During Brain Development". In: *Frontiers in Psychiatry* 12 (2021), p. 744419.

[Chi+20] C. R. K. Ching et al. "What we learn about bipolar disorder from large-scale neuroimaging: Findings and future directions from the ENIGMA Bipolar Disorder Working Group". In: *Human Brain Mapping* (July 29, 2020).

[Cla+20] L.-A. Claude, J. Houenou, E. Duchesnay, and P. Favre. "Will machine learning applied to neuroimaging in bipolar disorder help the clinician? A critical review and methodological suggestions". In: *Bipolar Disorders* (Feb. 28, 2020).

[Hoz+20] F. Hozer, S. Sarrazin, C. Laidi, P. Favre, M. Pauling, D. Cannon, C. McDonald, L. Emsell, J.-F. Mangin, E. Duchesnay, M. Bellani, P. Brambilla, M. Wessa, J. Linke, M. Polosan, A. Versace, M. L. Phillips, M. Delavest, F. Bellivier, N. Hamdani, M.-A. d'Albis, M. Leboyer, and J. Houenou. "Lithium prevents grey matter atrophy in patients with bipolar disorder: an international multicenter study". In: *Psychological Medicine* (Jan. 27, 2020), pp. 1–10.

[Man+20] J.-F. Mangin, D. Rivière, E. Duchesnay, Y. Cointepas, V. Gaura, C. Verny, P. Damier, P. Krystkowiak, A.-C. Bachoud-Lévi, P. Hantraye, P. Remy, and G. Douaud. "Neocortical morphometry in Huntington's disease: Indication of the coexistence of abnormal neurodevelopmental and neurodegenerative processes". In: *NeuroImage. Clinical* 26 (Feb. 13, 2020), p. 102211.

[Sto+20]   J. Stout, F. Hozer, A. Coste, F. Mauconduit, N. Djebrani-Oussedik, S. Sarrazin, J. Poupon, M. Meyrel, S. Romanzetti, B. Etain, C. Rabrait-Lerman, J. Houenou, F. Bellivier, E. Duchesnay, and F. Boumezbeur. "Accumulation of Lithium in the Hippocampus of Patients With Bipolar Disorder: A Lithium-7 Magnetic Resonance Imaging Study at 7 Tesla". In: *Biological Psychiatry* 88.5 (Sept. 1, 2020), pp. 426–433.

[Bou+19]   J. Bourgin, E. Duchesnay, E. Magaud, R. Gaillard, M. Kazes, and M.-O. Krebs. "Predicting the individual risk of psychosis conversion in at-risk mental state (ARMS): a multivariate model reveals the influence of nonpsychotic prodromal symptoms". In: *European Child & Adolescent Psychiatry* (Dec. 23, 2019).

[Fav+19]   P. Favre, M. Pauling, J. Stout, F. Hozer, S. Sarrazin, C. Abé, M. Alda, C. Alloza, S. Alonso-Lana, O. A. Andreassen, B. T. Baune, F. Benedetti, G. F. Busatto, E. J. Canales-Rodríguez, X. Caseras, T. M. Chaim-Avancini, C. R. K. Ching, U. Dannlowski, M. Deppe, L. T. Eyler, M. Fatjo-Vilas, S. F. Foley, D. Grotegerd, T. Hajek, U. K. Haukvik, F. M. Howells, N. Jahanshad, H. Kugel, T. V. Lagerberg, S. M. Lawrie, J. O. Linke, A. McIntosh, E. M. T. Melloni, P. B. Mitchell, M. Polosan, E. Pomarol-Clotet, J. Repple, G. Roberts, A. Roos, P. G. P. Rosa, R. Salvador, S. Sarró, P. R. Schofield, M. H. Serpa, K. Sim, D. J. Stein, J. E. Sussmann, H. S. Temmingh, P. M. Thompson, N. Verdolini, E. Vieta, M. Wessa, H. C. Whalley, M. V. Zanetti, M. Leboyer, J.-F. Mangin, C. Henry, E. Duchesnay, and J. Houenou. "Widespread white matter microstructural abnormalities in bipolar disorder: evidence from mega- and meta-analyses across 3033 individuals". In: *Neuropsychopharmacology* (Aug. 21, 2019). tex.ids: favre_correction_2019, pp. 1–11.

[Lai+19a]   C. Laidi, T. Hajek, F. Spaniel, M. Kolenic, M.-A. d'Albis, S. Sarrazin, J.-F. Mangin, E. Duchesnay, P. Brambilla, M. Wessa, J. Linke, M. Polosan, P. Favre, A. L. Versace, M. L. Phillips, J. V. Manjon, J. E. Romero, F. Hozer, M. Leboyer, P. Coupe, and J. Houenou. "Cerebellar parcellation in schizophrenia and bipolar disorder". In: *Acta Psychiatrica Scandinavica* 140.5 (Nov. 2019), pp. 468–476.

[Lai+19b]   C. Laidi, J. Boisgontier, A. de Pierrefeu, E. Duchesnay, S. Hotier, M.-A. d'Albis, R. Delorme, F. Bolognani, C. Czech, C. Bouquet, A. Amestoy, J. Petit, Š. Holiga, J. Dukart, A. Gaman, E. Toledano, M. Ly-Le Moal, I. Scheid, M. Leboyer, and J. Houenou. "Decreased Cortical Thickness in the Anterior Cingulate Cortex in Adults with Autism". In: *Journal of Autism and Developmental Disorders* 49.4 (Apr. 2019), pp. 1402–1409.

[Sco+19]   J. Scott, D. Hidalgo-Mazzei, R. Strawbridge, A. Young, M. Resche-Rigon, B. Etain, O. A. Andreassen, M. Bauer, D. Bennabi, A. M. Blamire, F. Boumezbeur, P. Brambilla, N. Cattane, A. Cattaneo, M. Chupin, K. Coello, Y. Cointepas, F. Colom, D. A. Cousins, C. Dubertret, E. Duchesnay, A. Ferro, A. Garcia-Estela, J. Goikolea, A. Grigis, E. Haffen, M. C. Høegh, P. Jakobsen, J. L. Kalman, L. V. Kessing, F. Klohn-Saghatolislam, T. V. Lagerberg, M. Landén, U. Lewitzka, A. Lutticke, N. Mazer, M. Mazzelli, C. Mora, T. Muller, E. Mur-Mila, K. J. Oedegaard, L. Oltedal, E. Pålsson, D. Papadopoulos Orfanos, S. Papiol, V. Perez-Sola, A. Reif, P. Ritter, R. Rossi, T. Schulze, F. Senner, F. E. Smith, L. Squarcina, N. E. Steen, P. E. Thelwall, C. Varo, E. Vieta, M. Vinberg, M. Wessa, L. T. Westlye, and F. Bellivier. "Prospective cohort study of early biosignatures of response to lithium in bipolar-I-disorders: overview of the H2020-funded R-LiNK initiative". In: *International Journal of Bipolar Disorders* 7.1 (Sept. 25, 2019), p. 20.

[Duc+18]   E. Duchesnay, F. Hadj Selem, F. De Guio, M. Dubois, J.-F. Mangin, M. Duering, S. Ropele, R. Schmidt, M. Dichgans, H. Chabriat, and E. Jouvent. "Different Types of White Matter Hyperintensities in CADASIL". In: *Frontiers in Neurology* 9 (2018).

[Had+18a]   F. Hadj-Selem, T. Löfstedt, E. Dohmatob, V. Frouin, M. Dubois, V. Guillemot, and E. Duchesnay. "Continuation of Nesterov's Smoothing for Regression With Structured Sparsity in High-Dimensional Neuroimaging". In: *IEEE Transactions on Medical Imaging* 37.11 (Nov. 2018). tex.ids: hadj-selem_continuation_2016 Conference Name: IEEE Transactions on Medical Imaging, pp. 2403–2413.

[Leb+18]   J. Lebenberg, M. Labit, G. Auzias, H. Mohlberg, C. Fischer, D. Rivière, E. Duchesnay, C. Kabdebon, F. Leroy, N. Labra, F. Poupon, T. Dickscheid, L. Hertz-Pannier, C. Poupon, G. Dehaene-Lambertz, P. Hüppi, K. Amunts, J. Dubois, and J.-F. Mangin. "A framework based on sulcal constraints to align preterm, infant and adult human brain images acquired in vivo and post mortem". In: *Brain Structure & Function* 223.9 (Dec. 2018), pp. 4153–4168.

[Löf+18]   T. Löfstedt, V. Guillemot, V. Frouin, E. Duchesnay, and Hadj-Selem. "Simulated Data for Linear Regression with Structured and Sparse Penalties: Introducing pylearn-simulate | Löfstedt | Journal of Statistical Software". In: *Journal of Statistical Software* 87.3 (2018).

[Nun+18]   A. Nunes, H. G. Schnack, C. R. K. Ching, I. Agartz, T. N. Akudjedu, M. Alda, D. Alnæs, S. Alonso-Lana, J. Bauer, B. T. Baune, E. Bøen, C. D. M. Bonnin, G. F. Busatto, E. J. Canales-Rodríguez, D. M. Cannon, X. Caseras, T. M. Chaim-Avancini, U. Dannlowski, A. M. Díaz-Zuluaga, B. Dietsche, N. T. Doan, E. Duchesnay, T. Elvsåshagen, D. Emden, L. T. Eyler, M. Fatjó-Vilas, P. Favre, S. F. Foley, J. M. Fullerton, D. C. Glahn, J. M. Goikolea, D. Grotegerd, T. Hahn, C. Henry, D. P. Hibar, J. Houenou, F. M. Howells, N. Jahanshad, T. Kaufmann, J. Kenney, T. T. J. Kircher, A. Krug, T. V. Lagerberg, R. K. Lenroot, C. López-Jaramillo, R. Machado-Vieira, U. F. Malt, C. McDonald, P. B. Mitchell, B. Mwangi, L. Nabulsi, N. Opel, B. J. Overs, J. A. Pineda-Zapata,

E. Pomarol-Clotet, R. Redlich, G. Roberts, P. G. Rosa, R. Salvador, T. D. Satterthwaite, J. C. Soares, D. J. Stein, H. S. Temmingh, T. Trappenberg, A. Uhlmann, N. E. M. van Haren, E. Vieta, L. T. Westlye, D. H. Wolf, D. Yüksel, M. V. Zanetti, O. A. Andreassen, P. M. Thompson, T. Hajek, and ENIGMA Bipolar Disorders Working Group. "Using structural MRI to identify bipolar disorders - 13 site machine learning study in 3020 individuals from the ENIGMA Bipolar Disorders Working Group". In: *Molecular Psychiatry* (Aug. 31, 2018).

[Pie+18a] A. de Pierrefeu, T. Löfstedt, C. Laidi, F. Hadj-Selem, J. Bourgin, T. Hajek, F. Spaniel, M. Kolenic, P. Ciuciu, N. Hamdani, M. Leboyer, T. Fovet, R. Jardri, J. Houenou, and E. Duchesnay. "Identifying a neuroanatomical signature of schizophrenia, reproducible across sites and stages, using machine learning with structured sparsity". In: *Acta Psychiatrica Scandinavica* 0.0 (2018).

[Pie+18b] A. de Pierrefeu, T. Fovet, F. Hadj-Selem, T. Löfstedt, P. Ciuciu, S. Lefebvre, P. Thomas, R. Lopes, R. Jardri, and E. Duchesnay. "Prediction of activation patterns preceding hallucinations in patients with schizophrenia using machine learning with structured sparsity". In: *Human Brain Mapping* 39.4 (Apr. 1, 2018). tex.ids: de2018prediction tex.publisher: Wiley Online Library, pp. 1777–1788.

[Pie+18c] A. de Pierrefeu, T. Lofstedt, F. Hadj-Selem, M. Dubois, R. Jardri, T. Fovet, P. Ciuciu, V. Frouin, and E. Duchesnay. "Structured Sparse Principal Components Analysis With the TV-Elastic Net Penalty". In: *IEEE Transactions on Medical Imaging* 37.2 (Feb. 2018). tex.ids: de2018structured, de_pierrefeu_structured_2017 tex.publisher: IEEE, pp. 396–407.

[Le +17] Y. Le Guen, G. Auzias, F. Leroy, M. Noulhiane, G. Dehaene-Lambertz, E. Duchesnay, J.-F. Mangin, O. Coulon, and V. Frouin. "Genetic Influence on the Sulcal Pits: On the Origin of the First Cortical Folds". In: *Cerebral Cortex* (2017). tex.ids: le_guen_genetic_2018, pp. 1–12.

[Mag+17] R. Magalhães, J. Bourgin, F. Boumezbeur, P. Marques, M. Bottlaender, C. Poupon, B. Djemaï, E. Duchesnay, S. Mériaux, N. Sousa, T. M. Jay, and A. Cachia. "White matter changes in microstructure associated with a maladaptive response to stress in rats". In: *Translational Psychiatry* 7.1 (Jan. 24, 2017), e1009.

[Ges+16] B. Gesierich, E. Duchesnay, E. Jouvent, H. Chabriat, R. Schmidt, J.-F. Mangin, M. Duering, and M. Dichgans. "Features and Determinants of Lacune Shape: Relationship With Fiber Tracts and Perforating Arteries". In: *Stroke; a Journal of Cerebral Circulation* (Apr. 5, 2016).

[Jou+16a] E. Jouvent, E. Duchesnay, F. Hadj-Selem, F. De Guio, J.-F. Mangin, D. Hervé, M. Duering, S. Ropele, R. Schmidt, M. Dichgans, et al. "Prediction of 3-year clinical course in CADASIL". In: *Neurology* 87.17 (2016), pp. 1787–1795.

[Jou+16b] E. Jouvent, Z. Y. Sun, F. De Guio, E. Duchesnay, M. Duering, S. Ropele, M. Dichgans, J.-F. Mangin, and H. Chabriat. "Shape of the Central Sulcus and Disability After Subcortical Stroke: A Motor Reserve Hypothesis". In: *Stroke; a Journal of Cerebral Circulation* 47.4 (Apr. 2016), pp. 1023–1029.

[Pir+16] L. Pirpamer, E. Hofer, B. Gesierich, F. De Guio, P. Freudenberger, S. Seiler, M. Duering, E. Jouvent, E. Duchesnay, M. Dichgans, et al. "Determinants of iron accumulation in the normal aging brain". In: *Neurobiology of aging* 43 (2016), pp. 149–155.

[Bou+15] J. Bourgin, A. Cachia, F. Boumezbeur, B. Djemaï, M. Bottlaender, E. Duchesnay, S. Mériaux, and T. M. Jay. "Hyper-responsivity to stress in rats is associated with a large increase in amygdala volume. A 7T MRI study". In: *European Neuropsychopharmacology: The Journal of the European College of Neuropsychopharmacology* 25.6 (June 2015), pp. 828–835.

[Duc+15] E. Duchesnay, J. Bourgin, F. Hadj-Selem, and V. Frouin. "Méthodes de prédiction multivariées basées sur la neuroimagerie : application aux maladies psychiatriques". In: *Annales Médico-psychologiques, revue psychiatrique* (2015).

[BD14] J. Bourgin and E. Duchesnay. "Phénotypes cliniques précoces et recherche de biomarqueurs stratégiques : les fondements d'une psychiatrie personnalisée". In: *L'information psychiatrique* 89.10 (Jan. 7, 2014), pp. 781–789.

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