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Mathematical Modeling of Infectious Diseases

CV in research

2021	**Research Director (INSERM, Paris)**
2012	**Research Scientist (INSERM, Paris)**
2009 – 2012	**Postdoctoral research fellow** Supervision : Pr. Alan S. Perelson *Theoretical Biology & Biophysics, Los Alamos National Laboratory, NM, USA*
2007 – 2009	**Postdoctoral research fellow** Supervision : Pr. Avidan U. Neumann *Mina & Everard Goodman Faculty of Life Sciences, Bar-Ilan University. Tel-Aviv, Israel*
2003- 2006	**PhD in biostatistics: "Inference in dynamical models of population: application to HIV & HCV"** Supervision : Dr. Rodolphe Thiébaut & Pr. Daniel Commenges *ISPED, University Bordeaux II, France*

Publications

1. Olivares C, Ruppé E, Ferreira S, Corbel T, Andremont A, de Gunzburg J, **Guedj J**, Burdet C. A model-based comparison of the impact of antibiotics on the gut microbiota diversity. Gut Microbes 2024.
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3. Vemparala B, Dixit NM, **Guedj J**. Advances in the mathematical modeling of post-treatment control of HIV-1. Current Opinion in HIV & AIDS 2024.
4. Zaaraoui H, Schumer C, Hoen B, Duval X, Opatowski L, **Guedj J**. Modelling the effectiveness of antiviral treatment strategies to prevent household transmission of acute respiratory viruses. PLoS Computational Biology 2024.
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9. El Messaoudi S, Brichler S, Fougerou-Leurent C, Gordien E, Gerber A, Kortebi A, Lagadic G, Subic-Levrero M, Metivier S, Pol S, Minello A, Ratziu V, Leroy V, Mathurin P, Alric L, Coulibaly F, Pawlotsky JM, Zoulim F, de Lédinghen V, **Guedj J**. Effect of Peg-IFN on the viral kinetics of HDV infected patients treated with bulevirtide. J HepReports 2024.
10. Marchand M, Gonçalves A, Mercier F, Chanu P, Jin J, **Guedj J**, and Bruno R. Tumor growth and overall survival modeling to support decision making in Phase Ib/II trials: A comparison of joint and two-stage approaches. CPT:PSP 2024.
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    See commentary: Goyal A, Murray JM. Effect of interferon-alpha on hepatitis D virus. Hepatology (in press)
    See commentary: Guedj J, Canini L, Cottler SH, Dahari H. Response to Goyal et al. Hepatology (in press)

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121. **Guedj J**, Thiebaut R, Commenges D. Joint modeling of the clinical progression and of the biomarkers dynamics using a mechanistic model. Biometrics 2010; 67(1):59-66.
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124. **Guedj J**, Bazzoli C, Neumann AU, Mentré F. Design evaluation and optimization for models of hepatitis C viral dynamics. Statistics in Medicine 2010;30(10):1045-1056.
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128. **Guedj J**, Thiébaut R, Commenges D. Practical identifiability of HIV dynamics models. Bulletin of Mathematical Biology 2007;69:2493-513.
129. Thiébaut R, **Guedj J**, Jacqmin-Gadda H, et al. Estimation of dynamical model parameters taking into account undetectable marker values. BMC Medical Research Methodology 2006;6:1-10.
130. Lazaro L, Coureau G, **Guedj J** et al. Change in T-lymphocyte count after initiation of highly active antiretroviral therapy in HIV-infected patients with history of Mycobacterium avium complex infection. Antiviral Therapy 2006; 11:343-350.
131. Commenges D, Jacqmin-Gadda H, Proust C, **Guedj J**. A Newton-like algorithm for likelihood maximization: the robust variance scoring algorithm. arXiv:mathST/0610402 2006.

*: equal contributors

Invited speaker in international conferences

1. The use of viral dynamic models to develop therapeutics against tropical viral infections. Anti-infectives meeting in Manchester. December 2024.
2. Modeling respiratory infections. Synergie & Résistances. Aix-en-Provence. October 2023.
3. Modeling viral dynamics of SARS-CoV2: treatment & transmission. Workshop on Mathematical Perspectives on Immunobiology. September 2023, Blagoevgrad, Bulgaria.
4. Modeling HBV & HDV kinetics during antiviral therapy. 10th international HBV Cure meeting, Paris, June 2023.

5. Integrating correlates of protection into mathematical models of SARS-CoV-2 viral dynamics. American Society of Clinical Pharmacology & Therapeutics, Atlanta, March 2023.
6. Viral dynamics of SARS-CoV2 and role of antiviral treatments. Sesstim webinars. December 2022.
7. Modeling viral kinetics during HBV treatment. What it can teach us to optimize future therapies. European Meeting on HIV & Hepatitis, Paris, June 2022.
8. Pharmacometrics to support clinical investigation during COVID-19 pandemics. Page Virtual Meeting, September 2021.
9. Modeling SARS-Cov-2 viral dynamics to optimize antiviral therapy. PK/UK Virtual Meeting. November 2020.
10. Modeling SARS-Cov-2 viral dynamics to optimize therapy. ACOP. Virtual Meeting. November 2020
11. SARS-Cov-2 viral dynamics in NHPs and hospitalized patients. Modelling Heterogeneous Populations with applications in Biology. Grenoble. November 2020
12. Modeling SARS-Cov-2 viral dynamics to optimize therapy. AAPS. Virtual meeting. October 2020
13. Pitfalls of PK/PD of repurposed drugs. ESCMID Conference on Coronavirus Disease (ECCVID). Virtual Meeting. September 2020.
14. Ebola viral dynamics. HPV & microbiota dynamics. Montpellier. March 2019.
15. Mechanistic models in oncology. Recent advances in joint models for cancer and the new statistical challenge of immunotherapy clinical studies. Bordeaux. January 2019.
16. Ebola viral dynamics. Mathematical Biosciences Institute Workshop. Columbia. February 2018.
17. Joint modeling of tumor kinetic and OS. FDA-ISoP Public Workshop: Model Informed Drug Development (MIDD) for Oncology Products. FDA, February 2018.
18. Joint modeling in pharmacokinetics. Fort-Lauderdale. October 2017
19. PK/PD in infectious diseases. FIP Pharmaceutical Sciences World Congress. Stockholm. May 2017
20. The role of pharmacometrics in viral dynamics. Viral dynamics: past, present & future. Santa Fe. May 2017.
21. HCV modeling: insights on drug development. PK UK. London. November 2016.
22. HCV modeling: insights on drug development. Synergie & Résistances. Aix-en-Provence. October 2016.
23. Review on HCV modeling. Kinetic and Dynamic Complexity in Drug Transit-Response in the Human Body. PAGE meeting. Crete. June 2015
24. Viral Dynamic Modeling of DAAs. Journées du Groupement de Recherche Statistique et Santé. Rennes. September 2012.
25. Viral Dynamic Modeling of DAAs. 7th International Workshop on Clinical Pharmacology of Hepatitis Drug. Boston. June 2012
26. Understanding silibinin's modes of action against HCV using viral kinetic modeling. Workshop on Silibinin, Cologn. February 2012.

PhD supervision and cosupervision

1. Adrien Mitard, “Correlates of protection in SARS-CoV-2”, since 2023
2. Clarisse Schumer, “Coinfection of viral respiratory viruses, from in vitro to in vivo analyses”, since 2023
3. Maxime Beaulieu, “Modeling the efficacy of antiviral strategies against variants of concerns of Sars-CoV-2: from general community to hospitalized patients, since 2022
4. Selma El Messaoudi, “Modeling to support HBV cure”, 2020-2024 (now at Novo Nordisk)
5. Aurélien Marc, “The shifting paradigm of viral load and its implication on transmission”, 2020-2023.
6. Guillaume Lingas, “Modélisation de la dynamique virale du SARS-CoV-2 : implications pour l’évaluation thérapeutique », 2019-2022 (now Medical Student).
7. Marion Kerioui, “Modèles conjoints de la dynamique des lésions cibles et de la survie : application à la prédiction de la réponse à l’immunothérapie dans le cancer de la vessie”, 2018-2022 (now postdoc at the Sloan Kettering Memorial Center)
    - ⇨ Recipient of the 2023 prize Daniel Schwartz rewarding the best PhD thesis in biostatistics
8. Antonio Gonçalves, “Development of a modeling framework to optimize combination therapy of new antiviral agents against HBV”, 2017-2020 (now at Certara).
9. Vincent Madelain, “Viral dynamics during infection with Ebola virus and treatment with favipiravir”, 2015-2018 (now at Servier).

10. Solène Desmée, "Modélisation conjointe de données longitudinales non-linéaires et de données de survie : applications au cancer de la prostate métastatique", 2013-2016 (now associate professor at Université de Tours)
11. Tram Nguyen, "Handling data below the quantification limit in viral kinetic modeling for model evaluation and prediction of treatment outcome", 2011-2014 (now at Sanofi)
12. Cédric Laouénan, "Utilisation des modèles dynamiques pour l'évaluation des traitements de l'hépatite C", 2011-2014 (now Professor of Biostatistics at Université Paris Cité).

PhD reviewer

1. Léonie Courcoul, « Modèles conjoints avec variance résiduelle hétéroscédastique : application à l'étude de l'impact de la variabilité de la pression artérielle sur des événements de santé compétitifs », Université de Bordeaux 2024.
2. Macauley Locke, "Understanding viral infections using mathematical models and statistical analysis", University of Leeds, 2023.
3. Denis Rustand, "Modèles conjoints pour un biomarqueur semi-continu et un évènement terminal avec application aux essais cliniques en cancérologie", Université de Bordeaux, 2020.
4. Thibault Etienne, « Modélisation mathématique de la dégradation des ARNm bactériens et intégration de données omiques », Université Lyon 1, 2020.
5. Ronan Duchesne, "Erythroid differentiation in vitro under the lens of mathematical modelling", ENS Lyon, Université Lyon 1, 2019.
6. Vincent Aranzana-Climent, « Apport de la modélisation semi-mécanistique dans l'étude PK/PD des antibiotiques seuls et en combinaison dans la lutte contre les bactéries résistantes », Université de Poitiers, 2019.
7. Rubest Raja, "Modelling and optimization of novel therapies for HIV and hepatitis C virus infections", Indian Institute of Science, 2018.
8. Laura Villain, " Analyse et modélisation de l'effet des injections d'interleukine 7 sur les patients infectés par le VIH", Université de Bordeaux, 2018.

Habilitation reviewer

1. Raphaelle Metras, "Modelling vector-borne and zoonotic pathogens », Sorbonne Université, 2022.
2. Max Von Kleist Contributions to the Mathematical Systems Medicine of Antimicrobial Therapy and Genotype-Phenotype Inference, Freie Universitat Berlin, 2020.

Reviewer (not exhaustive)

Biostatistics & Biomathematics	Bioinformatics. Bulletin of Mathematical Biology, Epidemics, CPT: Pharmacometrics & System Pharmacology, Journal of Statistical Planning & Inference, Journal of Pharmacokinetics & Pharmacodynamics, Journal of the Royal Statistical Society C, Journal of Theoretical Biology, Mathematical Biosciences, Mathematical Medicine & Biology, Philosophical Transactions of the Royal Society B, PLoS Computational Biology, Statistical Methods & Applications
Medicine	Antimicrobial Agents & Chemotherapy, Antiviral Therapy, Antiviral Research, Clinical Infectious Diseases, Clinical Pharmacology & Therapeutics Ebio medicine, Journal of Hepatology, Journal of Virology, Hepatology, Lancet Infectious Diseases, Microbiome, Nature Communications, Nature Medicine, PLoS Biology, PNAS, PLoS Pathogens, Science
Editorial Board	Journal of Hepatology

Scientific & Educational Societies

Since 2023	Member of the ANRS « groupe sur les antiviraux et les anticorps monoclonaux thérapeutiques »
Since 2021	Member of the INSERM evaluation and recruitment committee (CSS 6)
Since 2021	AC ANRS« Modélisation des maladies infectieuses »
2020-2022	Member of the preclinical group on SARS-CoV-2 (ANRS)
2020-2022	Drug expert committee, EU Response
2020-2022	Groupe d'évaluation des mAbs anti-Covid, Reacting (ANRS)
Since 2019	Conseil de l'école doctorale ED393 Pierre Louis de Santé Publique
2012-2016	ANRS CSS3 « Recherches cliniques et thérapeutiques sur le VIH »
Since 2014	AC34 (since 2014) « HBV Cure »

Grant as PI (or WP PI)

2022-2025	Modelling of viral respiratory co-infection dynamics in human epithelium (ANR/DGF, 885KE incl 150 KE)
2021-2023	Emergen, ANRS (70 KE)
2021-2024	Multiscale modeling in HBV, PI, Roche (200 KE).
2020-2023	Mechanism of natural control of HIV, French Embassy in India
2020-2023	Therapeutics accelerator Covid-19, PI, Bill & Melinda Gates Foundation (250 KE)
2020-2022	Viral dynamics modeling, PI, ANR (200, incl 70 KE)
2020-2022	HIV modeling control, WP leader, NIH (150 KE)
2020-2022	Phage therapy, WP leader, French-German ANR (70 KE)
2020-2023	Nipah pathogenesis, WP leader, MESRI. (210 KE)
2018-2021	Modeling immune-oncology, PI, Genentech. (40 KE)
2017-2020	HBV Modeling, PI, Roche. (150 KE)
2014-2017	Prostate cancer therapeutic optimization, PI, Sanofi (150 KE).
2014-2016	Favipiravir against Ebola, WP leader, EU H2020 (

Prize & Fellowship

2015-2018	Laureate APHP "Contrat d'Interface"
2012-2024	INSERM « Prime d'Excellence »
2009-2012	Los Alamos Postdoctoral Fellowship
2008-2009	French Consulate in Tel-Aviv, « Volontaire-International Chercheur »
2007	Postdoctoral Fellowship « Fondation de la recherche médicale »
2003-2006	PhD fellowship from the National Agency for Research in AIDS (ANRS)