

PERSONAL INFORMATION

Mireia Valles-Colomer



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SUMMARY

Dr Mireia Valles-Colomer is a tenure-track Principal Investigator at the Medical and Life Sciences (MELIS) department of the University Pompeu Fabra, leading the Microbiome Research Group. With a background in Microbiology and Computational Biology (Autonomous University of Barcelona, Spain and Free University of Brussels, Belgium), her research focuses on the role of the human microbiome in mental health and its transmission among individuals. She performed the first population-level study on the link between the gut microbiome and host anxiety and depression during her PhD at VIB-KU Leuven (Belgium), in which she characterised the microbial production and degradation of neuroactive compounds in metagenomic data (Valles-Colomer et al, Nat. Microbiology 2019). The study was included in "Nature milestones 2019" as milestone paper in human microbiota research. During her postdoc in the group of Nicola Segata (EMBO long-term fellowship, University of Trento, Italy) she also showed that the gut microbiome can be transmitted among multiple familial generations (Valles-Colomer et al, Nat. Microbiology 2022), and performed the first large-scale study on the person-to-person transmission landscape of the gut and oral microbiomes (Valles-Colomer et al, Nature 2023).

EDUCATION

September 2014 – June 2019 **PhD Biomedical Sciences – KU Leuven-VIB (Belgium)**

Title: "Assessment of the neuroactive potential of the gut microbiota in quality of life and depression"

Promotor: Prof Dr Jeroen Raes; *Co-promotors:* Dr Sara Vieira-Silva & Dr Marie Jossens

September 2012 - July 2014 **MSc Biomolecular Sciences – VUB (Belgium)**

Master thesis: "Development of a fast and cost-effective qPCR-based human gut microbiome monitoring assay"

Promotor: Prof Dr Jeroen Raes; *Supervisor:* Dr Karoline Faust

September 2008 – June 2012 **BSc Biotechnology – UAB (Spain)**

ACADEMIC POSITIONS

From September 2023 **Tenure-track group leader – MELIS Department – UPF (Spain)**

Group: Microbiome Research Group

October 2019 - August 2023 **Postdoctoral researcher – CIBIO – University of Trento (Italy)**

Project: "The person-to-person transmission landscape of the oral and gut microbiomes"

Group leader: Prof Dr Nicola Segata

July 2019 – September 2019 **Postdoctoral researcher – KU Leuven-VIB (Belgium)**

Project: "Transmission of the gut microbiome across multiple familial generations"

Group leader: Prof. Dr Jeroen Raes

PUBLICATIONS

Total number of citations: 7,261

h-index: 23

First author publications

1. **Valles-Colomer M***, Menni C*, Berry SE, Valdes AM#, Spector TD#, Segata N# (2023). Cardiometabolic health, diet and the gut microbiome: a meta-omics perspective. *Nature Medicine*, 29(3):551-561. doi: 10.1038/s41591-023-02260-4.
2. **Valles-Colomer M****, Blanco-Míguez M, Manghi P, Asnicar F, Armanini F, Cumbo F, Huang KD, Manara S, Masetti G, Pinto F, Ricci L, Zolfo M, Farrant O, Goncalves A, Selma-Royo M, Binetti AG, Becerra JE, Han B, Lusingu J, Amuasi J, Amoroso L, Visconti A, Steves CM, Falchi M, Filosi M, Tett A,

Last A, Xu Q, Qin N, Qin H, May J, Eibach D, Corrias MV, Ponzoni M, Pasolli E, Spector TD, Domenici E, Collado MC, Segata N** (2023). The person-to-person transmission landscape of the gut and oral microbiomes. *Nature*, 614:125-135. doi: 10.1038/s41586-022-05620-1.

3. **Valles-Colomer M***, Bacigalupe R*, Vieira-Silva S*, Suzuki S, Darzi Y, Tito RY, Yamada T, Segata N, Raes J#, Falony G# (2022). Variation and transmission of the human gut microbiota across multiple familial generations. *Nature Microbiology*, 7(1):87-96. doi: 10.1038/s41564-021-01021-8.
4. **Valles-Colomer M**, Falony G, Vieira-Silva S, Raes J (2019). Practical guidelines for gut microbiome analysis in microbiota-gut-brain axis research. *Behav Brain Sciences*, 42, E78, doi:10.1017/S0140525X18002881.
5. Vieira-Silva S*, Sabino J*, **Valles-Colomer M***, Falony G*, Kathagen G, Caenepeel C, Cleynen I, van der Merwe S, Vermeire S#, Raes J# (2019). Quantitative microbiome profiling disentangles inflammation- and bile duct obstruction-associated microbiota alterations across IBD/PSC diagnoses. *Nature Microbiology*, 4:1826-1831. doi: 10.1038/s41564-019-0483-9.
6. **Valles-Colomer M**, Falony G, Darzi Y, Tigchelaar EF, Wang J, Tito RY, Schiweck C, Kurilshikov A, Joossens M, Wijmenga C, Claes S, Van Oudenhove L, Zhernakova A, Vieira-Silva S#, Raes J# (2019). The neuroactive potential of the human gut microbiota in quality of life and depression. *Nature Microbiology*, 4:623-632. doi: 10.1038/s41564-018-0337-x.
7. Boesmans B*, **Valles-Colomer M***, Wang J, Eeckhaut V, Falony G, Ducatelle R, Van Immerseel F, Raes J#, Verbeke K# (2018). Butyrate producers as potential next-generation probiotics: safety assessment of the administration of *Butyricoccus pullicaecorum* to healthy volunteers. *mSystems*, 3(6): e00094-18. doi: 10.1128/mSystems.00094-18.
8. **Valles-Colomer M***, Darzi Y*, Vieira-Silva S, Falony G, Joossens M#, Raes J# (2016). Meta-omics in IBD research: applications, challenges and guidelines. *J Crohns Colitis*, 10(6):735-46. doi: 10.1093/ecco-jcc/jjw024.

Senior author publications

9. Ianiro G*, Punčochář M*, Karcher N*, Porcari S, Armanini F, Asnicar F, Beghini F, Blanco-Míguez A, Cumbo F, Manghi P, Pinto F, Masucci L, Quaranta G, De Giorgi S, Sciumè GD, Bibbò S, Del Chierico F, Putignani L, Sanguinetti M, Gasbarrini A, **Valles-Colomer M***, Cammarota G#, Segata N# (2022). Variability of strain engraftment and predictability of microbiome composition after fecal microbiota transplantation across different diseases. *Nature Medicine*, 28:1913-1923. doi: 10.1038/s41591-022-01964-3.
10. Karcher N*, Nigro E*, Punčochář M, Blanco-Míguez A, Ciciani M, Manghi P, Zolfo M, Cumbo F, Manara S, Golzato D, Cereseto A, Arumugam M, Nam Bui TP, Tytgat HLP, **Valles-Colomer M***, de Vos WM#, Segata N# (2021). Genomic diversity and ecology of human-associated *Akkermansia* species in the gut microbiome revealed by extensive metagenomic assembly. *Genome Biology*, 22(1):1-24. doi: 10.1186/s13059-021-02427-7.

Other publications

11. Blanco-Míguez A, Gálvez EJC, Pasolli E, De Filippis F, Amend L, Huang KD, Manghi P, Lesker TR, Riedel T, Cova L, Punčochář M, Thomas AM, **Valles-Colomer M**, [10 authors], Segata N#, Strowig T# (2023). Extension of the *Segatella copri* complex to 13 species with distinct large extrachromosomal elements and associations with host conditions. *Cell Host & Microbe*, 31, 1-16. doi: https://doi.org/10.1016/j.chom.2023.09.013
12. Manghi P*, Blanco-Míguez A*, Manara S, NabiNejad A, Cumbo F, Beghini F, Armanini F, Golzato D, Huang KD, Thomas AM, Piccinno G, Punčochář M, Zolfo M, Lesker TR, Bredon M, Planchais J, Glodt J, **Valles-Colomer M**, Koren O, Pasolli E, Asnicar F, Strowig T, Sokol H, Segata N. MetaPhlAn 4 profiling of unknown species-level genome bins improves the characterization of diet-associated microbiome changes in mice. *Cell Reports*, 42, 112464. doi: https://doi.org/10.1016/j.celrep.2023.112464
13. Manara S, Selma-Royo M, Huang KD, Asnicar F, Armanini F, Blanco-Míguez A, Cumbo F, Golzato D, Manghi P, Pinto F, **Valles-Colomer M**, [8 authors], Segata N (2023). Maternal and food microbial sources shape the infant microbiome of a rural Ethiopian population. *Current Biology* 33 (10), 1939-1950. e4.

14. Blanco-Míguez A, Beghini F, Cumbo F, McIver LJ, Thompson KN, Zolfo M, Manghi P, Dubois L, Huang KD, Thomas AM, Nickols WA, Piccinno G, Piperni E, Punčochář M, **Valles-Colomer M**, Tett A, Giordano F, Davies R, Wolf J, Berry SE, Spector TD, Franzosa EA, Pasolli E, Asnicar F, Huttenhower C, Segata N (2023). Extending and improving metagenomic taxonomic profiling with uncharacterized species using MetaPhlAn 4. *Nature Biotechnology*. doi: 10.1038/s41587-023-01688-w.
15. Malan-Muller S, **Valles-Colomer M**, Palomo T, Leza JC (2023). The gut-microbiota-brain axis in a Spanish population in the aftermath of the COVID-19 pandemic: microbiota composition linked to anxiety, trauma, and depression profiles. *Gut Microbes* 15(1):2162306.
16. Porcari S, Benech N, **Valles-Colomer M**, Segata N, Gasbarrini A, Cammarota G, Sokol H, Ianiro G (2023). Key determinants of success in fecal microbiota transplantation: From microbiome to clinic. *Cell Host & Microbe* 31(5):712-733.
17. Malan-Muller S, **Valles-Colomer M**, Foxx CL, Vieira-Silva S, van den Heuvel LL, Raes J, Seedat S, Lowry CA, Hemmings SMJ (2022). Exploring the relationship between the gut microbiome and mental health outcomes in a posttraumatic stress disorder cohort relative to trauma-exposed controls. *European Neuropsychopharmacology* (56):24-38.
18. Xu Q*, Wu C*, Zhu Q*, Gao R, Lu J, **Valles-Colomer M**, Zhu J, Yin F, Huang F, Ding L, Zhang X, Zhang Y, Xiong X, Bi M, Chen X, Zhu Y, Liu L, Liu Y, Chen Y, Fan J, Sun Y, Wang J, Cao Z, Fan C, Ehrlich SD, Segata N, Qin N#, Qin H# (2022). Metagenomic and metabolomic remodeling in nonagenarians and centenarians and its association with genetic and socioeconomic factors. *Nature Aging* 2, 438-452. doi: 10.1038/s43587-022-00193-0.
19. Beller L, Deboutte W, Falony G, Vieira-Silva S, Tito RY, **Valles-Colomer M**, Rymerans L, Jansen D, Van Espen L, Papadaki MI, Shi C, Yinda C, Zeller M, Faust K, Van Ranst M, Raes J, Matthijnssens J (2022). Successional stages in infant gut microbiota maturation. *mBio*, 12(6):e0185721. doi: 10.1128/mBio.01857-21.
20. Forslund SK*, Chakaroun R*, Zimmermann-Kogadeeva M*, Markó L*, Aron-Wisniewsky J*, Nielsen T*, Moitinho-Silva L, Schmidt TSB, Falony G, Vieira-Silva S, Adriouch S, Alves RJ, Assmann K, Bastard JP, Birkner T, Caesar R, Chilloux J, Coelho LP, Fezeu L, Galleron N, Helft G, Isnard R, Ji B, Kuhn M, Le Chatelier E, Myridakis A, Olsson L, Pons N, Prifti E, Quinquis B, Roume H, Salem JE, Sokolovska N, Tremaroli V, **Valles-Colomer M**, Lewinter C, Søndertoft NB, Pedersen HK, Hansen TH; MetaCardis Consortium*, Gøtze JP, Køber L, Vestergaard H, Hansen T, Zucker JD, Herberg S, Oppert JM, Letunic I, Nielsen J, Bäckhed F, Ehrlich SD, Dumas ME, Raes J, Pedersen O, Clément K, Stumvoll M, Bork P (2021). Combinatorial, additive and dose-dependent drug-microbiome associations. *Nature*, 600(7889):500-505. doi: 10.1038/s41586-021-04177-9.
21. Belkhou C, Tito RY, Bacigalupe R, **Valles-Colomer M**, Chaffron S, Joossens M, Obregon A, Marin Reyes L, Trujillo O, Huys GRB, Raes J (2021). Treponema peruense sp. nov., a commensal spirochaete isolated from human faeces. *International Journal of Systematic and Evolutionary Microbiology*, 71(10): 005050. doi: 10.1099/ijsem.0.005050.
22. Beghini F*, McIver LJ*, Blanco-Míguez A, Dubois L, Asnicar F, Maharjan S, Mailyan A, Manghi P, Scholz M, Thomas AM, **Valles-Colomer M**, Weingart G, Zhang Y, Zolfo M, Huttenhower C, Franzosa EA, Segata N (2021). Integrating taxonomic, functional, and strain-level profiling of diverse microbial communities with bioBakery 3. *eLife*, 10, e65088.
23. Asnicar F*, Berry SE*, Nguyen LH, Piccinno G, Drew DA, Leeming E, Gibson R, Le Roy C, Al Khatib H, Francis L, Mazidi M, Mompeo O, **Valles-Colomer M**, [21 authors], Chan AT#, Huttenhower C#, Spector TD#, Segata N# (2021). Microbiome connections with host metabolism and habitual diet from 1,098 deeply phenotyped individuals. *Nature Medicine*, 27(2), 321-332. doi: 10.1038/s41591-020-01183-8.
24. Karcher N, Pasolli E, Asnicar F, Huang KD, Tett A, Manara S, Armanini F, Bain D, Duncan SH, Louis P, Zolfo M, Manghi P, **Valles-Colomer M**, Raffaetà R, Rota-Stabelli O, Collado MC, Zeller G, Falush D, Maixner F, Walker AW, Huttenhower C, Segata N (2020). Analysis of 1321 Eubacterium rectale genomes from metagenomes uncovers complex phylogeographic population structure and subspecies functional adaptations. *Genome Biology*, 21(1):138. doi: 10.1186/s13059-020-02042-y.
25. Vieira-Silva S, Falony G, Belda E, Nielsen T, Aron-Wisniewsky J, Chakaroun R, Forslund SK, Assmann K, **Valles-Colomer M**, Nguyen TTD, Proost S, Prifti E, Tremaroli V, Pons N, Le Chatelier E, Andreelli F, Bastard JP, Coelho LP, Galleron N, Hansen TH, Hulot JS, Lewinter C, Pedersen HK, Quinquis B, Rouault C, Roume H, Salem JE, Søndertoft NB, Touch S; MetaCardis Consortium, Dumas ME, Ehrlich

- SD, Galan P, Gøtze JP, Hansen T, Holst JJ, Køber L, Letunic I, Nielsen J, Oppert JM, Stumvoll M, Vestergaard H, Zucker JD, Bork P, Pedersen O, Bäckhed F, Clément K, Raes J (2020). Statin therapy is associated with lower prevalence of gut microbiota dysbiosis. *Nature*, 581(7808):310-315. doi: 10.1038/s41586-020-2269-x.
26. Reynders T*, Devolder L*, **Valles-Colomer M**, Van Remoortel A, De Keyser J, Nagels G, D'hooghe M#, Raes J# (2020). Gut microbiome variation associated to Multiple Sclerosis phenotypic subtypes. *Annals of Clinical and Translational Neurology*, 7(4):406-419. doi: 10.1002/acn3.51004.
 27. Schiweck C, **Valles-Colomer M**, Arolt V, Müller N, Raes J, Wijkhuijs A, Claes S, Drexhage H, Vrieze E (2020). Depression and suicidality: A link to premature T helper cell aging and increased Th17 cells. *Brain Behav Immun*, 603-609. doi: 10.1016/j.bbi.2020.02.005.
 28. Hansen LBS*, Roager HM*, Søndertoft NS*, Gøbel RJ*, Kristensen M, **Valles-Colomer M**, [43 authors], Gupta R#, Licht TR#, Pedersen O# (2018). A low-gluten diet changes the intestinal microbiome in healthy adults: a randomised cross-over trial. *Nature Communications*, 9(1):4630. doi: 10.1038/s41467-018-07019-x.
 29. Malan-Muller S, **Valles-Colomer M**, Raes J, Lowry C, Seedat S, Hemmings S (2018). The gut microbiome and mental health: implications for anxiety- and trauma-related disorders. *OMICS*, 22 (2).
 30. Vandeputte D*, Kathagen G*, D'hoel K*, Vieira-Silva S*, **Valles-Colomer M**, Sabino J, Wang J, Tito RY, De Commer L, Darzi Y, Vermeire S, Falony G#, Raes J# (2017). Quantitative microbiome profiling links gut community variation to microbial load. *Nature*, 551, 507-511. doi: 10.1038/nature24460.
 31. Vieira-Silva S*, Falony G*, Darzi Y, Lima Mendez G, Garcia Yunta R, Okuda S, Vandeputte D, **Valles-Colomer M**, Hildebrand F, Chaffron S, Raes J (2016). Species-function relationships shape ecological properties of the human gut microbiome. *Nature Microbiology*, 1(8):16088. doi: 10.1038/nmicrobiol.2016.88.
 32. Falony G*, Joossens M*, Vieira-Silva S*, Wang J*, Darzi Y, Faust K, Kurilshikov A, Bonder M, **Valles-Colomer M**, [17 authors], Raes J (2016). Population-level analysis of gut microbiome variation. *Science*, 352 (6285), 560-4. doi: 10.1126/science.aad3503.

*: (co-)first authors, #: (co-)senior authors, **: (co-)corresponding authors

TEACHING EXPERIENCE

September – December 2023 Lecturer in the course “Bioinformatics” of the BSc Human Biology (Pompeu Fabra University, Spain). Theory classes, seminars, and practicals; 40 hours.

May 2023 Lecturer in the course “Animal behavior”: “The influence of the human microbiome in human behavior” of the BSc Environmental Sciences (Autonomous University of Barcelona, Spain). Lecture, 2 hours.

February – April 2023 Teaching assistant in the course “Computational Microbial Genomics” of the MSc Computational and Quantitative Biology (University of Trento, Italy). Practical course, 12 hour teaching assignment.

May 2022 “Analysis of the human gut microbiome in the gut-brain axis context”. Neuroscience School of Advanced Studies (Venice, Italy). Workshop, 4 hours.

April 2022 “Basic-to-Intermediate analyses of shotgun metagenomics data workshop”. 3rd World of Microbiome Conference (Vienna, Austria). Workshop, 2 hours.

September 2021 – June 2022 “Comparative analysis of phenotype prediction tools in bacterial genomes”. Co-supervision of Vittoria Ossanna’s Bachelor Thesis Computer Science (University of Trento, Italy).

February – April 2022 Teaching assistant in the course “Computational Microbial Genomics” of the MSc Computational and Quantitative Biology (University of Trento, Italy). Practical course, 12 hour teaching assignment.

February – April 2021 Teaching assistant in the course “Computational Microbial Genomics” of the MSc Computational and Quantitative Biology (University of Trento, Italy). Practical online course, 12 hour teaching assignment.

February 2020 “Shotgun data processing: mapping-based approaches for taxonomic and functional profiling at the species- and strain-level resolution”. Metabarcoding and metagenomic data processing and analysis workshop (Naples, Italy).
Workshop, 8 hour workshop.

From October 2019 Co-supervision of three PhD students (CIBIO-University of Trento, Italy): Nicolai Karcher, Leonard Dubois, Davide Golzato.

2017-2018 “Topographic variation of the upper gastrointestinal tract microbiota”. Co-supervision of Tanine Daryoush’s Master Thesis Biomedical Sciences (KU Leuven, Belgium).

INVITED TALKS

October 2023 MELIS Symposium, Barcelona, Spain. Invited oral presentation: How do our body-associated microorganisms spread? The person-to-person transmission landscape of the human microbiome.

October 2023 NeoHealth meeting “Antibiotic Resistance Genes and Microbiota”, Valencia, Spain. Invited oral presentation: Functional and strain-level profiling of the gut microbiome to understand its role in health and disease.

August 2023 Neurogastro2023, Bucharest, Romania. Invited oral presentations: Microbiome in anxiety and depression and The link between diet, microbiome and metabolism.

June 2023 Barcelona Debates on the Human Microbiome 2023, Barcelona, Spain. Invited oral presentation. Exploring the relationship between the human microbiome and mental health.

May 2023 Navigating the Future in Healthcare Science, Pisa, Italy. Invited oral presentation. The person-to-person transmission landscape of the human microbiome.

October 2022 7th International Conference on Clinical Metagenomics (ICCMg), Geneva, Switzerland. Invited oral presentation. Transmission of the gut microbiome across multiple familial generations.

September 2022 SIBE (Italian Society of Evolutionary Biology) 2022, Ancona, Italy. Invited oral presentation. Person-to-person transmission of the human microbiome.

July 2022 Barcelona Debates on the Human Microbiome 2022, Barcelona, Spain. Invited oral presentation. Person-to-person transmission of the gut and oral microbiomes.

April 2022 3rd World of Microbiome Conference, Vienna, Austria. Invited oral presentation. Transmission of the oral microbiome.

April 2022 Pharmabiotics 2022 Conference, Lyon, France. Invited oral presentation. Genomic diversity and ecology of human-associated Akkermansia species in the gut microbiome.

March 2022 New ideas in microbiome research conference, Australasian Human Microbiome Research Network, online. Invited oral presentation. Vertical and horizontal transmission of the human microbiomes.

July 2021 African Society for Bioinformatics and Computational Biology webinar, online. Invited oral presentation. The neuroactive potential of the human gut microbiota in quality of life and depression.

June 2021 8th International Human Microbiome Consortium Congress, online. Invited oral presentation. The human gut microbiota in quality of life and depression.

December 2020 World Microbiome, Neurodevelopment and Behavior Congress, online. Invited oral presentation. The neuroactive potential of the human gut microbiota.

May 2019 National Gastroenterology Meeting, Jönköping, Sweden. Invited oral presentation. Analysis of the gut microbiome in health and gastrointestinal disease.

SELECTED TALKS

September 2023 EMBO/EMBL Symposium The Human Microbiome, Heidelberg, Germany. Selected oral presentation. Tracking the transmission of the gut microbiome: a one health perspective.

January 2022 5th Microbial Virtual International Forum, online. Selected Research Highlight. Variation and transmission of the human gut microbiota across multiple familial generations. *Best Research Highlight award.*

September 2018 EMBO/EMBL Symposium The Human Microbiome, Heidelberg, Germany. Selected oral presentation. Neuroactive potential of the human gut microbiota: a framework for gut-brain axis annotation from metagenomic data.

July 2017 FEMS Congress, Valencia, Spain. Selected oral presentation. A framework for gut-brain axis annotation from metagenomic data.

September 2016 NSAS Microbiota and Brain Summer school, Bressanone, Italy. Poster presentation. Population-level association of microbiota composition with quality of life and depression.

September 2015 Methods in Epidemiology Symposium, Leuven, Belgium. Poster presentation. Population-level association of microbiota composition with wellbeing parameters.

TECHNOLOGY TRANSFER

"A new inflammation-associated, low cell count enterotype". Jeroen Raes, Severine Vermeire, Sara Vieira-Silva, Gwen Falony, Mireia Valles-Colomer, Lindsay Devolder, Joao Guedelha Sabino, Gunter Kathagen, Marie D'hooghe, Jacques De Keyser. European Patent Office, EP 17207770.3.

AWARDS

Faculty Opinions Recommendation of [Valles-Colomer M et al., Nature 2023 614(7946):125-135]. Gabaldon T, 18/04/2023, Classified as: Exceptional New Finding; 10.3410/f.742496525.793598319

Best Research Highlight talk for "Variation and transmission of the human gut microbiota across multiple familial generations" (200\$) – Microbiome Virtual International Forum, online, January 2022.

F1000Prime recommendation of [Valles-Colomer M et al., Nat Microbiol 2019 4(4):623-632]. Yu J and Park H, 25/02/2019, Classified as: New Finding, Novel Drug Target, Good for Teaching; 10.3410/f.734997864.79355662.

2017 Best clinical article award [Vandeputte D et al., Nature 551:507–511]. Belgian Society of Internal Medicine.

Young scientist award on the project "Genetic alterations in Chronic Mieloid Leukemia" (1.000€) – FUB, Spain, 2008

LANGUAGES

Catalan (C2-native), Spanish (native), English (C1), French (B2), Italian (B2), Dutch (B1)