

## PERSONAL INFORMATION

## Mireia Valles-Colomer


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Date of birth 11/04/1990 | Nationality Spanish | Gender Female

## SUMMARY OF ACADEMIC AND SCIENTIFIC BACKGROUND

Dr Mireia Valles-Colomer is currently an EMBO postdoctoral researcher in CIBIO (University of Trento, Italy). 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 the person-to-person transmission of microorganisms. As part of her PhD research (VIB-KU Leuven, Belgium) she sought to characterise the microbial production and degradation of neuroactive compounds in metagenomic data, and performed the first population-level study on the link between the gut microbiome and host anxiety and depression (Valles-Colomer et al, Nat. Microbiology 2019). The study was included in "Nature milestones 2019" as milestone paper in human microbiota research, and was awarded a recommendation from F1000Prime. As part of her postdoctoral research she is investigating the person-to-person transmission landscape of the gut and oral microbiomes (Valles-Colomer et al, Nat. Microbiology 2022; Valles-Colomer et al, Nature (*under revision*)).

## EDUCATION AND TRAINING

September 2014 – June 2019

**PhD Biomedical Sciences – KU Leuven-VIB (Belgium)**
*Promotor:* Prof Dr Jeroen Raes; *Co-promotors:* Dr Sara Vieira-Silva & Prof Dr Marie Jossens

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

*Analysis of shotgun and 16S metagenomic datasets, wet lab protocols (DNA extraction and sequencing library preparation, (q)PCR, flow cytometry), numerical ecology, multivariate statistics, compositional data analysis, notions of machine learning.*

September 2012 - July 2014

**MSc Biomolecular Sciences – VUB (Belgium)**
*Training in Molecular Microbiology, Molecular Biology, Structural Biology, Biocatalysis, Biostatistics, Bioinformatics and omics (R, Python, Bash).*
*Grade: Greatest distinction (85%)*
*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)**
*Training in Biochemistry, Clinical and Environmental Microbiology, (Molecular) Genetics, Cellular/Molecular Biology, Virology, Genomics and Proteomics, Bioinformatics.*
*Grade: Outstanding (82%)*

September 2006 – June 2008

**Baccalaureate in Science and Technology – IES Jaume Callís (Spain)**
*Grade: Honours (94%)*

## PROFESSIONAL ACADEMIC POSITIONS

October 2019 – February 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

### First author publications

1. **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.
2. **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.
3. 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*, doi: 10.1038/s41564-019-0483-9.
4. **Valles-Colomer M**, Falony G, Darzi Y, Tigchelaar EF, Wang J, Tito RY, Joossens M, Wijmenga C, 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*, doi: 10.1038/s41564-018-0337-x.
5. Boesmans B\*, **Valles-Colomer M\***, Wang J, Eekhaut 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).
6. **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.

### Senior author publications

7. 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#. Variability of strain engraftment and predictability of microbiome composition after fecal microbiota transplantation across different diseases. *Nature Medicine*, under review.
8. 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

9. 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.
10. 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<sup>#</sup>, Qin H<sup>#</sup> (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.
  11. Beller L, Deboutte W, Falony G, Vieira-Silva S, Tito RY, **Valles-Colomer M**, Rymenans 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.
  12. Forslund SK\*, Chakaroun R\*, Zimmermann-Kogadeeva M\*, Markó L\*, Aron-Wisniewsky J\*, Nielsen T\*, Moitinho-Silva L, Schmidt TSB, Falony G, Vieira-Silva S, Adirouch 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, Hercberg 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*, doi: 10.1038/s41586-021-04177-9.
  13. 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.
  14. 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.
  15. 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<sup>#</sup>, Huttenhower C<sup>#</sup>, Spector TD<sup>#</sup>, Segata N<sup>#</sup> (2021). Microbiome connections with host metabolism and habitual diet from 1,098 deeply phenotyped individuals. *Nature Medicine*, 27(2), 321-332.
  16. 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.
  17. 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.
  18. Reynders T\*, Devolder L\*, **Valles-Colomer M**, Van Remoortel A, De Keyser J, Nagels G, D'hooghe M<sup>#</sup>, Raes J<sup>#</sup> (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.
  19. 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.
  20. Hansen LBS\*, Roager HM\*, Søndertoft NS\*, Gøbel RJ\*, Kristensen M, **Valles-Colomer M**, [43 authors], Gupta R<sup>#</sup>, Licht TR<sup>#</sup>, Pedersen O<sup>#</sup> (2018). A low-gluten diet changes the intestinal microbiome in healthy adults: a randomised cross-over trial. *Nature Communications*, 9(1):4630.

21. 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).
22. 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.
23. 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.
24. 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.

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

## TEACHING EXPERIENCE

May 2022	"Analysis of the human gut microbiome in the gut-brain axis context". Neuroscience School of Advanced Studies (Venice, Italy). <i>Workshop, 4 hours.</i>
April 2022	"Basic-to-Intermediate analyses of shotgun metagenomics data workshop". 3 <sup>rd</sup> World of Microbiome Conference (Vienna, Austria). <i>Workshop, 2 hours.</i>
February – April 2022	Teaching assistant in the course "Computational Microbial Genomics" of the MSc Computational and Quantitative Biology (University of Trento, Italy). <i>Practical course, 12 hour teaching assignment.</i>
February – April 2021	Teaching assistant in the course "Computational Microbial Genomics" of the MSc Computational and Quantitative Biology (University of Trento, Italy). <i>Practical online course, 12 hour teaching assignment.</i>
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). <i>Workshop, 8 hour workshop.</i>
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).

## GRANTS AND FUNDING

Grants	EMBO Postdoctoral Fellowship (130.000€) – EU, 2020-2022 "Broaden your Horizon" travel grant to attend NSAS Summer school (1.500€) – KU Leuven, Belgium, 2016 FWO doctoral grant (1110918N) (129.500€ including 3.720€/year of bench fee) – Belgium, 2015-2019 Merit scholarship based on academic results (10.000€) – VUB, Belgium, 2012-2014 Student-research assistant scholarship (3.000€) - Spanish Ministry of Education, 2011-2012 University scholarship for highly promising students (2.000€) – Spanish Ministry of Education, 2008-2012
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## INVITED CONFERENCES AND TALKS

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|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| October 2022 (upcoming) | 7 <sup>th</sup> International Conference on Clinical Metagenomics, Geneva, Switzerland. Invited oral presentation. <i>Variation and transmission of the human gut microbiota across multiple familial generations.</i> |
| July 2022               | Barcelona Debates on the Human Microbiome 2022, Barcelona, Spain. Invited oral presentation. <i>Person-to-person transmission of the gut and oral microbiomes.</i>                                                     |
| April 2022              | 3 <sup>rd</sup> World of Microbiome Conference, Vienna, Austria. Invited oral presentation. <i>Transmission of the oral microbiome.</i>                                                                                |
| April 2022              | Pharmabiotics 2022 Conference, Lyon, France. Invited oral presentation. <i>Genomic diversity and ecology of human-associated Akkermansia species in the gut microbiome.</i>                                            |
| March 2022              | New ideas in microbiome research conference, Australasian Human Microbiome Research Network, <i>online</i> . Invited oral presentation. <i>Vertical and horizontal transmission of the human microbiomes.</i>          |
| July 2021               | African Society for Bioinformatics and Computational Biology webinar, <i>online</i> . Invited oral presentation. <i>The neuroactive potential of the human gut microbiota in quality of life and depression.</i>       |
| June 2021               | 8 <sup>th</sup> International Human Microbiome Consortium Congress, <i>online</i> . Invited oral presentation. <i>The human gut microbiota in quality of life and depression.</i>                                      |
| December 2020           | World Microbiome, Neurodevelopment and Behavior Congress, <i>online</i> . Invited oral presentation. <i>The neuroactive potential of the human gut microbiota.</i>                                                     |
| May 2019                | National Gastroenterology Meeting, Jönköping, Sweden. Invited oral presentation. <i>Analysis of the gut microbiome in health and gastrointestinal disease.</i>                                                         |

## SELECTED CONFERENCES AND TALKS

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|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| January 2022   | 5 <sup>th</sup> Microbial Virtual International Forum, <i>online</i> . Selected Research Highlight. <i>Variation and transmission of the human gut microbiota across multiple familial generations.</i> Best Research Highlight award. |
| September 2018 | EMBO/EMBL Symposium The Human Microbiome, Heidelberg, Germany. Selected oral presentation. <i>Neuroactive potential of the human gut microbiota: a framework for gut-brain axis annotation from metagenomic data.</i>                  |
| July 2017      | FEMS Congress, Valencia, Spain. Selected oral presentation. <i>A framework for gut-brain axis annotation from metagenomic data.</i>                                                                                                    |
| September 2016 | NSAS Microbiota and Brain Summer school, Bressanone, Italy. Poster presentation. <i>Population-level association of microbiota composition with quality of life and depression.</i>                                                    |
| September 2015 | Methods in Epidemiology Symposium, Leuven, Belgium. Poster presentation. <i>Population-level association of microbiota composition with wellbeing parameters.</i>                                                                      |

## 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

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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

Mother tongue

Spanish, Catalan

Other languages

English (C2), French (B2.2), Italian (B2), Dutch (B1.2)