



MARIA LAURA FERRANDO, MSc Ph.D.

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A versatile and resourceful **PhD Molecular Microbiologist** with experience in planning and successfully executing scientific research oriented to the **therapeutic field**. Sixteen years of work experience in international settings. Solid written and communication skills. Research experience in academia and industry

AREAS OF EXPERTISE

- Infectious diseases - AMR
- Microbiota analysis
- Vaccine / Immunity
- Host-pathogen interactions
- Project Management
- Team supervision

PROFESSIONAL EXPERIENCE

RESEARCHER

FEB 2024 – PRESENT

C.N.R. - ISTITUTO DI RICERCA GENETICA E BIOMEDICA (IRGB), CAGLIARI (IT)

- investigate the impact of intestinal and vaginal microbiota on the onset of cardio-metabolic diseases in women.

RESEARCHER

JUL 2022 – JAN 2024

IRCCS SAN RAFFAELE SCIENTIFIC INSTITUTE, EMERGING BACTERIAL PATHOGENS UNIT. MILAN (IT)

- In charge of projects on Antimicrobial Resistance (AMR) in multidrug-resistant micro-organisms (MDRO)
- In charge of Medical reports for nosocomial infections caused by MDRO and diagnosed by whole-genome sequencing
- Scientific writing (reviews, reports and publications)

PRODUCT MANAGER MICROBIAL GENOMICS

BASECLEAR - EXPERTS IN GENOMIC SERVICES. LEIDEN (NL)

DEC 2021 – JAN 2022

Responsible for the development of new products and services within product **lines** related to human and animal microbiome research using Next Generation Sequencing (NGS) techniques

- Follow and keep informed of developments in the field and actively respond and contribute to these
- In charge of quality control, improvement of products and services
- Communication with external and internal customers before, during and after projects
- Provide support with budgeting and actively contribute to cost control

POSTDOCTORAL RESEARCHER - "Program for innovative global prevention of zoonotic bacterial disease."

WAGENINGEN UNIVERSITY. HOST-MICROBE INTERACTOMICS. WAGENINGEN (NL)

NOV 2017 – OCT 2021

Responsible for projects on 1) bacterial virulence, 2) the influence of microbiota on infectious diseases, 3) the development of vaccines against zoonotic pathogens

- Plan, design, and perform experiments with an analytical and problem-solving mindset to study the use of potential therapeutic targets in bacterial infectious diseases.
- Oral and written communication of the achievements to scientific bodies or working groups
- Training and supervision of the personnel including 3 PhD candidates, 3 BSc and 2 MSc students, 2 technicians

Major knowledge: metagenomics and metatranscriptomics sequencing, bioinformatics, high-throughput antigens production, mutagenesis by CRISPR/Cas9, set up of multiplex qPCR, cells/organoid culture, *in vitro* biological assays

POSTDOCTORAL RESEARCHER - "Project on global health and zoonosis preventions."

ACADEMIC MEDICAL CENTER. DEPT. MEDICAL MICROBIOLOGY - AMSTERDAM (NL)

MAR 2012 - MAR 2016

Responsible for projects on the transmission of zoonotic pathogens from pig to human using *in vivo* and *in vitro* models

- Prepared protocols; planned, executed experiments, and analysed data
- Production of both verbal and written scientific communications
- Training the personnel of laboratories involved in data collection and reporting

Major knowledge: molecular cloning, mutagenesis, *in vitro* bacterial interaction with host-cell, *in vivo* infection experiments, gene expression, immunoscreening, advanced microscopy imaging, genetic analysis of bacterial population

PHD CANDIDATE - “Mechanisms of infection of the major zoonotic pathogen in pigs.”

WAGENINGEN UNIVERSITY. HOST-MICROBE INTERACTOMICS. WAGENINGEN (NL)

JAN 2008 - JUN 2012

During this period, I have acquired strong knowledge in bacterial genomics, molecular biology, and infection biology to study the development and progression of infectious diseases in the host

Major knowledge: mutagenesis, biochemistry, RT-qPCR, microarray, immunoassays, cell-based biological assays

RESEARCH FELLOWSHIP WINNER FOR 2 YEARS (Master&Back European post-graduated program)

UNIVERSITY OF AMSTERDAM. AMSTERDAM (NL)

JUN 2006 - JAN 2008

Development of novel anti-microbial agents. Molecular modelling

Major knowledge: cloning, expression and purification (HPLC) of recombinant proteins

CLINICAL RESEARCH ASSOCIATE

UNIVERSITY OF CAGLIARI. ISTITUTO DI SANITÀ PUBBLICA. CAGLIARI (IT)

MAY 2004 - MAY 2006

Microbiological environmental monitoring

CLINICAL RESEARCH ASSOCIATE

EXPERIMENTAL ZOOTECNICAL INSTITUTE LOMBARDIA-EMILIA ROMAGNA. BRESCIA (IT)

MAY 2002 - MAY 2004

Development of molecular methods for the detection of zoonotic viruses in animals and food

RESEARCH FELLOWSHIP WINNER FOR 3 MONTHS (Italian National Grant, CIB)

NATIONAL INSTITUTE F AGRICULTURE & BOTANY (NIAB). CAMBRIDGE (THE UK)

2000

Development of molecular markers (microsatellite DNA) in plants

RESEARCH ASSOCIATE

UNIVERSITY OF PARMA. PARMA (IT)

JAN 1999 - DEC 2001

Detection of genetically modified organisms (GMOs) in food

EDUCATION

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| ▪ PhD in Host-Microbe Interactions (4 years), Wageningen University (NL) | 2012 |
| ▪ Postgraduate Specialization in “Microbiology and Virology” (4 years), University of Cagliari (IT) | 2007 |
| ▪ Master in Science , Biological Sciences, University of Cagliari (IT) | 1998 |

SKILLS AND PROFESSIONAL KNOWLEDGE

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- Strong knowledge of multiple laboratory techniques in **Clinical Microbiology**: handling Category 2 bacterial pathogens, microbial culture, biochemical tests, genotyping, multidrug-resistant micro-organisms (MDRO) molecular typing and surveillance service for the Hospital, Epidemiological cut-off values (ECOFFs) according EUCAST, determination Minimum inhibitory concentration (MIC) for antibiotics by broth microdilution, E-test ; **Molecular Biology**: Plasmid purification, DNA and RNA extraction including bead beading technique, quantification of DNA/RNA/proteins by Qubit Fluorometers, electrophoresis, PCR, simplex and multiplex qPCR, probes design (TaqMan, Beacons), Northern and Western blotting, cloning, high-throughput LIC cloning and expression test, mutagenesis by gene replacement with antibiotic cassette marker and CRISPR/Cas9 system, complemented mutants, DNA-protein interaction (EMSA); **Transcriptomics**: qRT-PCR, microarrays, RNA-seq; **Biochemistry**: *in vitro* protein production and recombinant purification protein by affinity chromatography and size exclusion with HPLC Akta chromatography system, enzymes assays, SDS-PAGE; **Cell Biology**: cell culture, organoid systems from porcine ileum, cytotoxicity assay, transepithelial electrical resistance (TEER), Permeability Assays (FITC)-dextran, IF confocal microscopy, immunohistochemistry; **Bacteria-host interactions**: bacterial adhesion to, invasion and translocation of host epithelium; **In vivo infection**: *in vivo* experiment using animal models (piglets); **Immunology**: Dendritic Cells culture, phagocytosis assay, immunoassay (flow cytometry), Toll-like receptor signaling assay, ELISA; **Cell-based biological assays** SpectraMax M5 Multimode microplate reader for fluorescence (Molecular Devices), luminescence assays
 - **Hospital surveillance: Ridom SeqSphere+** bacterial typing with whole genome shotgun (WGS) data
 - **Metagenomics 16S rRNA analysis pipeline**: basic knowledge of Illumina NGS and Nanopore platforms, CLC Microbial Genomics Platform (Qiagen), Galaxy platform Mothur Microbiome Analyst, Canoco 5 for visualization of multivariate data

- **Other bioinformatics skills for genomic analysis:** Artemis Comparison Tool, eBURST V3-MLST, MicrobesOnLine, RegPrecise DB, MEME, GenBank, BLAST; **DNA/Protein manipulation:** Benchling, VectorNTI, PROSITE, ExPASy, Oligo6, Primer Express; **multiplex qPCR design** Beacons designer 8.0; **DNA sequence Analysis:** Bioedit, Chromas, CodonCode Aligner, Clustal Omega; **Omics data:** Blast2Go, TMEV (Multiple Array Viewer), KEGG **Statistical analysis of data** (e.g., GraphPad Prism)
- **Languages:** Italian (Mother Language), English (Proficient, C1 level), Dutch (Beginners, A1-A2 level)

PROFESSIONAL TRAINING:

- **Metagenomics** applied to Surveillance of Pathogens & Antimicrobial Resistance (workshop, e-learning), Tallinn (EE) **2018**
- **Quality systems course:** Good Manufacturing Practices (**GMP**), Hogeschool Leiden, (NL) **2016**
- **Biosafety Practices** and Biological Agents (**BSL2**), Good Laboratory Practice (**GLP**). AMC Amsterdam **2012**
- **Article 9**, International Course Laboratory Animal Science, Utrecht University **2011**
- **Statistics for the Life Sciences.** Wageningen University **2011**
- **Statistics course Animal Design of Experiments.** Wageningen University **2011**

Publications and congresses

- **Author of 19 scientific publications in international journals (plus 3 under revision)**
- **Presenter at 14 international conferences (8 oral* - 6 poster presentations) * 3 times INVITED SPEAKER**

PEER-REVIEWED PUBLICATIONS:

1. Alvaro A., Piazza A., Papaleo S., Perini M, Pasala A.R., Panelli S., Nardi T., Nodari R., Sterzi L., Pagani C., Merla C., Castelli D., Olivieri E., Bracco S., Ferrando M.L., Saluzzo F., Rimoldi S.G., Corbella M., Cavallero A., Prati P., Farina C., Cirillo D.M., Zuccotti G., Comandatore F. (2024) Cultivation and sequencing-free protocol for *Serratia marcescens* detection and typing. *iScience* 27: 109402.
2. Sterzi, L., Nodari, R., Di Marco, F., Ferrando, M.L., Saluzzo, F., Spitaleri, A., et al. (2024) Genetic barriers more than environmental associations explain *Serratia marcescens* population structure. *Commun Biol* 7: 468.
3. Murray GGR, Hossain ASMM, Miller EL, Bruchmann S, Balmer AJ, Matuszewska M, Herbert J, Hadjirin NF, Mugabi R, Li G, Ferrando ML, Fernandes de Oliveira IM, Nguyen T, Yen PLK, Phuc HD, Zaw Moe A, Su Wai T, Gottschalk M, Aragon V, Valentin-Weigand P, Heegaard PMH, Vrieling M, Thein Maw M, Thidar Myint H, Tun Win Y, Thi Hoa N, Bentley SD, Clavijo MJ, Wells JM, Tucker AW, Weinert LA. (2023) The emergence and diversification of a zoonotic pathogen from within the microbiota of intensively farmed pigs. *Proc Natl Acad Sci U S A* 120: e2307773120.
4. Gussak A, Ferrando ML, Schrama M, van Baarlen P, Wells JM. Precision Genome Engineering in *Streptococcus suis* Based on a Broad-Host-Range Vector and CRISPR-Cas9 Technology. *ACS Synth Biol*. (2023) Aug 21. doi: 10.1021/acssynbio.3c00110. Epub ahead of print. PMID: 37602730.
5. Casula E, Contu MP, Demontis C, Coghe F, Steri GC, Scano A, Ferrando ML & Orrù G. (2022) "Changes in the oral status and periodontal pathogens in a Sardinian rural community from pre-industrial to modern time." *Sci Rep*. Sep 23;12(1):15895. doi: 10.1038/s41598-022-20193-9.
6. Ferrando ML, Gussak A, Mentink S, Gutierrez MF, van Baarlen P, Wells JM. (2021). Active Human and Porcine Serum Induce Competence for Genetic Transformation in the Emerging Zoonotic Pathogen *Streptococcus suis*. *Pathogens* 10.
7. Orrù G, Scano A, Fais S, Loddo M, Carta MG, Steri GC, Santus S, Cappai R, Ferrando ML and Coghe F. (2021). Evaluation of "Caterina assay": An Alternative Tool to the Commercialized Kits Used for *Severe Acute Respiratory Syndrome Coronavirus 2* (SARS-CoV-2) Identification. *Pathogens* 10:325.
8. Ferrando ML, Coghe F, Scano A, Carta MG, Orrù G. (2021). Co-infection of *Streptococcus pneumoniae* in Respiratory Infections Caused by SARS-CoV-2. *Biointerface Res Appl Chem* 11:12170–12177.
9. Vacca C, Contu MP, Rossi C, Ferrando ML, Blus C, Szmukler-Moncler S, Scano A, Orrù G. (2020). In vitro interactions between *Streptococcus intermedius* and *Streptococcus salivarius* K12 on a titanium cylindrical surface. *Pathogens* 9:1–15.
10. van Dijk IA, Ferrando ML, van der Wijk AE, Hoebe RA, Nazmi K, et al. (2017) Human salivary peptide histatin-1 stimulates epithelial and endothelial cell adhesion and barrier function. *FASEB J*.
11. Ferrando ML, Willemsse N, Zaccaria E, Pannekoek Y, van der Ende A, et al. (2017) Streptococcal Adhesin P (SadP) contributes to *Streptococcus suis* adhesion to the human intestinal epithelium. *PLoS One* 12: e0175639.
12. Ferrando ML, Schultz C (2016) A hypothetical model of host-pathogen interaction of *Streptococcus suis* in the gastrointestinal tract. *Gut Microbes*: 0.
13. Ferrando ML, de Greeff A, van Rooijen WJ, Stockhofe-Zurwieden N, Nielsen J, et al. (2015) Host-pathogen Interaction at the Intestinal Mucosa Correlates With Zoonotic Potential of *Streptococcus suis*. *J Infect Dis* 212: 95-105.
14. Ferrando ML, van Baarlen P, Orru G, Piga R, Bongers RS, et al. (2014) Carbohydrate availability regulates virulence gene expression in *Streptococcus suis*. *PLoS One* 9: e89334.
15. Meijerink M, Ferrando ML, Lammers G, Taverne N, Smith HE, et al. (2012) Immunomodulatory effects of *Streptococcus suis* capsule type on human dendritic cell responses, phagocytosis and intracellular survival. *PLoS One* 7: e35849.
16. Ferrando ML, Fuentes S, de Greeff A, Smith H, Wells JM (2010) ApuA, a multifunctional alpha-glucan-degrading enzyme of *Streptococcus suis*, mediates adhesion to porcine epithelium and mucus. *Microbiology* 156: 2818-2828.
17. Orru G, Ferrando ML, Meloni M, Liciardi M, Savini G, et al. (2006) Rapid detection and quantitation of *Bluetongue virus* (BTV) using a Molecular Beacon fluorescent probe assay. *J Virol Methods* 137: 34-42.

18. Losio MN, Ferrando ML, Daminelli P, Chegiani F (2004) Setting up a PCR-based method to trace animal species in processed meat products. *Vet Res Commun* 28 Suppl 1: 253-255.
19. Bertasi B, Bignotti E, Ferrando ML, D'Ambrosia F, Scaratti L, et al. (2003) The Standardization of a Molecular Biology Method to Verify the Presence of *Microcystis aeruginosa*. *Veterinary Research Communications* 27: 277-279.

PUBLICATIONS (ONLINE OR UNDER REVIEW)

1. Gaiser R, Ferrando ML, Oddo A, Pereira M, Guan X, Molist F, Fernandez-Gutierrez M, Fredriksen S, Bryant C, Petras D, Dorrestein P, Boeren S, Medema M, Hill C, Kleerebezem M, van Baarlen P, Wells JM "A mammalian commensal of the oropharyngeal cavity, produces antibiotic and antiviral valinomycin in vivo" (2022). <https://www.researchsquare.com/article/rs-126949/v1> under revision in *Nature Communications*
2. S Fredriksen, C Neila-Ibáñez, I Hennig-Pauka, X Guan, J Dunkelberger, I Fernandes de Oliveira, ML Ferrando, F Correa-Fiz, V Aragon, J Boekhorst, P van Baarlen, JM Wells (2022). *Streptococcus suis* infection on European farms is associated with an altered tonsil microbiome and resistome bioRxiv 2022.08.01.500980; <https://doi.org/10.1101/2022.08.01.500980>

CONFERENCE PROCEEDINGS:

Oral presentations - Invited speaker*

1. Vinerbi E, Maschio A, Busonero F, Crobu F, Ferrando ML, Lenarduzzi S, Mazzà D, Spreckels JE, Stracquadini M, Elena Stefani, De Seta F, Girotto G, Sanna S. Vaginal microbiome compositional changes during a menstrual cycle: results from the women4health cohort. 10th International Human Microbiome Consortium Congress (IHMC) 2024
2. Badalucco Ciotta F, Saluzzo F, Pescò A, Mori G, Carletti S, Rizzi P, Chiurlo M, Ripa M, Tassan Din C, Tonelli M, Di Marco F, Ferrando ML, Batignani V, Moro M, Scarpellini P, Mancini N, Castagna A, Cirillo D M, Oltolini C. Ceftazidime/avibactam resistance in KPC-*Klebsiella pneumoniae*: genomic characterisation and clinical features. European Congress of Clinical Microbiology and Infectious Diseases (ECCMID) 2023
3. Gussak A, Ferrando ML, Murray G, Hossain M, Weinert L, van Baarlen P, Wells JM.. Identification and characterization of genes contributing to the virulence of the major swine pathogen *Streptococcus suis*, p. 52. In *WIAS Annual Conference 2020: Frontiers in Animal Sciences*. WIAS.
4. Fredriksen S, Neila C, de Oliveira IF, Murray G, Guan X, Ferrando ML, Correa-Fiz F, van Baarlen P, Aragon V, Wells JM. The tonsillar microbiome of *Streptococcus suis* diseased piglets, p. 22. In *WIAS Annual Conference 2020: Frontiers in Animal Sciences*. WIAS.
5. Ferrando M.L. Growth of *Streptococcus suis* in normal porcine serum induces natural competence and increased expression of virulence factors and metabolic pathways predicted to promote survival in the blood and organs 2019 Montreal (Canada) 4th International workshop on *Streptococcus suis*
6. Ferrando M.L.* "Streptococcus suis an intestinal pathogen for pigs and humans." Annual Meeting of the Japanese Society for Bacteriology 2016 Osaka (Japan)
7. Ferrando M.L.,* et al. "Host-pathogen interaction at the intestinal mucosa correlates with zoonotic potential of *S. suis*" *Medische Microbiologie en de Nederlandse Vereniging voor Microbiologie (NVvM)* 2015 Papendal (NL)
8. Ferrando M.L., "Host-pathogen interaction at the intestinal mucosa correlates with zoonotic potential of *Streptococcus suis*." 3rd International One Health Congress 2015 Amsterdam
9. Ferrando M.L.,* "Interaction of *Streptococcus suis* with intestinal epithelial cells" 1st International workshop on *Streptococcus suis* Canada-China collaboration 2013 Beijing (China)
10. Ferrando M.L., et al. "Streptococcus suis interaction with human intestinal epithelial cells." *Medische Microbiologie en de Nederlandse Vereniging voor Microbiologie (NVvM)* 2013 Papendal (NL)
11. Ferrando M.L., et al. "Metabolic pathways targets for anti-infective" 2nd Stars network and Marie Curie training event 2011 Siena (IT)
12. Ferrando M.L., et al. "Transcriptional control mechanisms linking carbohydrate metabolism, colonization and virulence in *Streptococcus suis*." XVIII Lancefield International Symposium. 2011 Palermo (IT)
13. Ferrari M, Soncini M, Losio MN, Ferrando ML, Gilberti F, Corradi A, Petroniani P. Xenotrapianti e rischi correlati alla trasmissione dei retrovirus endogeni del suino. 2003 *Large Animals Review* 4:39-43.
14. Ferrari M, Tosini A, Corradi A, Borghetti P, Scalvini A, Cantoni AM, Ferrando ML, Alborali L. Experimental infection with a Porcine Reproductive and Respiratory Syndrome Virus (PRRSV) strain with relevant genomic mutations in the ORF5 region 2003. Congress paper – 4th International Symposium on Emerging and Re-emerging Pig Diseases

Poster presentations

1. Chair-person poster session* Ferrando M.L., et al. "Host-pathogen interaction at the intestinal mucosa correlates with zoonotic potential of *Streptococcus suis*." XIX Lancefield International Symposium. 2014 Buenos Aires (AR)
2. Ferrando M.L., et al. "Streptococcus suis virulence determinants associated with zoonotic potential" Young Antigone meeting 2014, Scheveningen (NL)
3. Ferrando M.L., et al. "Intestinal translocation contributes to *Streptococcus suis* infection in piglets." *Medische Microbiologie en de Nederlandse Vereniging voor Microbiologie (NVvM)* 2014 Papendal (NL)

4. Ferrando M.L., et al. "ApuA a multifunctional α -glucan-degrading enzyme of *Streptococcus suis* mediates adhesion to porcine epithelium and mucus" Medische Microbiologie en de Nederlandse Vereniging voor Microbiologie (NVvM) **2010** Papendal (NL)
5. Ferrando M.L., et al. "Role of a multifunctional carbohydrate utilization gene *apuA*, in the virulence of *Streptococcus suis*". Microbial Pathogenesis & Host Response. **2009** Cold Spring Harbor Laboratory, New York (USA)
6. Ferrando M.L., et al. "Surface virulence determinants of *Streptococcus suis*." WIAS Science Day **2008**. Wageningen

SEMINAR AND MEETINGS:

*Invited speaker**

1. Ferrando M.L.* "Microbiome development in piglets and colonization resistance against zoonotic pathogens" **2018** Seminar at Cagliari University (IT)
2. Ferrando M.L., et al. "Microbiome development in piglets and colonization resistance against *Streptococcus suis*" 1° meeting PIGSs **2018** Cambridge (UK)
3. Ferrando M.L., et al. "Microbiota-mediated colonization resistance against pathogens" NCOH Science Café **2018** Wageningen
4. Ferrando M.L., et al. "Role of Streptococcal adhesin protein P in the interaction at the host intestinal mucosa of *Streptococcus suis*." Young Antigone meeting, **2015**, Rotterdam
5. Ferrando M.L., et al., "A transcriptional control mechanism linking carbohydrate metabolism and virulence in *S. suis*" WIAS Science Day **2011** Wageningen

References

- Dr Peter van Baarlen (WUR), Assistent Professor, Supervisor
- Prof Jerry Wells (WUR) Full professor, HMI Chair group, Supervisor
- Prof Constance Schultsz (AMC) Full professor, Supervisor
- Prof Menno de Jong (AMC) Full professor, Project coordinator
- Dr Elisabetta Giufra (INRA) Project leader, Collaborator
- Prof Germano Orru' (UNICA) Full professor, Molecular Biology Service (AOU-Cagliari) Chair group, Supervisor
- Dr Walter Pirovano (BaseClear), Innovation Manager, Supervisor