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Education

- January, 2009 Ph.D. (Genetic and Biomolecular Sciences), University of Pavia, Italy.
- June, 2006 Qualification diploma to practice the profession of biologist.
- July, 2005 Laurea Specialistica (Master Degree) in Experimental and Applied Biology, (110/110 *cum laude*, awarded with dignity of printing), Science Faculty, University of Pavia, Italy.
- July, 2003 Bachelor Degree in Biological Sciences, (110/110 *cum laude*) Science Faculty, University of Pavia, Italy.
- July, 2000 High School Diploma at the Scientific High School F. Vercelli, Asti, Italy.

Research experience

- 2009-present Postdoctoral fellow in the Laboratory of Microbiology and Microsystems, Global Health Institute, EPFL, Lausanne, Switzerland.
Research theme: **Study of mycobacterial heterogeneity *in vitro* and *in vivo* at the single-cell level, using microfluidic platforms.**
Supervisor: Prof. John D. McKinney.
- Combination of microfluidics and time-lapse imaging to visualize single-cell heterogeneity in *M. tuberculosis* under stress and explanted from host tissue.
- Development of new mycobacterial fluorescent reporter strains to investigate intracellular cell functions in real-time, within live cells.
- Development of new microfluidic platforms to visualize host-pathogen interaction at the single-cell level.
- 2008-2009 Postdoctoral fellow in the Unit of Structural Microbiology, Institut Pasteur, Paris, France.
Research themes: **Structural and biochemical characterization of NfnB, a *Mycobacterium smegmatis* nitroreductase, and PknB a *Mycobacterium tuberculosis* kinase.** - EU 6th Framework Programme: NM4TB.
Supervisor: Prof. Pedro Alzari.
- Crystal structure and biochemical analysis of a mycobacterial nitroreductase responsible for the inactivation of a completely novel antitubercular drug class.
- 2005-2008 PhD student in the laboratory of General and Molecular Microbiology, Dept. of Genetics and Microbiology, University of Pavia, Italy.
Research theme: **"Benzothiazinones as new antimycobacterial drugs: identification and characterization of the cellular target and resistance mechanism".**- EU 6th Framework Programme: NM4TB.
Supervisors: Prof. Giovanna Riccardi and Prof. Edda De Rossi.
- Identification of a novel mycobacterial drug target (Research work highlighted in F1000 - <http://f1000.com/prime/1159796>).
- 2002-2005 Master thesis in the laboratory of General and Molecular Microbiology, Dept. of Genetics and Microbiology, University of Pavia, Italy.

Research themes: **Antimicrobial resistance in *Burkholderia cepacia* complex strains isolated from cystic fibrosis patients: identification and characterization of efflux transporters.**

Mechanisms of resistance in mycobacteria and efflux pumps.

Supervisor: Prof. Edda De Rossi.

Teaching experience

2013	Supervisor for International Summer Research Program at EPFL, Switzerland
2012-2013	Supervisor for Bachelor projects at EPFL, Lausanne, Switzerland.
2008	Assistant in Microbiology Lessons to undergraduate students, Pavia, Italy.
2008	Assistant supervisor for Master theses at Science Faculty, Pavia, Italy.
2007	Assistant in Microbiology Lab Exercises for SILSIS students, Pavia, Italy.
2005-2008	Assistant in General Microbiology Lab Exercises at Science Faculty, Pavia, Italy.

Training courses

Practical training course: Techniques of Blood Collection in Mice, RESAL, Geneva, September 2014.

Training program: Analysis of Genomics Data: II. Analysis of High Throughput Sequencing Data, EPFL Bioinformatics and Biostatistics Core Facility, March 2014.

Course N°13-0168 Matlab for beginners, 2 days, Domaine IT - EPFL, February 2013.

Workshop: Development of wireless biosensors for animal and medical application - CHUV, EPFL, RESAL, Lausanne, July 2012.

RESAL Module 1: Introductory Course in Laboratory Animal Science (theory and practice), Certificate for Animal Experimentation, EPFL, Lausanne, February 2011.

Clean Room training at the Center of MicroNano Technology (CMI) - EPFL, 2010.

Course: Microbial Proteomic Techniques - Biotechnology Foundation Turin, Italy, April 2006.

Training Courses for Laboratory Security on Biological, Chemical and Radioactive Hazards.

Honors and Awards

Awarded with a Research Grant from the Institut Pasteur Scientific Council, to head a 5-year research group (starting in May 2015), granted by the Agence Nationale de la Recherche - Investissements d'Avenir, in the framework: Laboratory of Excellence - Integrative Biology of Emerging Infectious Diseases, Paris, France, June 2014.

Member of the Editorial Board for the Mycobacterial Diseases Journal, 2014.

Prize Novartis 2009 for the best publication on "Microbial pathogens: functional genomics, pathogenicity mechanisms, vaccines": Makarov V, **Manina G** *et al.* 2009. *Science* 324: 801-804.

Award for the best Ph.D. thesis, University of Pavia, Italy, 2009.

Awarded with a Doctorate Fellowship on "Genetic and Biomolecular Sciences", Dept. of Genetics and Microbiology, University of Pavia, Italy, 2005.

Awarded with Scholarships during thesis studies, E.Co.M.A.P. Roma, Italy, 2002-2005.

Invited lesson and research seminar at Université de Lausanne - Faculty of Biology and Medicine, Switzerland, June 2014.

Invited talk at Institut Pasteur, Paris, France, March 2014

Invited talk at Life Science Symposium - Global Health meets Infection Biology, EPFL, Switzerland, and awarded by Stiftung Forschung Infektionskrankheiten, Basel Switzerland, 2012.

Invited talk at Curr Trends Biomed - The Biology of Intracellular Bacterial Pathogens, UNIA, Spain, 2011.

Invited talk at 11th FISV Annual Congress, Riva del Garda, Italy, 2009.

Invited talk at 7th International Conference on the Pathogenesis of Mycobacterial Infections, Saltsjöbaden, Sweden, 2008.

Publications

10. **Manina G**, Dhar N, McKinney JD. Single-cell dynamics of DNA-damage response in *Mycobacterium smegmatis*. (Manuscript in preparation).
9. **Manina G**, Dhar N, McKinney JD (2015). Stress and host immunity amplify *Mycobacterium tuberculosis* phenotypic heterogeneity and induce nongrowing metabolically active forms. **Cell Host & Microbe** (In press: <http://dx.doi.org/10.1016/j.chom.2014.11.016>).
8. Riccardi G, Pasca MR, Chiarelli LR, **Manina G**, Mattevi A, Binda C (2013) The DprE1 enzyme, one of the most vulnerable targets of *Mycobacterium tuberculosis*. **Appl Microbiol Biotec** 97(20):8841-8.
7. **Manina G**, McKinney JD (2013) A single-cell perspective on Non-Growing but Metabolically Active (NGMA) bacteria. **Curr Top Microbiol** 374:135-61.
6. **Manina G**, Pasca MR, Buroni S, De Rossi E and Riccardi G (2010) Decaprenylphosphoryl-beta-D-ribose 2'-epimerase from *Mycobacterium tuberculosis* is a magic drug target. **Curr Med Chem** 17(27):3099-108.
5. **Manina G***, Bellinzoni M*, Pasca MR*, Neres J, Milano A, de Jesus Lopes Ribeiro AL, *et al.* (2010) Biological and structural characterization of the *Mycobacterium smegmatis* nitroreductase NfnB, and its role in benzothiazinone resistance. **Mol Microbiol** 77(5):1172-85. (***Equal contribution**)
4. Makarov V*, **Manina G***, Mikusova K*, Möllmann U*, Ryabova O, Saint-Joanis B, Dhar N, *et al.* (2009) Benzothiazinones kill *Mycobacterium tuberculosis* by blocking arabinan synthesis. **Science** 324(5928): 801-4. (***Equal contribution**)
3. Milano A, Pasca MR, Provvedi R, Lucarelli AP, **Manina G**, de Jesus Lopes Ribeiro AL, Manganelli R and Riccardi G (2008) Azole resistance in *Mycobacterium tuberculosis* is mediated by the MmpL5-MmpS5 efflux system. **Tuberculosis (Edinb)** 89(1):84-90.
2. Guglierame P, Pasca MR, De Rossi E, Buroni S, Arrigo P, **Manina G** and Riccardi G (2006) Efflux pump genes of the resistance-nodulation-division family in *Burkholderia cenocepacia* genome. **BMC Microbiology** 6(66):1-14.
1. Buroni S, **Manina G**, Guglierame P, Pasca MR, Riccardi G and De Rossi E (2006) LfrR is a repressor that regulates expression of the efflux pump LfrA in *Mycobacterium smegmatis*. **Antimicrob Agents Chemother** 50(12):4044-52.

Poster Abstracts and Presentations

10. **Manina G**, Dhar N, McKinney JD. Real-time single-cell imaging to analyze growth dynamics and heterogeneity of *Mycobacterium tuberculosis* during infection. Life Science Symposium 2012 - Global Health meets Infection Biology, EPFL, Lausanne, Switzerland, August 29-31, 2012. **Selected for short talk.**
9. Delincé M, Bureau J-B, Santi I, **Manina G**, Soldati T, McKinney JD. Real-time single-cell analysis of *Dictyostelium*-mycobacterium interactions. Annual International *Dictyostelium* Conference, Madrid, Spain, July 29 - August 2, 2012.
8. **Manina G**, Dhar N, McKinney JD. Real-time single-cell approach towards understanding mycobacterial heterogeneity and stress response. Gordon Research Conference on Microbial Stress Response, Mount Holyoke College in South Hadley, MA United States, July 15-20, 2012.

7. **Manina G**, Dhar N, McKinney JD. Real-time single-cell imaging to analyze the growth dynamics and heterogeneity of mycobacteria during infection. Current Trends in Biomedicine - The Biology of Intracellular Bacterial Pathogens - UNIA, Baeza, Spain, October 24-26, 2011. **Selected for short talk.**
6. **Manina G**, Sivagnanam V, Dhar N, McKinney JD. Microfluidic platform for time-lapse imaging of *Dictyostelium discoideum* infected with *Mycobacterium marinum*. EPFL MicroNanoFabrication Annual Review Meeting, Lausanne, Switzerland, May 10, 2011.
5. **Manina G**, Dhar N, McKinney JD. Microfluidic platform for time-lapse imaging of *Mycobacterium tuberculosis* – macrophage interaction at single cell resolution. EPFL MicroNanoFabrication Annual Review Meeting, Lausanne, Switzerland, May 18, 2010.
4. **Manina G**, Bellinzoni M, Pasca MR, Mikusova K, Milano A, Makarov V, Buroni S, Ribeiro AL, Lucarelli AP, De Rossi E, Cole ST, Alzari PM, Riccardi G. Role in benzothiazinone resistance of nitroreductase NfnB of *Mycobacterium smegmatis*. XXVIII SIMGBM National Meeting, Spoleto, Italy, June 11-13, 2009.
3. **Manina G**, Makarov V, Pasca MR, Ryabova O, Buroni S, De Rossi E, Milano A, Moellmann U, Kordulakova J, Mikusova K, Riccardi G, Cole ST. Rv3790 is the cellular target for benzothiazinones, a new promising antitubercular drug class. 10th FISV Annual Congress, Riva del Garda, Italy, September 24-27, 2008.
2. **Manina G**, Makarov V, Pasca MR, Ryabova O, Buroni S, De Rossi E, Milano A, Moellmann U, Kordulakova J, Mikusova K, Riccardi G, Cole ST. Identification and characterization of the cellular target for benzothiazinones, a new potential antitubercular drug class. Seventh International Conference on the Pathogenesis of Mycobacterial Infections, Saltsjöbaden, Sweden, June 26-29, 2008. **Selected for short talk.**
1. **Manina G**, Pasca MR, De Rossi E, Milano A, Riccardi G. Identification of cellular targets of new antitubercular drugs. 8th FISV Annual Congress, Riva del Garda, Italy, September 28 - October 1, 2006.

Coauthor in 7 additional posters not listed.

International application (Patent Cooperation Treaty)

Riccardi G, **Manina G**, Pasca MR. "An effective new drug target for the treatment of tuberculosis". International Application in conformity with Patent Cooperation Treaty PCT/EP2008/001088.

Riccardi G, **Manina G**, Pasca MR. "Nitroreductase NfnB from *Mycobacterium smegmatis*". International Application in conformity with Patent Cooperation Treaty PCT/EP2008/009231.

Scientific Expertise

Microbiology and molecular biology skills.

Structural biology techniques.

Expertise to work in BioSafety Level 2 and BioSafety Level 3 environments.

Certification in animal experimentation including handling of animals in BioSafety Level 3 environment.

Routine cell culture techniques.

Fluorescence microscopy – Live cell imaging.

Flow cytometry.

Basic micro-fabrication technologies (clean room) - mask design and writing, photolithography, deep reactive ion etching, ionic bonding, PDMS device fabrication.

Computer Skills

Office, Prism, Life Science databases and basic bioinformatic programs, image processing using ImageJ and Fiji, CleWin, L-Edit, basics in Matlab.

Language Skills

Italian - Mother tongue

English - Advanced level (Preliminary English Test; Oxford Placement Test 1).

French - Good level of reading and comprehension, and basic oral expression.

Referees

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Pedro Alzari, Group Leader. Institut Pasteur, Structural Microbiology Unit, CNRS URA2185, Rue du Dr. Roux 25, 75724 Paris cedex 15, France. Tel: +33 (0)1 45688607; Fax: +33 (0)1 45688604; e-mail: pedro.alzari@pasteur.fr.

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