

PERSONAL INFORMATION Alessandra Polissi

POSITION Full Professor of Microbiology  
Department of Pharmacological and Biomolecular Sciences  
University of Milano

WORK EXPERIENCE

2015-2018 Associate Professor of Microbiology  
Department of Pharmacological and Biomolecular Sciences  
University of Milano

2007-2015 Associate Professor of Microbiology  
Department of Biotechnology and Biosciences  
University of Milano-Bicocca

2003-2007 Research associate  
Department of Biotechnology and Biosciences  
University of Milano-Bicocca

1996-2002 Group Leader -Department of Microbiology  
GlaxoSmithKline Research Medicine Center  
Verona (IT) - Stevenage (UK)

1990-1995 Maitre Assistante  
Department of Medical Biochemistry  
University of Geneva  
Geneva - Switzerland

EDUCATION AND TRAINING

1987-1990 PhD in Cellular and Molecular Biology  
University of Milano

PERSONAL SKILLS

Mother tongue(s) Italian

Other language(s)

	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken interaction	Spoken production	
English	C2	C2	C2	C2	C2
French	C2	C2	C2	C2	B2

Levels: A1/A2: Basic user - B1/B2: Independent user - C1/C2 Proficient user  
[Common European Framework of Reference for Languages](#)

- Communication skills**
- Teaching activity  
Applied Microbiology for Pharmaceutical Chemistry, Università degli Studi di Milano  
Applied Microbiology and Hygiene, Pharmacy, Università degli Studi di Milano
  - Speakers at numerous national and international meetings
- Organisational / managerial skills**
- Head of the Molecular Microbiology laboratory. The laboratory is composed by 1 Assistant Professor, 2 PhD students, 1 post-doctoral fellow and graduated students preparing their experimental thesis.
  - Erasmus Delegate for the Department of Pharmacological and Biomolecular Sciences
  - She served as a member of the Executive Committee of the Italian Society of General Microbiology and Microbial Biotechnologies (SIMGBM)
  - She served as a member of PhD Theses Committee for the University of Geneva (CH), Université de Toulouse (FR), Université Catholique Louvain (BE), University of Singapore (Singapore), Université de Namur (BE)
- Other skills**
- Evaluator of national and international projects from several funding agencies: Italian Ministry of Research and Education, National Science Foundation (US), Institut Pasteur (RF), Agence Nationale pour la Recherche (FR), Wellcome Trust (UK), European Community.
- Grants**
- EU-Horizon 2020
- European Training Network funded by the European Commission under the Horizon 2020 Marie Skodowska-Curie Action (2017-2020) N. 721484 Train2Target- An integrated multidisciplinary approach towards a new generation of antibiotics: Targeting function and cross-talk of bacterial envelope protein machineries. Network Coordinator (11 partners)
- Ministero Istruzione Università e Ricerca (MIUR)
- 2012WJSX8K - "Host-microbe interaction models in mucosal infections: development of novel therapeutic strategies" (2013-2016). Coordinator Research Unit
  - 200824M2HX - "LPS antagonists and inhibitors of its biosynthesis: design, synthesis and bioassays". (2009-2011). Partner
- Regione Lombardia
- Progetti di Ricerca Industriale e Sviluppo Sperimentale ID n. 30190679 (2012-2014). "Nuovi antibiotici mediante rational design" (Rational Drug Design). Coordinator Research Unit
  - Progetti di cooperazione scientifica internazionale Rif. 16876 (2010-2012). Partner: Harvard University. "Rational Drug Design to target outer membrane biogenesis of Gram-negative pathogenic bacteria". Principal Investigator
  - Programma Regionale Triade (2010). Progetto DAFNE, DDUO n. 14344. Azioni Sperimentali a supporto di sistemi produttivi, cluster e filiere d'impresa. "Innovazione nei processi di controllo della qualità microbiologica nell'industria cosmetica" Coordinator Research Unit
- Fondazione Cariplo
- Bando Ricerca Scientifica in Biomedicina RIF 2010.0653 (2011-2013). "Outer membrane biogenesis in Gram-negative bacteria as a target for innovative antibacterial drugs" Ruolo: Laboratorio ospitante Principal Investigator (Under 35);
- Fondazione per la Fibrosi Cistica
- FFC#10/2008 - "Essential proteins of *Pseudomonas aeruginosa* outer membrane biogenesis as novel targets for new anti-microbial drugs design and synthesis" (2008-2010) Principal Investigator
  - FFC#13/2010 - "*Pseudomonas aeruginosa* lipopolysaccharide cell surface transport is a target process for developing new antimicrobials (2010-2012)" Principal Investigator
- Honours and awards**
- Editorial Board Member of "Frontiers in Microbiology"
- Memberships**
- ASM (American Society of Microbiology)

## Selected Publications

- Polissi A, Bestetti G, Bertoni G, Galli E, Dehò G. (1990). Genetic analysis of chromosomal operons involved in aromatic hydrocarbon degradation in *Pseudomonas putida* TMB. *Journal of Bacteriology* 172: 6355-6362.
- Harayama S, Polissi A, Reikik M. (1991) Divergent evolution of chloroplast-type ferredoxins. *FEBS Lett.* 285: 85-88.
- Dehò G, Bertoni G, Polissi A. (1992) Bacteriophage P4-derived vectors for cloning and transposon mutagenesis in *Pseudomonas* and in other gram-negative bacteria. In "Pseudomonas: molecular biology and biotechnology" S. Silver (ed) ASM publication, 39: 358-366.
- Polissi A, Bertoni G, Acquati F, and Dehò G. (1992) Cloning and transposon vectors derived from satellite bacteriophage P4 for genetic manipulation of *Pseudomonas* and other Gram-negative bacteria. *Plasmid* 28: 101-114.
- Polissi A, and Harayama S. (1993) *In vivo* reactivation of Catechol 2,3 Dioxygenase by a chloroplast-type ferredoxin: a bacterial strategy to expand the substrate specificity of aromatic degradative pathways. *The EMBO Journal* 12: 3339-3347.
- Polissi A, Goffin L, Georgopoulos C. (1995) The *Escherichia coli* heat shock response and bacteriophage  $\lambda$  development. *FEMS Microbiol. Rev.*17: 159-169.
- Polissi A. and Georgopoulos C. (1996) Mutational analysis and properties of the *msbA* gene of *Escherichia coli*, coding for an essential ABC family transporter. *Mol. Microbiol.* 20: 1221-1233
- Zhimin Z, White KA, Polissi A, Georgopoulos C, Raetz CRH. (1998) Function of *Escherichia coli* MsbA an essential ABC family transporter in Lipid A and phospholipid biosynthesis. *J. Biol. Chem.* 273: 12466-12475.
- Polissi A, Pontiggia A, Feger G, Altieri M, Mottl H, Ferrari L, Simon D. (1998) Large-scale identification of virulence genes from *Streptococcus pneumoniae*. *Infect. Immun.* 66: 5620-5629.
- Rimini R, Jansson B, Feger G, Roberts TC, de Francesco M, Gozzi A, Faggioni F, Domenici E, Wallace DM, Frandsen N, Polissi A. (2000) Global analysis of transcription kinetics during competence development in *Streptococcus pneumoniae* using high density DNA arrays. *Mol. Microbiol.* 36: 1279-1292
- Bergé M, Garcia P, Iannelli F, Prère MF, Granadel C, Polissi A, Claverys J-P. (2001) The puzzle of *zmpB* and extensive chain formation, autolysis defect and non-translocation of choline binding proteins in *Streptococcus pneumoniae*. *Mol. Microbiol.* 39: 1651-1660
- Dopazo J, Mendoza A, Herrero J, Caldara F, Humbert Y, Friedli L, Guerrier M, Grand-Schenk E, Gandin C, de Francesco M, Polissi A, Buell G, Feger G, García E, Peitsch M, García-Bustos J-F. (2001) Annotated draft genomic sequence from a *Streptococcus pneumoniae* type 19F clinical isolate. *Microbial Drug Resistance* 7: 99-125
- Polissi A, de Laurentis W, Zangrossi S, Briani F, Longhi V, Pesole G, Dehò G. (2003) Changes in *Escherichia coli* transcriptome during acclimatization at low temperature. *Res. Microbiol.* 154: 573-580
- Serina S, Nozza F, Nicastro G, Faggioni F, Mottl H, Dehò G, Polissi A. (2004) Scanning the *Escherichia coli* chromosome by random transposon mutagenesis and multiple screening. *Res. Microbiol.* 155: 692-701
- Polissi A. and Soria M.R. (2005) Functional genomics of bacterial pathogens: from post genomics to therapeutic targets. *Mol. Microbiol.* 57: 307-312
- Sperandeo P, Pozzi C, Dehò G, Polissi A. (2006) Genetic analysis of the *Escherichia coli* *yrbG-yhbG* locus reveals multiple pathways for KDO biosynthesis and three new essential genes implicated in bacterial cell envelope. *Res. Microbiol.* 157: 547-558
- Sperandeo P, Cescutti R, Villa R, Di Benedetto C, Candia D, Dehò G, Polissi A. (2007) Characterization of *lptA* and *lptB*, two essential genes implicated in lipopolysaccharide transport to the outer membrane of *Escherichia coli*. *J. Bacteriol.* 189: 244-253
- Sperandeo P, Lau F, Carpentieri A, De Castro C, Molinaro A, Dehò G, Silhavy TJ, Polissi A. (2008) Characterization of LptC (YrbK), a new and essential inner membrane component of the LPS transport machinery and interactions with other components of LPS assembly pathway in *Escherichia coli*. *J. Bacteriol.* 190:4460-4469
- Suits MDL, Sperandeo P, Dehò G, Polissi A, Jia Z. (2008) Novel structure of the conserved Gram-negative lipopolysaccharide transport protein LptA and mutagenesis analysis. *J. Mol. Biol.* 380: 476-488
- Cipolla L, Airoldi C, Galliani P, Polissi A, Nicotra F. (2008) Re LPS biogenetic pathway: enzyme characterization and synthetic efforts towards inhibitors. *Curr. Org. Chem.* 12: 576-600

- Dellasega D, Facibeni A, Di Fonzo F, Bogana M, Polissi A, Conti C, Ducati C, Casari CS, Li Bassi A, Bottani CE. (2008) Nanostructured Ag<sub>4</sub>O<sub>4</sub> films with enhanced antibacterial activity Nanotechnology 19: 475602-475608
- Cipolla L, Polissi A, Airoidi C, Galliani P, Sperandeo P, Nicotra F. (2009) The Kdo biosynthetic pathway toward OM biogenesis as target in antibacterial drug design and development Curr. Drug Discov. Technol. 6: 19-23
- Sperandeo P, Dehò G, Polissi A. (2009) The Lipopolysaccharide transport system of Gram-negative *Bacteria* Biochem. Biophys. Acta 1791: 594-602
- Sommaruga S, De Gioia L, Tortora P, Polissi A. (2009) Structure prediction and functional analysis of KdsD, an enzyme involved in lipopolysaccharide biosynthesis, Biochem. Biophys. Res. Comm 338: 222-227
- Airoidi C, Sommaruga S, Merlo S, Sperandeo P, Cipolla L, Polissi A, Nicotra F. (2010) Targeting Bacterial Membranes: NMR Characterization of Substrate Recognition and Binding Requirements of D-arabinose 5P Isomerase, a key enzyme in the biosynthesis of LPS, Chemistry 16:1897-1902
- Gourlay LJ, Sommaruga S, Nardini M, Sperandeo P, Dehò G, Polissi A, Bolognesi M. (2010) Probing the active site of the sugar isomerase domain from *Escherichia coli* arabinose-5-phosphate isomerase via X-ray crystallography. Protein 19:2430-9.
- Cipolla L, Polissi A, Airoidi C, Galliani P, Nicotra F. (2011) New targets for antibacterial design: Kdo biosynthesis and LPS machinery transport to the cell surface Curr Med Chem 18:830-52
- Sperandeo P, Villa R, Martorana AM, Samalikova M, Grandori R, Dehò G, Polissi A. (2011) New Insights into the Lpt Machinery for Lipopolysaccharide Transport to the Cell Surface: LptA-LptC Interaction and LptA Stability as Sensors of a Properly Assembled Transenvelope Complex. J Bacteriol. 193:1042-53.
- Galbusera E, Renzoni A, Andrey DO, Monod A, Barras C, Tortora P, Polissi A, Kelley WL (2011) Site-specific mutation of *Staphylococcus aureus* VraS reveals a crucial role for the VraR-VraS sensor in the emergence of glycopeptide resistance. Antimicrob Agents Chemoter. 55:1008-1020
- Airoidi C, Sommaruga S, Merlo S, Sperandeo P, Cipolla L, Polissi A, Nicotra F. (2011) Targeting Bacterial Membranes: Identification of *Pseudomonas aeruginosa* D-Arabinose-5P Isomerase and NMR Characterization of its Substrate Recognition and Binding Properties. ChemBioChem. 12:719-727
- Martorana AM, Sperandeo P, Polissi A, Dehò G. (2011) Complex transcriptional organization regulates an *Escherichia coli* locus implicated in lipopolysaccharide biogenesis. Res Microbiol. 162:470-482
- Villa R, Martorana AM, Okuda S, Gourlay LJ, Nardini M, Sperandeo P, Dehò G., Bolognesi M, Kahne D, Polissi A. (2013) The *Escherichia coli* Lpt transenvelope protein complex for lipopolysaccharide export is assembled via conserved structurally homologous domains. J Bacteriol. 195:1000-1008
- Santambrogio C, Sperandeo P, Villa R, Sobott F, Polissi A\*, and Grandori R\*. (2013) LptA assembles into rod-like oligomers involving disorder-to-order transitions. JAMS 24:1593-1602
- Gabrielli L, Airoidi C, Sperandeo P, Gianera S, Polissi A, Nicotra F, Cipolla L. (2013). Phosphonate analogues of arabinose 5-phosphate: Putative ligands for arabinose 5-phosphate isomerases. European Journal of Organic Chemistry. 34: 7776-7784.
- Gabrielli L, Merlo S, Airoidi C, Sperandeo P, Gianera S, Polissi A, Nicotra F, Holler TP, Woodard RW, Cipolla L. (2014). Arabinose 5-phosphate isomerase as a target for antibacterial design: studies with substrate analogues and inhibitors. Bioorg Med Chem. 22: 2576-2583
- Sestito SE, Sperandeo P, Santambrogio C, Ciaramelli C, Calabrese V, Rovati GE, Zambelloni L, Grandori R, Polissi A\*, Peri F.\* (2014). Functional characterization of *Escherichia coli* LptC: interaction with LPS and a synthetic ligand. ChemBioChem, 15:734-742.
- Cipolla L, Airoidi C, Sperandeo P, Gianera S, Polissi A, Nicotra F, Gabrielli L. (2014). Synthesis and biological evaluation of arabinose 5-phosphate mimics modified at position five. Carb. Res. 389: 186-191
- Polissi A, Sperandeo P. (2014). The lipopolysaccharide export pathway in *Escherichia coli*: structure, organization and regulated assembly of the Lpt machinery. Marine Drugs 12: 1023-1042
- Martorana AM, Motta S, Di Silvestre D, Falchi F, Dehò G, Mauri P, Sperandeo P, Polissi A. (2014) Dissecting *Escherichia coli* outer membrane biogenesis using differential proteomics. PlosOne 9:e100941
- Bollati M, Villa R, Gourlay L, Benedet M, Dehò G, Polissi A, Martorana A, Sperandeo P, Bolognesi M, Nardini M. (2015). Crystal structure and functional implications for LptH, the periplasmic component of the conserved lipopolysaccharide transport machinery from *Pseudomonas aeruginosa*. FEBS J. 282: 1980-97
- Zanini S, Polissi A, Maccagni EA, Dell'Orto EC, Liberatore C, Riccardi C. (2015). Development of antibacterial quaternary ammonium silane coatings on polyurethane catheters J Colloid Interface Sci. 451:78-84.

- Santambrogio C, Sperandeo P, Barbieri F, Martorana AM, Polissi A\*, Grandori R.\* (2015). An induced folding process characterizes the partial-loss of function mutant LptAI36D in its interactions with ligands *Biochem. Biophys. Acta* 1854:1451-7
- Martorana AM, Benedet M, Maccagni EA, Sperandeo P, Villa R, Dehò G, Polissi A. (2016) Functional interaction between the cytoplasmic ABC protein LptB and the inner membrane LptC protein, components of the lipopolysaccharide transport machinery in *Escherichia coli*. *J Bacteriol.* 198:2192
- Sperandeo P. and Polissi A. (2016) Lipopolysaccharide transport to the outer membrane: new insights in assembly into the outer membrane. *Structure* 24:847-849
- Benedet M, Falchi FA, Puccio S, Di Benedetto C, Peano C, Polissi A, Dehò G. (2016) The lack of the essential LptC protein in the trans-envelope lipopolysaccharide transport machine is circumvented by suppressor mutations in LptF, an inner membrane component of the *Escherichia coli* transporter. *PlosOne* 11:e0161354.
- Martorana AM, Motta S, Sperandeo P, Mauri PL, and Polissi A. (2016) Differential Proteomics Based on Multidimensional Protein Identification Technology to Understand the Biogenesis of Outer Membrane of *Escherichia coli*. *Methods Mol Biol*, 1440:57-60
- Sperandeo P, Martorana AM, Polissi A. (2017) Lipopolysaccharide biogenesis and transport at the outer membrane of Gram-negative bacteria. *Biochim Biophys Acta.* 1862:1451-1460
- Laguri C, Sperandeo P, Pounot K, Ayala I, Silipo A, Bougault CM, Molinaro A, Polissi A\*, Simorre JP. (2017) Interaction of lipopolysaccharides at intermolecular sites of the periplasmic Lpt transport assembly. *Sci Rep.* 2017 7:9715
- Sperandeo P, Martorana AM, Polissi A. (2017) The lipopolysaccharide transport (Lpt) machinery: A nonconventional transporter for lipopolysaccharide assembly at the outer membrane of Gram-negative bacteria. *J Biol Chem.* 292:17981-17990.
- Santus W, Barresi S, Mingozzi F, Broggi A, Orlandi I, Stamerra G, Vai M, Martorana AM, Polissi A, Köhler JR, Liu N, Zanoni I, Granucci F. (2017) Skin infections are eliminated by cooperation of the fibrinolytic and innate immune systems. *Sci Immunol.* 2. pii: ean2725.
- Viani F, Rossi B, Panzeri W, Merlini L, Martorana AM, Polissi A, Galante YM (2017) Synthesis and anti-bacterial activity of a library of 1,2-benzisothiazol-3(2H)-one (BIT) derivatives amenable of crosslinking to polysaccharides *Tetrahedron* 73:1745-1761
- Falchi FA, Maccagni EA, Puccio S, Peano C, De Castro C, Palmigiano A, Garozzo D, Martorana AM, Polissi A, Dehò G, Sperandeo P. (2018) Mutation and suppressor analysis of the essential LPS-transport protein LptA reveals strategies to overcome severe outer membrane permeability defects in *Escherichia coli*. *J Bacteriol.* 200: e00487-17.
- Laguri C, Silipo A, Martorana AM, Schanda P, Marchetti R, Bougault CM, Polissi A, Molinaro A, Simorre J-P. (2018) Solid State NMR studies of intact lipopolysaccharide endotoxin. *ACS Chem Biol* 13:2106-2113
- Peters K, Pazos M, Hugonnet J-M, Martorana AM, Polissi A, VanNieuwenhze MS, Arthur M, Vollmer W. (2018) Copper inhibits peptidoglycan LD-transpeptidases suppressing  $\beta$ -lactam resistance due to bypass of Penicillin-binding proteins. *Proc Natl Acad Sci USA* 115:10786-10791
- Lo Sciuto A, Martorana AM, Fernández-Piñar R, Mancone C, Polissi A, Imperi F. (2018) *Pseudomonas aeruginosa* LptE is crucial for LptD assembly integrity, antibiotic resistance and virulence *Virulence*.9:1718-1733.
- Morè N, Martorana AM, Biboy J, Otten C, Winkle M, Montón Silva A, Atkinson L, Yau H, Breukink E, den Blaauwen T, Vollmer W, Polissi A. (2019) Peptidoglycan remodeling enables *E. coli* to survive severe outer membrane assembly defect. *mBio* pii: e02729-18

Personal information

I authorize the handling of personal information in this curriculum, according to D.Lgs n. 196/03 and following modifications and Regulations EU 679/2016 (General Regulations concerning Data Protection or GRDP) and art. 7 of University Regulations concerning protection of personal information.

I authorize, according to D.lgs 14/03/2013 n. 33 concerning transparency, in case of conferment of the position and of the fellowship, the publication of this curriculum in the web site of Università degli Studi di Milano in the section "Amministrazione trasparente", "Consulenti e collaboratori".

Date 16 April 2019

Signature

