

Prof. Enrico Bergamaschi, CV



Personal information

First name(s) / Surname(s) **Enrico Bergamaschi (Prof., MD, PhD)**
Address Corso Massimo D'Azeglio 12, Turin, Italy
Telephone(s) +39 011.6933749 (Institutional)
E-mail enrico.bergamaschi@unito.it
Nationality Italian
Date of birth November 13, 1957
Gender male

Scientific or professional associations

1999- Italian Association of Industrial Hygienists (AIDII)
1992-2020 International Commission on Occupational Health (ICOH)
1985- Italian Society of Occupational Medicine SIML (formerly: Italian Society of Occupational Medicine and Industrial Hygiene). President of the Piedmont Section
2020- **Nanotechnology Industries Association**

Occupational field

Higher Education System (University), National Health Care System

Work experience

Dates **Decembre 2016 - present**

Position held **Full Professor of Occupational Medicine at the Department of Public Health and Pediatrics**

Main activities and responsibilities Teaching in official courses of the School of Medicine (Medicine and Surgery, Preventive Techniques in the Environment and in the Workplace); responsible for the Occupational Health Service of the University; co-director of the Unit of Occupational Medicine, Responsible of the Laboratory of Toxicology and Industrial Epidemiology

Name and address of the employer University of Turin, Via Verdi 9, Torino, Italy

Dates **2001 - 2016**

Occupation or position held **Associate Professor of Occupational Medicine**

Main activities and responsibilities Teaching activities in official courses of the Medical Faculty; responsible for the Industrial Hygiene in official courses; Responsible for teaching Occupational Medicine, Industrial Hygiene, Health management and Occupational Epidemiology in official courses of the Faculty of Medicine and Surgery. Responsible for the health surveillance of Hospital workers (since 2011). Responsible of coordination of national (since 2006) and International research Projects (since 2011). Acquisition of knowledge and capacity to carry out experimental and epidemiological studies and to lead research groups.

Name and address of the employer University of Parma (Medical School)

Type of business or sector High Education System

Dates **1990-2001**

Occupation or position held **University researcher of Occupational Medicine**

Main activities and responsibilities	Research in the field of Industrial and Environmental Toxicology. Task leader in EU funded collaborative research Projects and in National Projects. Responsible by rectoral decree of the Risk assessment and monitoring for the University of Parma. Knowledge and capacity to collaborate in an international, multidisciplinary and multicultural environment.
Name and address of employer	University of Parma Medical School
Type of business or sector	High Education System
Education and training	
Dates	1990
Title of qualification awarded	PhD in Occupational Medicine and Industrial Hygiene PhD Thesis “ Biological and immunochemical markers of renal damage induced by industrial chemicals. Identification of biomarkers of early effect in experimental models of nephrotoxicity; validation of biomarkers in groups of workers occupationally exposed to organic solvents or heavy metals
Name and type of organisation providing E&T	Consortium between the Universities of Parma, Milan, Pavia and Bari
Dates	1989
Title of qualification awarded	Specialty degree in Occupational Medicine
Name and type of organisation providing E&T	University of Parma
Dates	1983
Title of qualification awarded	Degree in Medicine and Surgery
Name and type of organisation providing E&T	University of Parma

Research works

The research activity has been carried out in the field of Industrial and Environmental Toxicology and has been characterized by the development of biomarkers of exposure, internal dose and early effects on critical organs (namely, central nervous system, lung and kidney) and by their application on specific groups of workers occupationally exposed to xenobiotics (heavy metals and organic solvents). Specific subgroups of general population have also been investigated for early disturbances possibly induced by environmental pollutants. The research activity along more than two decades has been characterized by a multidisciplinary approach, including in vitro and in vivo toxicology, analytical chemistry, cell biology and molecular biology methods..

The methodological approach included both experimental and epidemiological evaluations, from mechanistic studies to risk assessment in specific groups of exposed workers.

The metabolism of many industrial chemicals (e.g., n-hexane, styrene, naphthalene, mercapturic acids, monoaromatic hydrocarbons) has been investigated by applying hyphenated techniques, such as liquid- or gas-chromatography coupled with mass spectrometry, to better understand the main metabolic pathways relevant for setting up consistent exposure biomarkers. Recent studies relies on the role of genetic polymorphism of xenobiotic-metabolizing enzymes on the variability observed in the internal dose and effects - especially genotoxicity and pneumotoxicity - among workers occupationally exposed to aromatic compounds (e.g., polycyclic aromatic hydrocarbons) and gaseous pollutants causing oxydative stress (e.g., nitrogen dioxide and ozone). Biochemical changes at respiratory level have been assessed by using non-invasive methods, such as the measurement of inflammatory mediators in exhaled breath condensate and serum pneumoproteins in blood and urine. Some results still represent a reference for Regulatory Agencies involved in the definition of Occupational Exposure Limits-Health Based, such as EPA and EU Commission (e.g. Perchloroethylene, Styrene and Chromium(VI)).

In the last 15 years, the research and dissemination activities have been carried out under the area of toxicology of engineered nanomaterials, occupational exposure to nanomaterials, safety and risk assessment of engineered nanomaterials and ultrafine particles from combustion processes (see below)

BIBLIOGRAPHY

AUTHOR OR CO-AUTHOR OF > 120 PEER-REVIEWED FULL PAPERS IN INTERNATIONAL JOURNALS.

GOOGLE SCHOLAR: <http://scholar.google.it/citations?user=XNkmJLgAAAAJ&hl=it>

H-INDEX = 40 (SCHOLAR) , 34 (SCOPUS) N. TOTAL CITATIONS = 4420 (3188 SCOPUS)

AUTHOR OF 15 BOOK CHAPTERS

Research Projects

Most of the above research activity has been developed in the framework of collaborative EU Projects (since 1994) allowing the opportunity to work in a multicultural and multidisciplinary environment.

1. Early markers of nephrotoxicity resulting from exposure to environmental pollutants, EU/STEP 1994-1997.
2. Mechanisms of Neurotoxicity; Applications to Human Biomonitoring, EU/STEP 1994-1997.
3. Peripheral markers for risk assessment of pneumotoxic and nephrotoxic pollutants: mechanistic basis and health significance of intermediate end-points, EU/Environment (Human Health) 1996-99.
4. A mechanistic in vitro approach to risk assessment and biomonitoring of neurotoxic metals. EU/Environment (Human Health) 1996-99.
5. Health risk for the general population associated with non-ferrous smelter activities in East Europe: an assessment based on biomarkers of internal dose and early genotoxic effects (Research Project INCO-COPERNICUS)
6. Biomarkers for noninvasive assessment of acute and chronic effects of air pollutants on the respiratory epithelium. Development and application to adults and children along a North-South European gradient. HELIOS, QLK4-1999-01308.
7. Genetic polymorphism and biomonitoring of styrene. SUSCEPSTYRENE, QLK4-1999-01368.

Research collaboration in EU-funded Projects:

a) **“Reference Methods for Managing the Risk of Engineered Nanoparticles” - MaRiNa** (FP7-Call NMP.2010.1.3-1) a “Large” Project (2011-2015) which represented the most comprehensive consortium on Nanosafety issues, with 46 partners. The aim of MARINA was to develop specific reference methods for all the main steps in managing the potential risk of ENM, addressing the four central themes in the risk management paradigm for ENM: Materials, Exposure, Hazard and Risk. In the framework of WP 9 “Human Toxicology”, the unit coordinated by E. B. has been involved in “Identification and evaluation of existing tests”; “Identify and validate new test principles”; “Toxicokinetics and organ toxicity and dose response models using selected ENMs.

b) **“Safe Nano Worker Exposure Scenarios” - SANOWORK**. - (FP7-280716) 2012-2015, led by the Institute of Science and Technology for Ceramics - Italian National Research Council (ISTEC-CNR). E.B. led WP “Toxicological Hazard Assessment”, coordinating the activities of the University of Parma, of the IOM - Edinburgh - and of the University of Pisa. The main goal of the Sanowork project has been to identify a safe occupational exposure scenario by exposure assessment under real conditions and at all stages of nanomaterial production, use and disposal, mainly containing hazard and worker exposure potential by developing exposure mitigation strategy based on “Safety-by-Design” approach in close cooperation with leading industrial partners.

c) **BIOMaterial Risk Management. GA 760928 [BIORIMA]** led by IOM, in which EB will undertake studies on **nano-specific biomarkers** for occupational risk assessment (**task 3.4**); BIORIMA aims to develop an integrated risk management (IRM) framework for nano-biomaterials (NBM) used in Advanced Therapeutic Medicinal Products (ATMP) and Medical Devices (MD). The BIORIMA RM framework is a structure upon which the validated tools and methods for materials, exposure, hazard and risk identification/assessment and management are allocated plus a rationale for selecting and using them to manage and reduce the risk for specific NBM used in ATMP and MD.

d) **Integrated approach for exposure and health effects monitoring of engineered nanomaterials in workplaces and urban areas** [LIFE NanoEXPLORE 2018-2022 - grant LIFE17 ENV/GR/000285]. The overall aim of NanoExplore project is to develop and demonstrate the feasibility of an integrated approach to conduct biomonitoring studies, characterize exposure levels and elucidate possible health effects deriving from exposure to engineered nanomaterials (ENM) in indoor workplaces and urban areas. The NanoExplore project will build a harmonized approach to overcome current data gaps and barriers limiting the implementation of REACH regulation and the use of human bio-monitoring data in the protection of human health and the environment when dealing with particles in the nanometer range by combining long series of robust data on the concentration of ENMs measured by a wireless sensor network (WSN) of monitoring devices, appropriate biomarkers, and a tailored designed data management application.

e) **Plastics Fate and Effects in the human body [PlasticsFatE**. The main goal of PlasticsFatE (Plastics Fate and Effects in the human body) is to improve our present understanding of the impact of micro- and nano-plastics (MP/NP) and associated additives/adsorbed contaminants (A/C) in the human body. This will be achieved by developing and applying validated methods that are integrated into a new tailored risk assessment strategy for determining the fate and effects of these plastic particles on human health. As our understanding of the real dimension of human exposure to plastics is still very poor, there is an obvious need for more scientifically sound data on main exposure routes, sources and levels of MP/NP and A/C, and on their fate and effects in humans. There is a particular need to establish methodologies that can produce robust science-based data needed to improve our present understanding. The performance and applicability of current analytical and biological methods to MP/NP has not been tested or validated before to ensure that we obtain the reliable data. The lack of robust methodologies also hampers in turn the development of internationally accepted guidelines for method standardization and harmonization, which is an essential requirement for sustainable risk assessment and management of plastic particles and to support relevant EU policies and strategies, such as the EU plastics strategy or REACH (where polymers are defined but not plastics).

Participation in working groups of the European Commission

- **Since 2008**: Active member of the EU initiative "**EU Nanosafety Cluster**" - a DG RTD NMP initiative to maximise the synergies between the existing FP6 and FP7 projects addressing all aspects of nanosafety including toxicology, ecotoxicology, exposure assessment, mechanisms of interaction, risk assessment and standardisation. Member of the WG n. 5 "Risk Assessment/appraisal/management", aimed at developing the risk assessment approaches and the related intelligent testing strategy (ITS) which supports regulatory decision making.

He coordinated WG 12 "**Human field studies and epidemiology**", a multidisciplinary group made up of professionals from various institutions (TNO / CEA / IVS / VITO / IST) with which it collaborates, which has provided indications for the drafting of the "Risk Management Tools" section of the document Nanosafety 2015-2025: A Strategic Research Agenda towards Safe and Sustainable Nanomaterial and Nanotechnology Innovations. Co-author of the Volume: "Nanosafety in Europe 2015-2025: Towards Safe and Sustainable Nanomaterials and Nanotechnology Innovations" coordinated by the Finnish Institute of Occupational Health and produced by the NanoSafety Cluster.

www.tti.fi/en/publications/electronic_publications/pages/default.aspx

- **Since 2011**: Member of the "**Risk Assessment / Management**" working group of the EU-US Research Community (EU-US CoR) (Chairmen: M. Wiesner USA & D. Brouwer TNO NL) aimed at harmonizing the National Nanotechnology Initiative USA and EU joint efforts in Nanosafety research. The Research Communities are made up of groups of people who share a significant interest in the field of Nanosafety and interact regularly in order to develop a shared repertoire of resources: experiences, tools, ways of dealing with recurring issues and challenges. Members are in constant contact through the use of wikis, webcasts, conference calls and / or through the annual US-EU meeting.

- Active member of the "**Research Regulatory Roadmap**" (RRR) working group (coordinator: Prof Vicki Stone, Edinburgh). The aim of the working group is to generate a roadmap of the research priorities that must be addressed to adequately support a refinement of current legislation (or the development of new regulations) relevant for Nanosafety. The priorities are grouped into three themes: 1. Development of methods; 2. data generation, including identification of the relationship between physico-chemical properties and hazard; 3. Risk assessment (RA) according to the strategies that originate from current approaches towards "smarter" strategies in the future. The specific contribute included: Determine mode of action for hazard; Identify best suited exposure monitoring strategies; Identify relevant long term hazard models.

The final report "Research priorities relevant to development or updating of nanorelevant regulations and guidelines is available at

https://www.nanosafetycluster.eu/uploads/files/pdf/RRR_Final_version_090317.pdf.

Scientific advisor at national and international level

- Project reviewer for Agence Francaise de la Recherche, 2010.
- Project reviewer for Projects presented by the University of Milan and Trieste (2011, 2017).

- **Since 2016, enrolled in the register of European Projects expert evaluators** (Candidature EX2014D175498). The expert must assist the Commission with the evaluation of the proposal(s) submitted in response to the following call(s) for proposal(s): - H2020-NMBP-HUBS-2018, H2020-NMBP-TO-IND-2018, H2020-NMBP-TR-IND-2018, H2020-NMBP-BIO-2018-two-stage, H2020-NMBP-ST-IND-2018. This involves in particular, the following tasks: - reading and analysing the background information (especially the proposal and the briefing material) - participating in the expert briefing(s) (meeting(s) or webcast briefing(s)) - participating in evaluation meeting(s) and hearing(s) (if any) and - drafting and submitting the evaluation report(s) for the evaluated proposal(s) (and other deliverable(s), if any).
- **Evaluator of the quality of Research Products for ANVUR 2004-2010 and 2011-2014.**
- **Included in the reserve list of scientific experts of the European Food Safety Authority (EFSA)**

Scientific reviewer activity:

- Member of the Editorial Board of *Journal of Nanomaterials* ISSN: 1687-4110 (Print) ISSN: 1687-4129 (Online) doi: 10.1155 / JNM from 06/2011
- Member of the International Board of the journal *Environmental Health and Preventive Medicine* (EHPM), ISSN: 1342-078X (print version) ISSN: 1347-4715 (electronic version), the official journal of the Japanese Society for Hygiene.
- He has carried out and still performs the duties of referee for the following international and national magazines : International Archives of Occupational and Environmental Health; Occupational Medicine; Journal of Occupational and Environmental Medicine; Toxicology Letters; Journal of Hazardous Materials; Nanotoxicology; International Journal of Nanomedicine (Dove Med. Press); Environmental Health Perspectives; Science of the Total Environment; Regulatory Toxicology and Pharmacology; Chemical Research in Toxicology; Genetics Research International; Nanomedicine (Future Med.); Journal of Nanoparticle Research; Journal of Agricultural and Food Chemistry; Journal of Nanomaterials (MDPI) ; Chinese Journal of Chemistry, Particle and Fiber Toxicology, Nature Scientific Reports Nanomedicine (Future Med.); Proceedings of the National Academy of Sciences of the United States of America (PNAS).

Personal skills and competences																									
Mother tongue(s)	Italian																								
Other language(s)	English, French																								
Self-assessment																									
<i>European level (*)</i>																									
English																									
French																									
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C1	C2	B2	B2	B2	B2																				
	(*) Common European Framework of Reference for Languages																								
Social skills and competences	Excellent human relations at all levels, with great ability to lead and organize team work. Flexible for adapting to changes and open to continuous learning.																								
Organisational skills and competences	Project leader or principal investigator for Research Projects Member of organizing committee of scientific international events																								
Technical skills and competences	Lead Auditor for OH&S according to the OHSAS 18001 Standard (BSI)																								
Computer skills and competences	Competent with most Microsoft Office programmes, SPSS, Videoconferencing Tools																								