Seminar for University of Venice

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Metal ion Exposure to Microbes

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The use of metal compounds as antimicrobial agents has been around since antiquity, only to be replaced by the introduction of organic antibiotics and antiseptics in the mid 20th century. The interest in my group is the biochemical mechanisms of resistance towards metal-based antimicrobial agents. There is now a strong understanding of resistance mechanisms of bacteria growing as free-swimming stage (planktonic). However, considerably less is understood about the mechanisms of resistance of bacteria towards metals grown in their surface attached sessile state (Biofilms). Furthermore, there is remarkably little understood on how metals are toxic to bacteria. My group has used toxicity profiling to understand fundamental chemical properties contributing to resistance and toxicity. This approach it has allowed us to begin to explore the question of speciation. Biochemical assays have allowed us to ask questions about reactive oxygen species production and gene regulation and through omics approaches of proteomics metabolomics, and chemical genomics we have begun to obtained information of the system view for at least the metals of Cu and Ag. I will also describe briefly our work considering the difference of single species bacteria and environmental microbiome communities (from metal contaminated site).

Through such studies, the overarching goal of my research in this area is to obtain insights into the biochemical mechanisms of metal resistance/tolerance/toxicity, particularly in the context of bacterial biofilms.

Mini CV: (a full CV can be provided upon request)

Professor of Biochemistry & Microbiology (Since 2007)
Member of Dept. of Biological Sciences, University of Calgary, Alberta, Canada. (Since 1998)
BSc - Biochemistry/Chemistry; PhD - Physical Biochemistry;
PDF, Bacterial resistance mechanisms, molecular microbiology, bioenergetics.
Recent service includes: Department Head 2013-2016, Dean's Advisory committee, Vice President research advisory group, Faculty of Graduate Studies steering committee.
Trainees to date include: 43 graduate students. 20 PDFs and 143 project students.
Awards: University Teaching award in graduate supervision (2017); University award of Research Excellence (2013).
Career: 211 publications; >7500 citations; h=47 (GS), 38 (ISI).
Funding: from Canadian funding agencies of Natural Sciences Engineering Research council (NSERC) and Canadian Institutes of Health Research (CIHR) as well as industrial partnerships.
Editorial board for *Biochemistry & Cell Biology* and *Environmental Microbiology*.
Course teaching: Introductory Biochemistry, Introductory Biology, Biochemistry of Lipids, Biochemistry of biomembranes, Environmental chemistry, Environmental Science, Biochemistry Laboratory Techniques, Molecular Biology Laboratory techniques, Biochemical Toxicology. Advanced courses in: Molecular Microbiology, Biofilm physiology, Protein-protein interactions, Transporters.

Why in Italy?

Have been visiting researchers in Italy every few years since 2004

Collaborator in area of Bioremediation with Researchers at University of Bologna

Collaborator in area of Biogenic nanopartical production with Dr. Silvia Lampis and Prof Giovanni Vallini at University of Verona

- Providing lectures to PhD students on Biofilms
- Providing lectures to MSc students on metal nanoparticles as antimicrobials