

Micro- and Nanotechnologies to Overcome Biological Barriers: Eighth Annual CRS Italy Local Chapter Workshop

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The workshop was held at the University of Naples Federico II.

The CRS Italy Local Chapter annual workshop, “Micro and Nanotechnologies to Overcome Biological Barriers,” was held in Naples on November 12–14, 2015, and more than 140 delegates attended this important meeting. The meeting was held in the comfortable building of the Ex-Facoltà di Scienze Biotecnologiche, University of Naples Federico II.

Before the official start of the meeting, a morning session was held specifically dedicated to Ph.D. students and postdocs. The topic of this session was “Liposomes in Drug Delivery: From Basics to Clinical Applications.” The outstanding scientists Elias Fattal (Université Paris-Sud, France) and Gert Storm (Utrecht University, the Netherlands) held this “school on liposomes” in a friendly and communicative way. All 35 attendees were enthusiastic about the clarity of the expositions and the knowledge transfer.

The workshop started with a welcome from the president of the CRS Italy Local Chapter, Bice Conti (University of Pavia), and Giuseppe De Rosa, president of the local organizing committee. In her introduction, Bice Conti reminded everyone of the goals of CRS and upcoming activities. In particular, she underlined the relevance of the CRS Italy Local Chapter annual meeting for the Italian drug delivery community. Moreover, the importance of the meeting was highlighted by the presence of award-winning European scientists working in our field.

The workshop was structured following a consolidated form to favour open discussion, brainstorming, and information exchange among the participants. The meeting was divided into four sessions, including 15 speakers who gave 40 minute main lectures followed by 20 minute discussions, which were chaired and directed by discussant panels of scientists. Among the various lectures, some short technical communications were given by the sponsors of the meeting; their contributions were extremely important for the success of the meeting.

The lecture “Innovative Delivery Approaches in the Era of Microenvironment Targeted Anticancer Treatment” from Pierosandro Tagliaferri (Università degli Studi Magna Graecia of Catanzaro) opened the scientific session, giving the audience a different point of view on innovative approaches for cancer treatment. This lecture warmed up the floor and excellently introduced the theme of the workshop.

The first session, “Biomaterials,” was opened by the second invited lecturer, Tal Dvir (Tel Aviv University, Israel), entitled “Engineering Strategies for Regenerating the Diseased Heart,” which described cutting-edge technologies for engineering functional cardiac tissues or releasing biofactors.

The next talk was delivered by Gert Storm and was focussed on theranostic strategies for monitoring and optimising targeted nanomedicines. His presentation was engaging, stimulating discussion in the audience.

The last communication of the session was entrusted to Margherita Morpurgo (Padua University), who described her recent results on “Antibody Guided Nanoparticles Versus Antibody Drug Conjugates: A Quantitative Approach for Cell Trafficking and Potency Comparisons Using the Avidin Nucleic Acid Nano System (ANANAS) Technology.”

The second session of the meeting focussed on “Drug Targeting/Theranostics” and was opened by Paolo Antonio Netti (IIT, Naples) presenting some results on the polymeric nanoshuttles for theranostic applications developed in his laboratory. The second speaker of the session was Mirco Ponzoni (G. Gaslini Institute, Genoa). His talk was focussed on the “tumour vascular targeted approach” in overcoming biologic barriers for the therapy of neuroblastoma. He fascinated the audience, presenting exciting and promising data on this aggressive tumour in children.

The following speaker, Luisa Fiandra (University of Milan), illustrated how “Nanoformulation of Antiretroviral Drugs Allows Their Release over the Blood Brain Barrier: *In Vitro* and *In Vivo* Assays,” and Armando Cevenini (University of Naples Federico II) concluded the second session by reporting on “Tools and Avenues for Nanotechnology-Based Vectors Exploitation for Biomarker Signature and Therapeutical Drug Delivery.”

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Ijeoma Uchegbu presents on nanotechnology.



Arto Urtti presents on ocular drug delivery systems.



Andreas Bernkop-Schnürch presents on strategies to overcome the mucus gel barrier.

The third session was specifically dedicated to “Drug Delivery to the Brain.” The first presentation was given by Ijeoma Uchegbu (University College London, United Kingdom). During her presentation, entitled “Exploiting Nanotechnology to Create New Medicines—The Journey So Far,” she retraced the long and hard process of developing new drug delivery systems for delivering peptides into the brain to fight many important brain diseases. In particular, she underlined the main tasks that should be overcome and the

strategies that can be adopted to reach this important goal. The second invited speaker of the session, Sophia Antimisiaris (University of Patras, Greece), updated the audience on “Multifunctional Nanoliposomes for Targeting Amyloid Deposits in the Brain,” showing the feasibility of nanoliposomes decoration with two ligands to target the brain and amyloid species as potential theranostic systems for this brain disease in *in vitro* and *in vivo* performances.

Massimo Masserini (University Bicocca of Milan) reported on his recent work on “Functionalization of Nanoparticles with Plasma Proteins as a Strategy to Cross the Blood-Brain Barrier.” This exciting and hard work suggests that physiological circulating proteins in plasma can be exploited to devise new strategies to efficiently drive nanoparticles across the blood-brain barrier.

Finally, Giovanni Tosi (Modena Reggio Emilia University) reported, in an unusual and fascinating way, the results of his group on “Nanomedicine: Overcoming Blood-Brain Barrier with Nanoparticles,” using polymeric nanoparticles decorated with various ligands. The last day started with the fourth session of the meeting, “Topical/Mucosal Delivery.” Arto Urtti (University of Helsinki, Finland) illustrated his research experience on “Pharmacokinetic Factors in the Design of Ocular Drug Delivery Systems.” In detail, he presented some models that can be used in predicting and simulating the pharmacokinetics and drug delivery to ocular targets after drug administration, according to the various routes of administration.

Francesca Maestrelli (University of Florence) gave a presentation on “Metformine HCl-Loaded Chitosomes and Niosomes: *In Vivo* Studies of Hypoglycaemic Effect.” She evidenced, in his research, that the therapeutic efficacy of metformine is improved using an appropriate drug delivery system.

The wide data set presented by Andreas Bernkop-Schnürch (University of Innsbruck, Austria) in his talk entitled “Micro- and Nanocarriers: Strategies to Overcome the Mucus Gel Barrier” gave the audience an important overview on approaches that can be exploited in overcoming this important biological barrier. His presentation concluded the session and the scientific contributions.

The workshop included a poster session with contributions. This year, three posters were awarded. The first award, an *ex aequo*, was selected by a committee composed by the invited speakers, while the second prize was selected by the vote of all delegates.

The workshop was closed by Elias Fattal with concluding remarks. The workshop program was a great success, and the contributions of invited speakers were extremely appreciated by participants because they did not limit themselves to presenting their research but were actively involved in the critical open-minded discussion that opened novel viewpoints on research.

Social activities included a welcome cocktail and social dinner, which were attended by all delegates. These important events were appreciated, as they help networking.

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All abstracts are available on the website of the CRS Italy Local Chapter, www.itcrs.it/itcrs2. ■



The poster awards ceremony.



The social dinner in a typical Neapolitan restaurant.