



UNIVERSITÀ  
DEGLI STUDI DI BARI  
ALDO MORO



CAMERA DI COMMERCIO  
BARI



May 15th to 17th, 2025



15 May 2025: Workshop Welcome at 12.00  
am - Session 1 starts at 14.00 pm  
17 May 2025: Workshop ends at 13.00 pm



Camera di Commercio  
Industria - Artigianato e  
Agricoltura di Bari  
Corso Cavour, 2, 70121 **Bari**

# BIOINSPIRED THERAPEUTICS: UPCOMING PROMISE OR NEW CHALLENGES FOR DESIGN AND CHARACTERIZATION?

CRS ITALY WORKSHOP

# Workshop theme

The 2025 CRS Italy Chapter Workshop will focus on bioinspired therapeutics, specifically cutting-edge systems whose structures and functions mimic those of biological materials and natural processes. The workshop will provide an outlook on systems isolated from natural sources, used as-is, or combined with synthetic components to enhance biocompatibility and efficacy, with a particular emphasis on their conceptualization, rational design, and characterization. Contributions from invited scientists across multiple disciplines will create a rich environment where participants can gain insights and discuss the latest trends in bioinspired systems and their potential impact on drug delivery and controlled release. The workshop will be organized into few sessions, featuring invited speakers from Italy and abroad, who will explore various applications of bioinspired systems. Poster sessions and selected talks will provide opportunities to deepen discussions, explore interactions, and foster collaborations. The Organizing and Scientific Committees look forward to welcoming you to Bari for a highly stimulating and engaging workshop.

## Scientific committee

Stefano Salmaso  
Pasquale del Gaudio  
Fabio Salvatore Palumbo  
Nunzio Denora  
Rossella Dorati  
Silvia Franzè  
Angela Assunta Lopedota  
Silvia Pescina  
Francesco Puoci  
Michele Schlich  
Barbara Stella

## Organizing committee

Ilaria Arduino  
Annalisa Cutrignelli  
Nunzio Denora  
Massimo Franco  
Rosa Maria Iacobazzi  
Valentino Laquintana  
Antonio Lopalco  
Angela Assunta Lopedota  
Giuseppe Francesco Racaniello

## Invited Speakers:

### Stefania Bruno

Università degli Studi di Torino (Italy)

### Luigi Calzolari

Joint Research Center of the European Commission (Italy)

### Mariangela Garofalo

Università degli Studi di Padova (Italy)

### Gesualdo Loreto

Università degli Studi di Bari (Italy)

### Arben Merkoçi

Catalan Institute of Nanoscience and Nanotechnology ICN2 (Spain)

### Lorenzo Pradella

BrYet Europe srl (Italy)

### Gert Storm

Phospholipid Research Center (Germany)

### Pieter Vader

University Medical Center Utrecht (The Netherlands)

### Roy Van der Meel

University of Eindhoven (The Netherlands)

### Assaf Zinger

Technion- Israel Institute of Technology (Israel)



# Call for abstracts

The CRS Italy Local Chapter is soliciting abstracts in the broad fields of drug delivery, nanomedicine, and pharmaceutical technologies.

Abstracts **must be submitted** on-line following the instructions at <https://www.crsitalia.it/events/workshops/crs-italy-workshop-2023> **by February 15, 2025.**

Acceptance will be notified by March 7, 2025.

Selected abstracts will be offered a podium presentation during the regular sessions of the workshop.

All the abstracts will be presented during the Poster Sessions.

**On-line registration** at [www.crsitalia.it](http://www.crsitalia.it) **Fees due by March 28, 2025.**



## Venue

**Camera di Commercio Industria Artigianato e  
Agricoltura - Corso Cavour 2, 70121, Bari**



## Registration fees

CRS Senior € 80

CRS Junior € 50

NON-CRS Senior € 105

NON-CRS Junior € 65

Social Dinner – Oct. 6: € 40\*

## Organizing Secretariat

[info.crs.it@gmail.com](mailto:info.crs.it@gmail.com)

Indicate the reason for the bank transfer: LAST NAME and FIRST NAME, workshop CRS-Bari. \*Payment for social dinner must be added to the registration fee in the same bank transfer. Include in the reason for the bank transfer "+ DINNER" if you attend the dinner



## Accommodation

A limited number of rooms are available at special rates from the hotels reported in the website <https://www.crsitalia.it/events/workshops/crs-italy-workshop-2025>.

# Programme

**Day one Thursday May 15, 2025 (Half Day)**

**12.00 – 13.45** Welcome and Registration

**13.55-14.15 Workshop Opening**

Stefano Salmaso, Presidente CRS Italy Chapter  
Nunzio Denora, Dipartimento di Farmacia - Scienze Del Farmaco (UNIBA)

Lucia Di Bisceglie, Presidente Camera di Commercio di Bari  
Stefano Bronzini, Rettore Università di Bari  
Francesco Leonetti, Direttore Dipartimento di Farmacia - Scienze Del Farmaco (UNIBA)

**14.15 – 15.20 Session I** (Chair: Nunzio Denora, Michele Schlich)

Pieter Vader (University of Utrecht) (30 min)  
**Extracellular vesicle-inspired carriers for therapeutic RNA delivery**

Stefania Bruno (UniTo) (30 min)  
**Extracellular vesicles: a possible tool to obtain target therapy**

**15.20 – 16.40 Coffee Break and Poster Session I**

**16.40 – 18.30 Session II** (Chair: Pietro Matricardi, Fabio Palumbo)

Technical presentation (20 min) - Fabio Perissinotto (Alfatest)  
**Automated Microfluidic Production of Drug-Delivery Nanocarriers: from LNPs to Protein Nanoparticles**

Silvia Pisani (UniPv) (20 min)  
**ATP-Enriched Extracellular Vesicles from Mesenchymal Stem Cells: A New bioinspired Approach to Address Cellular ATP Deficiency in In Vitro Models**

Giorgia Ailuno (UniGe) (20 min)  
**Biomimetic hybrid vesicles for boron neutron capture therapy of glioblastoma**

Ilaria Arduino (UniBa) (20 min)  
**Microfluidic Fabrication of Hybrid Liposomes for Homotypic Targeting and Glioma Antitumor Efficacy**

**Day two Friday May 16, 2025 (Full Day)**

**9:00 – 10.40 Session III** (Chair: Anna Scomparin, Giuseppe De Rosa)

Arben Merkoçi (30 min)  
**Nanobiosensors for Diagnostics: Advancing Point-of-Care Technologies with Sustainable Nanotechnology**

Mariangela Garofalo (UniPd) (30 min)  
**Leveraging Extracellular Vesicles as nanopharmaceuticals for cancer drug delivery**

Nicola d'Avanzo (UniCz) (20 min)  
**Brain-targeted liposomes to boost CDP-Choline neuroprotective effect after ischemia**

Cristina Casadidio (UniCam) (20 min)  
**Advanced Hydrogel for siRNA-STAT3 Delivery to Treat Ovarian Cancer**

**10.40 – 11.20 Coffee Break**



# Programme

**11.20 – 12.40 Session IV** (Chair: Claudia Carbone, Angela Assunta Lopedota)

Gesualdo Loreto (30 min)

**The Gut-Kidney-Brain axis: the stunning interplay**

Luigi Calzolari (30 min)

**Quality attributes of advanced RNA therapeutics**

Laura Di Muzio (UniSapienza) (20 min)

**Rheology-driven development of bioinks for advanced 3D-bioprinting in drug discovery**

**12.40 – 14.10 Lunch Break (Discussion and Poster Session II)**

**14.10 – 15.20 Session V** (Chair: Rita Cortesi, Paolo Decuzzi)

Roy van der Meel (Eindhoven University of Technology) (30 min)

**Apolipoprotein nanoparticle platform technology for RNA delivery to immune cells**

Jason Thomas Duskey (UniMoRe) (20 min)

**One-step self-assembly of natural lactoferrin nanomedicines for gene delivery**

Monica Argenziano (UniTo) (20 min)

**Nanobubble-mediated siRNA delivery for overcoming melanoma resistance to targeted therapies**

**15.20 – 16.20 Coffee break and Poster Session III**

**16.20-17.00 Coffee on roundtable: development of bioinspired systems - All invited speakers**

**17.00 – 18.10 Session VI** (Chair: Antonio Di Stefano, Ida Genta)

Technical presentation (20 min) - Giuseppe Racaniello (Farmalabor)

**From Powder to Personalized Therapy: The One-Step Revolution of 3DForMe**

Gert Storm (30 min)

**Bioinspired Nanotherapeutics: from Academia to Patient**

Denise Murgia (IIT Ge) (20 min)

**Targeting Epigenetic Dysregulation in Osteoarthritis: Liposomal Delivery of L-2-Hydroxyglutarate**

**20.00 Social Dinner:** Circolo Unione Bari, Via Alberto Sordi, 7, 70121 Bari

# Programme

## Day Three Saturday May 17, 2025 (Half-Day)

### 9.00 – 10.15 Session VII (run by young scientists)

(Chairman: Gabriella Costabile, Giorgia Ailuno)

Lorenzo Pradella

**Enhancing technology transfer through entrepreneurial development: the engine to leverage from innovation**

Marco Dattilo (UniCal) (20 min)

**Synthesis and Characterization of a Cationic Copolymer as a Delivery System in Gene Therapy**

**Coffee break 10.15-10.50**

### 10.50 – 12.00 Session VIII

(Chairman: Alessio Malfanti, Mattia Tiboni)

Assaf Zinger (Technion) (30 min)

**Disease Driven Therapeutics**

Technical presentation (20 min) - Nella Rossini (Plasmapps)

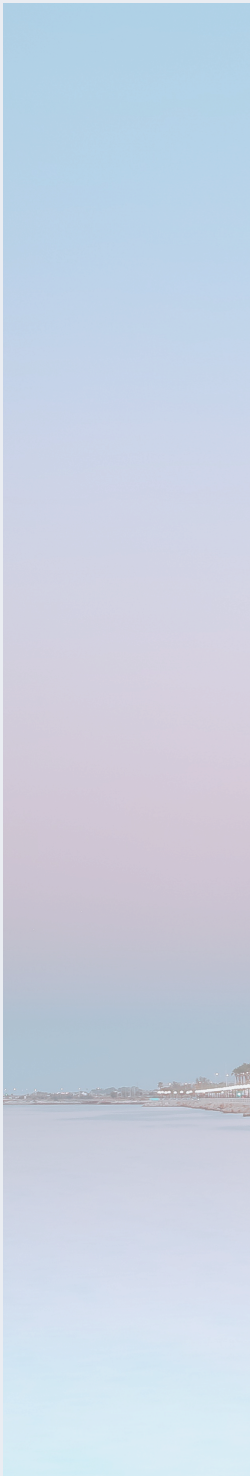
**Low Temperature Plasma Technology in biomedical application**

Thomas L. Moore (UniNa) (20 min)

**Multi-Drug Nanoparticle Cocktails Optimized by Machine Learning for Anti-Cancer Chemotherapy**

**12:00-12:45 Assemblea annuale di CRS-IT**

**12:45-13.00 Workshop Closing Remarks**



# Invited speakers



**Stefania Bruno, Professor**  
Università degli Studi di Torino (Italy)  
**Extracellular vesicles: a possible tool to obtain target therapy**

## Abstract

Extracellular vesicles (EVs) are heterogeneous phospholipid bilayer-enclosed nanoparticles, produced by all the cell type. Proteins are abundant in the EV cargo and they vary according to the physiological state of the cells of origin. Apart from proteins, coding and noncoding RNAs are present in EVs.

Recent research advances indicated that natural EVs can be safe drug carriers because, different from virus-derived structures, they are non-replicative and not mutagenic. Moreover, EVs can cross biological barriers, including the blood-brain barrier, and through endocytosis, they are internalized in the recipient cell to induce a response.

New methods for improving the EVs as carriers have been introduced, such as the modification of the EV surface to increase the EV homing and the innate targeting capacity of the injured organs. Approaches to increase the targeting toward a specific injured organ can be the expression of receptors for specific biomarkers upregulated during injury, or the creation of hybrid fused structures or the overexpression of anti-inflammatory molecules. The new nano-medicine approaches based on bioengineered EVs are an attempt to enhance their drug delivery capacity for potential clinical applications.

## Short Biography

Prof. Stefania Bruno conducts her research at the Translational Research Laboratory within the Department of Medical Sciences at AOJ Città della Salute e della Scienza in Turin (Italy).

She holds a degree in Biological Sciences (1999), a PhD in Human Oncology (2003), and a specialization in Clinical Biochemistry (2011), all from the University of Turin.

Since March 2022, she has been serving as an Associate Professor of Technical Sciences in Laboratory Medicine at the Department of Medical Sciences, University of Turin. Her main research interests focus on the applications of extracellular vesicles derived from various sources in regenerative medicine.



**Luigi Calzolari, PhD**  
Joint Research Center of the European Commission (Italy)  
**Quality attributes of advanced RNA therapeutics**

## Abstract

A significant number of nanomedicines has reached the market in the last decades. Recent examples are the mRNA Covid-19 vaccines based on lipid nanoparticles (LNP-mRNA), the most utilized COVID-19 vaccines in Europe and USA. In addition to vaccines against infectious diseases LNP-RNA therapeutics are being developed in several therapeutic areas: cancer therapy, rare diseases, neuroscience.

Their accurate characterization is challenging due to their intrinsic complexity; it requires combination of physicochemical, immunological and toxicological assays [1].

In this presentation, I will address the role of quality attributes (QA) in ensuring consistency and reproducibility and the analytical techniques for their measurement. The availability of accurate methods for the characterization of nanomedicines helps to address some challenges in the field and will guide the rapid development of safe and effective nanomedicines for different therapeutic areas.

## Short Biography

Dr. Calzolari has a MS (University of Florence) and PhD (University of Siena) in chemistry. After a Postgraduate Research at the University of California, Davis, he joined, in 1998, the Swiss Institute of Technology in Zurich, in the laboratory of the then Nobel laureate Kurth Wuthrich, where he determined the three dimensional structure of prion proteins responsible of neurological disorders, such as Mad Cow Disease. In 2007, he moved to the University of Kent (UK) as Senior Lecturer in biochemistry. In 2008, he joined the Joint Research Centre of the European Commission where his research focuses on the development of methods for the characterization of nanomedicines (in particular RNA-based) and biotherapeutics. He is an expert in the European Pharmacopeia working group on mRNA vaccines.



**Mariangela Garofalo, PhD**  
Università degli Studi di Padova (Italy)  
**Leveraging Extracellular Vesicles as nanopharmaceuticals for cancer drug delivery**

## Abstract

Despite extensive research, tumor-selective delivery of anticancer therapies remains a major challenge. Among a variety of nanocarrier based strategies, extracellular vesicles (EVs) show promise. These nano-sized lipid vesicles, produced by nearly all cell types, play a crucial role in intercellular communication. Our research focuses on repurposing EVs for cancer therapy. We discovered that cancer cells produce EVs capable of specifically targeting tumor tissue, making them potential drug delivery systems. A noteworthy strategy involves encapsulating oncolytic viruses in cancer cell-derived EVs for enhancing their selective delivery. These viruses not only induce cytolysis but also stimulate anti-tumor immune responses, acting as anti-tumor vaccines. We labeled EV formulations with indocyanine green and tracked their biodistribution through in vivo and ex vivo imaging, revealing that this class of bioinspired nanocarriers possess selective tumor tropism in humanized and patient-derived cancer models. Our findings suggest that EVs could be a safe and effective tool for personalized cancer treatment, potentially enabling systemic administration of oncolytic vaccines in challenging cancer cases.

## Short Biography

Mariangela Garofalo is an Assistant Professor of Pharmaceutical Technology in the Department of Pharmaceutical and Pharmacological Sciences at the University of Padua, Italy. She earned her Ph.D. in Biomedicine through a co-supervision program between the University of Helsinki in Finland and the University Federico II of Naples in Italy. She has served as a visiting scientist at several esteemed international institutions, including the Medical University of Graz in Austria, the Institute for Oncology Research in Switzerland, the Warsaw University of Technology in Poland, and the National Institute of Public Health in Poland. Recently, she was honored with the Ludwik Rajchman Award for her significant contributions to the development of novel cancer treatment strategies. Her research is focused on the definition of strategies to efficiently improve cancer treatment using nanomedicines as oncolytic viruses and extracellular vesicles and to shed light of the role of extracellular vesicles in the tumor microenvironment.



**Gesualdo Loreto, Professor**  
Università degli Studi di Bari (Italy)  
**The Gut-Kidney-Brain axis: the stunning interplay**

## Abstract

The complex interaction between the gut, brain, and kidney, often referred to as the "gut-brain-kidney axis," has emerged as an exciting area of research with profound implications for the understanding and management of chronic kidney disease (CKD) and acute kidney injury (AKI). Our research studies delve into the fundamental role of this interaction, shedding light on how it contributes to cognitive dysfunction, commonly referred to as "brain fog," in individuals with kidney failure. Additionally, we explore promising therapeutic interventions to address these issues. In the context of AKI, we have investigated the connection between dyslipidemia, particularly low HDL, and dysregulation in the kynurenine (KP) pathway, which generates neuroactive metabolites. We conducted experiments with CER-001, an engineered HDL containing apoA-I, to assess its potential to attenuate brain dysfunction in a porcine model of LPS-induced AKI and in a Phase 2a human clinical trial [1]. Our results demonstrate that CER-001 treatment attenuated systemic inflammation, downregulated indoleamine-2,3-dioxygenase (IDO1), which is the first and rate-limiting step of KP, thereby reducing neuroactive metabolites and waste accumulation. This intervention may have the potential to improve renal and cognitive function. Furthermore, we explored a mouse model of CKD using fecal microbiota transplantation (FMT), unraveling the critical role of gut dysbiosis in CKD progression. FMT showed promising results in improving gut microbiota, reducing uremic toxins, and restoring gut mucosal integrity [2]. At the renal level, FMT was associated with a reduction in proteinuria and fibrosis. Serum analysis also showed the protective effects of FMT in reducing neurotoxic and inflammatory factors, with a strong correlation with specific phyla in the microbiota. In conclusion, these findings highlight the intricate interaction of the gut-brain-kidney axis in the context of CKD and AKI. They also present promising therapeutic strategies to mitigate cognitive dysfunction, inflammation, gut dysbiosis, and renal impairment.

## Short Biography

Prof. Loreto Gesualdo graduated in Medicine and Surgery at the University of Bari and Specialized in Nephrology at the University of Chieti. His research activity focuses on the pathogenetic aspects of glomerulonephritides (IgAN, MN, DKD) and renal fibrosis. Winner as principal investigator of several international, European, national and regional projects. Since 2010 he is Full Professor of Nephrology at the University of Bari and Director of Nephrology, Dialysis and Transplantation Unit at the Bari Polyclinic, he is currently Regional Transplant Coordinator, Apulia Region. From 2016 to 2021 he was Dean of the Bari School of Medicine. From 2018 to 2022, he was President of the Italian Kidney Foundation.



### **Arben Merkoçi, Professor**

Catalan Institute of Nanoscience and Nanotechnology ICN2 (Spain)

### **Nanobiosensors for Diagnostics: Advancing Point-of-Care Technologies with Sustainable Nanotechnology**

#### **Abstract**

The demand for rapid, accurate, and accessible diagnostic tools underscores the need for innovative point-of-care (POC) devices. Nanobiosensors, leveraging nanotechnology and advanced nanomaterials such as gold nanoparticles, quantum dots, and graphene, offer unparalleled sensitivity and versatility. By integrating these nanomaterials with sustainable substrates like nitrocellulose etc., we develop optical (e.g., lateral flow assays) and electrical sensors tailored for diverse diagnostic applications. This presentation explores examples of nanobiosensors designed for virus detection (e.g., COVID-19), cancer biomarkers, and neurodegenerative diseases, including wearable sensors. These devices function as standalone systems or integrate with smartphones to enhance their utility as POC tools, demonstrating the transformative potential of nanotechnology in diagnostics.

#### **Short Biography**

Arben Merkoçi is an ICREA Research Professor and leader of the Nanobioelectronics and Biosensors Group at Catalan Institute of Nanoscience and Nanotechnology (ICN2), in Barcelona, Spain. He earned his PhD in ion-selective electrodes from the University of Tirana, Albania, and has conducted research at top institutions in Europe and the USA. His work focuses on integrating biological molecules with nanostructures to develop innovative biosensors. As member of the Academy of Sciences of Albania, Prof. Merkoçi directs NANOBALKAN and is Co-Editor-in-Chief of Biosensors and Bioelectronics. He has 350 publications (H-index: 95, >35,000 citations on Google Scholar) and has supervised 40 PhD theses. Prof. Merkoçi has contributed to developing Spain's first Nanoscience undergraduate program and teaches nanobiosensor courses globally. He collaborates with leading labs, evaluates international projects, and has delivered over 220 invited talks. He is co-founder of two spinoff companies Graphenicalab and PaperDrop, focused on various applications diagnostics applications.



### **Lorenzo Pradella**

BrYet Europe srl (Italy)

### **Enhancing technology transfer through entrepreneurial development: the engine to leverage from innovation**

#### **Abstract**

Innovation is one of the most powerful pathways to evolve humanity and society. Technology transfer plays a vital role in transforming academic research into tangible solutions. The commercialization of academic research could boost innovation in numerous industries due to the potential it holds. This process will help bridge the gap between theory and practice, enhancing economic growth, societal progress, and scientific advancement. The economy is changing fast and organizations need to adapt to current trends. Entrepreneurship is the process of starting and managing a business venture to achieve financial and personal goals. It involves identifying opportunities, developing a business plan, securing funding, and building a team to execute your vision. Successful entrepreneurs are risk-takers, problem solvers, and leaders who are passionate about their ideas and are willing to put in the work to make them a reality, through a new approach based on sustainable development goals.

#### **Short Biography**

My passion is creating value and impact through entrepreneurship and innovation in healthcare with over 30 years of experience. I have a background in pharmacology and business strategy, as well as an executive master's degree in business and strategy management. Currently CEO of BrYet Europe, the European operations of BrYet US, a venture-backed biotechnology company developing breakthrough therapies for metastatic cancers. Previously, co-founder and CEO of GreenBone Ortho, an innovative company that developed and commercialized a nature-inspired solution for large bone defects. I held also senior leadership positions at Zambon Group, Cardinal Health, and Zcube, establishing collaborations with major European and U.S. universities, as well as with venture capital firms. Track record of leading fundraising efforts, evaluating innovative opportunities, and translating ideas into operational requirements. Board member of several biotechnology startups. Currently President of the Italian Healthcare Licensing Group.



### **Gert Storm, Professor**

Phospholipid Research Center (Germany)

### **Bioinspired Nanotherapeutics: from Academia to Patient**

#### **Abstract**

Nanotechnology has become an essential element of pharmaceutical sciences and finds multiple applications in drug delivery systems (nanomedicines) in enhancing the therapeutic performance of drugs. This talk will address the basic nano principles potentially offering superior nanomedicines but also the low pace of clinical translation of academic results to clinical reality for patients. Currently marketed nanomedicines include liposomes, lipid nanoparticles, nanocrystals, antibody-drug conjugates, and polymer-based, protein-based and metal-based nanoparticles. A range of issues must be addressed in the clinical development of these nanostructures. Not only pharmaceutical aspects, safety and efficacy, also ethics, market size, possibility of market failure, costs, commercial development and healthcare reimbursement schemes are factors playing a critical role in realizing benefits to patients. Selected examples from my own experience will be discussed.

#### **Short Biography**

Gert Storm is em-professor at Pharmaceutics/Targeted Nanomedicine at the Department of Pharmaceutics of the Utrecht University and Department of Biomaterials Science & Technology (BST) of the University of Twente and keeps a visiting professor position at the Department of Surgery of the National University Hospital in Singapore. Clinical translation of academic results is a vital element of his ambition, as exemplified by the clinical testing of liposomal formulations of clodronate and corticosteroids to treat inflammatory disorders. Co-founder of Eden Ophthalmic (Singapore) and Ayuvant (Utrecht), scientific advisor at Liposoma (Amsterdam), vice-president of the Phospholipid Research Center (Heidelberg), board member of the European Foundation for Clinical Nanomedicine (Basel) and APV Focus Group Drug Delivery (Mainz). From 2014 on included in the lists of Highly Cited Researchers by Clarivate Analytics; H-index 129 (Google Scholar, December 2024); about 700 publications.



### **Pieter Vader, Professor**

University Medical Center Utrecht (The Netherlands)

### **Extracellular vesicle-inspired carriers for therapeutic RNA delivery**

#### **Abstract**

Extracellular vesicles (EVs) play a pivotal role in intercellular communication through functional transfer of bioactive cargo, including nucleic acids. Despite increasing interest in EV-mediated nucleic acid transfer, understanding of the mechanisms regulating EV-mediated nucleic acid delivery is limited. Recently, we developed a CRISPR/Cas9-based reporter system that allows the study of EV-mediated RNA transfer at single-cell resolution. We employed this system to compare the delivery efficiency of EVs to clinically approved state-of-the-art lipid nanoparticles and found that EVs delivered RNA several orders of magnitude more efficiently than these synthetic systems. To overcome challenges related to the difficulty of RNA loading into EVs, we prepared EV-liposome hybrid nanoparticles and evaluated them as RNA delivery systems in terms of cellular uptake, toxicity, and RNA delivery efficacy. We show that hybrids combine benefits of both synthetic and biological drug delivery systems and might serve as future therapeutic carriers of RNA. Finally, we show how we developed EVs as delivery vehicles for CRISPR ribonucleoproteins.

#### **Short Biography**

Pieter Vader graduated in Chemistry (B.Sc., 2005) and Drug Innovation (M.Sc., 2007) from the University of Utrecht. He earned his PhD degree in 2012 from the University of Utrecht on the subject of targeted delivery of siRNA to inhibit tumor angiogenesis. From 2012 to 2014, Pieter was employed as a (senior) postdoctoral fellow at the University of Oxford, UK, in the lab of Prof. Matthew Wood, supported by a NWO Rubicon fellowship. The research topic was development of small RNA-loaded extracellular vesicles for targeted delivery. In 2014 he moved back to The Netherlands to continue his work at the University Medical Center Utrecht. Currently, he is Associate Professor at CDL Research and at the Department of Experimental Cardiology. His main research interests are in the field of therapeutic applications of extracellular vesicles, including unraveling the mechanisms underlying extracellular vesicle-mediated cargo transfer. His research has been supported by a NWO Veni Grant (2014), ERC Starting Grant (2019), Dutch Heart Foundation Dekker Senior Scientist Grant (2019), NWO Vidi Grant (2020) and ERC Consolidator Grant (2023). In 2021, Pieter was awarded the Prix Galien Research Award for his work on drug delivery.



### **Roy Van der Meel, Professor**

University of Eindhoven (The Netherlands)

### **Apolipoprotein nanoparticle platform technology for RNA delivery to immune cells**

#### **Abstract**

Lipid nanoparticle technology is the current gold standard RNA delivery platform that enabled the clinical translation of the first siRNA drug and the COVID-19 mRNA vaccines. Nevertheless, currently approved lipid nanoparticle systems are mostly suited for vaccine purposes following local administration or hepatic delivery following intravenous administration. We have recently established nanodelivery platform technology based on natural lipoproteins, which prevents premature degradation of RNA, ensuring its targeted and intracellular delivery to immune cells in the bone marrow. By leveraging the apolipoprotein platform nanotechnology's inherent capacity to engage immune cells, we can achieve functional gene silencing or gene expression in immune cell subsets and their bone marrow progenitors, providing opportunities for immunotherapy development.

#### **Short Biography**

Roy van der Meel is a biomedical engineer specialized in nanomedicine and RNA therapeutics. After obtaining a PhD from Utrecht University under guidance of Wim Hennink and Gert Storm, he moved to Pieter Cullis' lab at the University of British Columbia where he gained extensive experience with lipid nanoparticle technology. In 2019, he was recruited to Eindhoven University of Technology by Willem Mulder and appointed Assistant Professor in the Precision Medicine group. His current research focuses on establishing platform nanotechnology for delivering RNA therapeutics to specific immune cells. He has co-authored over 60 publications in journals including Nature Nanotechnology, Nature Biomedical Engineering, Journal of Controlled Release, and ACS Nano. His research is supported by a Dutch Research Council Vidi Grant and he was awarded the CRS Young Investigator Award in 2024.



### **Assaf Zinger**

Technion- Israel Institute of Technology (Israel)

### **Disease Driven Therapeutics**

#### **Abstract**

Biomimetic nanoparticles aim to emulate the behavior of either cells or exosomes effectively. For example, leukocyte-based biomimetic nanoparticles incorporate cell membrane proteins to transfer the natural tropism of leukocytes to the final delivery platform. Here, I will demonstrate how tweaking the protein content improved the targeting of inflamed endothelium in three different preclinical models and describe the imaging challenges that arose in these projects. I will also discuss the reproducible production of two types of neuron-targeting biomimetic nanoparticles, each with a distinct lipid formulation backbone suited to potential therapeutic cargo (e.g., mRNA, small molecules, and protein), by integrating membrane proteins unbiasedly sourced from human pluripotent stemcell-derived neurons. Our combined use of a microfluidic, bottom-up approach and tuning of key synthesis parameters enabled the synthesis of reproducible, enhanced biomimetic nanoparticles that have the potential to improve the treatment of inflammatory-based conditions and genetic disorders through targeted nano delivery.

#### **Short Biography**

At the Technion- Israel Institute of Technology, my research group is developing biomimetic nanoparticles (NP) to treat neurodegenerative pediatric diseases, traumatic brain injuries, and breast and ovarian cancers. Our lab's main goal is to be one of the world's leading research groups in developing targeted biomimetic NP that can encapsulate a wide range of therapeutic molecules, including mRNA, proteins, and small molecules, thus revolutionizing how we treat numerous diseases. For example: (1) We improved the therapeutic outcome of pancreatic cancer treatment using a controlled-release enzyme delivery system. (2) We mimic white blood cells binding to inflammatory sites and develop a macrophage biomimetic drug delivery system. (3) We developed the first ever neuron biomimetic nanoparticles that mimics how neurons bind to other neurons through homotypic cell-cell adhesion protein. All these breakthroughs were published in top-tier journals (2132 citations and h-index 20).

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