CRS
BeNeLux & France Local Chapter

First CRS BeNeLux & France Local Chapter Meeting: Invited Speakers

On my experiences as a drug delivery scientist from the BeNeLux & France

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In this lecture I will try to explain how I have experienced my scientific career in drug delivery which started at Ghent University in Belgium in October 1999, exactly 25 years ago. I will focus on a number of findings of our lab and, especially, will illustrate how one idea has turned into another one.

Labeling nanoparticles with contrast agents to trace their accumulation to diseased tissues

Nicolas Tsapis
CNRS Research Director
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In drug delivery, nanomedicines are often associated with a contrast agent to yield nanotheranostic systems allowing both imaging and treatment. The theranostic word was first mentioned in 2002 and comes from the contraction of therapy and diagnostics. Nanotheranostics are designed to image nanoparticle biodistribution, to survey the extent of the disease, to deliver the treatment and to monitor in real time its mechanism of action and its efficacy. In this presentation, we will focus on the first goal and will present several examples of labeling polymer nanoparticles to detect them with one of three different imaging modalities: ultrasound, 19F magnetic resonance imaging or photoacoustics.

Clinical translation of mRNA Galsomes – a glycolipid adjuvanted mRNA vaccine

Ine Lentacker
Principal Investigator
Ghent Research Group on Nanomedicines, Ghent University, Belgium

Cancer immunotherapy harnesses a patient's immune system to target tumors by recognizing tumor-derived antigens. Over the last decade, RNA cancer vaccine technology has advanced rapidly, aided by next-generation sequencing and immunopeptidomics for improved neo-epitope selection. We developed an alternative nanoparticle vaccine (mRNA-Galsomes) combining immunosilent mRNA with the NKT cell activator α-GalCer. Following i.m. administration, this vaccine stimulates invariant NKT cells, inducing both innate and adaptive immune responses. In collaboration with Ghent University Hospital, we're preparing for a phase I clinical trial in lung cancer patients. part of this process, we recently performed a benchmarking study comparing different LNP formulations and preclinical toxicity experiments in Wistar Han Rats and pigs showing a similar toxicity profile as the BioNtech Comirnaty Covid-19 vaccine at similar doses.

Mesenchymal stromal cells for immunomodulation and regeneration: A journey beyond cell therapy

Edorta Santos
Assistant Professor
NanoBioCel Group, University of the Basque Country (UPV/EHU), Spain

Mesenchymal stromal cells (MSCs) are known for their ability to differentiate into mesodermal tissues, but their current significance lies in their capacity to modulate the immune system, reduce inflammation, and promote tissue regeneration. Through their secretome, MSCs exert therapeutic effects via paracrine action, releasing trophic factors, cytokines, chemokines, and extracellular vesicles. Recent studies have also shown that these effects can be systemic or delocalized. Therefore, it is also possible to isolate specific components from the secretome and use them as a replacement for cell therapy. This therapeutic approach, commonly known as cell-free therapy, offers a safer and more predictable alternative to cell therapy, simplifying regulation, production, and storage. In this talk, Edorta shares his experience in transitioning from the use of different MSC encapsulation systems to the emerging field of cell-free therapies, along with his insights on future challenges and prospects.

Precision Drug Targeting and Bioengineering Strategies to Advance Cancer Therapeutics

Jai Prakash
Full professor
Engineered Therapeutics, Department of Advanced Organ bioengineering and Therapeutics, University of Twente, Enschede, The Netherlands

Cancer is one of the most challenging diseases to be addressed in the clinic, attributed to its highly complex and dynamic microenvironment. Besides cancer cells, the tumor microenvironment contains different cell types such as fibroblasts, macrophages and immune cells as well as extracellular matrix. Crosstalk among each other creates an environment favoring cancer cells to proliferate, migrate and develop resistance. We aim to develop cutting-edge engineering technologies to re-program the tumor microenvironment to reverse their pro-tumoral properties. Learning from the natural cellular behavior, we have recently developed nanomedicine-based technologies to target tumor-associated macrophages and trained them to kill cancer effectively. Furthermore, we strive to understand the complex physiological and biochemical characteristics of the tumor microenvironment by developing 3D bioengineered models. Since many therapeutics fail in preclinical animal models or during clinical development, it is imperative to develop advanced in vitro models that mimic the tumor microenvironment. Over the years, we have developed a variety of cancer models based on 3D spheroids, bioprinted models and vasculature compression models. These models not only support testing therapeutics but also identifying novel biomarkers. Altogether, both cell-specific precision medicine and bioengineering approaches will advance personalized medicine tailored to individual patients.