



Consiglio Nazionale
delle Ricerche



ISTITUTO PER L'ENDOCRINOLOGIA
E L'ONCOLOGIA SPERIMENTALE
"G. SALVATORE"
2nd UNIT

Friday Seminar
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**Development of innovative RNA
aptamer-based drugs and targeted
nanosystems for cancer treatment**

Host: Anna Chiara De Luca (annachiaradeluca@cnr.it)

Conference Room, CNR, P. Castellino Campus

Abstract

Oligonucleotide aptamers, similarly to antibodies, form high-affinity bonds with their specific protein targets, thus representing an effective tool for active cancer targeting. However, being synthesized chemically, they are cheaper, non-immunogenic, more stable and reliable in terms of reproducibility compared to protein therapeutics. Although the SELEX (Systematic Evolution of Ligands by EXponential enrichment) process to isolate aptamers is typically carried out using purified target molecules, we employ whole live cells as selection targets in order to obtain aptamers against cell surface proteins in their native conformation and even in the absence of prior knowledge of biomarkers present at the cell surface. Here, I will report our recent data on the generation of nuclease-resistant RNA aptamers binding to unique biomarkers of triple-negative breast cancers (TNBC) and their preclinical development as therapeutics and theranostics. I will discuss about applications of our aptamers for: 1) identifying novel cancer biomarkers; 2) discriminating different subtypes of heterogeneous TNBC by aptahistochemistry; 3) interfering with malignant phenotype on their own and/or in combination with conventional chemotherapy and immunotherapy; 4) delivering drug-loaded nanoparticles specifically to target cancer cells.

Biography

Laura Cerchia is Senior Researcher and Group Leader at IEOS-CNR. She received her PhD from the University of Naples "Federico II" in Biochemical Sciences in 1997 and until 2000 she worked as post-Doc Research Fellow at the Department of Organic and Biological Chemistry (UNINA) focusing on the study of proteins and nucleic acids involved in the control of cellular homeostasis. Then, she moved at the IEOS and, as CNR fixed-term researcher (2001), staff (Jan 2008) and senior (Jan 2021) researcher, she is focusing on the generation of RNA aptamers targeting cancer cells and their preclinical development as theranostics, therapeutics and delivery agents of drug-loaded nanoparticles to human cancers. Since 2007 she leads her own independent team in the frame of national and international research grants that she coordinates as Principal Investigator. In the frame of 3-years Individual Grant (IG 2007), granted by Fondazione AIRC, her group identified novel aptamers targeting chemoresistant lung cancers that were validated, during the international 3-years Worldwide Cancer Research (WCR 2010) grant, as delivery agents of drugs to lung cancer and glioblastoma. Then, in the AIRC IG (2011) and AIRC IG (2016) projects, she focused on the development of innovative aptamer-based strategies for breast cancers treatment. These include smart aptamer-nanotherapeutics for triple-negative breast cancer, whose evaluation is on-going in the frame of the 5-years AIRC IG grant (2020-2025), the Join Bilateral agreement CNR-CONICET, Argentina (2023-2025) and the PNRR "National Center for Gene Therapy and Drugs based on RNA Technology" (2022-2025). Since 2016, she is member of International Society on Aptamers (IN-SOAP). As an expert in the aptamer field, she is independent reviewer for PhD defences (University of Strasbourg-France, Deakin University-Australia and Rhodes University-South Africa) and international grant proposals, and is involved in editorial activities for high-impact journals. She is author of more than 75 scientific publications on international peer-reviewed journals and inventor of 4 international patents.