PNRR Missione 4, Componente 2, Investimento 1.4 "Potenziamento strutture di ricerca e creazione di "campioni nazionali di R&S" su alcune Key Enabling Technologies"
Iniziativa finanziata dall'Unione europea –- NextGenerationEU.
National Center for Gene Therapy and Drugs based on RNA Technology
Sviluppo di terapia genica e farmaci con tecnologia a RNA
Codice progetto MUR: **CN00000041** – CUP UNINA: **E63C22000940007**

SPOKE: 5

Pharmacokinetic and pharmacodynamic evaluations of RNA-loaded nano-delivery systems for the treatment of pulmonary inflammation

RNA-based technologies are largely impacting the way to treat and prevent inflammatory and autoimmune disorders (Lodde V et al., Biomolecules. 2020,14;10(7):1044; Sargazi S et al., Cell Biol Int. 2022;46(9):1320-1344). In this scenario, there is an increasing interest in non-coding RNAs, such as microRNAs, circular (circ)RNAs, and long noncoding (lnc)RNAs as sensitive non-invasive biomarkers for disease diagnosis and prediction, for disease progression and the response to therapy monitoring, as well as novel therapeutic targets (Ashrafizadeh M et al., Semin Immunol. 2022;59:101606). More recently, a growing interest focused on the circulating extracellular vesicles, identified as pivotal mediators of intercellular communication with critical roles in physiological and pathological conditions (Shah R et al., Chest. 2018 153(1):210-216). Via this route, several molecules (e.g., nucleic acids, proteins, metabolites) can be transferred to proximal and distant targets to convey specific information. In simplest words, RNA delivery for cell-specific gene-silencing diseases associated with drug delivery is emerging as a new strategy for the treatment of both inflammatory and autoimmune diseases maximizing local drug concentration, increasing therapeutic efficacy, and limiting systemic toxicity (Paunovska K et al., Eur J Pharmacol. 2021 15; 905:174178). Therefore, the development of non-coding-RNA nano delivery systems for effective targeted delivery to inflammatory and autoimmune tissues can represent a valid pharmacological approach. Based on this evidence, the project aims to identify non-coding RNAs as potential promising biomarkers for the diagnosis and treatment of inflammatory and auto-immune diseases with particular regard to pulmonary inflammation. In order to address this issue, one identified the specific RNA to be targeted, safety and efficacy of RNA nano-delivery systems will be evaluated by using in vitro cell lines and in vivo animal models.