

**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**

**Doctorate of National Interest**

**RNA THERAPEUTICS AND GENE THERAPY**

**SELECT ONE OF THE FOLLOWING RESEARCH AREA:**

- ☒ **Mechanisms of Diseases and Drug Target Identification**
- ☐ **Design and Delivery of New Gene Therapy and RNA-Based Medicines**
- ☐ **Validation and Safety In Preclinical and Clinical Studies**

**LOCATION OF THE RESEARCH ACTIVITY (INSTITUTION/DEPARTMENT):**

Università Federico II Napoli, Dipartimento di Medicina Molecolare e Biotecnologie Mediche

**TUTOR:**

Paolo Maiuri

**PROPOSED RESEARCH ACTIVITIES (max 300 words):**

**The intrinsic shape of the cell nucleus.**

The nuclei of most cells tend to be either round or oval. Abnormal nuclear shape and size are typically associated with cancer or other diseases, as laminopathies. Mutations in genes encoding for the major structural components of the nucleoskeleton, the lamins, or for elements of the LINC complex, the set of proteins ensuring the connection between the nucleus and the cytoplasm, indeed, are leading to a variety of disorders, including muscular dystrophy, dilated cardiomyopathy and progeria. Moreover, they could have a crucial role in tumor onset and metastasis spreading. Yet, the basic mechanisms linking cell and nucleus shape, as well as cell and nucleus size, and how they are perturbed in different diseases, are still unclear. Interestingly, both cell and nuclear shape

and size react and adapt to physical external stimuli. Cells indeed sense mechanical properties of their micro-environments and accordingly start specific mRNA transcriptional profiles. The aim of this project will be to better characterize the interconnection between nucleus and cytoplasm and how this link is perturbed in different diseases or react to mechanical forces.

### **Selected articles of the PI**

Poli A, et al. Nat Commun. 2023 Mar 14;14(1):1432.

Pennacchio FA, et al. Front Bioeng Biotechnol. 2021 Jan 8;8:596746.

Nastały P, et al. Nat Commun. 2020 May 1;11(1):2122.