Hydrodynamics Laboratory (LadHyX), CNRS - Ecole Polytechnique UMR 7646



#### THE PROBLEM ADDRESSED

Abnormalities in the mechanical properties of nuclei and/or cells are involved in various pathologies including cancer and certain rare genetic diseases.

Mecanodiag provides **a novel functional diagnostic test** that would complement existing genetic testing which often leads to inconclusive diagnosis. The same platform can also be used for **drug screening**.

LadHyX is a multidisciplinary laboratory specializing in fluid mechanics research. It has a history of innovative technology transfers and has already spun off several start-ups.

The project team focuses on vascular biomechanics and bioengineering, has active collaborations with clinicians, and is a founding member of the IP-Paris Engineering for Health Interdisciplinary Center **(E4H)**.

#### TECHNOLOGY

MecanoDiag uses the concept of **cellular** and nuclear deformations on microstructured surfaces.

 A specialized microstructured culture substrate is optimized to deform cells and their nuclei to amplify differences in deformation between normal and diseased cells.  A full diagnostic system (microscopy platform and an AI-based image analysis software) under development will provide a quantitative diagnostic assessment.

MECANODIAG

#MedTech #Cellular&NuclearDeformations #AI

### **COMPETITIVE ADVANTAGES**

- Rapid (under 1hour), inexpensive, and high throughput tool for in vitro diagnosis. This technology can help reduce medical costs.
- Provide functional assay to detect abnormalities in cell and nuclear mechanical properties.
- Easy to use by external customers.

### APPLICATIONS

- Medical diagnosis of cell anomalies. Explored targets:
  - Laminopathy
  - Cancer
- Testing the effects of new treatments on cellular mechanical properties
- Drug screening

#### **DEVELOPMENT STATUS**

- TRL3: POC for laminopathy diagnosis
- Preliminary results on breast cancer diagnosis

### INTELLECTUAL PROPERTY

- 1 patent application:
- FR2209022, priority date 2022/09/08

## **INVENTORS & CONTACTS**

• Dr. Abdul Barakat, Research director at CNRS,

abdul.barakat@polytechnique.edu

• Dr. Claire Leclech, PostDoc at Ecole Polytechnique,

claire.leclech@ladhyx.polytechnique.fr

 TTO: Miora Ramahadison, miora.ramahadison@polytechnique.edu

## PUBLICATIONS

Leclech, Claire, et al. "Microgroove substrates unveil topography-driven, dynamic 3D nuclear deformations." <u>bioRxiv (2024)</u>.

Leclech, Claire, et al. "*Topography-induced large-scale antiparallel collective migration in vascular endothelium.*" <u>Nature Communications 13.1 (2022).</u>

# LOOKING FOR

- Medical/academic partners interested in exploring diseases involving abnormalities in cells' mechanical properties
- Early-stage testing of the effect of drugs under development