H.F.R.I.
Hellenic Foundation for Research & Innovation

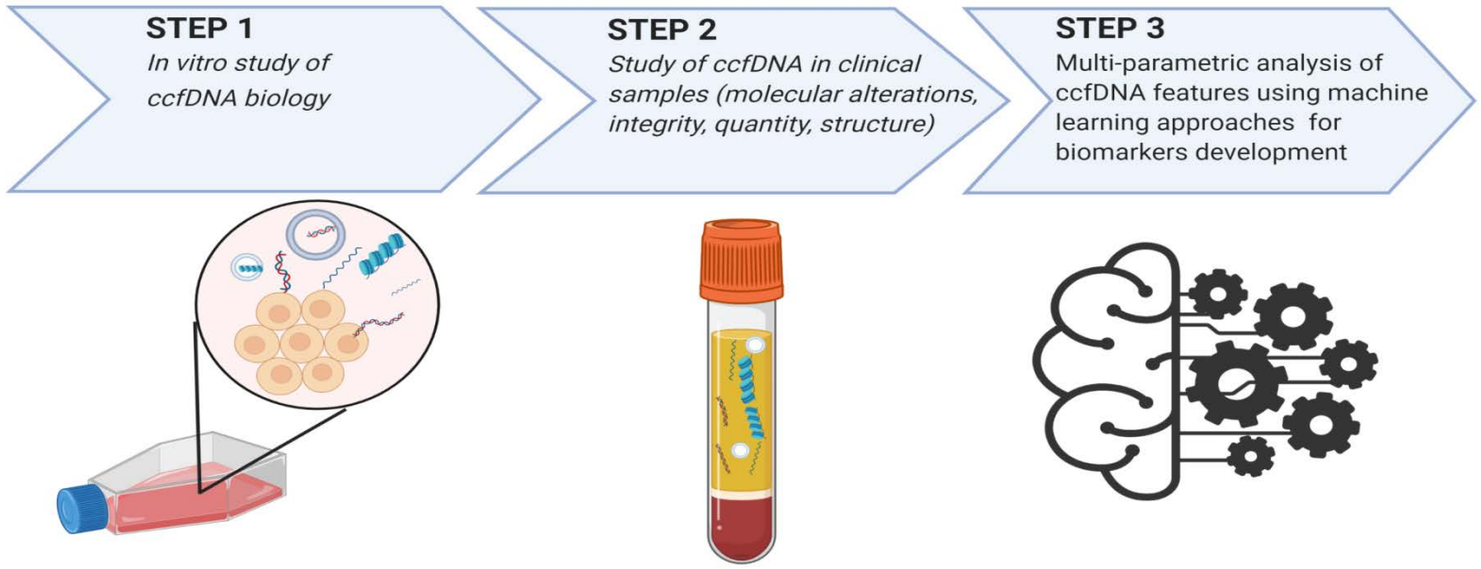
Description of the funded research project

Structure, origin, and function of cell-free DNA: the hidden information towards precision pharmacotherapy

PI Ekaterini Alexiou Chatzaki

1st Call for H.F.R.I. Research Projects to Support Faculty Members & Researchers and Procure High-Value Research Equipment

Project title: ***Structure, origin, and function of cell-free DNA: the hidden information towards precision pharmacotherapy***
Reader-friendly title: ***cfDNAPrePha***



Principal Investigator:
Ekaterini Alexiou Chatzaki
Prof. Pharmacology, DUTH
Director, Institute Agri-Health, HMU

Host Institution:
Department of Medicine,
Democritus University of Thrace
Greece

Scientific Area:
Life Science

Budget: **200,000€**

Duration: **36 months**

Collaborating Institution:
Cancer Epigenetics and Biology Program (PEBC), Bellvitge Institute for Biomed Research (IDIBELL), Barcelona, Spain

H.F.R.I.
Hellenic Foundation for Research & Innovation

Research Project Synopsis

FOCUS of this research is **circulating cell-free DNA(ccfDNA),** a biomaterial suggested as a minimally-invasive liquid biopsy with clinical value. Biological questions are addressed that build the prerequisite frame for its clinical use in three different pathological entities of major burden: **one malignancy (breast cancer), one metabolic (type 2 diabetes) and one inflammatory (osteoarthritis).**

Significant **STREGTHS** lie upon:

1. Well characterized biobanks.
2. Support by Prof. Esteller, a world pioneer in the field
3. Established and validated Standard Operational Procedures

Our contribution will employ **METHODOLOGY** such as capillary electrophoresis, Next Generation Sequencing, mass spectrometry and Methylight PCR, whereas *in vitro* cell lines and animal models will be used. Bioinformatic data mining and automated machine learning will aid target discovery step and multivariable data analysis tools will reveal clinically relevant algorithms.

Our **AMBITION** is to enrich basic knowledge on the biology of ccfDNA and to construct multiparameter tools to be used as reliable biomarkers for personalized management and precision pharmacotherapy.

Project originality

Our study will address **for the first time**:

- the *biology of ccfDNA*, in terms of integrity, quantity, protein/chemical composition and cell type specific patterns in the three studied deseases.

- Investigating ccfDNA by *Spectroscopy*, introducing a hi-tech cost-effective technique in the clinical setting.
- Investigating *in vitro* the hypothesis of "*genometastasis*"
- Addressing ccfDNA cellular *origin*.
- Employing a global data-driven approach in identifying DMSs with clinical
- Exploiting novel *automated machine learning* tools for multivariable feature-selection analysis to produce and validate clinically relevant signatures.

Expected results & Research Project Impact

Expected results:

- clarifying the biology of ccfDNA,
- targeting tissue specific and drug-related DMSs markers that could serve as indicators to precision pharmaco/therapy.
- expand knowledge and applications to diseases others than cancer,
- the expected multi-parameter tools will create knowledge capital and will be exploited in terms of patentability and opportunity in entrepreneurship, as they are expected to enter the development pipeline for personalized diagnostics (TRL6).
- advancements of this very competitive on a global scale field will be disseminated with scientific articles and presentations.

The Importance of this Funding

The funding of H.F.R.I. through the support of Faculty Members allows us to:

- continue our research activity in the competitive field of liquid biopsy, combining basic and applied research for the development of minimally invasive tools
- capitalize on our previous efforts in the field
- increase recognition and visibility of our University
- collaborate and transfer knowledge by a pioneer team from the Bellvitge Institute for Biomedical Research (IDIBELL)
- conduct our research in Greece and strengthen the "brain gain" in our country.

H.F.R.I.
Hellenic Foundation for Research & Innovation

H.F.R.I.
Hellenic Foundation for Research & Innovation

COMMUNICATION

185 Syggrou Ave. & 2 Sardeon St. 2
171 21, N. Smyrni, Greece
+30 210 64 12 410, 420
communication@elidek.gr
www.elidek.gr