THE PRECISION CARDIOLOGY MEDICINE PLATFORM: INTEGRATED SOLUTIONS FOR CARDIAC DISEASES. A UNIQUE EUROPEAN APPROACH.

Endorsed by: University Claude Bernard Lyon1, Lyon

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Organization: Hospices Civils de Lyon
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NONE

Brief summary:
Precision medicine brings efficiency and cost-effectiveness to medical care. Our goal is to develop the first Precision Cardiology Medicine Platform in Europe.

Project / initiative description (context and objectives):
Cardiovascular drugs are considered “ineffective” or “not completely effective” on 30% to 60% of patients. Adverse drug reactions have reached epidemic proportions and are increasing at twice the rate of prescriptions. In 2008, it has been estimated that Adverse Drug reactions accounted for 197,000 death in Europe and generated a cost of €79 billion.

Today, patients with cardiac diseases cannot benefit from efficient pharmacotherapy due to a lack of comprehension of the pathophysiology. Inter-individual variability also contributes to a poor risk/benefit ratio of drug therapy. Because the number of biomarkers is increasing, they have the potential to deliver therapeutic options based on the unique characteristics of an individual patient.

Our vision is to maximize treatment effectiveness and reduce adverse drug reactions of available compounds for patients suffering from cardiac diseases.

Our goal is to develop the first European Precision Cardiology Medicine Platform in order to offer end-to-end scientific capabilities encompassing phenotyping, genotyping, mechanistic investigations and pharmacological evaluation.

In the field of cardiac diseases, the main objectives of the platform are:

- To improve the risk benefit ratio of medical prescription at individual level
- To identify new pharmacological targets
- To evaluate new medications

Our current expertise in cardiovascular, molecular diagnostic and drug assessment is an unprecedented complementarity to build this platform.

Description of the existing or potential collaboration:
The following team has started working on this platform:

- Pr Philippe CHEVALIER: Professor of Cardiology, Head of the Cardiac Arrhythmias Unit at HCL, Coordinator of the “Centre National de Référence des cardiopathies héréditaires » de Lyon.
- Dr Quadiri TIMOUR: Doctor of Pharmacology, MCU PH University Claude Bernard Lyon 1, 30 years of academic research in cardiac pharmacology and in vivo studies.
- Dr George CHRISTE: PHD Electrophysiology, INSERM Lyon. A career dedicated to the in-depth study of cardiac channels.
- Dr Caroline AUCLERC: PHD Electrophysiology, IUH Bordeaux. Expert in cellular electrophysiology, laboratory technics and quality management.
- Dr Gilles MILLAT, PHD Molecular biologist. Head of the HCL Cardiogenetic D.
- Dr Patrice Nony MD, PHD at HCL. Methodologist expert in pharmacological assessment in cardiac diseases.
- Sébastien JACQUET, MBA EM Lyon. Marketing and Business Development in Life Science.
Project / initiative assets (type, originality, innovation...):

Our current expertise in cardiovascular, molecular diagnostic and drug evaluation is an unprecedented collaboration that has the potential to bring personalized/precision medicine to patients with cardiac diseases and to launch this unique collaborative Precision Cardiology Medicine Platform.

We anticipate providing the following path of services:

- Establish patient phenotypes by clinical expertise, ECG and biomarkers analysis
- Establish patient genotype by New Generation Sequencing and a relevant molecular diagnostic
- Replicate patient phenotype in human Ips cell derived cardiomyocytes and/or small animals
- Study drug efficiency and toxicology on replicated phenotypes
- Build an extensive cardiovascular genetic and myocardial tissue database
- Optimize drug therapy providing complete pharmacogenomics studies
- Assess disease risk and facilitate prevention

This path of services will leverage various innovative steps including some we have already started exploring:

- Development of new biomarkers to process new cardiovascular tests
- First phenotypical characterization of Zebra fish as a new animal model for cardiovascular studies
- Development of reliable and cost effective Human Ips cell derived cardiomyocytes production processes.

Citizen benefits:

1. Scientific perspectives:
Patients affected with cardiac diseases and their families are facing lack of scientific knowledge. It is for instance difficult to develop therapeutic tools and to define adequate therapeutic strategies. This unique platform will provide a full comprehension of a personalized/precision approach of drug therapy in cardiac diseases. This platform will help identifying the most relevant drugs to be further evaluated in specific patients during phase III RCTs, specifying the adequate design to be used in the corresponding RCT for each patient.

In the medium term, additional prospects could be considered for other cardiac diseases such as:
Identification of more relevant prognosis and predictive biomarkers and new therapeutic strategies of potential interest
Application of this global strategy towards the fields of ‘theragnostics’ and personalized medicine.

2. Socioeconomic benefits:
The cost of the few existing drugs is usually high and social consequences are major. The present project will contribute to speed-up the process of orphan drug development, and will transform our understanding of cardiac diseases and the practice of medicine in this domain.

3. Educational impacts:
Every single member of our project team is highly concerned about the need to communicate obtained results to the scientific community and to the general public (including patient associations). Dissemination of results will be made swiftly through the usual channels of original papers submitted for publication to peer reviewed and international scientific journals, oral presentations and posters at conferences, workshops and seminars.

Planned schedule:

2015   Development of new biomarkers to identify myocardial damage.
       We are already leading ongoing studies about atrial fibrillation and sudden cardiac death.
       Funding strategy: Institutional and private industry grants.

2015   First phenotypical characterization of animal model of atrial fibrillation and laminopathy in the zebrafish.
       Funding strategy: Institutional and private industry grants

2016   Creation of a biological data basis: Dilated Mycardiopathy, Hypertrophic Cardiomyopathy and cardiac laminopathies.
       Funding strategy: Institutional and private industry grants.

2016   Additional characterizations of new genetic variants in accurately phenotyped cardiac patients.
       Funding strategy: Institutional and private industry grants.

2016   Produce human Ips cell derived cardiomyocytes production process
       Funding strategy: Institutional and private industry grants

2017   Provide services to pharmaceutical industries
       Funding strategy: Private industry grants

What are you expecting from BIOVISION Catalyzer?

1 Meeting potential partners
2 Viability
3 International reach
4 Other