



Centro Nacional de Investigaciones Cardiovasculares Carlos III (CNIC)



MINISTERIO
DE ECONOMÍA
Y COMPETITIVIDAD



Fundación **pro**nic



EXCELENCIA
SEVERO
OCHOA

cnic

20th July 2016

1. CNIC: The institution

Management model

Mission and figures

Scientific organization

Translational research

Technology

2. Innovation activities

Technology Offers

Main research areas for potential collaboration

3. Pitfalls and proposed actions

Management model

- Public biomedical research foundation
- Funded through a pioneering public-private partnership between the Spanish Government and the Pro CNIC Foundation
- Started activity in 2006



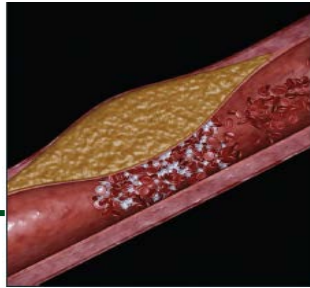
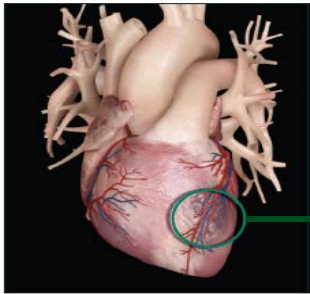
Pro CNIC Foundation currently includes 14 of the most important private Spanish companies not related to the biotechnology or biopharmaceutical sectors

CNIC's mission

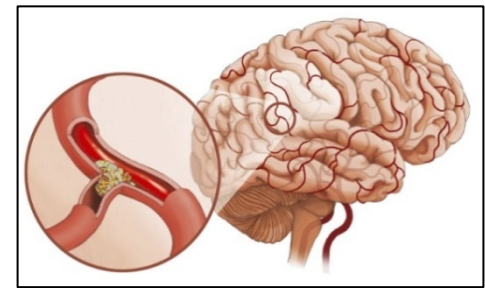


“The failure to act globally would create a catastrophe,
one that we know is coming
and have the power to prevent.”

Scientific American (2014)



Epidemics
without
Borders



The **CNIC's MISSION** is to improve cardiovascular health by advancing scientific knowledge and its effective transfer to clinical applications



CNIC in figures




450 
PEOPLE IN 2015

3/4 
RESEARCHERS
RECRUITED SINCE 2007

4,500 
TRAINING PARTICIPANTS
2006-2015

2015 SCIENTIFIC PUBLICATIONS


215
ARTICLES PUBLISHED

 60%
CNIC MAIN AUTHOR

75%
PUBLICATIONS IN Q1

COMPETITIVE FUNDING 2008-2015

€50M
NATIONAL GRANTS

 €25M
INTERNATIONAL GRANTS

25%
PRINCIPAL INVESTIGATORS
WITH AN ERC GRANT

NETWORKING / CLINICAL STUDIES

 9,000
PARTICIPANTS
6-CLINICAL PROJECTS

50 
INTERNATIONAL
COLLABORATIONS

63
AGREEMENTS
SPANISH NATIONAL HEALTH SYSTEM

INTELLECTUAL PROPERTY

 21
ACTIVE PATENT FAMILIES

16
TECHNOLOGY
OFFERS FOR OUT-LICENSING

General Director
Dr. Valentín Fuster

Basic Research Department

Dr. Vicente Andrés

Clinical Research Department

Dr. Borja Ibañez

Research Areas

**Myocardial
Pathophysiology**

Myocardial Biology
Cardiovascular Metabolism

**Vascular
Pathophysiology**

Vascular Biology
Signaling & Inflammation

**Cell & Developmental
Biology**

Genetics & Development
Cell Biology & Physiology

MODELS

Viral Vectors
Transgenesis
Pluripotent Cells
Animal Facility

Technical Units

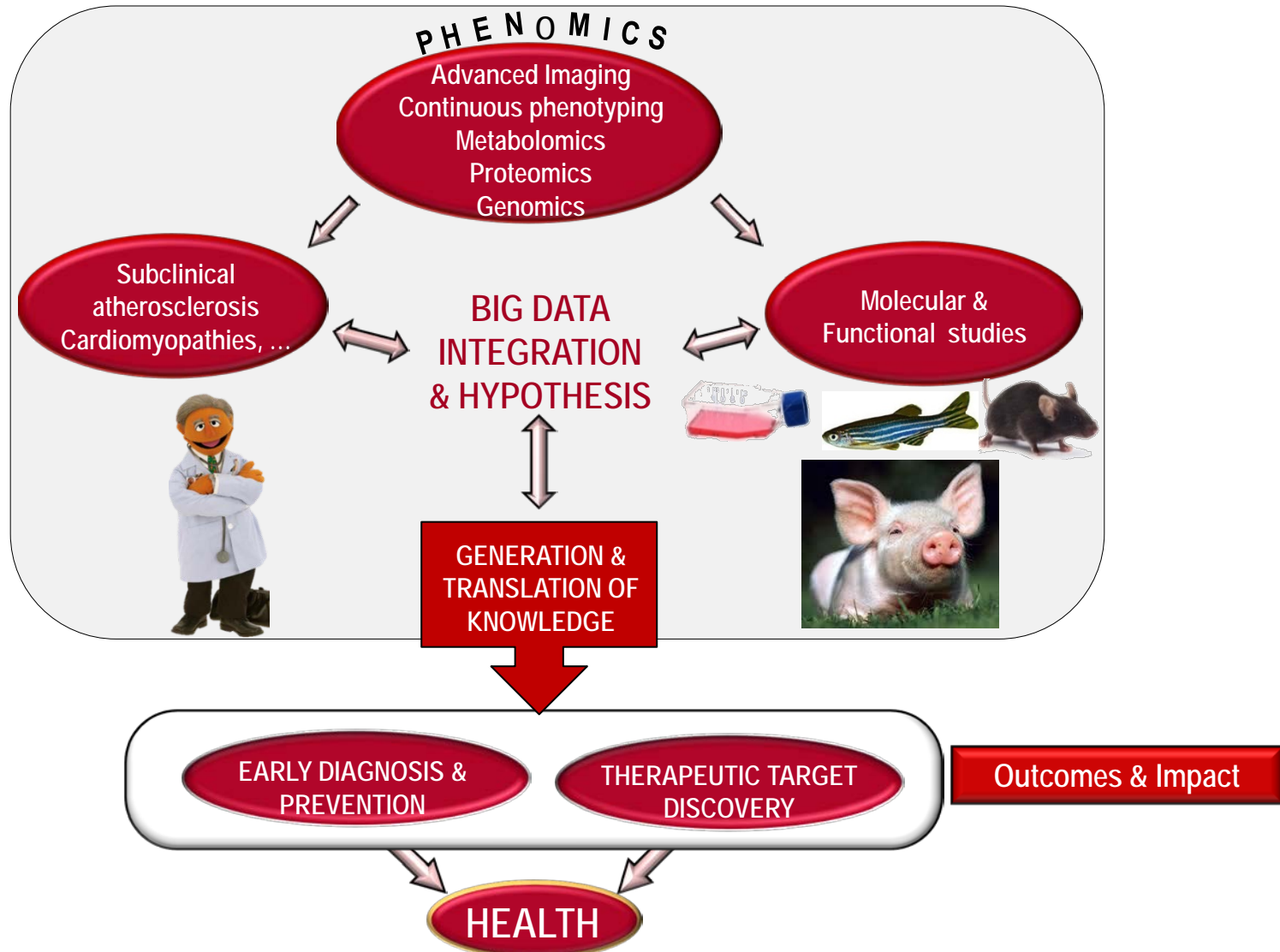
OMICS

Genomics
Bioinformatics
Proteomics/Metabolomics

IMAGING

Cellomics
Microscopy
Advanced Imaging

MULTIDISCIPLINARY & TRANSLATIONAL RESEARCH ON MECHANISMS AND EARLY DETECTION OF CARDIOVASCULAR DISEASE



Human studies towards promoting healthy aging

● **primordial**



Programa de Salud Integral

50/50

● **primary**



AWHS



TAN NIP



secondary



Polypill



SECURE

SECONDARY PREVENTION OF CARDIOVASCULAR DISEASE IN THE ELDERLY



SMALL, MEDIUM AND LARGE ANIMAL MODELS



Zebra fish

- Cardiac regeneration



Rabbit

- Atherosclerosis
- Restenosis
- Myocardial infarction



Mouse

- Atherosclerosis
- Vascular calcification
- Angioplasty
- Abdominal aortic aneurysm
- Myocardial infarction



Pig

- Atherosclerosis
- Restenosis
- Myocardial infarction
- Pulmonary hypertension
- Heart failure



GENOMICS

- Agilent Technologies Microarray Platform
- Affymetrix Microarray Platform
- Illumina Genome Analyzer Iix
- Robotic Platform Freedom EVO 200, Tecan
- ABI PRISM® 7900HT Sequence Detection
- ABI PRISM® 7900HT FAST Real-Time PCR
- ABI PRISM® 7000 Sequence Detection



BIOINFORMATICS

PROTEOMICS / METABOLOMICS

- High-throughput protein identification with shotgun LC-MS/MS
- High-throughput prot. quantification by stable isotope labeling (^{18}O , iTRAQ and SILAC)
- Systems Biology interpretation proteome-wide results with advanced statistical models
- High-throughput and targeted characterization of postranslational modifications



Q Exactive
Quadrupole-
Orbitrap MS

Orbitrap Elite
High-Field Orbitrap
Hybrid MS



CELLOMICS

Sorter, Cytometers,
High Content Imaging (Opera QEHS)



Opera QEHS

PRECLINICAL RESEARCH FACILITIES

Nano PET



Operating Theater



Hemodynamic Laboratory



PET/CT



Small and medium model studies: NanoPET/CT, 7 Tesla MicroMR, IVIS (3D image system), Ecocardiograph VEVO2100, FMT (in-vivo fluorescence), Clinical Pathology Laboratory, Operation Theater
Large model studies: 3 Tesla MRI, PET/CT (Multidetectors CT), Mobile Rx catheterization

CLINICAL RESEARCH FACILITIES



Human studies: PET/MRI 3 Tesla, Multidetector CT, vascular and myocardial 3D ultrasound, heart failure research unit (oxygen consumption tests, stress tests, etc.)



UNIQUE SCIENTIFIC AND TECHNICAL INFRASTRUCTURES (ICTS):

- Infrastructures with public ownership
- Unique, they are the only one of their kind
- Open to competitive access
- 29 ICTS (59 facilities)



DISTRIBUTED NETWORK FOR BIOMEDICAL IMAGING (ReDIB)



Infrastructure for Advanced Translational Imaging (TRIMA)



Platform for Molecular and Functional Imaging at CIC biomaGUNE

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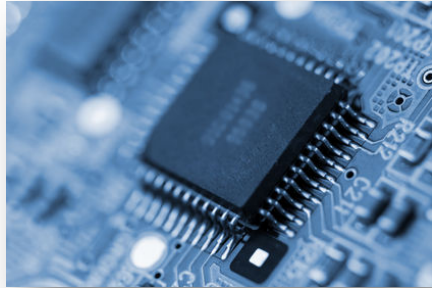
❑ THERAPIES

- Methods of using the calcineurin A variant **CnA β 1** for the treatment of **cardiac hypertrophy**.
- Use of selective **Beta-3** adrenergic receptor agonists to treat **pulmonary hypertension**.
- Inhibitors for the treatment of **Thoracic Aortic Aneurysm**.
- New therapy for **myeloproliferative diseases**.
- A new agent for the treatment of **lymphoid neoplasias**.
- Useful molecules for the treatment of **liver cancer**



❑ DIAGNOSTICS BIOMARKERS

- New **microRNAs** for the **diagnosis of cardiomyopathies**.
- Biomarkers useful for diagnosis of **Thoracic Aortic Aneurysm**.
- Method of detecting **predisposition to dilated cardiomyopathy**.

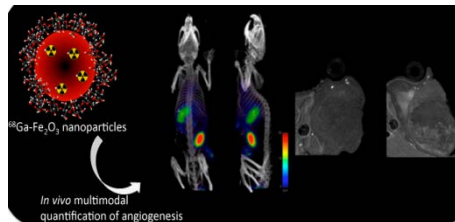


❑ TECHNOLOGIES

- New method of **predicting or prognosticating neurological performance and survival** in patients who have suffered a cardiac arrest due to ventricular fibrillation.
- **Optical device** for early detection of cardiovascular disease.
- Statistical framework for the **analysis of high-throughput quantitative**.

❑ ADVANCED IMAGING

- New biocompatible **nanosystem for dual hot spot in vivo imaging**.
- **Bimodal Liposomes for PET and Optical Imaging of Tumors**.
- New **radiopharmaceuticals for *in vivo* diagnosis**.
- **Nanoparticles for cancer therapies**.





1. Development of **NOVEL IMAGING STRATEGIES** for accurate and early detection of **subclinical atherosclerosis, arrhythmias and myocardial disease in humans**
2. Identification of **NEW BIOMARKERS, PATHWAYS AND MOLECULAR EVENTS** that predict or are associated with the initiation and progression of **atherosclerosis, arrhythmias and myocardial disease**
3. Characterization of the **FUNCTION, MECHANISM OF ACTION AND PATHOLOGICAL ROLE** of the identified biomarkers and pathways in the initiation and progression of CVD, through the use of new and established molecular, cellular and animal models
4. Translation of the knowledge generated into new **DIAGNOSTIC, PREVENTIVE AND THERAPEUTIC TOOLS**

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PITFALLS

ACTIONS

Lack of **knowledge and communication** between research institutions & industry

- Partnering events
- Creating a FORUM (administration-industry-research organizations)
- Common data base: patent portfolio, industry interest areas, etc.

Lack of **funding** at early stages of the project (public & private)

- Private: Involvement of industry at early stage of the project (de-risk the project to improve its value)
- Public: Specific funding to fill the gap of the technological development of the project (CDTI)

Legal **barriers**, difficult and time-consuming negotiations, different schedules, bureaucratic behaviour of research organizations, lack of knowledge in technology transfer, etc.

- Road map and life cycle of knowledge transfer: standard models for CDA, MTA, RCA, etc.
- Improving mechanisms/instruments of public-private partnerships

Atomized efforts in technology transfer

- National coordinating/integration entity for transfer technology activities in life sciences (mimicking international successful cases)

For further information



Julia Redondo, PhD
Science Management Director
Email: jredondo@cnic.es

Noelia López Martín
Technology Transfer Office
Email: nlopez@cnic.es



Fundación Centro Nacional de Investigaciones Cardiovasculares Carlos III
Melchor Fernández Almagro, 3, 28029 Madrid
Tel: +34 914531200

www.cnic.es