



Red HERACLES  
de investigación  
cardiovascular

# COLMAH

HUMAN ARTERY SAMPLE COLLECTION

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- 2. Objectives***
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## ***What is COLMAH***

COLMAH\* is the biobank of human arterial tissue collected by the HERACLES\* Program of the Spanish Cardiovascular Research Network, linked to a cross-referenced database with advanced search capacity. The goal is to offer an exceptional tool for basic, applied and translational research on the epidemiology, pathophysiology, diagnosis and treatment of cardiovascular diseases.



## **COLMAH key features**

- ✓ *The largest collection in Spain of human vascular samples from several vascular beds.*
- ✓ *With pertinent clinical data from all donors.*
- ✓ *Organized through a regularly updated central database with a powerful search engine*
- ✓ *State of the art technologies and rigorous protocols that allow:*
  - *Cryopreservation of arterial rings for morphometric and immunohistochemical studies*
  - *Independent storage of vascular smooth muscle and endothelial tissues for sequential RNA, DNA and protein extraction*
  - *Generation of a collection of human vascular smooth muscle and endothelial cell lines expanded from patient samples.*



## **COLMAH objectives**

- ✓ *Provide access to matched samples of healthy and diseased tissues with corresponding clinical data*
- ✓ *Allows the study of effects of biomarkers on the gene expression profile of vascular tissues*
- ✓ *Provide primary cell cultures from vascular tissues for functional studies*
- ✓ *Use of samples for pharmacogenomics, identification of new therapeutical targets and determination of individual responses.*
- ✓ *Determination of molecular and cellular changes in vascular tissues that could serve as early markers of vascular disease.*





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# COLMAH methodology

*Network of collaborators in several hospitals for sample collection*

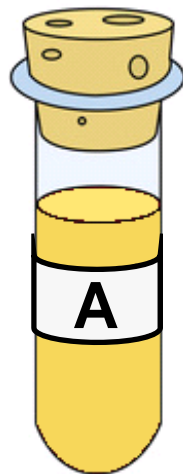


**COLMAH**  
COLECCIÓN DE MUESTRAS ARTERIALES HUMANAS

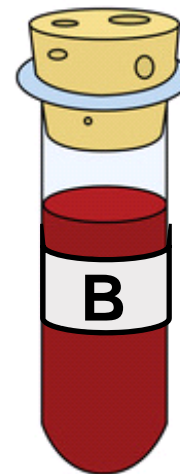


## ***COLMAH methodology***

*The collaborators have tubes for sample collection stored sterile at 4°C :*



*RNA later® solution  
(RNA, DNA, proteins)*



*Culture medium  
(fresh tissues and cells)*



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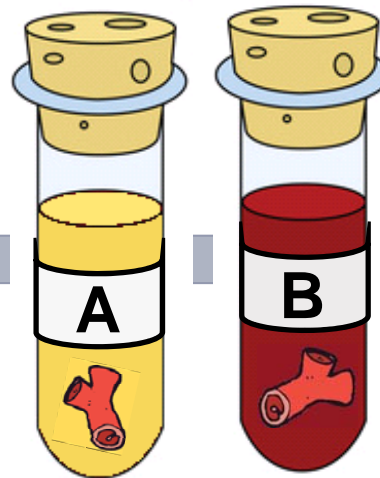
# COLMAH methodology

## Transport coordination



(HERACLES coordination node)

Network of  
collaborators in  
Hospitals



Processing centers:

**IBGM-UVA**

**FICUV**

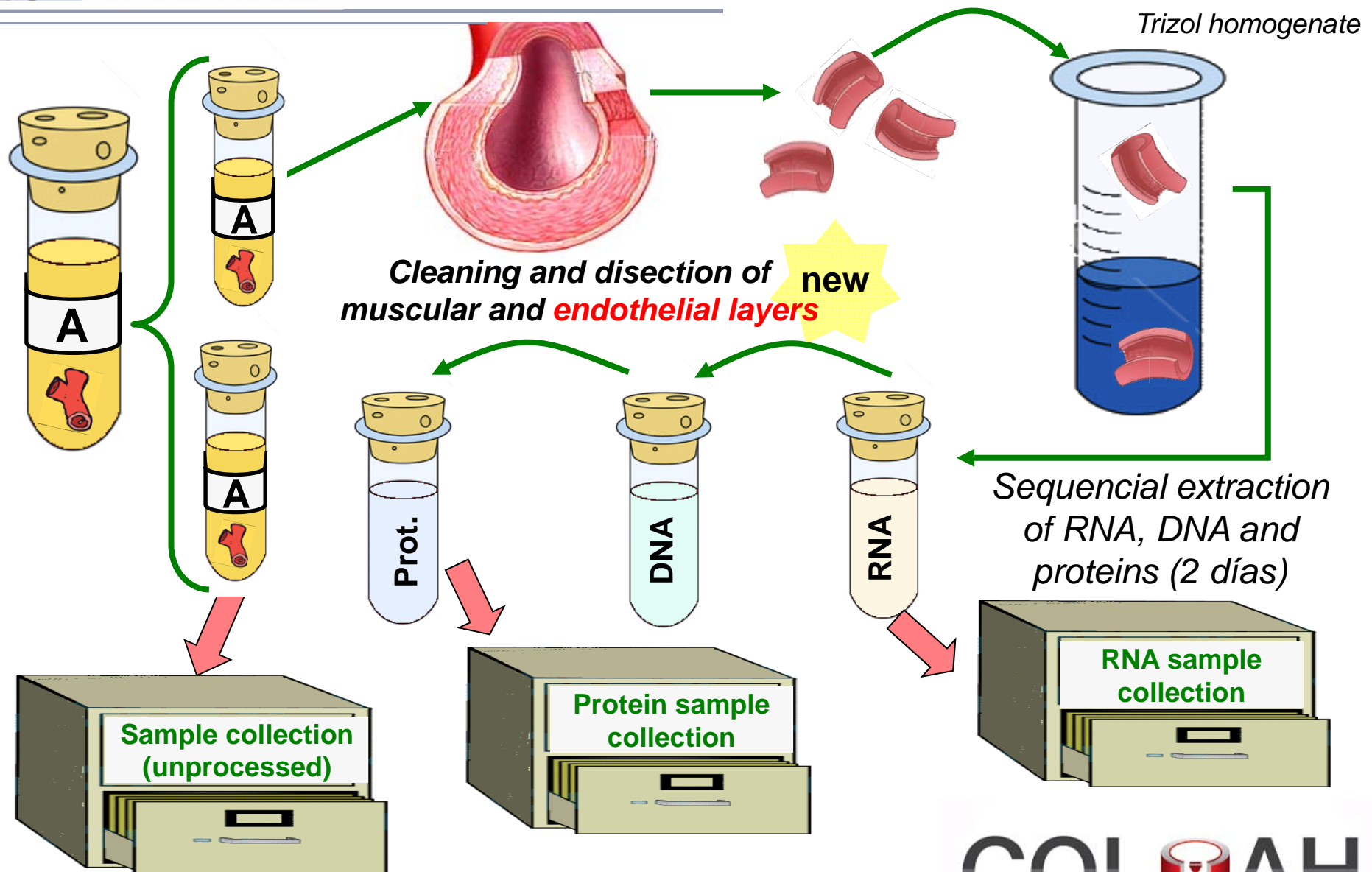
### Other functions of the coordination node:

- ✓ Provide protocols and materials to collaborator centers.
- ✓ Coordination of transport (primary and secondary samples).
- ✓ Elaboration and administration of the central database.



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# COLMAH methodology



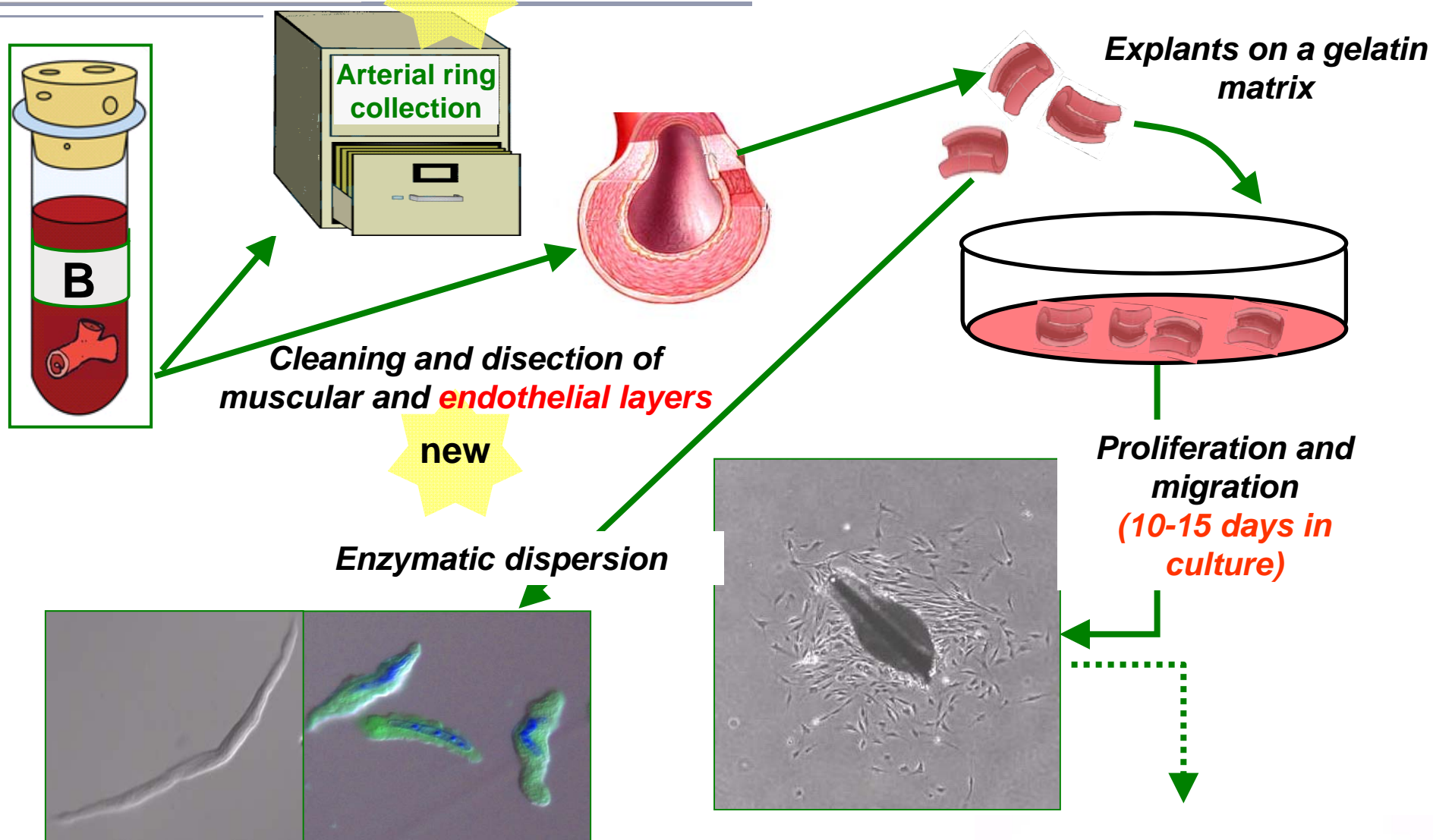
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# COLMAH methodology

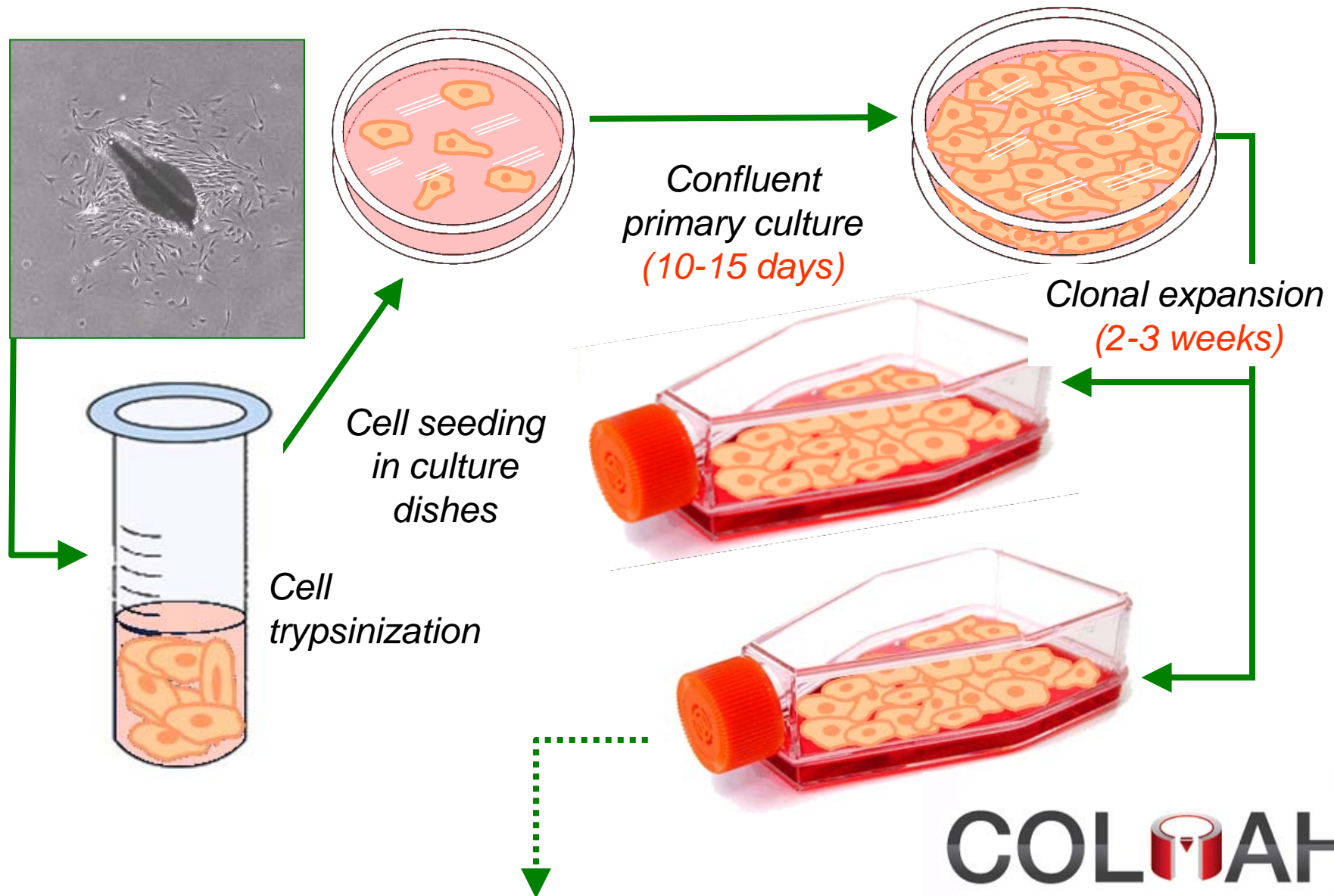


VSMCs for acute studies  
(electrophysiology,  
immunocytochemistry...)

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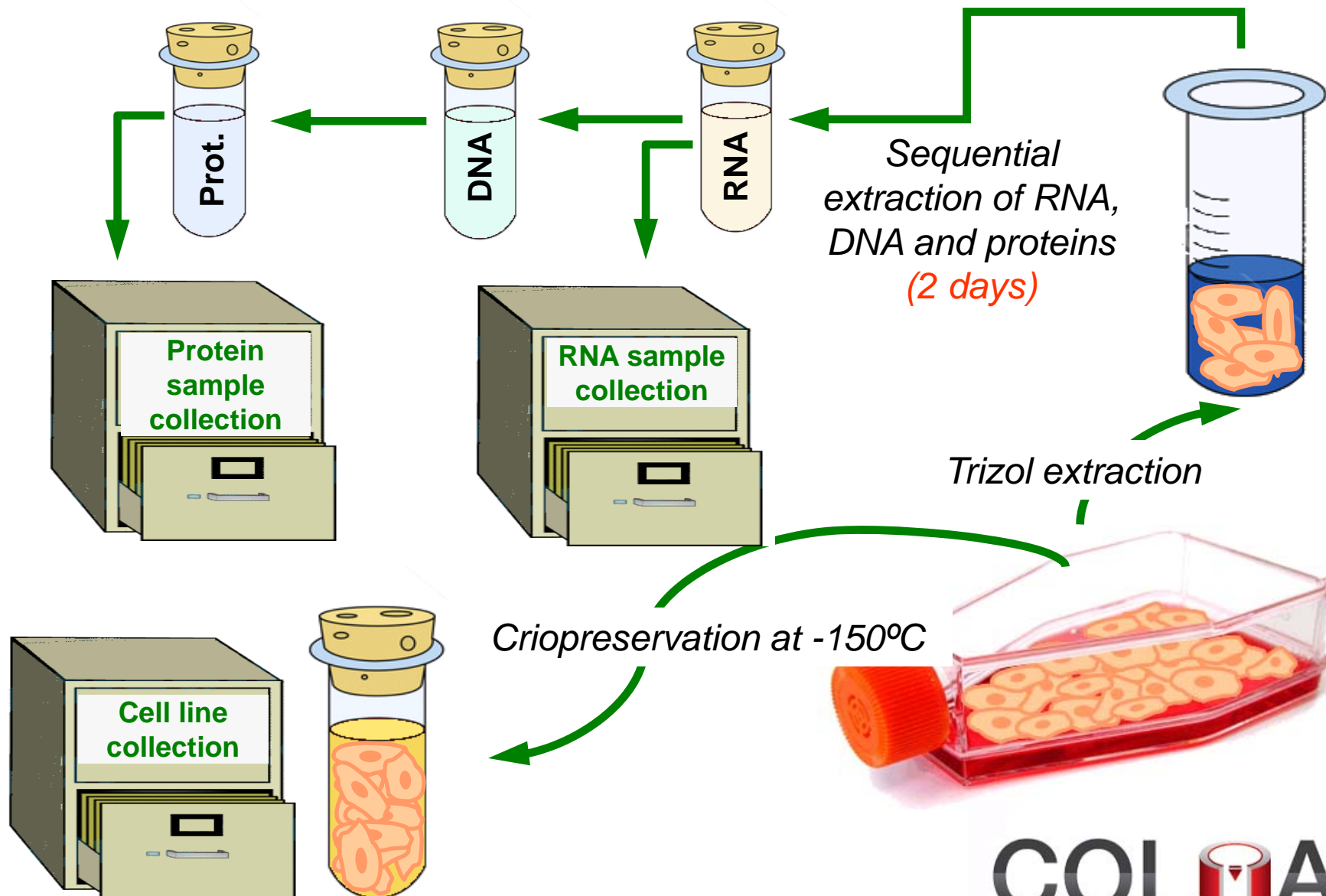
# COLMAH methodology





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## COLMAH methodology



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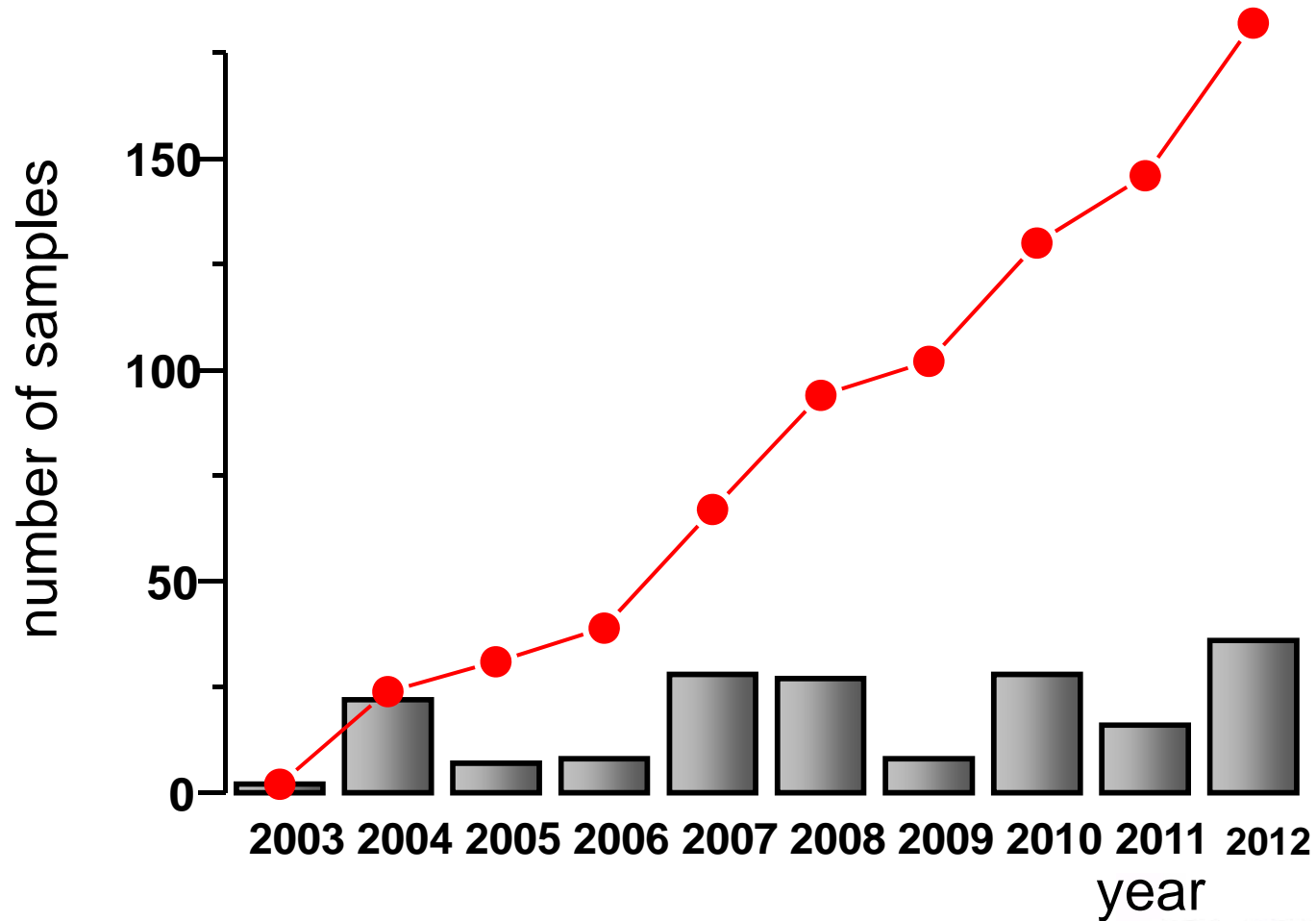
## **COLMAH samples**

- ✓ *Criopreserved arterial rings (since 2010)*
- ✓ *Criopreserved vascular smooth muscle cell lines (since 2003).*
- ✓ *Criopreserved vascular endothelial cell lines (since 2011).*
- ✓ *DNA, RNA and proteins from VSMC and endothelial cells from vascular tissue*
- ✓ *DNA, RNA and proteins from VSMC and endothelial cell lines*



## Available samples

### Evolution of the number of donor vessels

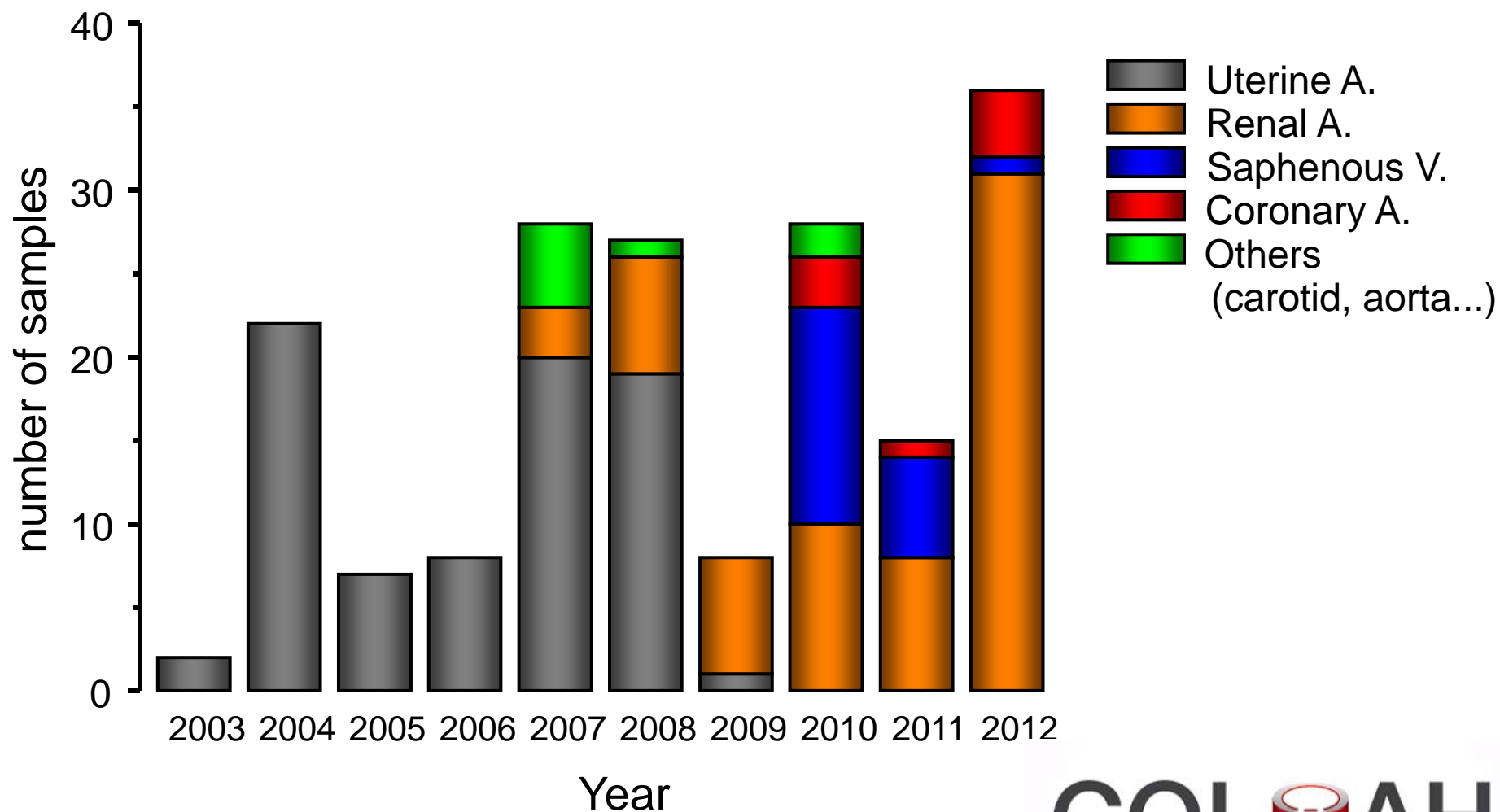






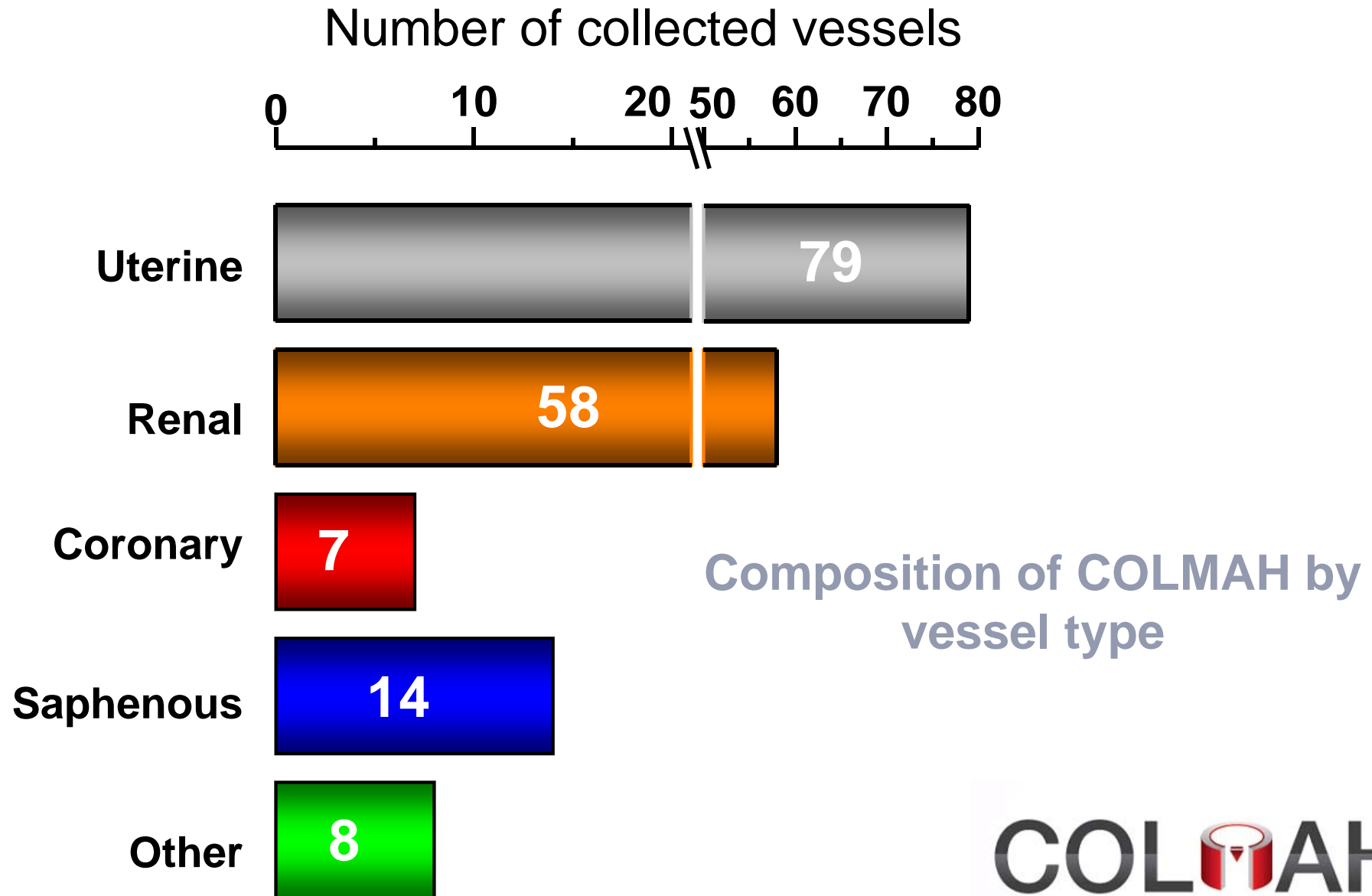
## Available samples

### Samples collected by year and vessel type





## Available samples

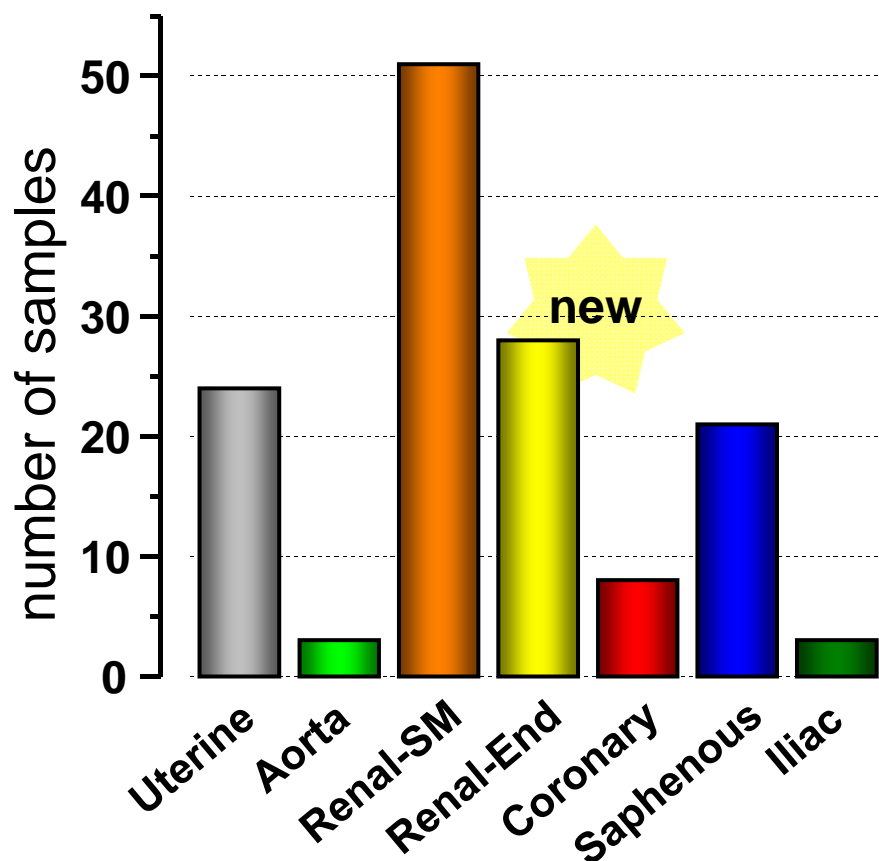




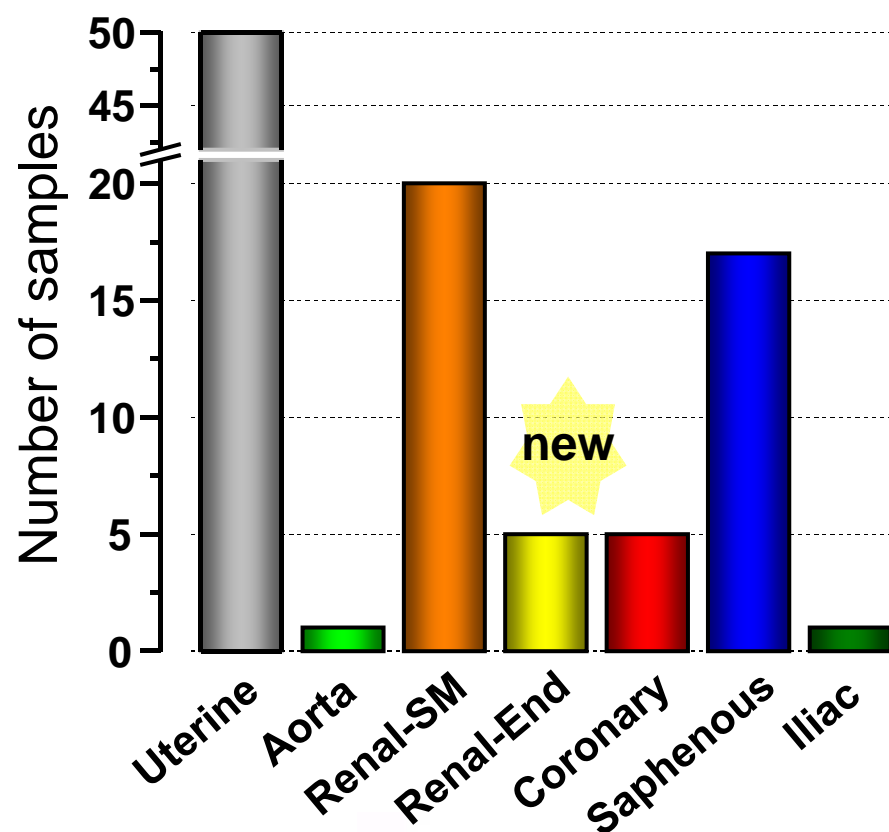
## Available samples

### RNA and protein sample collection\*

#### Samples from vessels



#### Samples from cultured cells

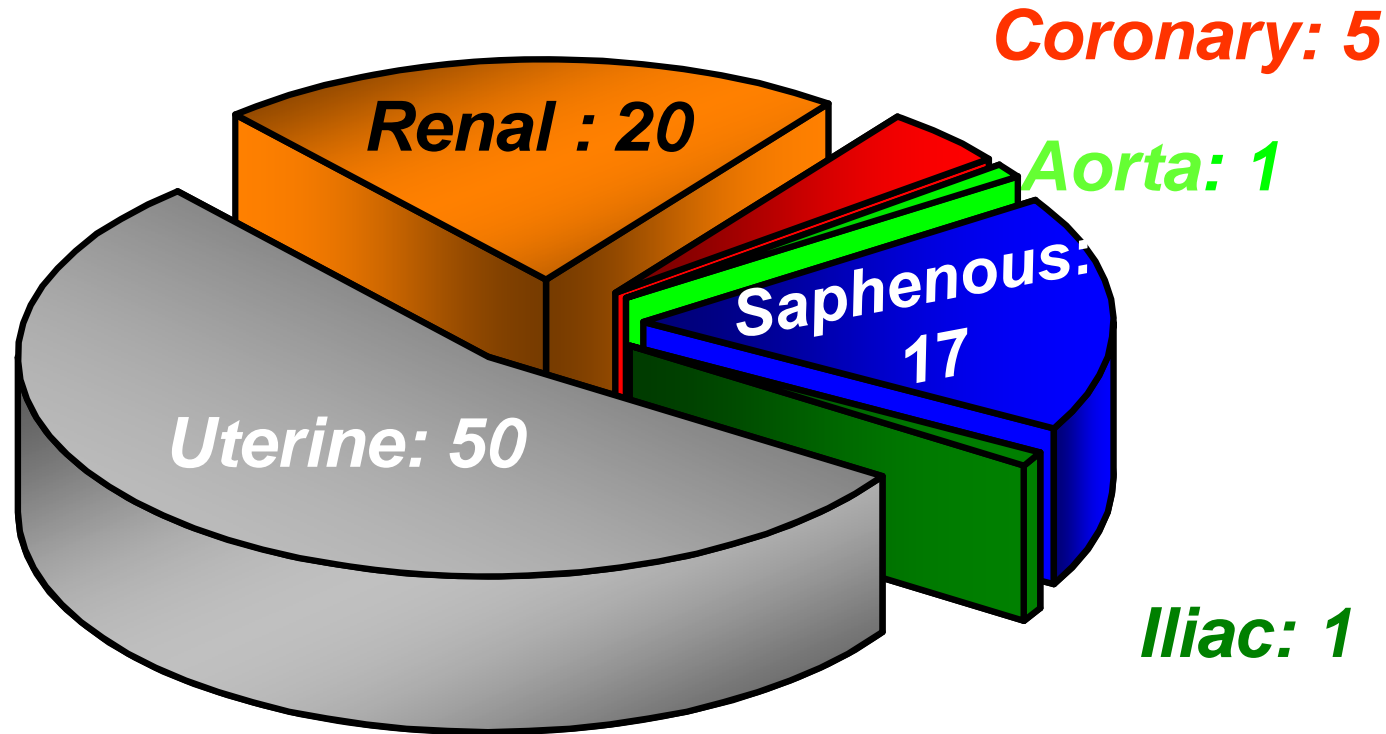


\* *Extracted or readily available*



## Available samples

### Cultured cell lines (VSMC)



**TOTAL = 94 VSMCs primary cultures**  
**+ 5 endothelial cultured cell lines**

new



## ***Use of COLMAH***

- ✓ **Expresion of interest (filling out a form)**
- ✓ **Provide a project to COLMAH scientific board (with representation of IBGM-UVA, FICUV, ULEC-IMIM and CARDIO-IDIBAPS nodes)**
- ✓ **Signature of a colaboration agreement between the project IP and HERACLES coordinator**





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**More info.....**

<http://www.redheracles.net/>

### WHY COLMAH?

COLMAH addresses the need for research access to matched samples of healthy and diseased tissues, as well as to clinical data about the patients and healthy donors, for studies of the molecular and genetic basis of vascular disease.

Macroscopic vascular disease becomes evident after a long period of clinically silent vascular dysfunction, as in patients with one or more risk factors - hypertension, diabetes, dyslipidemia, and other genetic and environmental factors - involved in vascular lesions. However, changes at the cellular level can be detected years before onset of clinical vascular disease.


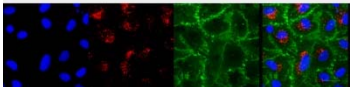
Access to a collection of arterial tissues is an indispensable tool to characterize disease stages, establish the relative contribution of the different risk factors, identify early biomarkers of the disease, and design new therapies targeting specific mechanisms.

### WHAT COLMAH AIMS TO DO

- Analyze the impact of risk factors and cardiovascular biomarkers on the gene expression profile of the vascular tissues.
- Launch functional studies to characterize the molecular mechanisms underlying cardiovascular diseases, using primary cell cultures obtained from vascular tissues.
- Study the direct contribution of genetic and environmental factors to vascular function.
- Identify new therapeutic targets, characterize new vascular drugs, and determine individual response to treatment.

### HOW COLMAH WORKS

- HERACLES network researchers obtain arterial tissues from donors, together with the relevant clinical data.
- COLMAH protocols for data management and for tissue collection, coding, transport and storage are coordinated in Barcelona, ensuring standardized quality and uniformity of procedures.
- Samples are coded to identify the participating medical center and sample type.
- Anonymized clinical data are entered in a relational database and permanently associated with the sample code.
- Samples are stored using a precise, detailed protocol.
- IMIM coordination center dispatches samples by express courier to HERACLES network laboratories in Valencia and Valladolid.
- Each laboratory carefully processes and stores samples according to established COLMAH protocols.

### WHAT IS COLMAH?

COLMAH<sup>®</sup> is the biobank of human arterial tissue collected by the HERACLES<sup>®</sup> cardiovascular research network, linked to a cross-referenced database with advanced search capacity. The goal is to offer an exceptional tool for basic, applied and translational research on the epidemiology, pathophysiology, diagnosis and treatment of cardiovascular diseases.

### KEY CHARACTERISTICS

- The largest collection in Spain of human vascular samples, from a wide variety of vascular beds.
- Pertinent clinical data from all tissue donors.
- Rigorous protocols.
- State-of-the-art technologies, including:
- Cryopreservation of arterial rings for morphometric & immunohistochemical studies.
- RNAlater<sup>®</sup> storage of arterial tissues for sequential extraction of RNA, DNA & proteins from endothelial or vascular smooth muscle cells.
- Extraction of primary cell lines from endothelial & smooth muscle explants for use in expression & functional studies.


### WHY COLMAH IS UNIQUE

COLMAH develops primary cultures from endothelial and vascular smooth muscle cells from healthy donors and from patients with vascular diseases. These cells are expanded, cryopreserved and identified with a barcode that links each sample to donor characteristics in a regularly updated central database. This powerful, searchable combination of tissue and data holds enormous potential for research in the field of vascular physiology and pathophysiology.

COLMAH: Colección de Muestras Arteriales Humanas  
HERACLES: Cardiovascular Research Network Program on Prevention of cardiovascular diseases & study of Repertoire mechanisms. The acronym stands for "Genetic Hypertension: Network for the Analysis of Ion Channels in Arterial Smooth Muscle and Systemic Hypertension Management".



### COLMAH AT A GLANCE



#### DONORS

- Patients
- Organ donors
- Umbilical cords

#### SAMPLES & DATA

- DNA
- RNA & proteins
- Frozen tissue
- Cell lines
- Clinical data (patients, healthy donors, newborns)

#### STORAGE, ANALYSIS & COORDINATION

- High-capacity freezers for sample storage
- Database management
- Statistical analysis
- Coordination of secure sample shipment

#### BIOMEDICAL RESEARCH APPLICATIONS

- Basic biomedical sciences
- Genetic expression
- Phenotype-genotype correlations
- Diagnostic & treatment biomarkers
- New therapeutic targets and drugs
- Personalized medicine

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COLMAH is a non-profit initiative at the service of the scientific community. Interested researchers must present a written research proposal for evaluation by the HERACLES network executive board. The quality, feasibility and expected impact of the project are taken into account before the use of COLMAH samples can be authorized.

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