# ciloa

Inspired by EXOSOMES

www.ciloa.fr

## CONTACTS


| | |
|---|---|
| Robert Mamoun, CEO | rmamoun@ciloa.fr |
| Bernadette Trentin, CSO | btrentin@ciloa.fr |
| Mealy Kong, CFO | mkong@ciloa.fr |
| Pierre Morgon, Advisor | pm@mrgnadvisors.com |


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# CILOA SNAPSHOT – **AT THE FOREFRONT OF EXOSOME ENGINEERING**

***CILOA IS PIONEER EXOSOME COMPANY WITH STRONG SCIENCE & KNOW HOW OUR TECHNOLOGY IS DESIGNED TO DEVELOP A NEW CLASS OF MEDICINES***

## COMPANY PROFILE

- Founded in 2011
- Spin-off of CNRS (French National Center for Scientific Research) & Montpellier University
- Founders:
  - Robert Z. MAMOUN, Ph D, CEO, former Director of Research at INSERM
  - Bernadette TRENTIN, Ph D, CSO
- Independent shareholders (of which the CNRS)

## TECHNOLOGY

- Unique proprietary technology
- *in vivo* exosome customization
- Protected by 2 fully international granted patents
- FTO

## APPLICATIONS

- Therapeutic exosomes
- Exosome Vaccines
- Antigens for mAbs vs challenging targets

## BIOPRODUCTION

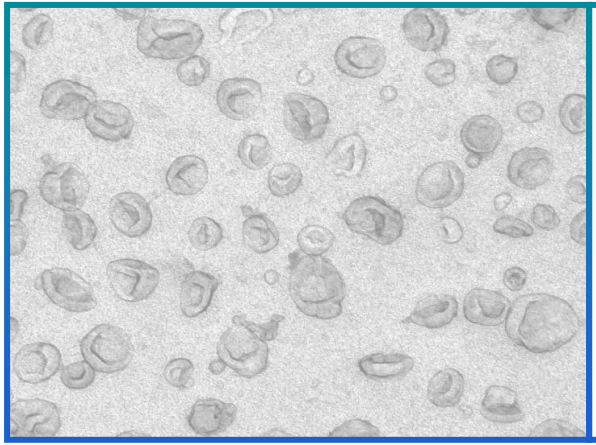
- GMP Standards
- Strong know how in purification & characterization
- High yields
- Scalability

## MAIN PARTNERSHIPS

- 2 deals with a US leading biotech
- Partnering with Sanofi

# EXOSOME : THE NATURAL INTERCELLULAR MESSENGER
## FOR THERAPEUTIC AND PREVENTIVE SOLUTIONS

### *EXOSOMES ARE NATURAL COMMUNICATION TOOLS USING INTERCELLULAR MACROMOLECULAR TRANSFER*

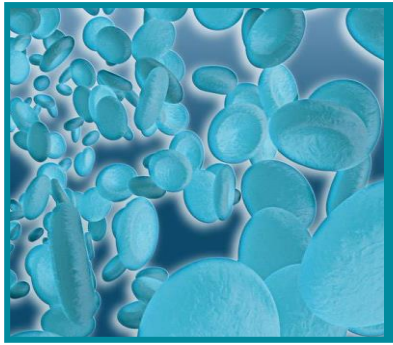


- Natural nano-vesicles produced by **all living cells**
- **Efficient delivery** of proteins and nucleic acids to other tissues
- **Pass all body biological barriers** including Blood Brain Barrier
- **Specific targeted delivery**
- Extensive delivery of **all kinds of payloads**
- Natural intercellular messengers in **immune response** and **organ regeneration**
- **Immune silent** allowing repeat delivery

### *A REVOLUTIONARY POTENTIAL FOR A NEW CLASS OF MEDICINES*

# THE CHALLENGES OF EXOSOMES

## *HARNESS THE POTENTIAL OF EXOSOMES NEEDS TO OVERCOME MAJOR CHALLENGES*



- Recombinant exosomes (targeting – delivery)
- Few companies with mature exosome technology
- Exosome's Purification
- No reference analytic and characterization standards
- Scalable production and purification processes

## *CILOA'S PROPRIETARY TECHNOLOGY AND PLATFORM ADDRESS EFFICIENTLY THESE CHALLENGES*

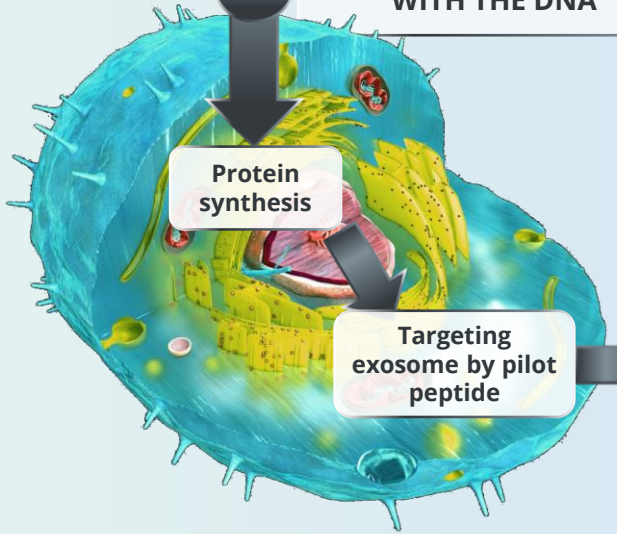
# PROPRIETARY TECHNOLOGY – **NATURAL ENGINEERED EXOSOMES**

1

**SYNTHESIS OF A CHIMERIC DNA**
(DNA CODING FOR CYTOSOLIC AND MEMBRANE PROTEIN FUSED TO PILOT PEPTIDE)

2

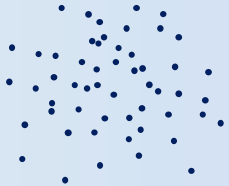
**CELLS TRANSFECTION WITH THE DNA**




CELL (10-100 µm)

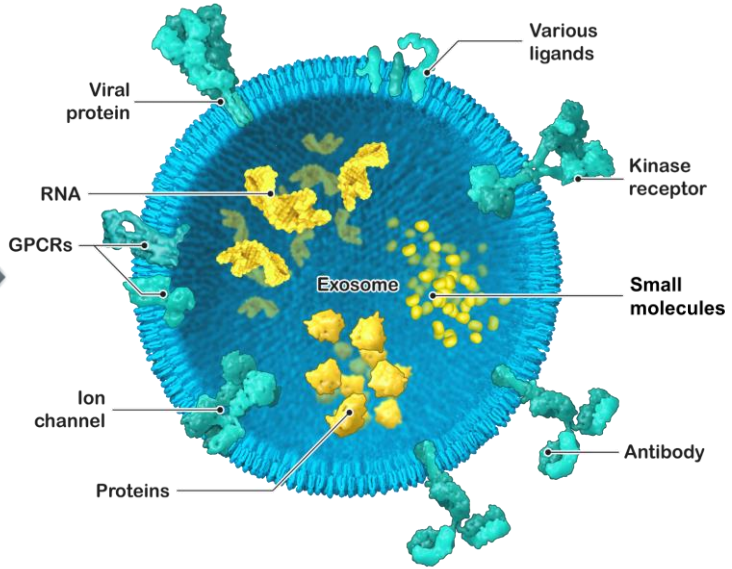
3

**NATURAL ENGINEERED EXOSOMES**



EXOSOMES (30-120 nm)

**EXOSOME CUSTOMIZATION**



# A MODULAR PLATFORM WITH **A WIDE RANGE OF APPLICATIONS**

## *IN VIVO* ENGINEERED EXOSOMES

- **MEMBRANE PROTEINS** FOR **SPECIFIC TARGETING**
- **MEMBRANE PROTEINS** WITH **THERAPEUTICAL FUNCTION**
- **INTERNAL PROTEINS, RNAs, & SMALL MOLECULES** TO **DELIVER A THERAPEUTIC COMPOUNDS**

## CUSTOMIZED EXOSOMES

- NEW THERAPEUTIC EXOSOME VECTORS
- MSC & iPS REGENERATIVE EXOSOMES
- MSC ENGINEERED EXOSOMES
- EXOSOMES MIMICKING VIRUSES (VACCINES)

## EXOSOME'S BIOPRODUCTION

| High yields | Purification | State of the art Characterization | GMP standards |
|---|---|---|---|

## APPLICATIONS

- **NEW THERAPIES** TARGETING ALL TYPES OF ORGANS IN **ONCOLOGY – CARDIOVASCULAR, NEURONAL, JOINT AND SKIN PATHOLOGIES - GENETIC DISEASES**…
- **IMPROVED THERAPEUTIC INDEX** (EFFICIENCY/TOXICITY) OF **EXISTING MOLECULES**
- **INCREASED MSC'S EXOSOMES FUNCTIONS**

# COST EFFECTIVE & SCALABLE BIOPRODUCTION PROCESS

***LIMITED CAPEX, REDUCED FOOTPRINT AND HIGH YIELDS PRODUCTION***
***PRODUCTION UNIT DESIGNED TO MEET GMP STANDARDS***

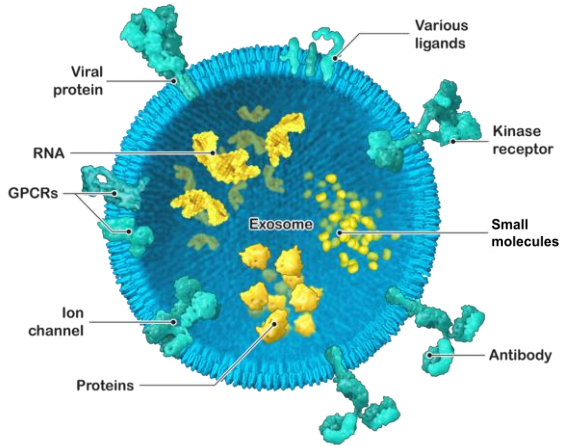
| CELL ENGINEERING | CELL CULTURE | PURIFICATION |
|---|---|---|
| Proprietary human allogeneic cell lines | High yields of production | Perfectly pure exosomes |

***OUR PRODUCTION UNIT WILL ALLOW THE TRANSITION INTO CLINIC OF CUSTOMIZED EXOSOMES***

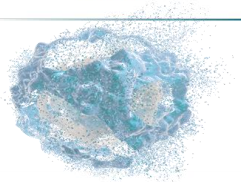
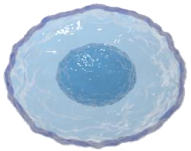
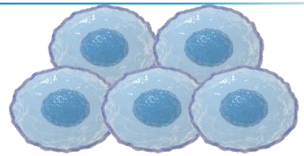
# DELIVERY OF **PROTEINS, GENETIC MATERIAL OR SMALL MOLECULES**

***OVERCOME A GENETIC DEFICIT OR TRIGGER A THERAPEUTIC EFFECT BY MODIFYING THE BEHAVIOR OF THE CELL***

## CARGOS




## APPLICATIONS

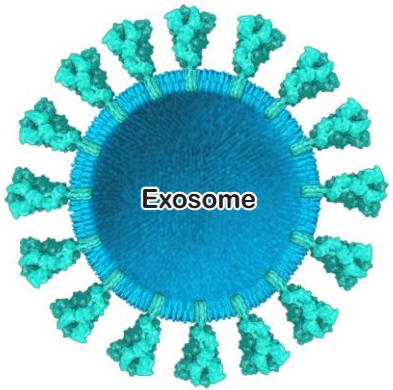
| DEATH | MODIFICATION | MULTIPLICATION |
|---|---|---|
|  |  |  |
| ▪ Tumor regression<br>▪ Infected cell killing | Gene therapy on any organ including brain (lost of funtion induced disease) | Organ regeneration (nerves or cardiac injuries) |

- Rare Diseases (lysosomal diseases, cystic fibrosis, etc…)
- Tumors
- Anti-inflammatory effects
- Immune System Recruitment
- Regenerative processes (Cardiac, Skin, Central Nervous system, neuro muscular, joints)

# EXOSOME VACCINES : **VIRUS- AND ADJUVANT-FREE**

## *CANDIDATES IN DEVELOPMENT AGAINST FLAVIVIRUS (ZIKA, GHIKUNGUNYA, DENGUE) AND COVID-19*

**CUSTOMIZED EXOSOME MIMICKING PERFECTLY THE VIRUS**

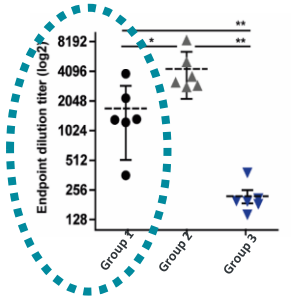



Spike Protein in fully native conformation

**PROMISING PRECLINICAL RESULTS IN COVID-19 VACCINES**

**LOW ADE RISK**

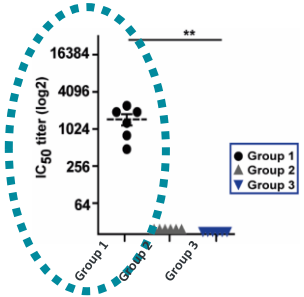
**GLOBAL ANTIBODIES**




Antibody titers at the same level or lower than competitors

**HIGH PROTECTION POTENTIAL**

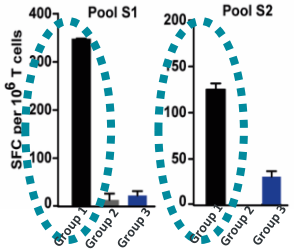
**NEUTRALIZING ANTIBODIES**




Neutralizing antibody titers higher than competitors (x2-x4)

**WIDE PROTECTION**

**CELLULAR RESPONSE**




Cellular response against S1 & S2 higher than competitors

# PIPELINE

| Candidate | Indication | Research | Preclinical | IND | Rights |
|---|---|---|---|---|---|

| THERAPEUTIC EXOSOMES | | | |
|---|---|---|---|
| Vector X1 | Oncology | | ciloa |
| Vector X2 | Oncology | | ciloa |
| Vector X3 | Undisclosed | | SANOFI |
| Vector X4 | Undisclosed | | SANOFI |

| VACCINES | | | |
|---|---|---|---|
| COVEVAX | Covid-19 | | ciloa |
| CHIKVAX | Chikungunya | | ciloa |
| ZIKVAX | Zika | | ciloa |

| ANTIBODIES (COLLABORATIVE AGREEMENTS) | | | |
|---|---|---|---|
| mAb 1 | Undisclosed | | Undisclosed |
| mAb 2 | Undisclosed | | Undisclosed |
| mAb 3 | Undisclosed | | SYnAbs |
| mAb 4 | Undisclosed | | SYnAbs |

More than 80 proteins including +60 membrane proteins

- 30 GPCRs
- 13 viral proteins
- 9 Kinase Receptors
- 3 Ion Channels
- 4 Antibodies
- Transporters…
- Other membrane proteins

# PARTNERSHIPS

## COMPANIES

SANOFI

Leading US Biotech (Out Licensing)

SYnAbs Singular Antibodies

Stemmatters

Polytheragene

vaxinano

## ACADEMIC

cnrs

Inserm

NIH National Institutes of Health

Institut Pasteur

UNIVERSITÉ DE MONTPELLIER

INRAE

# IP – PROPRIETARY TECHNOLOGY PROTECTED BY 2 PATENTS + FTO

## TARGETING

**NATURAL MEMBRANE PROTEINS EMBEDDING**
**Patent WO2009115561 + FTO**

- Customized Exosomes naturally secreted by cells
- Any membrane protein can be sorted
  - Mature
  - Fully conformational
  - Chemical-free process

## DELIVERY

**NATURAL LOADING & DELIVERY**
**Patent WO2011036416 + FTO**

- Proteins
- RNA
- Small molecules
- Enzymes
- Electroporation-free process

Fully Granted patents in USA, Canada, Europe, Japan

# AN EXPERIENCED TEAM

## Robert MAMOUN, PhD
## CEO, CO-FOUNDER

Robert holds a PhD in Molecular Virology from Victor Segalen University of Bordeaux, France.
He spent 35 years as Research Director at the INSERM Institute.
He worked on several aspects of onco-retroviruses and lentiviruses.
Robert founded Ciloa and was its CEO during 4 years.

**Expertise :** viral RNA and proteins, virus isolation, epidemiology, phylogenesis, poly- & monoclonal antibodies, epitope mapping, 3D-modeling of proteins, diagnostics.

## Bernadette TRENTIN, PhD
## CSO, CO-FOUNDER

Bernadette holds a PhD in Molecular Virology from Victor Segalen University of Bordeaux, France.
She spent 14 years in academic research in France & USA and then 10 years in Biotech.

**Expertise :** project management & coordination, infectious diseases, retrovirology, molecular biology, cellular biology, protein engineering, molecular imaging, diagnostic, personalized medicine, biomarkers, next generation sequencing and quality procedures.

## Mealy KONG
## CFO

Mealy is a graduate from Emlyon Business School, France. He has more than 20 years of experience as CFO in Major Group subsidiaries and in SMEs.
He also had strong business leadership as B. Unit Manager in a consulting company specialized in financial engineering of Innovation.

**Expertise :** drive operational change, support finance and business strategy, competitive analysis and drive revenue and profit growth.

**P. MORGON, Advisor** | **P. DESPRES, Referent** | **+ 11 (PhDs, MS, Tech)**

# THANK YOU

## CONTACTS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|---|---|
| Robert Mamoun, CEO | rmamoun@ciloa.fr |
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| Mealy Kong, CFO | mkong@ciloa.fr |
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