



TECHNOLOGY OFFER



DEFINE AND IMPLEMENT THE BEST
TECHNOLOGICAL SOLUTION TO ANSWER
YOUR QUESTIONS

BIOASTER is a Technology Research Institute
in microbiology developing solutions for global health issues

WE IMPLEMENT
TRANSFORMING
INNOVATIONS



COLLABORATIVE INNOVATION

ACADEMICS / INDUSTRIES
COLLABORATIVE PROJECTS,
ONE OR MULTIPLE PARTNERS

TECHNOLOGY OFFER

HIGH ADDED-VALUE
RESEARCH SERVICES
AND AD-HOC SERVICES

A LEADING-EDGE, UNIQUE, HIGH QUALITY AND ROBUST TECHNOLOGY OFFER



2450m² industrial standards BSL 2
& 3 laboratories



A single access point for a unique
multi-technology offer



Numerous state-of-the-art
& last generation equipments



An access to our technology
innovations, **designed**
by **BIOASTER**



120 people, 80+ scientific experts
coming from academics and industries



TECHNOLOGY OFFER

A privileged and easy access to our state-of-the-art technologies, dedicated to the four main fields of applied microbiology

Diagnostics - Vaccines - Antimicrobials - Microbiota

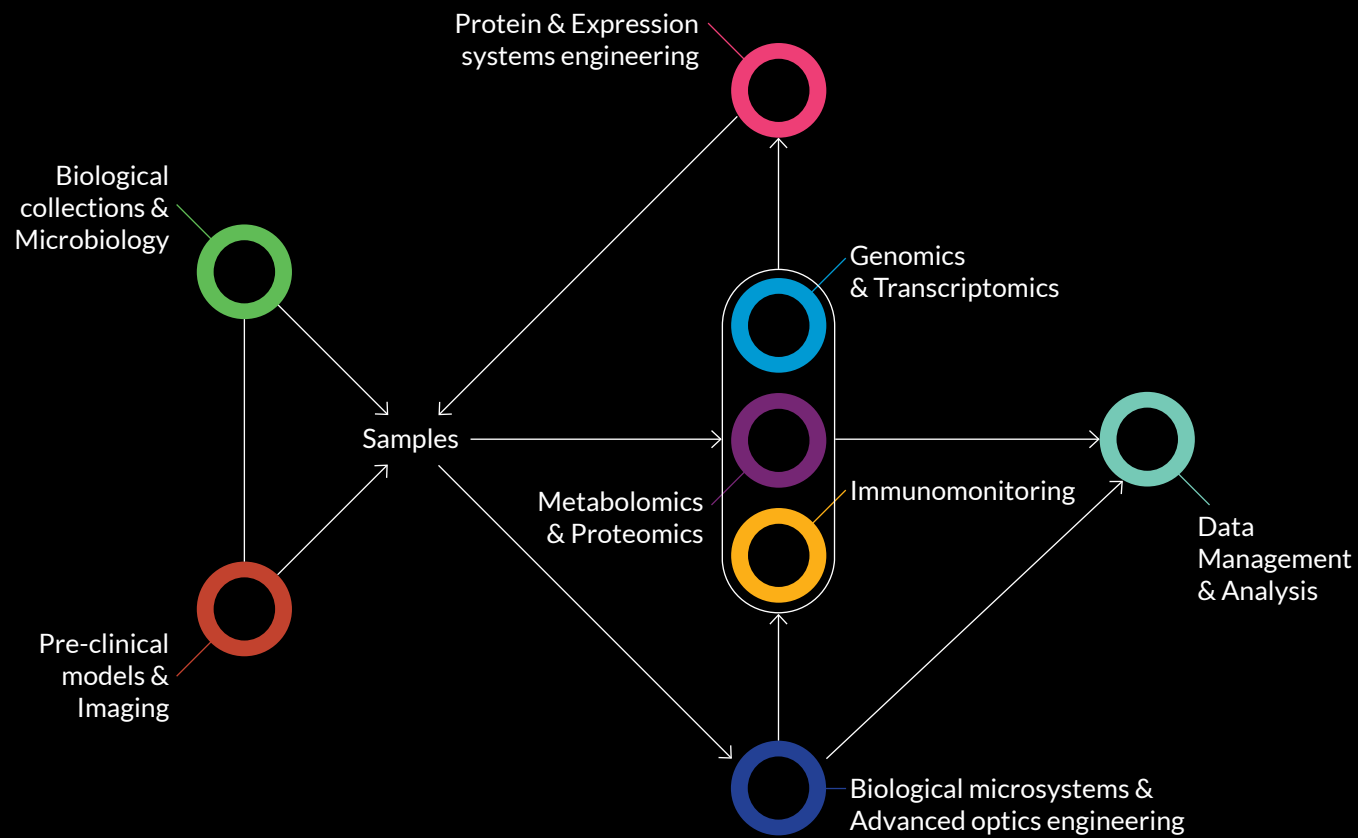
TECHNOLOGY UNITS

TECHNOLOGICAL VALUE PROPOSITION & APPLICATIONS

OUR TECHNOLOGICAL INNOVATIONS, DESIGNED BY BIOASTER

TECHNOLOGY UNITS

from sample preparation to data analysis



TECHNOLOGICAL VALUE PROPOSITION & APPLICATIONS

Numerous expertises to better answer your questions



**ACCESS TO
BIOLOGICAL SAMPLES**

- Biospecimens collaborative web platform
(<https://biospecimens.bioaster.org/>)

**IDENTIFICATION AND
CHARACTERIZATION OF
MICROORGANISMS**

- Exploration of specific phenotypic traits.
- Full genome sequencing and annotation

**COMPREHENSIVE MICROBIOTA
CHARACTERIZATION**

- Multi technological capacity to explore functional & taxonomic composition of a microbial community, and the associated host response

BIOFILM-ID

- High throughput screening platform dedicated to anti-biofilm hits identification and characterization.

**INFECTIOUS DISEASES
PRE-CLINICAL MODELS**

- Predictive animal models, in vivo assays coupled with multimodality imaging techniques

IN VIVO GNOTOBIOLOGY

- Standardized and characterized murine gut microbiota models & capabilities



TRANSCRIPTOMIC ANALYSIS

(from sample preparation to data analysis)

- Targeted RNA expression (medium-throughput mRNA platforms) or discovery (next generation sequencing)

METABOLOMICS & PROTEOMICS

(from sample preparation to data analysis)

- Metabolic Profiling (NMR & MS)
- Mass spectrometry Imaging (DESI)
- Dynamic metabolomics (Fluxomics)

HIGH THROUGHPUT IMMUNE CELLS ANALYSIS

- Flow cytometry: up to 1500 samples / plate; barcoding
- Single cell microfluidics

IMMUNE FINGERPRINTING IN BLOOD AND ORGANS

- Dynamics of the immune response in vessels, capillaries and organs
 - CyTOF-2 mass cytometer, up to 42 parameters/cell
- Human and mouse custom panels

PROTEIN EXPRESSION SYSTEMS & VECTORS OPTIMIZATION

- Including metabolic engineering, codon harmonization algorithms, enhancer elements, antibiotic free production systems

MICROSYSTEMS ENGINEERING

- Ultra High-Throughput-Screening with droplet microfluidics
- Biomechanical-based cell sorting in continuous flow microfluidics
 - POCT with Lab on chip and Biosensors

ADVANCED OPTICS

- Microbial applications with digital holographic microscopy and Raman spectroscopy

TAILOR-MADE SOFTWARE ENGINEERING

- Customized software and platforms focused on specific data management and visualization or knowledge extraction

ADVANCED DATA-DRIVEN INTEGRATION, VISUALIZATION & ANALYSIS

- Across technologies
 - Within species
 - Across species
 - Longitudinal





OUR TECHNOLOGICAL INNOVATIONS, DESIGNED BY BIOASTER

Access to the BIOASTER innovative technologies

Met-SAMoA[®]

Innovative approach for antimicrobials MoA discovery & development

ANOXIC platform

Sorting and cultivation of microorganisms in controlled atmosphere

BIND-IT

Fast *de novo* generation of binders

GAME-XXL

Genomic And Metabolic Engineering

NANOCAGE

Versatile vectorization system

Met-SAMoA[®], DESIGNED BY BIOASTER, Metabolic Screening of Antimicrobial Mode of Actions

An integrated NMR/MS metabolomics platform for the prediction of the novelty of new antimicrobials mechanisms of action (MoA) based on their metabolic signature.

INTEREST

- Facilitate & accelerate new antimicrobials discovery and development
- Identify the novelty of a MoA - or confirm the target - of a new drug candidate

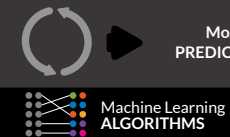
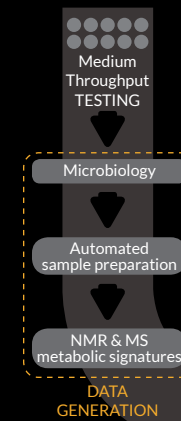
ADVANTAGES

- High level of specificity: sub-target level of information
- Medium-throughput automated platform, with industrial standards
- Simpler, faster and safer approach than classic methods

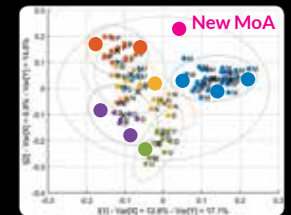
KNOW HOW

- High level omics technologies (NMR/MS) to generate MoA associated metabolic signatures
- Biostatistics-based MoA identification: prediction algorithms and machine learning
- Design and implementation of a dedicated database

POTENTIAL ANTIMICROBIALS



DRUG DEVELOPMENT



VISUALIZATION



MoA PREDICTION

ANOXIC PLATFORM, DESIGNED BY BIOASTER, sorting and cultivation of microorganisms in controlled atmosphere

An integrated platform for the selection and growing of microorganisms in controlled aerobic or anaerobic conditions, and their characterization

INTEREST

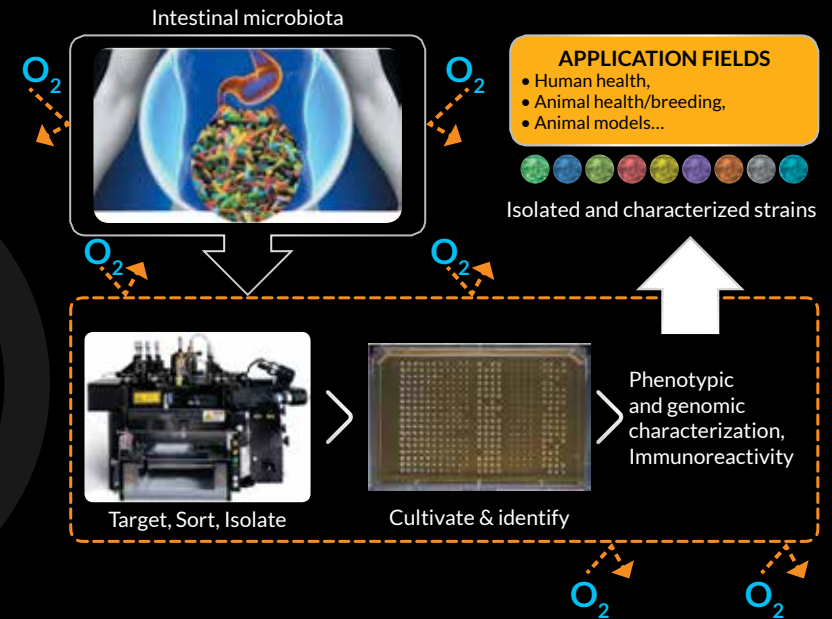
- Specific tools for selecting and growing micro-organisms from various microbiota, with the objective to build high-value collections that can be used by our collaborators
- Viability of anaerobic micro-organisms must be preserved

ADVANTAGES

- The BD Influx™ flow cytometer is perfectly adapted for the detection of bacteria
 - It allows high throughput sorting in a variety of formats
 - Selecting cells according to several criteria will potentially give access to under-represented groups of micro-organisms

KNOW HOW

- The BD Influx™ flow cytometer has been adapted for use in controlled atmosphere: with or without oxygen
- Methods to pre-select and stain microbial groups of interest
- Adapted cultivation methods
- Adapted identification and characterization methods



BIND-IT, DESIGNED BY BIOASTER, fast *de novo* generation of binders

An integrated platform for generating novel binders that specifically recognize a molecule of interest with good affinity

INTEREST

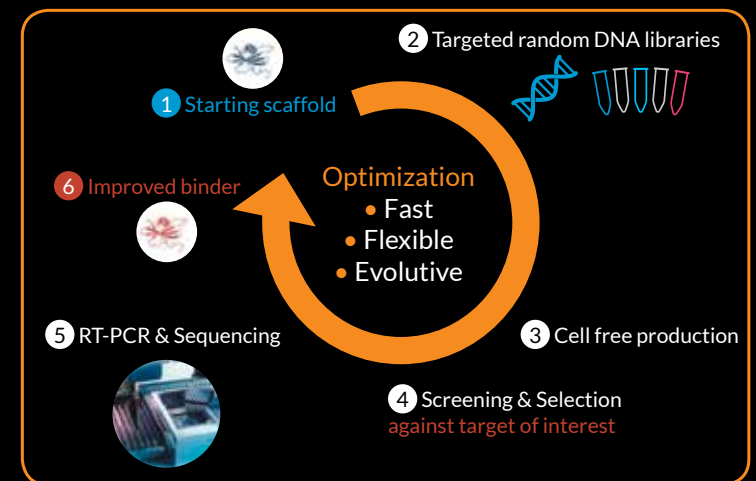
- Rapid access to protein binders/ effectors specific for relevant biological targets
- Potential applications: *in vitro* diagnostics, therapeutics, vaccines, research

ADVANTAGES

- Fast and versatile (a few days)
- No need for immunization
- Low cost & reproducible *in vitro* production process (*E. coli*)
- No post-translational modifications
- Affinities to the picomolar range

KNOW HOW

- Protein expression and engineering
- Technology display
- Cell free production
- Next generation sequencing



GAME-XXL, DESIGNED BY BIOASTER, Genomic And Metabolic Engineering

Expression system engineering for improved quality and increased production of lipidated lipoproteins

INTEREST

Potential applications:

- Improve lipoprotein lipidation
- Non native lipidated proteins
- Universal lipidation tool for addition of TLR2 agonist activity

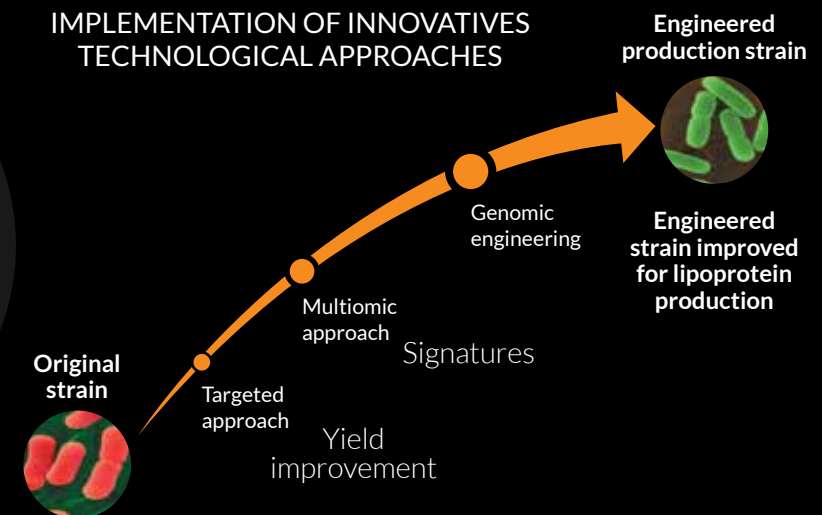
ADVANTAGES

- Improve robustness of production process
 - Decreased CoGs
- Streamlined analytical tools

KNOW HOW

- Vector optimization
- Multiomics & functional analysis workflow
- Host system engineering and optimized process

IMPLEMENTATION OF INNOVATIVES TECHNOLOGICAL APPROACHES



NANOCAGE, DESIGNED BY BIOASTER, Versatile vectorization system

Versatile protein cage nanoparticles for target epitope surface display & heterologous protein packaging

INTEREST

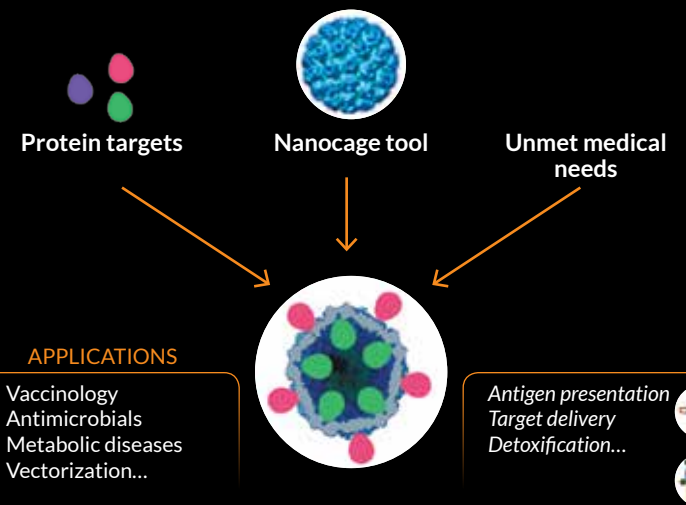
- Target surface presentation & internal cargo loading
- Epitope repetitiveness (high immunogenicity)
- Versatile nanocage tool

ADVANTAGES

- *In vitro* auto-assembly
- Generation of nanoparticles in *E coli* as well as other expression systems
- Wide array of applications

KNOW HOW

- Industrial USP&DSP process
- Biochemical & physical characterization



2016 Lagoutte et al., J. Virol Methods
2016 patent application filed on protein cage nanoparticles

“

More to come ...

*as every day, we drive forward great innovative technology ideas,
that accelerates the development and manufacturing of the next
generation of solutions in microbiology and infectiology*

”

LABORATORIES AND EQUIPMENTS

focus on specific technological capabilities

ADVANCED MICROBIOLOGY LABORATORY

Integration of aerobic and anaerobic bacteria isolation, cultivation and characterization

BD Influx Cell Sorter
Flexible flow cytometry
platform

BACTRON600 SHEL
LAB Anaerobic
Chamber



BIO-RAD Adagio automated
system for antimicrobial disk
susceptibility tests

Pall Micro-24 MicroReactor
system

GENOMICS & TRANSCRIPTOMICS

Analytical laboratory

Sequencing libraries
automated preparation
(Evo 150, Tecan)

Direct measurement
of gene expression
(nCounter, Nanostring)

2nd generation NGS
(MiSeq, Illumina)

2nd generation NGS
(NextSeq, Illumina)

Nanovolume
multiplex qPCR
(Biomark, Fluidigm)



QC/nucleic acids
(TapeStation 2200,
Agilent)

3rd generation NGS
(MinION, Oxford Nanopore)

dPCR systems
(RainDrop Plus,
RainDance)

METABOLOMICS & PROTEOMICS

Analytical laboratory

UHPLC

Mass spectrometer
triple-quadrupole
Quantum Ultra

NMR 600MHz
with cryoprobe

High resolution mass
spectrometer
Orbitrap Q-Exactive



Capillary electrophoresis
CESI-MS

High resolution Mass
spectrometer
QTOF maXis HD

Mass spectrometer
QTrap 5500

Mass spectrometer
Diagnostic
QTOF VITEK-MS

MICROFLUIDICS, MICROSYSTEMS AND ADVANCED OPTICS Laboratory



Workstation for droplet
and continuous-flow
microfluidics



Fluorescence imaging workstation
for microfluidics applications

Holographic microscopy

PRE ANALYTICAL STEPS AND SAMPLE PREPARATION AUTOMATION Laboratory

Noroit H-BOX



Tecan Freedom Evo 200

CYTOMETRY

From discovery to monitoring

CYTO 2 MASS CYTOMETER



Cytof 2, Fluidigm

FLOW CYTOMETER



Fac Symphony, BD



Macsquant 10, Miltenyi

HISTOLOGY AND IMAGING LABORATORY

- preparation of paraffin-embedded tissues sections
- exploration of tissues by vital staining, immunolabeling and fluorescence *in situ* hybridization

Paraffin embedding
workstation
Leica HistoCore Arcadia

Paraffin tissue processor
Leica TP1020

Cryostat
Leica CM1950



Microtome
Leica RM2255



Automated FISH
system
Leica ThermoBrite Elite

Microscope slide Printer
Thermo Scientific SlideMate

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