aviesan
alliance nationale
pour les sciences de la vie et de la santé

Institut Thématique Multi-Organismes
Technologies pour la santé

BIOASTER presentation to ITS, Nov 22 2017

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Deputy CSO

BIOASTER at a Glance

Created in 2012, BIOASTER is a Technological Research Institute dedicated to Microbiology and Infectious Diseases

BIOASTER is a private non-for-profit Foundation for Scientific Cooperation

BIOASTER promotes Translational Research between academia knowledge and industrial needs

BIOASTER builds national or international Research Programs by associating public and private partners and funding

BIOASTER leads and co-funds Technological Research Programs that are of high medical, technological and economical added-value

Built on Solid Foundations

More than a Century of Excellence

BIOASTER Founders

Institut Pasteur
LYONBIOPOLE
cea
cnrs
Inserm
DANONE NUTRICIA RESEARCH
INSTITUT MERIEUX
SANOFI PASTEUR

2 Co-founding leaders

3 Public Research Institutions

3 Majors of healthcare industry

3 Funding Supports

40+ SMEs

INVESTISSEMENTS D'AVENIR
RhôneAlpes Région
GRANDLYON communauté urbaine

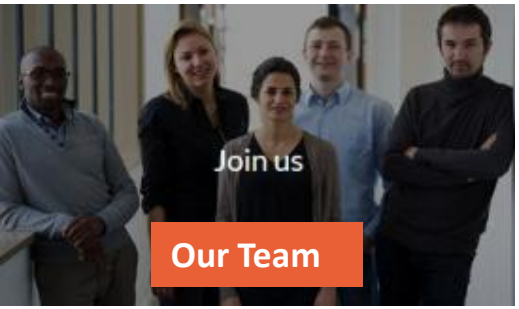
2 sites in France, 120+ People

BIOASTER Lyon (Headquarters, 3600 m²)

- BSL2 & BSL3 Laboratories
- Access to the largest BSL4 in Europe
- Dedicated collaborative spaces

BIOASTER Paris (Institut Pasteur Campus, 600 m²)

- BSL2 Laboratories
- Dedicated collaborative spaces

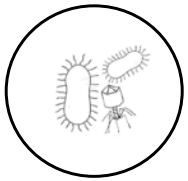


120+ people

- Origins: 60% private, 40% academic
- 70% of PhD & Bac+5 (international curriculum)
- 17 citizenships: Europe, Asia, Africa, Americas

An integrated approach

4 Programs & 7 Technological Units



MICROBIOTA

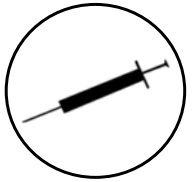
1. Exploration: microbiote composition, host-microbiota interactions
2. Development: protocols and methods, industrial applications
3. Validation: predictive models & clinical studies set-up

DIAGNOSTIC

1. Biomarkers: new markers identification, candidate markers/panels evaluation, signature refinement
2. Assay development: sample preparation, prototypes development and validation (performances, repeatability and robustness)
3. Sample collection: clinical network management, biological specimens and ethical constraints

ANTIMICROBIALS

1. Identification & characterization of new drugs
2. Host-pathogens & host-drugs interactions
3. Support to alternative approaches



VACCINES

1. Healthy vs sick population biomarker identification
2. New vaccines/adjuvants mode of actions
3. Production and quality control development

7 Technological Units

(industrial standards)

- Biological Collections & Microbiology
- Genomics & Transcriptomics
- Metabolomics & Proteomics
- Immunomonitoring
- Expression systems proteins engineering
- Pre-clinical models & Imaging
- Data Management & Analysis

Technology units - overview

★ **BIOLOGICAL COLLECTIONS & MICROBIOLOGY**

- Single point of access to biological samples (https://biospecimens.bioaster.org/)
- Isolation and extensive characterization of microbiological strains
- Sample prep for gut microbiota analysis

★ **GENOMICS & TRANSCRIPTOMICS**

- Microbial genomics (*de novo*, resequencing); metagenomics (target, WGS), transcriptomics (host/pathogen, mode of action),
- *NGS, microarrays, HT validation systems, qPCR, dPCR, pre-analytical steps automation*

★ **METABOLOMICS & PROTEOMICS**

- Integrated metabolome / metaboproteome analysis. Profiling, fingerprinting, fluxomics, targeted analysis, lipidomics etc.
- *600 MHz NMR, high resolution mass spectrometry, pre-analytical automation, chemometrics & bioinformatics*

★ **IMMUNOMONITORING**

- Biomarker discovery and monitoring.
- Custom assay development
- *Flow, mass, image cytometry, fluorospot, Luminex, microfluidics, sample processing*

★ **PROTEIN & EXPRESSION SYSTEM ENGINEERING**

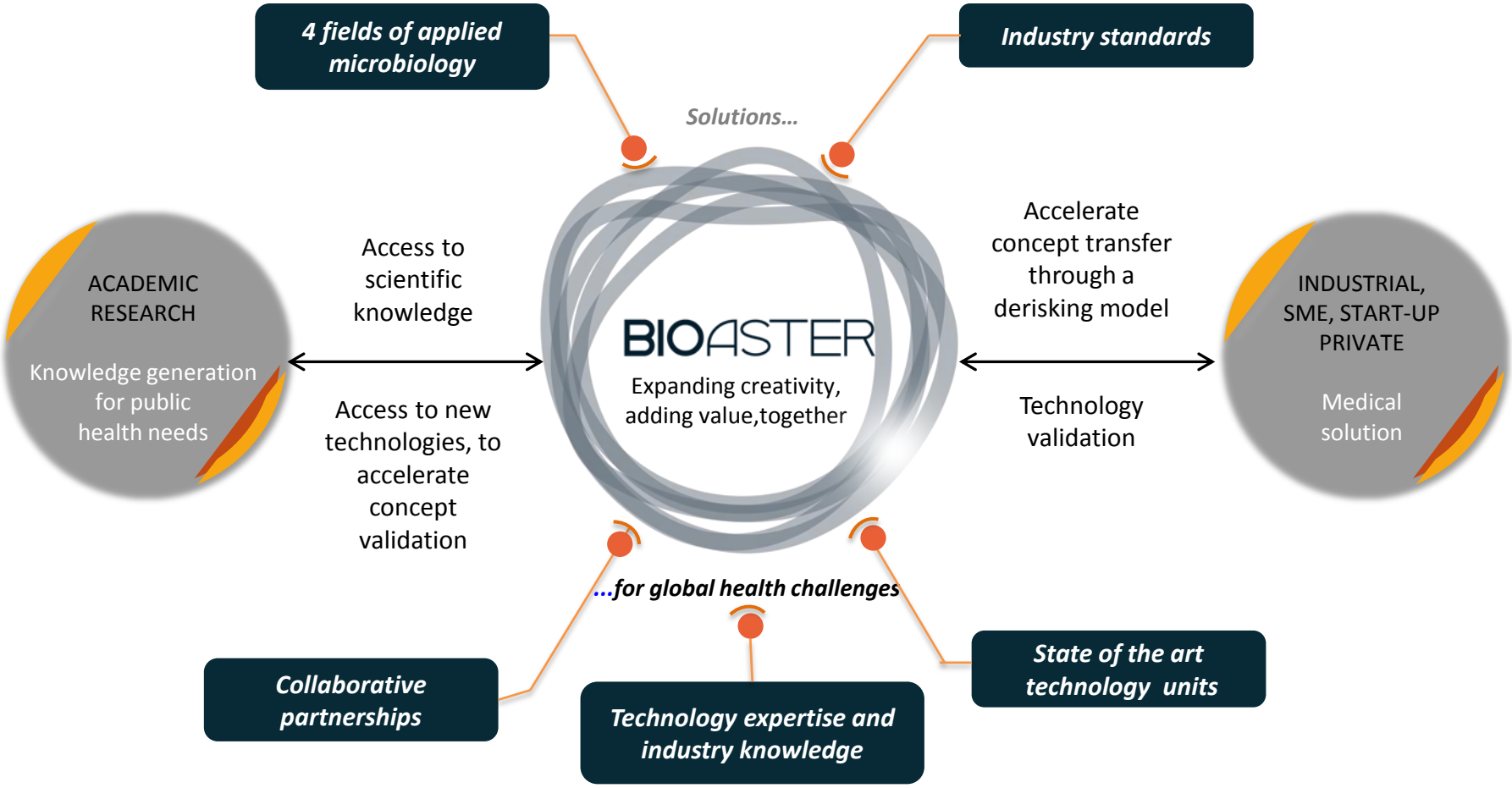
- Novel tools for biotherapeutics and diagnostics
- *Protein design, vectorization tools, host optimization and new host discovery, multimers, VLP, scaffolds, antibody engineering*

★ **PRE-CLINICAL MODELS & IMAGING**

- Specific microbiota & infectious-based models
- *Gnotobiology, host-microbiota interactions, infectious diseases, cell and molecular biology in vivo and 2D/3D imaging and biodistribution*

★ **DATA MANAGEMENT & ANALYSIS**

- Management, transversal analysis and integration of clinical, phenotypic and multi-omic experimental data
- *Massive data storage and intensive computing (Cloud-based HPC, Grid-computing), collaborative platforms (LIMS, eCRF, bioinformatics web platforms, tranSMART…), integrated knowledge management*



MAKE IT POSSIBLE

MAKE IT HAPPEN

MAKE IT IMPACTFUL

De-risking innovation

Expanding Creativity, Adding Value, together

Scientific de-risking

Through the combination of academic and industrial expertise in science, technology and development

Technological de-risking

Through the combination of state of the art equipment operated under industry standards

Financial de-risking

Through co-investment (project-by-project basis)

Number of projects	Academic & clinical partners	Industrial partners	Average project budget (M€)	Average project duration (years)
53	25	26	1	3

Projects

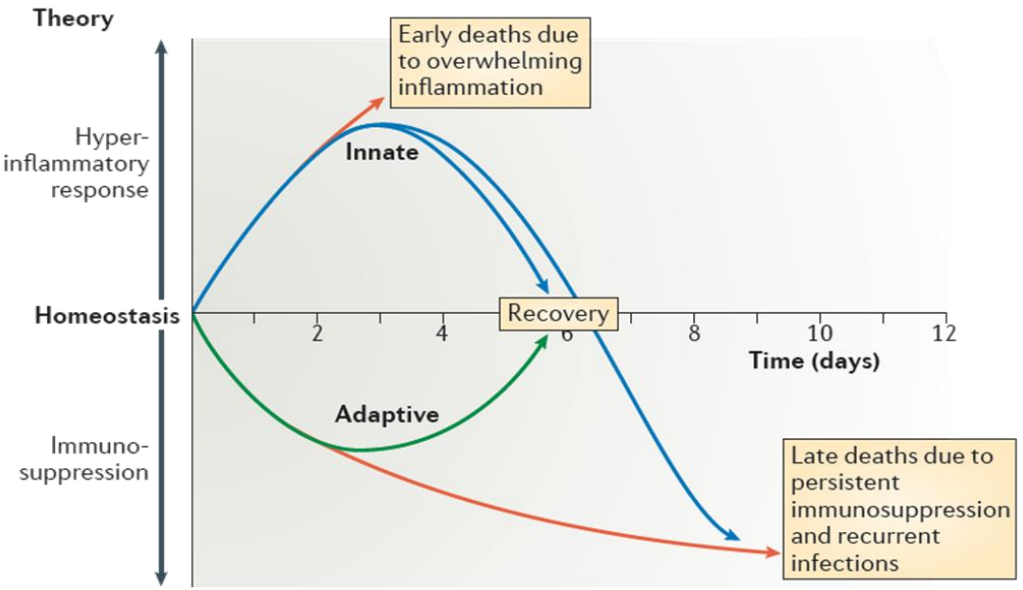
Examples

REALISM

REAnimation Low Immune Status Markers

- Monitor the immuno-inflammatory status of ICU patients and provide new innovative biomarkers for Infectious risk assessment and new therapeutic approaches

Sepsis-induced immunosuppression
Strong scientific data and a widely accepted model



Hotchkiss et al. Nat Rev Immunol (2013) 13(12):862-74

Strain engineering for the optimization of recombinant lipoprotein production

Implementation of innovatives technological approaches

Genomic engineering

Multi-omic approach

Pathway identification

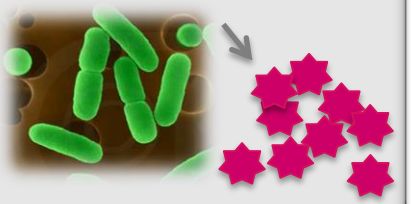
Targeted approach

Yield optimization

Original strain

Different lipidation levels , low yield

Engineered production strain



Robust production of lipoproteins correctly lipidated

MERIAL

SANOFI PASTEUR

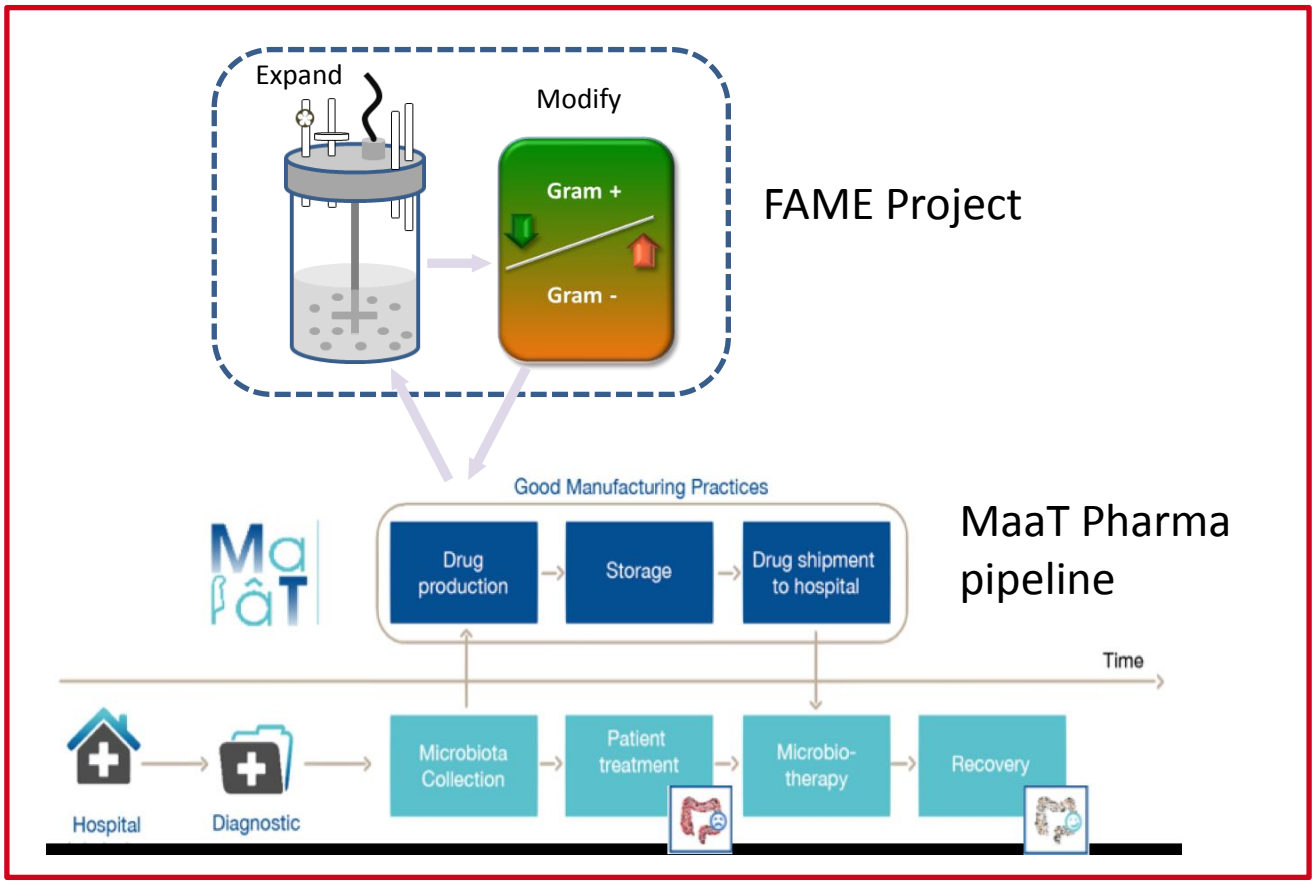
INSTITUT PASTEUR

« FAME »

Goal : to develop in vitro fecal microbiota expansion for therapeutic applications

Two main objectives of the project are:

- *In vitro* expansion of the intestinal microbiota, preserving initial composition
- *In vitro* controlled modification of microbiota, targeting optimal composition

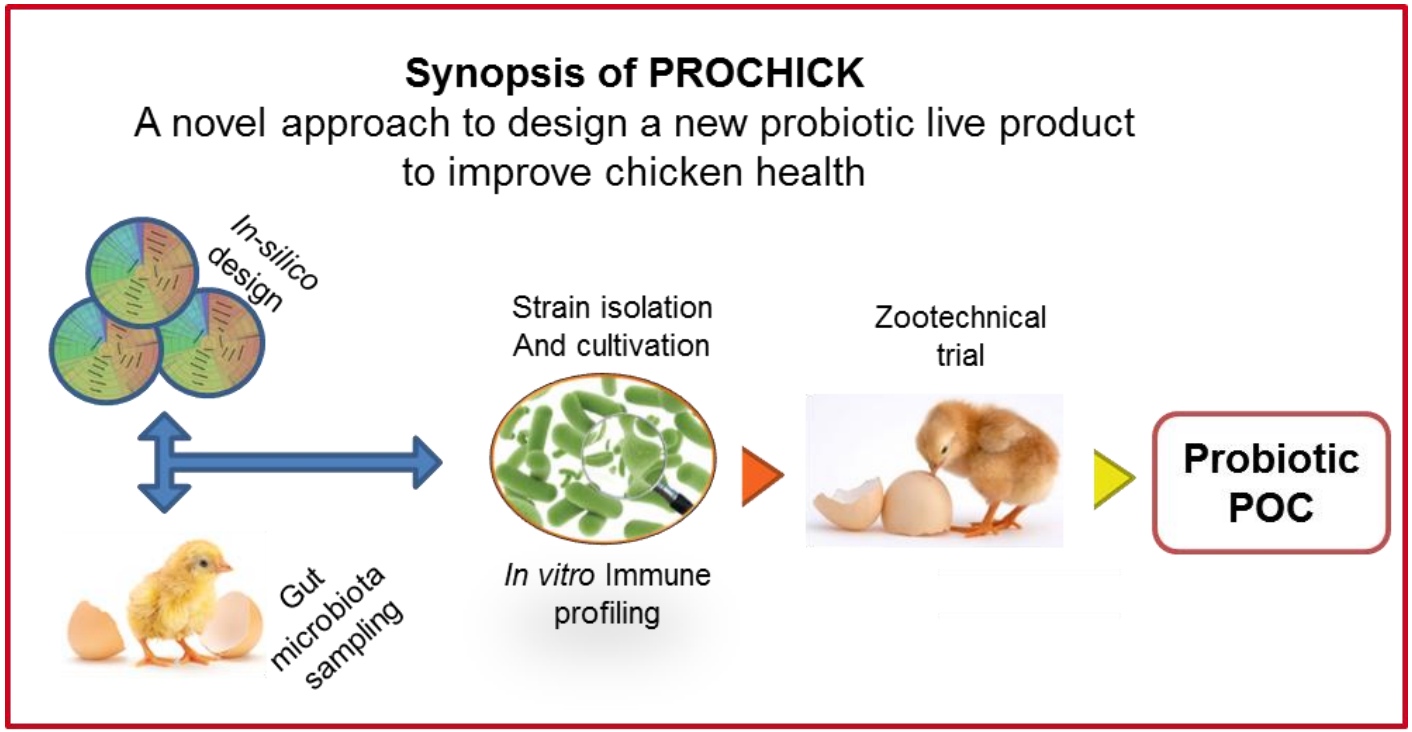


Microbiota as a Therapy

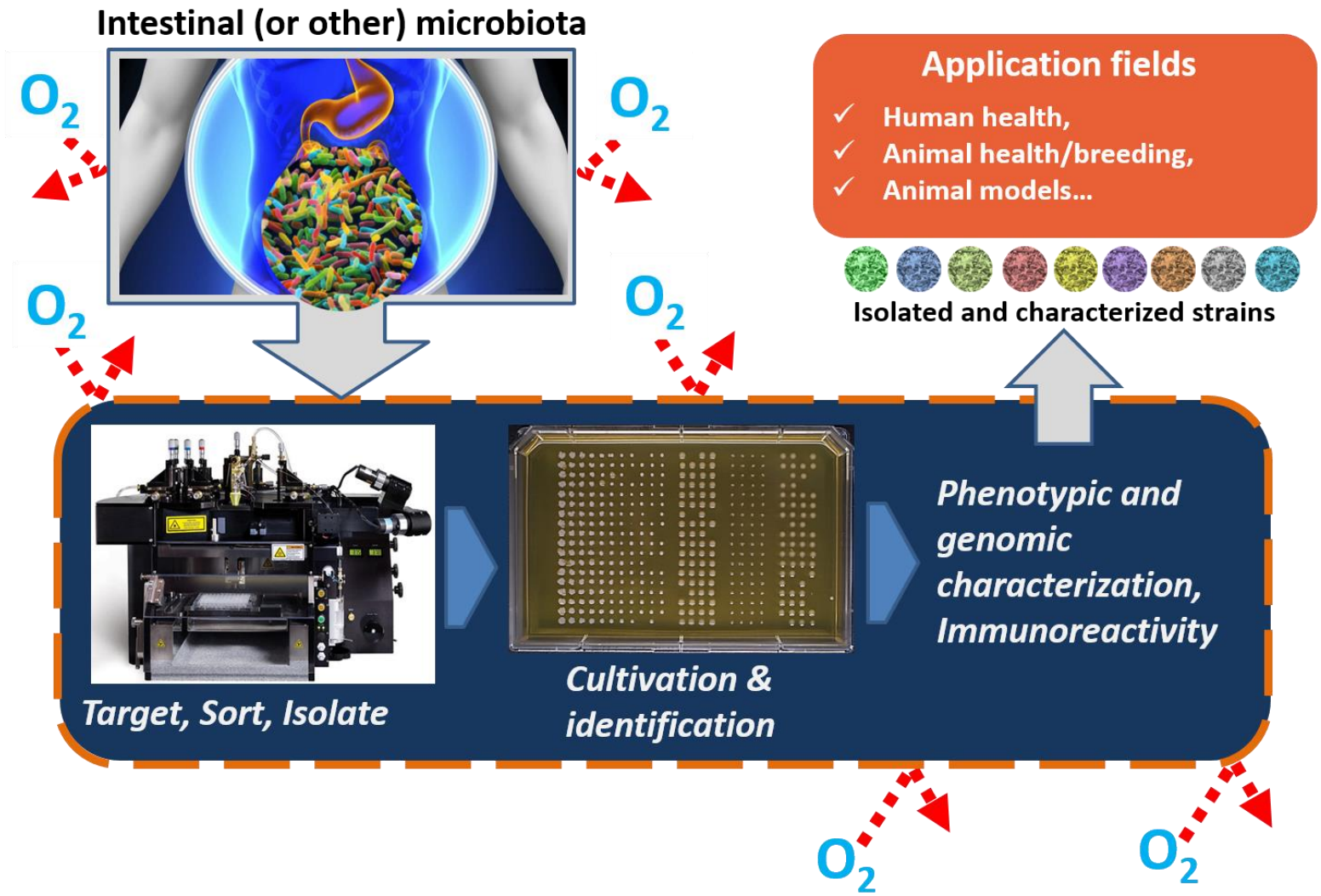
« Prochick »,
Goal : to develop new probiotic strains for chicken health

- Identification and selection of existing or new strains of probiotics for chicken growth / health improvement in the first week of life.
- In vitro characterization of the newly identified strains and clinical Proof of Concept (POC) in chickens.

MERIAL



Anoxic Platform



EBODIAG

an EBOLA Diagnostic Point Of Care test

- Define a sensitive immunochromatographic (lateral flow) rapid test to diagnose Ebola infection in endemic countries.

Ultrasensitive diagnostic test of Ebola Haemorrhagic Fever.

?

FUJIFILM

Met-SAMoA®

Metabolic Screening of Antimicrobial Mode of Action

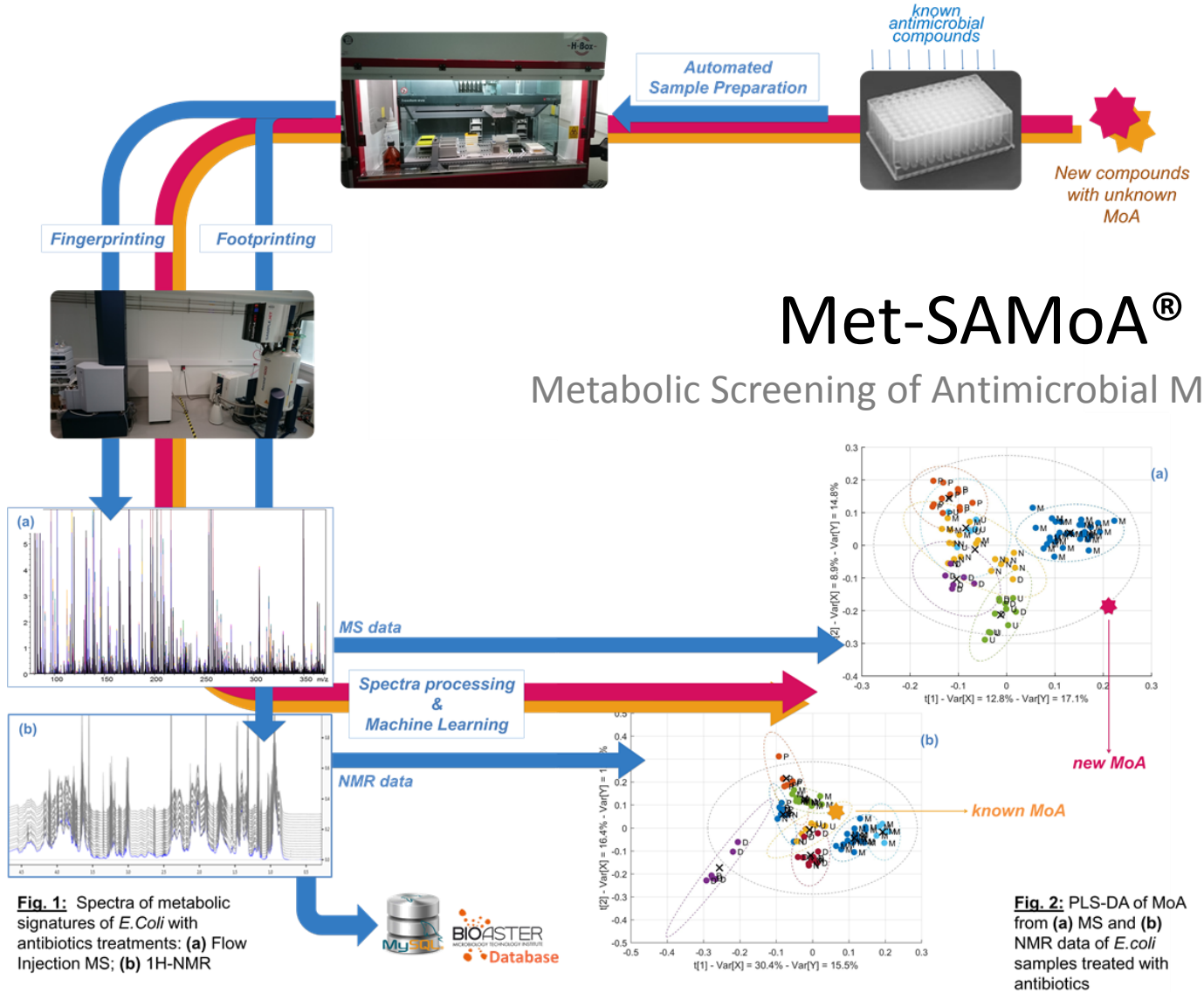


Fig. 1: Spectra of metabolic signatures of *E.Coli* with antibiotics treatments: **(a)** Flow Injection MS; **(b)** 1H-NMR

Fig. 2: PLS-DA of MoA from **(a)** MS and **(b)** NMR data of *E.coli* samples treated with antibiotics

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immunotherapies for infectious Diseases

congress 2017

1st edition : mAbs for infectious diseases

www.I4ID.org

December 11-12, 2017
International Convention Center
Lyon, France

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