Rapid deployment of a BIMS (Biobank Information Management System) to take in charge massive sample data from COVID-19 epidemiological studies

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Picture credit © Institut Pasteur

Introduction

On March 2020, when the COVID-19 pandemic hit Europe, the Institut Pasteur ICAReB biobank platform was solicited for the management of thousands of bio-resources in the frame of new projects whose aim was to describe the sero-epidemiology of the COVID-19 pandemic in France. Therefore, a bipartite project team was rapidly set up, comprising the informatics department of the Institut Pasteur (DSI) and the ICAReB biobank, with the company Modul-Bio to establish a BIMS able to fulfill the requirements in just a few weeks.

Random French Population ≈ 11 000 people

iCAReB Platform

Blood Samples

Medical analysis laboratories

Separation of blood components (Serum, Plasma, PBMC) and cryopreservation

Immunological assays (quantification of antibodies and neutralising antibodies)
Mathematical modelisation

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Recording, centralisation and management of COVID-19 patients and their biological data

A bioresource collection to describe the sero-epidemiology of COVID-19 pandemic in France

The ICAReB platform is part of the Center for Translational Science (CRT), which aims to facilitate research on humans, and of the Biological Resource Centre of Institut Pasteur (CRBIP). It provides access to human bioresources (samples with associated clinical data) for Institut Pasteur scientists and external collaborators.

The aim of the various studies presented here was to evaluate the prevalence of SARS-CoV2 antibodies in the French population. In the main case, residual sera from mainland France and French overseas have been collected in a random, but representative manner in terms of age, gender and location of patients. These sera were collected through medical analysis laboratories. In other cases, whole blood tubes were collected and processed. Then different serological tests were performed in order to detect and quantify the presence of SARS-CoV-2 antibodies and to analyse their neutralising properties.

Fast deployment of a BIMS for COVID-19 studies

First, an adaptation has been performed for transferring the minimal necessary data sets from thousands of patients and samples, into the MBioLIMS BioBanking® database using a a specific Excel template. Second, the corresponding development and other customizations were added to the latest version of the Modul-Bio software and rapidly installed on a dedicated server of Institut Pasteur. Third, this BIMS was tested, configured and brought into production in a couple of weeks. Since then, the Modul-Bio BIMS has allowed successful management of massive amounts of sample data from several epidemiological studies.

A complete management system for COVID-19 bioresources

Modul-Bio has provided the MBioLIMS BioBanking® solution to manage and centralise patients minimal information and COVID19 samples information, in order to facilitate the sero-epidemiological description of the pandemic in France **in less than 3 weeks**, from the purchase order date to the GoLive with the first patient and samples recorded in the software.

PO received on April 21st → Installation & Configuration on April 27th → Training on April 28th → Go Live on May 7th

Conclusion

MBioLIMS BioBanking® has enabled the rapid and efficient constitution and management of COVID-19 collections at Institut Pasteur. To date, close to 10 000 patients have been included in COVID-19 studies. Modul-Bio plays a major role by deploying a functional BIMS (Biobank Information Management System), tailored to the biobank specificities, centralizing a large number of samples and associated data. As MBioLIMS BioBanking® is a highly secure software specifically designed to manage biospecimens for Biobanks, Biological Resource Centers and cohort studies, fast deployment turnaround is achievable at customer sites.
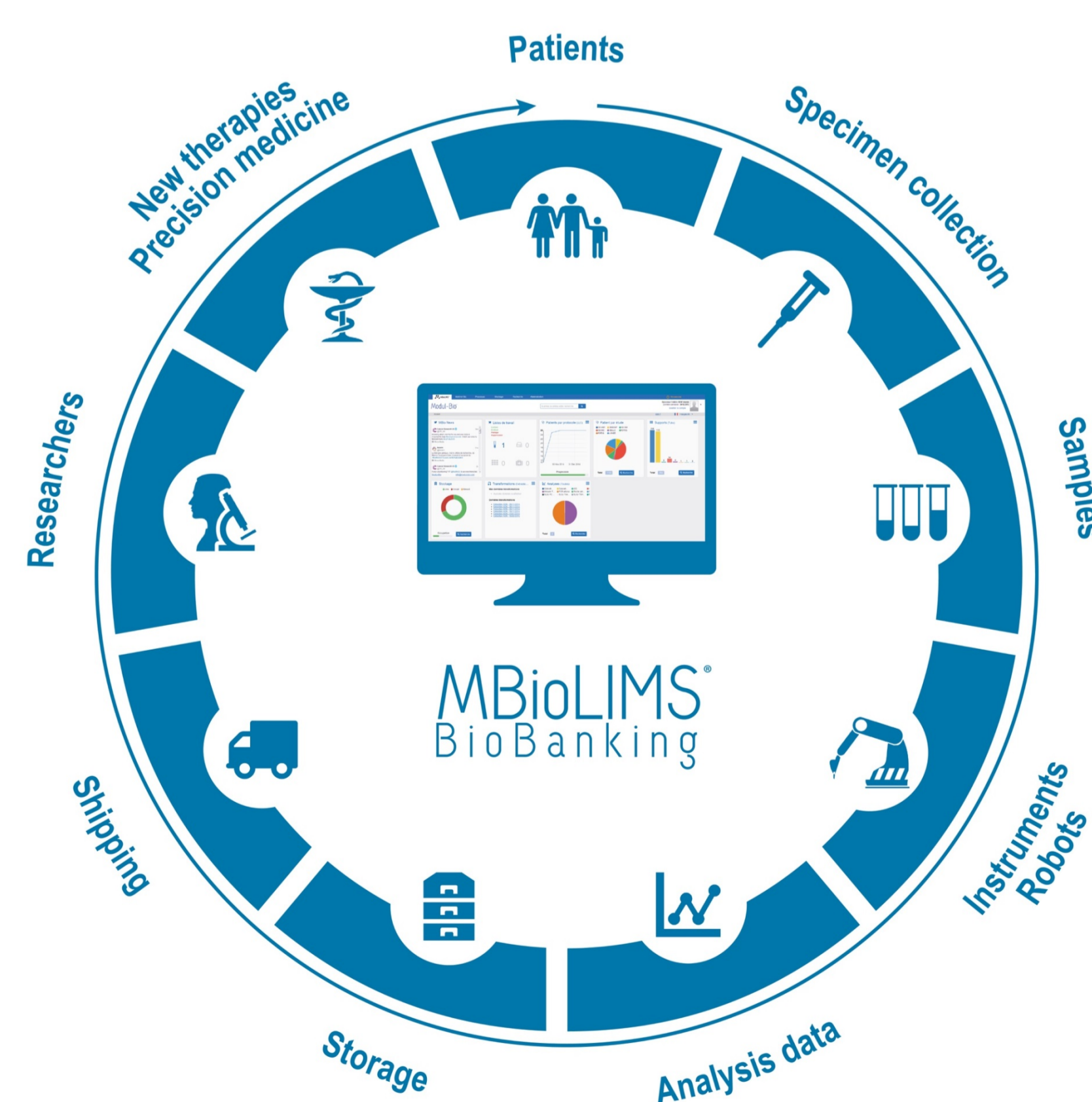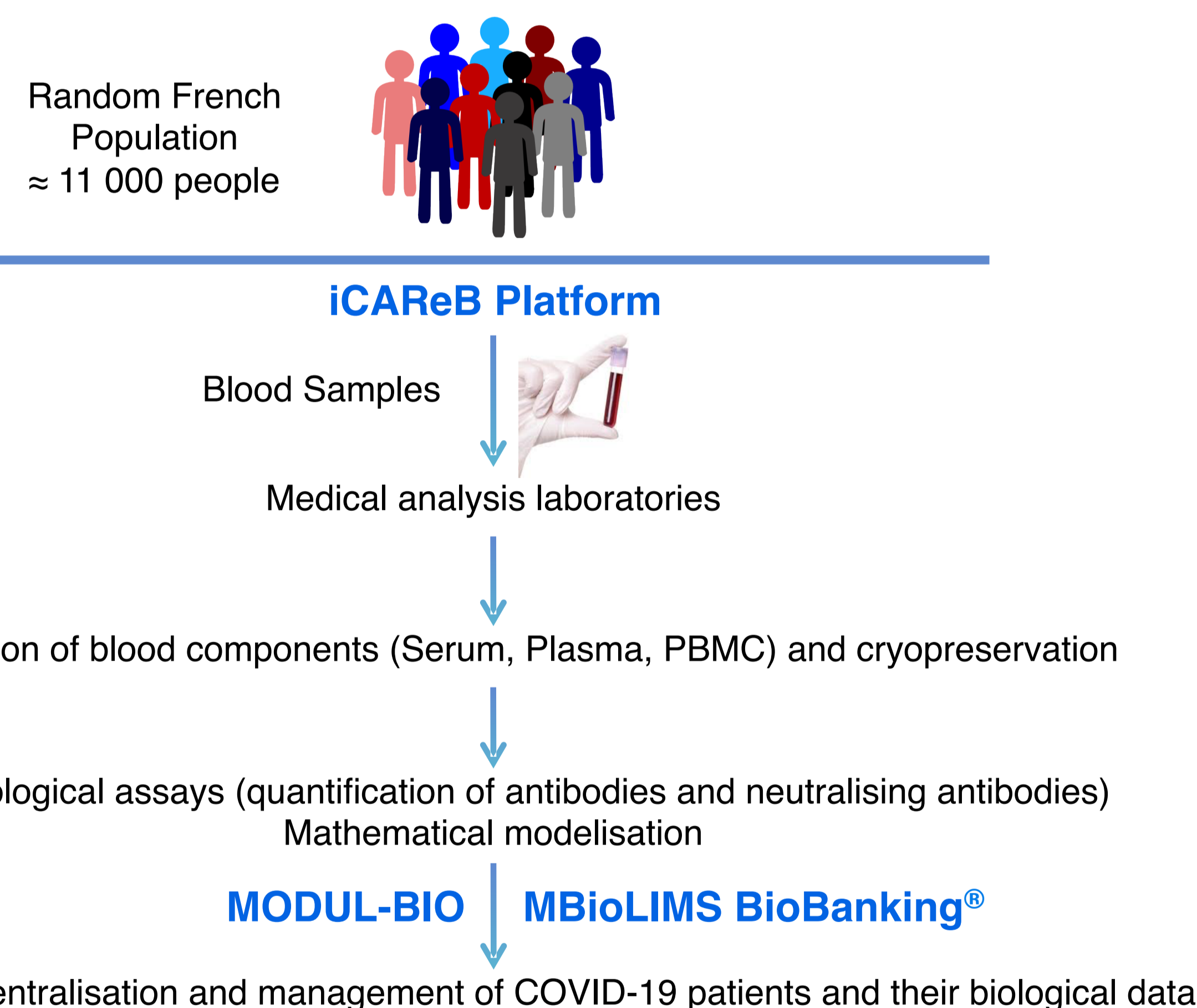
Management of the specialised biobank CRYO-LEA using the MBioLIMS BioBanking® System

MODUL-BIO: Laurent Jacotot, CEO - Philippe Vaglio, CSO
CRYOSTEM: Emilie Robert, Strategy & Valorisation Manager- Claire Fontenille, Regulatory, Operational and Quality Manager - Boris Calmels, BRCs Coordinator - Régis Peffault de Latour, Project Coordinator
LEA: Gérard Michel and Pascal Auquier, Investigators and Coordinators

INTRODUCTION

Survival rate of childhood leukemia has improved considerably but the increased number of long-term survivors is now attended by a growing awareness that many will develop health conditions as a direct consequence of their treatments.
A first step for developing an accurate strategy to reduce these long-term side effects (metabolic syndrome, cardiomyopathy, secondary tumors, osteonecrosis..) requires identification of their incidence and clinically detectable risk factors at a genetic level.
Since July 2018, a new specific biobank, named CRYO-LEA, has emerged, including patients treated in the childhood for a leukemia by chemotherapy or Hematopoietic Stem Cell Transplantation (HSCT).

CRYO-LEA: a unique biobank dedicated to leukemia treatments long-term effects

The French LEA (Leukemia of Children and Adolescents) cohort has been initiated in 2004 to evaluate prospectively long-term health status of childhood leukemia survivors treated after 1980. Briefly, clinical and quality of life data are collected during specific medical visits at pre-defined dates, beginning one year after completion of treatments and repeatedly thereafter.
However, to enable gene exploration of these long-term effects, a first crucial step was to constitute an adequate biological collection associated with the LEA database.
Since 2018, CRYOSTEM, the unique European ISO 9001-certified expert in biobanking networks in the field of HSCT, has put its knowledge to the benefit of LEA cohort to build its biological collection aiming at enabling further genetic studies to predict long-term effects of chemotherapy and HSCT to treat leukemia.

MBioLIMS BioBanking®, a complete management system of biological data for CRYO-LEA

Modul-Bio has provided the solution MBioLIMS to manage and centralise patients and samples information to facilitate this biobank and further studies into genetic susceptibility.
Considering that the software has been tailored to the specific needs of CRYO-LEA and its objectives, the MBioLIMS BioBanking software benefits are measured at different levels :
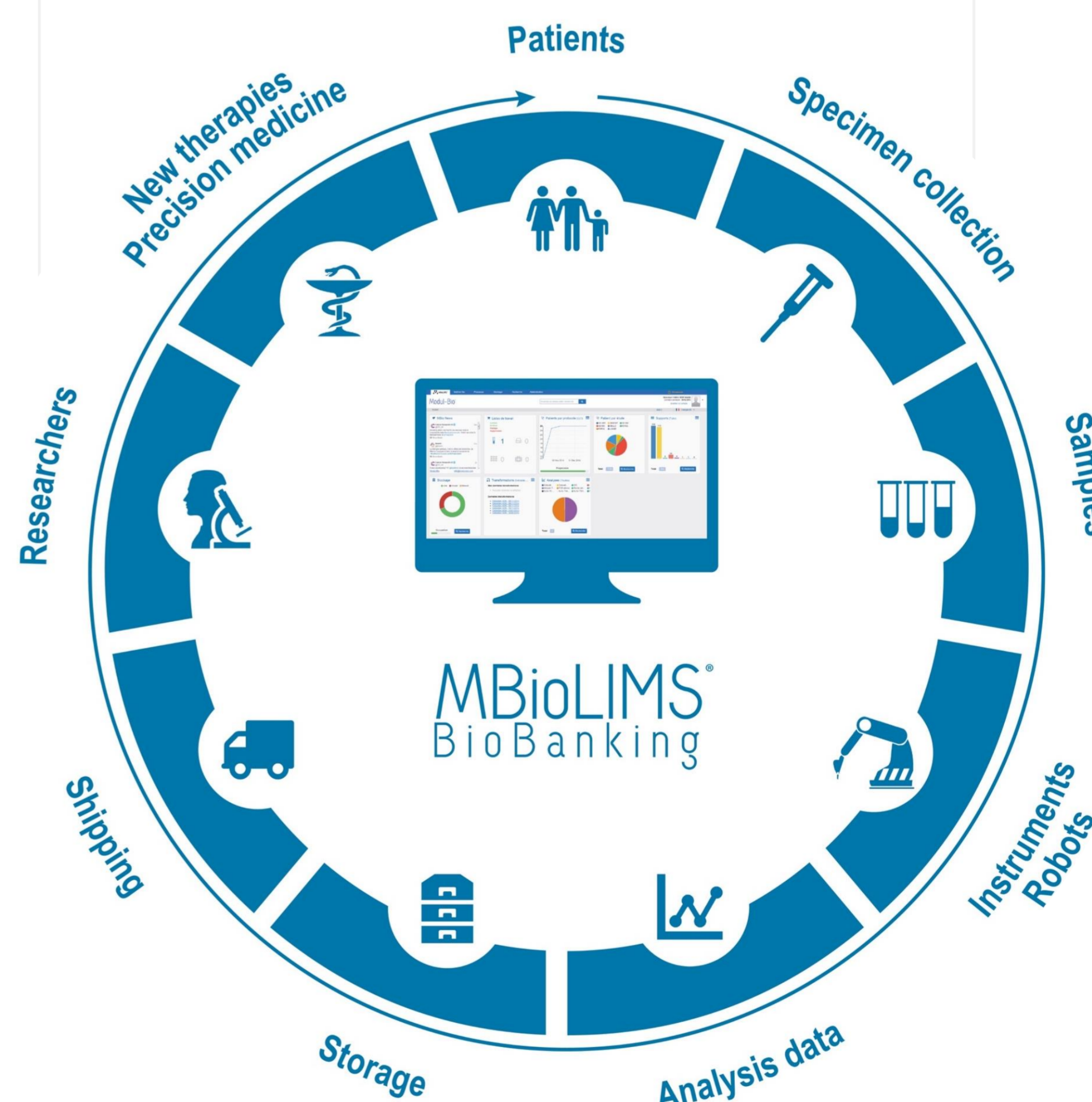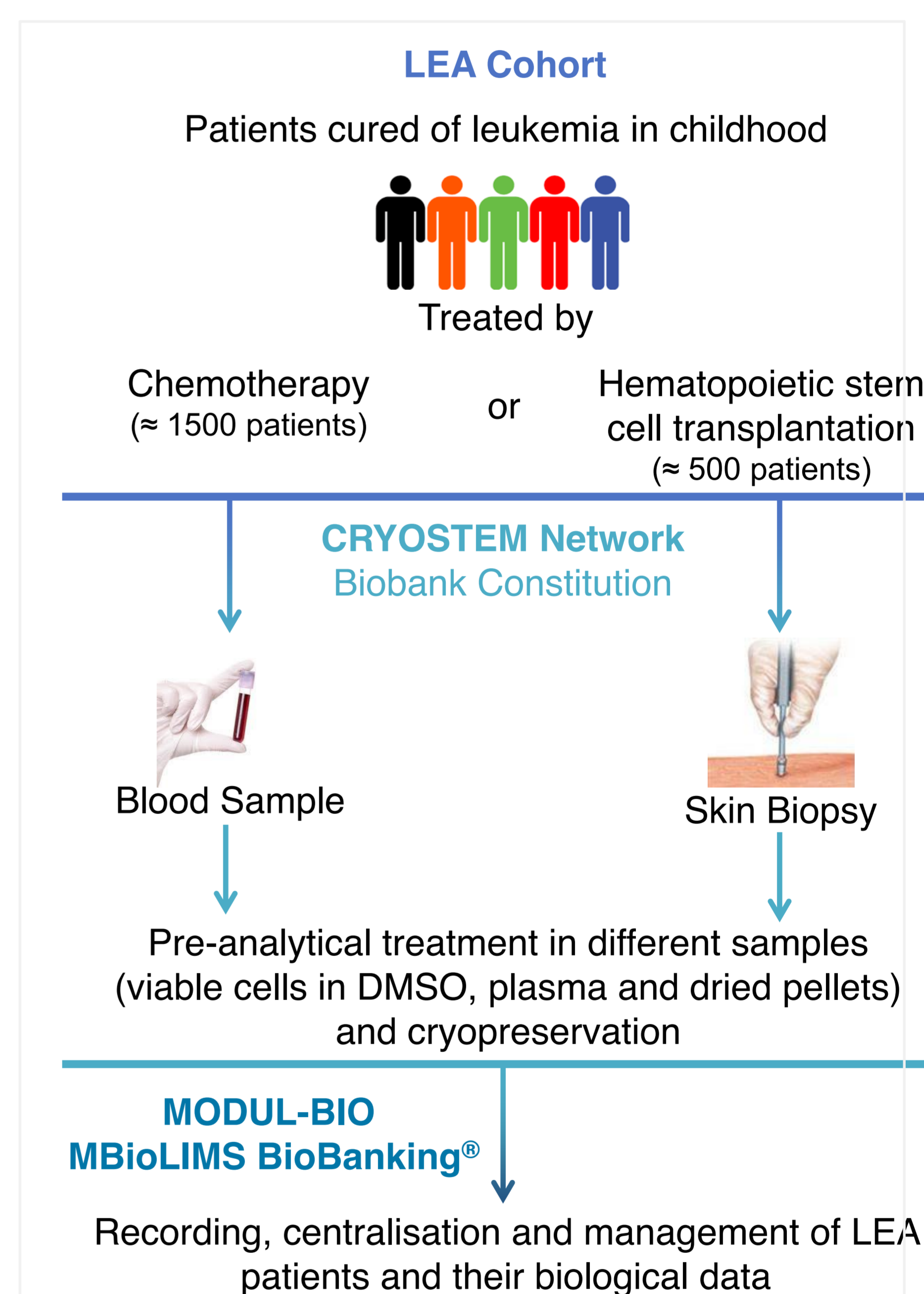- Management of the functioning of the 23 centres biobanking network as a unique one ;
- Secure storage and centralisation of biological data with restricted access ;
- Scalability to the type of samples according to the therapies used to treat leukemia
- Independent work and recording of included patients, collected samples and data ;
- Supervising functionality to administer and analyse the data from all sites which provides a powerful centralised source of information that can be interrogated and reported on to provide any specific information as required ;
- Accelerated training of the users in clinical services and Biological Resources Centres ;
- Management of the consent and samples provision regarding the consent status in line with the new European privacy regulation GDPR.
MBioLIMS ensures an auditable and automated sample life cycle history maintaining the custody and status of biological material as it is processed and researched.

CONCLUSION

MBioLIMS BioBanking has enabled in an efficient way the constitution and the management of the specific area biobank CRYO-LEA. To date, 1 350 patients have been included in CRYO-LEA protocol in almost 2 years. The software manages samples derived from both blood and skin biopsies samples, corresponding to 11 350 samples. Moreover the software also facilitates the samples provision thanks to its dedicated module.

Modul-Bio ensures a major role by deploying a functional BIMS Biobank Information Management System, tailored to the biobank specificities, centralizing a large number of samples and data, further used in genome-wide studies to identify genetic factors behind late side effects.

LEA Cohort
Patients cured of leukemia in childhood
Treated by
Chemotherapy (≈ 1500 patients) or Hematopoietic stem cell transplantation (≈ 500 patients)

CRYOSTEM Network Biobank Constitution
Blood Sample — Skin Biopsy
Pre-analytical treatment in different samples (viable cells in DMSO, plasma and dried pellets) and cryopreservation

MODUL-BIO MBioLIMS BioBanking®
Recording, centralisation and management of LEA patients and their biological data

MBioLIMS BioBanking