Cutting-edge research instruments

of the Fondazione IRCCS Ca' Granda Ospedale Maggiore Policlinico

Index

V1 - May 2025

1 Functional Genomics technologies

High Performing Computer (HPC) NGS

✓ Primary site (Invernizzi underground floor): 2 login nodes and 16 compute nodes, each with 28 compute cores and 375 GB RAM, total HPC provide about 1,2 TFlops; data storage is provided by two 4-node NAS for a current total of 450 TB of usable space. Users can access resources from the internal network and the Internet via a VPN server.

✓ Disaster Recovery site – 450 TB (Bosisio underground floor): provides storage replication and a second independent Internet access.

✓ Two 80TB desktop NASs are installed for backup of the data sequenced by Nanopore PromethION, the other for auxiliary data storage

✓ Additional software: eVAI by enGenome

FUNCTIONALITIES

✓ IT infrastructure for NGS data computing and analysis;
✓ Pipelines for genomics and transcriptomics analysis;
✓ Software for interpreting genomic variants (CE IVD marked)

LOCATION

Ospedale Policlinico di Milano, via Francesco Sforza 35
Pad. Invernizzi: underground floor
Pad. Bosisio: underground floor

CONTACT

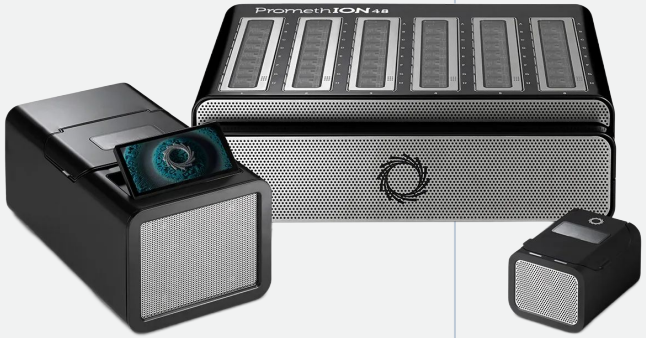
scienze.omiche@policlinico.mi.it

NGS instruments

INSTRUMENTS

- → Nanopore PromethION
- → 2x NextSeq2000
- → NextSeq550

Nextseq2000



PromethION

FUNCTIONALITIES

- ✓ WGS, WES long reads
- ✓ Epigenome (DNA and RNA)
- ✓ WES
- ✓ Metagenomic
- ✓ RNA-Seq, scRNA-Seq
- ✓ Targeted panels

LOCATION

Ospedale Policlinico di Milano, via Francesco Sforza 35
Pad. Invernizzi: 2nd floor
Pad. Bosisio: underground floor

CONTACT

scienze.omiche@policlinico.mi.it

NGS single cell

INSTRUMENTS

→ Chromium Connect 10XGenomics

FUNCTIONALITIES

✓ Single cell partitioning, barcoding and library prep.
✓ scRNA-Seq
✓ scATAC-Seq
✓ MultiOme: scRNA-Seq w/ scATAC-Seq or scRNA-Seq w/ Immuneprofiling
✓ Targeted panels (pre-designed)

LOCATION

Ospedale Policlinico di Milano, via Pace 9
Pad. IV Laboratorio Medicina – Emostasi e Trombosi: 1st floor

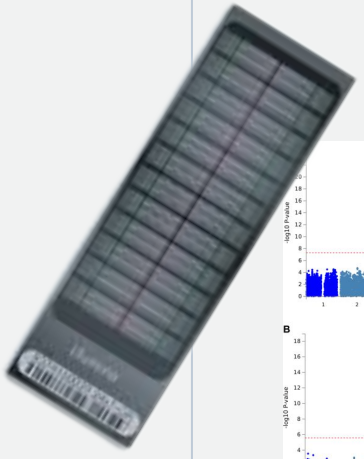
CONTACT

roberta.gualtierotti@policlinico.mi.it

iSCAN: array

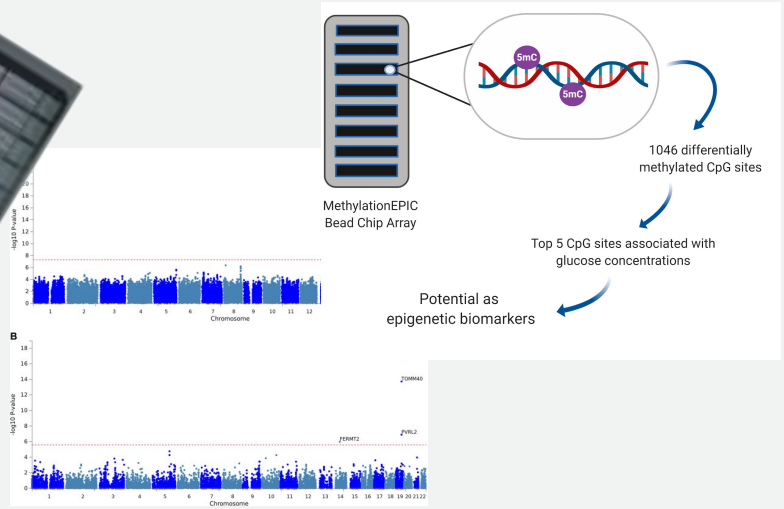
INSTRUMENTS

→ Epigenomics
→ SNPs



FUNCTIONALITIES

✓ Genome wide CpGs
✓ GWAS
✓ Molecular karyotype



LOCATION

Ospedale Policlinico di Milano, via Francesco Sforza 35
Pad. Bosisio: underground floor

CONTACT

scienze.omiche@policlinico.mi.it

High Throughput digital PCR

INSTRUMENTS

→ NanoString nCounter FLEX

FUNCTIONALITIES

✓ Fresh/frozen/FFPE/biological liquids
✓ RNA/miRNA panels

LOCATION

Ospedale Policlinico di Milano, via Francesco Sforza 35
Pad. Invernizzi: 2nd floor

CONTACT

scienze.omiche@policlinico.mi.it

Digital PCR

INSTRUMENTS

→ QIAcuity Eight

This nanoplate-based system seamlessly integrates a standard dPCR workflow of partitioning, thermocycling and imaging into a walk-away automated platform with minimal hands-on time.

POTENTIAL APPLICATIONS

- ✓ Rare mutation detection
- ✓ Copy number variation analysis
- ✓ Gene expression analysis
- ✓ Pathogen detection
- ✓ Genotyping
- ✓ miRNA research
- ✓ Cell and gene therapy

LOCATION

Ospedale Policlinico di Milano, Via San Barnaba n. 8
Pad. Vigliani Feal

CONTACT

valentina.bollati@unimi.it

High Throughput qPCR

INSTRUMENTS

→ QuantStudio™ 12K Flex Real-Time PCR System, Open Array

FUNCTIONALITIES

- ✓ Gene expression / Pathways
- ✓ microRNAs/lncRNAs
- ✓ Genotyping/ CNV /SNP
- ✓ Microbiota

LOCATION

Ospedale Policlinico di Milano, via Francesco Sforza 35
Pad. Ex Convitto

CONTACT

daniela.galimberti@policlinico.mi.it

Q Digital PCR System

INSTRUMENTS

→ QuantStudio Absolute Q

Using a microfluidic array plate technology, this system allows absolute quantification via digital PCR without the need for standard curves. Combines the power of dPCR with the simplicity of a qPCR workflow. With the ability to multiplex using up to four optical channels, the system enables more targets to be measured per sample.

FUNCTIONALITIES

It is ideal for applications requiring high sensitivity, precision, and accuracy in oncology, reproductive health, infectious diseases, inherited diseases and gene editing as well as:

- ✓ Rare target quantification
- ✓ Copy number variation analysis
- ✓ Gene expression analysis
- ✓ Genotyping

LOCATION

Ospedale Policlinico di Milano, via Pace 9
Pad. IV Lab. Medicina ad Indirizzo Metabolico: 1st floor

CONTACT

elena.dipierro@policlinico.mi.it

High Throughput Sanger Seq

INSTRUMENTS

→ AbiPrism 3100 Genetic Analyzer _16 capillaries

FUNCTIONALITIES

- ✓ Resequencing/validation
- ✓ Genotyping/LOH analysis
- ✓ Clonality

LOCATION

Ospedale Policlinico di Milano, via Francesco Sforza 35
Pad. Invernizzi: 1st floor

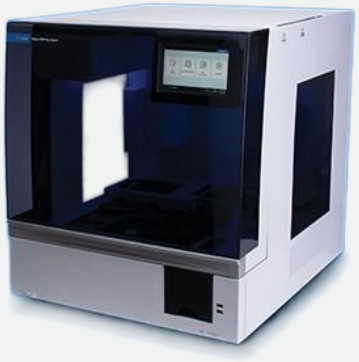
CONTACT

palma.finelli@policlinico.mi.it

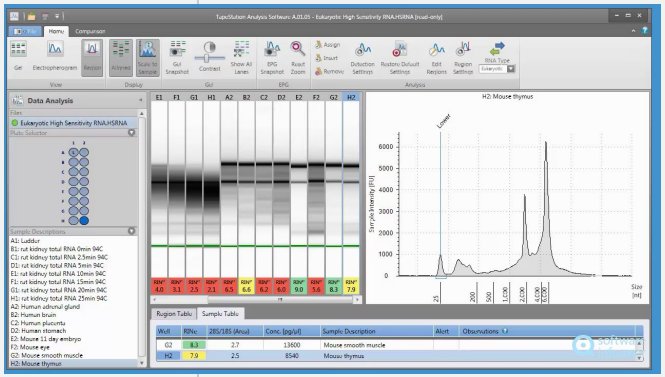
Ancillary molecular biology instruments

INSTRUMENTS

- → QIAcube, QIAsymphony
- → QIAxpert
- → Qubit
- → TapeStation 4200
- → Magnis



Magnis



TapeStation

FUNCTIONALITIES

- ✓ DNA purification
- ✓ DNA/RNA quantification and QC
- ✓ Liquid handler for Library prep (Agilent chemistry; 8 WES/8h)
- ✓ (Thermal cyclers)

LOCATION

Ospedale Policlinico di Milano, via Francesco Sforza 35
Pad. Invernizzi: 1st floor, 2nd floor

CONTACT

scienze.omiche@policlinico.mi.it
palma.finelli@policlinico.mi.it

Ancillary molecular biology instruments

INSTRUMENTS

→ Maxwell® RSC Instruments

FUNCTIONALITIES

Purification of:

- ✓ gDNA
- ✓ ccfDNA
- ✓ Fecal Microbiome DNA
- ✓ Viral Total Nucleic Acid
- ✓ mRNA
- ✓ miRNA

LOCATION

Ospedale Policlinico di Milano, via Pace 9
Pad. IV Lab. Medicina ad Indirizzo Metabolico: 1st floor

CONTACT

elena.dipierro@policlinico.mi.it

2 Spatial biology technologies

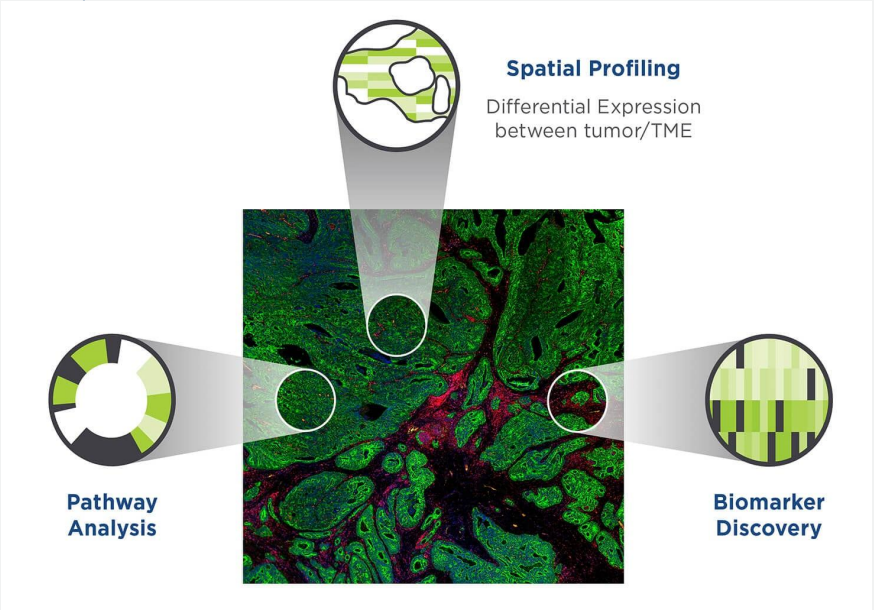
Spatial biology technologies

INSTRUMENTS

→ Nanostring GeoMX

FUNCTIONALITIES

✓ Spatial transcriptomics (whole transcriptome or panels)
✓ Spatial proteomics (panel of 590 proteins)



LOCATION

Ospedale Policlinico di Milano, via Francesco Sforza 35
Pad. Bosisio: underground floor

CONTACT

scienze.omiche@policlinico.mi.it

Spatial biology technologies

INSTRUMENTS

→ Miltenyi MACSima

FUNCTIONALITIES

✓ Targeted proteomics
✓ Multiplex/serial immunofluorescence

LOCATION

Ospedale Policlinico di Milano, via Pace 9
Pad. III Lab. Nefrologia: 1st floor

CONTACT

giuseppe.castellano@policlinico.mi.it

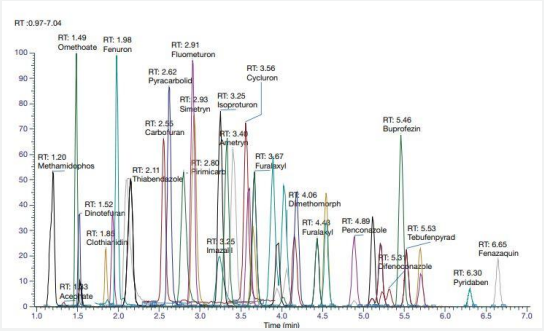
3 Mass spectometry

Mass spectrometry

INSTRUMENTS

→ Orbitrap Exploris 120

High-resolution mass spectrometers are designed to resolve analytes of interest from interferences



FUNCTIONALITIES

✓ **Metabolism**: identification of metabolites and discovery of biomarkers related to different disorders (metabolic, cardiovascular, oncological, neurological diseases).

✓ **Toxicology and Environmental Chemistry**: detection and quantification of environmental contaminants, toxins and hazardous chemicals in complex matrices (water, soil, biological fluids).

✓ **Pharmaceutical Analysis**: characterization of drugs and their metabolites, for the development of new drugs and for pharmacokinetic studies.

LOCATION

Ospedale Policlinico di Milano, Via San Barnaba 8
Pad. Vigliani Feal

CONTACT

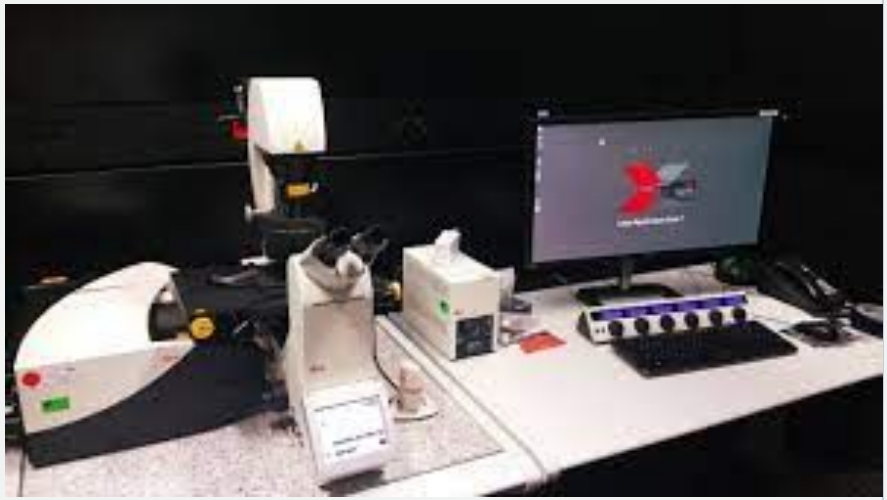
silvia.fustinoni@policlinico.mi.it

4 Imaging technologies

Imaging technologies

INSTRUMENTS

→ Confocal TCS SP8 Leica Microscope



FUNCTIONALITIES

✓ Organoids
✓ Monolayers/Tissues
✓ Live cells
✓ Label-free imaging and filter-free spectral detection system: record up to 5 dye emissions

LOCATION

Ospedale Policlinico di Milano, via Francesco Sforza 35
Pad. Invernizzi: 5th floor

CONTACT

yvan.torrente@policlinico.mi.it

Imaging technologies

INSTRUMENTS

→ Confocal microscopy Olympus FV4000

Confocal laser scanning microscope designed to provide high resolution images in three dimensions (3D) and with extraordinary contrast quality

FUNCTIONALITIES

✓ **Cell Biology:** visualize cellular and subcellular structures (e.g. vesicles, organelles) with great precision, monitoring the expression and localization of proteins or specific molecular probes; cells interactions

✓ **Histology**: obtain detailed images of tissues (e.g. oncological biopsies), allowing to study the structure and pathological alterations.

✓ **Molecular interactions**: monitor protein-protein, protein-DNA interactions and other molecular events in real time.

LOCATION

Ospedale Policlinico di Milano, via Pace 9
Pad. II Lab. Endocrinologia: 1st floor

CONTACT

giovanna.mantovani@policlinico.mi.it

Imaging technologies

INSTRUMENTS

→ Leica live cell Thunder Imager

FUNCTIONALITIES

- ✓ 3D cultures
- ✓ Live cells
- ✓ High speed/high quality images
- ✓ Selected spectra

LOCATION

Ospedale Policlinico di Milano, via Francesco Sforza 35
Pad. Ex Convitto

CONTACT

yvan.torrente@policlinico.mi.it

Imaging technologies

INSTRUMENTS

→ Transmission Electron Microscope

FUNCTIONALITIES

Visualization of cell:

- ✓ Ultrastructure
- ✓ Organelles
- ✓ Pathogens
- ✓ Nanoparticles

LOCATION

Ospedale Policlinico di Milano, via Francesco Sforza 35
Pad. Ex Convitto

CONTACT

giacomo.comi@policlinico.mi.it

Imaging technologies

INSTRUMENTS

→ MALDI Imaging

Types of samples that can be analyzed

✓ Fresh/frozen (no OCT)
✓ H&E stained slides
✓ FFPE

APPROACHES

✓ UNTARGETED: differences in images/ions/spectra

✓ TARGETED: compounds monitoring, localization/co-localization

LOCATION

MILAB - Istituto Nazionale Tumori, Via G. Venezian 1

CONTACT

yvan.torrente@policlinico.mi.it

Intra-vital/intra-vascular imaging systems

INSTRUMENTS

→ Cellvizio

✓ Confocal Laser Endomicroscopy

CONTACT

maurizio.vecchi@policlinico.mi.it

INTRUMENTS

→ Handheld vital microscopy

✓ Identification of microcirculatory alterations

CONTACT

alberto.zanella@policlinico.mi.it

Intra-vital/intra-vascular imaging systems

INSTRUMENTS

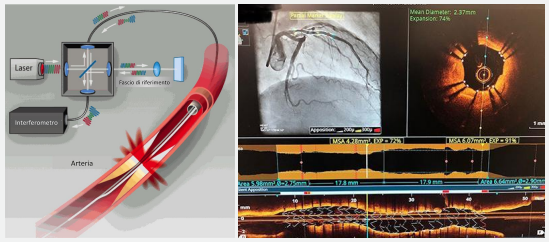
→ Coro FLOW cardiovascular system

✓ Vasculature morphology and function

INTRUMENTS

→ Cardio OCT (Optical Coherence Tomography)

✓ Visualizes the lumen and walls of vascular structures to identify thrombi, calcium deposits, the thickness of the fibrous plaque cap, dissections, plaque prolapse, stent malposition, etc.



CONTACT

stefano.carugo@policlinico.mi.it

5 Live-cells functional studies, extracellular vesicles

Real Time Live cell analysis

INSTRUMENTS

→ Agilent Seahorse XF Analyzer

FUNCTIONALITIES

Live cells phenotype/Metabolism:

- ✓ Organoids and monolayers
- ✓ T-cell activation
- ✓ Drugs effects and responses

LOCATION

Ospedale Policlinico di Milano, via Francesco Sforza 35
Pad. Invernizzi: 5th floor

CONTACT

lorenza.lazzari@policlinico.mi.it

Real Time Live cell analysis

INSTRUMENTS

→ Sartorius Incucyte Sx5

FUNCTIONALITIES

✓ Organoids, co-cultures and monolayers
✓ Long-term live cell experiments
✓ Live cells kinetic: energetics, migration, angiogenesis, proliferation, cytotoxicity
✓ Vital dyes: up to 5 fluorescence channels/6 microplates at once

LOCATION

Ospedale Policlinico di Milano, via Pace 9
Pad. IV Laboratorio Medicina – Emostasi e Trombosi: 1st floor

CONTACT

roberta.gualtierotti@policlinico.mi.it

EXTRACELLULAR VESICLES

Flow cytometer

INSTRUMENTS

→ Cute Northern Lights 3000 V/B/R

Flow cytometer, with its easy-to-use workflow, is a flexible and affordable full spectrum flow cytometry solution for everyday research applications.

FUNCTIONALITIES

✓ **Extracellular vescicles**: identification and characterization (physical/biological) of extracellular vesicles with dimensions equal to 100nm in diameter.

✓ **Cell Biology**: regulation of gene expression, proliferation and cell death (apoptosis), cellular subpopulations, expression of surface markers and intracellular proteins, analysis of circulating tumor cells.

LOCATION

Ospedale Policlinico di Milano, via San Barnaba 8
Pad. Vigliani Feal

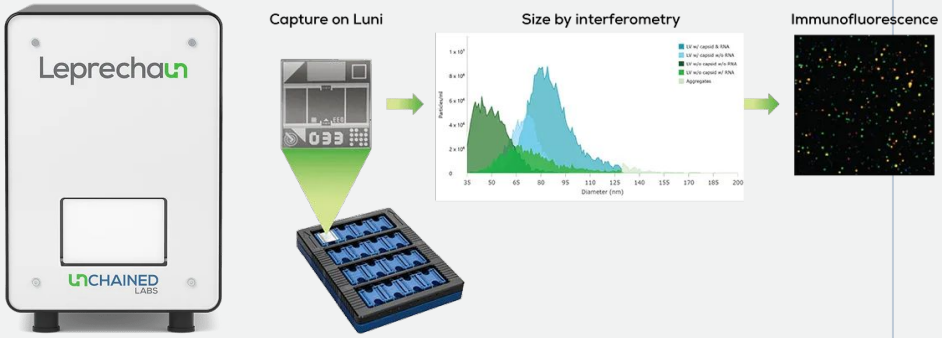
CONTACT

valentina.bollati@unimi.it

INSTRUMENTS

→ Leprechaun

Leprechaun is the only system that hunts down titer and structure for viruses and exosomes without worrying about sample purity.



FUNCTIONALITIES

Lentivirus:

- ✓ Titer
- ✓ Structure
- ✓ RNA content
- ✓ Contaminant analysis

Exosomes:

- ✓ Size
- ✓ Concentration
- ✓ Phenotype

LOCATION

Ospedale Policlinico di Milano, via Francesco Sforza 35
Laboratorio Traslazionale di Nefro-urologia Pediatrica
Pad. Invernizzi: 1 st floor

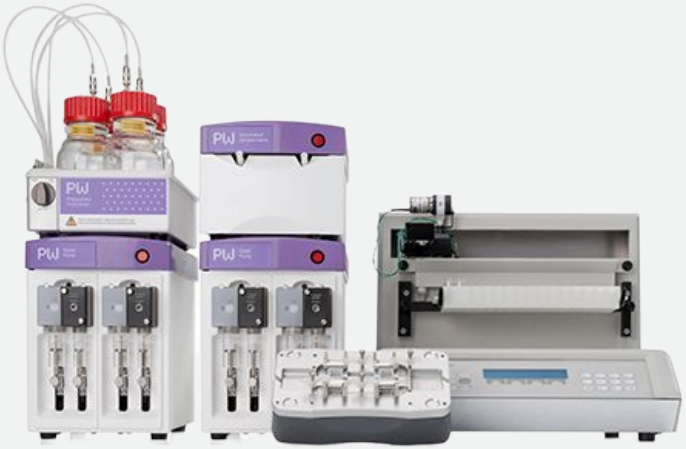
CONTACT

federica.collino@unimi.it

INSTRUMENTS

→ Automated Nanoparticles System

Microfluidic system designed for automated production, characterization and analysis of nanoparticles containing: Nucleic acids (DNA, mRNA, miRNA), Proteins, Drugs, Mitochondria



FUNCTIONALITIES

✓ **Extra Cellular Vescicles**: Functional validation of the content of specific pre-identified EVs.

✓ **Nanomedicine**: The system is widely used in the design of nanoparticles for controlled drug release, gene therapy and vectors for targeted delivery.

✓ **Tissue Engineering**: The system is used to produce nanoparticles capable of mimicking the extracellular matrix.

LOCATION

Ospedale Policlinico di Milano, via Francesco Sforza 35
Laboratorio Traslazionale di Nefro-urologia Pediatrica
Pad. Invernizzi: 1 st floor

CONTACT

federica.collino@unimi.it