

Biotech and life science

State-of-the-art core facilities and cutting-edge research, including Armenise-Harvard and Dulbecco-Telethon laboratories, organised as a R&I centre designed to unravel and tackle the key issues in cancer biology & genomics, cell & molecular biology, microbiology & synthetic biology, and neurobiology & development, taking advantage of and developing new bioinformatics and computational biology tools.



Cancer Biology & Genomics

- ▶ **Experimental Cancer Biology.** In vitro and in vivo models mirroring human tumorigenesis and metastasis, mechanisms of resistance to therapies, epigenetic and oncogene-induced epigenetic reprogramming, tumors heterogeneity and metabolism studies, translational determinants of tumorigenesis and epitranscriptome in cancer
- ▶ **Brain disorder.** Mechanisms in brain cancer development and neurological disorders in neural stem cells and neurons
- ▶ **Pre-clinical research.** Identification of effective therapeutic targets, pre-clinical and co-clinical studies, prognostic and predictive biomarkers for Precision Oncology, drug design and drug screening assays

Cell & Molecular Biology

- ▶ **Cell division.** Molecular cross-communication between cell cycle and cell death machineries, chromosome segregation biology
- ▶ **New approaches to drug development.** Novel approaches for cardiac and neurodegenerative disease, model organisms and organoids, viral vectors, gene therapy and genome editing, oligonucleotides and RNA as diagnostic tools and therapeutics

Microbiology & Synthetic Biology

- ▶ **Artificial biology.** Artificial cells, robotic interfaces, new bio-inspired materials for architecture and engineering
- ▶ **Microbiology.** Microbial pathogens - host interactions for new antibiotic approaches, microbiome analysis and computational metagenomics, microbial communities characterization, genotype/phenotype associations
- ▶ **Synthetic vaccinology.** Extracellular vesicles (EVs - OMV) as a vector to bio-distribute drugs and vaccines.

Neurobiology & Development

- ▶ **Neural development and regeneration.** Axons growth and ability to find their targets, molecular mechanisms behind neurodegenerative and brain disorders, epigenetic and transcriptional profile of brain functions, stem cell and their role in diseases and tumor generation
- ▶ **Translational neurobiology.** Neural model to elucidate the role of left-right brain asymmetry, hybrid neuron/ photonics systems, biomarkers and new therapeutic approaches for neurological and neuromuscular diseases

Bionformatics and Computational Biology

- ▶ **Computational biology.** Computational metagenomic tools, computational methods to study cancer evolution, statistical modeling and data integration, patients and clinical data management
- ▶ **Biological data analysis.** Bioinformatics approaches, computational strategies and algorithms for the analysis of NGS and high-density array data