Capabilities catalogue

exCell the patient mission

Co-LaB AcceiBio

About us

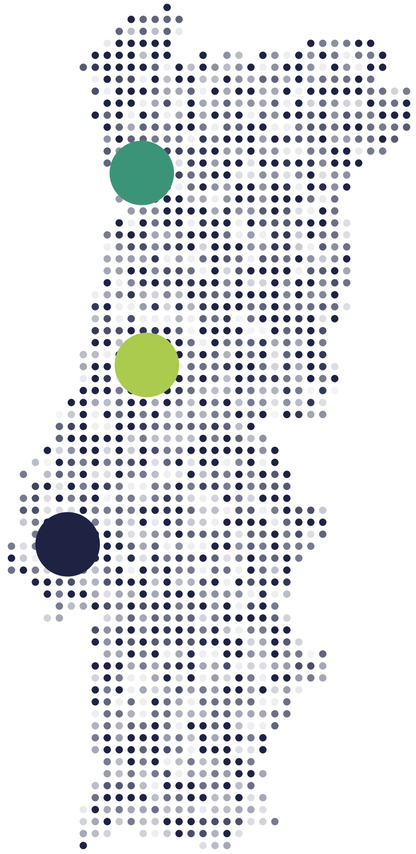
AccelBio is a **Collaborative Laboratory (CoLAB)** established in 2021 with a distinct mission: to facilitate the **translation, commercialization,** and global **dissemination of cutting-edge biomedical discoveries and innovations originating from premier research and development centers in Portugal.**

Centered on its proficiency in:

- **Organoid models**
- **Multiomics**
- **High-throughput screening**

AccelBio is committed to leveraging these capabilities and pioneering groundbreaking therapies for **immunology** and **oncology** conditions, as well as **infection**-related and **central nervous system** disorders.

As a non-profit entity, we want to ensure that state-of-the-art science is developed and make an impactful difference to patients' lives.



Our **associates comprise both academic and Pharma/Biotech partners**, in addition to a life sciences **investment fund** and the only **science and technology park** focused on life sciences in Portugal. AccelBio leverages and complements the combined existing drug discovery capacities of all associate members ranging from target validation to preclinical studies.

Instituto de Medicina Molecular | João Lobo Antunes
1290 Universidade de Coimbra
Roche
TARGTEX Targeted Therapeutics
BSIM Therapeutics
Técnico Lisboa
biocant park
CellmAbs Biopharmaceuticals
Vertical Sentinel
Biovance Capital
basinnov life sciences

Our approach

Working collaboratively with researchers

AccelBio provides pre-clinical translational insights to elevate your projects, and our core offerings cover **technological and scientific guidance, hands-on research, and strategic support in funding and business development.**

Drug discovery

Our team of experts can work with you to help develop your drug target into a drug program.

Humanized models

We offer the possibility to tailor 3D hiPSC-based organoids driven by purpose (efficacy, toxicology, mechanism of action).

Multiomics to computational Biology

Tap into our advanced data analytics expertise to research your biological topics from genomics, transcriptomics, proteomics and metabolomics.

Tech transfer/business development

We design and implement valorization plans aligned with market insights and regulatory pathways.

Cross-functional expertise

Our teams drive your initiatives forward, following a detailed **work plan** that efficiently guides us to **Go/No-Go** decisions.

Project evaluation

We objectively evaluate project **potential and mitigate risks**, addressing target-related concerns upfront, including potential toxicity and physiological impact, enabling informed resource allocation and timely focus on **high-probability-of-success programs.**

Drug discovery process

Target validation

We can demonstrate that the biological target plays a critical role in the disease process, and that modulation of the target itself can exert a therapeutic effect in the absence of toxicity on normal cells and tissues, using both *in vitro* and *in silico* approaches.

Hit identification

Hit discovery and confirmation phase helps in the identification of molecules with activity against the target. This phase needs the development of compound screening assays, depending on the drug target. Our main approach is the use of high throughput screening (HTS) but we can also take advantage of virtual screenings in a first stage.

Lead optimization

Compounds entering the lead optimization phase are evaluated by our integrated team, and a strategy is designed to optimize their properties, involving *in vitro* and *in vivo* assessments.

Preclinical studies

Early proof of concept studies include the assessment of lead efficacy, toxicity, and pharmacokinetics and pharmacodynamics studies.

Business development

We design and implement valorization plans aligned with market insights and regulatory pathways.

Research & development

- Target validation
- Hit identification
- Lead optimization
- Preclinical studies

Target validation

Target validation is a crucial process that **assesses the viability of a potential drug target.** It is achieved by meticulously evaluating the key biological characteristics of the target to gauge whether an experimental drug is likely to produce therapeutic benefits while maintaining a safe profile.

A well-founded target significantly lowers the risk of failure in later stages of development.

Here are some key features of a good drug target:

Target validation

Models and readouts

Our team of **translational scientists** is poised to assist you in selecting **the most suitable and effective methods for target validation through a comprehensive multi-validation approach.**

We offer guidance on choosing the optimal *in vitro* and *in vivo* preclinical research models, ensuring a seamless progression throughout the discovery and preclinical research phases.

AccelBio goes a step further by offering co-validation services for your target within relevant biological contexts. Leveraging our access to primary clinical samples, we facilitate the investigation of your target in both healthy and disease models.

Target validation models

- Cell lines of health and disease
- Transgenic lines
- Primary cell material of health and disease
- *Ex vivo* models of health and disease
- *In vitro* and *in vivo* models
- *In silico* capacities

Custom model development: tailored to your requirements.

Readouts

- Gene and protein expression
- Histopathology
- Blood biomarker analysis
- Immune cell profiling via flow cytometry
- Biomarker identification and validation
- Structure-based assessment studies
- High content cellular imaging
- *Ex vivo* imaging
- Multiplex immunofluorescence
- Absorbance
- Fluorescence
- Luminescence

Hit identification

Our team can support your hit identification efforts through strategy design, assay development, and screening activities. Assays can be transferred to our associate* facility, where our team miniaturizes and validates them for high-throughput screening.

Team and capabilities

- **Expertise in** high-throughput/ high-content screening for screening campaigns (genomic and small compounds) in multiple cellular models
- Virtual screening

Core expertise

- Assay development and adaptation
- Functional genomic screening (targetID, MoA)
- Drug screening
- High-content microscopy

***Universidade de Coimbra, member of EU-OPENSCREEN: Specialized Screening Site** (European Research Infrastructure for Chemical Biology and Early Drug Discovery)

Hit identification

Our equipment and readouts

Fully automated state-of-the-art facilities **equipped with a plethora of equipment, to maximize reproducibility and time efficiency.**

Liquid handling

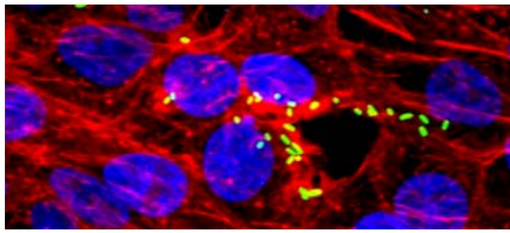
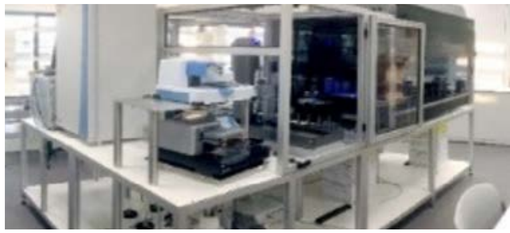
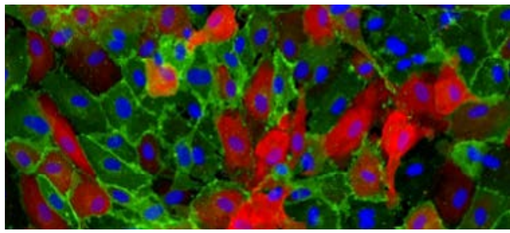
- Hamilton STAR liquid handling stations (96 head + 4 independent channels; HEPA filter)
- Hamilton Vantage liquid handling stations (96 head + 4 independent channels)

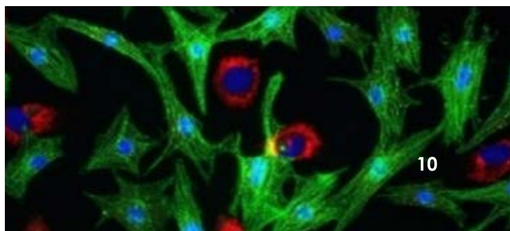
Readouts

- PerkinElmer Enspire multimode plate reader (absorbance, fluorescence & luminescence; em/exc monochromators)
- PerkinElmer Operetta HCS microscope (2x-40x magnification; brightfield, FL; em/exc filter wheel; 6- to 384-well plates)

Other equipment

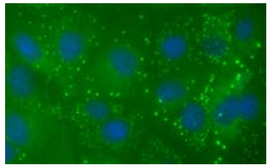
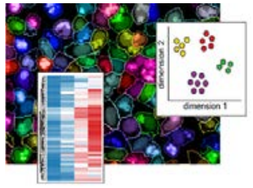
- Robotic incubator - ThermoScientific Cytomat C2
- Microplate washer – Biotek 405 Select
- Reagent dispensers – ThermoScientific Multidrop Combi (2 units)
- Plate sealer – ThermoScientific ALPS 3000



Hit identification

From HTS to cellular phenotyping

	Plate-reader readouts high-throughput screening	**Microscopy readouts high-content screening**	**Celular phenotyping phenotypic profilling**
			
PROS	Simple optimization Fast Quantitative	Quantitative Multiparametric Rich biological information Subcellar resolution	Generalized assay Streamlined assay development/analysis Completely unbiased
CONS	Binary results Poor biological information	Slow (acquisition and analysis) Complex assay development Complex analysis	Based on phenotypic signatures No primary readouts Clustering/complex data analysis

Assay portfolio

Our team of experts is here to support you at every stage offering a diverse portfolio of readily available assays. Moreover, we can design customized assays to meet your specific requirements.

- Cell proliferation
- Cell morphology
- Migration
- Cell viability/apoptosis
- Cell cycle
- Differentiation
- Infection assays (bacteria, virus, parasites)
- Reporter gene activity
- DNA damage
- Autophagy
- Transcription factor activation
- Extracellular matrix deposition
- Endocytosis
- Cell painting
- **Custom designed assays**

Preclinical studies

The study of absorption, distribution, metabolism and excretion (**ADME**) is an integral step of the drug discovery process. The purpose of **drug metabolism and pharmacokinetics programs (DMPK)** is to assist the design and selection of druggable candidate molecules that demonstrate efficacy and safety for future clinical use. DMPK assessment is performed in the phases of target identification, hit identification, lead identification and lead optimization, with resort to ***in vitro***, ***ex vivo*** **and** ***in vivo*** **models.**

In vitro models

In vitro **models** encompass both **artificial and biological techniques**, and include:

- **Optimized parallel artificial membrane assay (PAMPA)** model to predict human intestinal absorption and plasma protein binding.
- **Modified PAMPA** models to screen the permeability of drug candidates across the **Blood Brain Barrier** (BBB).
- **Cellular models** to: **1)** assess specific transporter-mediated drug interactions (Madin-Darby canine kidney (MDCK)), adaptable to mimic intestinal absorption (e.g., Caco-2 cells), nasal absorption (e.g., RPMI-2650 cells), pulmonary absorption (e.g., Calu-3 cells), and liver pharmacokinetics (e.g., HepaRG cells), depending on the intended administration route; **2)** study Parkinson's disease, through differentiation of SH-SY5Y cells into dopaminergic neurons under normoxia and physioxia conditions.

Preclinical studies

Ex vivo models

Ex vivo models are **more physiological** and are normally required when additional **evaluation of absorption or transport is necessary.**

Our researchers have adapted cell models and the **Ussing chamber** method to perform permeation studies with excised mouse jejunum segments, investigating absortion fraction and ATP-binding cassette transporter substrates.

In vivo models

Our team can develop, validate, and apply different modern methods for the early ADME/T molecular screening of potential drugs under development.

- **Absorption, tissue distribution, elimination**
- **Several routes of administration:** PO, IM, IP, IV, SC, inhalation, topical
- ***in vivo* efficacy models**
- **Preliminary tox studies** (dose-range finding, MTD)

Available **animal species models** include mice and rats.

Mass Spectrometry

Multiomics

Organoids

Complementary expertise, tools and facilities

Mass Spectrometry

AccelBio offers unique proteomics and metabolomics services to address key issues in drug and biomarker discovery, based in our Associate Universidade de Coimbra capabilities (reference lab and alfa tester for Sciex, APCER ISO 9001 Certified).

Our offering comprises expertise in large scale **metabolomics, transcriptomics,** and **proteomics**:

- Identification and quantification
- Labeled and label free (ID/Quant)
- Postranslational modifications mutations
- In-depth data interpretation to extract relevant information from proteomics experiments

Drug and metabolite quantification

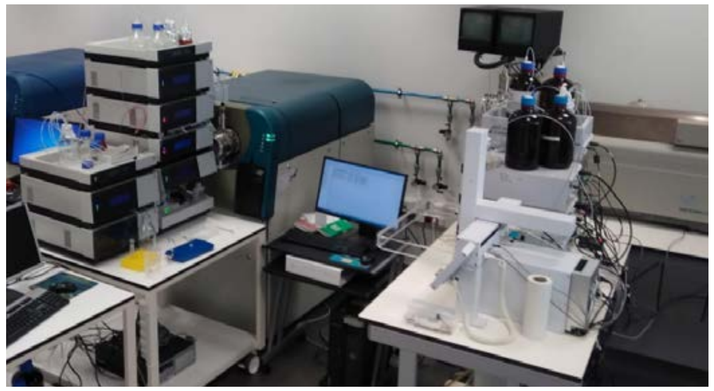
Pharma research, metabolite profiling, biosimilars and interactors

Biomarkers discovery, validation and quantification

The mass spectrometry platform can support target validation on the functional protein level. Likewise, it enables unbiased mode of action studies, the identification of specific pharmacodynamic and pharmacokinetics readouts and lead compound prioritization according to cellular activity profiles.

Mass Spectrometry

Our equipment, samples, parameters



State-of-the-art facilities **equipment to maximize reproducibility and time efficiency.**

- 5600 Triple TOF M5 Micro LC
- 6600 Triple TOF 425 Micro LC
- 4000 QTRAP CTC autosampler Shimadzu HPLC

Samples

- Plasma
- Hair
- Powders
- Lyophilized samples

Parameters

- Selectivity
- Limits of detection and quantification
- Linearity
- Carry over
- Precision: intermediate precision and repeatability
- Accuracy
- Recovery
- Matrix effects

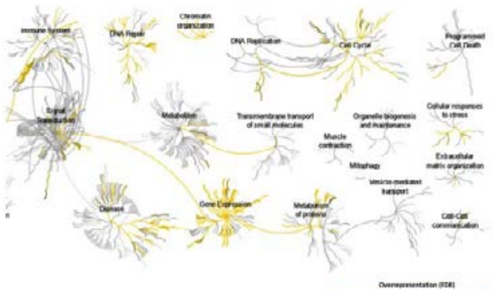
Mass Spectrometry

Assay portfolio

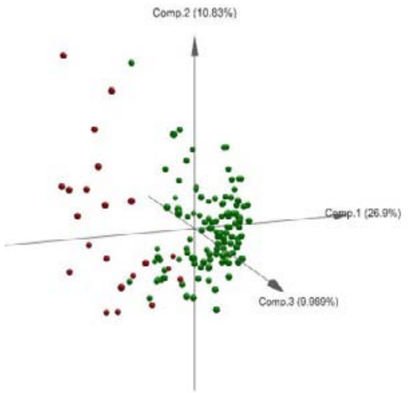
Assay portfolio

- Small molecule (ADME)
- Digital Biobank (ID/Quant of peptides and proteins)
- Biomarkers
- Drug long term exposure
- Intact protein analysis (ADC)

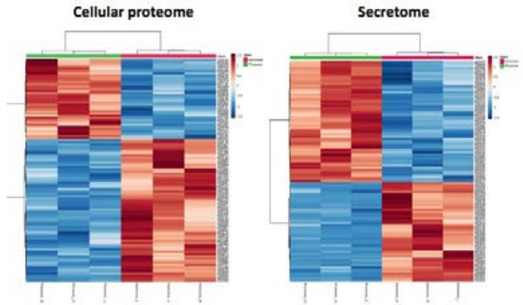
Dynamic interactomics



Multiomics for improved diagnosis and personalized medicine **(proteomics and metabolomics).**



Targeted cell culture under **normoxia** and **physoxia** conditions **(translational biomarkers).**



Multivariate analysis:
PLS-DA, with a VIP>1
Heatmap represent the top 100 proteins

Other multiomics capabilities

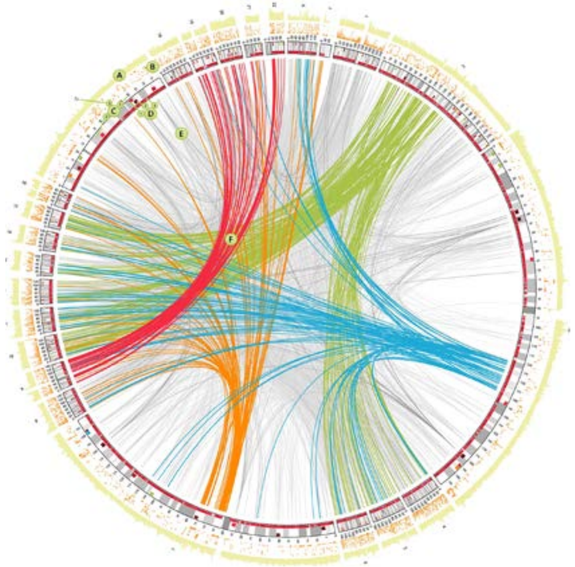
Reproducibility
Relevance
Accuracy

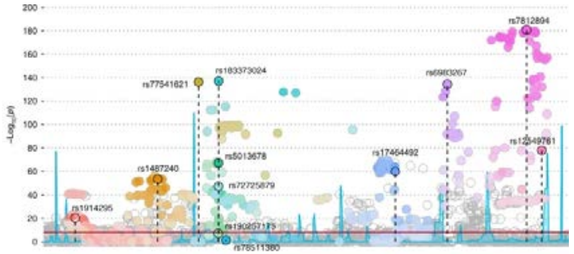
Our analytical pipelines are relevant for clinical application including biomarkers discovery, patients' stratification and prognostic panels development.

They assure reproducible results presented in a form of intuitive and interactive reports with publication-ready figures and tables with the key findings.

Genomics

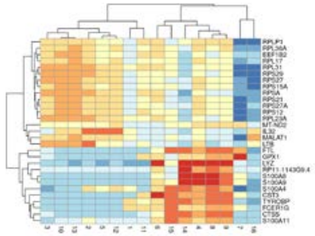
- Power calculations
- Variant analysis and classification
- Driver mutation identification
- Structural variation analysis
- Tumor mutational burden estimation
- Mutational signature analysis
- Microsatellite instability classification
- Clinical variant interpretation
- Pathway analysis
- Genome-wide association analysis
- Polygenic risk scores analysis

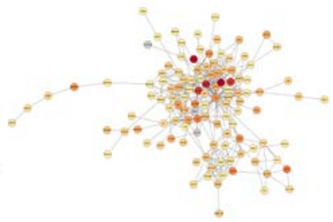




Other multiomics capabilities

Reproducibility
Relevance
Accuracy





Transcriptomics

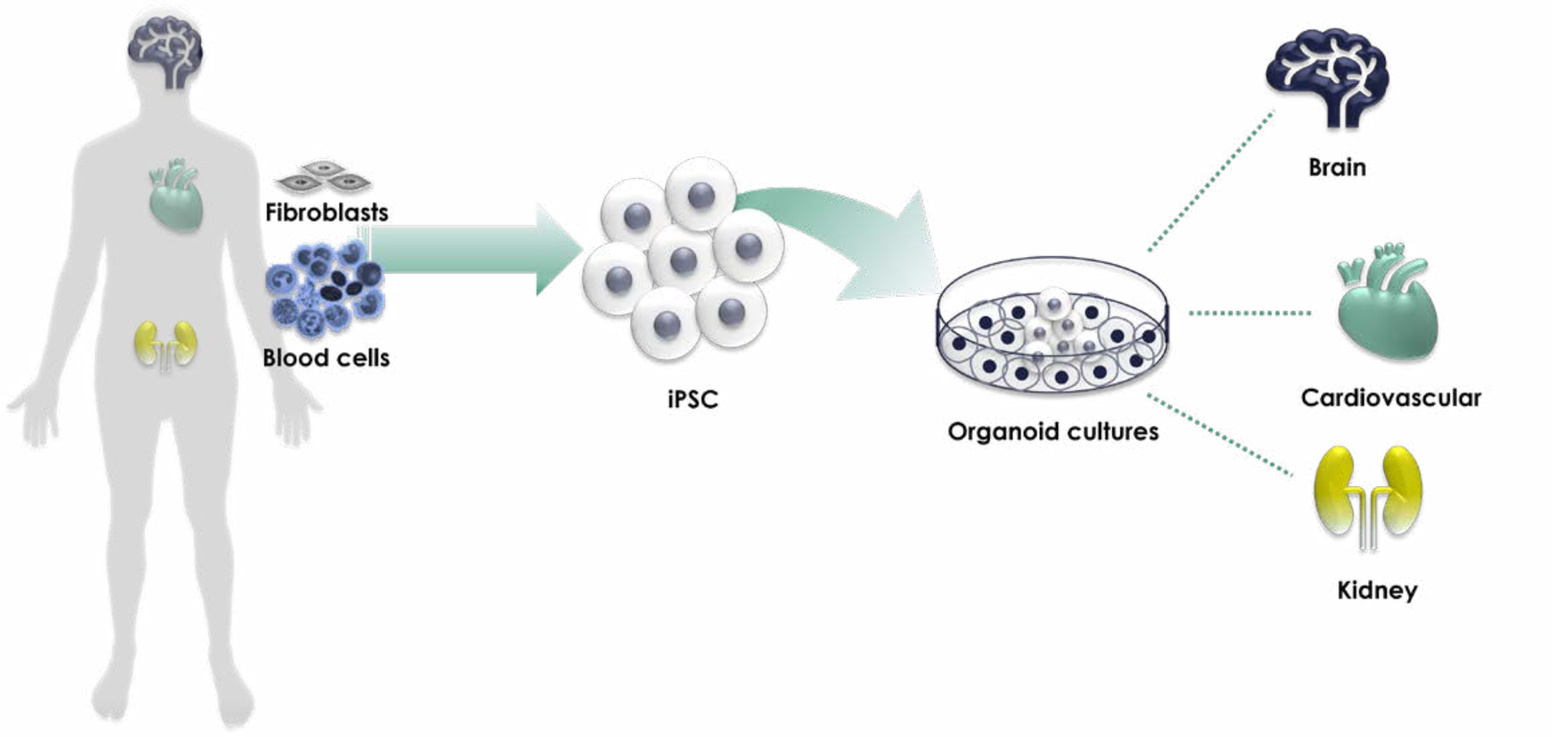
- Power calculations
- Exploratory analysis
- Differential expression analysis
- Pathway analysis
- Alternative splicing analysis
- Fusion gene detection
- Survival analysis
- Predictive modelling (machine learning)
- Patients' stratification
- Cross-study data integration

Single-cell RNA-seq

- Exploratory analysis
- Cell type identification
- Biomarkers identification
- Differential expression analysis
- Pathway analysis
- Trajectory analysis
- Cross-study data integration

hiPSC - based organoids

Using an integrated approach



Human-derived tissues

Human organoids **represent human physiology, rather than** being a **'human-like' or 'similar' system.**

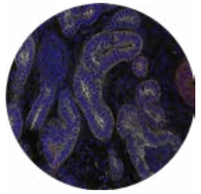
hiPSC - based organoids

Using an integrated approach

Unique features

- **Rapid:** adult stem cell-derived and pluripotent stem cell-derived organoids can be **established rapidly and easily;**
- **Robustness:** once established, **scale-out** is usually possible for **large-scale genomic screening and drug screening;**
- **Genetic manipulation:** most modern genetic engineering tools can be applied to induced pluripotent stem cells or directly to organoid systems;
- **Personalization:** induced pluripotent stem cells and organoids **can be obtained from individuals;**
- **Higher human resemblance:** allow recapitulation of organ biology;
- **Efficacy** and **toxicity** studies using models **closer to human biology.**

Available organoids and general features



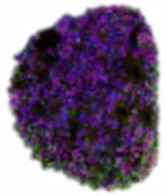
Kidney

2D & 3D

Complexity:
- Podocytes
- Proximal tubule
- Distal tubule

No disease phenotype

Applied to Acute Kidney Injury (AKI) or other diseases upon request



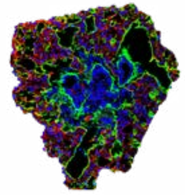
Brain

2D & 3D

Complexity
- Forebrain (dorsal and ventral part)
- Midbrain (including dopaminergic neurons)
- Cerebellum

No disease phenotype

Applied to Angelman Syndrome or other neurodevelopment diseases upon request



Heart

3D

Complexity
- Ventricle myocardium - Epicardium cardioids
- Ventricle (vascularized) - Myocardium cardioids
- Ventricle (vascularized) - Epicardium cardioids

No disease phenotype

Applied to cardiomyopathies, congenital heart diseases and other diseases upon request

Available organoids and general features

Organoid genetic background

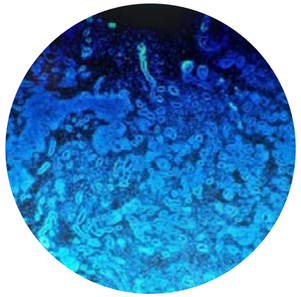
Mutated tissue source	Mutation	Outputs
Patient materials	Access biobanks of patient cells Defined patient mutation population	Patient cells converted into iPSC Genetic background removed (isogenic cells)
Gene editing	Introduce the mutation using CRISPR/Cas9 technology	Introduction of mutations in iPSC Differentiation into the defined organoid

hiPSC - based organoids

Technical capabilities

Technology field	Technology	Outputs
Imaging	Confocal microscope Comparative pathology	Structural organization Function Calcium based imaging Dextran uptake imaging
Genomics	Thermocyclers Quantitative genomics NGS	cDNA from mRNA qPCR RT PCR
Cell analysis	Flow cytometry	Cell viability Cell characterization
Action potential profiling	Microelectrode array Patch clamp	Measure action potential of cell parts Measure action potential of organoids
Multiomics	NGS Mass Spectrometry Immunostaining ELISA	Genomics Transcriptomics Proteomics Metabolomics
Computational Biology	Software and hardware	Integrated and full data profiling

Common kidney structure and functional assays



Screening capabilities

Accumulation of fluorescently labeled dextran in the proximal tubules - **Tubular and podocytes health assessment**

Tubular swelling assay - **Tubular Health assessment**

Analysis of aquaporin-2 (Aqp-2) translocation, a primary mechanism of water regulation by the kidney - **Tubular and podocytes health assessment**

Analysis of neutrophil gelatinase-associated lipocalin (NGAL) and hepatitis A virus cellular receptor 1 (HAVCR1) expression - **Tubular and podocytes health assessment**

Dislocation of apical and basolateral transporters (Na/K-ATPase) and Aqp-2 - **Tubular and podocytes health assessment**

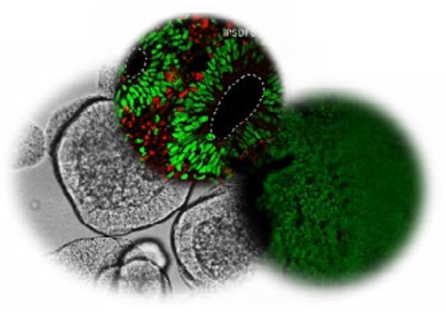
Detection of creatinine in the culture media
- **Podocytes health assessment** (glomerular filtration)

RNA sequencing - **Functional and morphology evaluation**

Tubular swelling assay

Assay steps	Assay technology analysis	Marker	Readout
1. Assessment of organoid size **2.** Incubation with cAMP pathway activator for 24 hours **3.** Collect and fix samples for imaging	Imaging	Standard markers Brightfield photos	Quantification of percent increase of organoid area Imaging diferences in proximal tubules (ongoing validation)

Common brain structure and functional assays



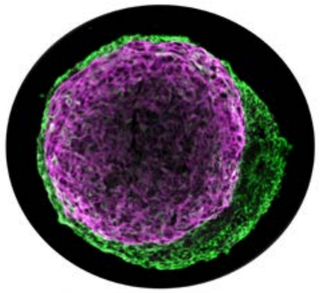
Screening capabilities

Gene expression (through quantitative PCR and/or RNA seq)
Immunofluorescence and confocal imaging
Quantification of luminal structures in cerebral organoids
Dendritic spines shape analysis
Calcium transients (with quantification of neuronal, progenitor and non-neural cell populations)
Electrical network behavior with multielectrode arrays
Customized assays

Drug penetration assays

Assay steps	Assay steps	Markers
Modelling portion		
1. Evaluation of molecular weight and size	Mathematical model Organoid validation	| GFP | Luciferase
2. Water diffusion coefficients		
3. Modeling based on Fick's laws of diffusion		
4. Calculations of distribution per unit space		

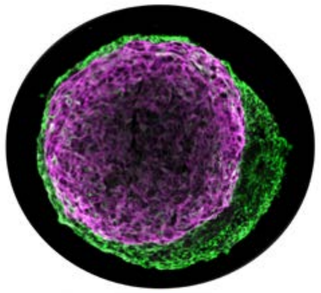
Common heart structure and functional assays



Drug-induced heart injury assay

Screening capabilities		Readouts	Markers | Equipment
Physical integrity assessment	Assessment of alterations in organoid size	Organoid diameter	BF image analysis
	Assessment of cell membrane permeability alterations	Immunofluorescence quantification - 3D or organoid slices	TOTO-3 staining
	Assessment of alterations on endoplasmic reticulum integrity		ER-Tracker Blue-White DPX dye
	Assessment of alteration in mitochondrial membrane potential		TMRE assay kit
	Assessment of alterations in vascularization		CD31+/NG2+
	Assessment of fibroses induction		ECM deposition - Fibronectin, Collagen I/IV, Laminin
	Assessment of cardiomyocyte proliferation alterations (Hyperplasia)	Immunofluorescence quantification - 2D (replated cells)	Ki-67+/NKX2.5+
	Assessment of cardiomyocyte enlargement induction (Hypertrophy)		a-actinin staining/cell
	Assessment of cardiomyocyte apoptosis induction		Caspase+/NKX2.5+ cells

Common heart structure and functional assays



Drug-induced heart injury assay

Screening capabilities		Readouts	Markers | Equipment
Functionaly assessment	Alterations in action potential profile	**1.** Conduction velocity **2.** Action potential duration at 50% and 90% repolarization (APD50/APD90)	Voltage sensitive dye (di-4-ANEPPS or ANNINE-6 plus)
		1. Beat per minute (bpm) **2.** Field Potential Duration (FPD) **3.** Field Potential Amplitude (FPA)	Multi Electrode Array (MEA)
	Heart	**1.** Peak amplitude **2.** Time to 50% calcium decay **3.** Calcium transient duration	Calcium sensitive dye (Fluo-4 or Fura2)
	Alterations in contraction profile	Beat per minute (bpm)	BF or Fluorescence video recording using CellMask Deep Red fluorescent dye
	Alterations in ion channels performance	**1.** Action potential profile **2.** Calcium efflux profile **3.** Contration profile	Drug stimulation with hERG channel blocker E-4031; L-type Ca2+ channel blocker Verapamil; Na+ channel blocker Lidocaine
Secretome assessment		Assessment of pro-inflammatory molecules secretion in response to drug exposure	Caspase+/NKX2.5+ cells

Business development

- Target drug profile
- Market analysis and positioning
- Development plan
- Regulatory strategy and compliance
- Business plan

Business development

CoLAB AccelBio offers all the relevant capabilities required to support drug discovery projects from target identification and validation through to preclinical studies, but drug discovery requires more than simply providing multiple capabilities.

We combine extensive knowledge and experience in **drug discovery, expert project management, business and regulatory knowhow,** and excellent understanding and knowledge of **all major therapeutic areas.**

Taking into account the unique needs, internal capabilities and capacities of each partner, we always conduct a comprehensive review of project goals and specific requirements. This ensures alignment and enables the development of a cohesive plan, allowing our partners to effectively leverage the benefits of our collaboration.

Target drug profile

We define a target drug profile for each asset that will serve as a reference guide for researchers and project teams throughout the drug development process, providing a clear set of criteria and goals, that the candidate should ideally meet to be considered successful.

Market analysis and positioning

We assess the competitive landscape and market potential for a specific therapeutic area and identify opportunities for differentiation.

Development plan

We objectively elaborate a development plan with key milestones and timelines for the drug development process and major decision points and go/no-go criteria for advancing through development phases.

Regulatory strategy and compliance

We ensure compliance with regulatory standards throughout the discovery and development process.

Business plan

We define a business plan that outlines the goals, objectives, strategies, and operations required to strategically leverage a drug asset, serving as a roadmap for how the project intends to achieve its commercial objectives.

FAQs

What does collaborate with AccelBio offer you?

AccelBio can accelerate your drug discovery project and de-risk drug assets until they are ready to be out-licensed to industry or established as the foundation of new spin-off companies:

Access to proven, integrated expertise and know-how spanning from target validation, hit identification, lead optimization and candidate selection:

Assay development

Our scientists develop or adapt pre-existing assays necessary for screening, hit confirmation and functional characterization of new molecules.

Screening

We carry out high throughput screening using commercial compound libraries.

Hit to lead optimization

Our medicinal chemists develop structure-activity relationships (SAR) to improve potency, solubility and physico-chemical properties of hit series to turn them into drug-like molecules.

Proof of concept

Candidate molecules are tested in relevant animal models of disease, organoids and human tissues/cells.

Benefit from our extensive **industrial experience** and **solid scientific foundation** in translational research, spanning various therapeutic modalities and target areas.

Experience **reduced cycle times** and **faster program progression**, facilitated by seamless transitions between highly integrated disciplines.

Enjoy the convenience of a **single point of contact** for your entire drug discovery program, reducing complexity and resource management efforts.

Access **innovative scientific advice** and insights from a team of experts.

Embrace a **flexible approach to drug discovery**, increasing the likelihood of project success and yielding high-quality drug candidates with optimized properties.

Secure novel IP and a **robust supporting data package**, primed for potential partnerships with pharmaceutical or biotechnology companies.

What kind of partnerships can be established with AccelBio?

Collaborative research

This type of collaboration involves research and development partnerships between you and AccelBio. It typically focuses on jointly conducting scientific investigations, sharing expertise, and developing intellectual property (IP) or new knowledge.

With this type of partnership, we combine your research capabilities with the AccelBio's resources and experience in drug development. This often includes sharing the responsibilities and costs associated with development.

Collaborative research agreements make provision for sharing IP that was jointly created as well as promotion of coordinated dissemination and commercialization activities where applicable.

Contract research

Contract research requires a specific requested by a client for a specific project to be carried out with identified aims and objectives. In return the client pays the commercial price for the research. Results and IP generated are normally owned by the client.

How do we select collaborative projects?

Our criteria for selecting a project are:

Scientific rationale and novelty

We assess the novelty of the target or therapeutic approach. We prefer not to work on targets already screened or fully explored by industry. Nevertheless, we may be interested in novel approaches to tackle known therapeutic targets if they show clear benefits.

Clinical relevance and need

We value addressing unmet medical needs or providing significant improvements over existing therapies.

Business and societal impact

We assess the potential market impact of the project, including its commercial viability and the ability to meet the needs of the target patient population. In addition, we consider the broader societal impact of the project, such as its contribution to public health or addressing global health challenges.

Competitive position and IP landscape

We assess the project's position in the competitive landscape, considering potential competitors and differentiation strategies. We prioritize projects with capability to generate new IP.

Team

We evaluate the primary team's ability to collaborate effectively, and its capacity to successfully execute the project.

Funding for collaboration

We assess the financial viability of the collaboration, considering the availability of funding and resources to support the project's progression through various stages of development, ensuring that the collaboration aligns with available funding and budgetary constraints.

We guide and support the transformation of scientific insights into successful drug discovery and development programs that could deliver novel therapeutics.

Connect with us

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