InnoSer
a smart road to better health

Oncology models

From cell lines to organoids and mouse models, we provide integrated drug development.

Our experts facilitate a collaborative approach ensuring we accelerate your drug development process using in-depth knowledge of the models in our portfolio to provide robust and reliable experimental data. Using state-of-the-art facilities and progressive thinking we provide well-established tumor cell lines for human and syngeneic applications. Furthermore, we offer a range of proprietary xenograft tumor models that recapitulate clinical characteristics and can be tailored to your tissue type from our growing model database. Our expanding patient tissue database provides a range of distinct and unique patient derived models that provide a critical link to clinical success.

With flexible and targeted in vitro assays to determine the effects of a drug on tumor cell killing, cell viability, proliferation, and specific biomarker expression at various doses, we can identify promising compounds early on. Our methods enable an informed and appropriate in vivo dosing approach to ensure an efficient and cost-effective road to meet your research's goals. InnoSer's oncology offerings are particularly valuable for medium to low throughput applications.

Choose the Right Model For Your Research

	Cost	Speed	Complexity	Translatability	Immuno-oncology	Readouts	Biomarkers
Cancer Cell Lines	+++	+++	---	---	---	+	+
Patient Derived Organoids	++	+++	--	+	---	++	+
Cell Line Derived Xenografts	-	-	--	-	---	+++	+
Patient Derived Xenografts	--	-	--	++	---	+++	++
Orthotopic Tumor Models	--	-	+	+++	---	+++	++
Metastatic Tumor Models	--	-	+	++	---	+++	++
Syngeneic Tumor Models	+	-	-	-	+	+++	+++
Humanized Tumor Models∗	---	--	+++	+++	+++	+++	+++

∗Humanized Tumor Models only available in context of co-development projects. Can be based on both PDX and CDX biology.

To benefit from a complete drug development solution these models can be integrated or combined with conventional drug discovery and preclinical research models aimed to assess your drugs pharmacological (pharmacodynamic and pharmacokinetic assessment) and toxicological profile both in vitro and in vivo.

Get in touch

info@innoserlaboratories.com

In Vitro

Cancer Cell Lines

InnoSer offers a selection of commercially available cancer cell lines for (early) drug screening. These lines can be applied as tumor models in either 2D, for medium throughput drug screening or integrated within a 3D matrix as spheroids. Key readouts may include biomarker analyses, cytotoxicity, cell migration and proliferation assays among other functional assays. These can be quantitatively assessed serving as early indicators of your investigational drug. Baseline comparisons can be decided on a case-by-case basis and will include a panel of standard-of-care therapies.

Patient-Derived Organoids

Since 2019, InnoSer has been leading an initiative to collect primary patient tumor samples to be turned into patient-derived models, both in vitro and in vivo. The application of such proprietary materials provides InnoSer with a unique repository of tumor models. As a result of their complex 3D organization and cell-to-cell interactions the use of patient-derived organoids has been shown to provide a meaningful translation of therapeutic responses in patients to research tools for (early) drug development.

In Vivo

Cell Line-Derived Xenografts

Cell line derived xenografts (CDX) are an effective way of establishing a therapeutic proof-of-concept be it in vivo rather than in vitro. These xenografts are created by the injection of cancer cells into immune-compromised mice. Tumor growth is monitored closely by InnoSer's experienced biotechnical staff. As a standard readout, we can provide growth curves using bioluminescent imaging or calipers for most of the available human cell lines in our repository.

Metastatic Tumor Models

These models have the capability to model the metastatic cascade whilst being closely monitored providing in-depth insights on the efficacy of the compound being tested. Being labelled with a fluorescent tag allows us to track these cells over time. Metastatic cancer cells have distinct properties which makes this model very suitable to effectively test therapeutics aimed at inhibiting pathways or genes associated with metastatic behavior.

Patient-Derived Xenografts

The gold-standard translational approach for modelling solid tumors, PDXs provide a robust system that can be widely applied from early to late preclinical drug development. By emphasizing GI-tumors, specifically PDAC, we aim to provide clients with models to capture enough patient-to-patient variation. PDX models are an invaluable addition to a preclinical dossier to suit your therapeutic pipeline. With our ongoing collection of patient samples we make it possible, to validate any specific tumor type with new indications not already available in our database.

Orthotopic Tumor Models

Cells, tumor fragments or organoids are grafted at the orthotopic site in the primary niche of immune-compromised mice. These models are provided as a progression on either a CDX or PDX model. This method is more complex than subcutaneous implantation, however, it allows for a more physiological representation of primary tumor pathophysiology as well as the pharmacokinetic traits at the primary site. These features can be leveraged to optimize the delivery of anti-cancer drugs to the target organ or to develop compounds that act via other components of the primary niche.

Immuno-oncology

Syngeneic Tumor Models

Syngeneic mouse models are highly relevant in providing a general impression of the efficacy of immuno-oncology drugs on a generalized tumor type. InnoSer has ample experience in working with syngeneic tumor models and can provide a broad spectrum of analyses.

Humanized Tumor Models*

Humanized tumor models are an important improvement upon syngeneic models advised in final stages of advanced preclinical development. These models are based on the use of cell lines or primary materials that are inoculated in mice with a reconstituted human immune system. This reconstitution may be either achieved with human PBMCs or with CD34+ hematopoietic stem cells. This model provides an opportunity for unique model development with distinct patient tissues of your choosing for an accurate and specific analysis on tumor modelling in the presence of a human immune system.

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Available Readouts

Selecting the right end points and readouts can provide robust results leading to streamlined decision making and efficient use of resources. In consultation with our experts, we apply the most efficient assessment techniques for determining critical data points such as EC50, IC50 and Emax that will enhance your decision-making capabilities in moving your compound closer to clinical trials.

In Vitro

Live-Cell Imaging:
In combination with various 2D and 3D cell cultures, applying live-cell imaging to your study can allow for early in vitro optimization of pharmacological features and efficacy of your drug. Tracking cell proliferation, apoptosis, phagocytosis, and cell motility are amongst some of the readouts made simple through our live-cell imaging capabilities.

Biomarker Analysis:
A rapid and convenient method for measuring individual or multiple target levels within a single, small-volume sample. Assays for analytes are available individually or in multiplexes and provide in-depth evaluations and help to provide quantitative data for rational decision making during the drug development process.

High-Content Imaging:
Changes in cellular behavior and morphology are important read-outs to determine therapeutic effects. Labelled compounds can be tracked to assess the therapeutic effects of your compound on key pathways. High-content imaging methods (3D imaging, confocal microscopy) help to visualize and quantify physiological changes with high efficiency.

In Vivo

Flow Cytometry:
Often used in combination with our syngeneic models, flow cytometry is a powerful technique used for characterizing and quantifying immune cell populations within a tumor. Our platform can measure up to 12 independent markers within a single assessment.
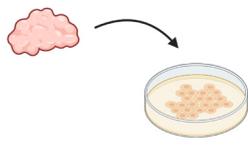
Advanced Ultrasound:
Quantify the volume of orthotopic and subcutaneous primary tumors using non-invasive and large spectrum ultrasound for real time analysis. We can provide powerful results determining unlabeled primary tumor volumes, vascularization, and perfusion.

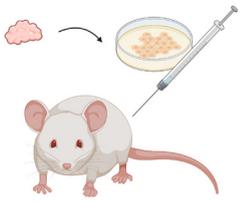### Bioluminescent and Fluorescent Imaging:
Particularly valuable for repeated assessments of tumorigenicity, tumor development, disease dissemination, tumor volume as well as treatment efficacy. Our BLI offers non-invasive and real-time visualizations and quantifications of the bioluminescent or fluorescent signal in vivo allowing for accurate evaluation of drug distribution.

Histopathology

Assessments of the histopathology, cytopathology and molecular pathology of your samples can be done by experts in the field utilizing a validated set of (immuno-)stains. We offer an extensive portfolio of IHC stains designed to provide in-depth analysis on a variety of cancer types and deeper insights to the tumor micro-environment. In addition to this, we can advise on clinically relevant biomarkers early on in your study promoting robust and meaningful data that can help improve the translatability of your results when moving your compound forward. A small selection of commonly used clinically relevant markers that are possible with our services are listed in the table below.

Selection of available clinically relevant biomarkers:

| Lung	Breast	Colorectal	Prostate	Ovarian	Pancreatic
PDL-1	ER	CDX2	Prostate Specific Antigen (PSA)	PAX8	CK7
TTF-1	PR	MSI panel	AMACR – P504s	ER	MUC5AC
P40	HER2		CK34bE12		
	GATA-3				
	P63				

Available Oncology Models

In Vitro

Cancer Cell Lines

- Accessible models for (proof-of-concept) drug-screening in vitro
- Less translatable to later models

Patient-Derived Organoids
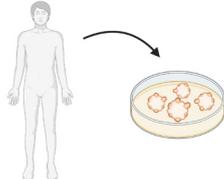
- More physiologic drug-screening approach in vitro
- Organoids shown to translate efficacy into patients
- More in-depth knowledge of therapeutic effects in vivo

In Vivo

Cell Line-Derived Xenografts

- Proof of concept in vivo efficacy
- Can implement provided cell lines of choice
- Subcutaneous, orthotopic or metastatic engraftment

Patient-Derived Xenografts
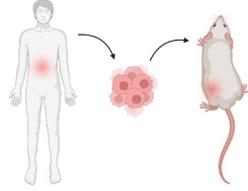
- Highly translatable tumor models for accurate representation of patient disease
- Ideal for proof of concept studies

Orthotopic Tumor Models
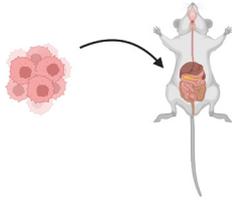
- Provided as a progression from either a CDX or PDX model
- Allows for improved physiological representation of primary tumor pathophysiology

Metastic Tumor Models

- Suitable to test pathways or genes associated with metastatic behavior
- Allow for the optimization of both drug delivery and efficacy in the presence of micro-environmental factors

Immuno-oncology

Syngeneic Models

- Models for immuno-oncology drug development
- Multiple models and tumor indications (breast, melanoma, etc.)

Humanized Models
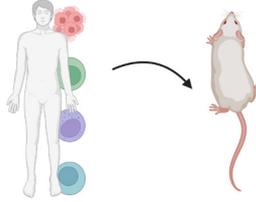
- Achieved with human PBMCs or with CD34+ hematopoietic stem cells
- Unique capacity to provide tumor modelling in the presence of an immune system

InnoSer | a smart road to better health

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