

National Biotechnology Research Park

Innovation · Translation · Incubation



中央研究院
ACADEMIA SINICA

國家生技研究園區
National Biotechnology Research Park



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Message from the President of Academia Sinica



“

*Achieve global peaks of excellence;
Fulfill social responsibilities in crucial areas;
Attract and cultivate top talent.”* ”

Thanks to the concerted efforts of distinguished scholars across many generations, Academia Sinica has developed into a world-renowned academic institution for research in the humanities and sciences. To fulfill our vision and build on our strengths, we have identified three main areas of responsibility for the coming 5 to 10 years, including “achieve global peaks of excellence, fulfill social responsibilities in crucial areas, and attract and cultivate top talent.” The promotion of biotechnology conforms to these responsibilities, and is a crucial endeavor for our nation, not only in terms of its economic future but also the people's health and well-being. Accordingly, Academia Sinica has taken the initiative in supporting the creation of the National Biotechnology Research Park, Taiwan's first scientific entity to integrate interdisciplinary and collaborative projects across governmental units. In addition, we established the Biomedical Translation Research Center to foster biotechnology enterprises in the Park, and promote the long-term growth of Taiwan's biotech industry.

Academia Sinica aims to stimulate interdisciplinary collaboration and promote a vibrant biomedical sharing ecosystem as part of the Park's overall progress. By leveraging our strengths in life science research, we can devote ourselves to translational research and development, technical platform services, and transferring the most advanced research achievements to innovative biotech start-up companies. We sincerely hope that our dedicated endeavors and abundant energy in research can help support our nation as it makes steady progress on the international stage in the areas of biomedical research and development.

James C. Liao
James C. Liao

Insight & Vision

Biotechnology is a knowledge-intensive industry that requires coordination of human resources, technology, domestic and international law, and capital. When these components are effectively managed and integrated, long-term research endeavors may produce products with high economic value. To stimulate and promote valuable and effective biotechnology research, Academia Sinica, in concordance with governmental development policy, has constructed the National Biotechnology Research Park in Nangang, Taipei; opened in October 2018.

In contrast to traditional science parks that focus on manufacturing and production, the National Biotechnology Research Park facilitates innovative research by closely integrating key institutions to create an efficient cluster effect. These institutions include the Food and Drug Administration of the Ministry of Health and Welfare, the National Laboratory Animal Center of the Ministry of Science and Technology, the Biotechnology Development Center of the Ministry of Economic Affairs, and the Biomedical Translation Research Center of Academia Sinica.

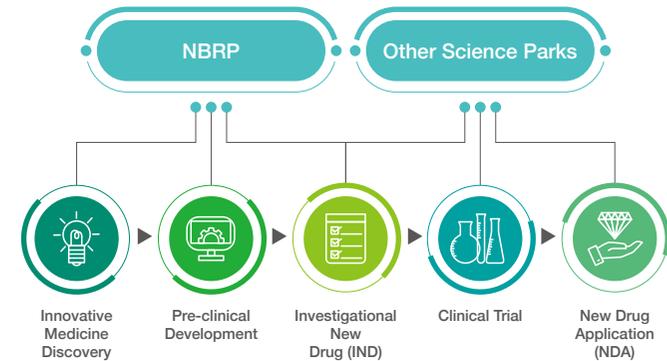


Mission



The National Biotechnology Research Park (NBRP) provides the first ecosystem platform for biomedical research on a national level. With the joint participation of industry, government, universities and national research labs, the NBRP aims to accelerate completion timelines for new drug development, with the ultimate goal of enhancing human health and welfare.

As a coherent engine driving R&D for new pharmaceuticals, the NBRP has built a bio-corridor for academic research and industrial development that maximizes efficiency across value chains. The NBRP focuses on the first part of journey toward biotechnological success by creating strong links between basic research and pre-clinical animal studies. Pre-clinical research results are then supplied to surrounding parks for further product development and mass production.



Environment & Space

About the National Biotechnology Research Park

The National Biotechnology Research Park (NBRP) was established to support the government's bio-industry development policy. Constructed in Nangang, Taipei, the NBRP not only aspires to be Taiwan's premier state-of-the-art biotechnology research center, but also embraces the obligation to maintain Taipei's natural environment. It is hoped that the NBRP can serve as a model for innovative research and development, while upholding high standards for ecological preservation.

The NBRP Ecosystem

Led by the Biomedical Translation Research Center (BioTReC) of Academia Sinica, the NBRP provides a strong service ecosystem, linking all biotech-related governmental agencies to drive the efficient development of biotechnologies. The park not only provides first-class research equipment and services for biomedical startups, but it also provides opportunities to initiate collaborations with global healthcare providers, foreign pharma and venture capital for global expansion and business networking. Training programs and professional mentorships have also been established to provide expert insights and consultations that can accelerate the timetable for product commercialization.

There are a total of seven buildings in NBRP, which house various research institutions and governmental agencies. All entities work hand-in-hand toward the same goal of promoting the success and growth of Biotechnology in Taiwan.

BioTReC of Academia Sinica :

Building A: Translational Medicine Center
Building B: Core Thematic Center
Building C: Innovation Incubation Center (BioHub Taiwan)
Building D: Bioinformatics Center

Ministry of Economic Affairs :

Building E: Development Center for Biotechnology (DCB)

Ministry of Health and Welfare :

Building F: Taiwan Food and Drug Administration (TFDA)

Ministry of Science and Technology :

Building G: National Laboratory Animal Center, National Applied Research Laboratories (NLAC, NARlabs)



Academia Sinica Biomedical Translation Research Center



Objectives

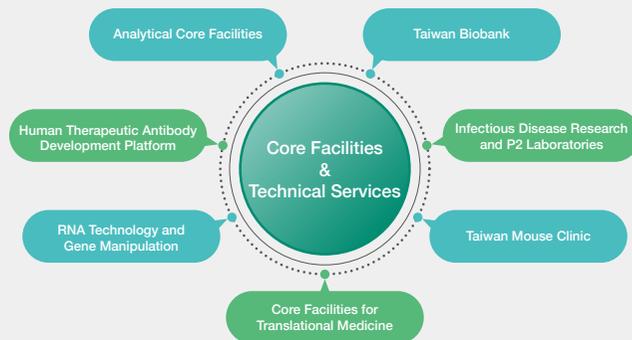
With the aspiration to support the development of biotechnology in Taiwan, the Biomedical Translation Research Center (BioTReC) was founded in September 2019 as a part of the National Biotechnology Research Park. The objectives of BioTReC align with government initiatives to accelerate bio-entrepreneurship from early discovery stages to commercialization. The center consists of four divisions, including the Translational Medicine Division, Innovation Incubation Division (BioHub Taiwan), Smart Medicine Division, and Emerging Infectious Disease Division. The establishment of BioTReC helps to forge a professional and innovative ecosystem that facilitates new drug discovery, as creation of a thriving biotechnology industry will ultimately enhance human health and welfare.

Mission

1. Solicit Biomedical Translational Projects

BioTReC solicits the most promising proposals for projects that seek to translate biomedical technologies from basic research to clinical application. Selected projects generally address urgent social issues, have exciting potential for high-impact application, or require public funding to overcome deficiencies in current medical practice. BioTReC provides the selected translational projects with the opportunity to conduct research activities within the park and supplies them with funding and state-of-the-art core facilities to accelerate biomedical research and development.

2. Provide Core Facilities and Technical Services



3. Recruit and Incubate Biotech Companies

The Incubation Innovation Division (BioHub Taiwan) was established to provide companies stationed in the park with holistic services and pivotal technologies. In order to build an all-in-one service model that comprises all information and resources from the government, BioHub has invited agencies that directly impact biomedicine research – including the Biomedical Industry Innovation Promotion (BIIP) Program Office, Drug Commercialization Center (DCC), Medical Device Commercialization Center (MDCC), Biotechnology and Pharmaceutical Industries Promotion Office (BPIPO) and Center for Drug Evaluation (CDE) – to form a joint office that serves in an advisory capacity. This office facilitates technological collaboration, regulatory coordination, and commercialization to nurture the growth of biomedicine seedlings.

4. Construct a Strong Biotech Ecosystem

Another important mission of BioTReC is to stimulate interdisciplinary collaboration between academia, industry and government agencies in order to enhance the international competitiveness of new drug development at NBRP. Leveraging the robust platform in the park, BioTReC organizes various forums, meetups, and seminars to extend the research power and implementation capabilities of start-up and resident companies. The ecosystem in the park provides an excellent environment to foster talent, encourage sharing and exchanging of information, and match potential businesses, creating ample opportunities to realize the creation of new biotechnologies.

5. Develop Biotech Talent

To foster an entrepreneurial mindset and develop business skills for biotech start-ups, BioTReC is planning to launch the Taiwan Biotech Innovation Academy (TBIA) in the near future. The TBIA will consist of a series of training programs that will help Biotech talent succeed at different phases and stages. The academy will not only offer professional development activities, but it will also include entrepreneur mentality coaching and professional mentorship.

6. Integrate and deploy research capacity for emerging infectious diseases

The Emerging Infectious Disease Division (EIDD) was established to integrate research capacity on infectious diseases in Academia Sinica. Through the long-term establishment of infectious biomaterials libraries, accumulation of research capacity, and cultivation of talents for infectious disease prevention and control, the EIDD pre-deploys and reserves its R&D capacities to provide immediate response and action to outbreaks of emerging infectious diseases. The mission of the EIDD is to research and develop testing technologies as well as therapeutic antibodies, drugs, and vaccines, thereby assisting Taiwan in epidemic prevention.



— Translational Medicine Division —



1 Translational Research Projects

Objectives

1. Select the most promising biomedical translational research teams, and provide funding, equipment and manpower to support the projects.
2. Help the selected teams execute their research plan efficiently. Provide related materials, methodologies, and instruments.

Targets

1. Projects that aim for technology transfer and industry-academia cooperation.
2. Projects that aim for commercialization and to open a startup in 3 years.
3. Projects that can independently bear the R&D cost and leasing expenses.

2 Core Facilities

Objectives

1. Provide resident companies and researchers with advanced instruments, equipment and technical services for translational research on disease prevention, detection, diagnosis and treatment.
2. Accelerate the timeline for translational research and pre-clinical verification of innovative precision medicine, medical devices and new drugs.

Targets

1. Domestic and international academic and research units.
2. Research teams and resident companies stationed in the park.
3. Domestic and international bio/pharmaceutical R&D industry.

For more information, please visit <https://biotrec.sinica.edu.tw/>



1. [Translational Research Projects]

A. Areas of Research



B. 14 Selected Projects from Academia Sinica

Development of Small Molecule Drugs for the Treatment of Drug-resistant Lung Cancer and Triple-Negative Breast Cancer

Research Area: Precision Medicine / Drug Discovery & Development

Technical statement: · Organic synthesis · Asymmetric synthesis · Establishing target- and phenotypic-based high-throughput screening to discover hit compounds · Mature technology for target identification

Applications: · Drug discovery · Structure-activity relationship study

Advantages: · Short turn-around times in hit-to-lead phase · Precise phenotypic anchoring for drug target identification

Contact person: Dr. Rong-Jie Chein rjchein@chem.sinica.edu.tw

Polymeric Nanoshells for Immune Modulation

Research Area: Precision Medicine / Vaccine Technology and Drug Delivery

Technical statement: · Proprietary biodegradable modular polymeric nanoshells for safe and precise induction of multivalent T cells.

Applications: Precision Vaccination!

· Precision vaccinations with custom anticancer vaccines · Novel antiviral vaccine design via potent T cell and antibody induction · Delivery of hydrophilic and combinatorial therapeutics

Contact person: Dr. Che-Ming Jack Hu chu@bms.sinica.edu.tw

Development of Human Monoclonal Antibody Targeting Cancer Glycans

Research Area: Cancer Immunology

Technical statement: · Single B cell platform to select human monoclonal antibodies that recognize tumor-specific glycan antigens

Applications: · Isolation of monoclonal antibodies recognizing cancer specific glycan epitopes · Cancer type-specific monoclonal antibodies for diagnosis · Cancer type-specific monoclonal antibodies for potential treatment

Advantages: · Unique glycan-specific monoclonal antibodies

Contact person: Dr. Kuo-I Lin kuoillin@gate.sinica.edu.tw

Development of Biomarkers and in vitro Testing Prototypes for Cancer Precision Medicine

Research Area: Precision Medicine / Biomarker Discovery

Technical statement: · High-quality proteogenomic big data and clinical data for lung and breast cancers · Internationally standardized platform of deep proteogenomic analysis · Mass spectrometry-based detection assay for cancer biomarkers

Applications: Disease detection/ biomarker screening and development

· Screening and validation of biomarker candidates for early detection and metastasis diagnosis · Development of *in vitro* testing prototypes and predictive indication for treatment of high-risk early-stage patients · Prediction of drug response

Advantages: · Comprehensive cancer proteogenomic landscape for East Asian patients

Contact person: Dr. Yu-Ju Chen yujuchen@gate.sinica.edu.tw

Rapid Urothelial Carcinoma Diagnosis

Research Area: Innovative Detection Technology

Technical statement: · We developed a portable optical sensing platform with the use of capped gold nanoslits, a microfluidic device, microRNA probes and functionalized gold nanoparticles to detect specific microRNA targets in urine for early monitoring of urothelial carcinoma recurrence.

Applications: · Urothelial carcinoma, kidney cancer and prostate cancer diagnosis

Advantages: · Portable, non-invasive, cost-effective and rapid diagnosis · High sensitivity and specificity

Contact person: Dr. Pei-Kuen Wei / Dr. Kuang-Li Lee klee@gate.sinica.edu.tw

Inhibition of Bacterial Growth and Biofilm Formation on Medical Materials

Research Area: Antimicrobial-coated medical devices

Technical statement: · Coating of antimicrobial drugs on medical devices

Applications: · Prevention of bacterial growth and biofilm formation on invasive medical devices and wound dressings · Biomaterials including silicone, polystyrene (PS), polyurethane (PU), polyvinyl chloride (PVC), polypropylene (PP), polyethylene terephthalate (PET), steel and titanium

Advantages: · Simple coating, no issue of drug resistance · Prevention of infection in catheters, sutures and dressings

Contact person: Dr. You-Di Liao ydliao@ibms.sinica.edu.tw

Novel Therapeutics for Tuberculosis

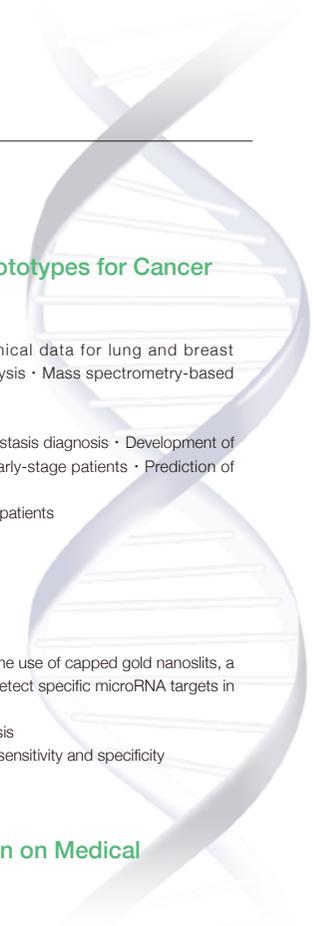
Research Area: Infectious Disease

Technical statement: · Drug discovery and evaluation system setup for tuberculosis (TB) infection

Applications: TB therapeutics discovery and development · A fluorescence-based assay for GlgE enables high-throughput screening to identify novel GlgE inhibitors · GlgE inhibitors may be evaluated as new anti-TB agents for treatment of multi-drug-resistant or extensively drug-resistant TB, as well as latent TB infection

Advantages: · New target: maltosyltransferase GlgE, no issue of antibiotic resistance. · Drug repurposing and reduction of treatment course without adverse effects of TB medicines

Contact person: Dr. Jiun-Jie Shie shiejji@gate.sinica.edu.tw



Rapid Residual Pesticide Screening & Detection System

Research Area: Innovative Detection Technology

Technical statement: · Establish a rapid and high-precision pesticide detection system through efficient enzyme display technology

Applications: Pesticide Residue Detection

· We have displayed acetylcholinesterase (AChE) on insect cell membranes for the detection of organophosphate and carbamate pesticide residues · AChE on cell membranes can be dried for easy storage and transportation

Advantages: · Compared with GC-MS and LC-MS analyses, our system saves cost and time. It also eliminates the need for conventional biochemical methods to extract and purify enzymes from flies. This technique is a fast, accurate and economical option for screening pesticide residues.

Contact person: Dr. Yu-Chan Chao mbycchao@imb.sinica.edu.tw

Novel Therapeutics for Bacterial Vaginosis

Research Area: Infectious Disease

Technical statement · Innate immune molecules as promising agents for the treatment of bacterial vaginosis (BV)

Applications: Future novel therapeutic agents for bacterial vaginosis

· Anti-biofilm formation · Kill drug-resistant bacteria · Prevention of bacterial vaginosis recurrence

Advantages: · Rapidly kills bacteria, no issue of drug resistance · Selective bactericidal activity · Immune response modulation

Contact person: Dr. Jyh-Yih Chen zoocy@gate.sinica.edu.tw

Pharmasaga – New Pharmaceutical Development for Type II Diabetes

Research Area: Metabolic Disease – Type II Diabetes

Technical statement: · First-in-class small-molecule drugs to reverse type II diabetes (T2D)

Applications: Better islets provide a way to reverse T2D!

· Novel biological target can apply to T2D diagnosis and treatment · Modern strategy to maintain islet mass and function to against T2D · Reduces β -cell failure and irreversible pathogenesis of T2D · Drugs may be applied alone or in combination

Contact person: Dr. Wen-Chin Yang / Dr. Tzung-Yan Chen zong770115@gmail.com

Optoproteomics System

Research Area: Innovative Medical Applications

Technical statement: · Optoproteomics – Don't just see it. GET IT! · The first system in the world to isolate proteins from cells under a microscope · Aiming to become universally applied equipment for protein studies, similar to Illumina for DNA/RNA studies

Applications: Turn a microscope into a targeting machine!

· Determine the root cause of diseases and improve drug discovery.
· Apply to studies of cellular processes and molecular mechanisms.

Contact person: Dr. Jung-Chi Liao info@syncell.com

Treatment for Neurodegenerative Diseases through Adenosine-Neuroprotection

Research Area: Neurodegenerative Disease

Technical statement: · J4 is an ENT1 inhibitor that maintains the balance of adenosine levels inside and outside the cell

Applications: New drug for neurodegenerative diseases! · Treatment of subjects with Mild Cognitive Impairment (MCI) or Alzheimer's disease (AD) who exhibit impaired cognitive function · Treatment of Huntington's disease (HD) patients with impaired motor functions

Advantages: · No effective drug treatments are currently available for AD or HD · J4 is a first-in-class, orally active compound with a distinct mechanism of action

Contact person: Dr. Yijuang Chern / Dr. Ching-Pang Chang vmike@ibms.sinica.edu.tw / Dr. Kuo-Chen Wu kowu0425@ntu.edu.tw

Therapeutic Development for Treatment of Neurodegenerative Diseases (ALS/Dementia) with Novel Hematopoietic Blood System and Chemical Compounds

Research Area: Therapeutic Development for Neurodegenerative Diseases

Technical statement: · Development of novel hematopoietic/blood system and compounds for therapy of ALS and dementia

Applications: · Prevent, rescue and/or reverse neurodegenerative diseases

Advantages: · Therapeutic development for currently incurable neurodegenerative diseases with use of patent-protected novel hematopoietic/blood system, mouse models, and chemical compounds

Contact person:

Dr. C.K. James Shen / Dr. Ming-Zong Lai / Dr. Keh-Yang Wang kywang@gate.sinica.edu.tw
Dr. Shih-Ling Huang cute.shiaoyeh@gmail.com

Rare Cell Expansion and 3D Organoid Culture System in Precision Medicine

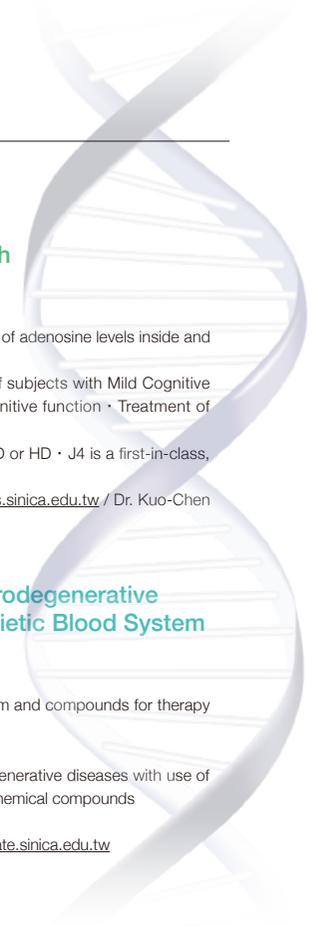
Research Area: Innovative Medical Application

Technical statement: · A proprietary organoid culture system capable of generating single cell derived organoid.

Applications: · 3D cell culture · Drug screening and testing · Regenerative medicine · Precision medicine

Advantages: · Capable of processing samples such as body fluids, tissues and cell lines to generate circulating tumor cell-derived tumoroids, tissue-derived tumoroids, stem cell organoid, and 3D cell line spheroid.

Contact person: Dr. Ying Chih Chang / Dr. Yu-Lin Tsai edwintsa403@gmail.com

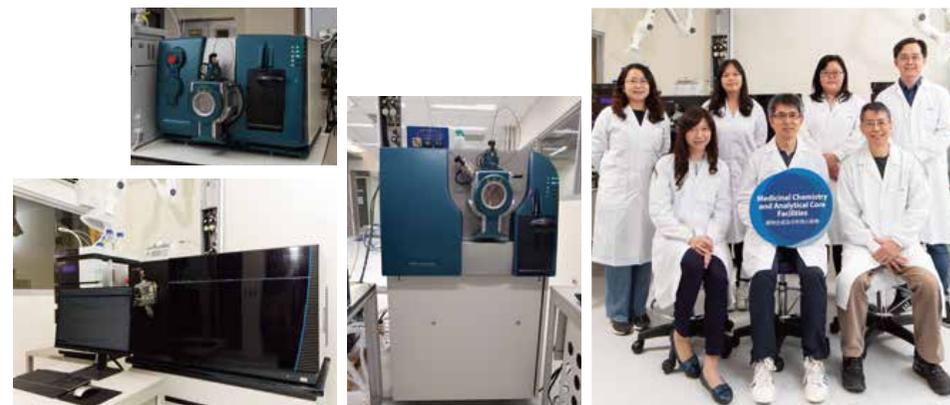


2. [Core Facilities]

The core facilities at the National Biotechnology Research Park (NBRP) provide researchers at NBRP and nationwide with cutting-edge instrumentation and specialized technical services, which help to accelerate the pace of R&D for innovative new drugs (small molecules, biologics, antibodies, botanicals, etc.), precision medicines, and medical devices. Our goal is to facilitate successful progression of IND-enabling studies, in order to enhance the output and international competitiveness of the biotech industry in Taiwan. The NBRP Core Facilities provide the following technologies to domestic and international researchers:

NBRP Core Facilities	Service
Medicinal Chemistry and Analytical Core Facility	<ol style="list-style-type: none"> 1. Customized Chemical and Drug Synthesis 2. Mass Spectrometry, Biophysical Analysis 3. Nuclear Magnetic Resonance (NMR)
Taiwan Mouse Clinic	<ol style="list-style-type: none"> 1. Phenotyping and Drug Efficacy Analysis 2. Small Animal Facilities 3. Animal Imaging Facility
Core Facilities for Translational Medicine	<ol style="list-style-type: none"> 1. Cell Sorting and Analysis Core Facility 2. Circulating Tumor Cell Capture and Single Cell Analysis Core Facility 3. Molecular Imaging Core Facility 4. Cell-based Assay Core Facility 5. Pathology Core-Facility 6. General Equipment
RNA Technology Platform and Gene Manipulation Core	<ol style="list-style-type: none"> 1. Development of RNAi drugs and CAR-T cell therapy, Customized CRISPR/Cas related service
Taiwan Biobank	<ol style="list-style-type: none"> 1. Establish and release databases of biological samples from the general public and common patients
Human Therapeutic Antibody Development Platform	<ol style="list-style-type: none"> 1. Phage-Displayed Human Naive Antibody Library 2. Single B Cell Platform 3. High-throughput Synthetic Human Antibody Engineering Platform
Infectious Diseases Research and P2 Laboratories	<ol style="list-style-type: none"> 1. P2 Laboratory 2. P2 Animal Laboratory

*P3 Laboratory is currently under construction.



1. Medicinal Chemistry and Analytical Core Facility

This core facility aims to provide advanced services in the synthesis and analysis for drug development. The core facility consists of three major units, including chemical and drug synthesis, nuclear magnetic resonance (NMR) spectroscopy, and mass spectrometry (MS).

Synthetic chemistry is one of the most important core components in the drug development. The chemical and drug synthesis unit uses advanced chemical synthesis technology to provide various services upon request, including asymmetric synthesis, synthesis of novel drug metabolism intermediates, coupling of small molecules and biological agents, standard reference intermediates and substances, up-scalable synthetic pathway, novel synthetic pathway planning, and synthesis technology consulting services to facilitate new drug development with scalable synthetic process along with customized project services.

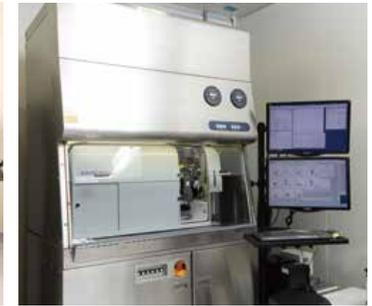
Based on our strength of qualitative and quantitative analysis and structure biology experience in the past years, the nuclear magnetic resonance (NMR) spectroscopy, and mass spectrometry (MS) units aim to provide high-precision and high-resolution structural identification and quantitation analysis services in small molecular drugs and biologics. By integrated services in small molecule synthesis, big molecule structure analysis, animal and molecule imaging, in the future, we aim to provide one-stop service and consultation for researchers and biotechnology manufacturers in the NBRP.





2. Taiwan Mouse Clinic

Taiwan Mouse Clinic (TMC) is a specific pathogen-free and user-friendly facility aiming to provide comprehensive and advanced phenotyping services as well as high-quality drug-evaluation assay platforms for drug development projects. Our services include animal models of human diseases, drug efficacy testing, safety pharmacology, physiological functions, behaviors, animal imaging, and pathology. We provide both standard service packages and specific custom-tailored services. The quality of all service items is ensured by oversight from user committee members and co-investigators. In addition, we invite three distinguished international and domestic scholars to review TMC services and R&D activities, in order to maintain the highest standards.



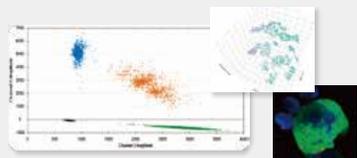
3. Core Facilities for Translational Medicine

In order to promote the domestic biotechnology industry and to support translational medicine incubation teams, the Core Facilities for Translational Medicine is designed as an industry driven, transdisciplinary platform to support fundamental clinical research and other innovative translational projects. The core offers state-of-art equipment, as well as research consultation teams and expert technicians to achieve the highest quality outcomes for world-class research. The core supports eight main research areas:

- a. **Precision medicine in cancer treatment:** Cancer subtype cell-specific gene mapping or follow-up of cancer treatment by extraction of patient circulating tumor cells for cell culture using the IsoFlux, C1 Single-Cell Auto Prep System and Rhapsody.
- b. **Cancer immunology research:** Decipher the interaction of cancer and immune cells, and evaluate cancer-immune treatments using several pieces of core equipment.
- c. **Cancer and tissue fibrosis extracellular matrix research:** 2D and 3D cell structural imaging to conduct tissue matrix macro- and micro-perspective analyses; uses Tissuegnostics scanning and SP8-DIVE multiphoton confocal microscope.
- d. **Cancer cell drug reaction research:** Analyze cancer cell drug reactions, using flow cytometers, automatic image analysis, automatic cell culture system and multifunction optical analysis systems.
- e. **Research on neurodegenerative, metabolic and cardiovascular disease, and regenerative medicine:** Investigate tissue regeneration prototypes and mechanisms with SP8-DIVE multiphoton confocal microscope, LSM 880 with Airyscan confocal microscope, and Gated STED microscopy.
- f. **Transplant immunology research:** Evaluate post-transplant surgery immune reactions with high-end flow cytometry analysis, tissue FAX resolutions, and auto-imaging systems.
- g. **Stem cell research:** Embryonic and somatic stem cell culturing and patient-specific induced pluripotent stem cell experiments, using a high-quality hypoxia workstation for cell culturing and flow cytometry.
- h. **Research on personalized disease models:** Investigate mouse models of human disease for drug discovery and support patient-specific induced pluripotent stem cell experiments, using cell sorting and analysis equipment and high-resolution molecular imaging.

Core facilities for Translational Medicine provide technical consultation, customized project service and user training course. Our executive scope includes high-dimensional advanced image analysis, automatic living cell image, digital pathology analysis, cell analyzing and sorting, CTC (circulating tumor cell) capture and single cell analysis, biomedical general instrument support, etc., assist development in translational medicine research teams, incubation teams and domestic biotechnology industry and act as a bridge between research and industry to link the resources effectively.

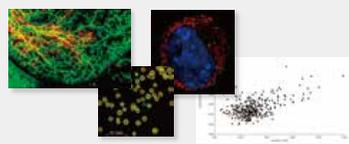
Circulating tumor cells Capture and Single Cell Analysis Core Facility



Service items

1. Absolute gene quantification
2. Gene copy number variations, gene point mutation detection
3. Single cell DNA, RNA extraction and whole transcriptome library preparation and analysis
4. Circulating tumor cells and cell clusters capture, identification and analysis

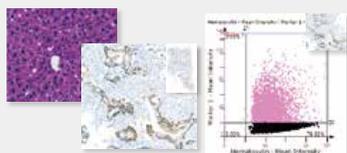
High-Dimensional Advanced Imaging Core Facility & Automatic Living Cell Imaging Core Facility



Service items

1. Confocal microscope imaging service & application. Ex: tissue/living cell
2. FLIM / FRET application and Super-resolution imaging
3. High content cell imaging and analysis
4. Automatic cell culture, imaging, and analysis - Integrated system
5. Full-time hypoxia culture workstation integrated imaging system

Digital Pathology Core Facility



Service items

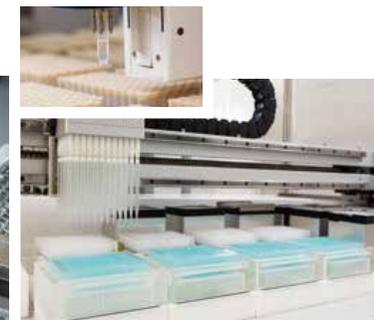
1. Provide tissue dehydration, embedding, paraffin section, automatic H&E, IHC staining and cover-slipping.
2. Slide Scan (IHC an IF) and analysis system which could offer digital image to mark and differentiate individual cell signal.
3. Automatic biochemical test and electrolyte testing by FUJIFILM DRI-CHEM NX-500, could analysis 31 parameters at the same time.

Cell Analysis and Sorting Core Facility



Service items

1. Stem cell characterization
2. Comparative analysis of immune cell subsets
3. Any type of cell enrichment *Support P2 Level Samples*
4. Detection of intracellular proteins/DNA/RNA/Exosomes
5. Consultation service for sample preparation



4. RNA Technology Platform and Gene Manipulation Core

RNA Technology Platform and Gene Manipulation Core (also known as RNAi core) is a national core facility which provides one-stop services (including RNAi, miRNA, CRISPR/Cas-related services) in Taiwan. The core facility can provide lentivirus and adeno-associated virus (AAV) related customized services which assist biotech companies in their research and development, such as:

1. RNAi Drug Development
2. Gene Knockout/Knock-in Cells
3. Lentivirus Technology in CAR-T Construction
4. Medical Applications of Lentivirus and AAV
5. Genome-Scale RNAi/CRISPR Genetic Screening

For the emerging virus (such as SARS-CoV-2), our platform can assist in the development of pseudotyped lentivector, which could mimic the entry of emerging virus. We can also establish cell model for drug screening and provide service for antibody neutralization assay.



5. Taiwan Biobank

The Taiwan Biobank is the first large-scale biobank in Taiwan to collect information about the lifestyles, environmental exposures, clinical traits, biosignatures and health conditions of our population. The Biobank aims to facilitate large generational research of common diseases in Taiwan by conducting large-scale cohort studies on 200,000 nationals between ages 30-70 (most without cancer history), and 100,000 patients with 10 to 15 of the most common diseases. These studies will enable the Taiwan Biobank to identify disease-causing factors and mechanisms of common diseases, facilitating the development of better treatment and prevention protocols that reduce the cost of medical treatment and improve our nation's health. Therefore, the Taiwan Biobank will not only help to identify disease-causing factors and mechanisms, but it will also provide a unique resource that will allow biomedical researchers to avoid common difficulties in studying the relationships between genes and environmental factors. Researchers are welcome to apply for access to the information and biospecimens collected by the Taiwan Biobank.



1. Ages 30-70
2. Nationality: Taiwan
3. Without cancer history



6. Human Therapeutic Antibody Development Platform

Human antibodies have the advantages of high specificity, excellent neutralizing activity, and low immunotoxicity, which leads to fewer adverse effects. Antibody-based therapeutics have become a prominent class of new drugs for the treatment of many human disorders, such as cancers, autoimmune diseases and infectious diseases. We have established two essential platforms for therapeutic antibody development, which include (1) human antibody discovery using a phage-displayed human naive antibody library, and (2) monoclonal antibody generation from hybridoma and humanization. Our phage-displayed human naive scFv library includes 6×10^{11} individual clones; its diversity is comparable to antibody libraries developed by international big-biotech/pharmaceutical companies or institutes such as Cambridge Antibody Technology (CAT), Dyax, or Morphsys (HuCAL®). We have obtained more than 20 patents from our antibody research, several of which have been transferred to biotech companies by Academia Sinica. Four of the patented technologies are in clinical trials.

We also established a technological platform of Generic Human synthetic (GH) antibody libraries from computational and bioinformatics studies, as well as chemical synthesis and molecular expression of the libraries with the phage display system. The number of functional antibody variants reaches nearly 10^{11} , which is on the order of 100 GH antibody libraries, each containing 1 billion variants. We have demonstrated that the GH platform routinely identifies many novel and unique functional antibodies targeting antigens of practical biomedical significance.

Additionally, we have developed a single B cell platform that utilizes a cutting-edge screening method for rapid production of human monoclonal antibodies. Antigen-specific memory B cells are collected from blood samples of patients, donors or immunized mice by flow cytometry, followed by reverse transcription polymerase chain reaction (RT-PCR) to rapidly screen for useful monoclonal antibodies. The entire process usually takes only about one month in the availability of good antigens. Thus, this platform can potentially be used in response to large outbreaks of infectious diseases to control the spread of pathogens in a timely manner. The platform has been successfully applied to identify monoclonal antibodies against the MERS virus and to search for antibodies against HIV and influenza viruses.

Several core antibody technologies have been made available through a customized and optimized antibody engineering service. This service facilitates antibody development for research, clinical diagnostic, and therapeutic uses in Taiwan.



7. Infectious Diseases Research and P2 Laboratories

The P2 laboratory of the Emerging Infectious Disease Division (EIDD) is for research on Risk Group 2 (RG2) pathogenic microorganisms. Our research focus is on infectious diseases that adversely affect human health, including influenza virus, respiratory syncytial virus, enterovirus, dengue, and common human pathogenic bacteria. The P2 laboratory offers collaboration opportunities and accepts commissions, including providing technical services, laboratory space, and equipment for domestic academic research institutions and biotechnology companies.

The P2 laboratory can conduct trials on cells, animals, and microorganisms to develop new drugs, vaccines, and other products related to infectious disease prevention and control, including detection and diagnostic reagents, microorganism disinfectants, and biosafety equipment. The P2 laboratory will work closely with the biotechnology industry to support the translation and commercialization of research findings, which are indispensable in improving human health and promoting the development of Taiwan's biotechnology industry. The P2 laboratory will actively participate in epidemic and pandemic prevention and control systems when an outbreak occurs.

Innovation Incubation Division (BioHub Taiwan)

Mission

- We collaborate with Regulatory, Financial, Pharmaceutical, Clinical, R&D, and Incubation centers to create investment opportunities in Taiwan and worldwide.
- We provide holistic service and create a productive ecosystem for Taiwan bio-industries to thrive.
- We create strong links across bio-industries.
- We connect people and make things happen!



What we offer

The major objectives of the Innovation Incubation Division are to foster growth among innovative pharmaceutical businesses via networking and joint-venture opportunities, and to provide access to invaluable R&D and marketing resources. This broad mandate is encapsulated in the image of 'BioHub Taiwan', which we seek to promote globally. In addition to startups and small businesses, we welcome the installation of mature firms. We adhere to the ideal that vibrant interaction amid a diverse composition will enable the productive exchange of insights and experiences, and we look forward to fruitful outcomes from seedlings that were nurtured in this environment. We also provide space and cooperation schemes for the establishment or extension of internationally leading accelerators, which can maximize the impact of funding from our country's investors and venture capital funds.

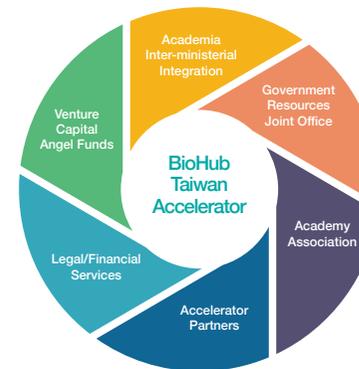
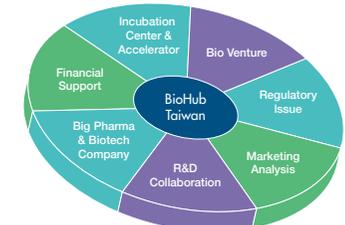
Taiwan Strengths

- BioHub integrates the highest level academic research, clinical capabilities and local companies to realize efficient commercialization of biotechnologies. It provides high-quality PIC/S and GMP facilities for the development of pharmaceuticals and medical devices in the context of a world-leading clinical trials industry.
- Outstanding strength as Asia's No. 1 country in clinical healthcare. The Taiwan Clinical Trial Consortium (TCTC) provides expertise in 13 therapeutic areas and access to National Health Insurance data.
- Highly educated, motivated and effective manpower: 5,000+ graduates entering the life-sciences market annually.
- Regulatory environment established with strong respect for IP rights.
- Biotech clusters have been established island-wide, each with its own specialization. All clusters are connected efficiently by Taiwan's High Speed Rail (HSR) system.



Resources from BioHub

To build an all-in-one service model that comprehensively provides all information and resources from the government, BioHub has invited biomedicine-related agencies to form a joint advisory office. The agencies include the Biomedical Industry Innovation Promotion (BIIP) Program Office, Drug Commercialization Center (DCC), Medical Device Commercialization Center (MDCC), Biotechnology and Pharmaceutical Industries Promotion Office (BPIPO) and Center for Drug Evaluation (CDE). This joint office will help to propel technological collaboration, regulatory coordination, and commercialization across departments and nurture the growth of biomedicine seedlings.



Largest in Taiwan "BioHub Taiwan Accelerator"

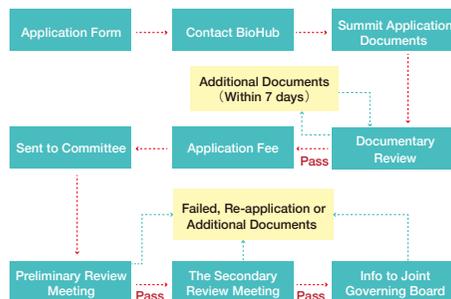
A brand-new ecosystem focusing on biomedical and smart healthcare, the BioHub Taiwan Accelerator was launched in July 2020 to build and bring repute to the National Biotechnology Research Park (NBRP) as the largest biomedical platform in the Asia-Pacific. In addition to keeping the momentum of leveraging international resources, BioHub Taiwan has been proactively building partnerships with domestic and foreign enterprises, such as multinational pharmaceutical companies, accelerators, accounting firms, law firms, venture capital, and contract research organizations (CROs). These enterprises are invited to station in the park in the form of mobile office to provide professional consultation to the resident companies.

BioHub Taiwan residence space

BioHub Taiwan focuses on innovative fields such as new drug development, digital medicine, and smart medicine. It shapes the park into a new hotspot for biomedicine industry R&D as well as investment in Taiwan and the Asia-Pacific. We sincerely welcome companies at various stages as well as venture capital and accelerators to reside in the National Biotechnology Research Park (NBRP) and become our partners. We believe that this model generates a positive communication environment; by sharing resources and experiences, more companies can copy the success model and create a win-win niche.



Application flowchart



Information



- BioHub Taiwan in Building C (2F-8F) has 75 units that are currently ready to lease to tenants, each unit is around 165 square meters.
- We provide research rental units, public instrument facilities, conference rooms, and even open spaces on the lower floor of Building C. This has successfully encouraged the interaction between the industry-academia and stimulated more cooperation and more involvement in the discussion.



- The units are available to accommodate domestic companies, startups and international companies that have R&D teams in Taiwan.
- For applicants are interested in the development of new drugs and digital health are advantages.

For more information, please visit <https://nbrp.sinica.edu.tw>



— Emerging Infectious Disease Division —

Vision

The prevalence of emerging infectious diseases in recent years has damaged public health, caused economic loss, and resulted in a sense of social uneasiness. Academia Sinica established the Emerging Infectious Disease Division (EIDD) in the National Biotechnology Research Park (NBRP) with the mission to pre-deploy and reserve R&D capacities to immediately respond to outbreaks of emerging infectious diseases. The EIDD provides P3 facility services and rapidly develops identification/rapid testing technologies and therapeutic antibodies, drugs, and vaccines, as well as next-generation technologies to fight against serious infectious diseases, such as avian influenza, and COVID-19. The EIDD integrates the resources of the NBRP and collaborates with relevant units in industry, government, academia, and research that help to build up a comprehensive strategy for the prevention and treatment of critical infectious diseases, thereby fulfilling social responsibilities and assisting Taiwan in epidemic prevention.



Mission

- Provide P3 facility services on demand
- Rapidly develop identification/testing reagents and tools
- Rapidly develop anti-viral drugs
- Rapidly develop therapeutic antibodies and vaccines
- Establish libraries of biomaterials critical for infectious disease research
- Cultivate talents for the prevention and control of infectious diseases

For more information, please visit <https://nbrp.sinica.edu.tw>

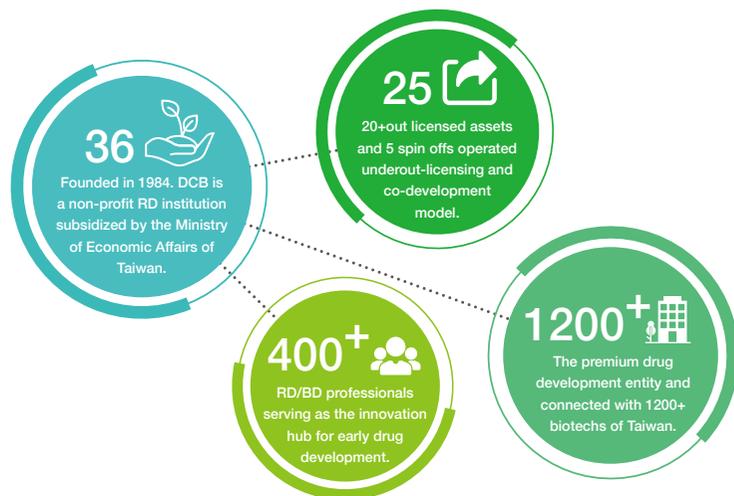


Ministry of Economic Affairs Development Center for Biotechnology

The Development Center for Biotechnology (DCB) was established as a nonprofit research institution in 1984 using funds provided by the public and private sectors. Currently located in the National Biotechnology Research Park, the DCB champions technological innovation, industrial development, and talent cultivation as its core values. We focus on preclinical development and translational medicine research, and play a vital role in drug commercialization to drive the development of the biotechnology industry in Taiwan.

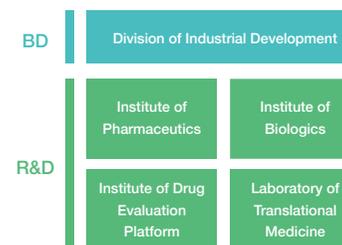
The DCB focuses on research and development (R&D) of novel drugs and treatment. We offer technology licensing services as well as integration services from commissioned research to business promotion, in addition to fostering international collaborations.

The DCB aims to become the "best partner" in the biotechnology industry. Through innovative R&D, business incubation, and business promotion, we utilize our cumulative capacity in drug R&D to align with international biotechnology and pharmaceutical development trends, thereby ensuring the quality of life and health of Taiwanese people.



Mission

- Focus on the preclinical development of biologics and small-molecule drugs for alignment with the National Biotechnology Research Park's research position on translational medicine.
- Develop the platform technology for drug optimization to connect with upstream target identification for new drug value adding.
- Form a cluster by connecting the Academia Sinica and biotech companies in the park to accelerate new drug development and commercialization.



Preclinical development of new drugs:



1. Lead optimization
 - small-molecule
 - Monoclonal antibody
2. Process scale-up
3. Pharmacology studies
4. ADME analysis

Tasks involved in drug commercialization:



1. New drug selection and evaluation
 - Domestic project sources
 - International project sources
2. Intellectual property protection for patent portfolio
3. Technology transfer
4. Fundraising and cultivation of start-ups

For more information, please visit <https://www.dcb.org.tw/>



Ministry of Health and Welfare Taiwan Food and Drug Administration



As part of its organizational restructuring effort to protect the health of the consumers, the Ministry of Health and Welfare (formerly known as the Department of Health, Executive Yuan) combined the organizations formerly known as the Bureau of Food Safety, Bureau of Pharmaceutical Affairs, Bureau of Drug and Food Analysis and Bureau of Controlled Drugs under the Department of Health into the Food and Drug Administration, Department of Health on January 01 of 2010. On July 23 of 2013, as part of the Executive Yuan's organizational restructuring, the Taiwan Food and Drug Administration under the Ministry of Health and Welfare was established. The restructured organization not only greatly shortened the time taken to plan and implement management policies, but also promoted the transparent, rapid and diverse disclosure of food and drug information, guaranteeing safety of the quality of food, drug, medical device and cosmetic products for all consumers.

Service Items

Pharmaceutical Management

The pharmaceutical management framework encompasses procedures from product development to market approval, including R&D, pre-clinical studies, clinical trials, application for market approval, manufacturing and post-market management. Each of these steps shall comply with various good practice (GxP) standards and regulations. In addition, comprehensive pharmaceutical management policies has been established through the harmonization of international regulations, production sources control, pre-marketing control, post-marketing surveillance, and management of product distribution and pharmaceutical vendors. These are all effective strategies to ensure the safety, efficacy and quality of the pharmaceutical products.

Core Missions

- Drafting and amendment of Pharmaceutical Affairs Act and relevant regulations, promotion and international harmonization
- Drug inspection, registration and consultation guidance
- GLP and GCP management
- GMP management for domestic and foreign pharmaceutical plants
- Promotion and implementation of GDP for Western Medicine
- Drug traceability and tracking
- Relief for drug-related hazards
- Management of pharmaceutical affairs services

Medical Devices Management

The framework of medical device management is centered on protection of consumers. It establishes corresponding regulatory mechanisms for the phases from product design, pre-clinical testing, clinical trial, pre-market application, to marketing. By covering fully the "design," "production," and "sale" of total product life cycle management system, the safety, effectiveness, and quality of medical devices are efficiently managed. Furthermore, to respond to the international regulatory trends and cope with the ever-changing environment, regulatory policies that may keep pace with the times and can be in line with international trends are being developed at an accelerated rate to promote the industry development.

Core Missions

- Drafting, amendment, promotion, and international harmonization of regulations on medical device management
- Registration and market approval and consultation assistance of medical devices
- Management of domestic and foreign medical device manufacturing plants (QMS /QSD certification)
- Consultation and case-specific assistance mechanisms for medical device regulations
- Pre-clinical and clinical trial management of medical devices
- Medical device firm and product traceability management
- Post-market safety monitoring and circulation inspection of medical devices

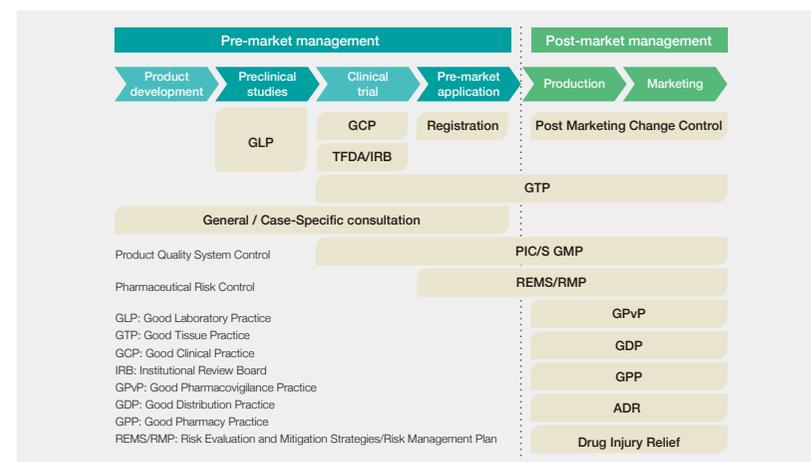
Cosmetic Management

The cosmetic management system is divided into production source control, pre-market management, and post-market surveillance. Source control management includes ensuring that manufacturers comply with the Establishment Standards for Cosmetics Manufactory and Cosmetics Good Manufacturing Practice Regulations (GMP). Pre-market management includes registration specific-purpose cosmetics. Post-market surveillance that focuses on implementing cosmetics quality surveillance programs, joint audits spanning multiple counties and cities, establishing a product adverse event reporting system for cosmetics, monitoring of domestic and global cosmetic safety alerts regularly, and strengthening consumer awareness of safe cosmetics use to create a comprehensive cosmetics quality and safety protection network.

Core Missions

- Drafting, amendment, promulgation and international harmonization of regulations on cosmetic management
- Registration of specific-purpose cosmetics
- Source management of cosmetics manufactory
- Consultation and assistance mechanisms for cosmetic regulations
- Post-marketing safety surveillance and circulation inspection of cosmetics

Life Cycle of Medicinal Products



Cosmetics Management Framework



For more information, please visit <https://www.fda.gov.tw/TC/index.aspx>



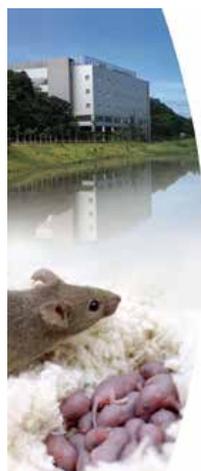
National Laboratory Animal Center National Applied Research Laboratories

The National Laboratory Animal Center (NLAC) is under the jurisdiction of the National Applied Research Laboratories. Being the largest laboratory animal resource center in Taiwan, NLAC also acts as the foundation and key platform for the development of biotechnology industry and biomedical research.

To uphold its core values of "Quality First, Welfare Foremost", the Center provides diversified animal resources and testing services based on a dual-track approach of advancing scientific application and animal welfare.



Comprehensive Solutions for Animal Studies



Lab Animal Resources

SPF animal species: mouse, rat, hamster, guinea pig, and rabbit
More than 300 GM mouse and rat strains

Animal Testing Fields

Core technology

Genetic engineering (CRISPR/Cas9, BAC)
Isolator technology, germfree mice, and microbiome
Pathology, Pathogen, health and environmental monitoring
Breeding and assisted reproduction technology
Surgical implantation, biomedical imaging, etc.

Animal facilities in accordance with international standards

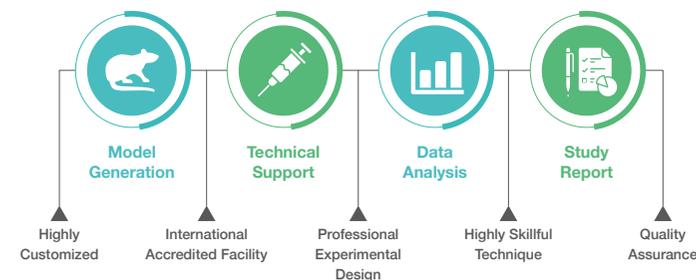
Testing fields for multiple species: rodent, rabbit, dog, pig, and goat
Quality: GLP compliant laboratory
AAALAC international accreditation

On-site services

Consultation to improve the quality of animal facility management
veterinary services
Core technology services

Customized Research One-Stop Service

In supporting pre-clinical evaluation of new drugs, medical devices, and biotechnology products, NLAC aims to fulfill the needs of biomedical product development and medical research and ultimately to accelerate the internationalization of Taiwan's biotechnology industry.



Drug Discovery and Preclinical Study

Disease Models and Research Services

Cancer

- Patient-derived xenograft (PDX)
- PDX Tumor banking
- Cell line-derived xenograft (CDX)
- Cancer immunotherapy

Microbiome

- Fecal microbiota transplantation
- Germ-free animal derivation
- Gnotobiotic animal derivation

Neural Degeneration

- Parkinson's disease
- Alzheimer's disease

Immunology

- Immune deficient mice
- Humanized-immune mice
- Autoimmune animal models

Metabolism

- Obese models
- T1ye I diabetic models
- Type II diabetic models
- Non-alcoholic fatty liver

Gene Modification

- Generation and archiving (member of IMSR)

Others

- Aging and degeneration
- Ischemic and hemorrhagic stroke
- Atherosclerosis
- Polycystic kidney disease

Technical Services

Rodent Behavior Studies

- Motor skill
- Learning and memory
- Cognition
- Pain

Small Animal Imaging Systems

- Ultrasound
- Bioluminescence
- Computed tomography

Pathology and Pathogen Test

- Tissue section and pathological analysis
- Blood chemistry and CBC test
- Rodent pathogen test

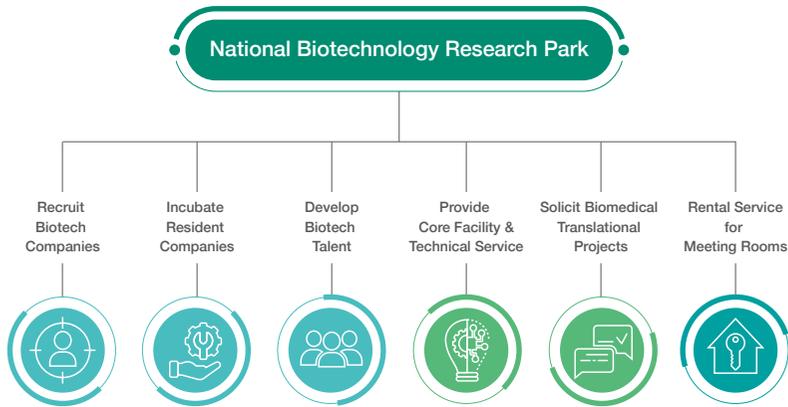
Immunological Analysis

- Flow cytometry
- Biomarker analysis
- Fluorescence-activated cell sorting

For more information,
please visit
<http://www.nlac.org.tw/>



Services Overview



NBRP Public Meeting Rooms & Charge Standard

Room No.	Layouts	Projector	Microphone	Video Conferencing	Managed by	Rental (NT\$)	
						Tenant	Guest
Building A A215	U-shaped (30ppl)	135"(1)*	Table Stand + Wireless	(1)	Academia Sinica	3,000	6,000
C201	Conference (392ppl)	300"(1) 200"(2)	Wireless	(2)	Academia Sinica	7,500	15,000
Building C C212	Theatre (100ppl)	180"(1)*	Wireless	(1)/(1)	Academia Sinica	6,000	12,000
Building E E120	U-shaped (50ppl)	135"(1)	Table Stand + Wireless	(1)	DCB	3,000	6,000
E249	Theatre (54ppl)	180"(1)	Wireless	(1)	DCB	3,000	6,000
Eco-Education	Theatre (50ppl)	180"(1)	Wireless	(1)	Academia Sinica	3,000	6,000
F327	U-shaped (50ppl)	120"(2)	Table Stand + Wireless	(1)	TFDA	3,000	6,000
F329	U-shaped (35ppl)	120"(1)	Wireless Microphone	(1)	TFDA	3,000	6,000
F328	U-shaped (20ppl)	120"(1)	Wireless Microphone	(1)	TFDA	1,500	3,000
Building F F330	U-shaped (20ppl)	135"(1)	Wireless Microphone	(1)	TFDA	1,500	3,000
Building G GB157	Theatre (120ppl)	180"(1)	Wireless Microphone	(1)	NLAC, NARIabs	6,000	12,000
GB107	Combined (45ppl)	135"(1)	Wireless Microphone	(1)	NLAC, NARIabs	3,000	6,000
GB108	Combined (45ppl)	135"(1)	Wireless Microphone	(1)	NLAC, NARIabs	3,000	6,000

* video communication – with multiple simultaneous connections

Note: 20% off for the resident companies within NBRP

NBRP Public Meeting Room Types

