

EPOC will create novel ways to Conquer and Cure Cancer

EPOC Researchers Catalog

Fiscal Year 2026

NCC
EPOC

Inquiry on collaborative research

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Introduction

The mission of the Exploratory Oncology Research & Clinical Trial Center (EPOC) is to rapidly advance research and development towards the realization of the National Cancer Center's goal of “a society that prevents, overcomes, with and beyond cancer”. To achieve this, we need a place that can accurately comprehend what is required in the clinical field and refine innovative ideas and seeds to meet those needs.

The landscape of pharmaceuticals and medical devices development is evolving at a dizzying pace, with open innovation and the emergence of the concept of drug discovery technology platforms. Hence, an international hub that can respond immediately to these changes is ever more important. EPOC's future vision is an agile, easily adaptable organization that swiftly responds to changes and challenges, based on excellent clinical and basic research conducted in collaboration with teams within the National Cancer Center, such as the Hospital, Hospital East, and Research Institute, as well as with domestic and overseas research institutions, thus overcoming various restrictions from standards and manufacturing which are bottlenecks to practical application through industry-academia collaboration, and converging technology and science from diverse fields of expertise based on clear exit strategies.

We have designated the near clinical phase, which encompasses applied research and early clinical research of promising game changing technologies in cancer treatment, including regenerative/cellular medicine, gene therapy, antibody drugs, nuclear medicine, AI and robotics, as the area of particular



focus. To this purpose, we have established the Kashiwanoha Regenerative Medicine Platform and others so that EPOC staff can work with domestic and international experts and cross-disciplinary teams to develop and implement new technologies. We will continue to evolve as a unique development base in which trust is placed, that 'EPOC will make it happen'.

Katsuya Tsuchihara, M.D., Ph.D.
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Exploratory Oncology Research &
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Index

Clinical development of radioligand therapy (radionuclides therapy)

Establishment of a translational research and clinical research implementation system focused on alpha-emitting radionuclides.

Anri Inaki, MD, PhD

Division of Functional Imaging Chief

4

Practical Application of Radiotheranostic Agents

Development of ²²⁵Ac-Labeled Peptide Agents Targeting Integrin

Mitsuyoshi Yoshimoto, PhD

Department of Strategic Programs Chief

6

Next-gen proton beam therapy development

Toward high-precision spatiotemporal control at the molecular and cellular levels

Hidenari Hirata, MD, PhD

Division of Functional Imaging Staff Physician

8

Toward promotion and development of BNCT

Expansion of indication of BNCT with a compact accelerator-based neutron irradiation system installed in the hospital

Hiroshi Igaki, MD, PhD

Division of BNCT Medical Research Chief

10

ImmuDDSVia: Antibody DDS Platform

DDS × Immunity × Molecular Imaging Antibody Therapeutics

Masahiro Yasunaga, MD, PhD

Division of Developmental Therapeutics Chief

12

Non-clinical models in drug development

Evaluating the drugs of various modalities

Ryo Tsumura, PhD

Section of Experimental Animals Head

14

Proposal for a new cancer treatment based on an understanding of cancer symptoms in pancreatic cancer

Evaluate the potential usefulness of pharmaceutical or diagnostic seeds on the crosstalk between tumor-induced inflammation and host reaction

Shuichi Mitsunaga, MD, PhD

Division of Biomarker Discovery (Kashiwa) Chief

16

Development of novel therapeutic drugs for leukemia

Rom understanding molecular mechanism to developing molecular-targeted drugs

Akihiko Yokoyama, PhD

Division of Translational Genomics Head / Tsuruoka Laboratory Team Leader

18

Drug discovery targeting chromosomal instability of cancer vulnerability

Chromosomal instability-mediated cellular stress and cancer drug discovery

Akihiro Ohashi, PhD

Division of Collaborative Research and Developments

20

Immunotherapy targeting unique cancer antigens

mRNA vaccine therapy and CAR/TCR-T cell therapy

Tetsuya Nakatsura, MD, PhD

Division of Cancer Immunotherapy Chief

22

Development of Immuno-Cell Medicines for Cancer Therapy

Establishment of an off the shelf immuno-cell platform

Yasushi Uemura, DDS, PhD

Division of Cancer Immunotherapy Head

24

Development of New Patient Stratification Techniques and Drugs

Establishment of analysis techniques for immune cells that reflect the tumor microenvironment

Hiroyoshi Nishikawa, MD, PhD

Division of Cancer Immunology Chief

26

Identification of Immunosuppressive Mechanisms in Tumors and Application to Novel Immunotherapy

The development of novel immunotherapy by analysis of the tumor microenvironment

Kota Itahashi, MD, PhD

Division of Cancer Immunology Head

28

Cancer Pathology for Drug Development

From Target Discovery to Biomarker Identification in Drug Development Pipeline

Shumpei Ishikawa, MD, PhD

Division of Pathology, Exploratory Oncology Research & Clinical Trial Center Division Chief

30

Advancing Cancer Therapy with Next-Generation Pathology

Unleashing data-driven insights through the power of pathology and technology

Hiroto Katoh, MD, PhD

Division of Pathology Division Head

32

Creating a Foundation for the Dissemination of Pathology AI

Pathology Digital Image Preparation for Pathology AI

Shingo Sakashita, MD, PhD

Division of Pathology Head

34

Cancer Stem cell research using organoid

Elucidation of the molecular mechanisms by which cancer stem cells acquire resistance to therapy

Naoya Sakamoto, MD, PhD

Division of Pathology Head

36

Integrated Analysis of Large-Scale Multi-Omics Data

Medical and Biological Information Extraction from Multi-Omics Data Using AI

Riu Yamashita, PhD

Division of Translational Informatics Head

38

Innovative Device Development Enabled by Interdisciplinary Convergence

A platform linking advanced technology seeds with clinical needs

Nobuyoshi Takeshita, MD, PhD

Division of Surgical Technology Chief

40

Endoscopic device development using academia seeds

Applied research using forefront technological seeds aiming for clinical output

Tomonori Yano, MD, PhD

Division of Science and Technology for Endoscopy (Kashiwa) Chief

42

Creation of innovative technologies of gastrointestinal endoscopy

Frontier of endoscopic diagnostic and therapeutic procedures

Seiichiro Abe, MD, PhD

Division of Science and Technology for Endoscopy (Tsukiji) Chief

44

Provision of Elderly Oriented Care

Programs that provide appropriate medical care and support for the elderly

Asao Ogawa, MD, PhD

Division of Psycho-Oncology Chief

46

Clinical development of radioligand therapy (radionuclides therapy)

Establishment of a translational research and clinical research implementation system focused on alpha-emitting radionuclides.



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- ▶ A well-equipped basic research facility for handling alpha-emitting radionuclides
- ▶ Development of imaging techniques for “Radiotheranostics”
- ▶ Technological development to promote the widespread use of radio-ligand therapy (radionuclides therapy)

Research background

Advancements in early cancer detection and effective treatments have improved the prognosis of cancer patients. However, there is still no established treatment for refractory cancers. The Division of Functional Imaging is developing imaging diagnostic techniques using radioactive isotopes and radio-ligand therapy (radionuclides therapy) to visualize refractory cancer lesions and functions, with the aim of improving the prognosis of patients suffering from refractory cancers. We are also working on the development and dissemination of related technologies.

Research characteristics

The Division of Functional Imaging has established a technique for detecting small pancreatic cancer lesions in mice using high-affinity RGD peptides labeled with radioisotopes. Additionally, in recent years, we have established a research facility on the Kashiwa campus that can handle alpha-emitting radionuclides, enabling the implementation of translational research utilizing radioisotopes. Furthermore, we are considering conducting clinical research and trials using the radionuclides therapy facility that is expected to be completed in the near future. We are also working on securing a system for the stable supply of Ac-225, an alpha-emitting radionuclide in high global demand, domestically. Concurrently, we are conducting research and development related to the containment of radioisotopes.

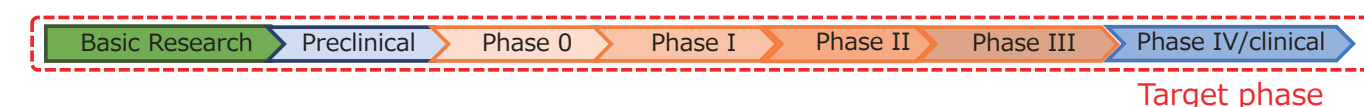
Potential research technical cooperation

- ◆ Provision of a non-clinical research facility capable of using various radioisotopes
- ◆ Facilitating translational research utilizing radioisotopes
- ◆ Development of materials and facilities for containing radioisotopes

Future research prospects

The Division of Functional Imaging aims to establish a research framework that consistently supports the stable supply of radioactive isotopes required for radio-ligand therapy, from basic research to clinical trials with a clear perspective. Furthermore, in order to promote the widespread use of radio-ligand therapy, we will concurrently work on system design for the safe and easy handling of radioactive isotopes, development of containment techniques, and the creation of educational materials for healthcare professionals.

Framework for Clinical & Translational Research

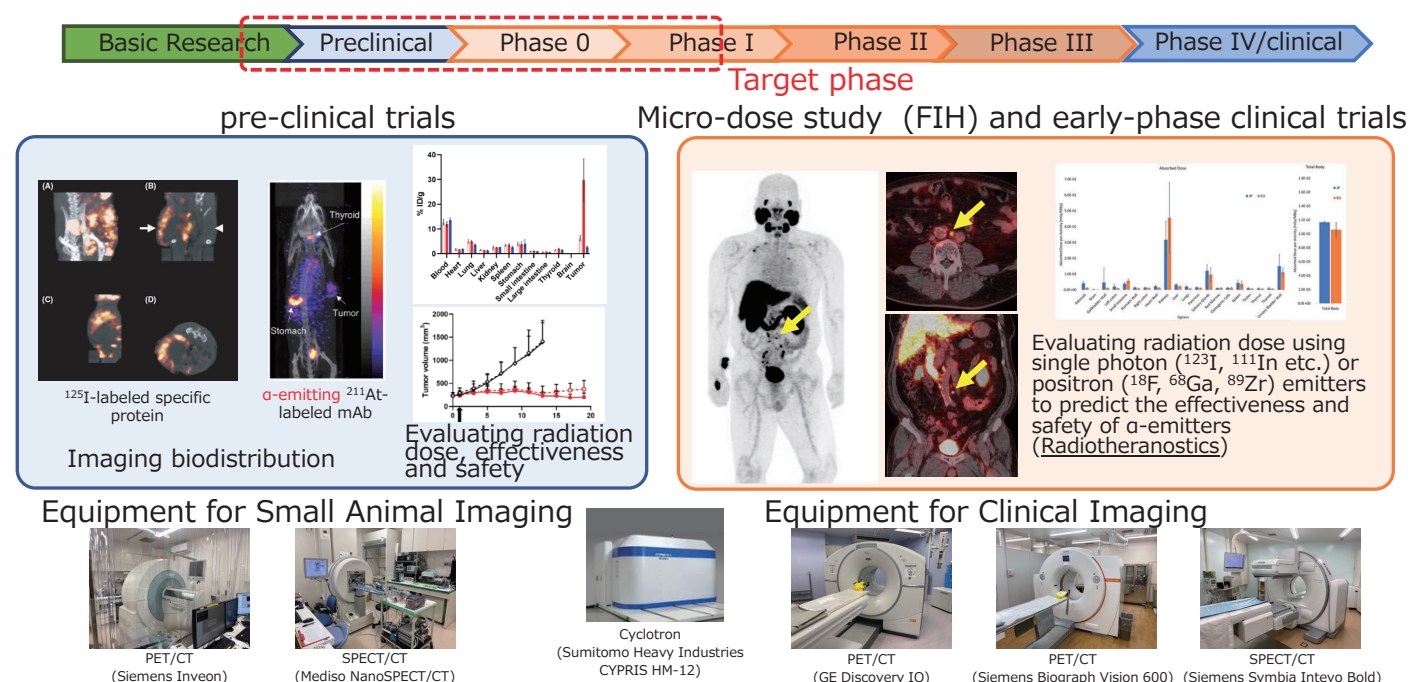


Domestic production of alpha-emitter is the most important KEYPOINT in all stages.

- ✓ ²²⁵Ac Domestic production
 - Decay product from ²³³U
 - (n,x) reaction from ²²⁶Ra or ²³⁰Th
 - (γ,n) reaction from ²²⁶Ra
- ✓ ²¹¹At Domestic production
 - (α,2n) reaction from ²⁰⁹Bi



in Radioligand Therapy



Practical Application of Radiotheranostic Agents

Development of ^{225}Ac -Labeled Peptide Agents Targeting Integrin



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- Establishment of a reliable manufacturing system for radiolabeled agents
- Building a preclinical research system to accelerate nuclear medicine drug development
- Drug development based on molecular imaging

Research background

Radiotheranostics is an innovative cancer treatment approach that enables both therapy and diagnosis by selectively using different radionuclides. In particular, alpha-emitting radionuclides have recently attracted attention because, unlike conventional X-rays and beta rays, they can directly damage DNA without depending on oxygen levels, making them highly promising for cancer treatment. Among alpha-emitting radionuclides, we focus on actinium-225 (^{225}Ac) and are actively engaged in the development of radiotheranostic agents. Currently, our research is centered on the development of ^{225}Ac -labeled peptide agents targeting integrin, with the aim of overcoming pancreatic cancer.

Research characteristics

Our research aims to bring radiotheranostic agents (radiopharmaceuticals) into practical use by developing new drugs and establishing a comprehensive preclinical research framework. To accelerate translational research, we are also establishing a reliable manufacturing system for radiolabeled agents. Using advanced imaging technologies, we conduct pharmacokinetic analyses to efficiently screen drug candidates. Furthermore, by building a high-quality, well-controlled supply system and utilizing exploratory IND (eIND) processes, we aim to reduce the time and cost of development. This integrated approach will enable a seamless transition from basic research to clinical application, ultimately providing new treatment options for refractory cancers.

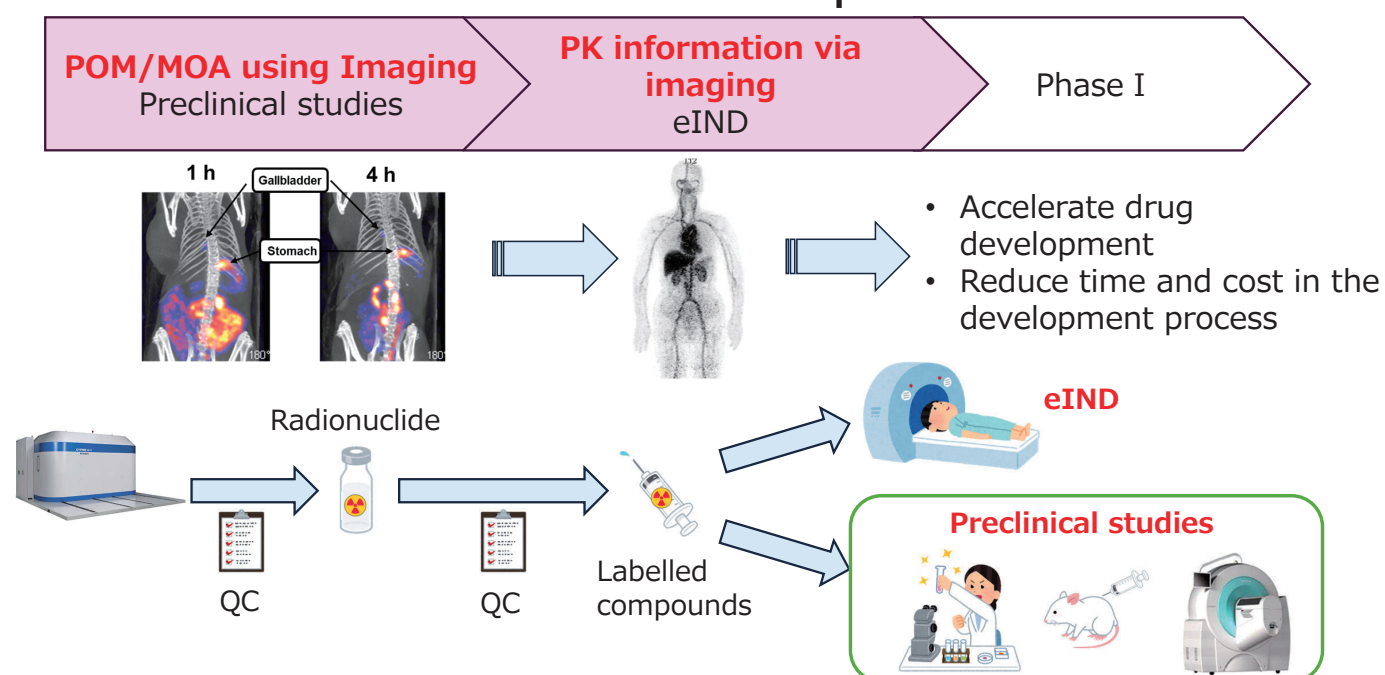
Potential research technical cooperation

- ◆ Labeling techniques for various metal radionuclides with antibodies and peptides
- ◆ In vivo imaging analysis using radionuclides
- ◆ Comprehensive development of radiotheranostic agents

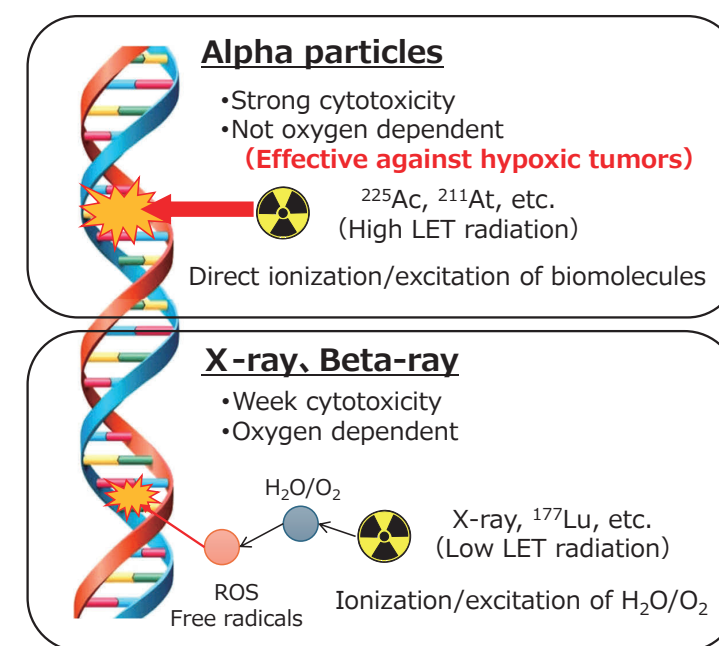
Future research prospects

Nuclear medicine therapy (radiotheranostics) is gaining global attention as a next-generation cancer treatment that integrates diagnosis and therapy, with rapid advances in new drug development. Our goal is to overcome refractory cancers by quickly delivering safe and effective novel radiopharmaceuticals to patients. To achieve this, we are building a comprehensive development system that seamlessly connects research and clinical application, accelerating the translation of promising discoveries into practical treatments.

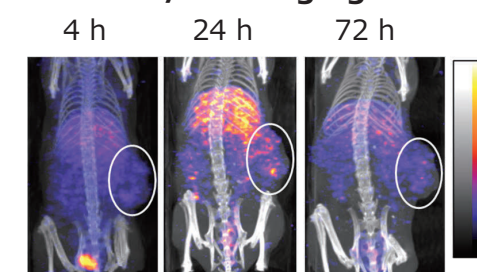
Establishment of a production system for radiolabeled compounds



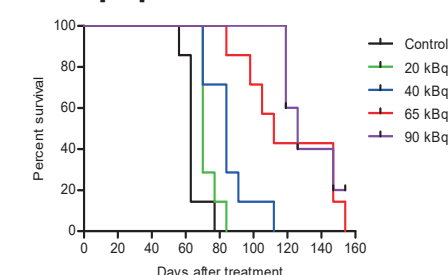
Development of radiotheranostics



SPECT/CT imaging



Therapeutic efficacy using ^{225}Ac labeled peptide



Next-gen proton beam therapy development

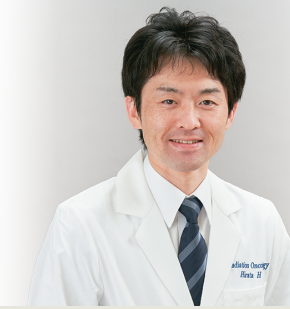
Toward high-precision spatiotemporal control at the molecular and cellular levels

- ▶ Tumor and radiation biology-guided proton beam therapy optimization
- ▶ Integrated high-precision multi-radiation-drug technologies
- ▶ Spatiotemporal optimization of radiation dose and quality

Research background

In Japan, approximately one in four cancer patients receives radiotherapy, primarily X-ray-based treatment. Recent advances in physics-based technologies, together with the advent of high dose-concentration charged particle beams, have enabled tumor irradiation with millimeter-scale precision and adaptation to tumor motion.

Despite progress in high-precision, organ-level treatments, outcomes for many cancers remain suboptimal. In addition, adverse events caused by irradiation of surrounding normal tissues remain a major challenge. Therefore, the development of more effective and safer radiotherapy is urgently required.



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Research characteristics

Leveraging the high dose-concentration properties of charged particle beams (protons), we aim to develop next-generation proton beam therapy by integrating diverse radiation modalities, such as α particles and X-rays, together with pharmaceuticals. We seek to achieve high precision at the cellular (micrometer-scale) and even molecular levels.

In addition to basic research, we will promote translational research using patient-derived specimens and functional imaging, aiming to realize precision medicine that adapts to real-time changes in tumor biological profiles and spatiotemporal dynamics during clonal evolution. We will conduct this research in collaboration with multiple institutions, including the Department of Radiation Oncology at the National Cancer Center Hospital East.

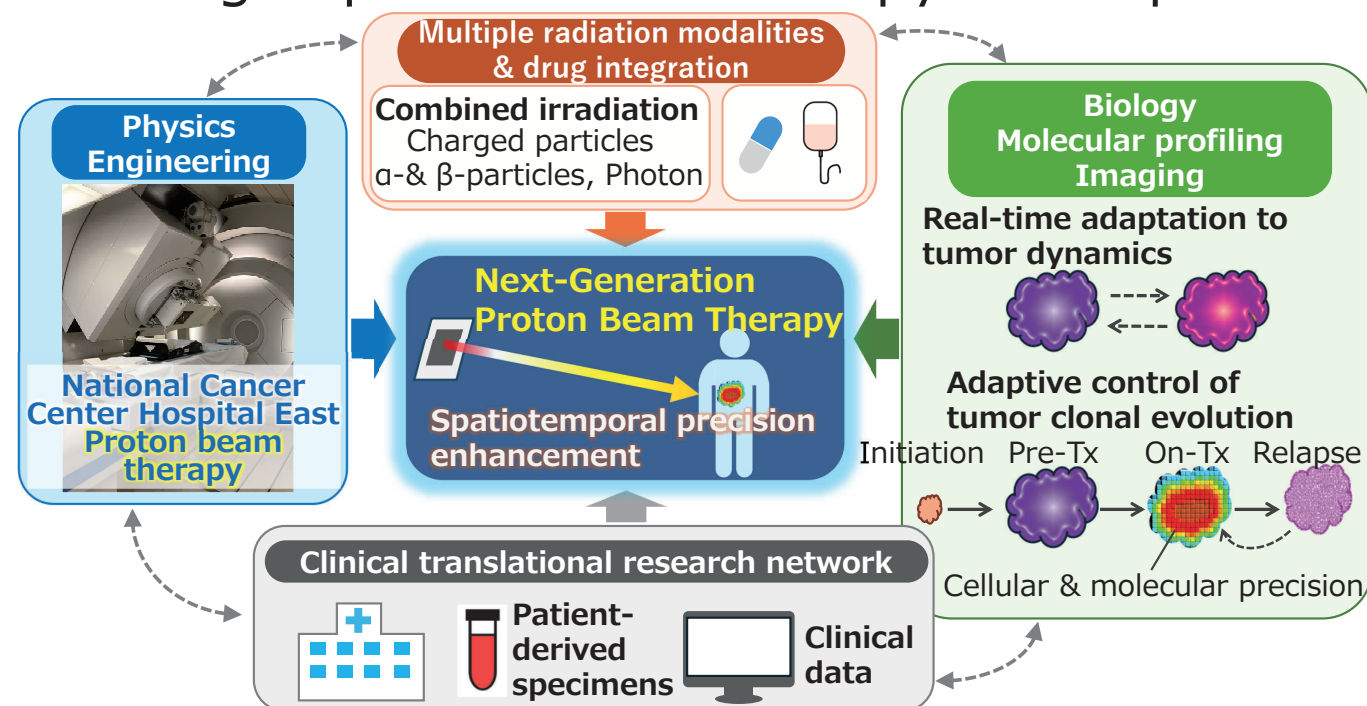
Potential research technical cooperation

- ◆ Proton beam and X-ray irradiation, including FLASH proton irradiation
- ◆ Multi-modality dose evaluation and simulation
- ◆ Clinical and translational radiotherapy infrastructure

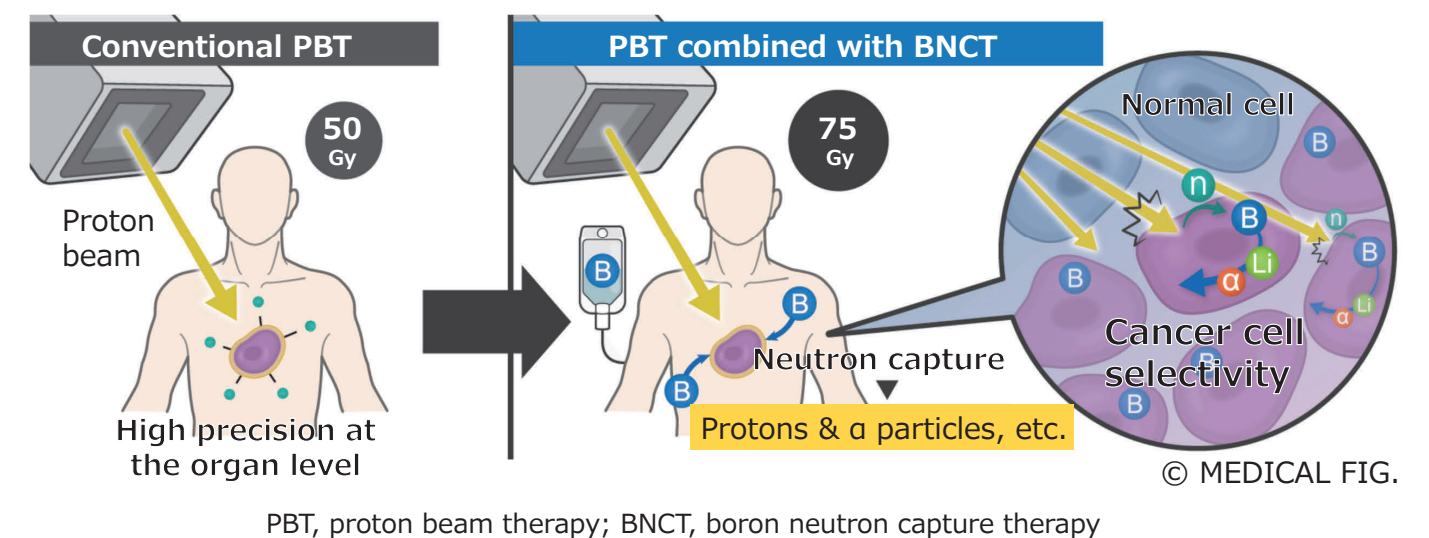
Future research prospects

We aim to integrate multiple radiation modalities and pharmaceuticals into proton beam therapy and elucidate their mechanisms at the cellular and molecular levels, thereby optimizing spatiotemporal control of radiation dose and quality. Furthermore, by integrating biological profiles and imaging, we aim to achieve precision radiotherapy.

Next-gen proton beam therapy development



Toward cellular-level precision



Toward promotion and development of BNCT

Expansion of indication of BNCT with a compact accelerator-based neutron irradiation system installed in the hospital

- ▶ Development and promotion of hospital-based BNCT
- ▶ Promotion of clinical trials of BNCT
- ▶ Development of new boron drugs

Research background

Boron Neutron Capture Therapy (BNCT) is a cancer treatment modality that selectively kills cancer cells using α particles and Li nuclei generated by the nuclear reaction of boron (^{10}B) and thermal neutron. The boron drug is specifically incorporated into cancer cells. The α particle and Li nucleus generated within the cancer cells have a range of about the diameter of a single cell, so they can efficiently damage the DNA of cancer cells and kill them with minimal adverse effect on the normal cells surrounding the tumor. In order to promote and develop BNCT, our division is engaged in basic and clinical research on BNCT in cooperation with related departments.

Research characteristics

Performing BNCT requires the incorporation of boron into cancer cells and the neutron irradiation system by an accelerator or a nuclear reactor. To predict in advance the amount of boron incorporated into cancer cells, we are developing/improving the ^{18}F BPA PET examination method. We are also working on the joint development of a compact accelerator which can be installed in a hospital and started a single-institutional clinical trial of BNCT for the patients with malignant melanoma and angiosarcoma in collaboration with the Department of Radiation Oncology and



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BNCT implementation requires the uptake of boron compounds into cancer cells and an environment of external neutron irradiation, such as an accelerator or nuclear reactor. To predict the amount of boron uptake into cancer cells before BNCT, we have developed and improved the ^{18}F BPA PET examination method. We have also made efforts to jointly develop a small accelerator that can be installed in hospitals and are currently conducting a single-center clinical trial of BNCT for angiosarcoma in collaboration with the Departments of Radiation Oncology and Radiological Technology, and Radiation Safety and Quality Assurance Division at National Cancer Center Hospital. We are also working with academic societies to propose international standards for neutron irradiation equipment for BNCT and standard methods for measuring neutrons.

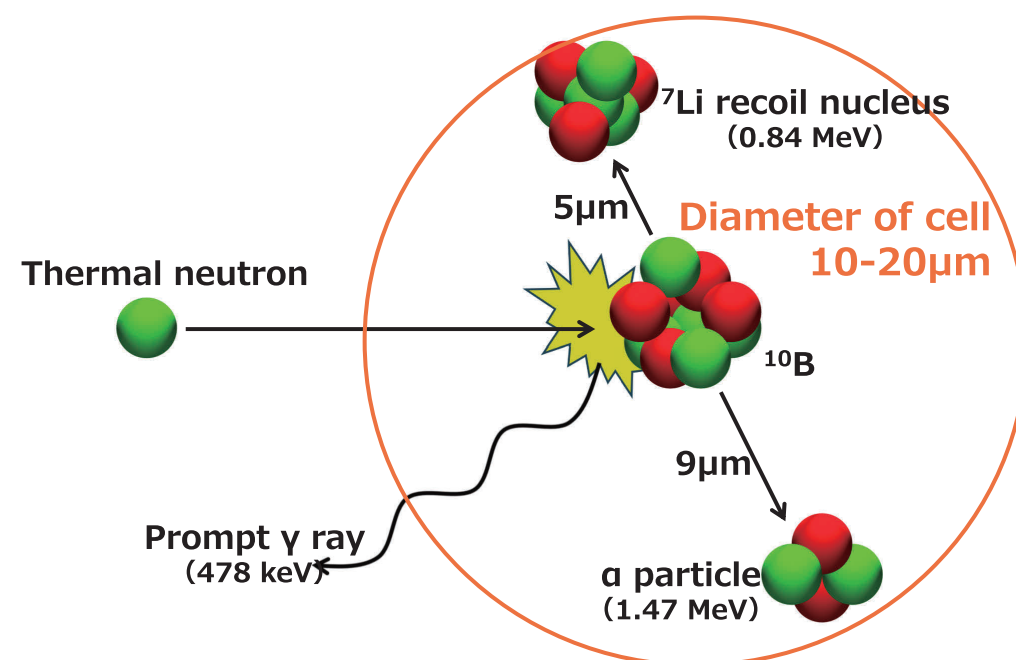
Potential research technical cooperation

- ◆ The use of neutron irradiation system of hospital-based accelerator
- ◆ ^{18}F BPA PET examinations
- ◆ Development of new boron drugs

Future research prospects

The indication for BNCT is defined by the uptake of boron drugs in tumor cells. We intend to develop new boron drugs to replace the existing BSH (borocaptate) and BPA (p-boronophenylalanine; borofalan) and expand the range of treatment indications for BNCT. We are currently conducting a single-center clinical trial, and after the regulatory approval of the neutron irradiation system for BNCT and the expansion of the indications for boron drugs, we are moving forward with research and development intending multicenter clinical trials and related technological extensions.

The principle of BNCT



Neutron irradiation system for BNCT at NCCH



ImmuDDSvia: Antibody DDS Platform

DDS × Immunity × Molecular Imaging Antibody Therapeutics

- ▶ Antibody DDS targeting disease niches
- ▶ Integrated immune modulation and TCE
- ▶ RI/optical theranostics and shark antibodies

Research background

Antibody therapeutics play a central role in the treatment of cancer and immune diseases; however, effective control of disease niches and the immune microenvironment—key drivers of relapse and refractoriness—remains insufficient. The persistence of pathogenic memory T cells and stromal barriers in solid tumors are fundamental mechanisms of therapeutic resistance. In addition, conventional systemic antibody administration is often limited by suboptimal delivery efficiency and toxicity. In this study, we aim to establish a novel drug discovery platform based on antibody-based drug delivery systems (DDS) by integrating immune modulation, molecular imaging, and tissue engineering. Furthermore, by leveraging shark-derived antibody technologies, we directly target disease niches to suppress recurrence and achieve durable remission. This integrated approach provides a conceptual framework for next-generation therapeutics in cancer and immune diseases.



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Research characteristics

This study presents a drug discovery platform that integrates multiple cutting-edge technologies centered on antibody-based DDS. 1) We establish a disease niche-targeting antibody platform for cancer and immune diseases. 2) We enable localized sustained delivery by integrating tissue engineering with SmartMatrix. 3) We optimize anti-tumor immunity and immune regulation by combining T cell engagers (TCEs) with engineered T cells (engT). 4) We integrate diagnosis and pharmacological evaluation through theranostics using radioisotope (RI) and optical imaging, as well as breath biopsy. 5) We further enhance tissue penetration and functionality by applying shark-derived immune systems, including VNAR-based antibodies.

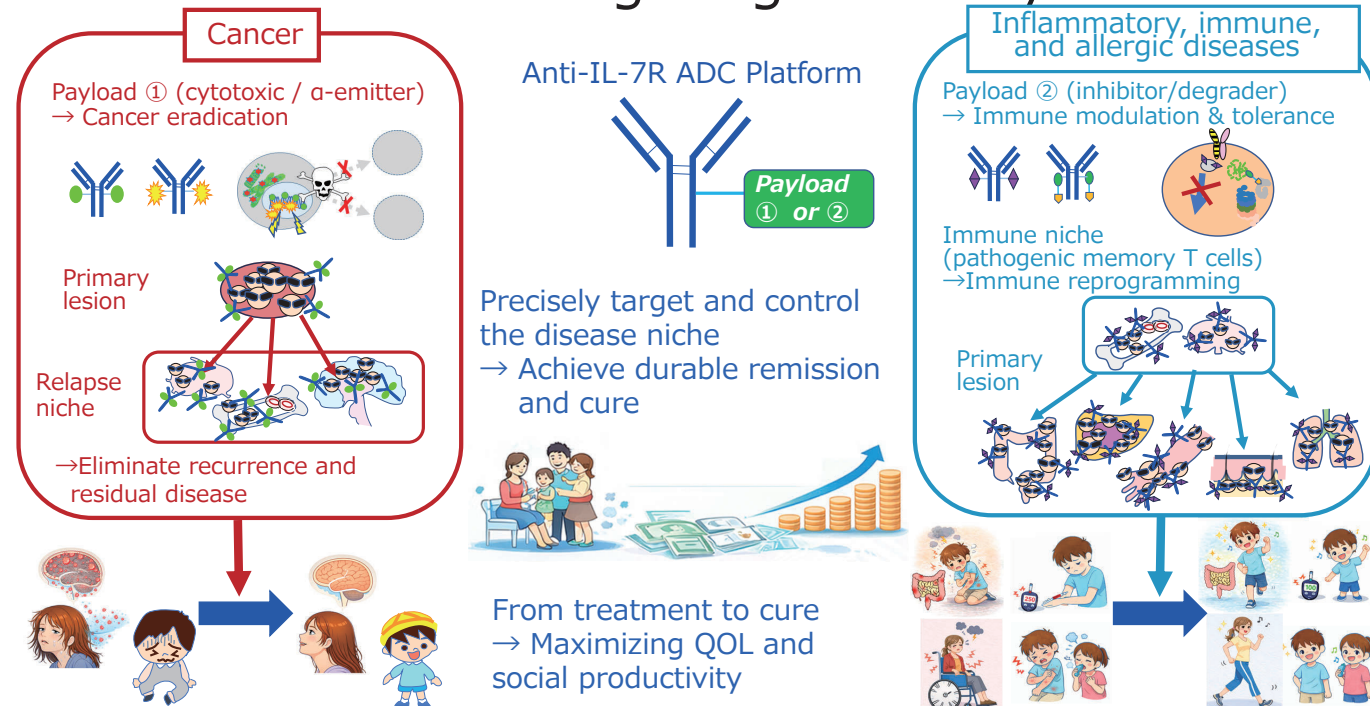
Potential research technical cooperation

- ◆ Antibody DDS / ADC design and optimization
- ◆ TCE and engineered T cell (engT) technologies
- ◆ Theranostics and shark-derived antibodies

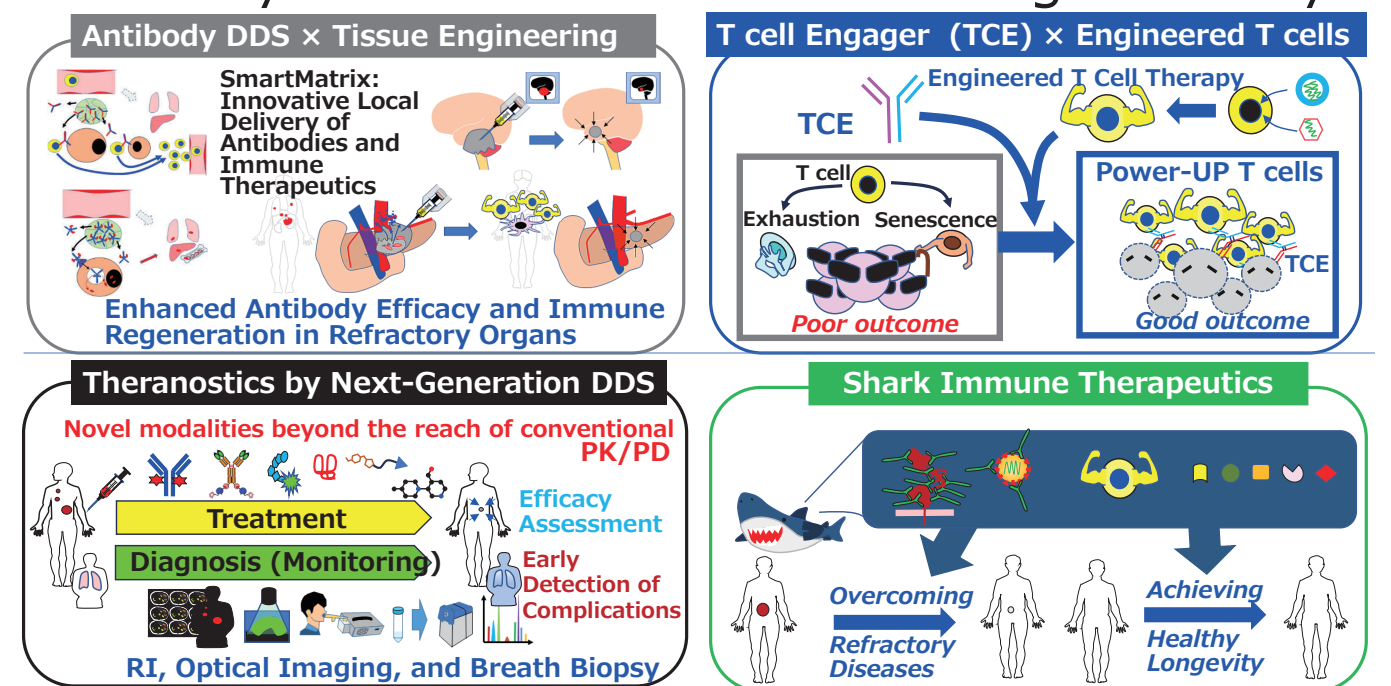
Future research prospects

This platform aims to achieve durable remission by targeting disease niches shared across cancer and immune diseases, thereby preventing relapses and overcoming resistance. By integrating diagnosis and therapy through a theranostic approach, it will accelerate precision medicine. Combined with cell-based therapies, it is expected to expand clinical applications. This platform has strong potential as a domestically developed antibody DDS foundation for drug discovery and commercialization.

Disease-Niche-Targeting Antibody Platform



Antibody-Based DDS Platform for Drug Discovery



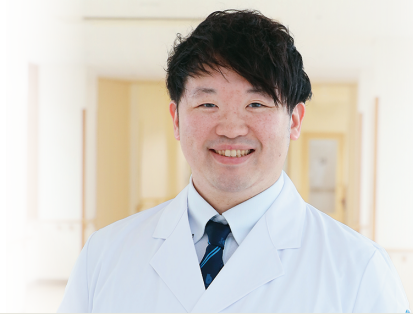
Non-clinical models in drug development

Evaluating the drugs of various modalities

- ▶ 3Rs (Replacement, Reduction, Refinement) in drug development
- ▶ PDX models and organoids derived from human cancer tissues
- ▶ Microphysiological systems (MPS) suitable for pharmacological studies of various drug discovery

Research background

Non-clinical models play a significant role in drug development. On the other hand, the discrepancy between the non-clinical model and the clinical trials is one of the factors of failure in drug development. Therefore, there is a high demand for the development of non-clinical models that more closely mimic humans. Furthermore, with the implementation of the FDA Modernization Act 2.0, the importance of the 3Rs (Replacement, Reduction, Refinement) in animal testing has been reaffirmed domestically and internationally from the animal welfare perspective. Thus, it is essential to develop in vitro evaluation systems, including MPS, as an alternative to animal models, and to create animal models that more closely mimic clinical conditions.



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Research characteristics

In recent years, various new therapeutic modalities, such as bispecific antibodies and CAR-T, have been developed all over the world. As a result, the action mechanisms are becoming more complex and diverse. Our laboratory aims to explore and develop optimal efficacy and toxicity evaluation systems for drug evaluation of various modalities by utilizing various non-clinical models, such as cancer organoids, PDX models, humanized mouse models, and MPS.

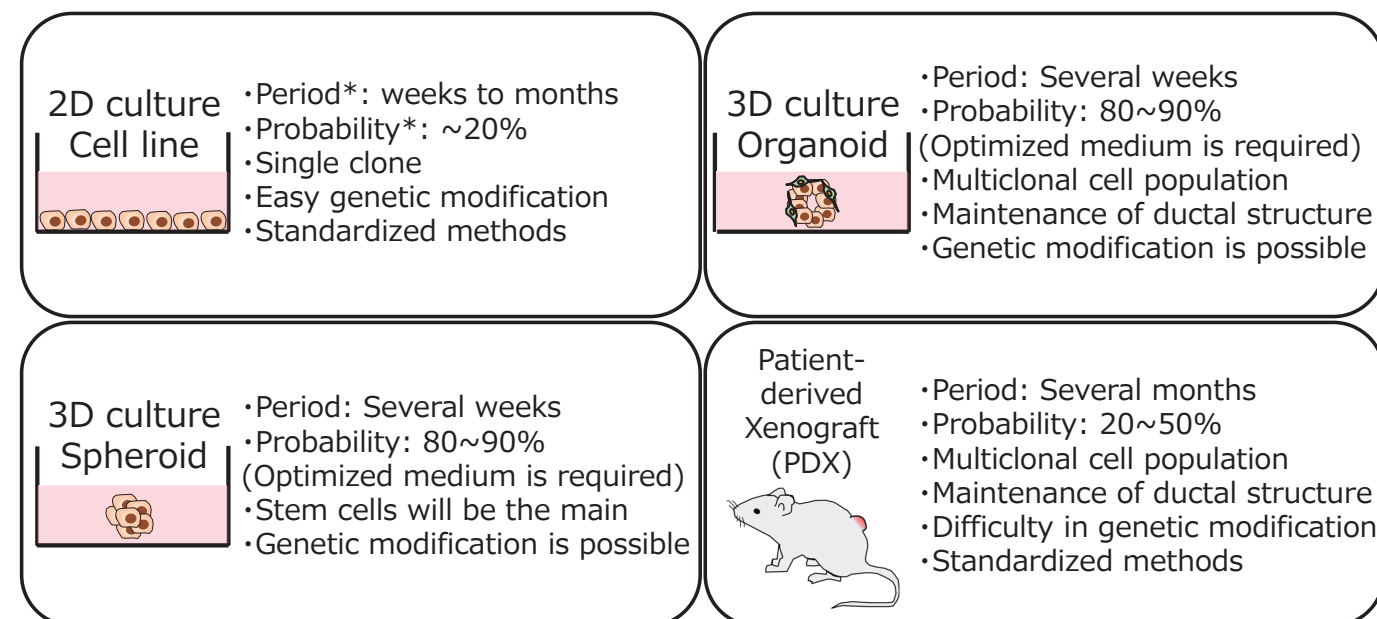
Potential research technical cooperation

- ◆ Various non-clinical model generation technologies
- ◆ Pharmacological studies using various non-clinical models
- ◆ Construction of new MPS

Future research prospects

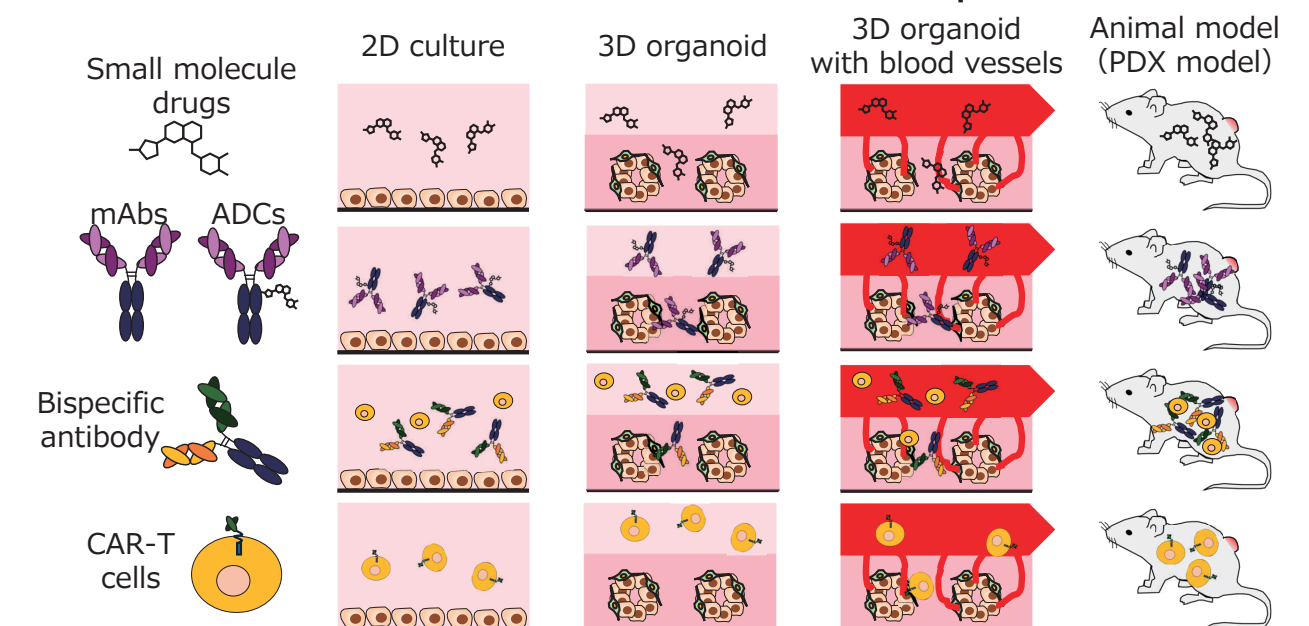
Due to the complexity of the action mechanisms of the new therapeutic modalities, the concept of DDS is an important key to accurately evaluate their efficacy and safety. Therefore, our laboratory is developing new MPS that can correctly evaluate the pharmacology and efficacy of various drugs.

Non-clinical models using patient samples



*Period and Probability mean for the establishment

Non-clinical model panel for drug development -Alternative model to animal experiment-



Proposal for a new cancer treatment based on an understanding of cancer symptoms in pancreatic cancer

Evaluate the potential usefulness of pharmaceutical or diagnostic seeds on the crosstalk between tumor-induced inflammation and host reaction

- Extensive clinical samples and data
- Testing the usefulness of seeds in cachexia
- Development of clinical proof-of-concept

Research background & characteristics

Increased systemic inflammatory responses, metabolic abnormalities, appetite loss, and chemo-refractory observed in pancreatic cancer patients are understood to be major components of cancer cachexia. In this field, we are conducting research and development of new treatment seeds based on our understanding of the pathophysiology of cancer symptoms obtained by analyzing samples and data from pancreatic cancer patients and animal models that reproduce the disease state. We are focusing on creating a clinical proof-of-concept (POC) via building fundamental data for clinical trials and conducting translational research. We are also working on the development of biomarkers for the early detection of pancreatic cancer, focusing on nucleic acids and protein fragments contained in body fluids (serum or urine).

Research characteristics

In our research work, novel therapies and biomarkers have been developed on interpretation of combining clinical samples and information, gene analyses, and various Omics information through collaborations with many external research institutes and drug discovery companies, which are built on the elucidation of the molecular mechanism of the crosstalk between tumor-induced inflammation and host reaction. The framework of a successful POC needs biological and clinical strategy, appropriate experimental animal models to test POC and clinical evaluation of POC using clinical data and samples. Our achievements indicate that we have the ability for doing or consulting the implementation of POC in pancreatic cancer. Moreover, our achievements include the biomarker research for early detection of pancreatic cancer. We would like to discuss various seeds for solution or detective-biomarker of pancreatic cancer-related difficulties as early detection, inflammation, desmoplasia, chemo-refractory, anorexia and cachexia.

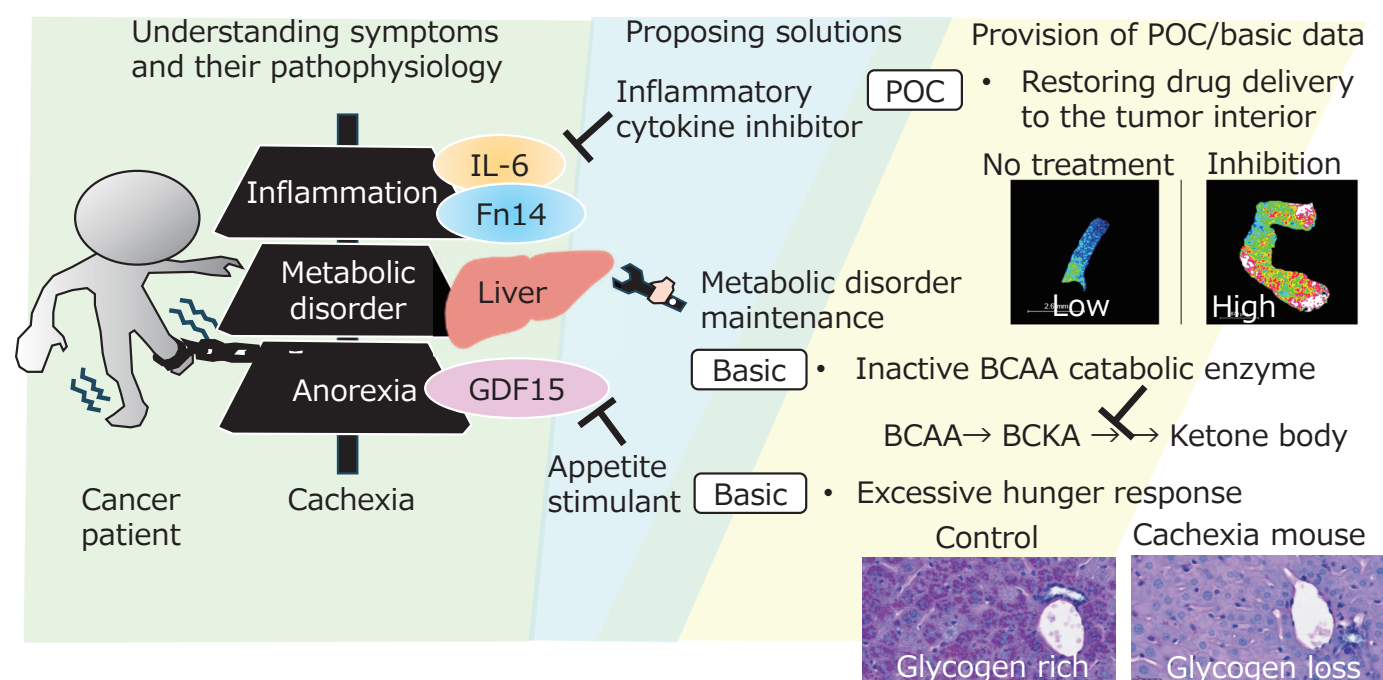
Potential research technical cooperation

- ◆ Clinical samples and data enable multi-omics analysis of pancreatic cancer, including protein lysate, nuclei acid and formalin-fixed paraffin-embedded samples from tissue, sera, plasma, symptoms on questionnaires, and treatment outcomes.
- ◆ Unique animal models mimicking cachexia and tumor-microenvironment
- ◆ Designing a research plan to obtain clinical POC

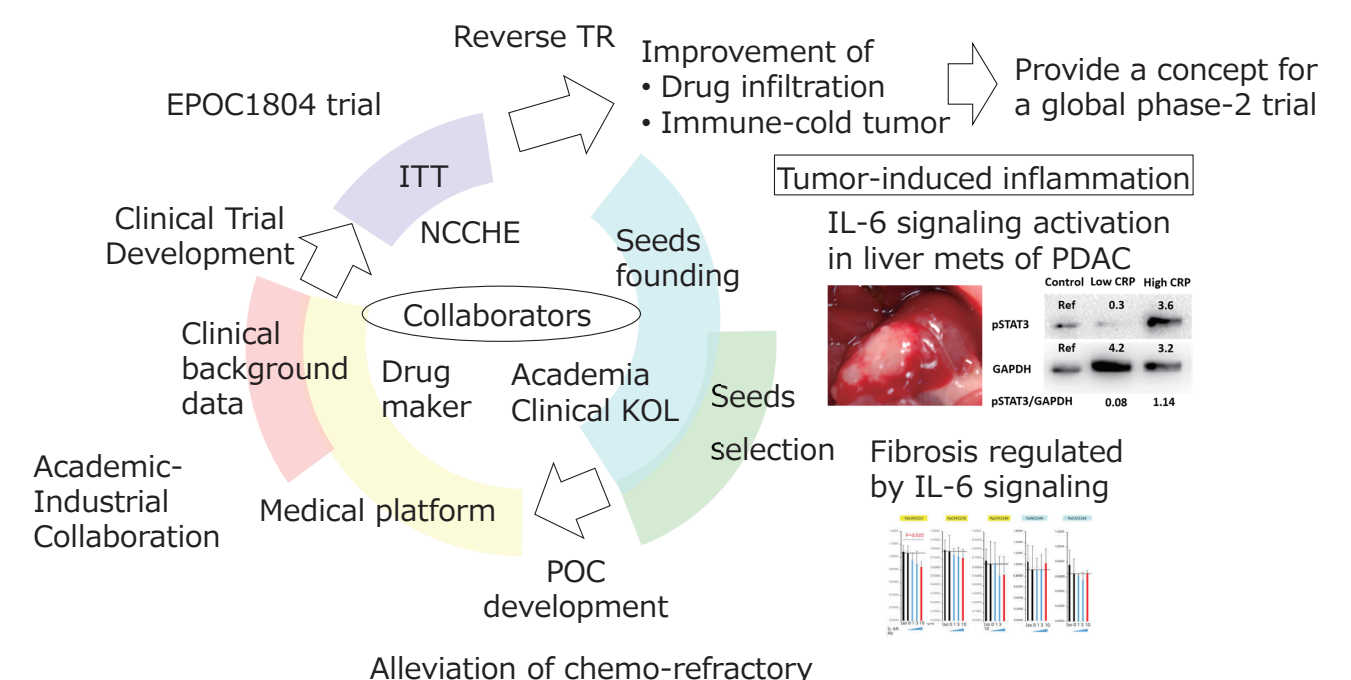
Future research prospects

We believe that clarifying the clinical significance of seeds from the beginning of research can increase the chances of them being applied clinically. Regarding the potential usefulness of pharmaceutical or diagnostic seeds proposed by companies and academia, we pre-evaluate the clinical benefits and methods of developing them as drugs from the perspective of the crosstalk between tumor-induced inflammation and host reaction, and work together to take the next step, aiming to obtain clinical POC in a short period of time.

Proposal for cancer symptom-based treatment



Case: Inflammatory cytokine inhibitor



Development of novel therapeutic drugs for leukemia

From understanding molecular mechanism to developing molecular-targeted drugs

- ▶ Basic research utilizing the leukemia-developing mouse models induced by MLL fusion genes
- ▶ Identification of novel therapeutic targets based on the molecular mechanism of leukemia
- ▶ Epigenome analysis using original chromatin immunoprecipitation methodologies

Research background

Leukemia is a major type of pediatric cancer. As it cannot be surgically resected, the development of molecular-targeted drugs with few adverse side-effects is strongly desired. Recently, oncogenesis-related gene alterations have been studied by exhaustive genome analysis, which realized the selection of therapeutic drugs and prediction of therapeutic efficacy for each gene alteration. In addition, leukemia subtypes prone to be refractory or exhibit resistance are also elucidated. By using the mouse leukemia model induced by MLL fusion gene which mimics human refractory leukemia, we are working to elucidate the mechanism of leukemia and develop novel molecular-targeted drugs.



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URL : https://www.ncc.go.jp/en/epoc/division/translational_genomics/kashiwa/index.html ▶



Research characteristics

Our team examines the function of individual oncogenes by using the hematopoietic precursor cells to which various oncogenic driver genes are introduced. In particular, we have studied the molecular mechanism of leukemia caused by MLL fusion genes and also identified the key MLL target genes for drug discovery. In addition, since the driver genes of leukemia often code for transcriptional regulators, we developed highly sensitive chromatin immunoprecipitation methodologies, which are greatly useful for the promotion of epigenome research. Recently, we began to understand that the oncogenic mechanism we have discovered in leukemia is also implicated in other types of cancer such as Wilms tumor.

Potential research technical cooperation

- ◆ Leukemia model in normal immune mice
- ◆ *Ex vivo* culture system using primary-cultured bone-marrow precursor cells
- ◆ Original highly-sensitive chromatin immunoprecipitation methods

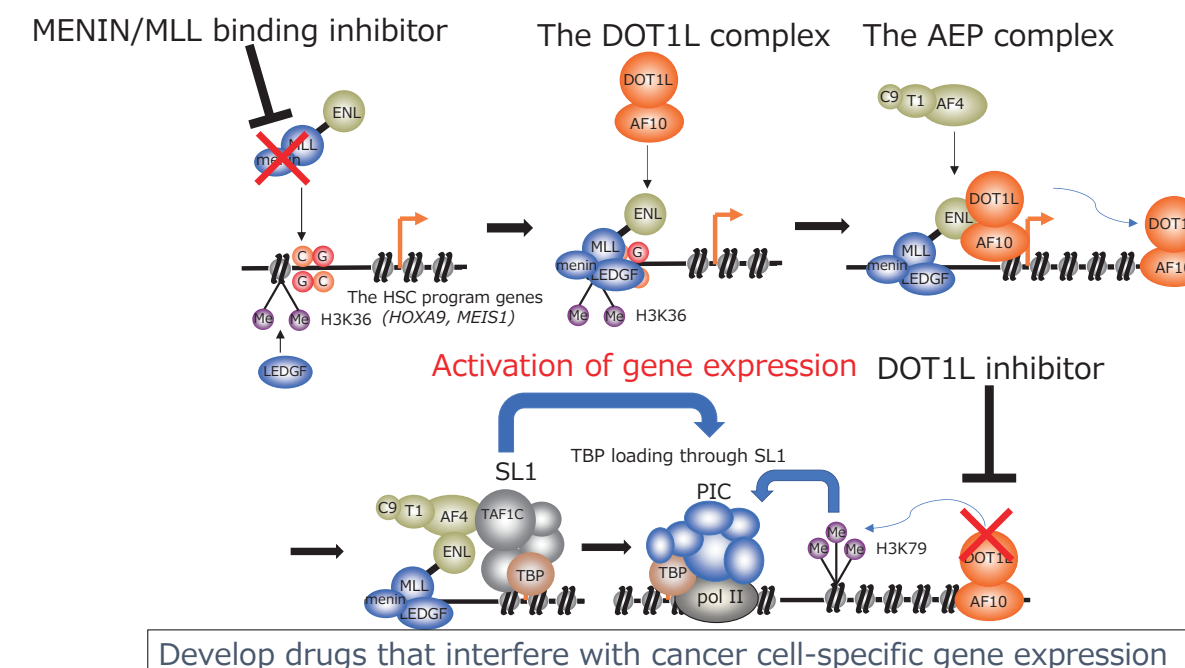
Future research prospects

We established mouse leukemia models by using the primary hematopoietic cells to which various oncogenic driver genes are introduced. By clarifying the detailed mechanisms through the full use of our original technologies, we aim to produce novel therapeutic drugs for high-malignant leukemia which cannot be treated completely with the current therapeutics.

Leukemia model



Development of Molecularly Targeted Drugs



Drug discovery targeting chromosomal instability of cancer vulnerability

Chromosomal instability-mediated cellular stress and cancer drug discovery

- ▶ Target discovery in newly-established cancer models of chromosomal instability
- ▶ Drug discovery targeting DNA replication stress
- ▶ Biomarker seeking for novel molecular-targeting therapies, integrating multiple-layer data package of multi-omics analyses

Research background

A key to success for molecular targeting cancer therapies is how accurately we could shoot the right targets, which are tightly connected to cancer hallmarks and vulnerabilities. Focusing on a pillar of cancer hallmarks “chromosomal instability”, we are currently investigating, 1) stress response pathways caused by chromosomal instability (polyploid-/aneuploid-mediated stress responses), 2) adaptive mechanisms of cancer cells against the polyploid-/aneuploid-mediated stress, and 3) correlation between the adaptive mechanisms against chromosomal instability and drug sensitivity/resistance (the adaptive mechanisms and cancer vulnerability). We aim to develop novel cancer therapeutics and innovative therapeutic strategies on chromosomal instability-mediated cancer vulnerabilities.



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Research characteristics

We are aiming to identify the vulnerability factors of chromosomal instability in cancer cells. Given that cancer cells manage to survive overcoming antiproliferative pressures of chromosomal instability, these vulnerability factors are expected to be “Achilles’ heel” in cancer cells, thus could be potential target molecules for the molecular-targeting therapies. We have successfully established various chromosomal instability cancer models using small molecule inhibitors as chemical tools. Utilizing these original models in the light of clinical information, we are investigating biological significance of chromosomal instability in cancer to identify the vulnerability factors. cells on basic and translational researches. In collaboration with talented researchers, we are energetically conducting a number of research programs integrating the cutting-edge technologies: multi-omics analyses of transcriptome or metabolome, chemical biology, pharmacology, cell biology, bioinformatics, and computational biology.

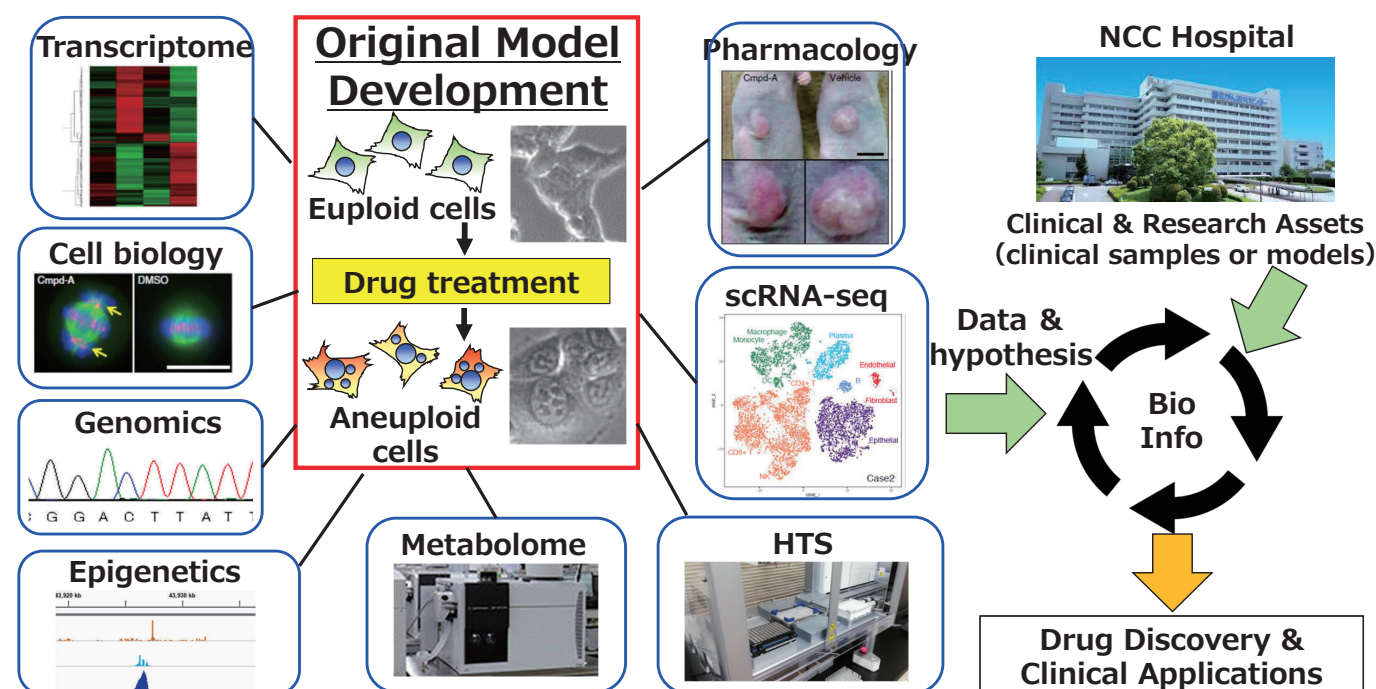
Potential research technical cooperation

- ◆ Chromosomal instability cancer models ◆ Multi-omics data in chromosomal instability cancer models
- ◆ Single-cell RNA analysis in cell lines and/or clinical specimens
- ◆ Screening analysis data in reference compound libraries (~3,400 cmpds)

Future research prospects

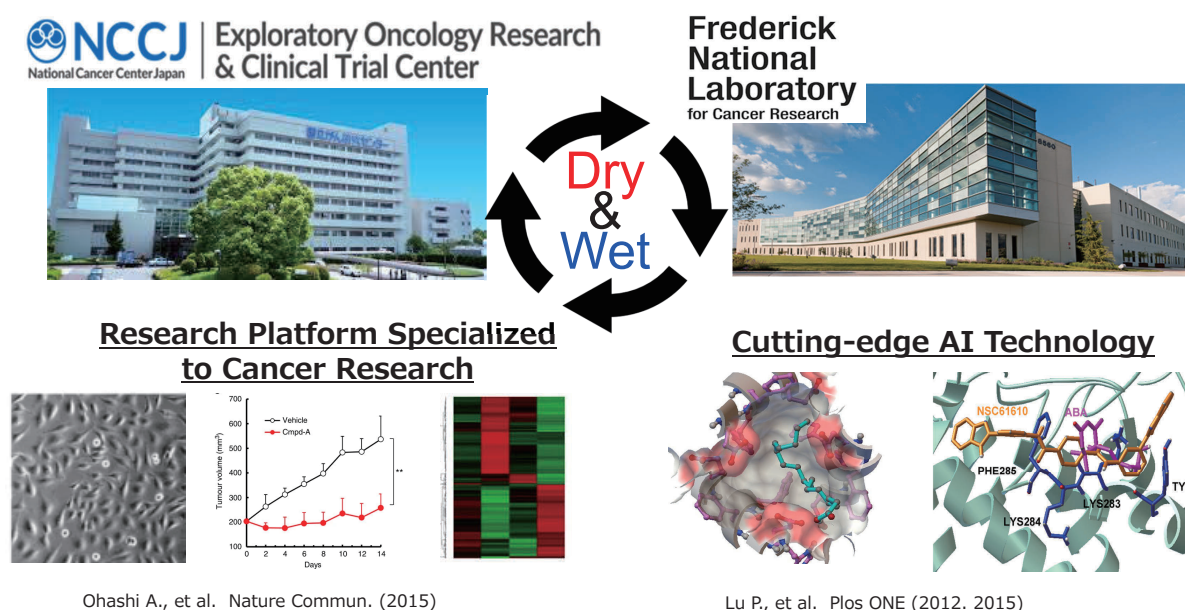
Integrating our cutting-edge technologies for basic, translational, and clinical researches, we commit to inspire the research innovation of cancer biology to be a world-leading cancer research laboratory. We also commit to contribute to development of the next generation of innovative cancer therapeutics originated in Japan.

Chromosomal Instability and Drug Discovery



Challenge for AI-Driven Drug Discovery

-Research Collaboration with FNLCR-



Immunotherapy targeting unique cancer antigens

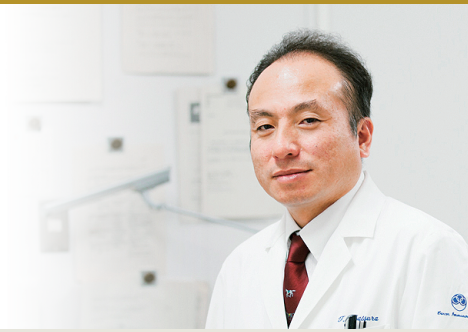
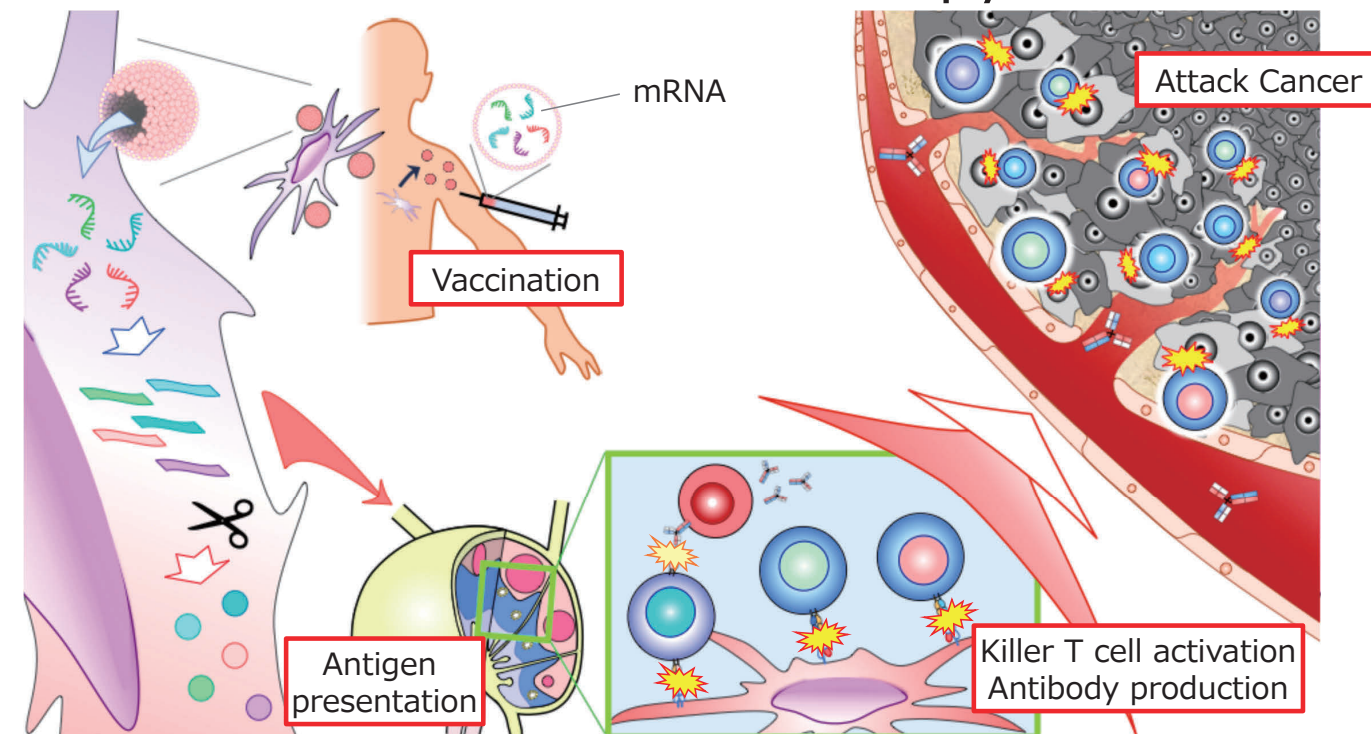
mRNA vaccine therapy and CAR/TCR-T cell therapy

- ▶ Universal cancer antigen cocktail mRNA vaccine therapy
- ▶ Cocktail CAR-T cell therapy targeting universal cancer antigens
- ▶ Personalized cocktail TCR-T cell therapy targeting universal cancer antigens

Research background

While mRNA vaccines have been a great success in developing a COVID-19 vaccine, no cancer vaccine therapy has been approved, and there is currently a global race to create one. In clinical development of T cell therapy, such as CART and TCR-T, Japan is lagging far behind the United States, China, and Europe. None has shown efficacy in solid tumors; this is also a global competition. On the other hand, CAR/TCR-T cell therapy has many problems, including high cost, complexity, and safety concerns, and there are few clinical trials in Japan, so it has not become widespread.

mRNA vaccine therapy



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Research characteristics

Our laboratory has selected 10 common cancer antigens that broadly cover solid tumors. In addition to developing cancer mRNA vaccine therapy that combines these common cancer antigens, we are also developing a low-cost, simple, and safe T cell therapy in which multiple CARs or TCRs that target these common cancer antigens are transiently expressed in T cells and administered. We aim to prevent cancer recurrence through the development of cancer vaccine therapy, and to extend life even in advanced or recurrent cancer through the development of CAR/TCR-T cell therapy.

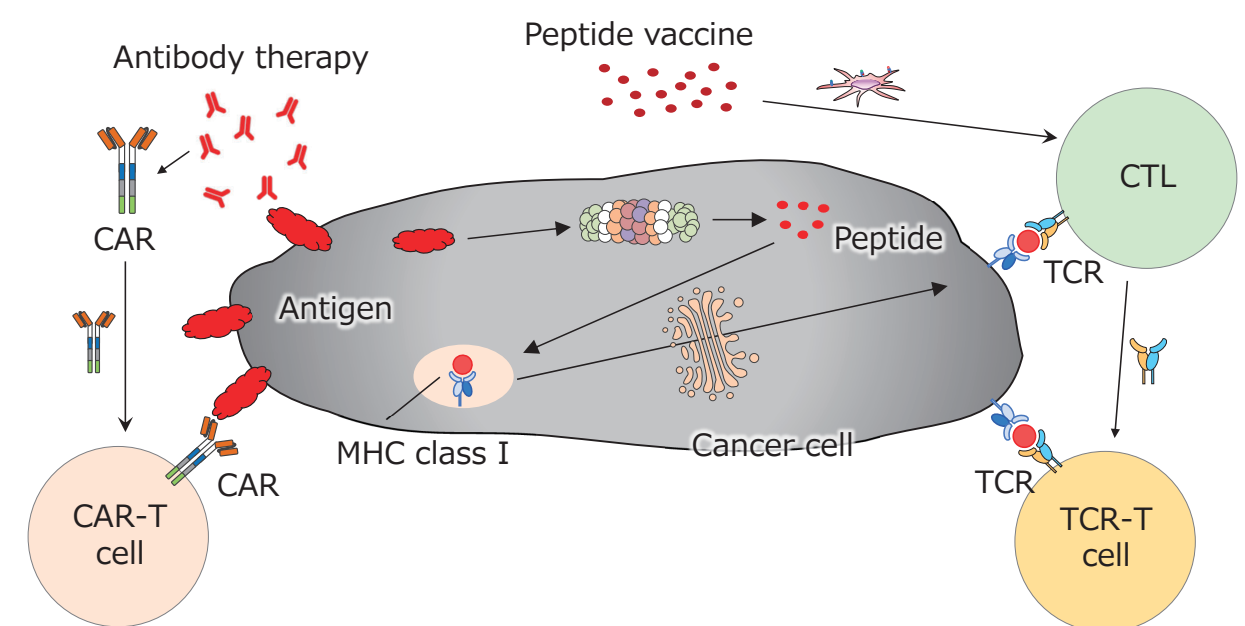
Potential research technical cooperation

- ◆ Cancer vaccine therapy
- ◆ CAR/TCR-T cell therapy
- ◆ Diagnosis of cancer recurrence risk using blood

Future research prospects

In Japan, one million people are diagnosed with cancer every year, and 400,000 die from it. We want to bring that number as close to zero as possible. We will continue to develop new treatments, while also considering the launch of startups that develop cocktail mRNA vaccine therapy and cocktail CAR-T cell therapy.

CAR/TCR-T cell therapy



Development of Immuno-Cell Medicines for Cancer Therapy

Establishment of an off the shelf immuno-cell platform



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- ▶ Development of Effector Cell Therapies
- ▶ Establishment of an antigen-presenting cell platform
- ▶ Development of cellular medicines that regulate the cancer microenvironment

Research background

In recent years, immuno-cell therapy, which eliminates cancer by administering genetically modified immune cells, has shown excellent therapeutic effects. However, current cancer immuno-cell therapy uses autologous cells obtained by blood collection, which causes problems such as the fact that the therapeutic effect varies from patient to patient and that the number of cells is insufficient for the treatment. Therefore, we are developing cell preparations that can be provided without relying on patient blood collection. In particular, we are working on methods to induce effector cells and myeloid (bone marrow) lineage cells from induced pluripotent stem cells (iPSCs), as well as on improving therapeutic efficacy using these cells.

Research characteristics

To provide off-the-shelf immuno-cell medicine, we are developing universal type effector cells. Meanwhile, we are also developing a technology to efficiently activate cancer-reactive T cells by loading iPSC-derived antigen-presenting cells with cancer antigen peptides. Recently, we have shown that iPSC-derived myeloid cells can be genetically modified and inoculated into some cancer tissues in mice to induce changes in the cancer microenvironment and induce systemic elimination of cancer through cancer-reactive T cell responses. This system is compatible and synergistic with immune checkpoint inhibitors.

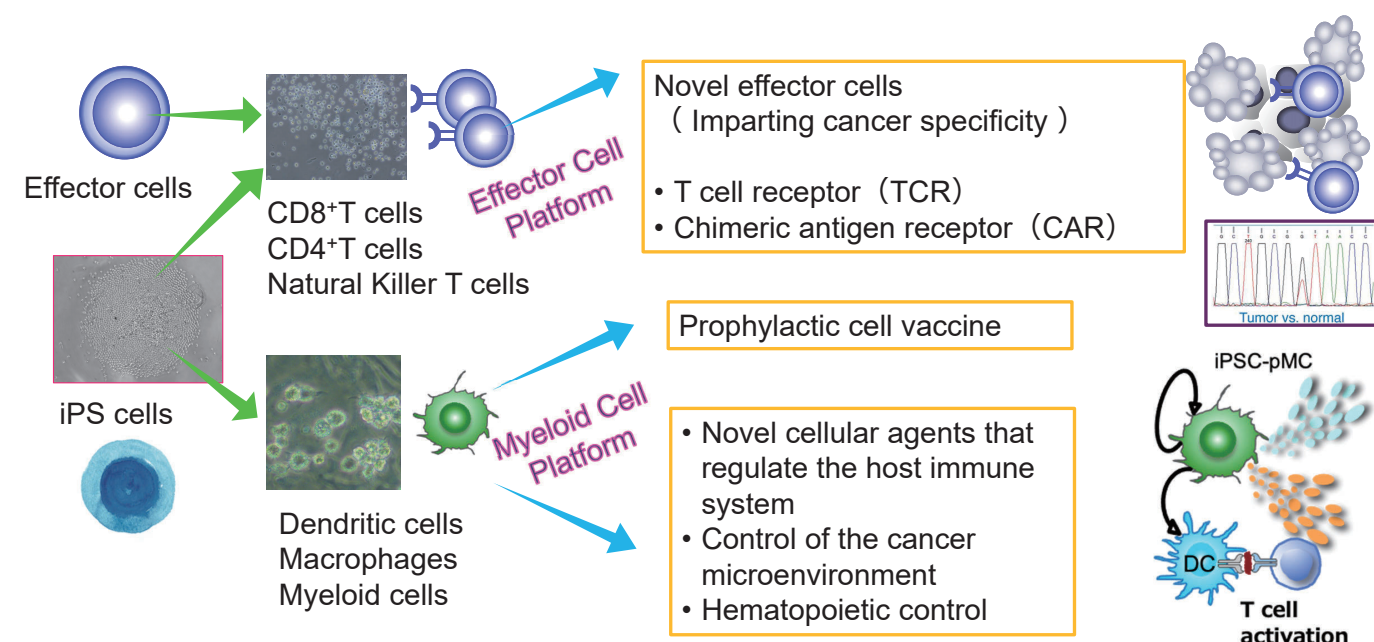
Potential research technical cooperation

- ◆ Technology for constructing universal type effector cells that transduce cancer antigen receptors
- ◆ iPSC-derived myeloid cell-based cell construction technology for cancer therapy
- ◆ iPSC-derived myeloid cell construction technology to induce T-cell infiltration in cancer tissue

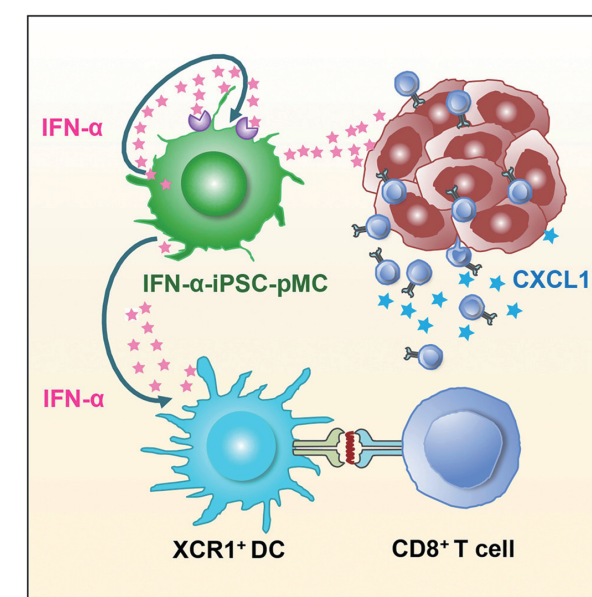
Future research prospects

Our research results have the potential to become a cellular medicine that can be produced in large quantities without the need for blood collection from cancer patients and with stable efficacy by utilizing universal type effector cells and iPSCs. We aim to clarify the efficacy in a mouse model and to construct a cellular drug product that can be administered to humans for practical use.

Genetically engineered immune cells



Type 1 IFN delivery using iPSC-derived myeloid cells



1. Induction of type 1 IFN response gene expression in cancer tissue
2. Promotes T cell infiltration
3. Activation of cancer-reactive T cells
4. Improved anti-tumor effect when combined with immune checkpoint inhibitors

Tsuchiya N. and Zhang R. et al.
Cell Rep. 29: 162-175, 2019

Development of New Patient Stratification Techniques and Drugs

Establishment of analysis techniques for immune cells that reflect the tumor microenvironment

- ▶ Techniques for examining immune cells in the tumor microenvironment
- ▶ Identification of patient stratification markers based on the characteristics of various types of immune cells
- ▶ Provision of analysis techniques for immune cells (particularly immunosuppressive cells)

Research background

As genetic analysis becomes a common strategy, personalized medicine based on genetic analysis data on cancer cells is now being applied into the clinic. At present, therapeutic agents, molecular-targeted reagents are prescribed to patients on the basis of the genetic analysis results of cancer cells, including EGFR mutations, ALK fusion gene expression; however, data from cancer cell genetic analysis are insufficient to determine the appropriate immunotherapy for many patients. Thus, the Division of Cancer Immunology focused not only on cancer cells but also on tumor-infiltrating immune cells for the optimal application of cancer immunotherapy based on the combination of genetic and immune analyses. We apply immune cell analysis techniques to identify new patient stratification markers and will contribute to the development of personalized medicine via new drug development activities.



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Research characteristics

It was difficult to accurately understand the condition of immune cells in the tumor microenvironment because of the difficulty to collect sufficient amounts of samples from tumor tissues. The utilization of new techniques that we developed has enabled the extraction of immune cells while maintaining the phenotypes and functions of immune cells in the tumor microenvironment. Furthermore, using this technique, we have identified new patient stratification markers on the basis of the expression of immune cell molecules and have prospectively evaluated their clinical benefits. We mainly focus on clarifying the immunosuppressive mechanisms of regulatory T cells (such as CD8 positive T cell anergy) and are committed to the development of new cancer immunotherapy.

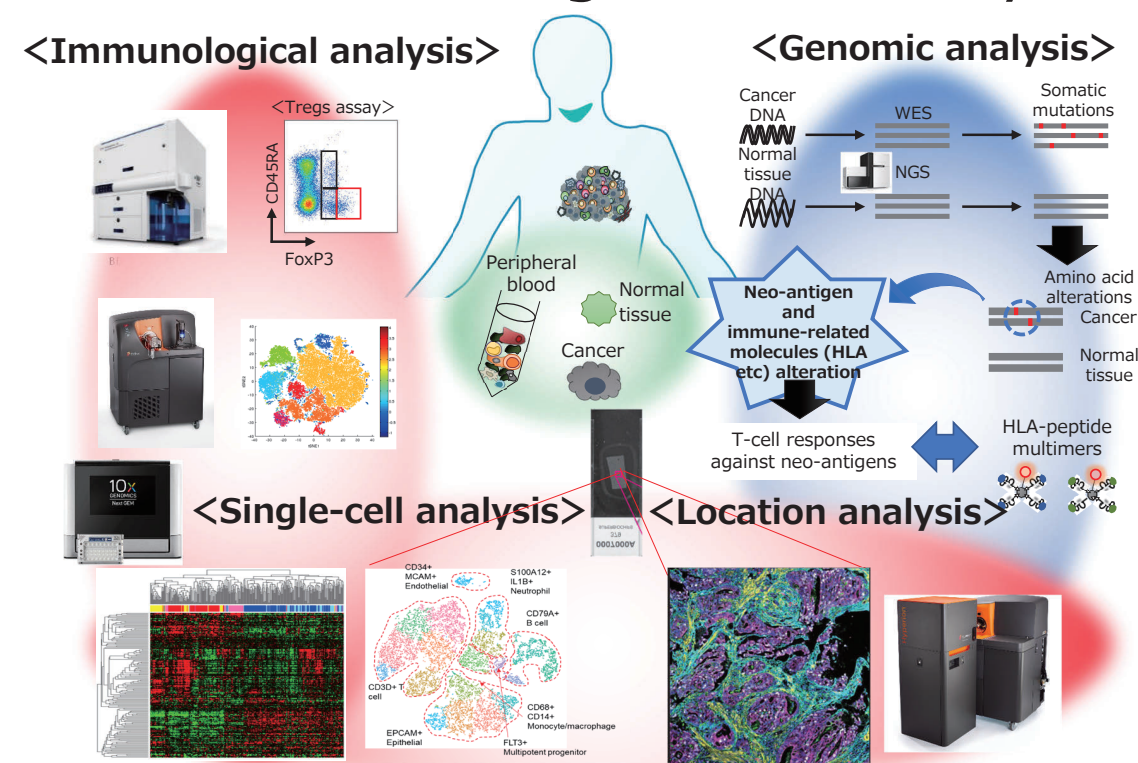
Potential research technical cooperation

- ◆ Techniques for extracting the immune cells reflecting the tumor microenvironment
- ◆ Analysis of patient stratification markers based on the analysis of immune responses in the tumor microenvironment
- ◆ Provision of various immunoassay techniques by focusing on regulatory T cells for drug discovery research

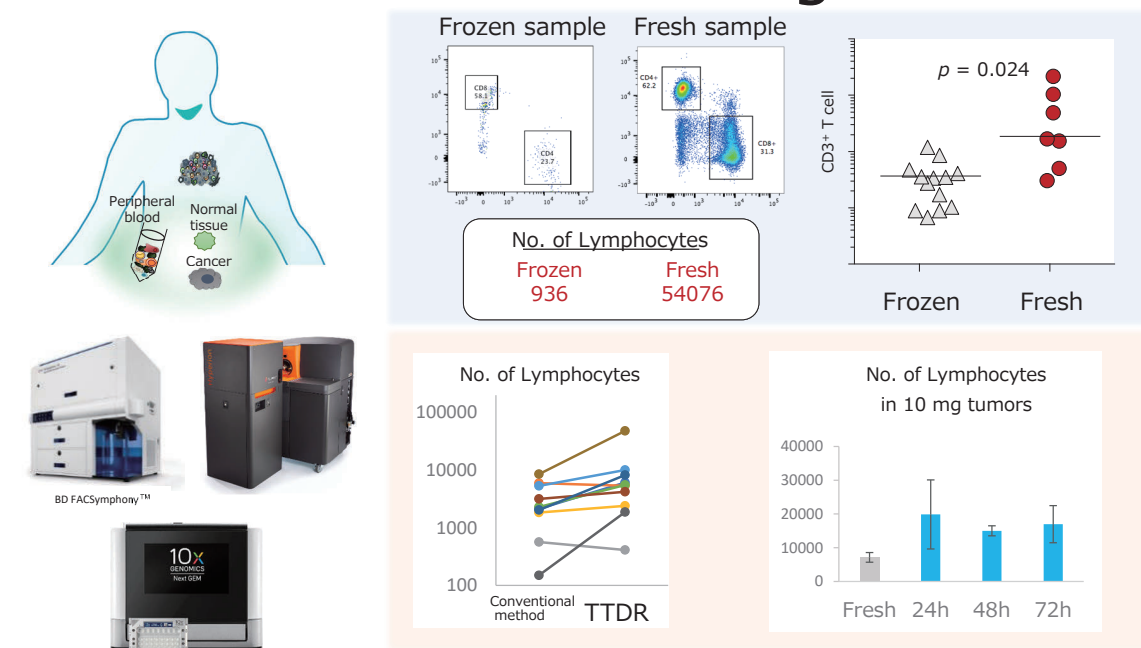
Future research prospects

The current cancer immunotherapy is not effective for all cancer patients since cancer cells employ various immunoselection strategies characterized by the loss of highly immunogenic antigens and by the establishment of immune suppressive mechanisms. We will integrate the genetic analyses about cancer cells and immune cells and their positional information inside the tumor and clarify the roles of immune cells in the entire tumor microenvironment to develop effective treatment options.

Immuno-genome assay



Establishment of Immuno-genome assay



Sufficient amount of cells can be prepared for Immuno-genome assay

Identification of Immunosuppressive Mechanisms in Tumors and Application to Novel Immunotherapy

The development of novel immunotherapy by analysis of the tumor microenvironment

- Analysis of immune cell profiles using human clinical specimens
- Evaluation of the effects of therapeutic agents on immune cells using tumor-bearing mouse models
- Functional analysis of immune cells

Research background

Immunotherapy such as PD-1/PD-L1 inhibitors and CTLA-4 inhibitors have dramatically improved the prognosis of cancer patients. In order to increase the number of patients who can maintain long-term response to immunotherapy, it is essential to conduct precise analysis of tumor cells and tumor microenvironment, and develop combined immunotherapy based on the analytical results. In addition to genomic analysis of tumor cells, we aim to identify therapeutic target cells and molecules through multifaceted profiling of the tumor microenvironment, including immune cells, cancer-associated fibroblasts, metabolic environment, microbiome, etc.

Research characteristics

Using techniques such as flow cytometry, multiplex immunostaining, and single-cell RNA sequencing, we are analyzing peripheral blood and tumor specimens from patients in clinical practice and those enrolled in early-stage clinical trials. In addition, new insights into therapeutic agents obtained from specimen analysis are validated using tumor-bearing mouse models. In particular, we are focusing on tumor immune responses by acquired immunity such as CD8⁺ T cells and regulatory T cells.

Potential research technical cooperation

- ◆ Characterization of peripheral blood and tumor-infiltrating immune cells by flow cytometry and multiplex immunostaining.
- ◆ Detailed profiling of the tumor microenvironment by single cell RNA/TCR sequencing.
- ◆ Evaluation of the effects of therapeutic agents on immune cells using mouse models.

Future research prospects

From the perspective of basic and translational research, our goal is to contribute to the development of next-generation drugs and the discovery of patient stratification markers to bring promising treatments to patients.

Kota Itahashi, MD, PhD

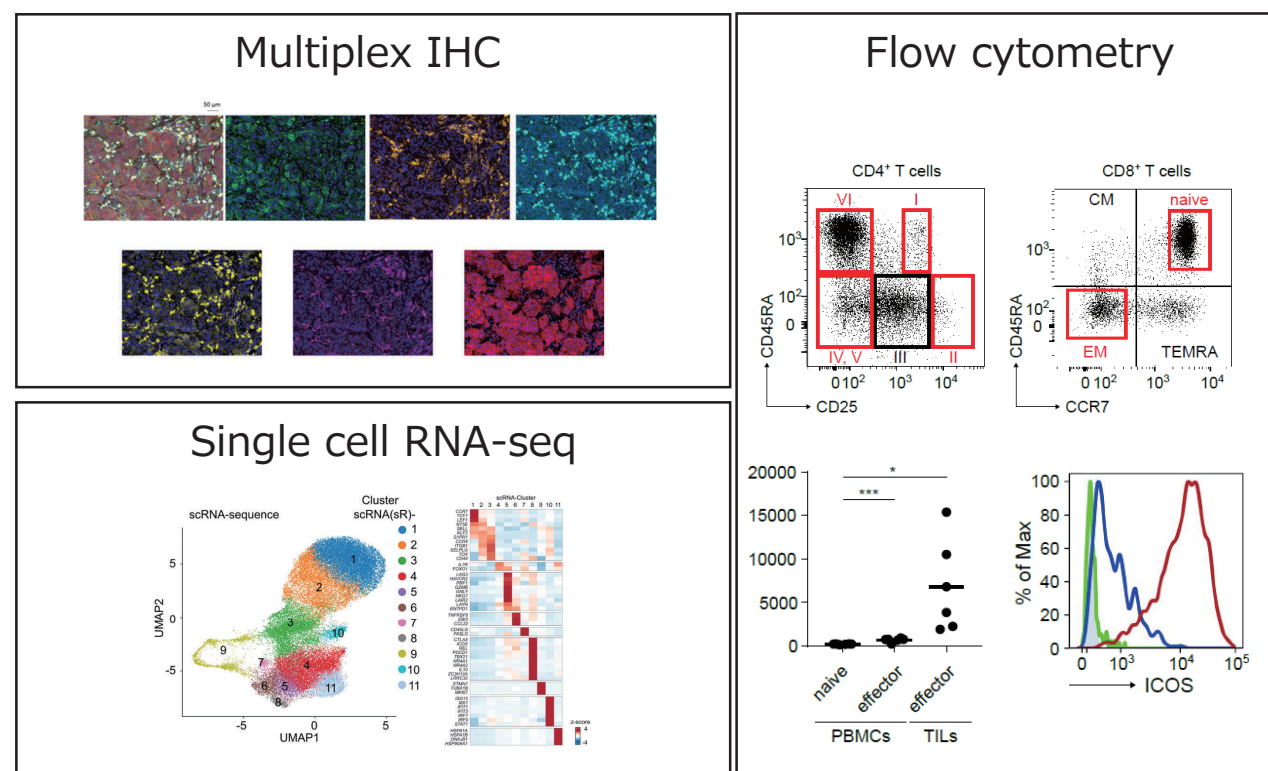
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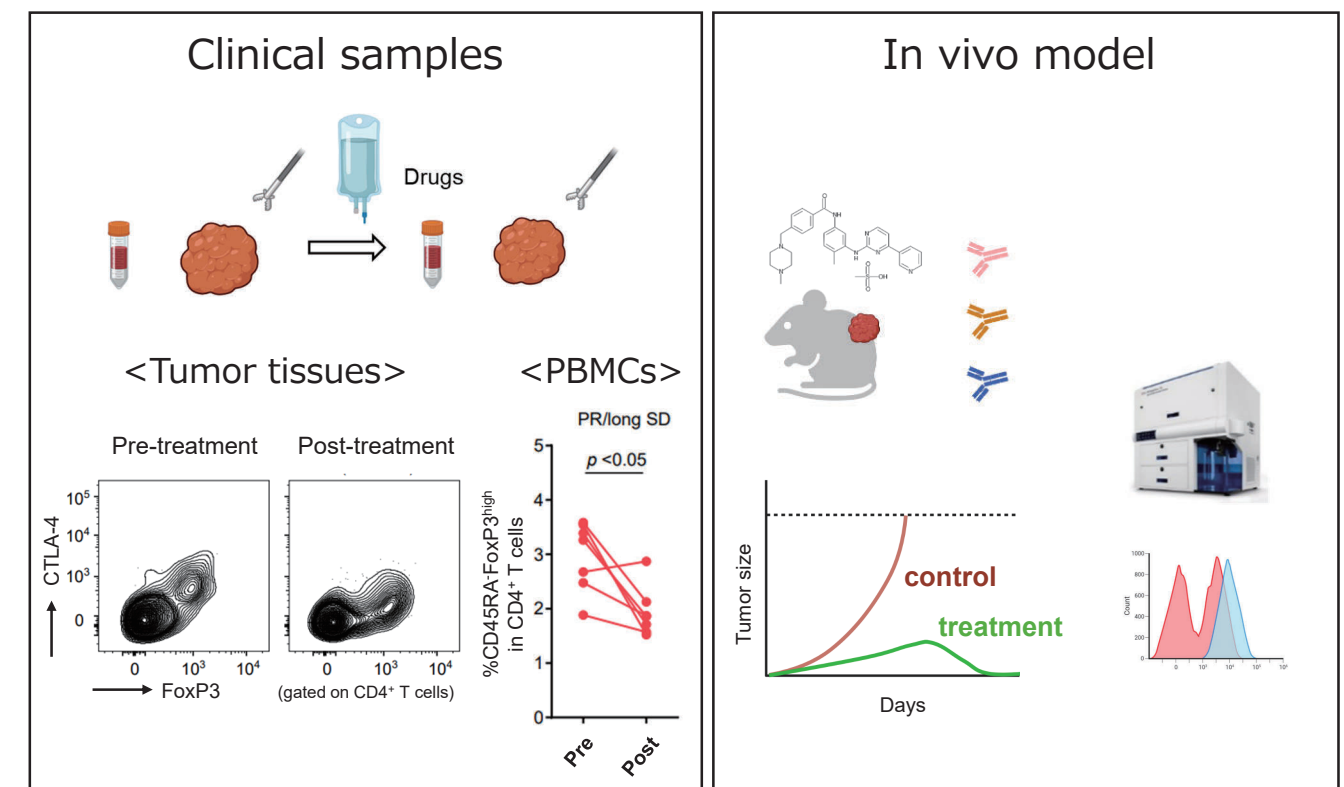
URL : <https://www.ncc.go.jp/en/epoc/division/immunology/kashiwa/index.html>



Evaluation of immune cells in tumors



Effects of drugs on immune cells



Cancer Pathology for Drug Development

From Target Discovery to Biomarker Identification in Drug Development Pipeline



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- ▶ AI-based quantification of histopathological information
- ▶ Exploratory analysis using spatial omics
- ▶ Development of pathology-related technologies

Research background

In recent years, drug modalities and mechanisms of action have become increasingly complex. As a result, simple genome sequencing or conventional IHC alone is often insufficient for target discovery or biomarker-based stratification of investigational drugs. Cancer tissues contain highly complex, high-dimensional information formed by the spatial arrangement of diverse cell types. AI-based quantification of cancer histopathology and spatial omics approaches now make it possible to identify novel therapeutic targets and biomarkers for investigational or approved products, including complex biologics, that were previously difficult to detect.

Research characteristics

Our research visualizes and quantifies the overall landscape of the cancer tissue microenvironment using spatial genomics and proteomics profiles. By identifying key cellular and molecular interactions within this environment, we aim to discover therapeutic targets based on novel mechanisms and identify biomarkers for complex biologics. Histopathological images contain rich, high-dimensional information derived from the spatial arrangement of various cell types. We develop deep learning methods that extract clinically important biological meaning from these images and convert it into quantitative high-dimensional features. We also develop foundational and related technologies for tissue processing and image acquisition that enable these analyses.

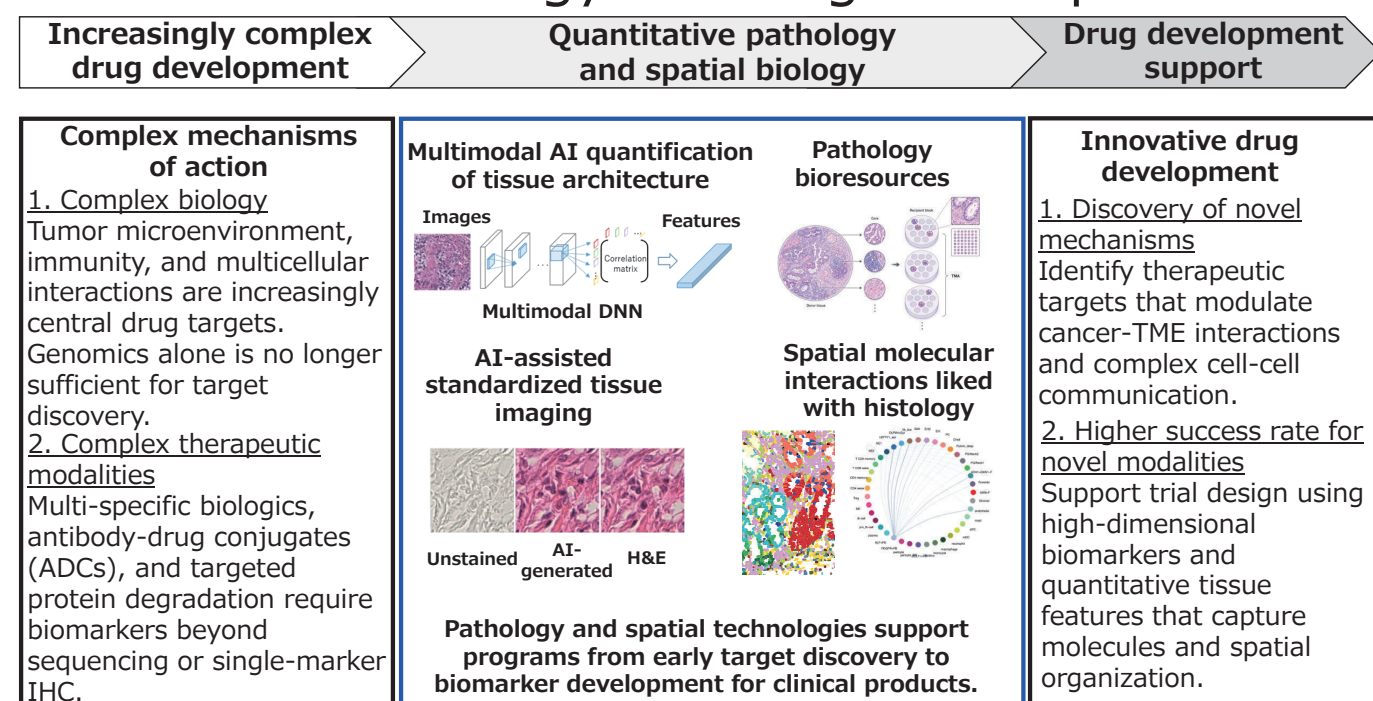
Potential research technical cooperation

- ◆ AI-based quantitative analysis of histopathological images
- ◆ Spatial omics profiling of cancer tissues
- ◆ Tissue processing and imaging technologies for pathology data acquisition

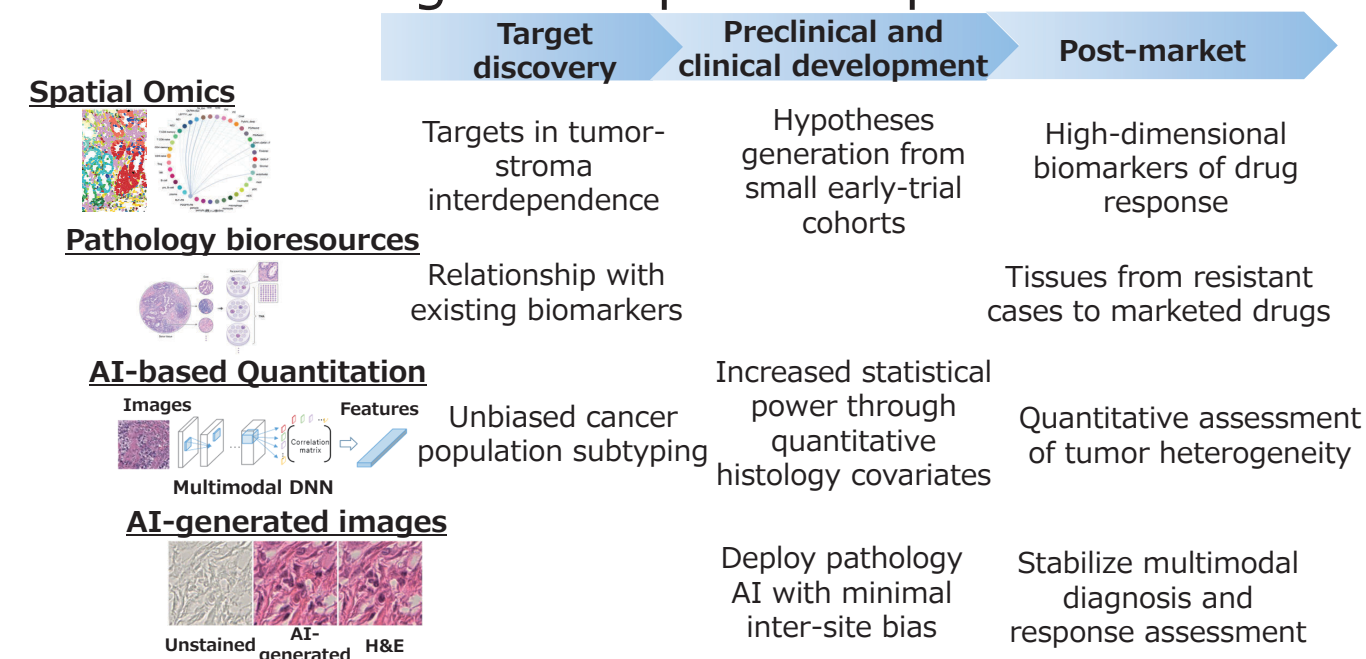
Future research prospects

By converting complex information traditionally interpreted by pathologists into quantitative data, integration with other clinical information will become easier, enabling multimodal diagnosis. This approach may also support clinical studies and trials in which previously difficult-to-define subclasses are quantitatively characterized based on tissue morphology.

Cancer Pathology for Drug Developments



Pathology and Spatial Applications Across the Drug Development Pipeline



Advancing Cancer Therapy with Next-Generation Pathology

Unleashing data-driven insights through the power of pathology and technology

- Decoding humoral tumor immunity through B-cell immune repertoire analysis
- Mapping cancer heterogeneity and molecular mechanisms with scRNA-seq and spatial analysis
- Creating innovative cancer therapies by data-driven elucidation of cancer molecular mechanisms

Research background

Tumors are not composed of cancer cells alone. They harbor diverse populations—including fibroblasts, immune cells, endothelial cells, and neurons—that coexist and dynamically interact. These cells establish aberrant interdependencies absent in normal tissues, collectively supporting tumor initiation, growth, immune evasion, and metastasis. My aim is to decode the hidden molecular rules and spatial control mechanisms of these multicellular networks, to redefine cancer as an “abnormal tissue,” and to exploit or target its structural and functional vulnerabilities for the development of new therapeutic strategies.



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Research characteristics

The foundation of my research is histopathology. By proactively integrating advanced technologies such as single-cell analysis, immune repertoire profiling, and spatial transcriptomics, I seek to visualize cancer molecular mechanisms that conventional pathology could not capture. Furthermore, by integrating multilayered, high-dimensional data, I advance a data-driven scientific approach to identify novel therapeutic targets hidden within the tumor microenvironment and translate them into innovative cancer therapies.

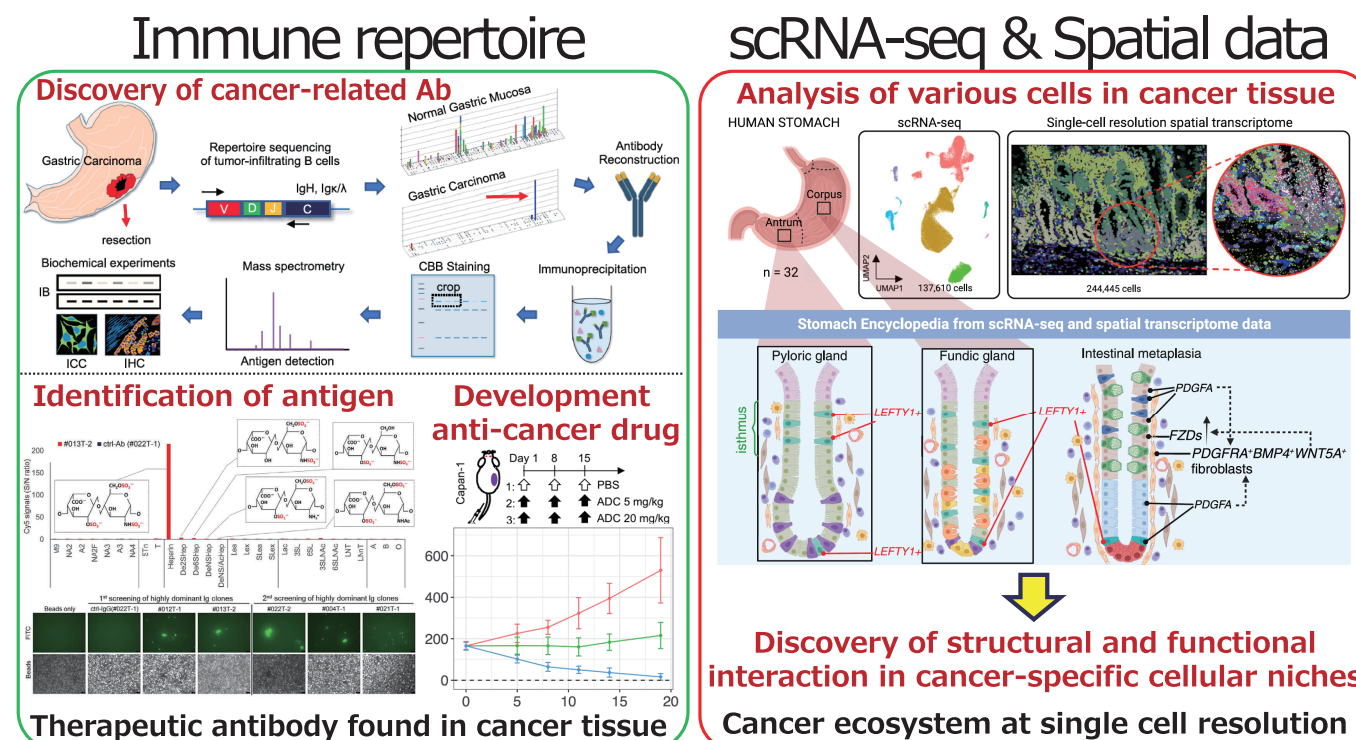
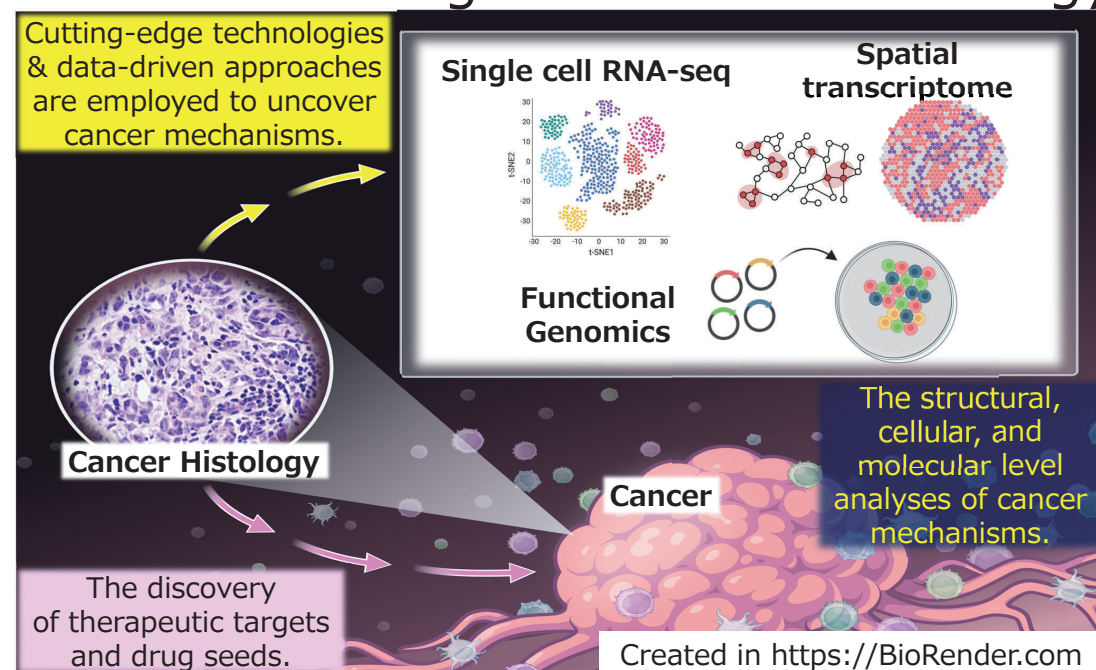
Potential research technical cooperation

- ◆ Immune repertoire analysis
- ◆ Single-cell analysis
- ◆ Functional genomics screening

Future research prospects

By fusing state-of-the-art technologies with histopathology, I aim to elucidate the molecular rules governing the tumor microenvironment and redefine cancer as an “abnormal ecosystem.” Harnessing the power of data-driven science, I seek to identify previously unrecognized molecular mechanisms of cancer and translate them into novel therapeutic strategies.

Data-driven Insights into Cancer Biology



Creating a Foundation for the Dissemination of Pathology AI

Pathology Digital Image Preparation for Pathology AI



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- ▶ Fully automated pathology digital image creation using the Conventional approach
- ▶ Fully automated pathology digital image creation using an evolutionary approach
- ▶ AI development in collaboration with pathologists

Research background

Pathological diagnosis of cancer is made by microscopic examination of pathological tissue by a pathologist, which enables not only diagnosis but also acquisition of basic clinical data such as prognostic factors and stage. However, due to the hurdle of digitization of pathology images and the lack of defined methods for using pathology AI, pathology AI has not yet been widely adopted. In our field, we are conducting research with two methods: one is to spread digitalization by automating all specimen preparation, and the other is to create pathology digital images in a completely new way. We are also aiming to establish the concept of AI that collaborates with pathologists rather than replacing pathology.

Research characteristics

Digitization of pathology images is essential for building AI-assisted pathology diagnosis technology. However, at present, scanning existing slides is a separate task that hinders the widespread use of AI. We are aiming at pathology digitization from both the perspective of automating digitization from specimen preparation (Conventional approach) and using other technologies such as image conversion AI, transparency, and Raman spectroscopy to produce digital images (Evolutional approach). We are also conducting research to establish the concept of AI that collaborates with pathologists rather than replacing pathology.

Potential research technical cooperation

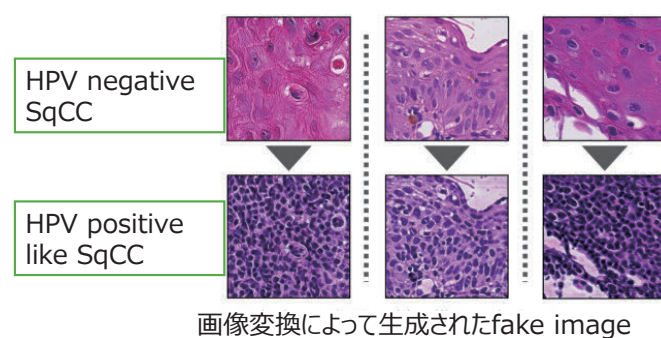
- ◆ Educational programs to develop human resources for AI technology
- ◆ New AI concept to collaborate with pathologists

Future research prospects

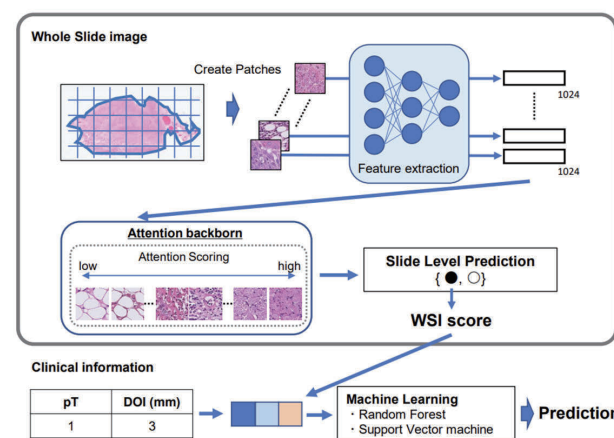
I aim to propose a new approach to the digitization of pathological images by advancing existing digital pathology image production. My goal is to establish a foundation for the widespread adoption of pathology AI. Additionally, I want to develop the concept of AI that collaborates with pathologists rather than replacing them.

AI working with pathologists

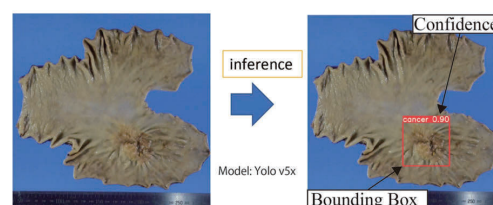
① AI finds new features



② Diagnosis fused by pathologists and AI

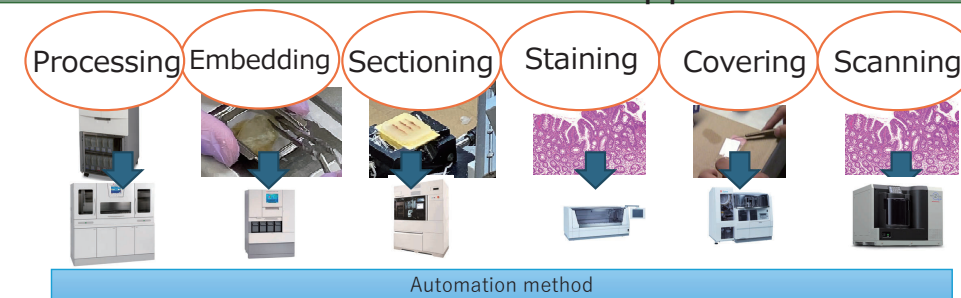


③ Macro cutting assistance AI



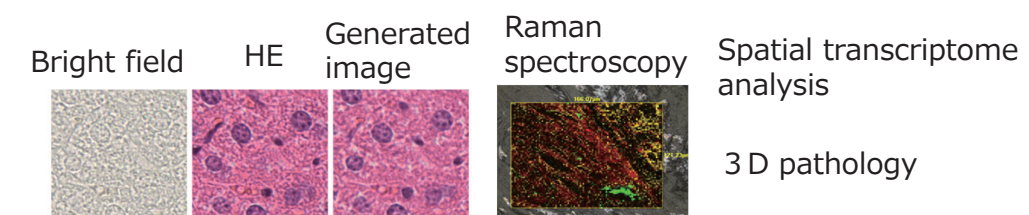
Pathology Digital Imaging Technology

Conventional approach



Approach in a way that automates all existing methods.

Evolutional approach



Approaches to pathology digitization using new methods

Cancer Stem cell research using organoid

Elucidation of the molecular mechanisms by which cancer stem cells acquire resistance to therapy

- Establishment of resistant organoids against anticancer drugs
- Omics analysis using the organoids
- Generation of therapeutic agents targeting cancer stem cells and diagnostic markers of drug resistance

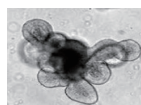
Research background

Cancer stem cells are thought to survive anticancer therapy and play an important role in the acquisition of therapeutic resistance, but the detailed mechanisms are unknown. Organoids are a three-dimensional culture method for stem cells and other cell populations. This culture method has the advantage that it is easy to obtain results similar to those of cancer cells in drug screening, etc., because it is possible to culture cells while maintaining characteristics similar to the cancer cells in the patients in in-vivo. We aim to establish gastrointestinal cancer organoids that are resistant to anti-cancer drugs and to elucidate the molecular mechanisms by which cancer stem cells acquire resistance to anti-cancer drugs.

Establishment of a gastrointestinal cancer organoid library

What is "Organoid"

3D-in vitro culture model established from ES/iPS cells or tissue stem cells

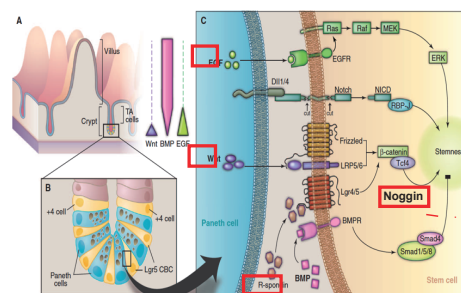


LETTERS

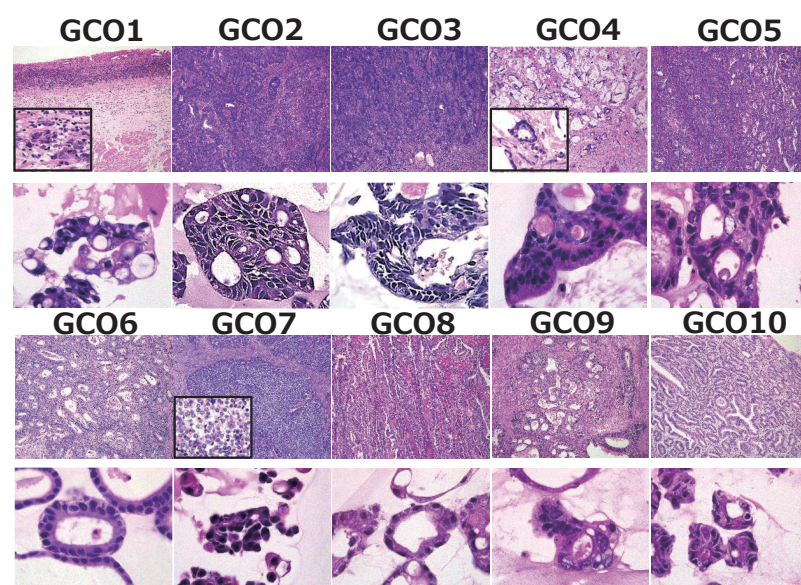
Single Lgr5 stem cells build crypt-villus structures in vitro without a mesenchymal niche

Toshiro Sato¹, Robert G. Vries², Hugo J. Snippert¹, Marc van de Wetering¹, Nick Barker³, Daniel E. Stange⁴, Johan H. van Es¹, Arne Abo¹, Pekka Kujala⁵, Peter J. Peters⁶ & Hans Clevers¹

Sato T, et al.: Nature 459:262, 2009



Sato T, Clevers H. Science 340 (6137): 1190-4, 2013



We have successfully established patient derived organoid library of gastric cancer/colorectal cancer



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Research characteristics

Organoids were established from tumor tissues collected from patients with gastrointestinal cancers (mainly gastric and colorectal cancers). By continuously exposing these organoids to anticancer agents such as 5-FU and platinum, we have established gastrointestinal cancer organoids that are resistant to anticancer agents. These organoid cultures allow us to increase the number of stem cells, which are conventionally scarce, and thus enable omics analysis focused on stem cells. We are currently analyzing gene expression profiles in anti-cancer drug-resistant organoids to identify candidate molecules involved in the acquisition of anti-cancer drug resistance in cancer stem cells.

Potential research technical cooperation

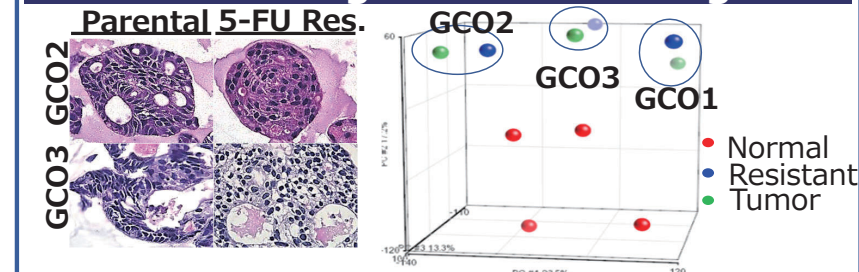
- ◆ Technics concerning organoid culture
- ◆ Provision of organoid library with clinical information of patients

Future research prospects

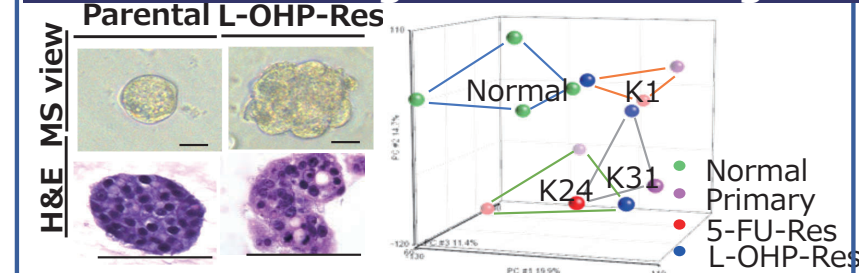
We believe it is important to define the biological features that distinguish cancer stem cells from normal stem cells. In addition, we would like to explore the molecular mechanisms by which not only cancer stem cells but also their surrounding cancer cells may acquire therapeutic resistance upon stimulation from cancer stem cells. Through this research, we aim to create therapeutic agents targeting cancer stem cells and diagnostic markers of therapeutic resistance.

Research on anticancer drug resistance

5-FU resistant gastric cancer organoid



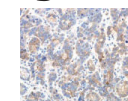
L-OHP resistant gastric cancer organoid



Novel Therapy Targeting Cancer Stem Cells in Gastric Cancer



Novel diagnostic marker for drug resistance in gastric cancer



Medical and Biological Information Extraction from Multi-Omics Data Using AI

- ▶ Integrated analysis of multi-omics data and construction of AI models
- ▶ Information extraction from single-cell and spatial omics data
- ▶ Integrated analysis of microbiome, cancer type, and prognosis

Research background

Tumor cells express traits characteristic of cancer cells under different transcriptional and translational regulation than normal cells. However, there are few reports on what kind of transcriptional and translational regulation they undergo in tumor cells and how they interact with the surrounding environment. In addition to omics information such as the genome, transcriptome, metabolome, microbiome, and proteome, various data such as CT, MRI, and pathological images have been accumulated as large-scale data. It is essential to construct a database and cross-sectional analysis technology to summarize them.



Research characteristics

In the field of spatial omics analysis, we have developed a unique AI technology that identifies distinctive cell clusters within view and accurately measures the expression both inside and outside these clusters. We also excel at related analysis that integrates medical information with sequence data such as DNA, RNA, and metagenomes. Furthermore, we extract regions of interest (ROI) using highly accurate machine learning models in the analysis of pathological images, CT, X-ray images, etc., and construct prognostic models for cancer by integrating multi-omics data.

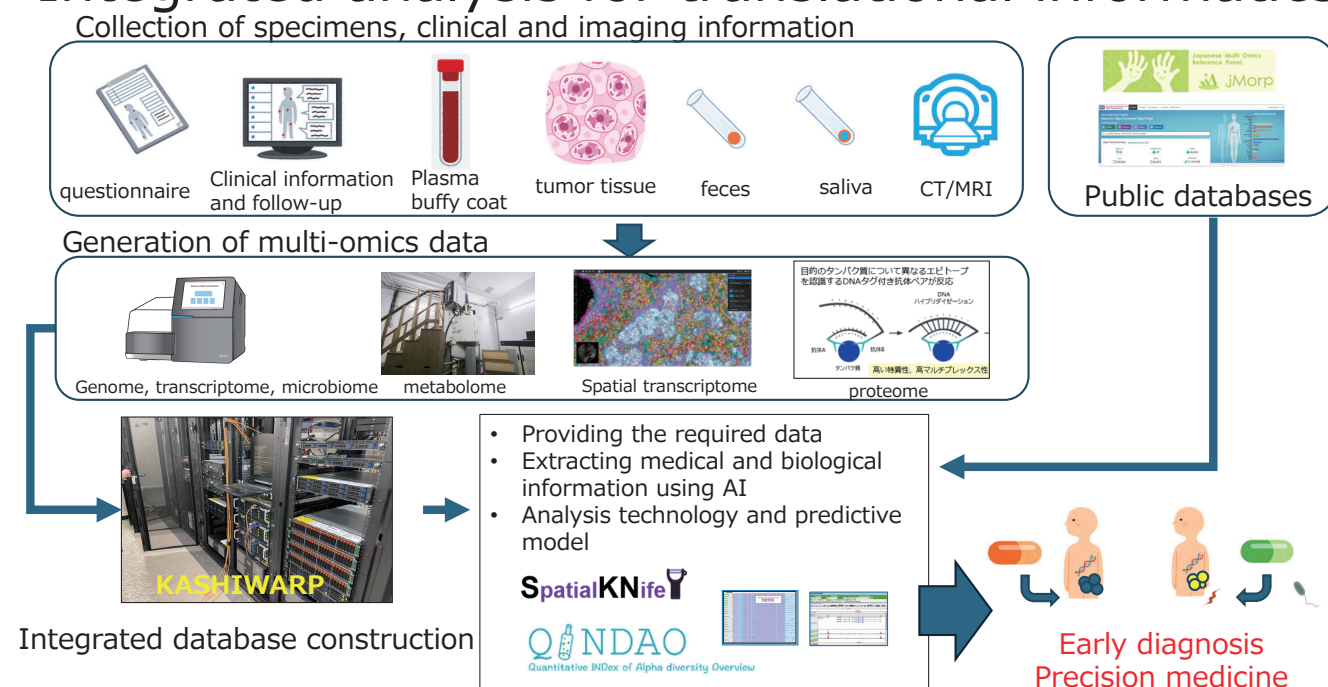
Potential research technical cooperation

- ◆ Multi-omics analysis of genomes, transcriptomes, proteomes, etc.
- ◆ Integrated analysis technology for single-cell and spatial omics data
- ◆ Computational analysis of 16S, shotgun metagenome, and single-cell metagenome

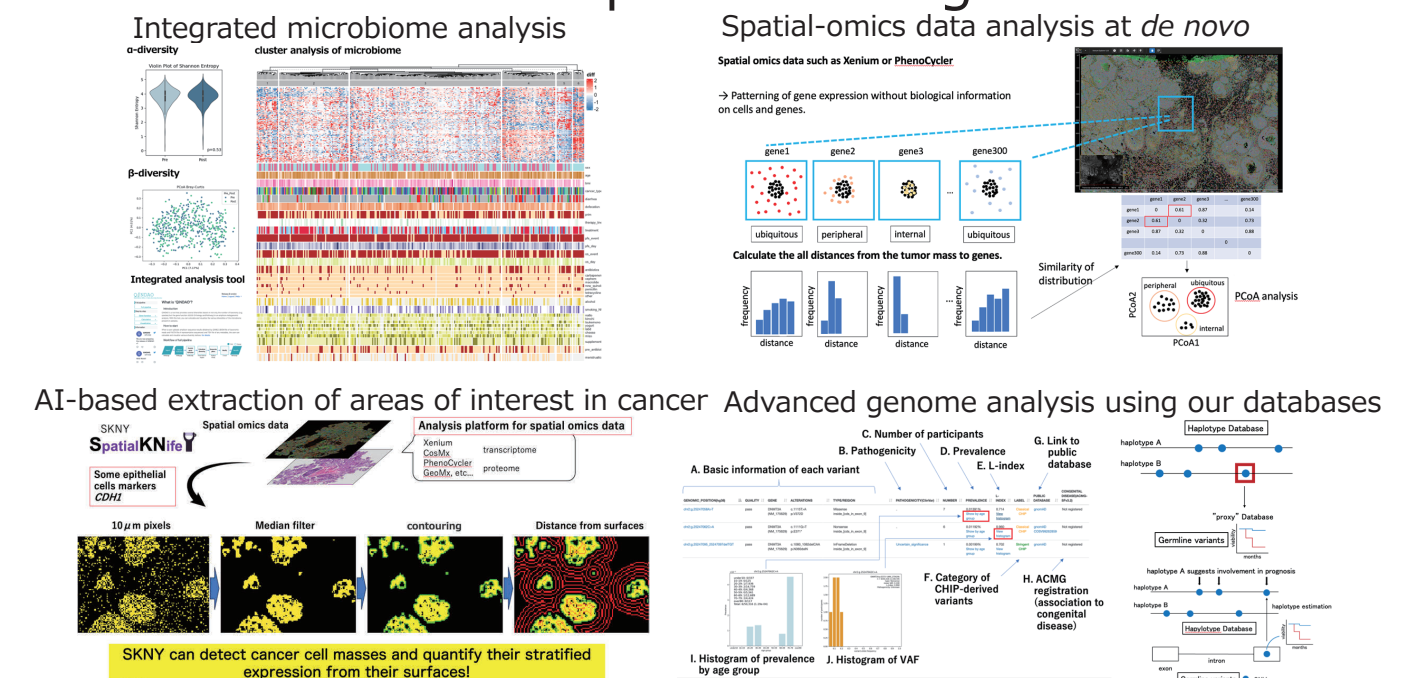
Future research prospects

By utilizing the databases and tools we have developed, we can extract deeper medical and biological insights from omics data. Moreover, we aim to integrate our findings with publicly available databases to facilitate the development of new drugs through 'translational informatics.'

Integrated analysis for translational informatics



Our unique technologies



Innovative Device Development Enabled by Interdisciplinary Convergence

A platform linking advanced technology seeds with clinical needs



Nobuyoshi Takeshita, MD, PhD
Division of Surgical Technology Chief

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URL : https://www.ncc.go.jp/en/epoc/division/surgical_technology/kashiwa/index.html



- ▶ Real-world implementation of digital surgery
- ▶ Realization of next-generation digital therapeutics through the integration of AI and devices
- ▶ Development of ultra-minimally invasive treatments and novel imaging modalities in oncology

Research background

As medical devices that improve clinical and economic outcomes, solutions are sought that lead to (1) improved cancer prognosis, (2) greater operational efficiency in clinical settings, (3) reduction of treatment related complications, and (4) improved patient quality of life (QOL). In this field, through interdisciplinary collaboration in accordance with the biodesign process and close cooperation with frontline clinical practice, we function as a hub for medical technology innovation that supports real-world implementation—from basic research through prototyping, proof of concept (PoC), regulatory approval and reimbursement, and commercialization.

Research characteristics

We collaborate with academia and startups to leverage their technology seeds and drive projects forward. Our focus areas include the real-world implementation of surgical support systems via digital surgery, the realization of next generation digital therapeutics through AI-device integration, and the development of ultra-minimally invasive therapies and novel imaging modalities in oncology, aiming to establish new frameworks for treatment and diagnosis. In particular, in our digital surgery initiatives, we utilize the surgical video database we have built to conduct R&D on surgical navigation and on assessing surgeons' technical skills.

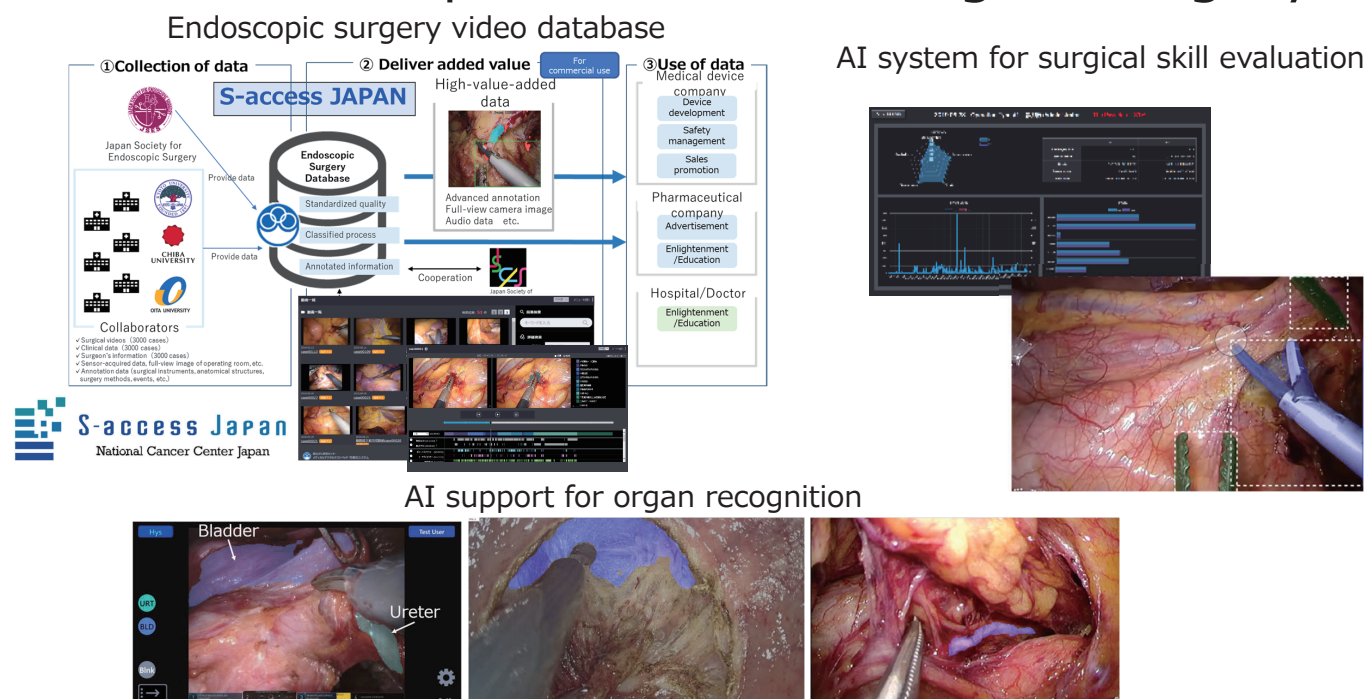
Potential research technical cooperation

- ◆ A database of endoscopic surgery videos collected domestically and internationally, and AI development that leverages this resource
- ◆ Refinement of clinical needs and matching with technology seeds using the biodesign methodology
- ◆ Evaluation of medical devices and obtaining PoC using medium and large sized animals

Future research prospects

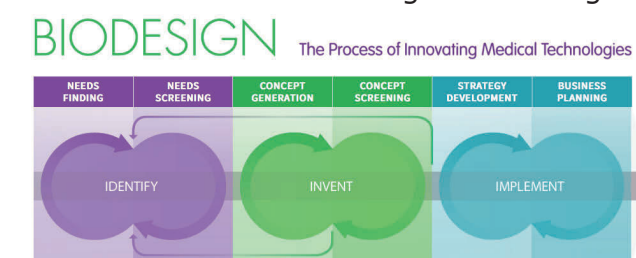
By combining advanced technology seeds from disciplines including medicine and engineering, linking them to clinical needs, and incubating them, we will promote the creation and real-world implementation of innovative medical technologies.

Real world implementation of digital surgery

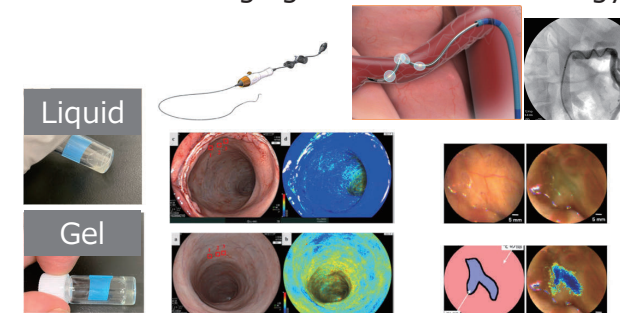


Medtech innovation with cross-disciplinary approach

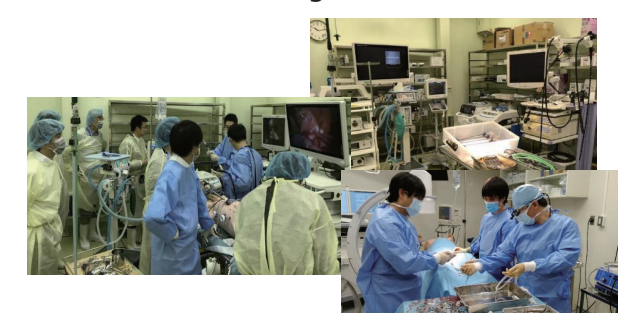
Refinement of clinical needs using the biodesign methodology



Minimally invasive treatments and novel imaging modalities in oncology



Evaluation of medical devices and obtaining PoC in animal lab



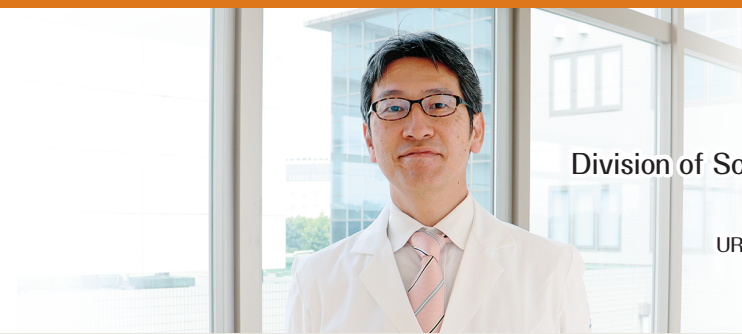
Endoscopic device development using academia seeds

Applied research using forefront technological seeds aiming for clinical output

- ▶ The development of new imaging and treatments using drugs and light
- ▶ The research to image the biological character of cancer
- ▶ The translational research using endoscopic taken clinical samples

Research background

Endoscopy is one the Japan's leading medical device disciplines at clinical. And there are a lot of basic researchers who are studying imaging and treatments of cancer, and they have been publishing superb research results. In our division, we practice applied research of endoscopic device development using forefront technological seeds at other academia and aim to achieve clinical output. Furthermore, our strength must be the strong connection and easy access to clinical division, and we will conduct clinical research of excellent seeds collaborating with the Division of Medical Device Innovation and Promotion or the Department of Gastroenterology and Endoscopy at National Cancer Center Hospital East.



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Division of Science and Technology for Endoscopy (Kashiwa) Chief

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Research characteristics

In cancer tissue, there are hypoxic area due to imbalanced proliferation and vascularity and it has been reported as the association of hypoxia and tolerant to cancer therapy of radiation or chemotherapy. We developed oxygen saturation imaging through collaborative research with a company and are conducting the applied research to clarify the biological character of the imaging. And we also practice collaborative research of imaging and treatment using light and drugs to improve and develop new photodynamic therapy or photoimmunotherapy.

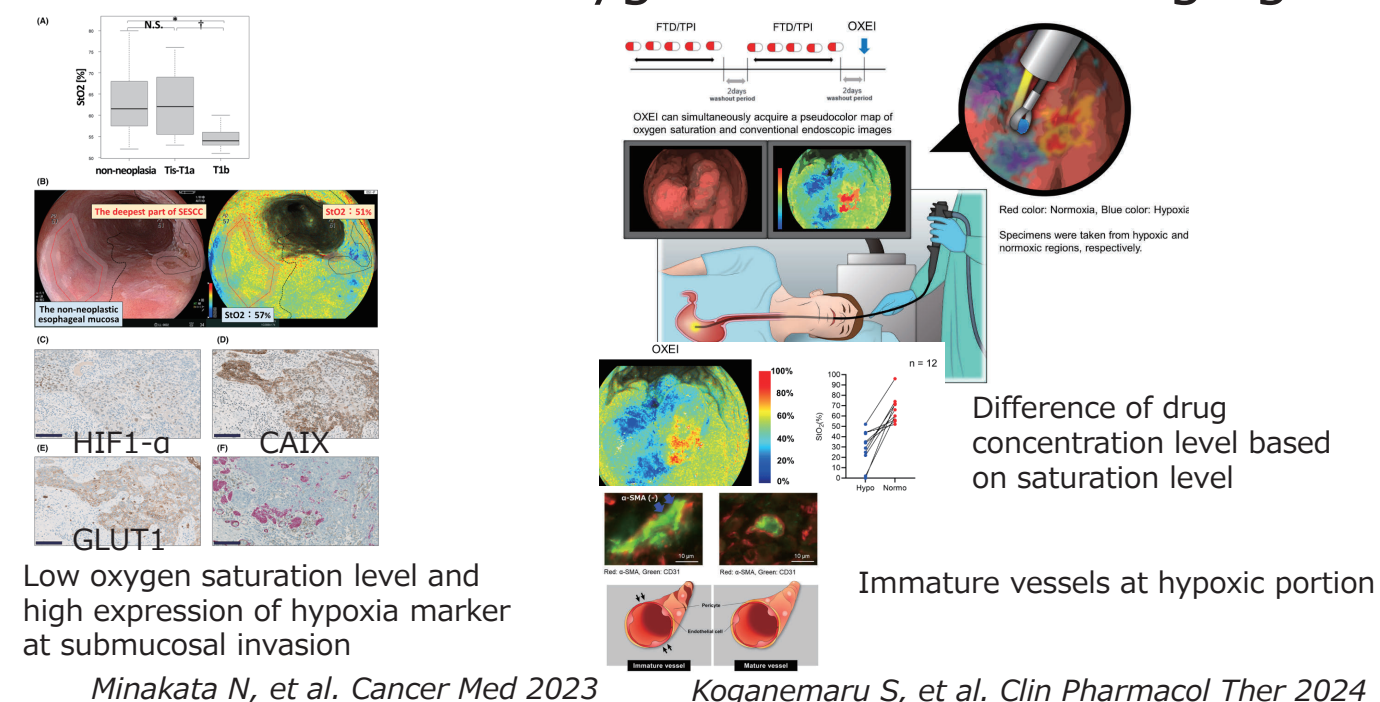
Potential research technical cooperation

- ◆ Oxygen saturation imaging
- ◆ Endoscopic taken clinical samples of GI cancer
- ◆ Treatment using drugs and light like photodynamic therapy

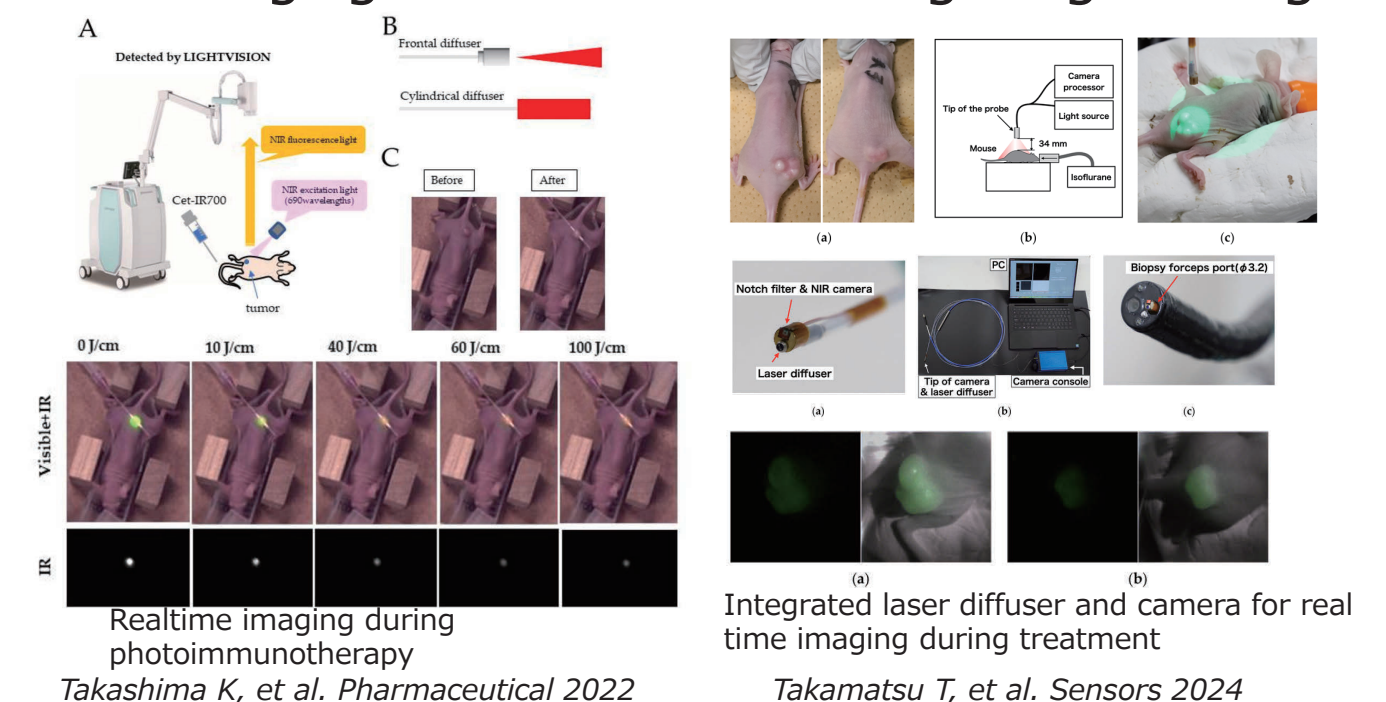
Future research prospects

In our clinical practice for GI cancer, the endoscopy plays a key role of detection, diagnosis and treatment of early neoplastic lesions. We aim to achieve imaging of biological or molecular character of cancer or treatment of patients with more advanced status.

The research of Oxygen Saturation Imaging

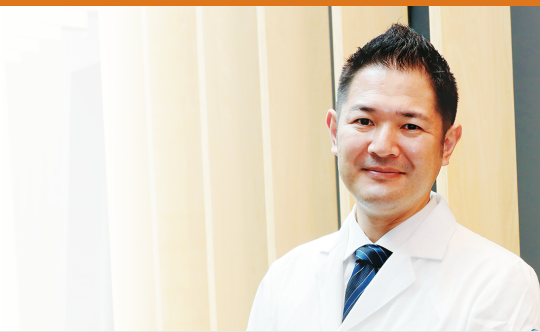


New imaging and treatments using drugs and lights



Creation of innovative technologies of gastrointestinal endoscopy

Frontier of endoscopic diagnostic and therapeutic procedures



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- ▶ Improvement of current endoscopy devices and equipment
- ▶ Development of endoscopic diagnostic and therapeutic equipment and training systems
- ▶ Development of future innovative diagnostic and therapeutic endoscopy

Research background

Endoscopy is used to enter human body to "detect" and "diagnose" lesions and disorders and to "treat" those. However, in diagnosis, there are limitations in the ability to detect lesions and in the accuracy of diagnosis. In treatment, there are still issues such as the existence of difficult-to-treat lesions, treatment-related complications, and the limited number of medical specialists. To conquer those issues, our department is working to develop innovative endoscopic diagnostic and therapeutic devices and training systems, as well as new diagnostic and therapeutic approaches using ultrasound echo-endoscopes from the gastrointestinal tract to the extraintestinal tract, a characteristic not found in intraluminal endoscopy in collaboration with companies and academia.

Research characteristics

In this field, we are working on research and development by identifying medical needs related to endoscopy.

One of our ongoing projects is the research and development of innovative endoscopic diagnostic and treatment devices and training systems, prioritizing needs and feasibility in collaboration with optical device manufacturers in the National Cancer Center Research Institute's Partners Laboratory. We will further develop our innovation in collaboration with basic and translational researches and explore research that will develop future clinical practice.

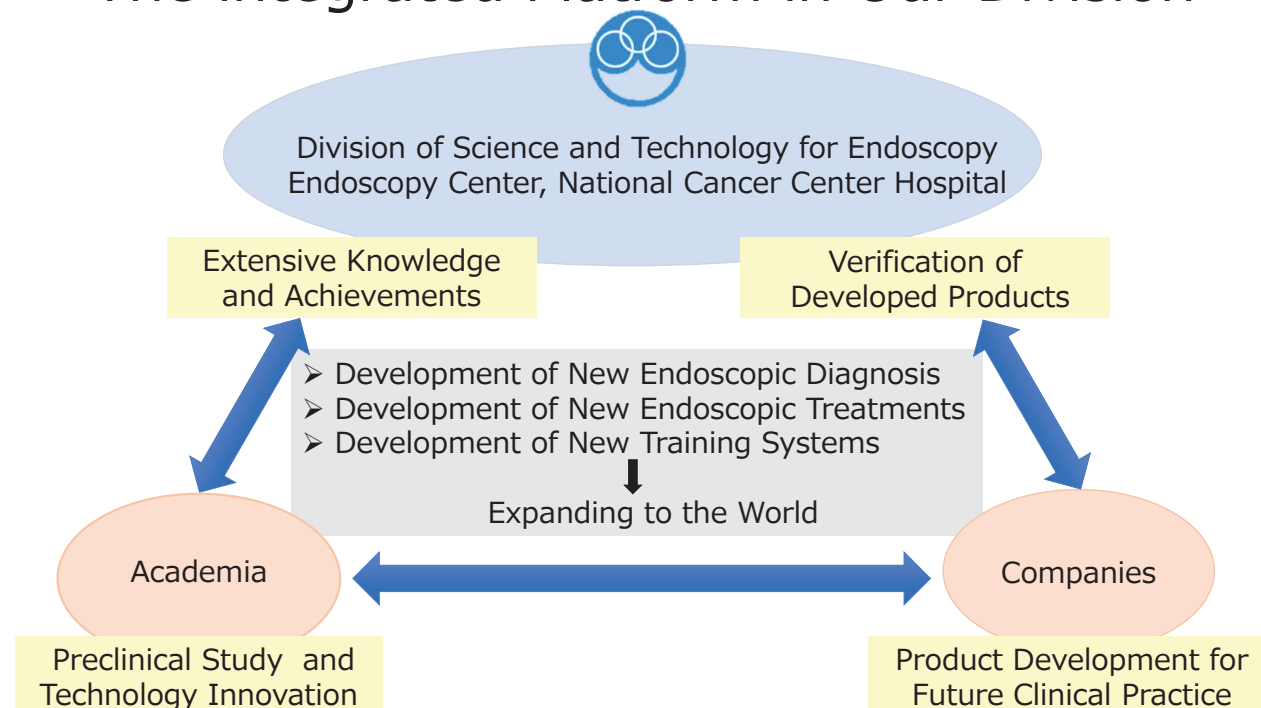
Potential research technical cooperation

- ◆ Development of endoscopic instruments that meet the daily medical needs of clinicians
- ◆ Development of endoscopic devices based on abundant high-quality clinical data
- ◆ Development of new treatment utilizing the delivery device using endoscopy

Future research prospects

We also aim to develop endoscopy-related devices and drugs from new approaches. For example, we hope to combine new technologies such as molecular imaging and functional imaging for early detection of lesions. We also hope to develop drugs that can be injected directly into lesions that are difficult to resect by endoscopy. For this purpose, we would like to strongly collaborate with companies and academia.

The integrated Platform in Our Division



Current Activities

Efficacy of next-generation endoscopy training simulator in improving international trainees' endoscopic submucosal dissection skills
Uozumi T Endosc Int Open 2026

Development of a Layer Structure Recognition System Using Video Analysis for Supporting Colorectal ESD Procedures
Abe S DDW2026

Force sensors installed on the units
Force sensor mounted novel colonoscopy training model

Provision of Elderly Oriented Care

Programs that provide appropriate medical care and support for the elderly

- ▶ Delirium education and training program
- ▶ Assessment of decision-making capacity in individuals with dementia, and methods of decision-making support
- ▶ Pathophysiological insights into acute cognitive impairment

Research background

Psycho-oncology is a composite discipline that seeks to clarify the anthropological side of cancer by applying knowledge in fields such as psychiatry, oncology, psychology, sociology, and ethics. As a society ages, the number of dementia patients undergoing cancer treatment increases. The development of delirium (cognitive impairment) during cancer treatment may also increase the risk of falling and interfere with daily activities after discharge. The Division of Psycho-Oncology is attempting to develop a system that can be implemented effectively at medical institutions in Japan for ensuring that elderly patients safely receive treatment and have a high quality of life during the treatment period.



Asao Ogawa, MD, PhD
Division of Psycho-Oncology Chief

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Research characteristics

As the only research division in Japan specializing in mental support for cancer patients, the Division of Psycho-Oncology work in coordination with the Department of Psycho-Oncology at the Hospital East on initiatives for the development and provision of optimal support methods for patients, parents, bereaved family members, and medical staff. We have developed training programs to support healthcare professionals who respond to delirium. We have also created programs for supporting healthcare professionals to ensure that dementia patients can receive cancer treatment in a proper and smooth manner. We are conducting a study to reveal the pathophysiology of delirium and chemobrain (a temporary decrease in cognitive function, such as memory and concentration, during and after anticancer treatment).

Potential research technical cooperation

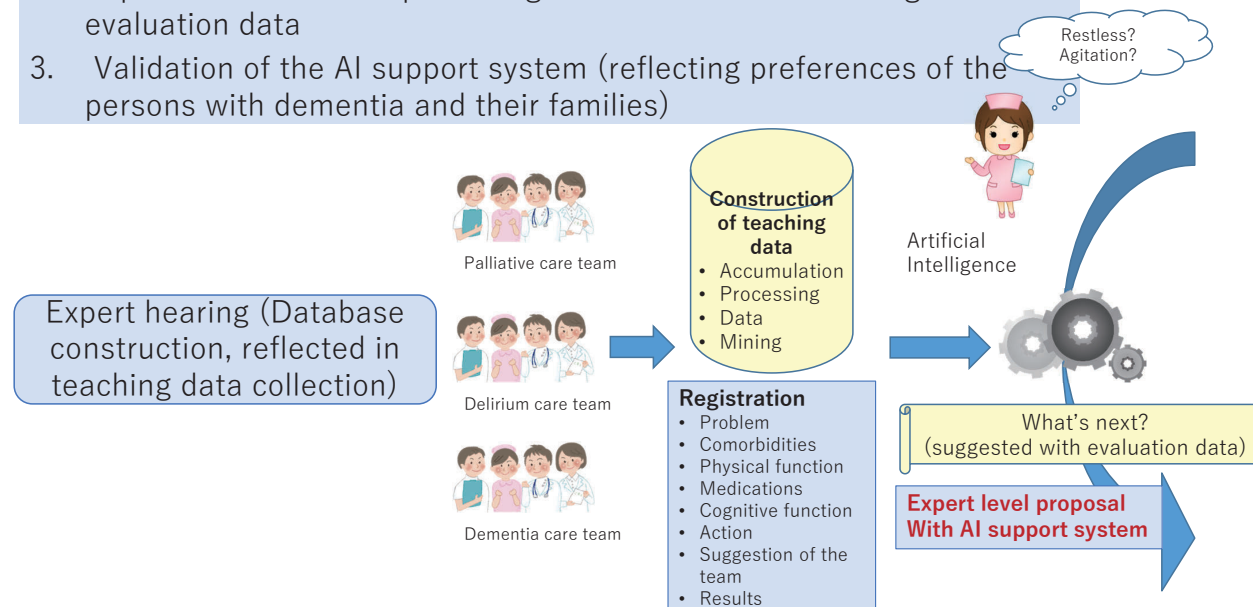
- ◆ Delirium education and training programs
- ◆ Cancer treatment support programs for dementia patients
- ◆ Pathophysiological findings of chemobrain

Future research prospects

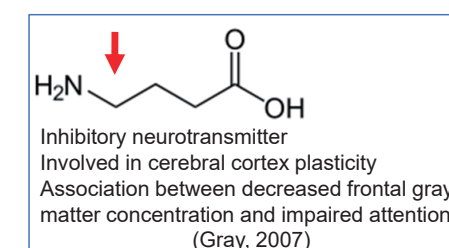
Given that studies on the pathophysiology of delirium are lacking, we want to clarify the mechanisms of delirium and develop an automatic sensor system for delirium induced by cancer treatment. Once chemobrain develops, patients will suffer from poor concentration and severe forgetfulness, which will greatly affect their social life in the workplace or at home. We will make an effort to develop therapeutic agents for chemobrain and encourage cancer patients to return to society early.

Development of AI support system for dementia care

1. Constructing a registry of dementia in acute care setting
2. Implementation of deep learning and cross-validation using evaluation data
3. Validation of the AI support system (reflecting preferences of the persons with dementia and their families)



Non-invasive measurement system of CNS disorders

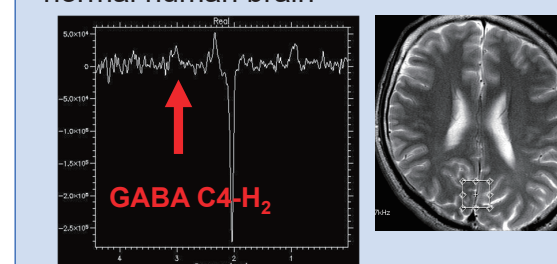


Basic study with phantom
1.25mM GABA C4-H₂ signal

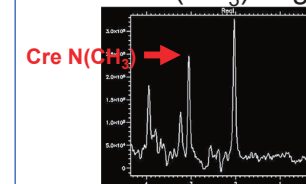


MEGA-PRESS

GABA C4-H₂ signal detected in normal human brain



Conventional method (PRESS);
Creatine N(CH₃) signal hides GABA signal



Basic information

History	April 1994	National Cancer Center Research Institute East (Director: Hiroyasu Esumi) was established.
	October 2005	Reorganized as the Research Center for Innovative Oncology (Director: Hiroyasu Esumi).
	April 2008	Atsushi Otsu was appointed as Director.
	November 2008	National Cancer Center Hospital East was selected as the Advanced Medical Development Special Zone.
	October 2009	The new Project Building was completed.
	April 2010	National Cancer Center Japan was transitioned to an Independent Administrative Institution.
	July 2011	National Cancer Center Hospital East was selected as the Early/exploratory clinical research center.
	September 2012	Exploratory Oncology Research & Clinical Trial Center (NCC-EPOC, Director: Atsushi Otsu) was established.
	April 2015	National Cancer Center Japan was transitioned to a National Research and Development Institution. The Research Center for Innovative Oncology and the Exploratory Oncology Research & Clinical Trial Center were reorganized to the Exploratory Oncology Research & Clinical Trial Center (NCC-EPOC) as an independent unit of National Cancer Center Japan (Director: Atsushi Otsu).
	May 2016	Atsushi Ochiai was appointed as Director.
	November 2016	The cancer metabolomics research promotion and support project in Tsuruoka, Yamagata Prefecture was selected as a Regional Revitalization Promotion Grant-eligible project.
	April 2017	National Cancer Center Tsuruoka Metabolomics Laboratory was opened.
	March 2021	Promotion of the next-generation community cancer medical care model construction project in Tsuruoka, Yamagata Prefecture was selected as a Regional Revitalization Promotion Grant-eligible project.
	July 2021	Center for Promotion of Translational Research (CPOT, Director: Atsushi Ochiai) was established.
	December 2021	National Cancer Center Japan was certified as a translational research support organization. Center for Promotion of Translational Research acts as the organization's base.
	April 2022	Toshihiko Doi was appointed as Director of the Exploratory Oncology Research & Clinical Trial Center and the Center for Translational Research Promotion.
	June 2024	Katsuya Tsuchihara was appointed as Director of the Exploratory Oncology Research & Clinical Trial Center and the Center for Translational Research Promotion. (July).
	April 2026	Medical Innovation Support Project in Tsuruoka, Yamagata Prefecture was selected as a Regional Future Grant-eligible project.

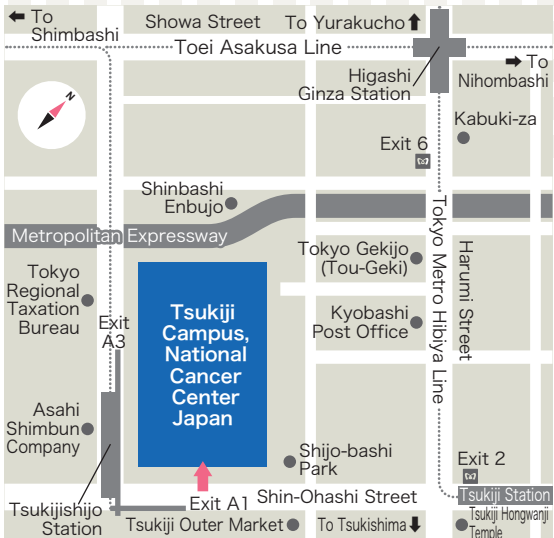
Location/Access



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For more information on EPOC, please see

Official Brochure



<https://www.ncc.go.jp/jp/about/pamphlet/digitalbook/epoc/original.pdf>



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