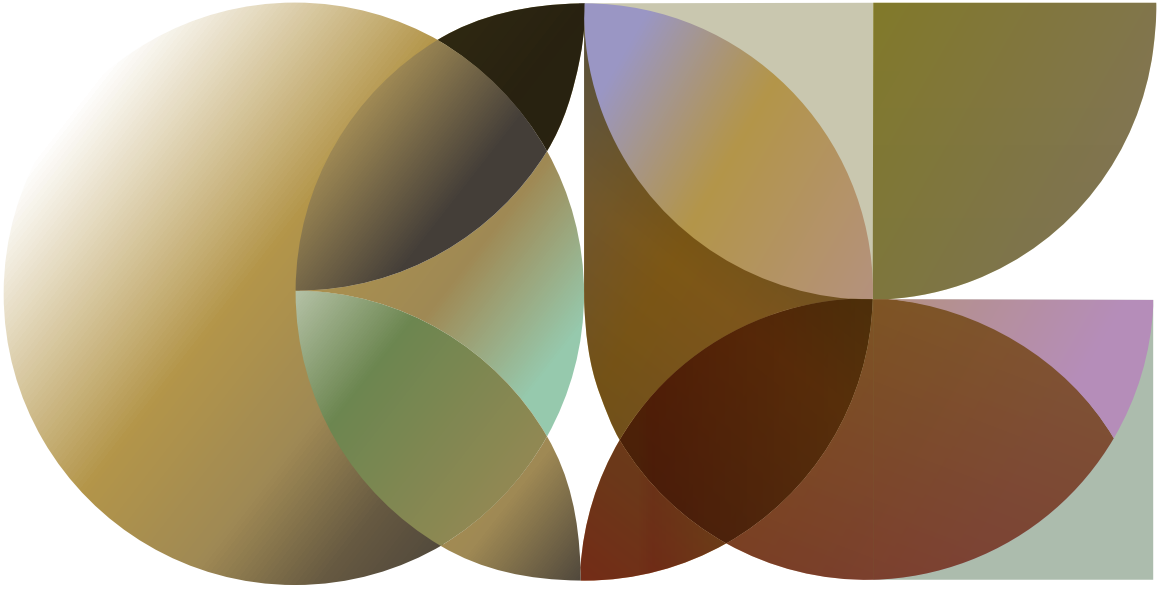

MICHINOKU ACADEMIA
STARTUP PLATFORM

# Adopted Projects List 2025

Step 1 Social Innovation Category　Step 1 Standard Category

| | | | |
|---|---|---|---|
| 1 | Tohoku University | Katsumi Sato | Business Viability of Utilizing Digital Archives of Local Resources |
| 2 | Tohoku University | Osamu Murao | Creating a New Market for Disaster Education through Hero-Based Content and Developing a Sustainable Business Model |
| 3 | Tohoku University of Art & Design | Yoshiki Seki | Conservation,restoration and inheritance of art collections |
| 4 | Niigata University | Zen Koike | Complementing Cencer Care Through Peer Support :A Digital Application for AYA Patients and Families in the Critical "First Month"from Diagnosis to Treatment |
| 5 | Iwate Prefectural University | Mizuho Okada | Supporting Newly Nurse Training with Skill Visualization |
| 6 | Fukushima Medical University | Miwako Kato Homma | Breakthrough in Predicting Cancer Recurrence |
| 7 | Tohoku University | Yuichi Negishi | Commercialization verification of highly active ～ 1nm platinum cluster fuel cell electrode catalyst |
| 8 | Tohoku University | Yasuki Okuno | Development of Three-Dimensional Dosimetry Technology for Standardization of Radiation Resistance Evaluation of Large Components |
| 9 | Tohoku University | Tomonori Nochi | Promoting Healthy Calf Development through Microbiota Improvement |
| 10 | Tohoku University | Emiko Sato | Development of functional food for feline kidney disease containing a combination of lactoferrin and nicotinamide |
| 11 | Tohoku University | Yusuke Sekiguchi | Personalized DX for Independent Mobility in Gait Disorder |
| 12 | Tohoku University | Guang Hong | Establishment and global sprite of clinical skill OnDemand education system using interactive VR technology |
| 13 | Tohoku University | Taku Nakai | Development of an Anti-Diabetic Hypoxic Room |
| 14 | Tohoku University | Kenji Kikuchi | Medical Applications of a Biomimetic Puncture-Assist System for Minimally Invasive Therapies |
| 15 | Tohoku University | Yoshiro Saito | Feasibility study for the commercialization of a male infertility treatment system based on comprehensive trace element analysis |
| 16 | Tohoku University | Hiroshi Hoshijima | Development of robotic anesthesia with AI |
| 17 | Tohoku University | Mao Fukuyama | Development of a Microplatform for Body Fluid Analysis |
| 18 | Tohoku University | Masanori Shigeno | FABP-Targeted Therapeutics for the Treatment of Multiple Sclerosis |
| 19 | Tohoku University | Atsuhiro Nagasaki | Industrialization of electrically charged alkaline phosphatase for mineralized tissue diseases |
| 20 | Tohoku University | Minoru Ishikawa | PROTACs for neurodegenerative diseases |
| 21 | National Institute of Technology, Nagaoka College | Shuji Kawakami | Realization of DX in the septic tank industry through BOD prediction technology and creation of a new organic matter recycling market by utilizing septic tank sludge |
| 22 | Nagaoka University of Technology | Akihiro Nakamura | Droplet Screening Service for the Bio-Manufacturing Sector |

Step 1 Standard Category　Step 1 Advanced Category　Step 2 Standard Category　Step 2 Advanced Category

| | | | |
|---|---|---|---|
| 23 | Nagaoka University of Technology | Ryuta Harada | Development of aquaculture technology using novel feeding stimulants |
| 24 | Niigata University | Masashi Okamoto | Medical Image Measurement DX solution Development Proof-of-Concept for Cost and Operational Optimization -Fully Automated Spine,Pelvis,and Lower Limb Measurement Based on Deep Learning - |
| 25 | Niigata University | Shunji Natsuka | Development of a Glycan Profiling Database for Specific Diseases and Functional Foods |
| 26 | National Institute of Technology, Akita College | Koh-ichi Maruyama | A project to maintain and preserve laminated wood and other building materials for a long time without being discouraged by disasters, and to spread the local timber culture to the world, where the beauty of wood can be appreciated |
| 27 | National Institute of Technology, Akita College | Ming Zhao | Utilization of coral-shape palladium porous nanomaterial for the development of seawater electrolysis-$H_2$ production system |
| 28 | Yamagata University | Kenshin Yoshida | Development of quantum dot films for the production of biofuels derived from microalgae |
| 29 | Miyagi University | Makoto Kanauchi | Development of an Enzymatic Production System for D-Amino Acids with Neuroactive Properties for Use as Functional Food Ingredients |
| 30 | Miyagi University | Motoko Morimoto | New Developments in Canine and Feline Cell Production and Evaluation Systems for New Drug Development in Veterinary Medicine |
| 31 | Tohoku University | Hinata Kariya | Developing a Novel Valve for Spacecraft to Accelerate Space Development and Validate its Commercialization |
| 32 | Tohoku University | Yasuhisa Hirata | Advanced Robotic Cushions for Optimal Posture and Safe, Independent Movement |
| 33 | Tohoku University | Takuro Matsumoto | AI-Powered Automated Slit-Lamp Microscope for Home-Visit Eye Care |
| 34 | Tohoku University | Yuya Kamano | Development of novel regenerative medicine using allogenic skeletal stem cell progenitors |
| 35 | Niigata University | Kazuhiro Hori | A Tongue Hygiene App with Image Recognition to Market |
| 36 | Tohoku University | Masahiro Yamada | inSituReg:Bio-Implant Driving Endogenous Regeneration |
| 37 | Tohoku University | kazutaka jin | Epilepsy-Specific Gene Panel and Drug-Selection Support AI |
| 38 | Tohoku University | Motoko Maekawa | Development of a Blood-Based Diagnostic Aid for Autism Using Lipid Biomarkers |
| 39 | Tohoku University | Takafumi Toyohara | Clinical translation of “living” vascular grafts |
| 40 | Tohoku University | Shinichi Sato | Novel Diagnostic Drug Development Business for Synucleinopathies Based on Aggregate Seed Detection |
| 41 | Niigata University | Susumu Sasaki | Extremely Early Diagnosis by Innovative MRI |
| 42 | Tohoku University | Yasuhiro Fukushima | HumiDAC : Energy Saving Carbon Capture from Air and Exhaust Gases |
| 43 | Tohoku University | Yasuko Tatewaki | Pioneering a New  Market for Dementia Screenig through Amyloid MRI |

# Project Title: Business Viability of Utilizing Digital Archives of Local Resources

## Summary of Seeds

### Providing 3D data of "Authentic Japan".

The game and movie industries are increasingly interested in the "Authentic Japan" . To reproduce the "Authentic Japan" requires real data, but it is inefficient to acquire real data on a case-by-case basis. On the other hand, there remain many local resources that are authentically Japanese, but they have not been archived due to economic challenges. This project will convert financially troubled local resources into digital data and provide the data to industries seeking the Authentic Japan.

## Client

Targeting **Game and Film companies** interested in traditional Japanese content

## Problems

**Game & Film industry**
-Growing interest in Japanese culture
-Seeking “Authentic Japan
-Difficulty in rights clearance

**Provides cost and opportunity** >>>

*Bridging the two sides*

<<< **Provides Authentic Japanese data**

**Local Resources**
-Insufficiently preserved, except for items of high historical value
-Records and investigations are not progressing.

## Solution

**Acquiring 3D data on local resources and provide data**

*Local resources: Cultural assets, folkloric resources, local performing arts, etc. in each region

## Our previous research

**Digitization of local resources has been implemented**

-We have been researching digital archiving of local performing arts.
-Began studying methods of measurement and utilization of local cultural assets, etc.

Katsumi Sato

Tohoku University
Graduate School of Education
Associate Professor

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| Project Title | **Creating a New Market for Disaster Education through Hero-Based Content and Developing a Sustainable Business Model** |
|---|---|

## Summary of Seeds

1. Provides an innovative educational experience where young children and their guardians can enjoy learning disaster preparedness through engaging hero-based content.
2. Delivers a hybrid disaster education program—optimized for preschools and kindergartens—combining online materials with interactive in-person activities.
3. Offers flexible, locally-tailored content that meets the specific disaster risks and needs of each community.
4. Promotes shared understanding and collective action by involving not only children, but also teachers and parents, thereby enhancing community-wide disaster resilience.
5. Ensures competitive differentiation through unique intellectual property and branded content that is difficult to replicate.

Osamu Murao

Tohoku University
International Research
Institute of Disaster Science
Professor

| Project Title | **Conservation, restoration and inheritance of art collections** |
|---|---|

## Summary of Seeds

The goal is to create a new management infrastructure for contemporary art works based on the use of technology and data in the field of cultural property conservation and restoration. Compared to classical works, which are the main target of cultural property conservation, contemporary art works use completely different materials and techniques than classical works, making it difficult to deal with them using only the current conservation infrastructure. In addition, contemporary art works are, Since there are many private collections, we propose a B-to-C management infrastructure. The development of this project will help to diversify the methods of managing art collections and, in turn, help to ensure the safe management, purchase, and inheritance of artworks.

This is expected to change the mindset that tends to leave the management of art works to specialists, and promote a shift from being someone else's business to one's own business, leading to an increase in interest in culture as a whole.

Seki Yoshiki

TOHOKU UNIVERSITY OF ART & DESIGN
Faculty of Design Engineering
Project Design
professor

## Project Title

**Complementing Cancer Care Through Peer Support: A Digital Application for AYA Patients and Families in the Critical 'First Month' from Diagnosis to Treatment**

## Summary of Seeds

Time from cancer diagnosis to the start of treatment ➡ **Approx. 1 month**

**Customers**

AYA patients diagnosed with cancer and their families

AYA: Adolescent and Young Adult

**Face wide range of serious challenges…**

- Decision Making
- Economic burden
- Relationship with others
- Fear of death or the future
- Employment and education
- Fertility concerns

Cannot be fully addressed by hospitals alone

Provide support in such times;

**"Peers"**
Other Patients and families

**Issues in peer support**

Peer Support Organizations
- Regional disparities

Online meetup
- Infrequently held

**Problem**

The need for a new platform for timely consultation

**Main functions**

**The "First month" support system following cancer diagnosis**

I'd like to talk to someone…

AYA patient Ms. A

Application for "First month" support
- ✓ Type of cancer
- ✓ Preferred supporter
- ✓ Desired type of support

Organize personalized support team

Support team for A

Peer B, a breast cancer survivor

Peer C, a cancer survivor familiar with fertility-related issues

**Support A via chat and video calls for one month**

**A peer-supported digital application for the anxious "first month" after a cancer diagnosis**

**Commercialization strategies**

- Sponsorship or contributions from supporting members
- Use in corporate marketing
- Use in research marketing

➡ Successful monetization

This research seed is inspired by my personal experience of being diagnosed with colorectal cancer at the age of 24

Zen KOIKE

Niigata University
Graduate school of health Sciences
Master's Course

| Project Title | **Supporting Newly Nurse Training with Skill Visualization** |
|---|---|

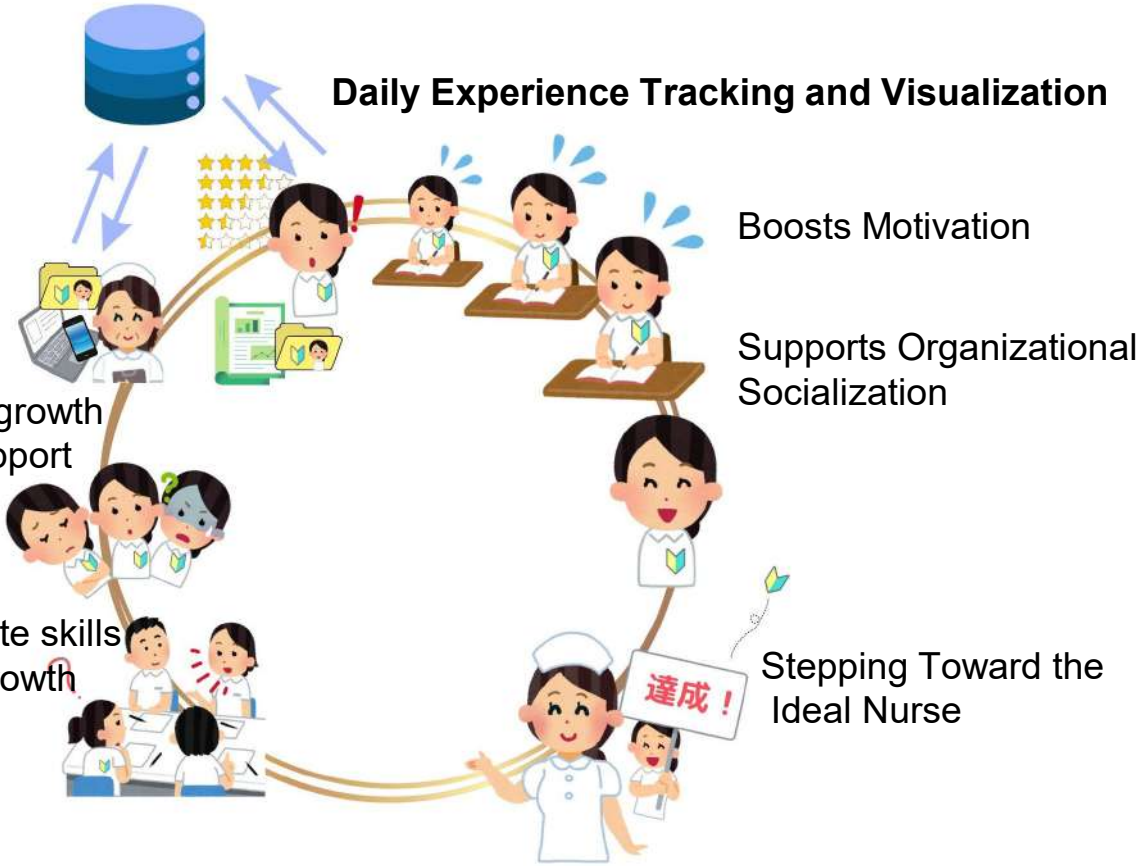
## Summary of Seeds

**Goals:**
① Help new nurses visualize their own growth
② Enable managers to give better advice by tracking progress
③ Reduce reporting burden and improve workplace QOL

**Benefits for Managers:**
Use digital data to build an effective training system

**Manager Challenges:**
Hard to track individual nurse growth
No usable data for training support

**New Nurse Challenges:**
High demand for many accurate skills
Hard to recognize their own growth



Mizuho OKADA

Iwate prefectural University
Faculty of Nursing
Professor

MICHINOKU ACADEMIA STARTUP PLATFORM

# Predicting the risk of future recurrence from very early stages of cancer

Project Title

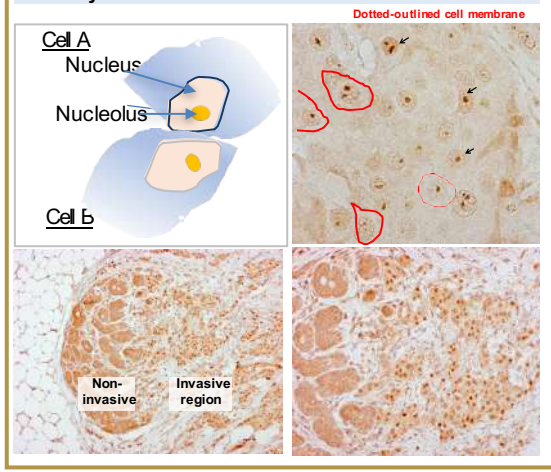
## Breakthrough in Predicting Cancer Recurrence

Summary of Seeds

### CK2α in the nucleolus as prognostic factor for future recurrence

We report here the IHC evaluation of protein kinase CK2α (CSNK2A1) in nucleoli of invasive ductal carcinoma of the breast is strongly associated with tumor recurrence and poor outcomes (p=0.0001), in both triple-negative and luminal types. The method has been applied to lung adenocarcinomas (p=0.0019). In both cases, nucleolar CK2α-positive staining can be suggested as an independent variable among multiple clinical-pathological factors that determine future length of recurrence-free survival. Our results suggest that evaluation of the nucleolus CK2α-positive group may be a new and precise prognostic factor, contributing to companion diagnoses and early treatment efficacy. We validated the protocol for IHC-staining by using our monoclonal antibody against CK2α which demonstrated high specificity and sensitivity for applications.

Detection of nuclear protein kinase CK2α by IHC analysis of invasive ductal carcinomas of breast




Nucleolar CK2α status as a precise, new, independent prognostic factor for recurrence-free survival

Coxproportional hazards regression / Multivariate

| Factor | Wald | HR | 95%-CI | P-value |
|---|---|---|---|---|
| CK2a Nucleolus (+) | 5.711 | 5.264 | 1.348-20.553 | 0.017 |
| Tumor size, >2.0cm | 0.636 | 1.837 | 0.414-8.152 | 0.424 |
| p Stage III | 0.205 | 1.356 | 0.363-5.069 | 0.651 |
| Nodal lymph, positive | 3.616 | 8.191 | 0.938-71.56 | 0.057 |


- Muto, S (2025) *Oncology Rep* https://doi.org/10.3892/or.2024.8837
- Homma, MK (2024) *Life Science Alliance* 7: doi: 10.26508/lsa.202302077
- Homma, MK (2022) *Lancet Onc* 23: doi:10.1016/ s1470-2045(22)00424-7
- Homma, MK (2021) *Cancer Science* 112: 619-628 doi:10.1111/cas.14728
- Homma, MK: https://www.fmu.ac.jp/home/biomol/HTML/HommaMK_2024E

**Miwako Kato Homma**

Fukushima Medical University
School of Medicine
Dept. Biomolecular Sciences
Special Research Fellow, PhD

MICHINOKU ACADEMIA
STARTUP PLATFORM

| Project Title | Commercialization verification of highly active ~1 nm platinum cluster fuel cell electrode catalyst |
|---|---|

## Summary of Seeds

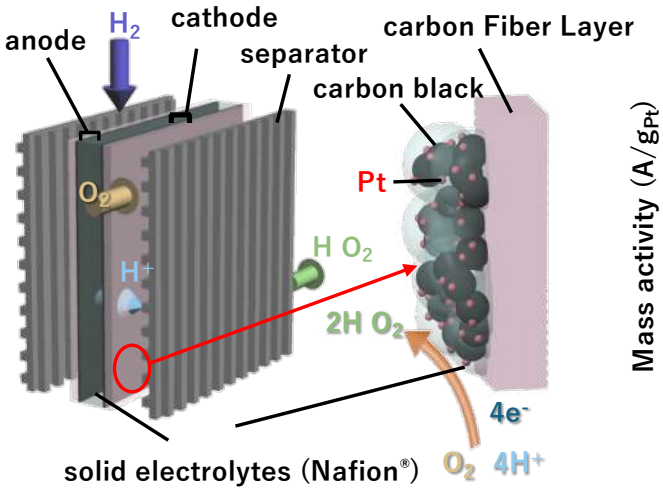
**Possible business models**

**Principal Investigators**

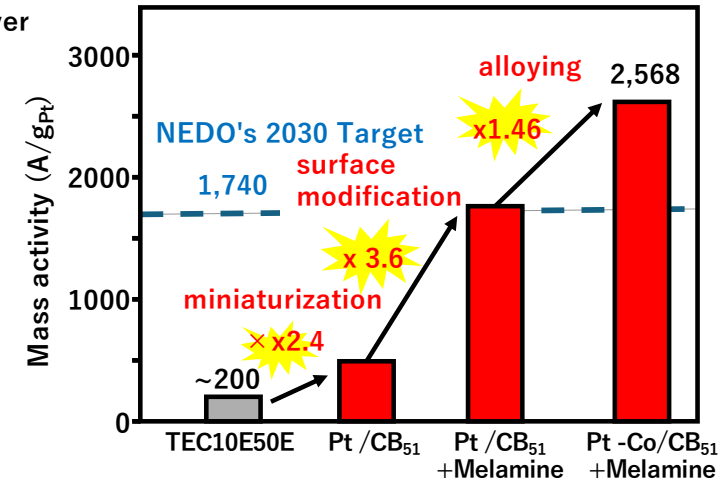
1) Selling catalysts → Automobile company

2) Selling technology → Chemical company

**Polymer electrolyte fuel cell**




**ORR mass activity of Pt catalyst**



Yuichi Negishi

Tohoku University・
Institute of Multidisciplinary Research for Advanced Materials
Professor

| Project Title | **Development of Three-Dimensional Dosimetry Technology for Standardization of Radiation Resistance Evaluation of Large Components** |
|---|---|

## Summary of Seeds

In components used in radiation environments, it is essential to ensure radiation resistance with high precision. This is of particular importance for components used in spacecraft for space exploration and robots operating in nuclear reactors. Some of these components are large in size and require testing using large gamma irradiation facilities. However, in such cases, the components themselves cause gamma-ray shielding and scattering, making it difficult to obtain detailed information on gamma-ray resistance within the interior of the component.

Furthermore, it should be noted that radiation detectors tend to be expensive and are themselves subject to degradation caused by radiation. Consequently, in order to facilitate large-scale structure measurements, there is a necessity to develop low-cost sensors with high radiation resistance. The use of multiple sensors also increases system complexity, necessitating the development of software that enables simple and stable measurements.

In this study, we propose a system capable of low-cost, multi-point radiation measurement by employing radiation detection elements based on amorphous solar cells, which we have developed. This approach facilitates practical radiation measurements inside large structures during actual irradiation tests.

Yasuki Okuno

Tohoku Univ.
Center for Fundamental Research on Nuclear Safety and Decommissioning Support Office
Research Assistant Professor

## Project Title

Promoting Healthy Calf Development through Microbiota Improvement

## Summary of Seeds

Antimicrobial resistance (AMR), driven by the excessive use of antibiotics in livestock production, has emerged as a global issue. Reducing antibiotic use in animal agriculture is strongly encouraged, and the development of alternative strategies is urgently needed.
We have demonstrated that fecal microbiota transplantation (FMT) from healthy donor calves effectively treat diarrhea in recipient calves without relying on antibiotics (***Microbiome***, 10: 31, 2022). Furthermore, we have elucidated the underlying mechanisms contributing to the therapeutic efficacy of FMT and proposed a roadmap for its implementation in livestock practice. To enable nationwide application, we have also developed a preservation method for donor-derived beneficial microbiota, which allows for long-term storage (***Scientific Reports***, 14: 28078, 2024). This ensures the effectiveness of microbiota transplantation even when donor and recipient calves originate from different regions. The cocktail composed of beneficial microbiota represents a novel concept not found in current veterinary pharmaceuticals, and its practical use will require appropriate regulatory frameworks. Additionally, to promote its widespread adoption, it is essential to understand the needs of livestock producers and clinical veterinary doctors. Therefore, this project aims to analyze those needs and to establish standardized production protocols for beneficial microbiota cocktails, ultimately facilitating their social implementation.

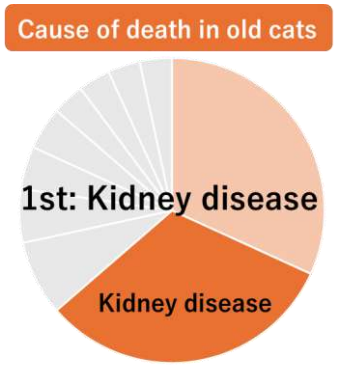
Tomonori Nochi

Tohoku University
Graduate School of Agricultural Science
Department of Agricultural Bioscience
Professor

| Project Title | **Development of functional food for feline kidney disease containing a combination of lactoferrin and nicotinamide** |
|---|---|

## Summary of Seeds

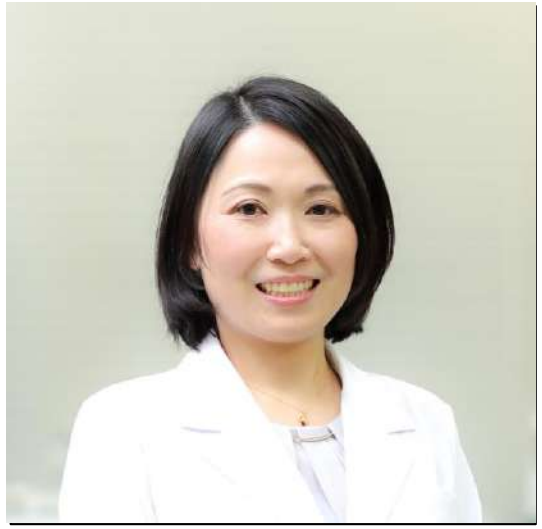
**Creating a unique functional cat food with dual active ingredients, lactoferrin and nicotinamide, that helps prevent kidney disease.**




**Cats with kidney disease** are one in four older cats, however, there are no effective preventive or therapeutic medications, and it is the leading **most common cause of death**.

The number of cats is increasing every year, and as cats are living longer, the prevalence of feline kidney disease is also increasing. **Pet owners need food that supports long-term health and prevents disease**.

The market is expected to continue growing due to the increase in cat breeding both in Japan and overseas.



Emiko Sato

Tohoku University
Graduate School of
Pharmaceutical Sciences
Associate Professor

# Project Title: Personalized DX for Independent Mobility in Gait Disorder

## Summary of Seeds

### Social issue

Roughly 300,000 people have strokes each year. Among them, **nearly half face daily living challenges, including local shopping**, due to gait disorders even after hospital discharge.

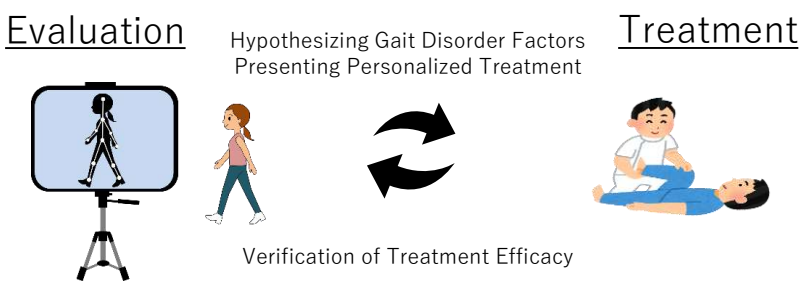
### Challenges in Rehabilitation Settings

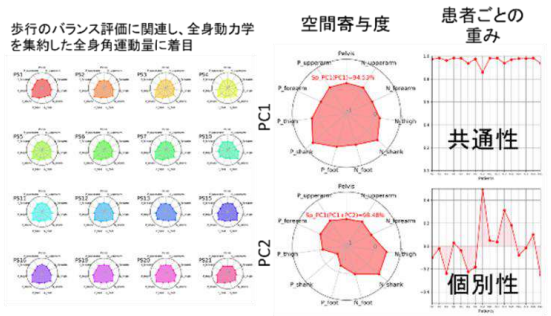
Gait disorders are complex, with causes varying by patient, involving both physical and cognitive functions. Thus, personalized treatment developed through repeated hypothesis-testing is essential.

**However, a lack of medical manpower currently prevents this critical cycle from being fully realized.**

### Solution

Automatic classification of gait impairment patterns by body part from video, providing personalized treatment.
Achieves high-quality, high-cycle evaluation and treatment.



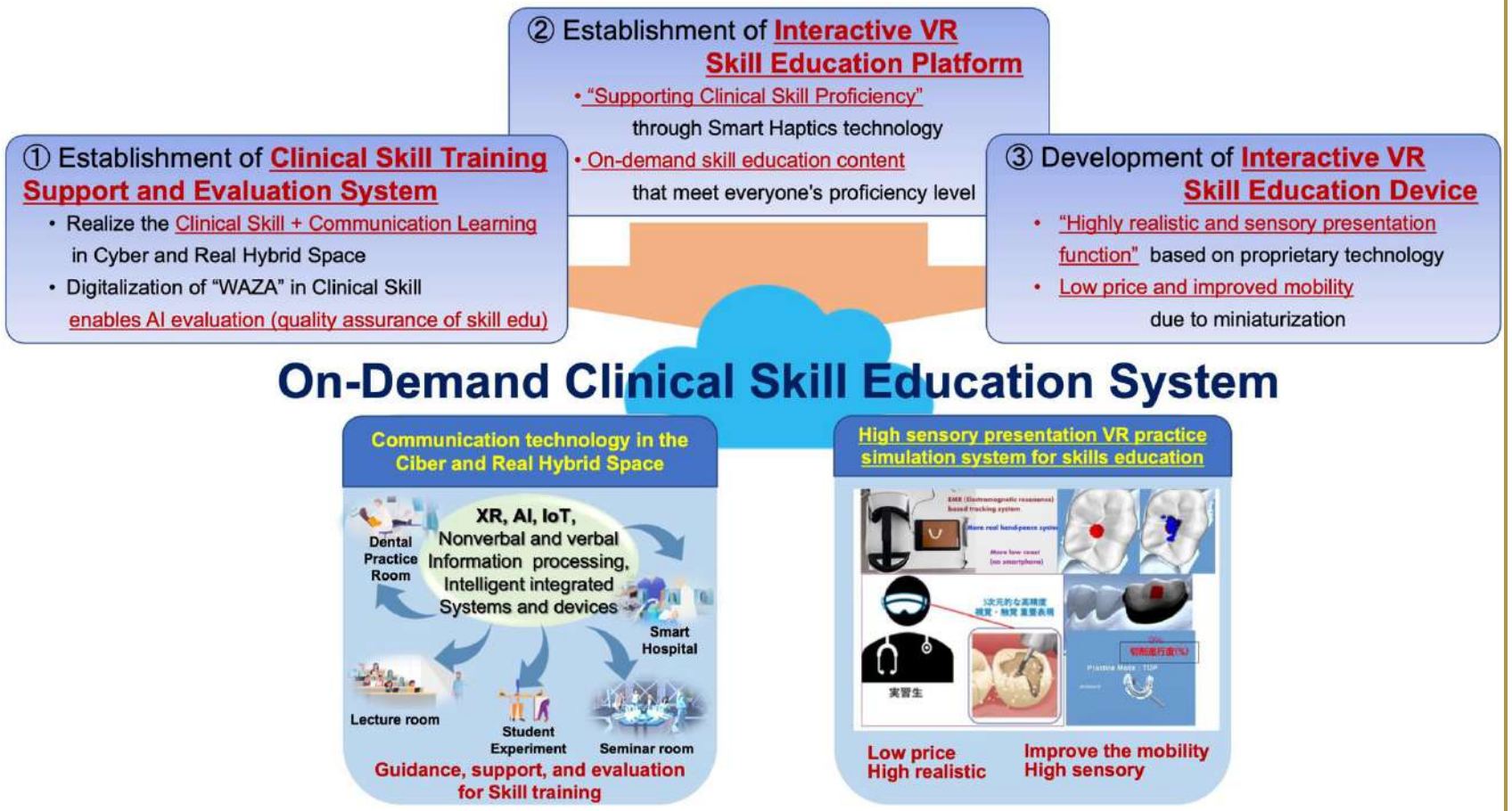



Yusuke Sekiguchi

Tohoku University
Organization for Research Promotion
Research Management Center
Specially Appointed Lecture

| Project Title | Establishment and global sprite of clinical skill OnDemand education system using interactive VR technology |
|---|---|

## Summary of Seeds



Guang HONG

Tohoku University・
Graduate School of Dentistry
Professor

| Project Title | Improving blood glucose levels with just one hour per day “Hypox Room” |
|---|---|

## Summary of Seeds

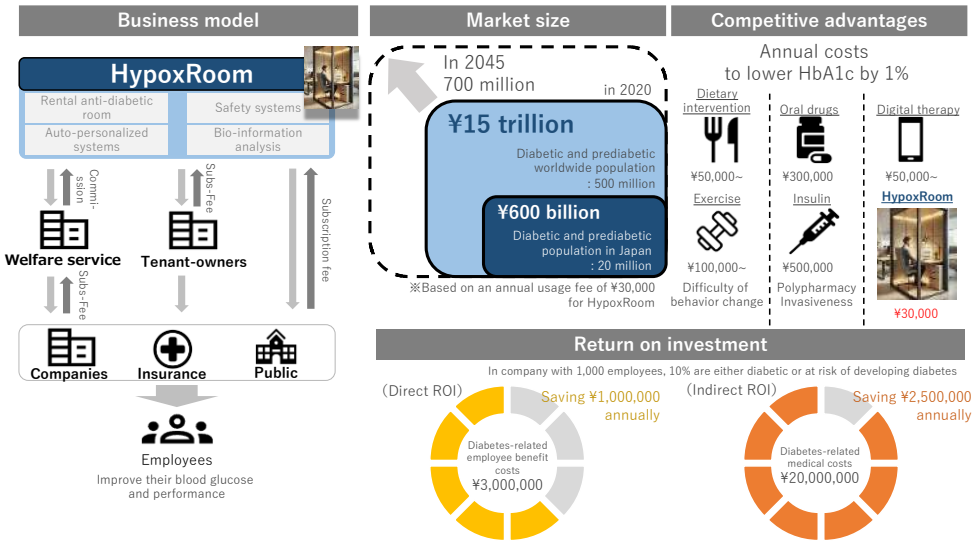
### Anti-diabetic room ”HypoxRoom”

**“Hypox Room” aims to enhance glycemic regulation by adjusting oxygen levels in accordance with real-time biometric data.**
Spending just one hour per session, at least three times a week, on activities such web conferencing, individual work.

**Effectiveness**
10% improvement over a three-week period

**Sustainability**
No behavioral modification required

**Extensibility**
Personalized by accumulated biometric data



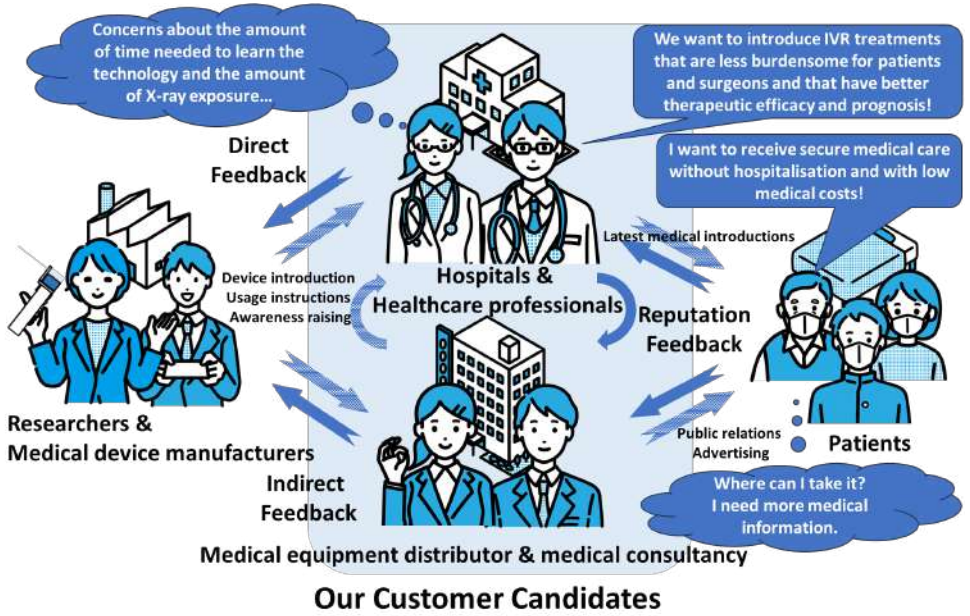
Taku Nakai

Oxygen biology
Tohoku University
Assistant professor

| Project Title | Medical Applications of a Biomimetic Puncture-Assist System for Minimally Invasive Therapies |
|---|---|

## Summary of Seeds

**Pursuing improved puncture accuracy and safety in CT-guided puncture through medical-engineering collaboration.**



Kenji Kikuchi

Tohoku University・
Department of Finemechanics
Associate Professor

| Project Title | **Feasibility study for the commercialization of a male infertility treatment system based on comprehensive trace element analysis** |
|---|---|

## Summary of Seeds

**・The number of infertility treatments continues to rise, and in recent years, one in every 5.5 couples has undergone infertility treatment. This has raised concerns over increased social security costs and a decline in overall well-being due to the high cost of treatment.**

**・Decline in sperm function leads to reduced conception rates, but effective methods to address this issue have not yet been established.**

**・This proposal aims to apply comprehensive metal analysis “metallomics,” which allows for the simultaneous measurement of essential elements and toxic metals, to the resolution of male infertility.**

**・As a business model, metallomic analysis of semen will be conducted on a contract basis for clinics providing infertility treatment.**

**・By measuring and evaluating essential elements critical for sperm function—such as selenium and zinc—and toxic metals harmful to sperm—such as cadmium, lead, and mercury—revenue will be generated through the provision of these analytical results.**

**・We propose a business model in which supplements for deficient elements are offered, generating additional revenue by providing evidence-based reasoning for supplement intake and evaluating the effectiveness of supplementation.**

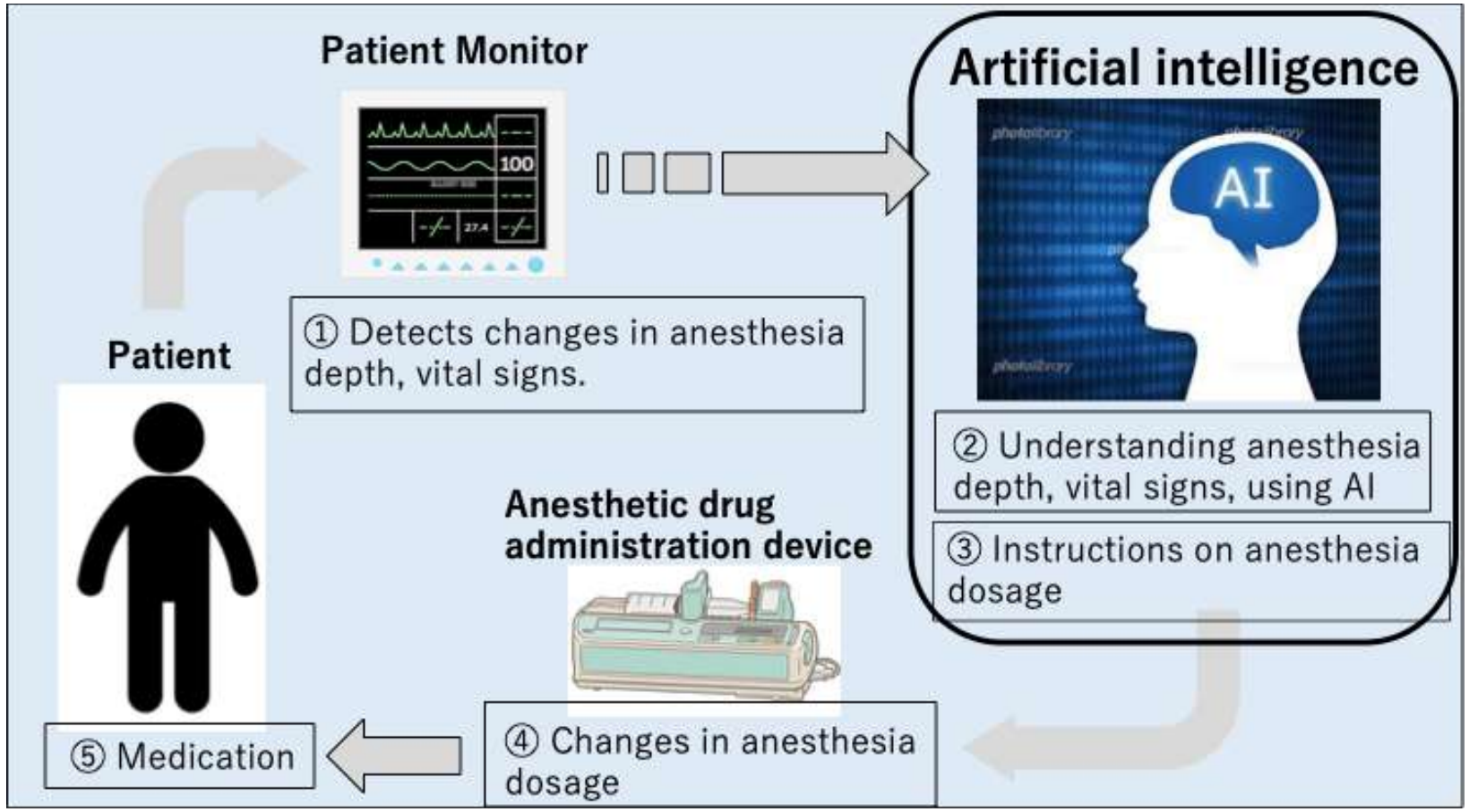
**Yoshiro Saito**

**Tohoku University Graduate School of Pharmaceutical Sciences Professor**

Project Title

# Development of robotic anesthesia with AI

Summary of Seeds



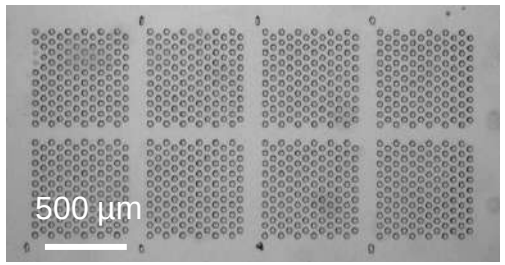
Hiroshi Hoshijima

Tohoku University
Graduate School of Dentistry,
Division of Dento-oral Anesthesiology
Associate Professor

| Project Title | **Development of a Microplatform for Body Fluid Analysis** |
|---|---|

## Summary of Seeds

- Protein aggregates present in body fluids are expected to serve as biomarkers for neurodegenerative diseases.
- This project aims to develop a platform for the highly sensitive and reproducible detection of protein aggregates in body fluids.
- This technology will be applied to dementia screening in routine health checkups, enabling early detection and treatment before the onset of noticeable symptoms.




Microfluidic manipulation of trace biofluids

Dementia testing using body fluids

Mao Fukuyama

Tohoku University
IMRAM
Associate Professor

| Project Title | FABP-Targeted Therapeutics for the Treatment of Multiple Sclerosis |
|---|---|

## Summary of Seeds

- **Multiple Sclerosis (MS)** is characterized by inflammation caused by immune cells in the central nervous system (brain and spinal cord) and optic nerves, leading to the destruction of the myelin sheath that surrounds nerve cells.
- **Immunosuppressive drugs** have been developed to suppress abnormal immune responses. However, **existing treatments often cause side effects related to immune system suppression**. Therefore, **there is a strong need for the development of novel therapeutics based on alternative mechanisms of action**.
- Collaborative research by Dr. Koji Fukunaga has revealed that **fatty acid binding proteins (FABPs)** are involved in the destruction of the myelin sheath.
- This study aims to **develop therapeutic agents targeting FABPs** for the treatment of multiple sclerosis.

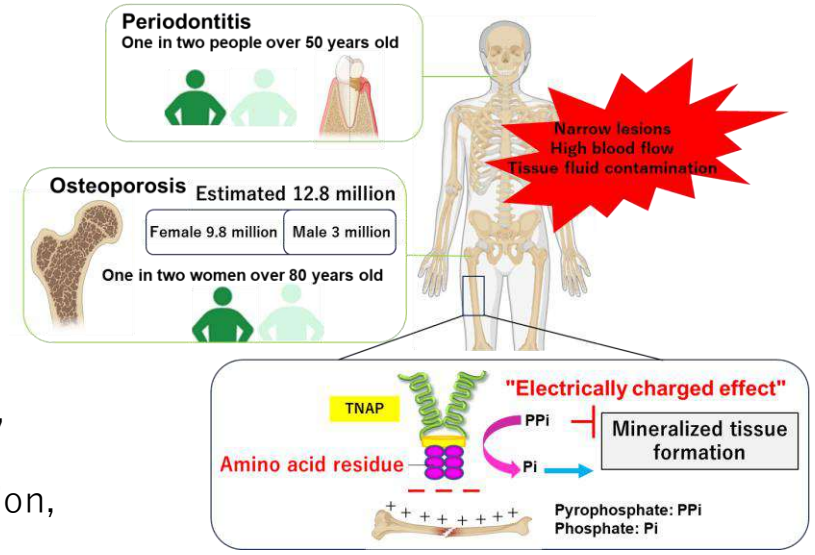
Masanori Shigeno

Tohoku University
Graduate School of
Pharmaceutical Sciences
Associate Professor

| 課題名 | Industrialization of electrically charged alkaline phosphatase for mineralized tissue diseases |
|---|---|

## シーズ概要

【Background】
Recently, the number of patients with mineralized tissue diseases such as periodontitis and osteoporosis has been increasing rapidly in the world. The incidence rate of both diseases is very high, and the number of patients is expected to increase in the future. Thus, the development of effective treatments is needed urgently. However, there are problems such as the fact that lesions have a rich blood flow and tissue fluid contamination, making it difficult to effectively act locally.




Applied patent（JP・US・EU）
U.S. Application (Filed)
No. 62/957,051 Compositions and Methods for Promoting Periodontal Health.
Nagasaki et al.

【Solution】
This study focuses on tissue non-specific alkaline phosphatase (TNAP), which strongly promotes calcification, and by genetically adding amino acid residues to make it negatively charged. TNAP promotes mineralization efficiently and effectively against positively charged mineralized tissues.

【Specific initiatives】
We have been developing this molecule, which can be a drug discovery target, with evaluating the therapeutic effects of TNAP on mineralized tissue diseases and their mechanism *in vivo* and *in vitro*.

Atsuhiro Nagasaki

Tohoku University
Graduate School of Dentistry
Division of Molecular and Regenerative Prosthodontics
Assistant professor

Project Title

# PROTACs for neurodegenerative diseases

Summary of Seeds

- drug discovery for a radical cure for neurodegenerative diseases
- small molecule PROTACs (proteolysis targeting chimera) that degrade aggregated proteins of neurodegenerative diseases.

Minoru Ishikawa

Tohoku University・
Graduate School of Life Sciences
Professor

MICHINOKU ACADEMIA
STARTUP PLATFORM

| Project Title | **Realization of DX in the septic tank industry through BOD prediction technology and creation of a new organic matter recycling market by utilizing septic tank sludge** |
|---|---|

## Summary of Seeds

- Currently, maintenance of septic tanks is handled by inspectors visiting the site. To solve this problem, we aim to develop a tool that can immediately predict treated water BOD on site. Specifically, a BOD prediction model will be constructed by deep learning using supervised data that links images of septic tank water surface and treated water BOD. Ultimately, the project aims to realize DX in the septic tank industry using BOD prediction technology to solve the shortage of human resources in septic tank technology, and to establish an organic sludge trading platform to create a new organic recycling market through the use of septic tank sludge.

Shuji KAWAKAMI

NIT, Nagaoka college
Depart. of Civil Engineering
Associate professor

| Project Title | **Droplet Screening Service for the Bio-Manufacturing Sector** |
|---|---|

## Summary of Seeds

Bio-manufacturing is anticipated as a dual-benefit innovation that addresses global societal challenges—such as food and resource shortages and environmental pollution—while simultaneously driving economic growth. In other words, the bio-manufacturing sector is expected to expand not only within existing bio-related industries but also through the entry of new ventures aiming to solve social issues. However, the discovery and improvement (i.e., breeding) of microorganisms (cells) essential for the production of bio-based products remains a major bottleneck. These processes require specialized expertise, significant time, effort, and financial investment, posing high business risks for companies attempting in-house development. This proposal aims to commercialize an ultra-efficient droplet-based screening technology to offer exploration and strain improvement services. By doing so, we provide our clients with a powerful solution to dramatically shorten the development timeline in bio-manufacturing.

Akihiro Nakamura

Nagaoka University of Technology
Institute of GIGAKU
Department of Science of Technology Innovation
Assistant Professor

| Project Title | Development of aquaculture technology using novel feeding stimulants |
|---|---|

**Summary of Seeds**

"Development of next-generation aquaculture technology that utilizes underexploited biomass resources to substantially enhance feeding efficiency in fish."

## Aquaculture Issues

**Tuna aquaculture producer**

Rising feed prices
→ Inability to achieve optimal fattening
→ Reduction in marketable (shipping) size

## Rising feed prices

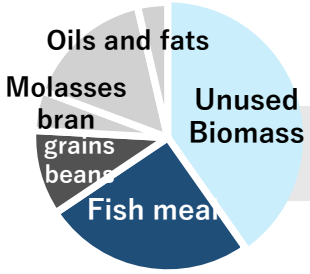
Trade Statistics" by the Ministry of Finance (for fishmeal);Survey by the Japan Association of Fish Feed (for compound feed data prior to June 2013);Survey by the Fisheries Agency (for compound feed data from July 2013 onward)Figure created by the Fisheries Agency

**Japan's No. 1 Yellowtail Farm**

Feed suspension due to red tide outbreaks
→ Reduction in harvest size
→ Economic hardship caused by rising feed prices

## Product・Services

Aquaculture feed




Issue

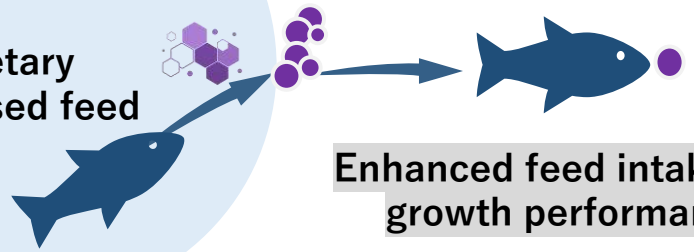
Decreased appetite
Impaired digestion

Exposed to suboptimal temperatures

World-first discovery (novelty))

**Substances capable of stimulating feeding behavior under low-temperature conditions**

A proprietary biomass-based feed



Patent

Enhanced feed intake and growth performance

Decreased production cycle and elevated biomass conversion rate

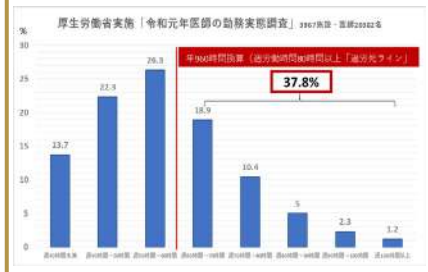
Harada Ryuta

Nagaoka University of Technology
Department of Science of Technology Innovation
5-year Integrated Doctoral Program

# Project Title

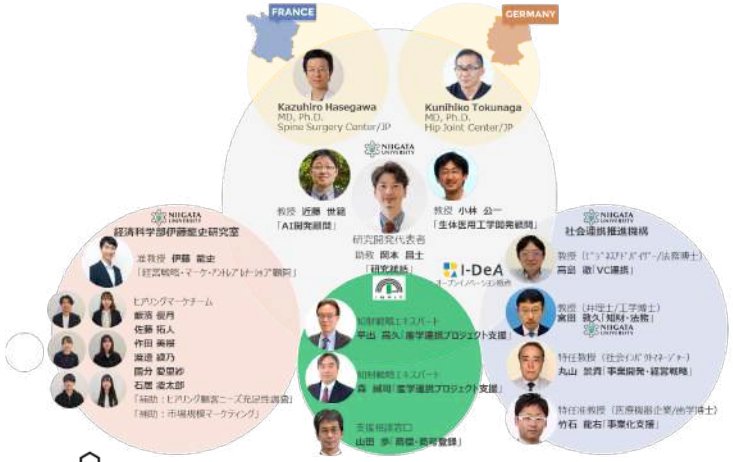
**Medical Image Measurement DX solution Development Proof-of-Concept for Cost and Operational Optimization —Fully Automated Spine, Pelvis, and Lower Limb Measurement Based on Deep Learning—**

## Summary of Seeds




Work-style innovation for physicians

Manual medical imaging measurements dependent on individuals




NIIGATA UNIVERSITY

IP license ↓ ↑ Royalty fee of IP license

Medical × Innovation × Real

MedIR（メドアイアール）

medir[me.dir]

DX solution for medical image

Software sales outsourcing ↓ ↑ Software license fee

Medical device manufacturer (distributor)

Strategic alliance or M&A

Providing subscription services

100,000yen per license monthly
Discount for institutional or annual contracts

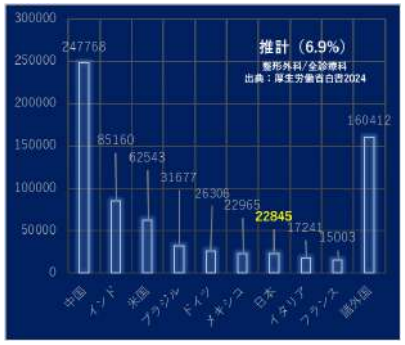
Giving access rights

Collaborative research or Contract research

Start UP

Expand into the domestic market

Expand globally

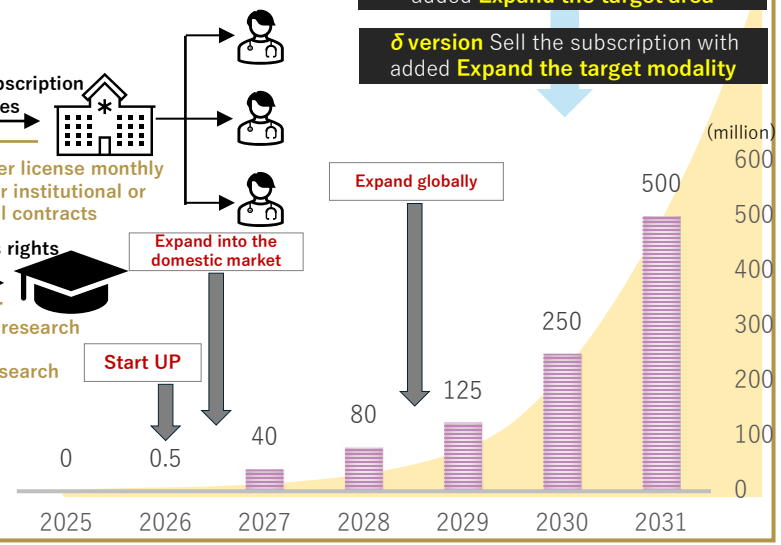



**α version Release the MVP** for free to **broadly publicize** the product

**β version** Sell the subscription with added **Core features**

**γ version** Sell the subscription with added **Expand the target area**

**δ version** Sell the subscription with added **Expand the target modality**



Masashi Okamoto

Niigata University
Graduate School of Health Sciences
Assistant Professor

**Our target market is software medical device**

**TAM（Total Addressable Market）**

Global）Customers count 691922×1.00×Subscription annual contracts 1,200,000=830 billion yen

**SAM（Serviceable Available Market）**

Domestic） Customers count22,845×1.00× Subscription annual contracts 1,200,000=27.4 billion yen

**SOM（ Serviceable Obtainable Market）**

Customers count 691922×0.06×Subscription annual contracts 1,200,000=49.8 billion yen

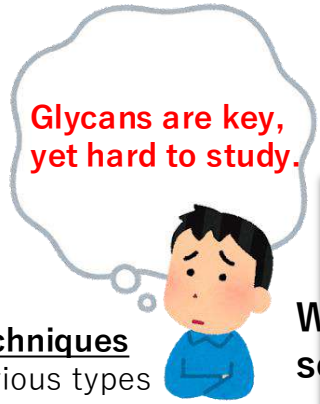
**Aiming for 49.8 billion yen in 5 years from startup**

| Project Title | Development of a Glycan Profiling Database for Specific Diseases and Functional Foods |
|---|---|

## Summary of Seeds

**Complex Processes**
- Massive data
- Specialized expertise
- Long working hours

**Highly Challenging Techniques**
Diverse methods for various types
- Glycoproteins
- Glycolipids
- Oligosaccharides
- Polysaccharides




**We will solve it!**

Pharmaceuticals
Food
Medical Science
Life Sciences

- **Glycan Database**
- **Analysis Software**
- **Automated Equipment**
- **Analysis reagent kits**

Original Technology

Venture

**Drug discovery**
- Cohort Studies
- Disease Biomarkers

**Diagnostics**

**Food**
- Extracellular polysaccharides
- β-Glucan
- Milk oligosaccharides

**Health foods**

**Drug production**
- QC of Biologics

**Antibody, etc.**

**Globalism**
- Big Data
- Global Standard

**Industrial standardization**

- Patent number 7394362 Servers, APIs and computer programs
- Patent number 7360644 Machine learning device, machine learning method, glycan structure refinement device, and computer program
- Kokai number (2023) 146083 High-performance liquid chromatography elution time standardization method by reversed-phase scale

Shunji Natsuka

Niigata University
Faculty of Science
Professor

## Project Title

**A project to maintain and preserve laminated wood and other building materials for a long time without being discouraged by disasters, and to spread the local timber culture to the world, where the beauty of wood can be appreciated**

## Summary of Seeds

・We will develop **a disaster prevention business** by standardizing the maintenance and conservation of laminated wood and other building materials for construction and other special purposes such as civil engineering and the owners of their facilities, as soon as possible, by standardizing the maintenance and conservation of laminated wood and other building materials using **a monitoring system**, as well as **a new repair and maintenance eco-business** for repairable decay and damage.

・The **deep technology** to predict wood damage and loss will create various values by combining the seeds of academia, such as constant stress monitoring and AI technology, with the **comprehensive knowledge** of industry, such as business infrastructure.

・From the viewpoint of disaster prevention, local governments have already expressed expectations and interest in technologies related to maintenance and preservation to manufacturing, delivery, and construction companies, and these requests are expected in the future. In addition to responding to these requests, the project aims to contribute to the “**inheritance of local timber culture**” and the “**spread of safe and secure wooden construction**” without compromising the aesthetic and cultural value of timber.

・First, we will target the facilities constructed in **Akita Prefecture**, and then develop a strategy for expansion into the **domestic market**, such as areas that are expected to be affected by the disaster, as well as the **international market**.

**Koh-ichi Maruyama**

National Institute of Technology, Akita college
Department of Creative Systems Engineering
Professor

| Project Title | Utilization of coral-shape palladium porous nanomaterial for the development of seawater electrolysis-$H_2$ production system |
|---|---|

## Summary of Seeds

Development of efficient and stable electrode materials for water electrolysis to produce clean H2 is crucial for a carbon neutral society. To this end, we developed a simple fabrication method for coral-shape mesoporous Pd nanomaterial (Pd NC) with a ligament size of around 4.1 nm, an average pore size of 28 nm, and a high surface area of 110 $cm^2/g$. The preparation was carried out by simple solvothermal reduction at a mild temperature, without using any templates.

In alkaline water electrolysis, the Pd NC outperforms the traditional Pd nanoparticles and the state-of-the-art Pt (under large potentials) for $H_2$ evolution reaction. Compared with Pd nanoparticles, the production amount of $H_2$ increased by 2.4 times at a potential of 0.4 volts, and the utilization efficiency of Pd was improved by 1.8 times (i.e., about 44% of material cost was saved) by using Pd NC as the electrode material. Moreover, Pd NC showed a long-term stability during the electrolysis in an alkaline medium and less than 5% of current loss was observed.

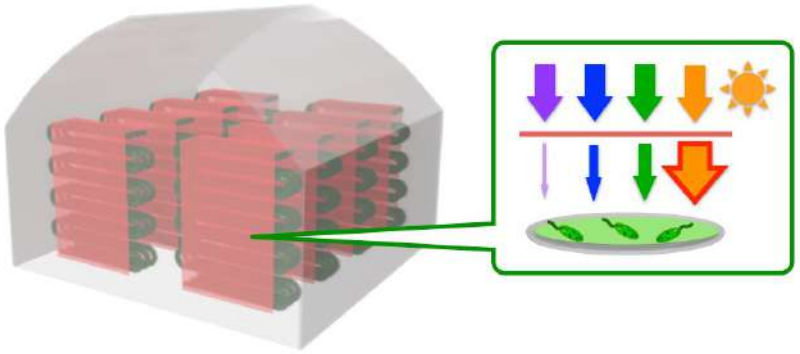
Ming ZHAO

National Institute of technology, Akita College・Department of Materials and Biology
Associate Professor

MICHINOKU ACADEMIA
STARTUP PLATFORM

| Project Title | Development of quantum dot films for the production of biofuels derived from microalgae |
|---|---|

Summary of Seeds



The widespread adoption of biofuels derived from microalgae is expected to contribute to the realization of a carbon-neutral society. However, this effort faces challenges due to the high cost of fuel, which stems from limited cultivation yields and restricted cultivation sites.

To address these issues, we have developed a light-wavelength conversion film that utilizes perovskite quantum dots as wavelength-converting materials, enabling low-cost and efficient outdoor cultivation using sunlight. Furthermore, by combining this technology with a closed-loop cultivation system namely, a photobioreactor that is less affected by weather conditions we aim to expand the cultivation area. This integrated approach will enable both high-efficiency cultivation of microalgae and the expansion of viable cultivation sites, thereby contributing to the production of low-cost biofuels.

Kenshin Yoshida

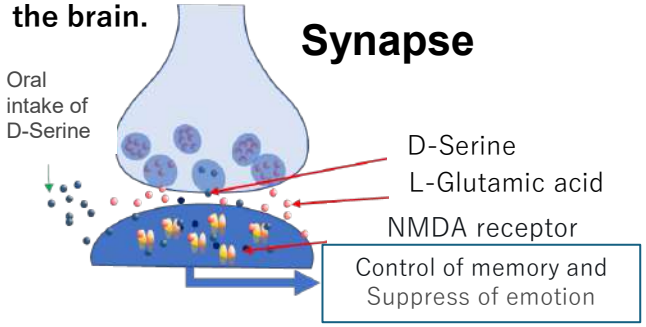
Yamagata University
Graduate School of
Science and Engineering
Doctor course

| 課題名 | Development of an Enzymatic Production System for D-Amino Acids with Neuroactive Properties for Use as Functional Food Ingredients |
|---|---|

## シーズ概要

- The aim of the project to develop innovative food products containing D-amino acids as D-serine, which are expected to maintain and activate brain supporting cognitive functions in the elderly.
- The existing D-serine synthesis method, D-serine is produced by chemical synthesis method using toxic heavy metals as catalysts.
- On the other hand, it was developed a new method for measuring D-serine production. Consequently, it was found a fermentation method using lactic acid bacteria strain H74 with D-serine conversion ability (Patent Application 2023-094516, Makoto Kanauchi and Hinako Kato, 'D-serine production method', Public University Corporation of Miyagi University).

**D-Serine, which is produced in the human body, regulates synaptic transmission in the brain.**




**Problem 1： D-serine is scarce in nature.**
**Problem 2： Edible D-serine is not available on the market.**
・**Chemical synthesis of D-serine:** This method may result in contamination with heavy metals used during the process.
・**Extraction of D-serine from plant or animal sources:** This method is inefficient and costly.

- Therefore, a new technology for the production of D-serine has been developed to enable the enzyme to function by immobilizing the D-serine converting enzyme derived from the Lactococcus lactis H74 strain. Consequently, the D-serine produced by this biocatalytic method provides functional food for the elderly to maintain and improve cognitive functions

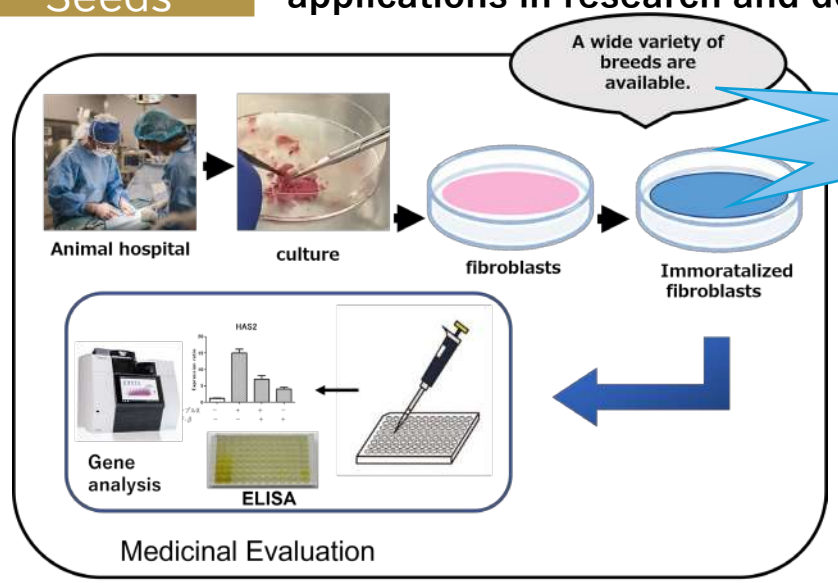
Makoto KANAUCHI

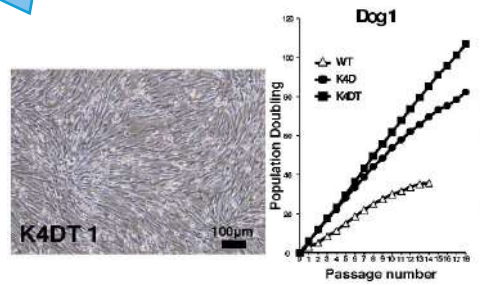
Miyagi University
Food Industrial Sciences
Professor

| Project Title | New Developments in Canine and Feline Cell Production and Evaluation Systems for New Drug Development in Veterinary Medicine |
|---|---|

## Summary of Seeds

**Immortalized fibroblasts from various dogs and cats enable diverse applications in research and development.**




Immortalized fibroblasts in a miniature dachshund

- *Drug Discovery*: RNA-seq for efficacy and safety evaluation
- *Regenerative Medicine*: Cell therapy using immortalized fibroblasts
- *Breakthrough in previously difficult cell culturing techniques*

- **Animal cells are essential for new drug development and regenerative therapies.**
- **Animal regenerative medicine market : Valued at USD 259.49 million (2023) Projected CAGR: 10.75% through 2029. A rapidly evolving field with transformative potential for veterinary healthcare.**

Motoko MORIMOTO

Miyagi University
School of Food Industrial Sciences
Professor

| Project Title | **Developing a Novel Valve for Spacecraft to Accelerate Space Development and Validate its Commercialization** |
|---|---|

## Summary of Seeds

**Problem: Long lead time** (**6-15 months**) of essential **valves for space propulsion systems** – a major barrier for **start-up space businesses**

Example of an Imported valve

**Impact:**

Spacecraft design/manufacturing plans are **valve-limited**

- **Agile development is difficult**
- **Increased running costs** until delivery
- **Limited valve procurement options**

**Solution:** Achieving **short lead times** through advanced technology from **non-space companies × space technology knowledge/know-how**

**Tier 1 Automobile parts company**

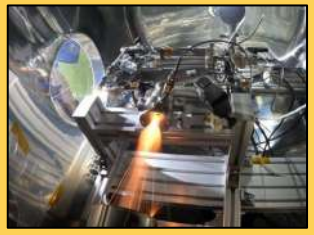
**Solenoid Tech**
**Manufacturing Tech**

Co-research

×

**Saito Grupe, FRIS, Tohoku univ.**

**Space Propulsion R&D Expertise**



➡

**Achieving Valve Mass Production & Quick Delivery**

**Accelerating Start-Up Space Business Growth**

Hinata Kariya

Tohoku University

Graduate School of Engineering

Department of Aerospace Engineering

2nd year of Master's degree

| Project Title | **Advanced Robotic Cushions for Optimal Posture and Safe, Independent Movement** |
|---|---|

## Summary of Seeds

- **Problem to be Solved:** Mobility-assistive welfare devices and robots, once fitted to a user's physical abilities and environment, are rarely readjusted, leading to risks of poor posture and falls.
- **Value Proposition: Posture Support with Adaptive Robotic Cushions**
  - **Cushion with Adjustable Softness and Hardness:** We are developing a "Robotic Cushion" whose shape and stiffness change according to the user's physical abilities and environment, significantly reducing poor posture and fall risks.
  - **High Versatility:** We provide a highly versatile solution designed to be shareable across various types of welfare devices and robots, enabling utilization in diverse situations.
  - **Lifelogging:** By integrating heart rate/body pressure sensors, the system enables daily status monitoring and anomaly detection.

Yasuhisa Hirata

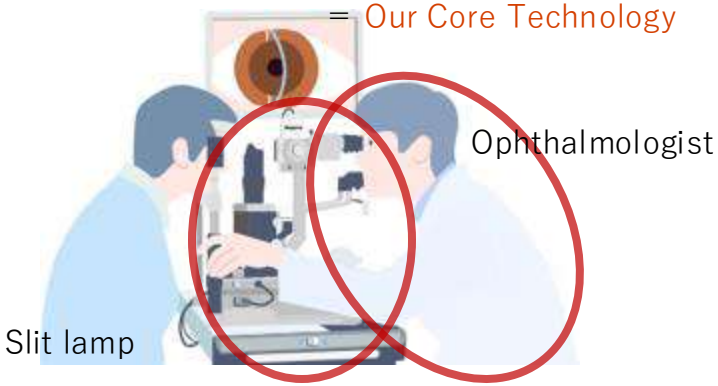
Tohoku University
Graduate School of Engineering
Professor

| Project Title | **AI-Powered Automated Slit-Lamp Microscope for Home-Visit Eye Care** |
|---|---|

## Summary of Seeds

＜<AI device that lets home-visit doctors
—who normally struggle with eye care—provide full ophthalmic exams>

○ Slit lamp＋ Ophthalmologist's Expertise
＝ Our Core Technology



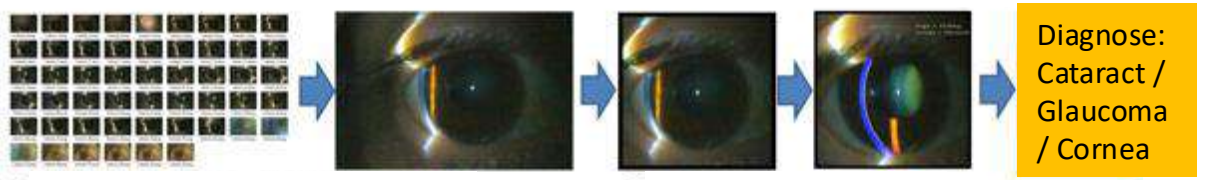

**We turned a slit-lamp — essential for eye exams — into a portable device.**
With AI, it automatically scans, detects abnormalities, and provides a diagnosis.

Outline

○ The Value of This Core Technology for Elderly Patients
in Nursing Facilities and Home Settings

**Traditional Eye Clinic Visit** – ≈ *3 hours*
Travel → Waiting & Check-in → Exam
→ More Waiting → Payment → Pharmacy → Home
**With Home-Visit Service** – ≈ *10 minutes*
Exam → Doctor Review → Done

Utilizing this technology in home medical practice significantly alleviates the burden of ophthalmic care for elderly patients.



Takuro Matsumoto MD

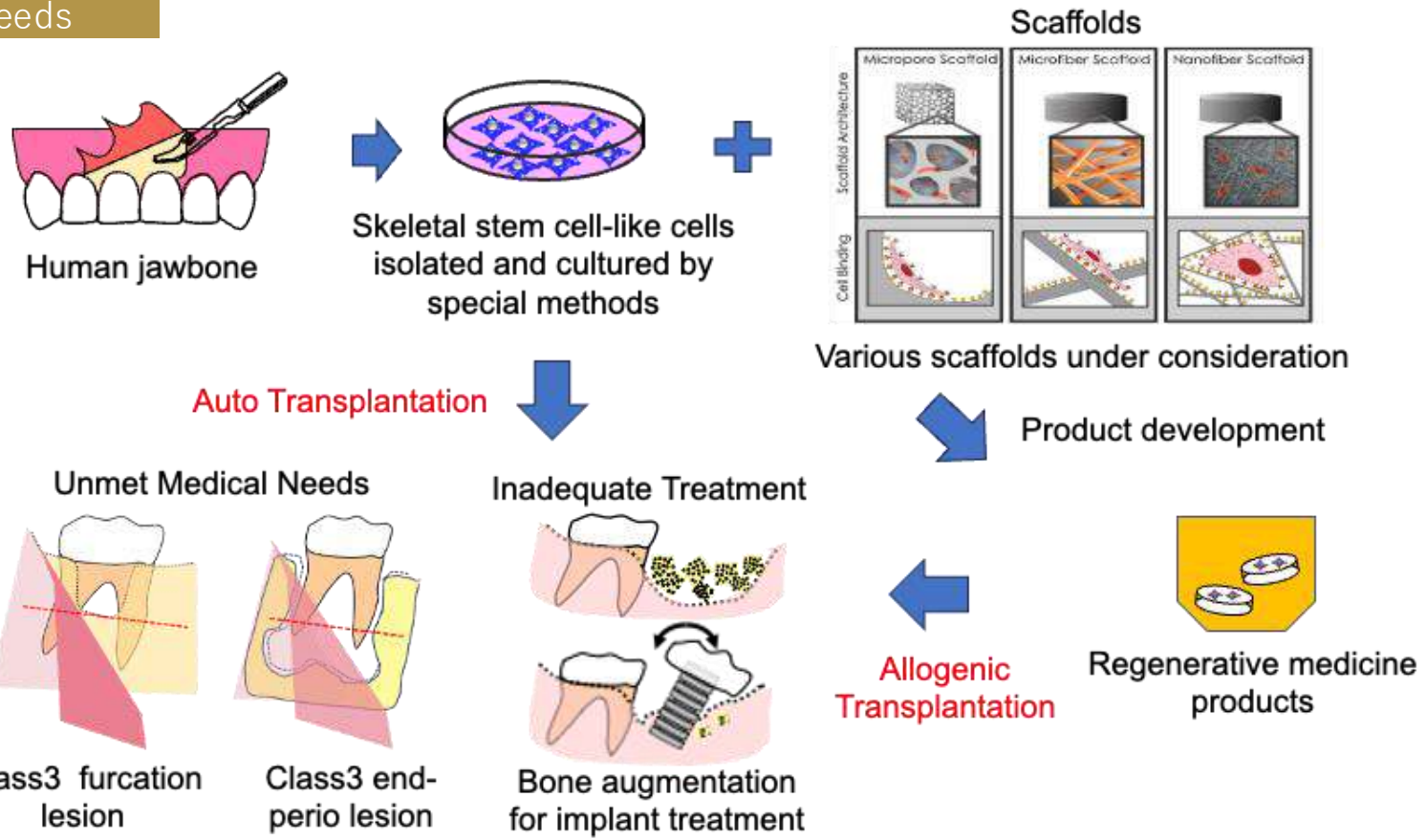
Tohoku University
Department of medicine
PhD Candidate

Biological Image Processing System
– International Publication Number 2023/062764 A1

Device and System
– Application Number PCT/JP2023/028635

| Project Title | Development of novel regenerative medicine using allogenic skeletal stem cell progenitors |
|---|---|

## Summary of Seeds




The development of innovative bone regeneration technology has the potential to preserve teeth that cannot be left behind and to facilitate the construction of the necessary bone.

Yuya Kamano

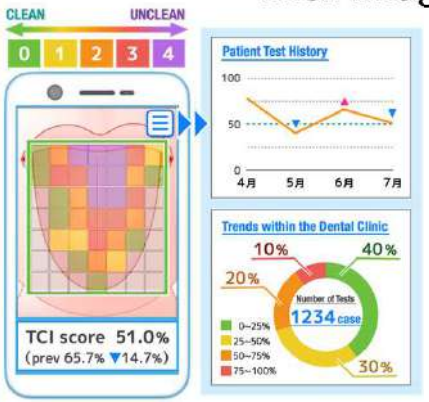
Tohoku University
Hospital Endodontics
Senior Assistant Professor

MICHINOKU ACADEMIA
STARTUP PLATFORM

| Project Title | A Tongue Hygiene App with Image Recognition to Market |
|---|---|

## Summary of Seeds

**A tongue assessment system using a smartphone application with image recognition technology for anyone, anytime, anywhere.**




### Challenges

Lack of simple and quantitative tools to assess tongue hygiene.

### Unique Value

- Provides immediate, user-independent, and detailed results.
- Enables longitudinal assessment through data storage.
- Offers simple visual feedback and cleaning methods.

### < Target Stakeholders >

**Oral Healthcare Manufacturers**
Product and promote new development

**Dental Clinics & Care Facilities**
Effective and continuous oral care management

**Universities & Research Institutions**
Reliable data collection for large-scale studies

### < End Users >

**Older adults & general population**
Assessment and motivation for oral self-care

**Dental professionals & care staff**
Professional oral care and assessment

**Researchers**
Quantitative assessment of oral condition

Kazuhiro Hori

Niigata University
Graduate School of Medical and Dental Sciences
Division of Comprehensive Prosthodontics
Professor

| Project Title | inSituReg: Bio-Implant Driving Endogenous Regeneration |
|---|---|

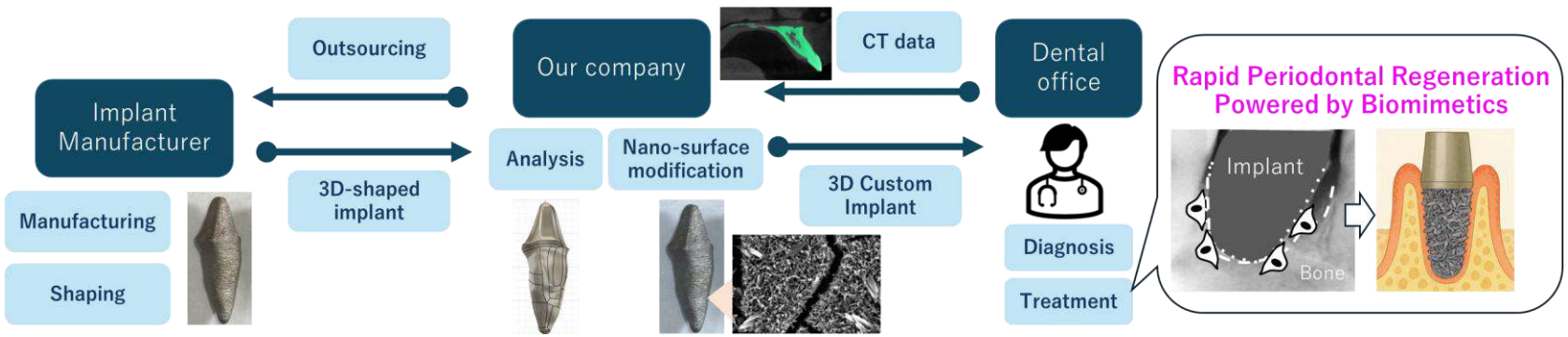
## Summary of Seeds

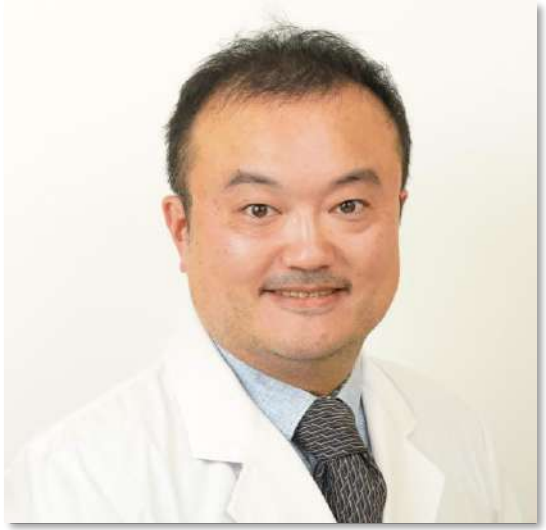
We are developing a next-generation “Bio-Implant” that regenerates periodontal ligament simply by placement after tooth extraction.

Using patient-specific CT data, we create custom implants featuring proprietary nano-surface modifications to activate endogenous stem cells. This biomimetic, cell-free strategy enables minimally invasive and simplified surgery.

Our B2B2C model—contract manufacturing, nano-processing, and dental clinic distribution—fits seamlessly into existing workflows. Targeting new markets such as younger patients and the elderly, we aim for global growth through strategic partnerships and early exit via M&A.

**From CT Scan to Chairside Delivery : A B2B2C Solution for Universal Smiles**



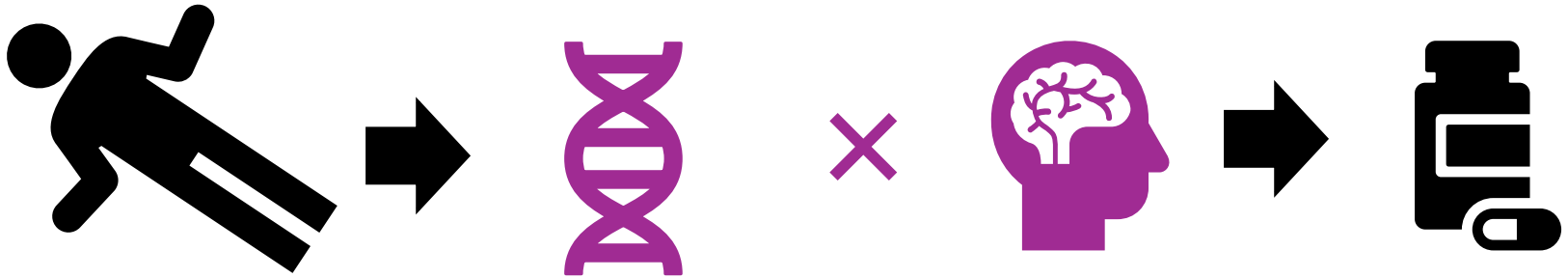
Masahiro Yamada

Division of Mechanobiology and Biomedical-Dental Engineering, Tohoku University Graduate School of Biomedical Engineering
Professor

| Project Title | Epilepsy-Specific Gene Panel and Drug-Selection Support AI |
|---|---|

## Summary of Seeds

- Epilepsy affects 1 in 100 people, and about 30% of cases are drug-resistant.
- In drug-resistant epilepsy, there are no clear guidelines for selecting medications, and finding the right regimen can take years to decades.
- In this project, we use a gene panel analyzing over 1,000 epilepsy-related genes together with AI to recommend optimal drugs and reduce seizures in patients.



**Refractory Epilepsy**
(0.3 million in Japan)

**Epilepsy Gene Panel**
・>1,000 monogene
・Polygenic risk score

**Drug selection AI**
・Multi-modal
・RAG

**Optimal Drug**

Kazutaka Jin

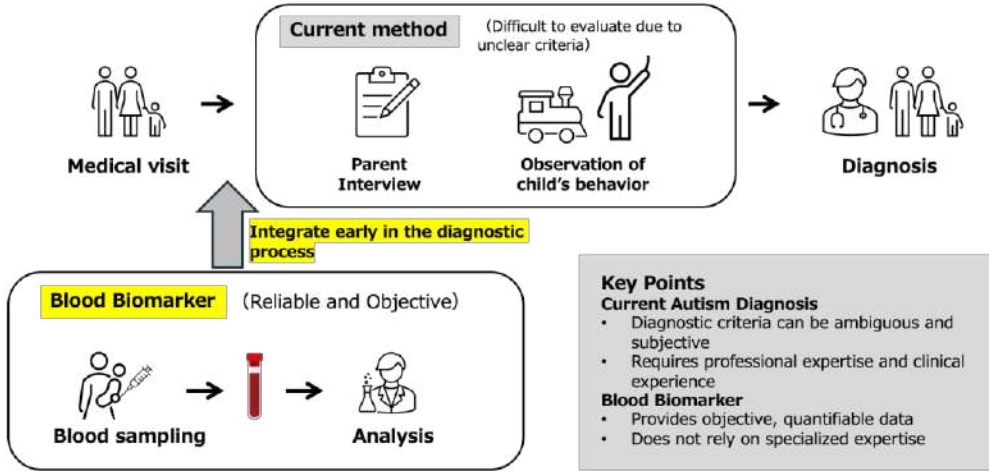
Tohoku University
Graduate School of Medicine
Department of Epileptology
Associate Professor

| Project Title | Development of a Blood-Based Diagnostic Aid for Autism Using Lipid Biomarkers |
|---|---|

## Summary of Seeds

This project proposes the development of a diagnostic aid for autism spectrum disorder (ASD) using the lipid-related biomarker FABP4 (Fatty Acid Binding Protein 4), which we have identified through our research. The aim is to develop a blood-based test kit utilizing this technology and to explore its commercialization potential. The key feature of this method lies in its ability to provide objective diagnostic indicators through blood sampling, which may complement existing diagnostic approaches. In parallel, we are also exploring FABP4-related drug discovery seeds. In the future, we envision building an integrated support model that links diagnosis and treatment for individuals with ASD.

**Integrating Blood Biomarkers into Autism Diagnostic Process**

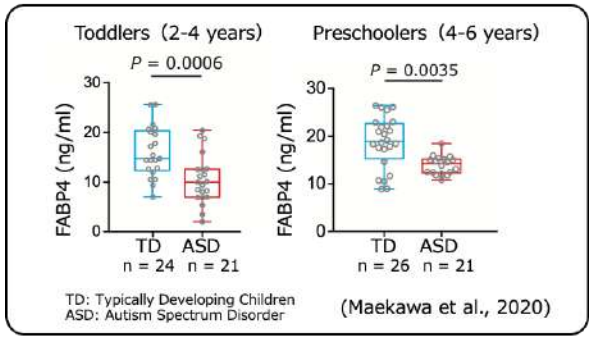



**Key Points**

**Current Autism Diagnosis**
- Diagnostic criteria can be ambiguous and subjective
- Requires professional expertise and clinical experience

**Blood Biomarker**
- Provides objective, quantifiable data
- Does not rely on specialized expertise

**Decreased FABP4 in the Serum of Young Children with ASD**




- FABP4 is an adipocyte-derived protein.
- FABP4 may be involved in normal brain development.
  (Kirikae et al., 2025; Sun et al., 2025)

Motoko Maekawa

Tohoku University・
Graduate School of Medicine
Associate Professor

Project Title

# Clinical translation of 'living' vascular grafts

Summary of Seeds

Atherosclerosis, the leading cause of stenosis and occlusion in major arteries, results in life-threatening ischemic conditions such as coronary artery disease and stroke. Current treatments, including vascular interventions and bypass surgery, often encounter restenosis—a recurrence of artery narrowing—highlighting the urgent need for more effective therapies.

Our groundbreaking approach leverages regenerative medicine, where damaged blood vessels are replaced with new, healthy ones. We have pioneered a revolutionary therapy using 3D blood vessels created from human induced pluripotent stem cells (iPSCs). These iPSC-derived blood vessels are not only structurally similar to human blood vessels but also function in a comparable way—a world-first achievement.

Our innovative therapy targets a broad range of atherosclerosis-related conditions, with an initial focus on Lower Extremity Arterial Disease. This breakthrough therapy has the potential to dramatically improve quality of life and promote healthy aging on a global scale.

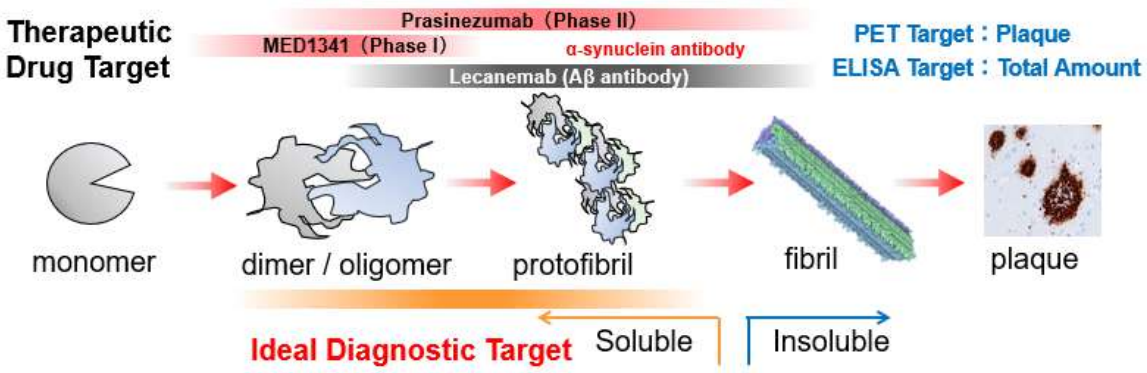
TakafumiToyohara

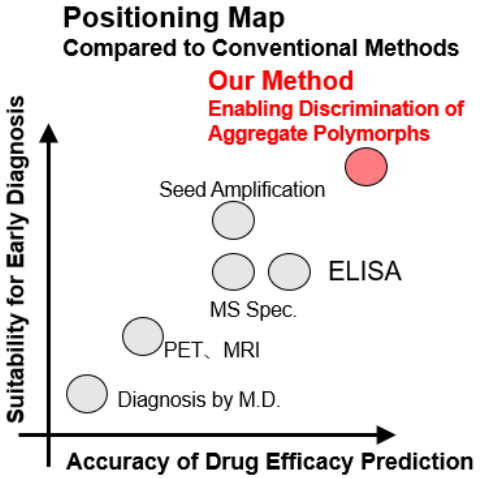
Tohoku University Hopital・
Department of Nephrology
and Hypertension
Associate Professor

| Project Title | Novel Diagnostic Drug Development Business for Synucleinopathies Based on Aggregate Seed Detection |
|---|---|

## Summary of Seeds

- Small molecule probes that selectively form covalent bonds with protein aggregates
- Develop the first method that not only quantifies aggregate seeds in subjects' blood but also identifies aggregate polymorphic structures
- Develop diagnostic drugs that enable early disease diagnosis and prediction of efficacy for future therapeutic drugs by utilizing proprietary protein chemical modification technology for analyzing aggregate seeds



Shinichi Sato

Tohoku University
Frontier Research Institute for Interdisciplinary Sciences
Associate Professor

MICHINOKU ACADEMIA
STARTUP PLATFORM

Project Title

# Extremely Early Diagnosis by Innovative MRI

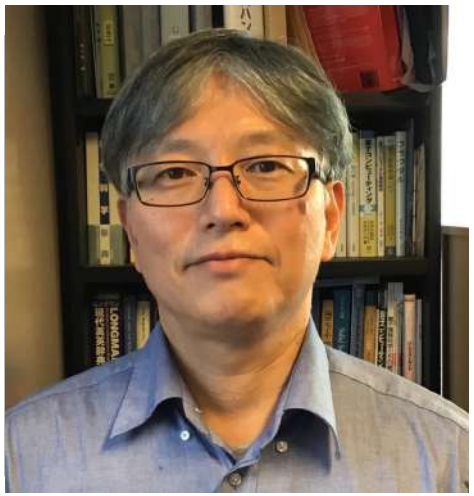
Summary of Seeds

- Contrast can be emerged from monotone images.

- The contrast comes from the difference in viscosities in organs (including brain) , blood or lymph fluid.

- The viscosities range from very low stage (smooth liquid) to sticky, gel and solid state.

This means that our innovative MRI enables us to detect various diseases, particularly cancer and malfunctions in the brain or in the blood vessels.



Susumu SASAKI

Niigata University・
Faculty of Engineering
Associate Professor

| Project Title | HumiDAC: Energy Saving Carbon Capture from Air and Exhaust Gases |
|---|---|

## Summary of Seeds

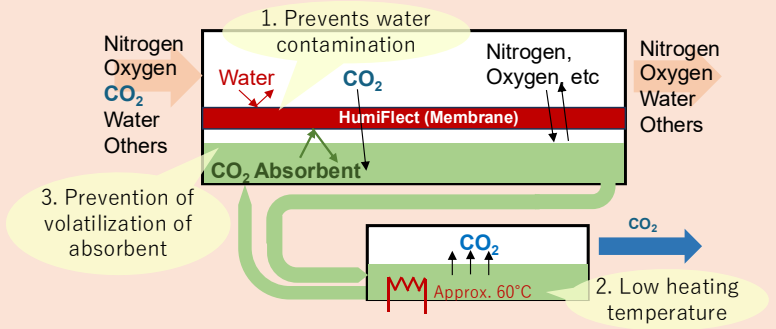
### Issue

To realize a carbon-neutral society, all manufacturers must **use non-fossil carbon resources** or **purchase credits created by $CO_2$ storage**

**Existing carbon capture technologies consume excessive amounts of energy!**

Especially in humid climates

### Solution




**HumiDAC prevents absorbents diluted by vapor → realizes energy-saving carbon capture even in humid climates!**

## Business Model

### Products

**1. Module Type**

Supply plant engineering companies with various types of HumiDAC modules for use in their large scale process

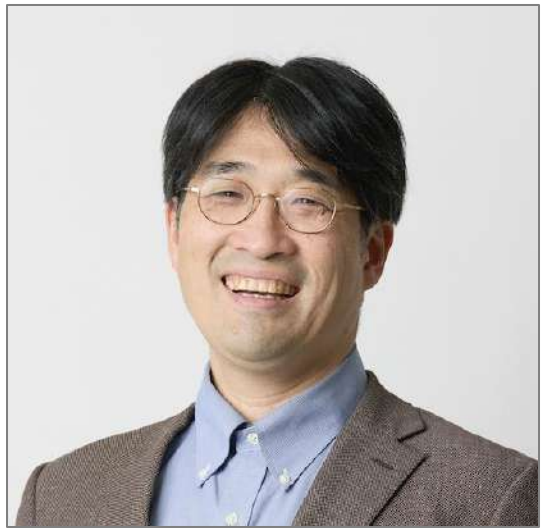
**2. Unit Type**

Assuming a company deploys HumiDAC at a commercial level (20or40 foot container with stacked HumiFlect membranes)

### Estimated customers

1. Chmicals producers who want to **secure their green carbon sources**
2. Companies who wants to **sell carbon dioxide or create carbon storage credits**

# all range of scales at all different kinds of locations will be our target



Yasuhiro Fukushima

Tohoku University
Graduate School of Environmental Studies,
Department of Frontier Sciences for Advanced Environment,
Professor

| Project Title | **Pioneering a New Market for Dementia Screening through Amyloid MRI** |
|---|---|

## Summary of Seeds

**This innovative technology enables the visualization of amyloid-β（Aβ）accumulation associated with Alzheimer's disease using standard MRI systems.**

As a cost-effective and scalable alternative to amyloid PET—which remains invasive, expensive, and limited in availability—this technology offers significant value to key stakeholders:

- **Brain Health Screening (Brain Dock)**:
  A safe, accessible solution for early dementia risk detection.
- **Pharmaceutical Companies**:
  Streamlined screening and substantial cost savings in clinical trial subject selection.
- **Hospitals**:
  Seamless integration into routine clinical workflows using existing MRI infrastructures.

By leveraging a cloud-based SaaS model, the system ensures nationwide accessibility and rapid deployment.

With the global rise in dementia cases, demand for this technology is expected to grow.

We aim to achieve ¥230 billion (approximately $1.5 billion USD) in revenue within five years.

Yasuko Tatewaki

Tohoku University IDAC
Department of Aging Research and Geriatric Medicine
Assistant Professor