Introduction of main measures

Construction of the platform to explore drug targets

Program Director **KUREBAYASHI Yoichi** Graduate School of Medicine, Kobe University Professor

Original measure: Development of AI to accelerate drug discovery (the Ministry of Health, Labor and Welfare)

Issues and Goal

Exploration of drug targets that show reliable efficacy in human clinical trials

Issues: The low success rate in selection of drug targets based on animal experiments during Phase 2 trials is the biggest bottleneck in conventional drug development. To address this issue, we aim to develop new, game changing platforms for drug discovery, that stratify patients and explore appropriate drug targets based on patient information and the use of AI.

Goal : To develop the wide range of AI methods/models required to build a platform for the data-driven exploration of drug targets in idiopathic pulmonary fibrosis (IPF) and lung cancer. Some of the methods/models will work by stratifying patients based on clinical and omics data (comprehensive biomolecular information). In addition, we will use these methods/models to identify at least one new drug target each for IPF and lung cancer and promote them for actual drug discovery in industry by out-licensing to companies.
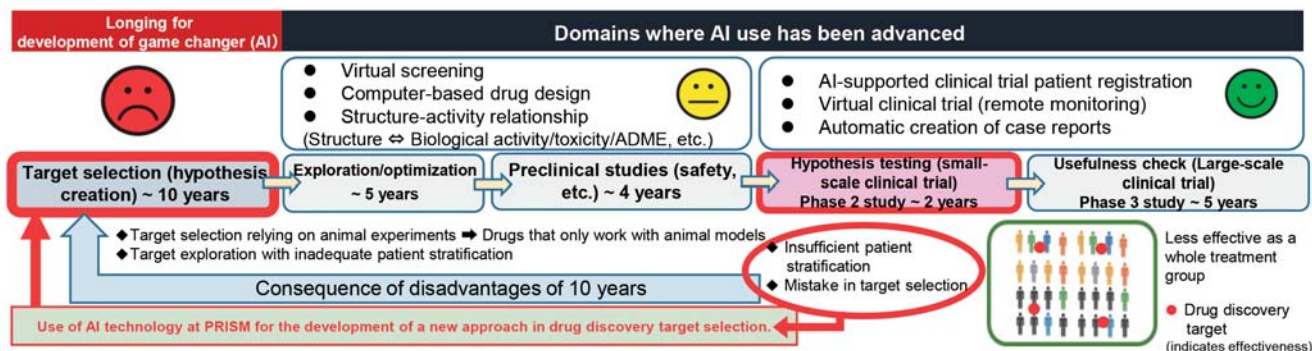
Overview

Exploration of drug targets using AI from clinical and omics data of patients

In collaboration with Japan's top-class medical institutions, we will collect high-quality clinical and omics data for more than 1,500 cases of IPF and lung cancer each, in order to build the world's largest integrated database for these diseases. Furthermore, we will use the collected data, in conjunction with scientific papers and existing databases, to develop the world's most advanced AI suite and knowledge base to stratify patients and explore drug targets in a data-driven manner. Fifteen organizations, including NIBIOHN, RIKEN, JST, universities and national institutes, are part of this project.
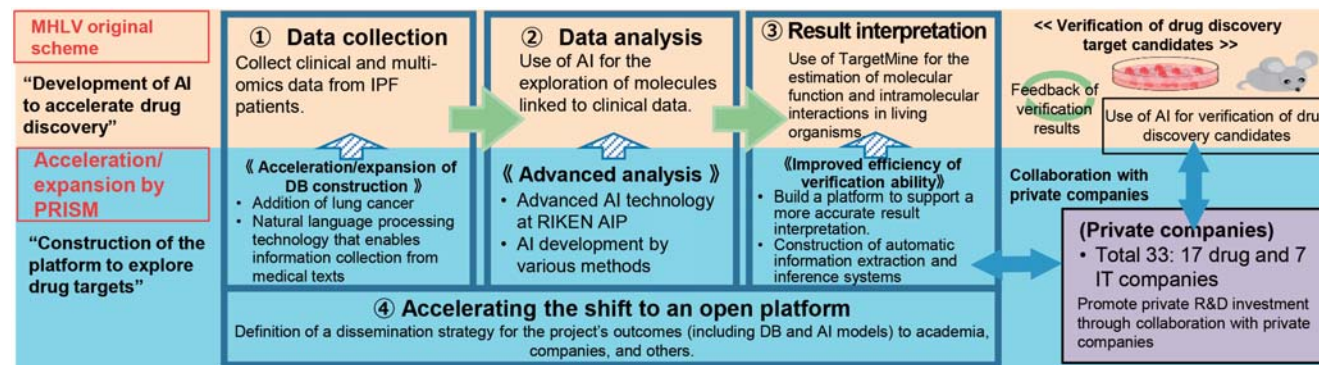
Achievements to date and expected positive ripple effects

Develop AI models/methods that extracts biomolecules closely related to diseases using only data, and without the requirement for specialized knowledge!

We have built a multi-omics integrated database that constitutes the world's largest medical information repository for both IPF and lung cancer.
We have also succeeded in developing an AI method/model that can explore drug targets based on the data without specialized knowledge.
At the same time, we are following a series of different principles to develop AI models;some of the models identify drug candidates with existing public data alone. We plan to apply the data from the integrated database to such models to improve its performance.
In addition to AI to explore drug targets, we are also developing tools for the analysis of clinical text, automatic knowledge extraction, and automatic inference system, among others.
Finally, we plan to launch an open platform to allow researchers both in industry and academia to widely use these systems in FY2021.

Building a smart preventive Long-term care platform
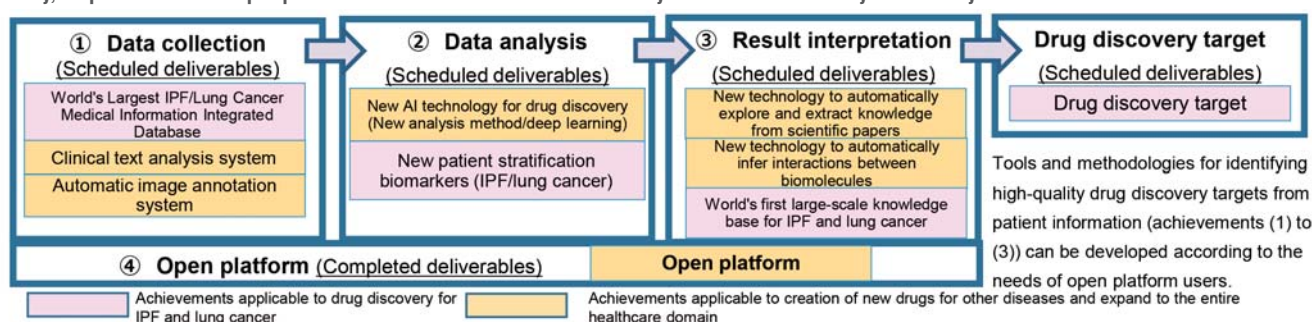
Program Director **TANAKA Shigeru** Chairman, Saitama Prefectural University

Original measure: General Long-Term Care Prevention Project (Community Support Project) (Ministry of Health, Labour and Welfare)

Issues and Goal

Issues of "places to go"

- As a general Long-term care prevention project, the national and local governments have promoted "places to go (kayoinoba)", which are places for activities such as gymnastics and hobbies for elderly people, and have taken individual approaches to high-risk elderly people, but there have been challenges such as improving the participation rate and nationwide deployment of effective initiatives based on evidence.
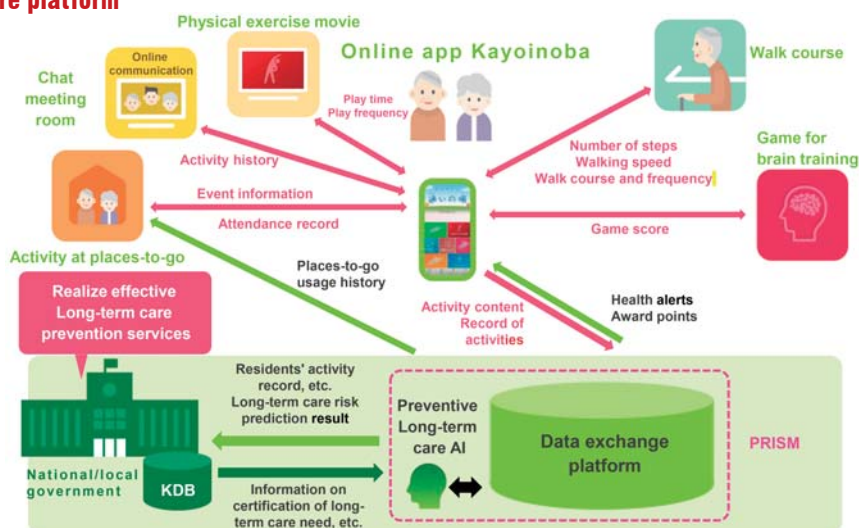
Online app "Kayoinoba" and preventive Long-term care AI

- Adopted these measures for PRISM in July 2019 and now promoting them with the aim of improving the participation rate and nationwide deployment to contribute to preventive Long-term care.
- Considering the impact of the COVID-19 pandemic, we will utilize the online app "Kayoinoba" released in July 2020 to improve the participation rate including online visits and develop AI that can contribute to Long-term care prevention project based on the data from the app.

Overview

Overview of smart preventive Long-term care platform

- Medical and AI experts will collaborate to develop AI and services that are effective in preventive Long-term care. We will expand effective initiatives utilizing ICT and AI in "places to go".

  ✓ Collect lifelog data of users through the apps, etc.
  ✓ The collected data will be analyzed to determine risks that may lead to the need for nursing care, etc. KDB (Kokuho Database), which retains information on certification of long-term care needs, etc., and other data will be used as outcome information.
  ✓ Based on the analysis, we will develop AI for preventive Long-term care and alerts & recommendations according to frailty risk levels.
  ✓ We will implement services in which offline places-to-go and the online app Kayoinoba are combined to improve the participation rate.

Achievements to date and expected positive ripple effects

Achievements in FY2020

- We collected more lifelog data through the online app "Kayoinoba" and started full-scale development of the preventive Long-term care AI.

  ✓ We started collecting data from the app, continued to collect information in the field, and accumulated them on the data exchange platform.
  ✓ By analyzing the accumulated data, we examined the risks that would lead to health deterioration, need for nursing care, and dementia.
  ✓ Based on the analysis, we developed a trial version of the preventive Long-term care AI and alerts & recommendations.
  ✓ We are aiming at improvement of the participation rate of places to go and online app Kayoinoba.

Expected positive ripple effects

- Through the data exchange platform, we will aggregate data in an integrated manner, systematize medical and social mechanisms leading to health deterioration and need for nursing care, develop AI that contributes to preventive Long-term care, and build a foundation that will activate the preventive Long-term care services of private businesses.

  ✓ The following are expected: smartphone usage guidance services at mobile carrier shops, new services by mobile carriers in collaboration with the data exchange platform, and increase in private investment induced by collaboration with service providers for elderly people.

Preventive Long-term care AI developed in FY2020

Developed **a model that predicts the answers to the basic checklist** based on the data collected by the online app Kayoinoba

Estimate the risk of Long-term care from the model output (answers to the basic checklist)