

# Development and Provision of Total Solutions in Collaboration with Partners

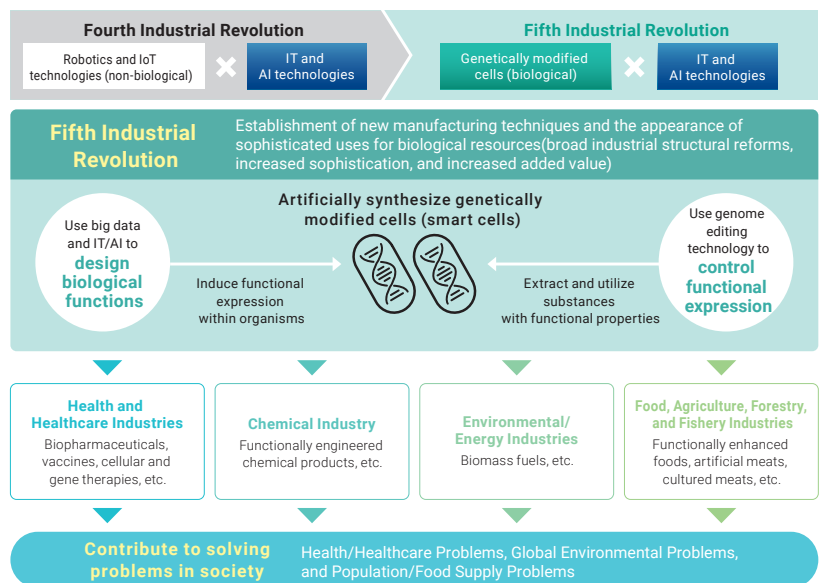
## Using Robotics and AI to Create a Platform for Autonomous Scientific Discovery

### Utilizing AI Technologies

Joint testing with Kobe University has begun to verify the usefulness of a prototype for the world's first "autonomous lab" system based on robotic, digital, AI, and other technologies. Combining biotechnologies with digital technologies will enable a transition from petroleum and natural gas-based manufacturing methods to biotechnology-based manufacturing methods that will lead to phasing out fossil fuels and reduce CO<sub>2</sub> emissions. Shimadzu aims to deploy an autonomous laboratory system, which includes liquid chromatographs (LC) and liquid chromatograph mass spectrometers (LCMS) for the development of biopharmaceuticals, new materials, and so on.



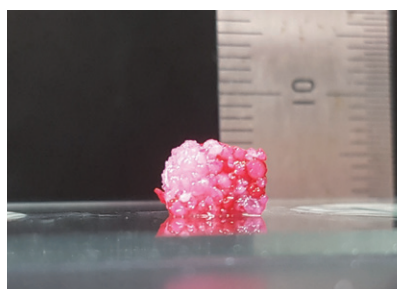
Illustration of Autonomous Lab System



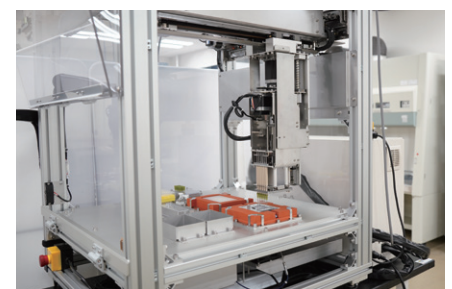
## Using 3D Bioprinting Technology to Solve Environmental, Food Supply, Health, and Other Challenges in Society

### Bioeconomy

In 2022, Shimadzu signed a partnership agreement with Osaka University and others to promote the use of 3D bioprinting technologies. The partnership aims to promote the adoption of cultured meats by researching and developing automatic production equipment, techniques for analyzing flavor, texture, and other characteristics, and technology for culturing cells. In 2023, the partnership took additional steps toward solving global societal challenges, such as the food supply crisis and environmental problems, by establishing the Consortium for Creating the Future of Cultured Meats and by promoting the adoption of cultured meat manufacturing methods in society.



Cell-based Cultured Meat that Simulates the Structure of Wagyu Beef



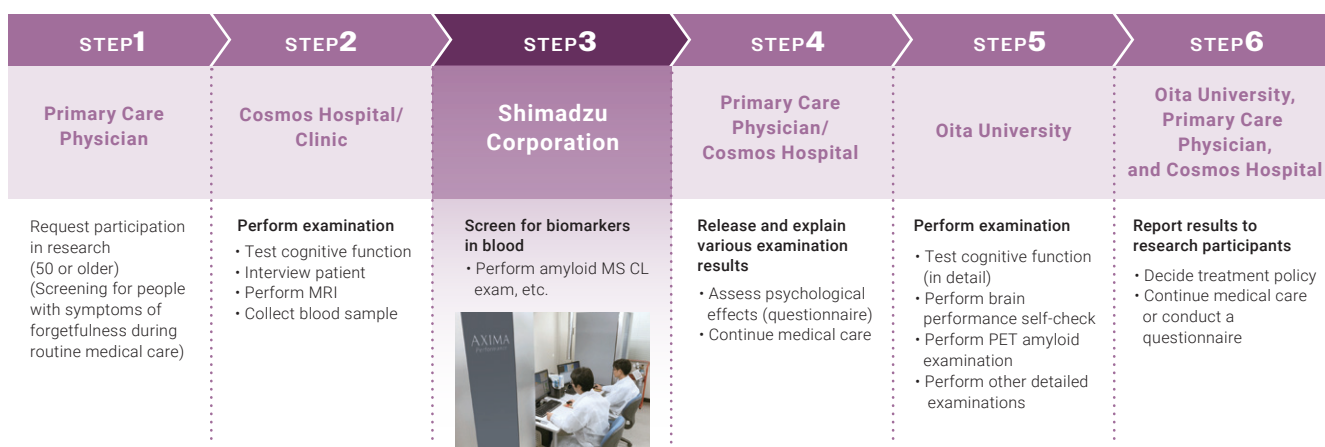
Automatic Cultured Meat Production System (Prototype)

## Establishing Japan's First Workflow for the Diagnosis of Dementia Using Blood Biomarkers



Shimadzu partnered with Eisai Co., Ltd., Oita University, and the Usuki City Medical Association to jointly start a cohort study\*1 for the early diagnosis of Alzheimer's disease. The site for the research was in Usuki City of Oita Prefecture, where blood biomarkers were used to establish Japan's first workflow for diagnosing mild cognitive impairment (MCI) and Alzheimer's disease. The aim is to contribute to the early diagnosis of Alzheimer's disease by demonstrating the usefulness of using blood biomarkers to healthcare personnel, from primary care physicians to dementia specialists in relevant academic fields.

\*1 Research study that investigates changes in the onset and status of diseases based on long-term observation of a specific group of subjects.



## Creating "Food and Health" Innovations for Achieving Societies with Longer and Healthier Life Expectancies



In 2019, the Shimadzu Group signed a joint research agreement with the National Agriculture and Food Research Organization (NARO) and established the NARO-Shimadzu Kyoto Laboratory for Food Innovation within Shimadzu. In 2022, Shimadzu and NARO established the Self Care Food Council, with Shimadzu serving as the secretariat, with the objective of achieving a society with longer and healthier life expectancies. In 2023, the partnership established the NARO-Shimadzu Testing Laboratory to support the development of healthy foods and beverages. The laboratory assists in verifying the functional benefits and safety of agricultural products and other foods. It also conducts research and development into healthy foods and beverages and promotes their quick adoption in society.



NARO-Shimadzu Testing Laboratory



NARO Shimadzu Kyoto Laboratory for Food Innovation