



## AI-Based Nutrition (AI Nutrition) Technology for Food Development in the Future

By developing technologies to effectively utilize the limited natural capital, we hope to build a new food supply industry that will conserve the global environment and increase and improve food quantity and quality. Furthermore, we aim to eventually build and spread a “natural capital (earth supremacy)-oriented society” that supports such an industrial structure for the benefit of future generations.

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### **Creation of Next-Generation Food Supply Industry for a Natural Capitalism Society**

Keywords: AI nutrition, futuristic food, natural capitalism

#### Background

#### Cultivating Consumer Awareness regarding Future-Oriented Foods through Reduction of Food Loss and Health Consideration

We have heavily utilized various biological resources since the beginning of human history. Owing to the fact that we assigned a high degree of priority on the economic efficiency in industrial development, our irreplaceable Earth has been terribly damaged, resulting in environmental destruction and global warming, among others.

In this project, we aim to first establish “AI Nutrition Technology,” a fundamental technology necessary to realize “health from food” based on scientific evidence by fully utilizing multimodal digital technology, through mathematical scientific methods and collaborative creation between medicine and food. By making full use of AI Nutrition technology, we will subsequently promote the development of “futuristic foods” that will help in improving healthy life expectancy. In doing so, we aim to calculate the total amount of nutrients necessary for all people to lead healthy lives, and then create a “next-generation food supply industry” by 2050. This industry will be capable of providing futuristic food products that utilize the bounty provided by the Earth without further exhausting or wasting the limited natural capital. By promoting these efforts, we will build abundant natural capital for the future.

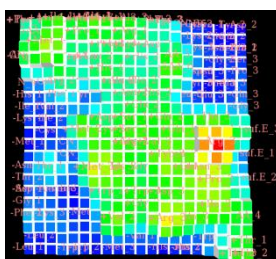
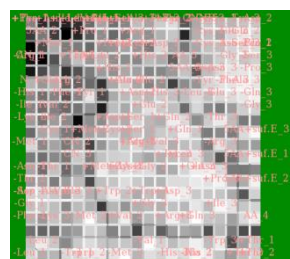
Furthermore, the food supply industry, which is shaped by the demands of consumers, will strive to transform the consciousness of consumers from the current economic-oriented capitalism to “natural capitalism.” The “One Earth Guardians Fostering Program,” promoted by the University of Tokyo Graduate School of Agricultural and Life Sciences, will join this activity.

#### Research Contents

#### Realizing “Health from Food” through AI Nutrition Technology for Social Transformation!

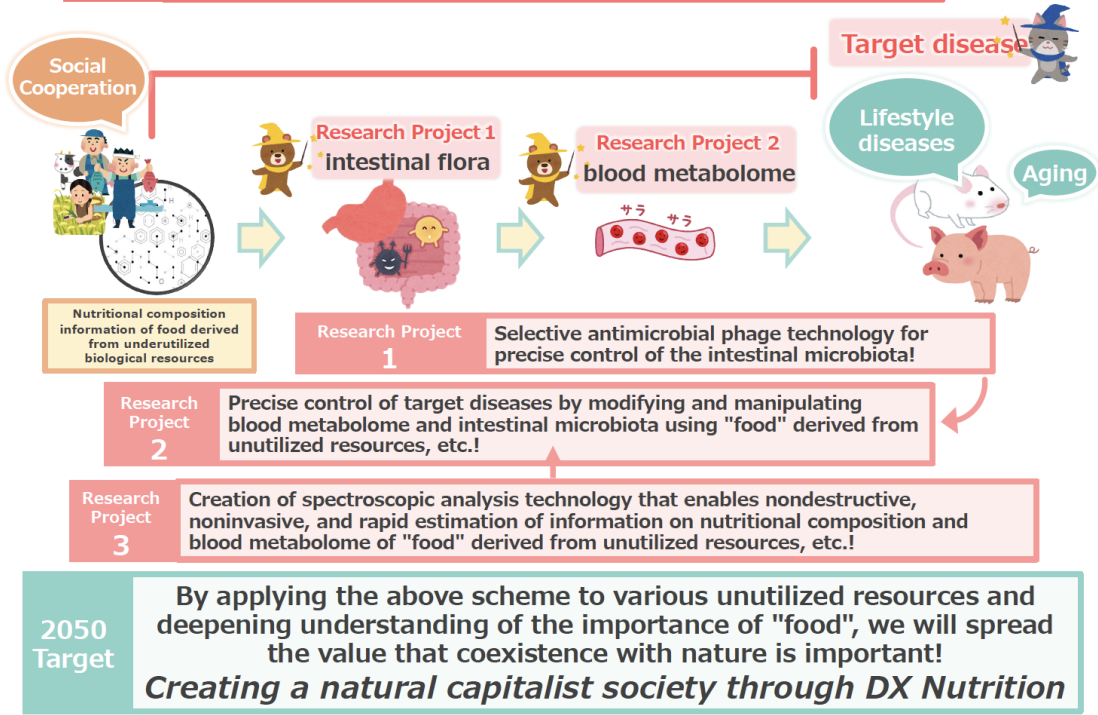
By 2030, this project will establish the foundation of “AI Nutrition Technology” to design biological information to suit specific purposes by comprehensively understanding the effects of nutrients and other components of foods and feeds on individual organisms through mathematical scientific methods and the collaborative creation of medicine and food.

Furthermore, by making full use of this technology, we will pave the way for the realization of the concept of “food for the future,” which will enable the maintenance and promotion of health through food based on scientific evidence. In this project, we will explore foods that are particularly effective in preventing lifestyle-related diseases and aging.



The rats were classified via SOM analysis using the amino acids levels in the blood of rats fed various diets as input values (right figure). The darker units indicate greater inter-rat differences. As shown in the left figure, the rats can be roughly classified into three groups based on blood amino acid concentration alone. On the right is a heatmap of rat liver TAG concentrations for each unit. The liver TAG concentrations can also be classified into the same three groups. This figure highlights that the profile (pattern) of blood amino acid concentrations determines liver TAG concentrations, and when examined in combination with other results, we conclude that machine learning is effective in nutritional science. (Sci. Rep. 8: 5461. 2018)

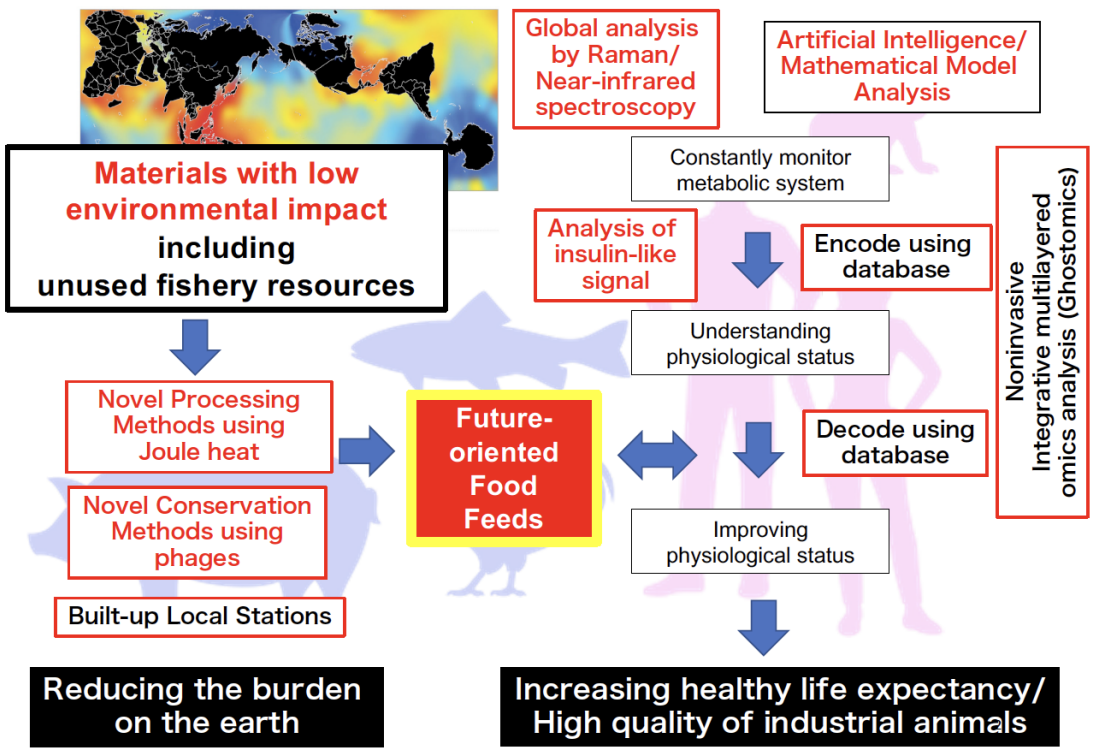
**2030 Target** Realize "Health from Food" based on scientific evidences by making full use of digital technology (AI Nutrition)!



**Targets by 2030**

By 2030, we will elucidate the effects of diet and intestinal microflora on blood nutrient dynamics and the impact of their control on health, thereby ensuring the production and supply of completely new futuristic foods through the development of AI Nutrition technology.

**Our Future Goals of the Moonshot Program 2030**



**Cooperating Research Institutes**

The University of Tokyo, Jichi Medical University, Toyo University, University of Tsukuba