

TSUKUBA FRONTIER



Professor, Institute of Life and Environmental Sciences

ISODA Hiroko

A Bioassay Approach to Food Resource Functionality

Exploring the Power of Natural Products

Numerous foods and herbs traditionally consumed are recognized for their health benefits and medicinal properties. Bioassays play a crucial role in scientifically substantiating these benefits, offering a method to evaluate the functions of compounds in these foods using biological materials. This methodology is employed to reveal the culinary secrets of the Mediterranean and North African regions.

Food Resource Functionality

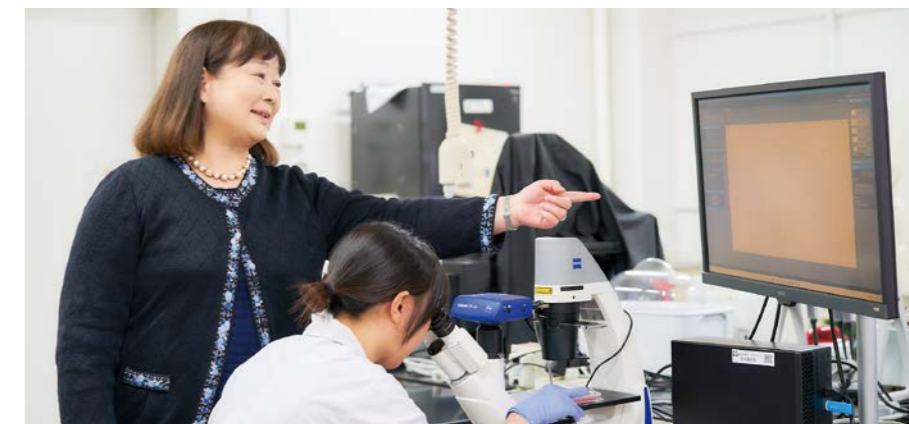
Epidemiological studies indicate that individuals adhering to a Mediterranean diet tend to have longer lifespans and are less prone to conditions such as atherosclerosis or Alzheimer's disease. This can be linked to the medicinal properties of herbs and aromatics, like olives and rosemary, integral to the Mediterranean diet. The Mediterranean region boasts a rich tradition of utilizing natural flora and fauna for medicinal purposes. These traditional medicines bear similarities to Chinese herbal medicines in Japan but are more casually incorporated into daily life, rather than being strictly medicinal. This has ignited interest in the power of unique food resources that have been inherited through generations in this region.

To scientifically decipher the empirical wisdom nurtured by local communities, molecular-level analysis is indispensable. Bioassays serve as methods to scrutinize the compounds in foodstuffs and assess their functions, including safety, utilizing various cell types and disease-state mouse models.

Employing Over 40 Different Bioassays

The laboratory utilizes over 40 diverse bioassays. Leveraging these evaluation systems, we probe the functions of natural compounds present in food resources and traditional medicines. For instance, we have unearthed that coffee components exhibit antiaging effects (such as cognitive function enhancement), and olive components possess antidepressant effects. These functions are advantageous for preserving everyday health rather than curing serious diseases like cancer, rendering them broadly applicable. This has attracted attention from medical field researchers and can pave the way for clinical research involving human subjects. The capability to conduct these studies seamlessly is a distinctive advantage of the University of Tsukuba.

Naturally, not all natural compounds



Isoda Laboratory, Institute of Life and Environmental Sciences, University of Tsukuba

The laboratory is involved in the discovery of new bioactive compounds and the clarification of their mechanisms, employing over 40 bioassays rooted in animal cell engineering for the assessment of food resource functionality and environmental safety. Research themes encompass functional analysis and optimal utilization of food resources, transformation of food components into seeds for functional food and cosmetics, functional distribution of arid land vegetation and database construction, and enhancement of food and environmental safety evaluation methods. Pertaining to arid land vegetation, rigorous field surveys and comprehensive data collection are being executed.



are beneficial. However, in the realm of medicine, it is not rare for new drugs to be developed based on natural compounds, and herbal medicines are occasionally employed to mitigate side effects. Accurately analyzing the function of natural compounds in food resources is not only pivotal for drug discovery but also for unlocking the potential of food ingredients.

Mediterranean Region Research: A Fusion of Humanities and Sciences

These studies also form a pivotal research theme of the University of Tsukuba's Alliance for Research on the Mediterranean and North Africa. The Alliance undertakes research on the resources and culture of the Mediterranean region in partnership with local research institutions, employing an integrated humanities-science approach. Beyond food resources, the Alliance explores other areas such as the utilization of high-purity silica from Sahara Desert sand for solar power generation, water resource management, and the establishment of international relations as a novel economic zone.

In the investigation of traditional medicinal properties of remedies, field research is vital. Mere communication with local people is not adequate; it is essential to amass a broad spectrum of information, encompassing aspects of language and culture. The Alliance comprises researchers specializing in the culture and religion of the Mediterranean region, facilitating a profound understanding of the region through detailed local language interviews about medicinal

herb-burning rituals, as well as scientific information about the medicinal properties of the herbs.

Social Implementation of Past Research Results

In the realm of academic research, we have internationally published over 500 papers on various evaluation systems evidence, signifying an unrivaled strength. To translate these findings into societal applications, we have initiated a venture company that strategizes drug discovery and functional food development. Despite the challenges in management, we are committed to creating a new business model.

Understanding the roles of herbs and spices beyond their taste and aroma makes it crucial to leverage these ingredients and their components more effectively. If we can uphold good health and stave off illness and aging through daily meals, it's precisely what we all need. This approach will significantly enhance the quality of life (QOL) in an aging society.

PROFILE

A professor at the University of Tsukuba's Institute of Life and Environmental Sciences, she also serves as the Director of the Alliance for Research on the Mediterranean and North Africa. She holds director positions at the R&D Center for Tailor-Made QOL and the Food and Medicinal Resource Engineering Open Innovation Laboratory (FoodMed-OIL) at AIST and the University of Tsukuba. Additionally, she is an auditor at the International Agricultural Research Center and has been a member of the International Strategy Committee of the Science and Technology Council, MEXT. Since 2004, her work at the Alliance has involved exploring the functional ingredients of Mediterranean food and medicinal resources, such as olives and aromatic medicinal plants, and analyzing their mechanisms. Her specialization lies in food functionality and natural product drug discovery.