

## Impact Objectives

- Explore the efficacy and safety of functional foods
- Undertake basic research on the development of functional foods and cosmetics that incorporate a drug development perspective

# Science-based benefits

*Dr Sachie Nakatani belongs to a team that looks at the efficacy and safety of functional foods to see if they have genuine benefits that are based on science. She shares some of the background to this research*



**Your research background is in the value of collagen. Can you talk a little about this?**

Collagen was historically not of nutritional focus because its amino acid score is zero. However, in recent years, dipeptides contained in various food ingredients, which are transferred to the blood, have been reported as having physiological activity on the body. Collagen has long been used in traditional Chinese medicine. For example, the extract from donkey skin called Asini Corii Collasus, has traditionally been used for hematopoietic action, infertility and beauty products. In Japan, collagen is often used for beauty products and joint pain prevention, but it was unclear if it contained useful ingredients. Also, many Japanese nutrition researchers thought that eating collagen would be meaningless because it breaks down into amino acids in the digestive tract. Another team's study revealed that taking collagen supplements could detect dipeptides in the blood. We found that some of the peptides contained therein had physiological activity.

**What type of research projects are you involved in at Josai University, Japan?**

I belong to a research team that is focused on the efficacy and safety of functional foods. Pharmacokinetics and safety are carefully considered in drug development. In our department, we are conducting basic research on the development of functional foods and cosmetics that incorporate a drug development perspective. In Japan, the Locomotive Syndrome was proposed by the Japanese Orthopedic Association – a syndrome that refers to musculoskeletal diseases or dysfunctions that are mainly caused by ageing. These conditions generally lead to a requirement for nursing care, so we are working on developing methods to prevent Locomotive Syndrome.

**How does your work have value to people generally?**

There is food which can be described as 'food with a functional claim' in the Japanese system. Under the responsibility of the food company, it is a product with a functional claim based on scientific evidence. It leads to basic research such as whether these are really worth taking. If we can demonstrate the efficacy of certain foods, then taking them will obviously be supported by science. On the other hand, if we demonstrate the futility in taking certain foods, then it will hopefully make people realise there is very little point in ingesting certain supplements and they can perhaps

start taking supplements with actual benefits.

**Are you undertaking any joint research?**

I belong to the Molecular Biology Society of Japan, the Japan Society of Nutrition and Food Science, the Functional Food Society of Japan and the Japan Chitin and Chitosan Society of Japan. I am conducting joint studies with researchers from other research institutes and corporate researchers who I met at academic conferences. Researchers who belong to Japanese companies also want to know the truth and want to learn. Some say that companies operate on profit and do not seek the truth. However, I would be glad if I could cooperate in basic research with a company that wanted to develop and sell something really good.

**Finally, in what ways do you think scientists can better communicate?**

I appreciate that you can write articles in a magazine such as *Impact* in an easy-to-understand manner, and I would like many people in Japan to read *Impact* articles through the University homepage. This will help communicate the importance of the work that we are doing, but also other team's work in different areas. ●

# The potential benefits of collagen hydrolysate

*A team of researchers based at Josai University is investigating bioactive components contained in collagen hydrolysate. The findings could one day help to extend the healthy lifespan of people around the world*

In Japan, there is a system in place called 'Foods with Function Claims'. This system basically requires that if a food company wants to make a claim about the specific benefits of a foodstuff, it must be supported by scientific evidence. This is an important initiative for a wide variety of reasons. For instance, people taking foodstuffs that are not supported by scientific evidence might well decide not to take supplements with genuine benefits because they believe they are already taking adequate steps.

To comply with the 'Foods with Function Claims' system, companies rely on the work of researchers to determine whether what they are claiming is supported by scientific evidence. Dr Sachie Nakatani leads a team based at Josai University in Japan, which is investigating a wide range of different foodstuffs to determine whether they have genuine health benefits.

## ALLEVIATING AGE-INDUCED OSTEOARTHRITIS

One of Nakatani's projects is investigating the supplementation of glucosamine hydrochloride and collagen hydrolysate, which have been linked to a reduction in problems associated with age-induced osteoarthritis. Collagen, in particular, has long been thought by the medical science community to have no health benefits, despite claims to the contrary. 'Collagen has an amino acid score of zero and was thought to break down in the digestive tract,' explains Nakatani. 'However, recent research findings led to us investigating collagen to determine whether it did have health benefits.'

The team knew that both collagen-derived dipeptides and glucosamine are components of an extracellular matrix of cartilage. 'Tissues are composed of cells, growth factors and scaffolds - when the extracellular matrix (which is a scaffold) is damaged because of various factors, such as ageing and injury, degradation products are generated *in vivo*,' Nakatani outlines. They hypothesised that these degradation products act as a signal

to cells and contribute to the repairing of tissue. 'We are conducting research to evaluate the cell response by adding collagen hydrolysate and glucosamine to cells,' She says. 'Degradation products generated *in vivo* might act as signal molecules, so we are looking for a degradation product that works as a signal molecule.' The team study the mechanism of action of the signal molecule using cultured cells and, when a signal molecule is ingested, they evaluate whether the living body is positively affected.

## EXTENDING THE HEALTHY LIFESPAN

The team has also been working on some research evaluating the effects of collagen peptide supplementation on the maintenance of knee joint conditions in healthy university students belonging to a running club. The players, who are also based at Josai University, were worried about becoming easily injured, so a nutrition researcher investigated and suggested measures for improvement.

A team led by Dr Mano, a professor who taught Nakatani, examined whether collagen hydrolysate intake could improve pain and blood parameters. 'Collagen peptide supplementation was shown to improve knee joint condition in healthy male subjects, but also demonstrated the potential to suppress inflammation and reduce muscle tissue damage,' observes Nakatani. The team has obtained results that support the need for special care for athletes with a strong joint load, with other results currently under review.

Ultimately, Nakatani and her team want to extend the healthy lifespan of people. 'My favourite proverb is 'Let food be thy medicine and medicine be thy food' by Hippocrates,' comments Nakatani. 'A healthy diet is obviously important, but many people - myself included - eat foods that shorten our lives, such as sweets and fats.' Her focus is to help develop food that will support people when their diet is not perfect. ●

## Project Insights

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### BIO

**Dr Sachie Nakatani** has a PhD in Pharmacy and is an Assistant Professor in Josai University. Ph.D. (Pharmacy). She conducts research on the efficacy and safety of functional foods. Nakatani found that dipeptides appearing in the blood after taking collagen hydrolyzate have biological activity.

