Tokai University Educational System held the awarding/conferring ceremony for the winners of Shigeyoshi Matsumae Award of 2018 on January 16, 2019. The Shigeyoshi Matsumae Award is named after the founder of the university, and recognizes the achievement by students from kindergarten to university, alumni, and faculty members who have distinguished themselves exceptionally in the fields of culture, sports, and academic research based on the founding spirit. This year, a total of 587 groups and individuals were recognized (as of January 16, 2019). The awarding/conferring ceremony was held at the Tokai University Club in Kasumigaseki, Tokyo, and it was attended by President Tatsuro Matsumae, and many principals and chancellors in the various educational bodies within the Tokai University Educational System.

The Academic Department was recognized in the 1st award ceremony in 1991; since the 20th ceremony in 2010, it has been conferred both the Shigeyoshi Matsumae Academic Award and the Shigeyoshi Matsumae Academic Promotion Award. There have been a total of 76 recipients, including the three individuals recognized at the 28th ceremony in 2018.

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### 2018 Shigeyoshi Matsumae Academic Award

- **School of Medicine, Faculty of Medicine, Division of Surgery**
  - Associate Professor, Daisuke Sakai
  - “Understanding the pathology of spinal disease and realizing regenerative medicine”

- **Center for Liberal Arts**
  - Professor, Shogo Tanaka
  - “Conceptualization and Development of Embodied Human Science”

- **School of Medicine, Faculty of Medicine, Division of Basic Medicine**
  - Associate Professor, Hayato Terayama
  - “Functional morphological research in spermatogenic disorder and the vascular system as a whole body”
Daisuke Sakai
School of Medicine, Faculty of Medicine, Division of Surgery, Associate Professor
“Understanding the pathology of spinal disease and realizing regenerative medicine”

Sakai is committed to understanding the pathology of spinal disease and search for new and novel treatment methods. He has produced numerous results, including a report on the efficacy of stem cell transplantation therapy for intervertebral disc degeneration and a clarification of the primary reasons for aging and degeneration of intervertebral discs. He is also passionate about translating research findings to the clinics and has played a central role in realizing Japan’s first regenerative medicine for intervertebral discs.

Comments upon award conferral

Intervertebral disc degeneration is the primary cause of various spinal disease, such as scoliosis and disc hernia. However, there are currently no methods to prevent it, except for symptomatic treatments such as surgery. For over 20 years, I have shed light on the pathology of intervertebral disc degeneration and on developing regenerative treatment options.

A hurdle in the study of intervertebral disc degeneration is the lack of understanding of the reasons for tissue aging, which is a cause of the disease. In the past, the nucleus pulposus that is at the center of intervertebral discs was the main subject of study, but in an attempt to conduct broader, deeper studies, I expanded my research subjects to include the annulus fibrosus cells, encircling the nucleus pulposus as well as pathologies such as scoliosis and spinal canal stenosis that are caused by intervertebral disc degeneration. As I had already acquired research know-how, I was able to achieve results relatively quickly by applying it to other cells and pathologies.

I am grateful to Tokai University for its understanding of the importance of cooperation between industry and academia and of research cooperation across fields of study and between institutions. For my current research in clarifying the causes of scoliosis, I am performing clinical research jointly with the Department of Physical Education and the Sports Medical Science Research Institute at the University. It is difficult for promising research to be implemented practically through academia alone, but I am conducting research to develop new pharmaceuticals with support from the Japan Agency for Medical Research and Development (AMED) in cooperation with the Advanced Life Science Institute and Institute of Medical Sciences at Tokai University, as well as with pharmaceutical companies. One of the strengths of researchers in academia is that they have a good understanding of the needs of medical practice. Therefore, close cooperation with the pharmaceutical companies that are the professionals for development has the future goal of organizing a system that can provide low-cost drugs through creativity and innovation using different methods from the past, when investment of tremendous research funds would eventually lead to new drug discovery and commercialization.

In addition, as alongside research, I am also engaged in clinical treatments as a spinal surgeon in the department of orthopedic surgery. My specialty lies in scoliosis, which often occurs in adolescents, but its initial diagnosis is difficult, and it is a condition that strongly impacts patients as a result of interventions like surgery. It is highly likely that there are multiple causes of scoliosis, and although these have not been completely ascertained, I would like to shed light on these causes by studying intervertebral discs and connect these to the early diagnosis and early treatment of the condition.

Career Summary
March 2005: Doctorate: Completed PhD program at Tokai University Graduate School of Medicine
April 2005: Lecturer, Tokai University, School of Medicine, Faculty of Medicine, Division of Surgery
April 2007: Assistant Professor of the above
April 2012: Associate Professor of the above
April 2013: Research Fellow, University of California, San Diego, Department of Orthopaedic Surgery and Rady Children’s Hospital
April 2014: Returned as Associate Professor, Tokai University, School of Medicine, Faculty of Medicine, Division of Surgery (to date)
Comments upon award conferral

Many people may not immediately understand the term Embodied Human Science. In traditional psychology, the body was ignored and only the mind was considered based on a philosophy known as mind-body dualism. However, the mind does not in fact function separately from the body. Embodied Human Science aims to understand the totality of the mind and the body without ignoring the latter.

In my own research, I go through a philosophical debate regarding how the conventional view of psychology should be changed and then conduct experiments and surveys based on new perspectives. In scientific research, it is impactful to discover new empirical facts and laws behind them, and in engineering research, it is productive to contribute to the development of new technologies. However, in my own case, new achievements are only attained through developing fields of research based on entirely new paradigms, and so over the short-term, there is a difficult period during which no visible results are produced. However, once the paradigm is settled, the research can be long-lived, as it can continue over the span of 50 years.

One of my experiments indicating the relationship between the mind and the body is as follows. I performed an experiment on non-verbal communication, in which two subjects drew a picture without speaking. The first subject drew a portion of the drawing and handed it to the other subject, who proceeded to draw a little more. As the paper was handed back and forth, the two subjects alternately added to the drawing. The timing of when to stop drawing and hand the paper over was communicated by some type of non-verbal harmonization, so I collected video recordings of the actions of both subjects from various angles to investigate the nature of this non-verbal harmonization. As a result, groups that had a smooth drawing process synchronized their movements of nodding and leaning forward. In addition, after the study, the subjects individually and subjectively evaluated the degree to which communication had been established, and we found that the cases with a high rate of synchronization self-evaluated as having a higher degree of communication. In conventional psychology, coming to a mutual understanding was understood as indirect inferring the mind of the other person hidden behind the body. However, this experiment suggested that the degree of synchronization with the physical body of a partner could reflect mutual understanding.

I myself have been researching at the boundary between the humanities and the natural sciences, while Tokai University has upheld the fusion of the two as its foundational principle. A total understanding of mind and body should also directly connect to improving quality of life (QOL), which is a focus of Tokai University. I am currently conducting joint research with a variety of professors at the school within my own personal network, but I would like to create an institute for human research that is more organized and takes a broader, more multidisciplinary perspective. I would like to create such a team and organization and secure greater outside funding.

Career Summary

September 2003: Doctorate: Completed PhD program at the Tokyo Institute of Technology, Graduate School of Decision Science and Technology, Department of Value and Decision Science
April 2004: Part-time Lecturer, Tokyo University of Science
April 2005: Lecturer, Tokai University Center for Liberal Arts (Additionally the School of High-Technology for Human Welfare, Numazu Campus General Education Program Center)
April 2011: Associate Professor of the above
October 2013: Visiting researcher at the University of Heidelberg, Centre for Psychosocial Medicine (visit through the Tokai University Domestic/Overseas Research Visit Program, Long Term)
April 2016: Professor, Tokai University Liberal Arts Education Center
Professor, Tokai University Center for Liberal Arts (to date)
(August 2016 to August 2017: Visiting researcher at the Heidelberg Centre for Psychosocial Medicine as a visit through a Grant-in-Aid for Scientific Research and the Fund for the Promotion of Joint International Research)
Comments upon award conferral

After working at Tokyo Medical University for about ten years, I transferred to Tokai University six years ago. During that time, I have been devoted to education in anatomy.

My efforts have been particularly focused on studying infertility. According to a WHO survey, about 10% of couples who want to have children suffer from infertility, and half these cases are of infertility in men. In addition, about 70% of cases of male infertility are caused by sperm dysmorphia of unknown etiology. To date, I have searched for the cause of spermatogenic disorder from the immunological perspective, including autoimmune orchitis, and the environmental medicine perspective, including the impact of chemical substances.

The immune function in the body that distinguishes between self and non-self develops from infancy to puberty, but sperm are produced in the testes starting in puberty. The testes have a mechanism to suppress an autoimmune response, but if an abnormality occurs, the immune system considers sperm to be a foreign material and attacks it. When the testes are punctured with a needle for testing or research, it is possible for sperm to leak to the outside of the testes (seminiferous tubules), stimulating an immune response. As a result, my studies have been on mice rather than humans.

Recently, I have turned my attention to neonicotinoid pesticides, which are widely used worldwide, to analyze the effect of their exposure to testes. There are concerns over the environmental impact of neonicotinoid pesticides, including suggestions that they may be responsible for colony collapse disorder in which honey bees suddenly disappear. I have been administering this pesticide to adult and juvenile mice to observe changes in the intratesticular environment.

When I transferred from a medical university with a single department to this university, I felt that the limited perspective of medical schools is insufficient for contributing to improvements in quality of life (QOL). I felt that it would be possible to conduct multidisciplinary research involving multiple departments by focusing on pesticides. Although the case of ingesting pesticides is a subject for medical schools, the impact on ecosystems is a question for environmental science, while the changes in production and economic output that would result from regulating pesticides is a question for agricultural science, political science, and economics. I believe that taking the perspective of multiple departments in this way can contribute to improving QOL.

In the future, I would like to study the effects of common chemicals needed by society at large on the reproductive organs in addition to the effects of pesticides. In addition, I have an interest in the pathology of the testes with causes other than chemicals. I would like to continue anatomical research together with undergraduate students, graduate students, research students, and up-and-coming doctors.

Career Summary

March 2002: Completed the Course of Environmental Health Science at the Azabu University Graduate School of Environmental Health
April 2002: Research Assistant, Tokyo Medical University, Department of Anatomy
April 2004: Assistant Professor of the above
April 2013: Lector, Tokai University, School of Medicine, Division of Basic Medicine, Department of Anatomy
April 2017: Associate Professor of the above; additionally, Tokai University Graduate School of Human Environmental Sciences, Course of Human Environmental Sciences
April 2018: Additionally, Tokai University School of Humanities and Culture, Department of Human Development, Course of Environment and Resources (to date)