

Kayukawa Clinic Director's Diary

The predecessor of Kayukawa Clinic was *Okada Clinic*, which opened on June 1, 1996. Dr. Tamotsu Okada, who had retired from Nagoya University at the end of March that year, established the clinic next to his home. Over the course of 19 years, he provided daily medical care to nearly 6,000 patients. He treated all psychiatric disorders, including sleep apnea syndrome, narcolepsy, restless legs syndrome, various sleep disorders, anxiety disorders, depression, bipolar disorder, schizophrenia, dementia, and epilepsy. He also conducted examinations such as PSG, EEG, and MSLT with great enthusiasm, and continued presenting at academic conferences even after turning 77. When *Okada Clinic* closed at the end of April 2015, it was succeeded by *Kayukawa Clinic* on May 1, 2015. For many years afterward, patients who had been under Dr. Okada's care for more than half a century would often ask, "How is Dr. Okada doing?" Many of them would say, "Thanks to Dr. Okada, I have somehow managed to make it through life." Every year, I thought about organizing a gathering where his former patients could meet him again, but before it could be realized, Dr. Okada passed away. The following memorial essay was published in the *Newsletter of the Japanese Society of Sleep Research*. I am also posting it here on our clinic's website, hoping that it may reach those patients who never had the chance to see him again. Dr. Okada would sometimes talk about *Jinsei Gekijō* (*The Theater of Life*), a novel by Shiro Ozaki, a friend of his late father. Though he was not particularly skilled at singing, he would occasionally perform Morishige Hisaya's *Shiretoko Ryojō* on karaoke.

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In Memory of Dr. Tamotsu Okada, Honorary Member of the Japanese Society of Sleep Research

By Yuhei Kayukawa

Introduction

Dr. Tamotsu Okada, who coined the term *sleep apnea syndrome (SAS)*, passed away on September 29, 2018. When we hear the term *SAS*, it is his name that immediately comes to mind. His warm and gentle personality comforted all who knew him. From the founding of the Sleep Research Society, the predecessor of the Japanese Society of Sleep Research, Dr. Okada had been involved as an active member. He deeply respected the pioneers of sleep research in Japan, Dr. Einosuke Koga and Dr. Yutaka Honda, and shared a close friendship with his contemporaries, Dr. Yasuo Hishikawa and Dr. Yoichi Nakazawa. (See *Pioneers of Sleep Science in Japan*, edited by Yuhei Kayukawa and Toshitaka Kobayashi, supervised by Masako Okawa, Life Science Publishing, 2013.) This piece is written as a tribute to the late Dr. Tamotsu Okada.

1. Technological Innovations in Polysomnography

Dr. Tamotsu Okada stood out for his originality in exploring sleep respiration with innovative physiological methods. In 1968, soon after the publication of the *Rechtschaffen & Kales (R&K) PSG Manual*, he performed *polysomnography (PSG)* on as many as 1,000 cases, adding oral–nasal airflow sensors and thoracoabdominal respiratory belts to *electroencephalography (EEG)*, *electromyography (EMG)*, and *electro-oculography (EOG)* recordings. At a time when evoked potential studies dominated neuroscience, he proceeded at a steady, deliberate pace — one case a week, about fifty per year — climbing his own mountain, step by step, with unwavering dedication.

In 1975, he identified *SAS* in a non-obese patient complaining of persistent insomnia. Two years later, in 1977, he presented his findings at the International Congress of Electroencephalography in Copenhagen. After the conference, he climbed Mont Blanc — an expression of his unflagging spirit at age 45.

Declaring, “From now on, I will devote myself to *SAS*,” he wrote a comprehensive review article: Tamotsu Okada, “Sleep Disorders Associated with Respiratory Disturbances,” in *Clinical Symptoms*

Series 16: Sleep Disorders (eds. Hideo Ueda, Yasuo Shimazono, Jūgorō Takeuchi, Yasuo Toyokura; Nankodo, 1982, pp.158–183).

Dr. Okada recognized early on that the physiological assault of *SAS* extends beyond the mere fragmentation of sleep caused by repeated arousals accompanying apnea. He focused on the subtle yet significant chronic cerebral impairments induced by hypoxemia. To elucidate this, he noninvasively measured arterial oxygen saturation and presented his findings at the 1985 annual meeting of the Japanese Society of Sleep Research. This work marked a major breakthrough in Japan’s research on *SAS*. Today, digitalized PSG systems are routinely equipped with *body-position sensors* and *pulse oximetry (SpO₂)*. This innovation traces back to Dr. Okada’s proposal to Healthdyne in 1990—without which such standardization might never have materialized. He classified patterns of oxygen desaturation into three distinct types: the *cyclic pattern*, the *continuous type*, and the *REM-dominant type*. Furthermore, he demonstrated the differences between middle-aged and elderly patients with *obstructive sleep apnea syndrome (OSAS)* who complained of *excessive daytime sleepiness (EDS)*,

and age-related *OSAS* patients who exhibited fewer arousal responses.

While advancing the technical sophistication of *PSG*, Dr. Okada also deepened the understanding of the pathophysiology of *SAS*. Through epidemiological studies, he reported that “*SAS* is by no means a rare disorder.” In the era when *tracheostomy* and *uvulopalatopharyngoplasty (UPPP)* were the only available treatments, he contributed nearly half of the nationwide cases analyzed by the Japan Sleep Apnea Research Group, which was established to obtain insurance coverage for *acetazolamide*. In 1982, Dr. Okada personally brought back to Japan the very first *continuous positive airway pressure (CPAP)* device from the United States. Anticipating its eventual spread in Japan, he also examined the prognosis and secondary complications associated with *SAS*.

② Further Elucidation of the Pathophysiology of *SAS*: Low-field MRI and NIRS

Dr. Okada further advanced the understanding of *SAS* by introducing innovative physiological measurement techniques. He applied ultra-low-field MRI, which had originally been developed for evaluating the motor function of cartilage tissue in orthopedic medicine, in simultaneous recordings with *PSG*. Through this combined approach, he demonstrated that during episodes of *obstructive sleep apnea (OSA)*, even when the respiratory curve on *PSG* appeared flat, the upper airway continued to exhibit respiratory effort. This pivotal finding was published in 1996. For these simultaneous *PSG*–MRI recordings, Dr. Okada ingeniously designed ceramic electrodes, ensuring compatibility with magnetic environments. He also utilized near-infrared spectroscopy (*NIRS*)—a technique later popularized as optical topography for assisting in the diagnosis of depression—to investigate the cerebral effects of hypoxemia caused by *OSA*. The culmination of these extensive studies on *SAS* was published in the monograph “Obstructive Sleep Apnea Syndrome — Its Pathophysiology and Clinical Aspects”

(edited by Tamotsu Okada and Yuhei Kayukawa, Sōzō Publishing, 1996).

③ Practice of Interdisciplinary and Multidisciplinary Research, and Fostering of Human Resources

Benefiting from the democratic and open-minded atmosphere of the Nagoya University School of Medicine, Dr. Okada engaged in collaborative studies with his classmates in diabetology, radiology, neurology, and physiology. After assuming the position of Director of the *EEG* Laboratory at Nagoya University Hospital, he advanced interdisciplinary and multidisciplinary research that transcended departmental boundaries—working closely with colleagues from cardiology, pulmonology, neurology, neurosurgery, oral surgery, and pediatrics. Such cross-departmental collaboration was rare at the time and remains a remarkable achievement in the history of Japanese medical research.

Many of his classmates, colleagues, and former students would undoubtedly say, “I owe what I am today to Dr. Tamotsu Okada.” He was quick to recognize and praise the intellectual curiosity of young researchers, and he actively encouraged innovative methodologies and the exploration of new research themes. In a medical community still marked by a hierarchical, apprentice-like culture, Dr. Okada never imposed work or research topics on his juniors. This reflected his deep belief that “Experiences of being forced to do something hinder freedom and independence.” After being appointed Professor in the Department of Medical Technology at the Nagoya University College of Medical Technology, he devoted himself to the training of clinical technologists interested in *PSG*. Over the years, he educated nearly 800 technologists, many of whom continue to play active roles throughout Japan.

④ The Roots of Dr. Okada’s Pioneer Spirit

Dr. Tamotsu Okada was born on October 25, 1932, in Okazaki City, Aichi Prefecture. After Japan’s defeat in 1945, he toiled in the fields to grow sweet potatoes, helping his family survive the postwar food shortages.

He often described himself as belonging to the “postwar burnt-ruins generation.” Recalling the terrifying days of the war, he would imitate the sound of incendiary bombs dropped by B-29 bombers—*“Hyurururuu!”*—as he spoke of the tragedy of war. In 1951, he entered Nagoya University at the top of his class, and after graduating in 1957, he completed his internship and joined the Department of Psychiatry. Under the leadership of Professor Tsuneo Muramatsu, often referred to as the “Emperor” of Nagoya Psychiatry, Dr. Okada was constantly encouraged to seek new insights (*Neues*). With guidance from Dr. Toshiharu Nagatsu, his senior by two years—biochemist, friend of Nobel laureate Arvid Carlsson, and discoverer of *dopamine β -hydroxylase* (*D β H*)**—Dr. Okada conducted biochemical research on schizophrenia. However, he soon recognized the limitations of an approach that relied solely on statistical differences between patient and control groups, and came to believe that directly capturing biological phenomena in real time was the more meaningful path toward understanding.

His favorite mottos were:

“If you strike the stone bridge too long, you will never cross it.”

— *Eizaburo Nishibori*, leader of Japan’s first Antarctic wintering expedition and

“No road lies before me, but a road will be made behind me.”

— *Kōtarō Takamura*, sculptor and poet

His epistemological foundation was grounded in Mitsuo Taketani’s “Three Stages of Scientific Cognition”, and he continuously pursued empirical evidence at the ontological level through *EEG* and *PSG* studies.

No matter how senior he became, Dr. Okada approached every academic presentation with the freshness and humility of a newcomer— carefully preparing written manuscripts and basing his talks solely on his own verified clinical data. He disliked unoriginal presentations that borrowed others’ ideas or relied on secondhand data.

Conclusion

In 2007, when Dr. Okada was nominated for the Tokai Television Cultural Award, he received numerous letters of recommendation from leading sleep researchers across Japan, including Drs. Masako Okawa and Kenichi Honma. He was ultimately awarded this honor—an exceptional achievement, given that no member of the Nagoya University Psychiatry alumni had yet received a Nobel Prize, the Order of Culture, or the Chunichi Cultural Award. Having found all four leaves of his clover, Dr. Okada remained active well beyond Japan’s average healthy life expectancy, working into his eighties. After his beloved wife passed away, he lived another 22 years, watching his two children grow independent before returning peacefully to nature at the age of 85.

Elegant and refined, he loved travel and photography—journeying through Tibet and the deserts of China. Free from jealousy and envy, he treated everyone with dignity and respect. Resembling the actor Ichirō Arishima in appearance, Dr. Okada embodied both intellect and grace. I am deeply grateful for the more than forty years of friendship and guidance I received from him, and I respectfully offer my prayers for his eternal peace.

The future of *SAS* research and sleep medicine now rests upon the shoulders of all of us.

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