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## **Pioneers and history of Japanese neuroradiology.**

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# HISTORY

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## Pioneers and History of Japanese Neuroradiology

Mutsumasa Takahashi

Prof Makoto Saito and Prof Kentaro Shimidzu were the two most important pioneers in Japanese neuroradiology. They were also pioneers of Japanese neurosurgery who established neurosurgery as a subspeciality from general surgery. Both professors graduated from Tokyo University School of Medicine, in 1915 and 1929, respectively. Both trained at the First Department of Surgery at Tokyo University Hospital but never worked together, because Prof Saito became a professor of surgery at Aichi Medical College, before Prof Shimidzu started his training in the same department. However, in the final years of their careers, they collaborated to form the Japanese Society of Neurosurgery in 1948, and both contributed to the development of cerebral angiography. In those days, diagnostic radiology was performed by clinicians, and neuroradiologic practice was carried out by surgeons and internists. Radiologists were mostly interested and engaged in radiation therapy.

### Prof Makoto Saito

Prof Makoto Saito (Fig 1) was born on June 14, 1889, in Miyagi Prefecture and was brought up by his foster father, who was a younger brother of his mother (1). He was good at rowing during his high school years and was known to be a very ardent and studious student during his medical school years at Tokyo University Medical School, always occupying one of the most front and center seats of the classrooms. On graduation from Tokyo University Medical School in 1915, he started training in the surgical department of the same university to be a general surgeon, followed in 2 years by the staff appointment at Aichi Medical College, which

later became Nagoya University School of Medicine. Prof Saito was influenced significantly by his foster father, who was also a general surgeon in Sendai, Miyagi-Prefecture, and who strongly advised him to specialize in the field in which surgical knives had not yet reached within the body, that is, neurosurgery. In 1920, Prof Saito went to Europe and studied neurosurgery and pathology for 4 years at the University of Vienna, Berlin University, and the University of Paris with the financial help of his foster father. In 1923, he was awarded the degree of doctor of medical sciences by Aichi Medical College for his work on diseases of the choroid plexus.

In addition to his prolific works on various aspects of surgery, including general surgery, blood transfusion, and emergency medicine, he developed a strong interest in neuroradiology. In 1927, he clinically applied pneumoencephalography and myelography for diagnosis in the central nervous system (2). In 1929, at the 30th Annual Meeting of the Japanese Society of Surgery, he was invited to give a special lecture entitled "Surgery of the Brain and Skull," in which he mostly concentrated on pneumoencephalography and ventriculography for the diagnosis of cerebral lesions, but he demonstrated the value of cerebral angiography as well, which was performed by the open exposure and injection of contrast medium into the superior thyroid artery with compression of the proximal common and external carotid arteries during injection (3) (Saito M, "Brain and Skull Base," Proceedings of the 30th Meeting of the Japanese Society of Surgery, 1929:1-138; Saito M, "The Roentgenological Diagnosis of the Cerebral Tumors," Proceedings of the First Pan-Pacific Surgical Conference, Honolulu, Hawaii, 1929:86-92). Prof Saito further concentrated on development of emulsified lipiodol called *L'ombre* and used this preparation not only for cerebral angiography, but also for angiography of the peripheral arteries and veins.

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Fig 1. Prof Makoto Saito.



Fig 2. Prof Kentaro Shimidzu.

In addition, he developed a peripheral nerve visualization technique in 1932 by injecting the same contrast medium via a lumbar puncture (4–6). He also developed a technique of making lymph vessels visible by using the same contrast media (7). Prof Saito was often photographed with a skeleton, which was given to him by his foster father.

He went to Europe for a second time in 1933, this time on a Japanese government scholarship, and visited France, Spain, Portugal, and Austria, while lecturing at many universities (1). At Lisbon University in Portugal, he met Prof Egas Moniz, who had developed cerebral angiography several years before. Prof Saito stated that their new contrast medium, L'ombre, was well accepted by Prof Moniz, and his visit to Portugal was reported in a Portuguese local newspaper (1). The two pioneers in cerebral angiography had a lot in common, and Prof Egas Moniz congratulated Prof Saito on his various achievements in neuroradiology. On his way home, Prof Saito visited many American institutions and met neurosurgical giants such as Cushing (Boston), Dandy (Baltimore), and Bailey (Chicago). He was impressed and amazed by the fact that neurosurgery was being established as a subspecialty in the United States. During the Second World War, his hospital, Nagoya University Hospital, was burned down completely by bombing, and he lost his

home, hospital, and university to ashes, which he cherished for many years. After the war, he worked hard and contributed significantly to rebuild the university hospital and medical school as the director of the university hospital.

Prof Saito died of myocardial infarction on January 2, 1950.

### Professor Kentaro Shimidzu

Prof Kentaro Shimidzu (Fig 2) was born on March 18, 1903 in Tokyo and graduated from Tokyo University School of Medicine in 1929 (9, 10). He was an excellent baseball player and was on the team of the First High School as well as on the team of Tokyo University. He played as a catcher and was a strong batter. He was one of the players who established the "golden age" of the Tokyo University baseball team.

Prof Shimidzu first decided to go into psychiatry, because he was influenced by a famous professor of psychiatry by the name of Prof Hiroyuki Uchimura who was a good baseball player and a coach of the Tokyo University baseball team. He first developed an interest in the pathophysiology of psychosis. However, he experienced two cases of misdiagnoses, a young woman with psychotic hysteria later proved to have a glioblastoma and a young man with cerebellar ataxia later proved to have an

acoustic neurinoma. Because of the great disappointment of these bitter experiences of misdiagnosis, he decided to go into neurosurgery instead of psychiatry. He began training in surgery in 1932 under the guidance of Prof Aoyama at the First Department of Surgery, Tokyo University Hospital. In 1937, he developed the percutaneous technique of cerebral angiography, which was described in a paper under the title "Beiträge zur Arteriographie des Gehirns—einfache percutane Methode" in *Archiv für Klinische Chirurgie* (11). Prof Shimidzu states in this paper that the advantages of his new technique include: (a) no complications, (b) no scar in the neck, and (c) a simple and fast technique. This technique was accepted widely in Japan and abroad. Prof Shimidzu in collaboration with Dr Keiji Sano also reported that Takayasu disease manifests in the aortic arch and its branches as an inflammatory disease and coined the term "pulseless disease" (12).

In 1940, he went to study with Prof Bailey and was very well liked by him and his associates in the United States. However, the Second World War broke out, and he was forced to come home in 1942. After his return from the United States, he concentrated on various aspects of general surgery, neurosurgery, and neuroradiology. In 1949, he went to the United States again for further study and returned with an electroencephalography unit and opened a new research field in electrophysiology in Japan. Among others, Prof Shimidzu contributed significantly to the pathophysiology and treatment of pulseless diseases, brain tumors, and brain traumas.

In May 1948, when the general assembly of the Japanese Society of Surgery was held in Niigata, pioneers in neurosurgery got together and formed the Japanese Society of Neurosurgery (9, 10). The founding members included Prof Saito (Nagoya University), Prof Shimidzu (Tokyo University), and Prof Nakata (Niigata University). Prof Shimidzu was the president of the Japanese Society of Neurosurgery in 1952 and 1959. He was given a Shiju-hou-shou, Emperor's Prize, in 1965 for his work in neurosurgery and neuroradiology. He was a pioneer in neurosurgery with future insight into the international trend. He was also a founding member of the Japanese Society of Neuroradiology.

Prof Shimidzu was kind and supportive to patients but was very severe and strict toward his students and attending physicians.

After retirement from Tokyo University, he became the president of Japan Central Railways Hospital. He died on July 8, 1987, after a long illness from cerebral infarction.

### Foundation of the Japanese Society of Neuroradiology

To Prof Saito and Prof Shimidzu, neuroradiology was, of course, very important in the diagnosis of central nervous system disorders and was widely applied by surgeons and internists in Japan. This tendency lasted for a number of years, but soon Japanese radiologists learned and began to practice neuroradiology.

The Japanese Society of Neuroradiology was founded on December 17, 1960, by proposals from Prof Tatuyuki Kudo, a neurosurgeon, and Prof Toshio Katow, a radiologist (both at Keio University), with board members including Prof Kentaro Shimidzu (with Associate Prof Keiji Sano, both surgeons at Tokyo University), Prof Hiromu Tachiiri (with Associate Prof Kazuo Hara, both radiologists at Osaka University), Prof Tadashi Miyagawa (a radiologist at Tokyo University), Prof Shigeo Okinaka (a neurologist at Tokyo University), and Prof Haruo Akimoto (a psychiatrist at Tokyo University (12, 13)). Prof Katow was not a neuroradiologist but had many friends in radiology and neuroradiology in Europe and the United States. Therefore, he was encouraged by his international friends, especially Prof Fischgold, to form a society of neuroradiology, which had not yet developed as a subspecialty in Japan.

At the first meeting, organized by Prof Shimidzu, nine papers were presented at Kojinkai Restaurant of Tokyo University (13). The membership of the society at its foundation primarily consisted of neurosurgeons and only a few radiologists. The number of papers presented gradually increased to 43 at the Ninth Annual Meeting held in 1968. However, at the 10th Annual Meeting on December 3, 1969, the society was dissolved because of violent student movements against the old university system and the medical training system of Japan.

During this period, the society was maintained by funds from the Waxmann Foundation, founded by Prof Katow. All the expenses of the annual meetings and publication of the *Proceed-*

ings of Annual Meetings of the Neuroradiological Society, later called *Nippon Acta Neuroradiologica*, which was the official publication, were all supported through this fund.

There were no annual meetings of the Japanese Society of Neuroradiology for 2 years in 1970 and 1971, but a new society of neuroradiology was formed on February 19, 1972, at Noguchi Hideyo Memorial Hall in Tokyo (13, 14). The founding board members included Drs Kazuo Hara (a radiologist at Osaka University), Yutaka Maki (a neurosurgeon at Chiba University), Mutsumasa Takahashi (a radiologist at Kyushu University), and Ryukichi Nomura (a neurosurgeon at Nagoya National Hospital), together with Prof Tatsuyuki Kudo (a neurosurgeon at Keio University) being the director of the boards. Since its foundation, the society membership has been increasing in number each year, and it now has about 400 neurosurgical members and 200 neuroradiological members. The ratio of radiologists to neurosurgeons is increasing gradually. With use of the fund collected by Prof Katow, the Katow Toshio Prize was established on February 24, 1979, and has been given to one or two young investigators each year who publish the best paper in neuroradiology. The official publication or journal of the Japanese Society of Neuroradiology has been *Neuroradiology* published by Springer-Verlag in Germany since 1981. Prof Mutsumasa Takahashi is one of the editors in chief, and five members of the society participate on the editorial board of the journal.

Japanese neuroradiology was given great international honor in September 1994, at which time the XV Symposium Neuroradiologicum was held in Kumamoto. The president of the symposium, elected by its past presidents, was Prof Mutsumasa Takahashi.

Japanese neuroradiologists have been working hard to establish neuroradiology as a subspecialty of radiology, as it is in other leading countries in the world. However, the roots of Japanese neuroradiology originate from the extensive and world-famous work of its two pioneers, Prof Saito and Prof Shimidzu.

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