

# Introductory Paragraph for the International Neuroscience Journal (INJ)

Yong Kwang Tu<sup>1,\*</sup>

<sup>1</sup>Department of Neurosurgery, National Taiwan University Hospital, Taipei, Taiwan

\*Corresponding author: Yong Kwang Tu, Department of Neurosurgery, National Taiwan University Hospital, Taipei, Taiwan. Tel/Fax: +886-223123456, E-mail: yktu@ntu.edu.tw

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## 1. Introduction

In the world of medicine and science innovation is occurring so rapidly that it is becoming increasingly important for professionals to keep up with developments which may have direct implications for their work. In neurosciences it is imperative that neuroscientists have access to essential information about developments in neurology, neurosurgery, neuroradiology, neuroanatomy, neuropharmacology, neurophysiology, molecular neurobiology, nuclear medicine, radiation therapy, and other fields such as cognitive neuroscience and reconstructive neurosurgery. It is for this reason that the International Neuroscience Journal (INJ) is being established. Its aim will be to widen communication among neuroscientists and to open up new ways of thinking by illustrating ways in which different disciplines in neuroscience are influencing each other, and to point out ways in which they may influence each other in the future. In short; the aim is to promote integration between fields of neuroscience which have been separate and distinct in the past, so that new ideas and approaches in the clinical practices of neurosurgery and neurology can develop in the years ahead.

## 2. The Evolution of Neurosurgery in Taiwan

The evolution of scientific thought has benefited from cross cultural influences since the time of the ancient Greeks. The evolution of medicine and neurosurgery in Taiwan is a particularly interesting example of the way in which a scientific discipline can emerge as the result of numerous cultural influences. The story of the development of modern medicine and neurosurgery in Taiwan begins with the accession of Taiwan in 1895 to Japan as a condition of the Treaty of Shimonoseki, which dictated the terms of China's surrender to the Japanese following the Sino-Japanese war. In the years following the signing of this treaty Japan became Taiwan's ruler and began to rapidly upgrade Taiwan's infrastructure and governmental institutions. While Taiwan did have two

hospitals practicing Western medicine, both of which were established by missionaries (MacKay Hospital and Shinlow Hospital), neither provided medical education. The Japanese rulers of Taiwan set about establishing a university named the Imperial Taihoku (Taipei) University, which began as a medical school. From those early days until Japan's surrender to the Allied Forces in 1946, significant advances in medicine took place in Taiwan in collaboration with the major universities in Japan. The practice of neurosurgery, however, was sporadic, and was done by general surgeons. This early sporadic period may be considered the first stage of neurosurgery in Taiwan. The second stage in the development of neurosurgery in Taiwan took place after the Second World War. From 1946 to 1949 China was embroiled in a bitter civil war which culminated in the evacuation of the army of Chiang Kai-shek to Taiwan, bringing with it a number of experienced military surgeons. This tumultuous event led to the development of two branches of neurosurgery in Taiwan, one at the National Defense Medical School and the other at the long established medical school of the National Taiwan University, which was the new name given to the institution formerly known at the Imperial Taihoku University. We may think of this as the second phase in the development of neurosurgery in Taiwan. The surgical staff at the National Defense Medical College were almost all graduates of the Peking Union Medical College. One of these doctors, Shi-Kai Wang, traveled to San Francisco to study neurosurgery for a year, and returned to Taiwan to begin practice as the first neurosurgeon at the National Defense Medical College. Dr. Chun-jen Shih, a young graduate of the National Taiwan University School of Medicine, went to work with Dr. Wang, and then traveled to Montreal to continue his studies in neurosurgery under Dr. Penfield at the Montreal Neurological Institute. After completing his studies for two years, he returned to the National Defense Medical College where he became a pioneering neurosurgeon. He was the first neurosurgeon in Taiwan to regularly perform brain tumor surgery, while at

the same time conducting research into the relationship of hyperhidrosis, a common disease on this subtropical island, and the sympathetic nervous system. At the National Taiwan University Medical School Professor Tien-Chen Kao, a Taiwanese surgeon who had graduated from the University of Tokyo and received his surgical training in Japan, was appointed in 1949 as the Chairman of the Department of Surgery and then became the Director of the university hospital. He established the Neurosurgical Service at the National Taiwan University Hospital and began brain tumor surgery. He was very interested in psychosurgery and performed many frontal lobotomies. He designed and manufactured his own apparatus for performing frontal lobotomies. After an initial clinical trial he verified that his lobotomy apparatus could provide a wider resection of the frontal fibers with safer and more satisfactory results. Despite the difficult conditions and unstable political situation at that time, Professor Kao continued to teach and to dedicate himself to his clinical work. He had a profound impact on his first group of students. Dr. Tsu-Pei Hung went to Queen Square, London, for his further training, and became a pioneer in neurology in Taiwan. Dr. Chun-Jen Shih, the pioneering neurosurgeon at the National Defense Medical College, was also a student of Professor Kao. Dr. Kao also encouraged several of his young residents to go to the United States and enter neurosurgical training programs there. Among them was Professor Yun-Peng Huang who completed his neurosurgical training and then focused on neuroradiology, eventually becoming a professor of Neuroradiology at New York Mount Sinai Medical School. There he carried out his famous studies about posterior fossa angiography and became a world-renowned neuroradiologist. Another founding influence on the development of neurosurgery in Taiwan was Dr. Albert L. Y. Shen, who had studied under Dr. Chun-Jen Shih before continuing his studies at the New England Medical Center in Boston, where he finished his neurosurgical training under Dr. Bernard Stein. When he returned to Taiwan, he became the first chair of the neurosurgery department at a newly established hospital, the Taipei Veteran's General Hospital. This was the first department to include neurosurgical subspecialty programs which then produced graduates who became the founders of research and practice in their subspecialties in Taiwan. These included Dr. David Hon-Chi Pan who became a famous neurosurgeon in stereotactic surgery and radiosurgery and Dr. Tai-Tong Wong who became a world famous pediatric neurosurgeon. During the initial difficult years at the National Taiwan University Medical School following the removal of the Nationalist government to Taiwan, numerous newly trained neurosurgeons traveled to the United States to continue their studies. There many of them had successful careers, but almost none of them returned to Taiwan because of the difficult times being experienced on the island. One exception was Professor Chen-Te Lin, who became the chair of the neurosurgical service at the National Taiwan Uni-

versity Medical School. He also introduced many new techniques in neurosurgery to Taiwan, but he decided to return to the United States after China took over Taiwan's seat at the United Nations. As the economic and political situation settled in Taiwan over time, a new group of neurosurgeons began to make their mark on neurosurgery in Taiwan. These surgeons had not received their training in China, as those who came over with Chiang Kai-shek had done, nor from Japan, as those who had done their training under the rule of the Japanese. This younger group of physicians had received their training in the United States and other western countries. The gradual importance of the contributions of this group can be considered as the third stage in the development of neurosurgery in Taiwan. With the introduction of microsurgery and CT scanners in the 70s, neurosurgery in Taiwan experienced a period of rapid development. However, due to limited resources from the government, neurosurgery at the National Taiwan University developed more slowly than its competitors in the country. Professor Chen-Te Lin left the National Taiwan University Hospital in the early 1970's. In the following two decades the department of neurosurgery was led consecutively by DR. Ching-Chang Hung, Dr. Ming-Chien Kao, and Dr. Swei-Ming Lin. During the late 90s Dr. Yong-Kwang Tu became a Professor and then the Chair of this department. Dr. Tu had trained with Professor Roberto Heros at the Massachusetts General Hospital. He became the first neurosurgeon dedicated to cerebrovascular and skull base surgery after he returned to Taiwan. He set up a subspecialty system in the department of neurosurgery and integrated all the clinical neuroscience departments of the university into an Institute of Clinical Neuroscience and Behavior Medicine. Under his leadership, neurosurgery at the national Taiwan University regained its leading position in neurosurgery in the country. Professor Tu became President of the Asian-Australasian Society of Neurological Surgery in 2007 and President of the World Federation of Neurosurgical Societies in 2013. The development of neurosurgery in Taiwan was very much concentrated in Northern Taiwan for several decades until the early 70s. One of the disciples of Professor Shih, Dr. S.L. Hwong, went to Kaohsiung Medical University to establish the first neurosurgical service in southern Taiwan after finishing his training in Taipei. A few years later Cecile K.S. Chang, a trainee of Albert Shen, started the first neurosurgical service in central Taiwan at a branch hospital of the Veteran's General Hospital in Taichung. In the mid 1970's the department of neurosurgery at the largest private hospital in Taiwan, the Chang-Gung Memorial Hospital, was founded by a Canadian neurosurgeon, Dr. David Fairholm, who trained a new group of Taiwanese neurosurgeons in his department. These neurosurgeons carried on his work after he returned to Canada, and expanded the Chang-Gung department of neurosurgery to include three centers serving the whole country of Taiwan. Altogether, this department now has the largest number of neurosurgeons and the highest

patient volume in Taiwan and serves many thousands of patients each year. Currently, there are 600 board certified neurosurgeons serving a population of 23.5 million in Taiwan. There are 26 training programs in Taiwan and the length of training is 6 years following 2 years of post-graduate training. Depending on their patient volume and the number of their staff members, these centers are allowed to train one or two trainees per year or one trainee every other year. As a result the total number of neurosurgical trainees is restricted to 24 per year by the Ministry of Health and Social Welfare. About half of the 26 training programs are located in or in the vicinity of Taipei, the capital city. The rest of these programs and

smaller neurosurgical services are evenly distributed throughout the country, even on some remote islands. Over the course of four decades Taiwan has established a high level of neurosurgical practice. Taiwan now has one of the highest concentrations of neurosurgeons in the world in relation to its general population. While this is in many ways a blessing, it also precipitates some potential problems, such as the possible overuse of certain neurosurgical procedures. These issues are being closely scrutinized by the national medical insurance authority, and new policy guidelines are expected in the future to control any possible problems which may arise as a result of an overabundance of neurosurgeons.