Prof. Jianding Ye: promoting radiological innovations by integrating clinical experience with scientific research

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At 3 pm, we arrived at the Radiology Department of Shanghai Chest Hospital (SCH) on the third floor of the building, where patients were still queuing for examinations. Prof. Jianding Ye (*Figure 1*) received our interview in the interval of the busy work. We learned from what he said that Prof. Ye is scrupulous with work and always put patients first.

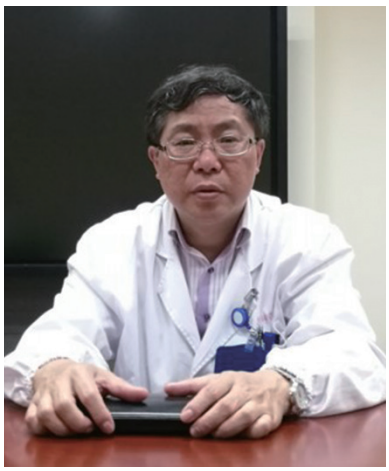

Figure 1 Prof. Jianding Ye.

Brief history and characteristics of the radiology department in SCH

At the start of the interview, Prof. Ye explained the concept of radiology. Radiology initially was based on X-ray imaging; later, radiotherapy was developed to kill tumor cells by using an X-ray dose higher than that for imaging. Today, the radiology department of SCH comprises five divisions, namely conventional X-ray imaging, computed tomography (CT), magnetic resonance imaging (MRI), digital subtraction angiography (DSA), and chest interventional therapy.

He then made a brief account of the history of the radiology department. In the past, developing X-ray photographs took much time, and the photographs were usually of only one plane section. Today, direct digital radiography allows observation from multiple plane sections and simplifies the imaging process to facilitate quality control. With advanced technology and equipment, the further digitalization of traditional imaging devices has substantially improved the accuracy of imaging-based diagnosis.

Prof. Ye also pointed out that with the help of these advanced techniques, the radiology department of SCH has made great progress in detecting small and early lesions, thus taking a lead in China and even the world in terms of image quality and diagnosis accuracy. This provides evidence for effective early treatment and prognosis assessment, and plays an important role in promoting precision medicine. The radiology department has developed from the single radiography to the multi-model medical imaging thanks to technological advancement.

The diagnosis of chest diseases initially relied on physical diagnostic instruments, such as stethoscope, and then chest radiography, enabling doctors to see through the chest. However, these techniques can only provide limited information and can hardly detect small lesions in lungs due to the obstruction of chest wall tissues. With the development of image-based diagnostic equipment and technology, digital radiography, CT, MRI, ultrasonic imaging, and isotope imaging have been available.

Prof. Ye said the diagnosis of cardiovascular diseases, which was image-based, has turned to image-guided interventional treatment. He added that the radiology department of SCH was one of the first Chinese centers that adopted cardioangiography, which was developed by predecessors based on their own experience and foreign information after experiments of peripheral vessel angiography, cardiac

angiography, static angiography, and dynamic angiography. Today we can use more convenient and safe technologies to observe imaging of cardiovascular diseases, including DSA, high pressure injector, and dual-source CT.

Nowadays, radiologists can see more information on diseases, thus improving the accuracy and efficiency of diagnosis. Prof. Ye compared radiologists to scouts, who provide scientific evidence of early lesions for clinical doctors and thus buy time for early treatment to improve the treatment efficacy and the quality of life.

Research topics and future developments of radiology

Now clinical treatment has posed higher requirements on the radiology department. For instance, radiologists have to provide information on anatomical sites and characterization of lesions, the progression and clinical stages of lesions, the necessarity of a surgery, and the timing of surgical intervention, which put more duties and pressure on them. Even so, Prof. Ye firmly believes that study on clinical imaging is an indispensable part of radiologists' work, as daily problems during work need to be solved via research and long-term follow-up visits.

The radiology department of SCH is conducting many clinical studies. In detection and diagnosis, there are studies on the risk stratification of early-stage lung cancer and imaged-based assessment system of curative effect as well as MRI-based multi-model precise diagnosis of mediastinal tumor; as for cardiovascular diseases, the department is studying the screening, prompt detection, and early warning of high-risk artery lesions and exploring feasible screening methods for eligible patients; technically, they are trying to improve magnetic resonance sequences, so as to improve the quality and efficiency of MRI and extend their application in functional assessment. According to Prof. Ye, research on interdisciplinary multi-technological integration is promising, and radiologists should know the advantages and limitations of various devices and technologies to better use them, and should also avoid increased physiological and economic burden caused by excessive reliance on them.

The radiology department is also exploring artificial intelligence (AI), but has yet to apply the technology into clinical practices. AI machines can provide useful information for doctors, improve staff efficiency, and reduce error rates but cannot completely replace doctors. Prof. Ye believes that AI will eventually be used in the medical sector to assist medical staff in many aspects, including imaging-based diagnosis.

Prof. Ye said the radiology department heavily depends on equipment in addition to venues, funds, and staff. But aside from hardware, the diligence of radiologists also matters. Extensive pathological knowledge and rich clinical experience are necessary for accurate diagnosis.

Vision on the training of young radiologists and cooperation with Shanghai Chest

Prof. Ye has cared about the training of young radiologists. During the interview, he expressed concerns over the decreasing number of young radiologists. On one hand, radiologists are under heavy work stress and pressure from scientific research, but are underpaid in the light of the great responsibilities on their shoulders; on the other hand, radiologists should have all-round medical knowledge and thus the cycle of training, consisting of standard and special training, is long.

Prof. Ye spoke highly of the training model for young radiologists at the radiology department of SCH. At the specialized hospital, radiologists should rotate though such divisions as CT, MRI, and angiography after standard training, and then choose a direction following the rotation for further study. Prof. Ye reckoned that although radiologists are busy with daily work, they should participate in daily studies on disease cases, weekly discussions, and lectures given by experts, which are conducive to their personal development. He also encouraged young doctors to take part in academic activities and meetings to broaden their vision. The hospital has also invited professional advisers to give various trainings, including PPT production, to improve young doctors' ability of presentation. Meanwhile, Prof. Ye pointed out that radiologists should learn up-to-date clinical knowledge to better understand and explain diseases, which is also beneficial to their work.

As for cooperation with *Shanghai Chest*, he proposed that there might be a column of radiology to publish articles about new technology, hot research topics, or even a new book in this field.

Prof. Ye, with years of experience in diagnostic imaging, has always been patient- and clinical practice-oriented. He upholds the spirit of his predecessors to build the strength of the radiology department of SCH and passes on the spirit to younger radiologists.

Expert's introduction

Prof. Jianding Ye is the chief of the department of radiology of Shanghai Chest Hospital and meanwhile an adjunct associate professor in Shanghai Jiaotong University School of Medicine. He is a member of the Shanghai Society of Radiology Society of Chinese Medical Association, leader of the Heart/Chest Panel of the Shanghai Society of Radiology Society, member of the Radiology Section of the Chinese Medical Doctor Association, member of Society of Cardiovascular Computed Tomography China Branch, and member of the Shanghai Municipal Government Procurement Advisory Committee. He has rich experiences in the radiological diagnosis of various cardiovascular diseases, imaging diagnosis of thoracic tumors (especially for small solitary pulmonary lesions), interventional radiology for lung tumors, and embolization therapy for advanced lung metastasis.

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Footnote

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