

# Opportunities and Challenges of MRI in the Developing World

J. Dai<sup>1</sup>

<sup>1</sup>Beijing Tian Tan Hospital, Beijing, China, People's Republic of

## Opportunities

In recent years many developing countries are undergoing rapid, profound economic and social change and development. Being the largest developing country, China is taking advantage of this trend. With a population of about 1.3 billion, one-fifth of the world's total, China has a rapidly growing need and economic resources for advanced healthcare products, including MRI systems. With China as an example, we see unprecedented huge opportunities of MRI market in the developing world.

Driven by the amazingly growing economy, China has one of the fastest growing healthcare markets in the world, exceeding 16% annual growth over the last decade. Demand for higher living standards, growth of the aging population, and increased healthcare awareness are a few factors responsible for this phenomenon.

There is a huge market potential for MRI equipment in China. At the present, there is only 1 MR scanner per 1 million people in China, while there are over 50 MR scanners per 1 million people in USA. The ratio of difference is 1 and 50. This market potential will mostly come from small to medium-sized hospitals, as most 3A hospitals (the best hospitals) in China already have MRI systems installed. China has a total number of 18,000 hospitals, among which only 1,000 hospitals are 3A hospitals. In the next ten years, small to medium-sized Chinese hospitals are expected to install a total of more than 4,000 MR scanners, an average of 300-400 units each year.

There is also a growing demand for "high-field" MR systems coming from many 3A hospitals. Recognizing the important relationship between innovation and economic growth, China is investing heavily on scientific research and development of cutting-edge technology. Most state-owned 3A hospitals are getting more than one MR system installed, mostly sophisticated high-field MR systems, both for clinical and research works. In this process, we also notice that Chinese universities and research institutes are gradually involved into collaborating with MR vendors for new MRI technology development. One example is that the Chinese Academy of Science is working on fMRI for "Cognitive Neuroscience Research" in collaboration with Siemens.

Other driving force behind more opportunities of MRI market in China are market oriented industrial reform, such as the implementation of a national healthcare insurance plan, and strengthening the protection of intellectual rights.

## Challenges

While there are great opportunities of MR market in the developing world, there are also huge challenges before us. They include uncertain outcome of healthcare system reforms, lack of properly trained personnel, and low charge of MRI scanning. Again, this is to share with you our experience in China by taking a look at these challenges.

China's healthcare system has been undergoing reconstruction over the last decade. That process-per-se and uncertain outcome of the reformation may slow down the implementation of more advanced medical equipments, including MRI systems.

Short of properly trained staff member is another severe challenge to the rapid growth of both MRI clinical applications and research. The dilemma for China's MRI professionals is that many of them have limited knowledge of MR physics and limited experience in MRI clinical applications and research. Study for advanced degree program of MRI was almost nonexistent in China's universities. Some MRI concepts and practices common in the developed countries are not as

familiar to the Chinese MRI professionals. However the Chinese MRI community is working hard to build up training programs and degree programs for MRI at universities and research institutions, so as to catch up with the rapid development of the imaging science.

While China's healthcare system is developing with the installation of more modern equipment, but 30% of the medical institutions are still equipped with medical devices of the 1970s and 1980s. The gap between the University hospitals and small to medium-sized hospitals is also reflected in the clinical application of their MRI equipments. With less properly trained staff members, most non-3A hospitals in China find it difficult to efficiently or properly incorporate high tech, high quality imaging, and high priced devices into their daily practice

While quality is an important factor for advanced medical equipments like MRI scanners, affordability is often-times even more important. The living standards are still low in the developing world including China. It is difficult for China's medical institutions to charge patients for MRI examination at the same level as that in the developed countries. But at the mean time, the market prices of MRI scanner remain the same no matter whether it is sold, in China, or in USA. As such, it is more difficult for a Chinese medical institution to recoup its investment on MRI scanners.

## Summary

In summary, there are great opportunities of incorporation of MRI in the developing world. However, we are also challenged in many aspects while we are taking advantage of these opportunities. China is addressing the challenges with more healthcare system reform, manufacturing more MRI systems locally, and setting up more MRI training programs. And, the help from ISMRM, especially in setting up training programs, will accelerate the growth of MRI communities in the developing world.