Editorial

Neurointervention 2012;7:66-67
http://dx.doi.org/10.5469/neuroint.2012.7.2.66

ISSN (Print): 2093-9043 ISSN (Online): 2233-6273

Translational Research: Where Do We Go?

Back in the 1950s and 60s, basic and clinical research was fairly tightly connected in the United States and was largely done by physician-scientists who also treated patients [1]. That changed with the explosion of molecular biology in the 1970s. Clinical and basic research began to separate, and biomedical research emerged as a discipline in its own right and with its own training. The majority of biomedical research has been done by highly specialized PhD scientists and with physician-scientists now being in the minority [1, 2].

Medical-research agencies worldwide are experiencing a similar awakening [3]. While there never was a shortage of basic science discovery, one perceived problem had been the lag between basic discovery and the appearance of new drugs and treatments due to the divergent ecosystems of basic and clinical research during the past 30 years or so [4]. The abyss left behind was sometimes labeled the 'valley of death' as it leads to no real communication between clinical and basic scientists [1]. There has thus been a call for more research that could bridge the gap from bench to bed, i.e. translational research, a term first used in the late 1990s [1, 5].

In the 1960s, South Korea was one of the world's poorest countries, however, by the 1990s it had become the world's twelveth largest economic power and was a leader in the development of industries such as semiconductors, telecommunications, electronics, automobiles, shipbuilding, etc. When Korea announced ten future growth engines as a dynamic force for new national growth in the early 2000s, the bio-healthcare business was included in the new vision of the development in bio-healthcare items including new drugs, bio-organs, bio-chips, diagnostic imaging devices, intelligent drug delivery systems, etc.

Public health and welfare are currently the nationwide hot political issues in Korea. A part fit for the rapid economical growth would be the increasing medical costs due to the promotion of public health and welfare. In 2009, the total medical expense versus GDP (gross domestic product) was 6.9% in Korea compared to the 9.5% OECD (Organization for Economic Cooperation and Development) average; [6] and also in 2009, the growth of the total medical cost per capita was 8.7% in Korea compared to the 4.1% OECD average. Recently, due to the rapid and robust growth of the bio-healthcare business, preparing the aging Korean society where the average life expectancy was M:F = 77:84 years in 2010, bio-health industries are becoming more and more important even though the trade market size of Korea is now only the tenth in the world. Therefore, the world-leading Korean companies in the fields of semiconductors, telecommunications, electronics, automobiles, and shipbuilding have been encouraged to support the bio-health business because they recognized it as a promising future industry.

The Korean Ministry of Health and Welfare proposed a nationwide plan for an Innovative Research-driven Hospital in 2007. The total budget for this project from 2012 to 2023 would be 2,400 million US dollar which could be used to transform conventional clinical hospitals into the research-driven hospitals. There are also additional sources of support including tax cuts for research equipment and administrative support for eligibility application of the products for health insurance. However, this project would be challenging in the major Korean hospitals as such a transformation would require a tremendous investment from the hospitals and also poses a high risk for the hospital administration which requires independent governance for the research.

Recent change in Asan Medical Center (AMC) is a good example to show current research trend in Korea. In 2011, AMC established the Asan Institute of Life Science as the first Korean civilian-driven global bio-

cluster and with the hope of creating the "World's Best Research-driven Hospital". This new research authority consists of a biomedical research center, a clinical research center, a biomedical engineering center, and an intellectual property center. The goals of this organization are to find new biomaterials, pharmaceuticals, stem-cell therapies, medical devices/instruments, software and intellectual property, and to encourage rapid prototyping for clinical application. Not only internationally renowned research institutions, including the Dana Farber Cancer Research Center and the Pasteur Institute, but also more than ten Korean pharmaceutical companies, venture businesses, and translational research centers have already begun real-time collaboration with AMC. This could result in the extension of the research capacity to outside research groups and companies and establishing our own research governance as well as intensifying the rapid prototyping of new product in order to able to resolve clinical unmet needs and to validate the target for translational research.

Although translational research has recently been discussed in the area of coronary intervention as well as in other clinical fields [5, 7], there has been little discussion on any strategy for the application of interventional neuroradiology in which rapid prototyping might be much emphasized. Research-driven hospitals in Korea, such as AMC, encourages the transition from the simple clinical application of medical devices or instruments to product-oriented translational research requiring the achievement of Technology Readiness level 6 (phase I clinical study). For this purpose, devices, e.g. catheters, embolic materials, stents, etc., biomarkers including microparticles [8], technological instruments including interventional or intravascular robots[9], and genomics [10] for the diagnosis or treatment of hereditary vascular diseases, might be targets for the unmet clinical needs in interventional neuroradiology.

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