Editorial

New normal: From basic to clinical medicine

Since 1970s, there was a rapid development of basic medical science and technology such as molecular biology, but these new theories and technologies failed to achieve timely application in disease diagnosis and prevention, resulting in a huge gap between theory and practice, which was called the valley of death. Some examples are listed below:

1. In current American mode of pharmaceutical product development, only 5 of 5000 leading compounds are granted approval for clinical trials and only 1 of them for final marketing.1

2. From 1979 to 1983, 101 dissertations were published in the top 6 basic bioscience journals (including Science, Nature, Cell, etc.), and the authors definitely believed an obviously valuable clinical prospect for their discoveries. However, 20 years passed, only 5 papers were approved for clinical application, and 1/5 has been proved to affect medical practice.1

3. In China, there are about 30,000 important scientific and technological achievements every year, while the average conversion rate is only 20%. The rate is as low as <8% in the field of medicine.2

In 2003, Dr. Elias Zerhouni, the director of National Institute of Health (NIH), published a roadmap for NIH on Science, clarifying that translational medicine would be a core and mainstream of research in the future. Furthermore, he pointed out that there would be an age for interdisciplinary study and most of current research centers would engage more in translational research centers would engage more in translational research.

Translational research — the term appeared on Cancer for the first time in 1993 — gained rapid development in the fields of biomedicine and molecular biology. The finding of cancer genes and other relevant genes translated these genes into biomarkers or medicine targets and was applied promptly to early disease diagnosis and treatment.

Translational medicine refers to the translation of relevant biomedical discoveries into medical technology (including drugs, vaccines, diagnostic techniques and medical equipment) to improve disease treatment and prevention. In terms of health policy, translational medicine integrates basic researches, clinical medicine, sociology and political science to further improve the process and effect of translation from basic research results to new diseases diagnosis and treatments, maximally raising human health level.3

Translational medicine is a new progress in evidence-based medicine, which is a blend of basic science, social science and political science, leading to optimal treatment and prevention, and provides better medical services.4

There are 5 tasks in translational medicine development:

1. To break traditional medical division and conduct interdisciplinary cooperation;
2. To rebuild a clinical research system, guided by demands for health and aiming at bidirectional transform between lab researches and clinical applications;
3. To take full advantages of space and resources and optimize the application of advanced technologies;
4. To closely integrate clinical strategic goals with science researches and centralized advantages from all parts, leading to a specific diseases-focused project;
5. To establish training bases of medical staff for continuous cultivation of excellent scientists.

There are three stages of modern translational medicine.

1. Preliminary stage: since Zerhouni’s roadmap published on Science in 2003, global researchers in basic and clinical medicine began to pay attention to translational medicine, resulting in gradual clarification and agreement for such varied opinions of some researchers as the thoughts that translational medicine is an old topic without any innovation, or translational medicine has been implemented long time ago.

2. Rising stage: a large number of new institutes have emerged both overseas and domestic since 2003, like translational medical centers, institutes of translational medicine, translational medicine bases, etc. These institutes held a number of academic conferences and published many high quality monographs and articles, e.g. Clinical and Translational Science, Principles of Human Research, Concept, Strategy and Practice of Translational Medicine edited by Chinese academician KR Dai, Art of Translational Medicine in Military co-edited by YH Qin and XB Fu, etc.

3. New normal stage: since 2014, the new translation medicine institutes trend to conduct application research oriented by market, and bridge the gap between basic researches and clinical applications.

To a large extent, translational medicine needs to cooperate with pharmaceutical firms to translate results into market.5

In January 2012, I paid a visit to a manufacture center located in Warwick University, Birmingham of UK. The director of the center,
N. Mallinson, guided me a visit to the experimental base and told that the focus of their researches was finding new resources, and a half of their funds came from government and the other half from enterprises, so the research result can be put into market in a short time.

Although there has been a great progress in translation from experiment to clinical application, difficulties still exist such as some basic research unable to be translated, or emphasizing translation too much but ignoring basic researches.

In translational process, the support from enterprise is very important, though some research results have been translated into application of clinical medicine, community healthcare, preventions and treatments without the participation of pharmaceutical firms. Proper legislation can guarantee smooth and rapid translation; meanwhile the government should provide positive supports from institutes, organizations, human resources and material resources in order to improve the conversion rate and people’s health benefit degree.

Translational medicine, digital medicine, precision medicine and evidence-based medicine are looking forward to closer integration and cooperation than before for a broader field. Additionally, translational medicine research has extended to aerospace field.

In the future, translational medicine not only yields more effective research results into market, but also involve into more fields, becoming a new normal.

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Zheng-Guo Wang*, Liang Zhang, Wen-Jun Zhao
Research Institute of Surgery, Daping Hospital, Third Military Medical University, Chongqing 400042, China

* Corresponding author.

E-mail address: wangzhg@cae.cn (Z.-G. Wang).

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