

# Design and construction of translational medicine platform for urologic oncology

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**Abstract:** Translational medicine is a new medical model which focus on overcoming the serious imbalance among the basic research, its clinical and public health application. Its core is to establish effective ties among basic medical researchers, public health workers and doctors who know the needs of patients, particularly translating the molecular medical research results to suitable disease prevention, diagnosis, treatment and prevention methods effectively. This paper discusses the design and construction of the translational medicine platform for urologic system tumors. However, there is no draw on the precedent, it is a challenging project to create such a complicated platform and make it running smoothly and effectively. Based on the Tianjin Translational Medicine Platform for Urologic Oncology (TTMPUO) which had been established in support of Tianjin Science and Technology Commission, this paper will focus on describing the design ideas and the essential parts of the platform.

**Keywords:** Translational medicine; platform; urologic oncology; design and construction

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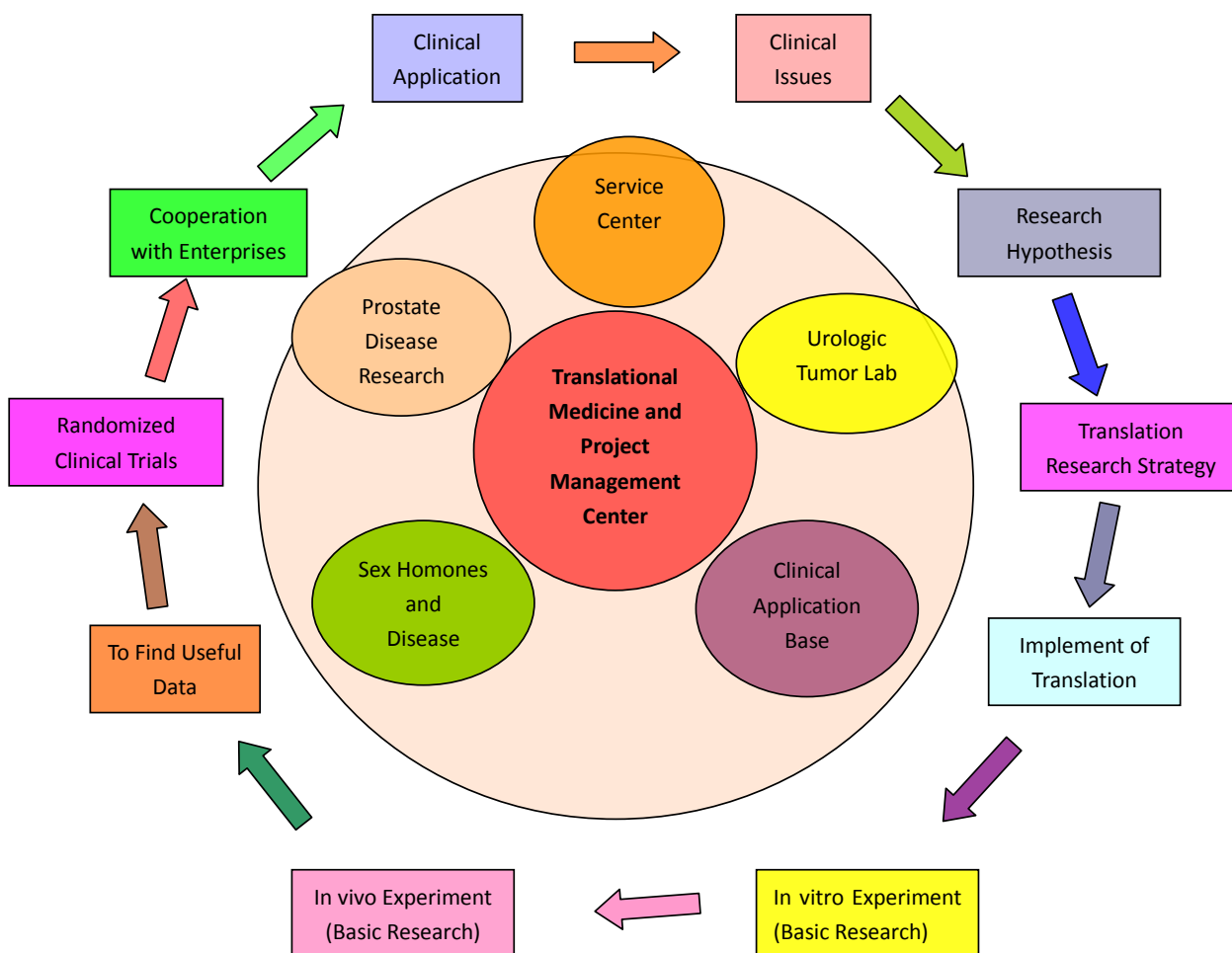
## Introduction

Translational medicine is a new medical model which focus on overcoming the serious imbalance among the basic research, its clinical and public health application. Its core is to establish effective ties among basic medical researchers, public health workers and doctors who know the needs of patients, particularly translating the molecular medical research results to suitable disease prevention, diagnosis, treatment and prevention methods effectively (1,2). Translational Medicine, personalized medicine, and predictable medicine constitute the systematic medicine which include system pathology, pharmacology, comprehensive diagnosis and treatment system. It is new modern medicine based on genome genetics, genomics chip technology and systems biology (3,4).

Tumor is a kind of disorders caused by uncontrolled proliferating cell which originated from multiple levels of genetic and epigenetic abnormalities. The genetic (epigenetic) of cancer cell is highly unstable, extremely

heterogeneous and strongly environmentally adaptable. These make tumor difficult disease lacking of diagnosis and treatment methods and the leading cause of death. Although each state has invested a lot of money, manpower and material resources to try to improve the survival of cancer patients, but results are not satisfactory. Apart from getting a flood of research papers, the benefit of cancer patients get is very limited (5). With rapid development of genome sequencing technology, nano and information science, comprehensive and profound understanding of the biological behavior of tumor shall get greatly accelerated. Thus, it has become a consensus of cancer researchers that it is necessary constructing translational medical research platform to make the conversion between basic research results and clinical application faster than before, and enhancing the survival of cancer patients (6).

Urologic system tumors do not occupy the most important position in cancer incidence in China, but they are the most common diseases among urology disorders.



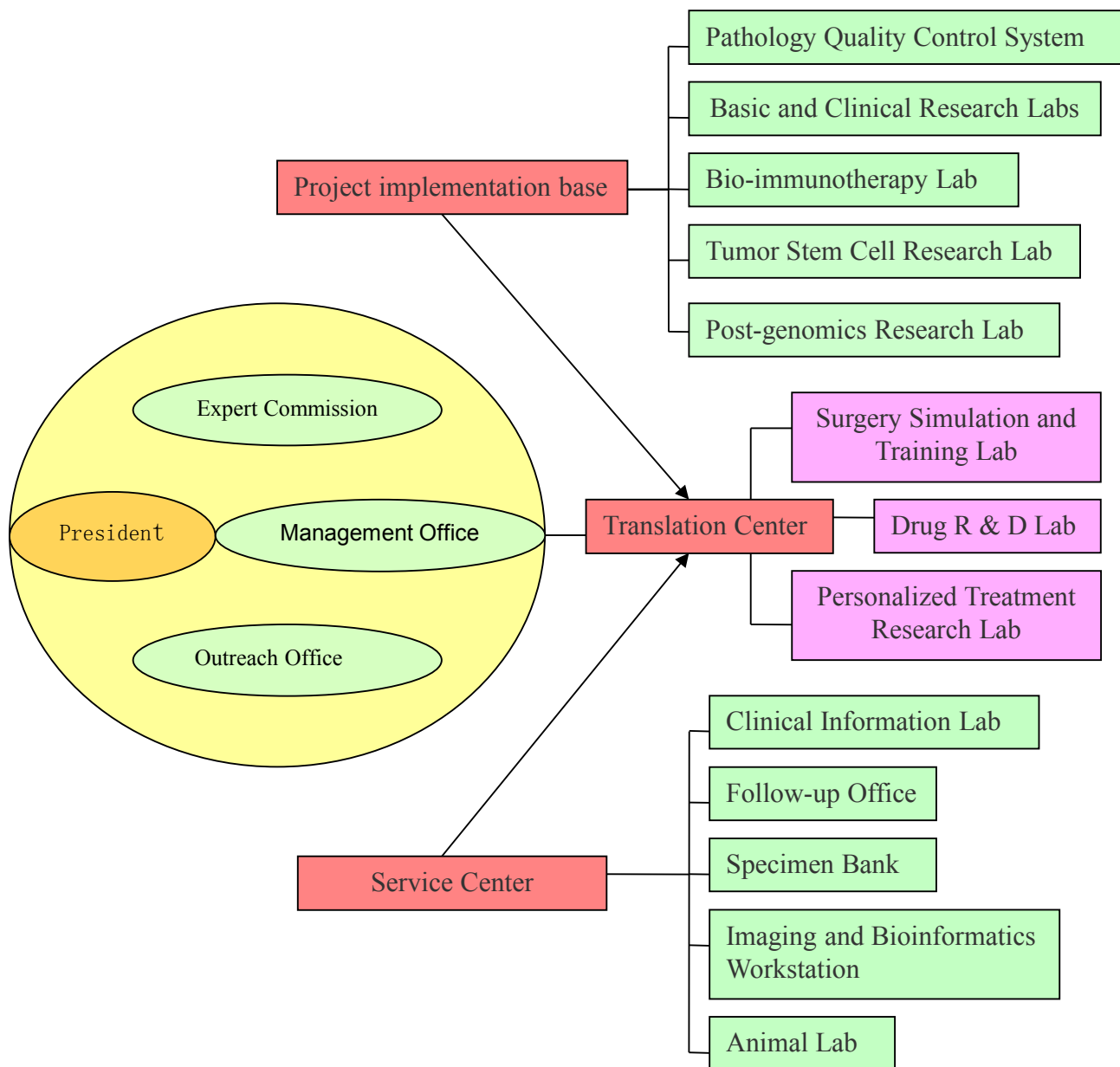
**Figure 1** The running mode map of Tianjin translational medicine platform for urologic oncology.

Their morbidity and mortality are increasing. Tumor can occur in various parts of genitourinary system, the most common is bladder cancer (7), followed by kidney tumor (8). In American and European countries the most common urologic tumor is prostate cancer. Over the past decade, with the social and economic development and improvement of people's living standards, in some developed cities and towns in China prostate cancer incidence has become significantly higher (9). Even in a few cities prostate cancer has replaced bladder carcinoma, being the most important male cancer. Thus, it is of great significance to solve the problem of genitourologic cancer, which is also the most important purpose of TTPMUO (Figure 1).

### Design and structure of the TTPMUO

Construction of the translational platform in urologic

oncology will help to promote the clinical transformation of existing scientific and technological achievements. It is conducive to improving the ties between basic research projects and clinical needs. And it will be useful to carry out the scientific and objective evaluation of implementation of those applied results, new techniques and treatment methods. This will form interactive and comprehensive relations between basic research and clinical applications, and promote the diagnosis and treatment of urologic cancer to a higher level. In the process of construction of the platform, in order to make it run smoothly and effectively, the following aspects will have to be included: (I) The administration department will have to be established, including Commission of Experts, management office and outreach coordination office; (II) A few high-standard bases where basic research project can be implemented must be constructed. As follows: pathological information and quality control management system, basic



**Figure 2** Organization chart of Tianjin translational medicine platform for urologic oncology.

and clinical research laboratory, biological immunotherapy research lab, cancer stem cells research lab, and post-genome research lab; (III) Construction of efficient translation and application centers or laboratories is also necessary, including: surgical operation simulation and new technique conversion lab, research and development platform of new drug, and personalized treatment research lab; (IV) In addition to these organizations and labs, we have established a translational medicine service center which is composed of translational

medicine information platform, specimen banks, statistics and follow-up office, imaging and bioinformatics workstations and animal laboratory (Figure 2).

Due to animal models play an important role in translational medical research, being one of the most important parts, Tianjin Living Urologic Tumor Lab (TLUTL) will be established. TLUTL project is modeled on Canada Living Tumor Laboratory ([www.livingtumorlab.com](http://www.livingtumorlab.com)) and created by Professor Yuzhuo Wang who will

be introduced to work as a distinguished professor in TTMUO. In TLUTL, immunodeficient mice implanted human urologic tumor tissue under the renal capsule (10) will be fully used. Tumor models building technology, clinical drug development, basic and translational medicine research will be combined. As an international leader in this field, Professor Wang has done a lot of research practice and has a series of successful experience in the past 10 years. Human tumor tissue transplantation model will quickly become a new generation of pre-clinical experimental model which will be widely used in anticancer drug development, translational medicine research and other fields (11). Based on technology maturity, anticancer drug development market and individual demand and reliance on such models (10), the establishment of TLUTL is very expected to be developed into a new industry that can bring enormous social and considerable economic benefits, with broad and optimistic prospects for development.

The process of translating basic scientific discoveries to clinical applications, and ultimately to public health improvements, has emerged as an important, but difficult, objective in biomedical research. The process is best described as a “translation continuum” because various resources and actions are involved in this progression of knowledge, which advances discoveries from the bench to the bedside (1). Fortunately, the construction of this platform will be supported financially by the Tianjin Science and Technology Commission. Being a project with grant, it has to have some specific objectives. (I) On the basis of Tianjin collaborative group of prostate cancer, Professional Committee of Urologic Oncology under Chinese Anti-Cancer Association, Tianjin Institute of Urology where the chairman of Tianjin Urology Committee is, the project will integrate basic research and clinical resources of the urologic oncology in Tianjin and establish collaboration pattern of multi-disciplinary joint research around the city. (II) Being run on the platform, the clinical application of recombinant BCG and personalized DC-peptide vaccine in chemotherapy and immunotherapy of urologic cancer will be realized. (III) The early warning system composed of biomarkers of molecular pathology of urologic cancer will be established, and it will be used in clinical practice. (IV) The gene chip diagnostic and classification systems composed of biomarkers will be applied clinically. (V) On the basis of translational research platform, further research on the pathogenesis, related systematic research projects of urologic oncology, new clinical treatment methods, and timely transformation of the research results to clinical

application will be carried out. (VI) With the platform running well, leading talent including “Yangtze River Scholar” at home and abroad will be introduced to promote and facilitate international cooperation, making the national key discipline of urology a world-class subject.

## Conclusions

The process of construction of TTMPUO can be described as a “translation continuum”, in which various resources and actions are involved. A feasible method especially in china is a modification of the existing institute or organization that has been established and existed for a long period. The modification is proposed to create a framework called the Biomedical Research Translation Continuum. This framework clarifies translation for basic researchers and Clinicians, making them understand and use the translational continuum to guide their research better as well as the translational activities within a conceptual framework. Translational Medicine Platforms are just like aircraft carrier on which the translational projects will act as the aircrafts and the platform provide good services that guarantee the projects running smoothly and obtaining reliable results. The most important objective of Translational Medicine Platform is to make the research result translation easier.

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None.

## Footnote

*Conflicts of Interest:* The authors have no conflicts of interest to declare.

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