



Shanghai Chest Hospital strives to build a research hospital: a visit to the Experimental Center

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The Experimental Center (EC) of Shanghai Chest Hospital (SCH) is located at the 13th Floor of Building 3. There are various advanced scientific instruments, standardized technical platforms, and vigorous young talents. In the clean and orderly EC, Prof. Liming Lu, the director of the EC, accepted our interview and shared her ideas and expectations about the construction, development, and functional orientation of the experimental center.

Eight platforms that support clinical and basic research

At the beginning of the interview, Prof. Lu briefly introduced the EC. Since 2013, SCH started to build the EC as a new type scientific research base. After taking 3 years, the EC now has been available to use, which provide the services to the clinical and basic research departments of SCH, Shanghai Chest Tumor Institute, Translational Medicine Research Center of SCH, and other institutions.

The EC has eight research platforms (*Figure 1*), including gene amplification and high-throughput sequencing platform, laser scanning confocal microscope platform, flow cytometric analysis and sorting platform, immunotherapy platform, proteomics and signaling platform, molecular pathology platform, drug screening and animal model platform, and cell culture and metabolism platform.

After entering the EC, we were impressed by the standardized and orderly management in the laboratory. The training policies, cautions, and safety checklists were precise and normative in each platform, and the space layout is scientific and reasonable. For example, the experimental zones are kept separate from staff resting area. And that each platform has corresponding color operating clothes to avoid cross contamination. Meanwhile, we also noticed that many graduate students from different departments of SCH were doing their own research here. They communicated frequently and warmly after experiments, and we could feel their interest, enthusiasm and passion in addressing pre-

clinical and clinical issues.

In the EC, the first class and up-to-date instruments and equipment can offer excellent research support for the researchers from SCH. There are not only the standard laboratories like molecular genetics laboratory (*Figure 2*), biological chemistry laboratory and immunology laboratory, and the instruments like fluorescence microscopy (*Figure 3*), hippocampal neurons energy metabolism real-time measuring instrument (*Figure 4*), and IsoFlux microfluidic immunomagnetic cell sorting system (*Figure 5*), but also establish the flow cytometry laboratory for automated analysis the cells function and sorting of cells (*Figure 6*), and the confocal microscope laboratory which can be used for observing the structure and specific biological changes of living cells and quantitative determinations in real-time (*Figure 7*).

At present, the EC has been approved as a national gene detection technology application demonstration center by the National Development and Reform Commission that can offer genetic testing for research on breast cancer and genetic diseases in SCH and other institutions. Thus, the basic tasks of the center are to serve the staff members and support the research in SCH. We can expect a better future of the experimental center.

Research and talent training: combination of clinical and basic research

Prof. Lu told us that to according to the policy of the hospital, the experimental center has two priorities. One is that, the center mainly supports the basic and clinical studies in key departments of SCH, including the research on chest tumors (lung cancer, thymic carcinoma, esophageal cancer, and mediastinal tumors) and cardiovascular surgeries. Up to now, the center has supported over 30 research projects in multiple clinical departments of SCH and provided professional experimental data for 10 SCI articles. Second, focusing on the long-term aim of SCH

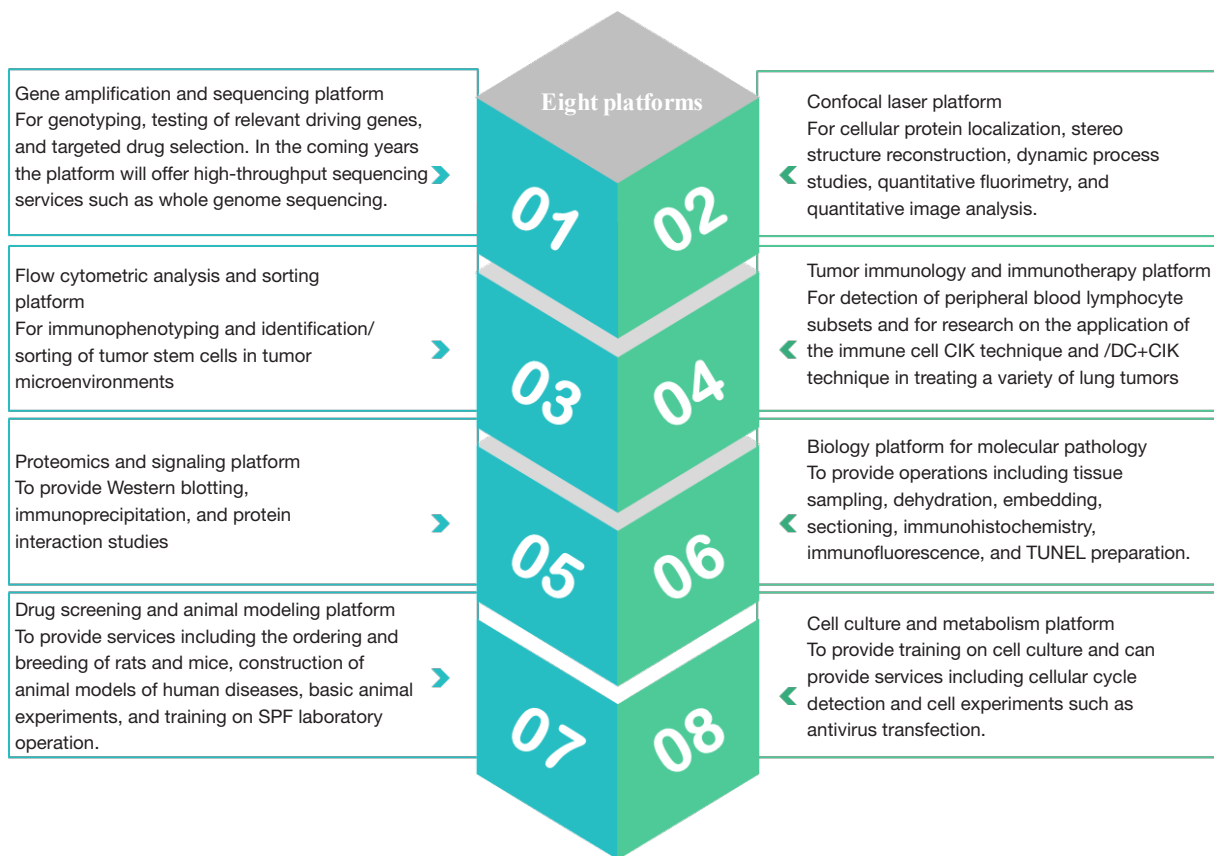


Figure 1 Eight platforms in the experimental center.



Figure 2 Standard PCR room.



Figure 3 Fluorescence microscope.

in applying for national or municipal key laboratories, the EC has carried out a few key research projects including establishing of Chinese patients’ lung cancer cell bank of, drug screening of drug resistant lung cancer and the mechanism of lung cancer metastasis, creation of humanized mouse patient-derived xenograft (PDX) model, creation

of the cardiovascular diseases models, and creation of the anesthesia animal models and the development of relevant protocols. In Prof. Lu’s own research field - immunology, the EC has carried out the basic and translational studies on the application of autologous immune cells in the treatment of malignant solid tumors and made notable progress. In the



Figure 4 Hippocampal neurons energy metabolism real-time measuring instrument.



Figure 7 Zeiss LSM710 confocal laser microscope.



Figure 5 IsoFlux microfluidic immunomagnetic cell sorting system.



Figure 8 A technician who is conducting an experiment.

coming years, the EC will support more research projects in clinical departments, and meanwhile will carry out clinical research on the autologous chimeric antigen receptor T-cell therapy for advanced non-small cell lung cancer with clinical departments.

On talent training, the center has 8 full-time technical staffs, and over 80% of them had a graduate degree (*Figure 8*). They have the backgrounds in cellular and molecular biology, immunology, oncology, and animal experiments. According to requirement of SCH on translational medicine, the staff frequently attend the ward round and academic discussions to enrich their understanding of clinical issues. Meanwhile, staffs have been formed a group with clinicians to solve the clinical problems of “real world”, facilitate the integration of preclinical research with basic studies, and thus promote the scientific research in SCH. The EC is very glad to welcome and encourage young clinicians to use each platform actively for training and learning of scientific research skills, and hopes this can lay the foundation for cultivate inter-disciplinary talent and physician scientist for SCH, said Prof. Lu.



Figure 6 Flow cytometry room.



Figure 9 Prof. Liming Lu.

About the configuration of technology and personnel, in addition to the technical staff, Prof. Lu hopes to introduce the top scientists from China and overseas in the future. Certainly, these experts should be focused on scientific research and be interested in translational research. “After all, serving the clinical and basic research in our hospital is the major work of the EC.” said Prof. Lu.

A solid start for a bright future

Over the past few years, with the strong support of hospital leaders and relevant departments, the EC has made great efforts in the design and construction of laboratory hardware and software. As for the future development of the center, Prof. Lu has a clear blueprint in her mind. The EC is an integral part of SCH’s vision that becoming a leading research hospital in China. Prof. Lu is envisaging that the EC will be built into an applied and basic research laboratory focusing on thoracic oncology, and a more professional experimental center that integrates the clinical/basic research, experiment teaching, and social services, so as to provide comprehensive support for the research, education and characteristic therapeutic breakthrough on special diseases in SCH. In addition, if the resources allow, the EC would offer external services in response to the initiative of the central government that open large-scale experimental platforms.

Recently, SCH has founded its first international journal, *Shanghai Chest*. When talking about the future cooperation with *Shanghai Chest*, the staffs of the EC said that they would submit articles actively to report the new technology, research and findings in the laboratory, so that expand

the influence of the center and promote the innovation and development of the platforms. Moreover, the studies conducted (and authored) by other institutions in the EC may also be published in the journal, which will help to promote the cooperation and exchange among multiple disciplines in the EC.

At the end of the interview, Prof. Lu mentioned that SCH is building a new scientific research building, and the design and construction of the EC has referred to a number of foreign top laboratories. It can be expected that the scale and capability of the EC will be further improved and thus the center will provide better services to the hospital. During the interview, Prof. Lu has also repeatedly stressed that the main interviewee should be the EC, rather than herself. She hoped that this interview would help more people to know about the EC and promote cooperation. Her selfless dedication is admirable, and it reflects the commitment and responsibility of each staff member in SCH.

Expert’s introduction

Liming Lu (*Figure 9*), PhD, research fellow, Professor, doctoral tutor. Prof. Lu is the director of the Experimental Center of Shanghai Chest Hospital. She has been a senior visiting scholar at the University of Cambridge. She is the executive editor of “*Current Immunology*”; instructor of the course “*Body defense and immune*”, teacher of the 8-year program and 4+4 program, instructor for “Medical School Student Scientific Innovation” program in Shanghai Jiaotong University School of Medicine; vice chairman of the Shanghai Society of Genetic Immunology, and executive director of the Chinese Society of Medical Biological Immunology.

The main research is immunoregulation and tumorigenesis. She has published more than 70 articles in peer-reviewed journals in these fields. She is the holder of 2 patents and 3 patent applications. She is the principal investigator of 12 national and municipal research projects, among which there is 1 project supported by the Major National R & D Program and 4 by the National Natural Science Foundation of China. She has completed over research projects supported by the National 863 Program, National 973 Program, Shanghai municipal grants, and Ministry of Health grants.

She has been listed in the “Shanghai Dawn Scholars”, “Shanghai Pujiang Talent Program”, “Shanghai Science and Technology Commission Science and Technology Star Talent Program”, and “Shanghai Health System

Outstanding Young Scholars”.

She has been participated in the contribution of *Principles of Immunology*, a Ministry of Education-designated textbook for graduate student, *Textbook of Immunology*, a textbook for overseas students, and some “tumor immunology” and national planning textbooks including *Tumor Immunology* and *Medical Immunology*. She was also a contributor of *Principles and Practice of Tissue Engineering*, *Immunological Technology*, and some other books listed in the “Tenth Five-year National Key Book Publication Program”, as approved by the General Administration of Press and Publication.

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Footnote

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