

PUMPING NEW BLOOD INTO HAEMATOLOGY RESEARCH

Soochow University's haematology programme has integrated basic and translational research with clinical care and talent training, advancing its progress as a world-class centre in the field.



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China's five-year survival rates of leukaemia and lymphoma are lower than those of many Western countries, according to recent figures. Discoveries made by haematologists at Soochow University and its First Affiliated Hospital are closing this gap with new options in the treatment of blood diseases.

The haematology programme at Soochow University started in the 1950s and has achieved many breakthroughs in the diagnosis and combined chemotherapy for leukaemia. With the efforts of generations of haematologists, and a tradition integrating basic research and clinical services, the programme has established strengths in haematopoietic stem cell transplantation,

leukaemia, and haemostasis and thrombosis. Its results have made it an internationally renowned centre for research, diagnosis and treatment of blood diseases.

Accelerating life-saving discoveries to combat malignant blood disorders

One of China's key centres for treatment of haematological cancers, from myelodysplastic syndrome, to leukaemia and lymphoma, the haematology programme at Soochow University, led by Depei Wu, spearheads comprehensive diagnosis and standardized treatment.

Housing one of the largest laboratories dedicated to haematological disorder diagnosis among China's hospitals, the

programme is a leader in molecular diagnosis of blood cancers and a top training ground in cytogenetics.

A pioneer in haematopoietic stem cell transplantation, the programme has improved treatment of blood cancers with its techniques. Soochow University houses one of China's most important centres in haematopoietic stem cell transplantation, rivalling its international counterparts in both scale and impact. It completed almost 900 transplants in 2019 alone, leading in China, and ranked among the top five worldwide for allogeneic transplantation. Long-term survival rates of its bone marrow transplants are comparable to those from the European Group for Blood and Marrow Transplantation

(EBMT). The research on disease mechanisms has also benefited the prevention and treatment of cancer recurrence after transplants, and graft-versus-host disease.

The programme's clinical successes are also backed by translational research, particularly on molecular markers. In a preclinical study, using high-throughput screening, researchers identified a novel compound that inhibits cyclin D2, a protein overexpressed in lymphomas and leukaemia. Having revealed the mechanism by which the inhibitor works, they have also shown in mouse models that it suppresses tumour growth without causing weight loss or organ damage. The potent anti-tumour activity and minimal toxicity demonstrate the potential of this small-molecular inhibitor in blood cancer therapy.

Blood vessel studies by another team have also informed chemotherapy and immunotherapy for other cancers. Immune checkpoint blockades (ICB), capable of inducing immune responses, are a promising strategy for cancer therapy. Soochow University researchers have found that increased vessel perfusion indicates ICB efficacy and can be used to guide personalized cancer immunotherapy.

Other breakthroughs include identifying how cell death leads to tumour development, demonstrating the way in which cell autophagy suppresses haematological malignancies, and revealing the mechanism underlying the growth of chronic myeloid leukaemia CD34+ cells.

The university hospital has also won government approval to conduct clinical trials of CAR-T therapy for patients with relapsed or refractory lymphoblastic leukaemia. The trials are showing encouraging results.

Elucidating complexities around blood clotting

In haemostasis and thrombosis, the programme's studies on the key physiological mechanisms, pioneered by Changgeng

Ruan, inform new treatment strategies. An exemplary contribution is the development of more than 150 SZ-series monoclonal antibodies to platelets and coagulation factors. Widely used in basic studies globally,

Integrating research and clinical services

Driving comprehensive research

- 424 faculty and staff devoted to laboratory diagnosis, clinical treatment and translational research on blood diseases, including one member of the Chinese Academy of Engineering and 24 PhD supervisors
- Having led 456 national, ministerial, or provincial projects, including many national key research projects
- 658 papers published in journals listed in the Science Citation Index
- Numerous national, ministerial and provincial science and technology progress awards, particularly for the development of diagnostic and treatment technologies for haematological malignancies and blood disorders

Excelling in clinical practice

- 278 beds, 46 wards with the class-100 laminar air flow system, and 16 day-care wards
- More than 120,000 outpatient visits in 2019
- China's first laboratory for high-resolution HLA typing accredited by the American Society for Histocompatibility and Immunogenetics (ASHI)
- Ranked third in haematology among domestic hospitals
- Having developed treatment guidelines for VWD, TTP and blood cancers
- A National Health Commission designated training ground for specialists in haematology

many of these antibodies have seen clinical applications in disease diagnosis and treatment, including as routine diagnostic reagents for bleeding disorders.

In one study, researchers at Soochow University, found the potential of SZ-21, a single-chain antibody, as an anti-thrombosis drug. SZ-21 can bind to proteins on the surface of platelets, suppressing platelet adhesion and aggregation. A national patent has already been awarded, and clinical trials of this antibody are ongoing.

Seeking to understand the physiology and activation of platelets and the mechanisms underlying blood clot formation, the team has studied multiple genes and proteins, revealing their roles in regulating thrombo-inflammation, activating the coagulation system, and regulating platelet lifespan. These results have benefited treatment development for platelet diseases and evaluation of anti-thrombosis therapies.

Studies on the regulation mechanism of cardiovascular and lymphatic vessels have also shed light on treatment strategies. Researchers have found an activating enzyme of corin, a molecule highly expressed in heart cells. In showing how the deficiency of corin is linked to hypertension in pregnant women with pre-eclampsia, they have opened a new avenue for its early diagnosis. Their studies on receptor tyrosine kinases (RTKs), which are key regulators of normal cellular processes, have revealed how some key RTKs play their roles in the formation and development of lymphatic vessels and veins.

These discoveries have led to diagnostic tools and therapies for platelet disorders like von Willebrand disease (VWD), thrombotic thrombocytopenic purpura (TTP), and idiopathic thrombocytopenic purpura (ITP). Test kits for ITP, coagulation factor drugs, and flow cytometry reagents developed by the laboratory have gained national approval and seen clinical use. A recombinant drug, developed as part of a national major new development programme, has been licensed to a pharmaceutical company. ■

1963

Yueshu Chen, China's founding father of haematology, established the laboratory in the Medical College of Soochow.

1981

Changgeng Ruan, a member of the Chinese Academy of Engineering, established China's first laboratory dedicated to research on thrombosis and haemostasis.

1988

Ruan became the founding director of the Jiangsu Institute of Haematology.

2007

The Key Laboratory of Thrombosis and Haemostasis, led by Ruan, was established.

2009

The Cyrus Tang Haematology Center was established to promote basic research and technological innovation in haematology.

2014

The Institute of Blood and Marrow Transplantation was founded by Depei Wu.

2020

The First Affiliated Hospital of Soochow University was approved to become the National Clinical Research Center for Blood Diseases.