

# RUIJIN HOSPITAL

IN CELEBRATION OF 110 YEARS OF EXCELLENCE

October 2017



## CUTTING-EDGE KINDNESS

With roots as a haven founded by a religious order, the medical research leader continues to set towering standards.

# RUIJIN HOSPITAL



**2,118**

Beds in 2016



**3,200,058**

Outpatient visits in 2016

AWARDED

**181**

RESEARCH GRANTS  
IN 2016



**404**

SCI PUBLICATIONS  
IN 2016



A KEY PROVIDER OF  
PREMIER  
HEALTHCARE  
SERVICES

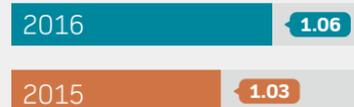
— INPATIENTS  
— OPERATIONS



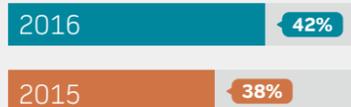
TOTAL RESEARCH FUNDS  
2012-2016



CASE MIX INDEX



% OF LEVEL III/IV SURGERIES



**894**

clinical faculties



**500+**

undergraduates



**300+**

graduate students



*Ruijin Hospital*

## CUTTING-EDGE KINDNESS

**G**uangci means kindness in Chinese. When a group of French Catholics founded the *Hôpital Sainte-Marie* in Shanghai in 1907 they chose *Guangci* as its name to reflect its aim of spreading kindness by saving lives. The name has been changed to Ruijin, but kindness remains the hospital's core endeavour.

After more than a century, Ruijin has become a leading general hospital incorporating research, education and care. Based on the heritage of Western medicine and enriched by Chinese medicine and culture, the hospital has established a strong global reputation for medical innovation.

Ruijin's achievements include treating a severely burned steel factory worker with a novel fluid replacement strategy,

now known as the 'Ruijin formula', setting a new bar for burns treatment. In the treatment of leukaemia, its use of a novel differentiation therapy with all-trans retinoic acid arsenic, coupled with arsenic, which was widely used in traditional Chinese medicine, has opened a new chapter of acute promyelocytic leukaemia treatment. Many of China's leaders in medicine, such as Wang Zhenyi, Chen Zhu, Chen Saijuan, Chen Guoqiang and Ning Guang come from Ruijin, all globally recognized for their achievements.

As the affiliated hospital of Shanghai Jiao Tong University, Ruijin is the flagship teaching hospital of its medical school. It offers 23 doctoral programmes and 16 graduate specialties. Of its 45 clinical disciplines, four are national key disciplines authorized by the Chinese Ministry of Education. It also has 22

national key clinical departments and a state key clinical laboratory.

With 3,900-plus physicians and staff, the hospital is well equipped for high-quality medical care. It has more than 2,100 beds and provides air medical services for emergency rescue, many of its patients having been rescued by helicopter.

In 2014, the launch of the National Centre for Translational Medicine in Shanghai, China's first national-level comprehensive centre of its kind, marked Ruijin's devotion to integrating basic research and clinical care.

Ruijin benefits from its special culture of integration and innovation. Following the Ruijin spirit of spreading kindness and pursuing excellence, the hospital, with its history of unshakeable medical ethics and exquisite skills development, will continue to be a benchmark of excellence. ■

Ruijin's day-to-day medical care is supported by an enviable track record in medical innovation.

## Air rescue pioneer

Ruijin Hospital is Shanghai's main base for air medical services and burns emergency care. With the capacity for comprehensive air rescue services and intensive care, Ruijin is instrumental to the response to almost all major disasters in China, where emergency treatments are needed.

Shanghai's first air rescue service was provided by Ruijin. In 2010, a car crash victim with severe organ damage was airlifted to Ruijin and sent directly into surgery from the hospital heliport. Ruijin doctors controlled the bleeding within three minutes and, due to the speedy rescue, the patient was saved.

Now, Ruijin has a well-trained air rescue team, with state-of-the-art helicopters used as air ambulances. It houses the command centre for coordinating air rescues for the entire city of Shanghai.

# SETTING BENCHMARKS

**W**ith roots as a haven founded by a religious order, Ruijin Hospital has integrated Western and traditional Chinese medicine for the past 110 years. It has established itself as a leader in medical education, research and services in China, and continues to set towering standards.

### A benchmark for medical education

Ruijin has always considered medical education as an integral part of its development, and since 1914 has assumed the responsibility of student training. It is now the flagship teaching hospital for Shanghai Jiao Tong University School of Medicine, and has the largest number of students out of all the university's affiliated hospitals. It aims to foster professionals with a commitment to medical

excellence, and strong ethics and skills.

With 894 clinical faculty members, including 190 clinical professors, Ruijin provides theoretical education and clinical practice opportunities to more than 500 undergraduates and 300-plus graduate students. Its undergraduate programme in clinical laboratory medicine is one of the first in China and it also has a doctoral programme on the subject.

A legacy of its French roots, some of its medical education

programme is done in French, led by the pioneering generation of professors, such as Kuang Ankun, Fu Peibin, Ye Yanqing, Gao Jinglang and Wang Zhenyi. The programme offers courses in French, covering internal medicine, surgery, maternal and child health and other core medical subjects. Each year, a group of students are also selected for internships or residency training in France. During its more than 30 year history, the programme

has produced a strong core of medical talent, who are now playing a significant role in Sino-French relations in culture, education, and science and technology. Meanwhile, Ruijin receives international students from France and other countries, extending the global reach of its medical philosophy.

As a national centre for residency training, Ruijin has created an educational platform for medical simulation, training medical students, resident

doctors, specialists and early-career physicians and nurses. With a highly realistic clinical environment for experiential learning and advanced simulation equipment, the platform enables hands-on practice in medical evaluation, clinical responses and teamwork skills, while ensuring patient safety.

### Advancing medical practices with research

Ruijin is China's pioneer in burns treatment, endocrinology, organ transplantation and leukaemia treatment. Its medical

achievements are strongly linked to its advanced research, fuelled by its rich clinical resources.

From reinventing the fluid replacement formula when rescuing a severely burned patient, to developing a differentiation therapy with the use of all-trans retinoic acid for treating acute promyelocytic leukaemia (APL), Ruijin's researchers have been working closely with clinical doctors, putting Ruijin at the forefront of Chinese medicine. Many of Ruijin's medical innovations are rooted in inspiration from traditional Chinese medicine,

which is creatively used to advance treatment strategies.

With the launch of the national research centre for translational medicine in Shanghai, a key national science infrastructure project, in which Ruijin plays a main role, Ruijin Hospital is expected to become China's strongest clinical research base for translational medicine.

### Global outreach

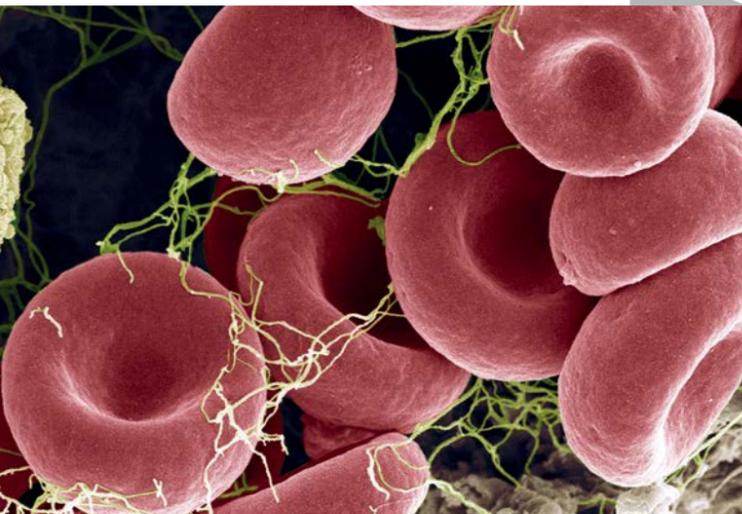
Ruijin has been extending its global ties, receiving hundreds of groups of international visitors for academic and clinical exchange every year.

One of the key bridges for international exchange is the 21st century Sino-US Symposium on Medicine, which, inaugurated in 2000, has been hosted by major cities in China and the United States. The symposium focuses on the most current medical trends, cutting-edge medical technologies and hospital management, offering a broad platform for medical knowledge exchange. The symposium has made a significant impact on the bilateral sharing of

knowledge and experience in the field of medicine.

Following the national belt and road initiative, Ruijin has also set up exchange mechanisms with medical institutions in Israel, Morocco and the Czech Republic in recent years, gaining a good reputation in these countries.

With a long tradition of spreading kindness and pursuing excellence, Ruijin is aiming at globally significant benchmarks to improve its global impact and competitiveness. It seeks to broaden its global perspective and optimize its talent cultivation and incentive systems. As part of its strategic development plan, it has recently launched a Guangci Scholar Plan, seeking to increase its talent base by attracting and fostering talented medical scholars, including leading experts, as well as promising young talent. With a team of dedicated and brilliant healthcare professionals and researchers, Ruijin is confident about the next era of excellence and innovation. ■



## Haematology

# BREAKTHROUGH FOR LEUKAEMIA TREATMENT

cells was the key. Through a series of experiments, they found in 1985 that all-trans retinoic acid (ATRA) induced differentiation of leukaemic cells from APL patients. Based on this result, a clinical study yielded a complete remission rate as high as 85% for the use of single-agent ATRA. The clinical use of ATRA has spread worldwide, opening a new era of APL treatment.

However, a new challenge of retinoic acid syndrome and drug resistance emerged, causing relapse. In response to these issues with ATRA use, the Ruijin team, by discovering the clinical value of arsenic in leukaemia treatment, proposed an improved strategy. Arsenic trioxide (ATO) works by

promoting degradation of oncogenic proteins and showed high efficacy in treating relapsed APL. Researchers at Ruijin revealed the molecular mechanism of differentiation induction by ATO and showed that the combination of ATO and ATRA had enhanced effects on inducing differentiation. The efficacy of the combined therapy of ATO and ATRA was proved in clinical studies, bringing significantly increased survival of APL. This model is now globally accepted as a standard of care.

The Ruijin department of haematology, with SIH, is striving to extend its success in combating APL to other subtypes of leukaemia and blood cancers. ■

Acute promyelocytic leukaemia (APL), once considered to have a high risk of fatality has become highly curable, thanks to researchers at the haematology department of Ruijin Hospital, and its research arm, the Shanghai Institute of Haematology (SIH).

Leukaemia, cancer of blood cells, is the most common cancer in youths. Its subtype, APL, first described in 1957, has a high incidence of early haemorrhagic

death. Traditional treatment approaches are not able to differentiate between cancer cells and normal ones.

Led by Wang Zhenyi, a renowned haematologist in China, a team of Ruijin researchers started exploring the differentiation therapy for APL in the early 1980s. They believed that treatment solutions would come from a better understanding of the cellular mechanisms of the disease and that elucidating factors contributing to the differentiation of leukaemic

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## Working miracles for burns victims

Ruijin Hospital pioneered modern treatment methods for burns victims and is renowned for a milestone case.

In 1958, a local steel factory worker was burned by molten iron, and was taken to Ruijin Hospital (then called Guangci Hospital) with burns to 89% of his body, 23% of them third degree. In that era, patients with more than 75% of body-surface area burned had little chance of survival, but Ruijin doctors wanted to save him.

The first challenge was fluid replacement to reverse shock. If following the Evan's formula, the gold-standard used then for calculating fluid requirements, the amount of replacement fluid would be inadequate. Doctors had to increase fluid infusion and add plasma based on the patient's clinical

condition to keep normal blood volume. Their move helped him recover from shock.

Infection posed another threat. Serious pseudomonas infection, caused by a gram-negative bacterium, can cause sepsis. Doctors creatively used phage, a virus that infects bacteria on the burn wound, while applying polymyxin B, a typical antibiotic for gram-negative infections. They successfully controlled the infection.

Skin grafting was the final critical step. Ruijin doctors applied grafts using his own skin and the skin of donors and successfully controlled donor skin graft rejection.

After three months' intensive treatment, the patient was healed. His full recovery was hailed as a miracle and lauded by many in the international community.

Based on this experience, Ruijin's burns department has developed novel techniques

for burn care. The fluid resuscitation formula they proposed was an improvement on the Evan's formula and reduced serious complications of burns, improving recovery rates.

The mixed grafting of allogeneic skin and small autogeneic islands innovated by the team improved treatment for severe large-area burns. The team has also pioneered using hibernation therapy to reduce excessive stress responses, which supports the protection of organs, ensuring smooth recovery from early-stage shock.

Using these novel techniques, improved by contemporary technologies, the department has treated many severely burned patients. On the Lethal Area 50 Index, an indicator of burn care quality, Ruijin is 106.4% and 83.4% respectively across all its patients and across patients with third-degree burns. ■



## Endocrinology

# UNRAVELLING DIABETES

Changing lifestyles mean obesity, diabetes, and other metabolic disorders are becoming common health threats in China. By integrating traditional Chinese and Western medicine, the Department of Endocrinology at Ruijin Hospital has made significant achievements in treating these diseases.

As a leader in research on endocrinology and metabolism, Ruijin was the first in China to diagnose and treat primary aldosteronism, a hormonal disorder causing high blood pressure in 1958. It developed a novel oral glucose tolerance test to screen for diabetes in patients with high blood sugar in early 1980s, and pioneered the use of molecular biology techniques to study the mechanisms of metabolic diseases. It is now one of two national centres for research on metabolic diseases.

In support of the prevention and control of diabetes, the Ruijin endocrinology department conducted a large-scale epidemiological study on diabetes in 2010. Led by

Ning Guang, the department director and vice president of Ruijin Hospital, the Ruijin group surveyed roughly 100,000 adults, including migrants, nationwide using multistage probability sampling and conducted oral glucose tolerance tests for diabetes screening. For the first time, they mapped the distribution of diabetes in China, and estimated the prevalence of diabetes among Chinese adults at 11.6% and pre-diabetes at 50%, indicating a growing public health threat. In search of solutions, they have collaborated with 25 hospitals to build community bases across the country for an observational study on the link between diabetes and the complications of tumour and cardiovascular diseases. Furthermore, a biobank, established through five million samples collected from 450,000 people, has shed light on preventive interventions for diabetes and other endocrine and metabolic diseases.

The department has conducted a double-blind comparative study with a long-term follow-up on the

prognosis and effect of anti-diabetes drugs on Type 2 diabetes with coronary artery disease. They discovered the protective effects of metformin, a common diabetes drug, on the cardiovascular system. Another clinical study suggested that berberine, a yellow compound traditionally used in China to treat diarrhoea, can not only lower blood sugar and blood cholesterol levels, but also increase insulin sensitivity. The study was acclaimed as having opened the door for the use of traditional Chinese medicine in diabetes treatment.

Basic research efforts by Ruijin endocrine department are also promising. A recent metagenome-wide association study in obese Chinese youth has identified the link between gut microbiome and obesity

and pinpointed responsible bacteria. Using whole exome and transcriptome sequencing, they have provided genomic evidence for the independent origins of benign thyroid nodules and thyroid cancer. Other achievements include genome scanning for genes involved in susceptibility to Type 2 diabetes, finding genes responsible for insulinoma and the identification of potentially functional mutated genes in adrenal Cushing's syndrome. Results are published in high-quality journals, including *Science*, *Nature Genetics* and *JAMA*, marking the global recognition of the department. ■

▲ Ruijin endocrinologists have discovered new mechanisms associated with diabetes and identified targets for intervention.

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General surgery

# SEAMLESS TRANSITIONS

Ruijin's department of general surgery has boasted many firsts in its 110-year history. Doctors from the department pioneered orthotopic liver transplantation in China as early as 1977. They also performed China's first laparoscopic surgery of colon cancer in 1993, the first split liver transplantation in 2002, and succeeded in Asia's first islet cell transplantation in 2003.

Building on its strengths in gastrointestinal, pancreatic and breast surgeries, the department is dedicated to optimal outcomes with minimal invasion. It leads the country in gastrointestinal tumour surgery, comprehensive treatment of severe pancreatic cancer, radical operation on breast cancer, living donor liver transplantation, and robotic surgery on the thyroid.

Traditional surgeries often require large incisions, causing heavy bleeding and pain for patients. The Ruijin gastrointestinal surgery centre focuses on standardizing the multidisciplinary team treatment and improving minimally invasive surgery techniques to reduce trauma and assist rapid recovery.

In addition to the laparoscopic surgery of colon cancer, it pioneered in using laparoscopy in extensive operations of rectal cancer and gastric cancer, including 3D laparoscopic surgeries for the gastrointestinal tract. It has performed more than 8,000 laparoscopic rectal cancer surgeries and 2,000-plus laparoscopic gastric cancer surgeries, lowering costs and bringing greater benefits to patients.

The advanced techniques and rich experience of Ruijin surgeons have won international acclaim.

Because of the position of the pancreas and its complex nature, pancreatic surgery still poses great technical challenges and is associated with serious complications. The Ruijin pancreatic centre uses robotic technology to improve operation outcomes. It leads the world in the number and quality of robot-assisted duodenum-preserving pancreatic head resection (DPPHR) and medial pancreatectomy.

It boasts the world's first robot-assisted radical operation on a gallbladder. The centre has won awards for technical innovations made in hepatic-biliary-pancreatic surgery.

The breast centre has integrated resources from surgery, oncology and radiation to provide standardized treatment. It is active in practicing personalized and multidisciplinary diagnosis and treatment. Its biopsy and novel adjuvant therapy of breast cancer based on molecular typing have significantly improved recovery rates for patients. ■

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## Anaesthetic excellence

The department of anaesthesia at Ruijin Hospital was one of the first established in modern China. Over its illustrious history, it has been responsible for many firsts, including:

- \* The application of halothane inhalation for general anaesthesia;
- \* The use of muscle relaxants in artificial hibernation;
- \* Anaesthesia for treating

patients with large-area severe burns;

- \* Surgical and acupuncture anaesthesia for open-heart surgery under extracorporeal circulation;
- \* The use of eserine for emergence from anaesthesia induced by traditional Chinese medicine
- \* Anaesthesia for liver transplantation and heart transplantation;
- \* Proposal of the concepts of

'ideal anaesthetic state', 'precise anaesthetic management' and 'comfortable medical care' and their clinical application;

Focusing on the mechanisms of general anaesthesia, the department has published more than 50 papers in SCI journals and received funding for dozens of national-level research projects. It has also developed core technologies, such as for the assessment of effective blood volume, brain

function evaluations during the perioperative period and strategies for the prevention of cognitive impairment.

As the national training base for doctors and specialists, the department established the evaluation system for clinical anaesthesia and has compiled several guidelines and textbooks for anaesthesiologists. It will continue its innovation in support of comfortable medical care and safety. ■

Cardiovascular medicine

# THE HEART OF EXPLORATION



The Ruijin cardiovascular department has mastered novel techniques for treating cardiovascular diseases.

The department of cardiovascular medicine at Ruijin Hospital, established in 1952, is a testament to the legacy of medical exploration by generations of academic leaders at Ruijin.

In the 1960s and 70s, Gong Lansheng, the first director of the Institute of Hypertension, led the development of many anti-hypertension drugs, such as compound tablets made from kendir leaves, by integrating Chinese herbal medicine. Their innovations have contributed to high blood pressure treatments.

In the 1970s, Ruijin's Qi Wenhong reported a rare heart arrhythmia known as Torsade de Pointes (TdP) and pioneered the use of isoproterenol, a medicine which had been typically used to slow the heart rate, for the treatment of TdP. Qi was also the first to report triggered arrhythmia in

China and saved a patient by applying verapamil, a calcium channel-blocker.

In 1990, Shen Weifeng, a cardiovascular professor, performed Shanghai's first percutaneous mitral balloon valvuloplasty (PMBV), a non-surgical procedure to open a narrowed mitral valve to improve heart function. He also pioneered percutaneous transluminal coronary angioplasty and intracoronary stent placement in Shanghai.

More recently, the department led in the interventional treatment of complex arrhythmia using the CARTO 3 system, an electromagnetic technology-based 3D imaging technique. It is also China's leader in heart transplantation, off-pump coronary bypass surgery, comprehensive treatment of heart failure and other surgical treatment of cardiovascular diseases. ■

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Nephrology

# EXPERT KIDNEY SPECIALISTS

Ruijin Hospital is a national leader in the study and treatment of kidney problems.

Its department of nephrology, top-ranked among its counterparts in China, is renowned for strength in treating inherited and secondary kidney diseases, acute and chronic renal failure, and tubulointerstitial diseases.

The department was the first in China to report type 1 and type 4 renal tubular acidosis, an accumulation of excessive acids in the blood caused by kidney malfunction. It also made the initial report of Liddle syndrome, hyperoxaluria and macroglobulinemia in China, which are associated with kidney damage.

Focusing on the genetic basis rare kidney diseases, it identified many novel mutations, including those on COL4A3 and INF2, which were first reported in Chinese focal segmental glomerulosclerosis patients.

New testing methods devised by the department have contributed significantly to the diagnosis of kidney

diseases in Shanghai and around the region. These include the use of single sample plasma clearance of iohexol, a non-ionic contrast agent, to measure the glomerular filtration rate, a key index of renal function, and measuring  $\alpha$ -galactosidase A activity for screening for Fabry disease.

The department also pioneered the parathyroid hormone (PTH) blood test to support monitoring of chronic kidney diseases, in addition to the tests of vitamin D, prostaglandin E2, antineutrophil cytoplasmic antibodies (ANCA), serum cystatin C and erythropoietin to support diagnosis and management of kidney diseases.

With 90 beds and a blood purification centre equipped with 80 advanced machines, the department currently supports 650 dialysis maintenance patients. Its 28 physicians are dedicated to clinical services, while also contributing to multiple national-level research projects, bringing globally recognized results. ■

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## Respiratory medicine

# BREATHING LIFE INTO TREATMENT

The respiratory department at Ruijin Hospital has its origins in a lung department established in 1952. Now among China's top 10, it specializes in thoracic intervention, treatment of lung tumours, chronic respiratory diseases, sleep disorders and serious lung infections.

The department pioneered rigid bronchoscopy and iodology in China as early as 1953 and put flexible bronchoscopy into clinical use in 1976. Its physicians removed a foreign body using a fiberoptic bronchoscope in 1994. More recently, the department succeeded in several advanced interventional techniques, including thoracoscopy, fiberoptic bronchoscopic balloon dilatation, bronchoscopic examination under intravenous anaesthesia, endobronchial ultrasound with a guide sheath and bronchial thermoplasty for treating severe asthma.

For better control of asthma, the department founded the Shanghai Asthma Home in 1990s, which was recognized by the Global Initiative for Asthma (GINA). Ruijin's experts also pioneered applying lung-protective ventilation strategies for severe asthma and achieved good results. In the prevention of the chronic obstructive pulmonary disease (COPD), the department

took part in a large-scale epidemiological study of the disease and for the first time, determined China's prevalence of COPD, supporting research on early-warning techniques.

The Ruijin respiratory department has East China's largest sleep disorder treatment centre. Leading clinical research in the area since the 1980s, the department has been dedicated to studying the mechanisms, gender differences and biomarkers of sleep-disordered breathing. In 1998 it reported treating sleep apnea syndrome combined with acute respiratory failure for the first time in China. It led an epidemiological survey of sleep disorders in 2003, China's largest ever.

In its respiratory intensive care unit, set up in 2004, with negative pressure isolation rooms, the department has saved many patients with severe respiratory diseases. By summarizing its experience in controlling bacterial drug resistance, the department has set up guidelines for treating community-acquired pneumonia.

Physicians from the Ruijin respiratory department have also been active in public health emergencies, ranging from the Tangshan earthquake in 1976 and the SARS outbreak in 2003 to the influenza A virus infection between 2010 and 2014. ■

## Success in infection control is catching

Established in 1930, the department of infectious diseases is one of the oldest of Ruijin Hospital's units. Building on proven traditions, the department has enhanced its clinical expertise and become one of China's key bases for the research and management of infectious diseases.

Dedicated to eliminating viral hepatitis and related diseases in China in the past 30 years, the department boasts a leading position in the field. With the establishment of a consultation centre for complicated liver diseases, a treatment centre for severe hepatitis and an artificial liver support centre, it has set milestones for the treatment of liver failure in China. The enhancement of early diagnosis of liver tumours and the multidisciplinary management, in practice for several years, have proved effective, leading to improved prognosis and survival. The efforts have already benefited many patients and made a significant social impact.

As the largest infectious disease department among Shanghai's general hospitals, the department has one outpatient and three inpatient units, with 118 beds, covering almost all areas of infection-related diseases. It is also responsible for guiding the treatment of central nervous system infections, acute severe infections, influenza A and measles. It has established platforms for molecular diagnostics of pathogenic microbes and for detecting biomarkers to predict effects of antiviral therapy and disease progression. The department has obtained more than 100 grants from national and local governments, garnering more than 20 million RMB in funding support.

With many experts, the Ruijin infectious diseases department also plays a key role in training specialists and researchers on infectious diseases. It has trained nearly 200 masters or doctoral graduates and more than 1,200 early-career physicians. ■

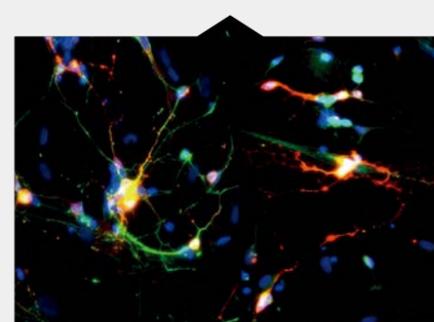


Ruijin respiratory department played a key role in controlling the SARS epidemic.

## Inventions in neurology

Neural degenerative diseases affect many functions and can be life threatening. Focusing on Parkinson's and motor disorders, Alzheimer's disease, dementia and other neural genetic diseases, the Ruijin department of neurology has become one of the largest of its kind in China after 30 years' development. Its 30-plus experts have innovated in diagnostic and treatment techniques, including:

- Integrating the evaluation of non-motor symptoms, Mmolecular neuroimaging, polysomnography sleep testing with electroencephalogram monitoring, genetic testing and other tools for early and precise diagnosis of movement disorders, which has improved diagnostic specificity and sensitivity;
- Establishing China's first deep brain stimulation (DBS) treatment centre, which has treated more than 700 Parkinson's patients, 100 dystonia patients and 50 cases of Tourette's syndrome since 2009;
- Applying the injection of botulinum toxins, more commonly known as botox injections for the treatment of dystonia and other muscle movement disorders, which puts Ruijin at the top rank among Chinese hospitals;
- Combining functional MRI, molecular neuroimaging and proteomics testing, which has significantly improved early detection of dementia, particularly Alzheimer's disease;
- Collaborating with the school of mechanical kinetics at Shanghai Jiaotong University to develop rehabilitation assistance robots for patients suffering from spastic paraplegia;
- Routine use of genetic testing, nerve or muscle biopsy and electrophysiological testing in the diagnosis and assessment of neural genetic and muscle diseases. The department has also established bio banks and data banks for various neurodegenerative diseases. ■



## Dermatology

# REMOVING BARRIERS TO SKIN DISEASE CURES

The dermatology department at Ruijin Hospital applies modern immunology techniques to the diagnosis and treatment of complex dermatological diseases, which are common in China. It led the country in the prevention and treatment of occupational skin diseases from the 1950s to 1980s, winning awards for its studies on the toxicity of asphalt, the epidemiology of a dermatitis outbreak caused by a kind of caterpillar, and the prevention of paddy field dermatitis. In China, it also pioneered applying anti-nuclear antibody testing to the diagnosis of lupus, a chronic inflammatory disease.

Today, the department has built up its strength in treating inflammatory and autoimmune skin diseases, as well as skin cancers. Researchers from the Ruijin dermatology department found that the interleukin-17 (IL-17) family cytokines, the key pathogenic cells causing psoriasis, come from a kind of T-cell in the dermis. This landmark discovery led to the development of psoriasis therapies targeting IL-17 and a skin barrier repair cream.

For pemphigus, a rare autoimmune blistering disease,

Ruijin researchers proposed treatment based on the antibody level. They were the first in China to develop a serological diagnostic tool for pemphigus and other bullous diseases by cloning pemphigus antigens. They also found B cells as a new therapeutic target for pemphigus and pioneered using glucocorticoid, an anti-inflammatory hormone for topical treatment of mucous membrane pemphigoid, an autoimmune skin disease similar to pemphigus. Lessons drawn on the mechanisms of glucocorticoid therapy are useful in pemphigus treatment.

Dermatomyositis is another autoimmune disease, characterised by the inflammation of skin or muscles, which leads to interstitial pneumonia and cancer. Ruijin researchers have studied the relationships of interstitial lung disease, the damage to skin and presence of anti-MDA5 antibodies, which are known to be associated with dermatomyositis.

The department has also made breakthroughs in the diagnosis and treatment of T-cell lymphoma of the skin, using an alternative to chemotherapy. Their efforts have improved patient survival from this and other serious skin diseases. ■

## Emergency

# EXPERTS IN A MEDICAL CRISIS

The emergency department (ED) at Ruijin hospital has integrated emergency medical services, research and training. It also has enhanced care for children with its paediatric emergency department. The ED receives around 320,000 patient visits per year, including 38,000 who are severely ill. As a tertiary care referral centre and a trauma centre with its own heliport, it cares for patients from all economic backgrounds, whether they are presenting with a routine or the most life-threatening of conditions. Many patients are transferred from other hospitals in Shanghai or beyond. In close collaboration with cardiovascular and neurologic specialists at Ruijin, the ED offers immediate treatment to patients needing time-critical care with its accredited chest pain and stroke centres.

With a threefold mission of healing, teaching and discovery, the department offers a nationally recognized emergency medicine residency programme. More than 75% of its graduates go on to work in EDs throughout Shanghai. The department also offers fellowship training in ultrasound, traumatology, medical toxicology, and health administration.

Ruijin's ED is also a CPR training centre authorized by the American Heart Association (AHA) and has trained both medical professionals and lay people in first aid care. It plays a highly visible role in Shanghai's emergency planning, air and helicopter rescue, management of hazardous materials incidents, and identification and intervention of public health emergencies. ■

## An intensive level of quality

Top ranked in Shanghai, the department of intensive care medicine at Ruijin Hospital provides essential treatment to critically ill patients in Shanghai and across the country. It leads China in the treatment of acute pancreatitis.

In the late 1990s, a professor of the department, Tang Yaoqing, along with Zhang Shengdao from the surgical department, first proposed the concept of "fulminant pancreatitis" in China, a disease characterized by rapid organ failure and high mortality. Tang and Zhang recommended personalized treatment for the disease and saved a patient of fulminant acute pancreatitis who experienced eight cardiac arrests in 1999. They also established the blood purification approach

in China and their guidelines for treating severe acute pancreatitis are recognized internationally.

The department also excels in intensive care for severe infections and the diagnosis and treatment of multiple organ dysfunction. It has played a key role in medical rescues after major disasters, ranging from the Wenchuan earthquake and several major fires, to the avian flu pandemic.

With 30 beds and 24 dedicated medical professionals, along with advanced information management techniques and integrated life monitoring support systems, the department has overarching responsibility for intensive care of all critically ill patients admitted to Ruijin. It is also a key player in some major projects in Shanghai: building an aeromedical rescue centre and a city-wide collaboration to enhance integrated treatment for critically ill pregnant women. ■

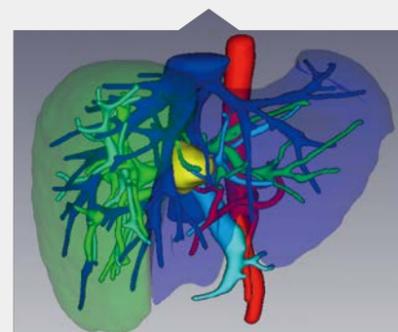
## A strong vision in diagnosis

The department of radiology at Ruijin Hospital is China's front-runner in mammography screening. Equipped with advanced facilities, it applies cutting-edge radiological technologies to support disease diagnosis and treatment.

In 1974, the department developed China's first mammography machine collaboratively with other institutions and soon applied it to the diagnosis of breast cancer. In 2009, it pioneered the clinical use of dual-energy CTs and developed techniques for noise reduction and optimization of scanner parameters. By setting up guidelines for energy CT scanning and cancer staging criteria, Ruijin radiologists have improved the accuracy of preoperative staging for gastric cancer. Results from the dual-energy CT scanning also benefited the selection of operation methods and the performance of laparoscopic surgery. In 2015, Ruijin's Luo Xianfu and Yan Fuhua proposed the innovative use of virtual iron content imaging based on dual-energy CT for quantification of liver iron content, demonstrating the advantage of non-invasive assessment.

The department also specializes in abdominal, breast, endocrinal and cardiovascular imaging.

The clinical use of multi-parametric MRI imaging has improved the accuracy of diagnosis, staging and post-treatment assessment for breast cancer. Applying imaging techniques for the monitoring of chronic liver diseases contributes to early detection of liver cancer. ■



Artificial intelligence-based 3D quantitative imaging supports pre-operative evaluations of liver tumours.

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## Clinical laboratory medicine

# EXCELLENCE IS IN RUIJIN'S BLOOD



## Instrumental in today's nuclear medicine

While personalized treatment is sweeping the world as a healthcare trend, the department of clinical laboratory at Ruijin hospital has been practicing this concept for 20 years. They proposed integrating tests, and, guided by the results, offered precision diagnosis and treatment for bleeding disorders and blood clots.

The department recommended to the Chinese Ministry of Health that platelet count (PLT), activated partial thromboplastin time (APTT) and prothrombin time (PT) all need to be tested before surgeries to investigate causes of bleeding, and measure the time it takes for blood to clot. Country-wide adoption of this practice has eliminated abnormal surgical bleeding.

Beyond traditional blood tests, the Ruijin clinical laboratory team pioneered genetic testing for inherited bleeding disorders and blood clots in China in the 1990s. They discovered more than 200 types of gene mutation and studied the pathogenic mechanism of some of these mutations. DNA testing enables doctors to tailor treatment

to individual's genetic makeup. The Ruijin team has screened more than 1,600 haemophilia carriers for prenatal diagnosis, becoming a leader among similar institutions around the world. Their laboratory diagnoses were found to be accurate and praised by the president of the World Federation of Hemophilia as one of the best models for the prevention of inherited bleeding disorders in developing countries.

The Ruijin team developed a clotting factor replacement therapy for haemophilia during the perioperative period, which only used half to one third of the dosage of coagulation products required by international standards.

The department has also set up systems of laboratory diagnosis for infectious diseases and haemolytic anaemia, with established genetic and pharmacogenomics tools. It is now developing new programmes to improve early diagnosis of cancer and genetic diseases.

As the country's training base for laboratory diagnosis, the department is exploring a novel teaching model that integrates laboratory testing with clinical treatment. ■

Established in 1960, the department of nuclear medicine at Ruijin Hospital is a key clinical base in China with state-of-the-art facilities and instruments, such as PET/MR, PET/CT and SPECT/CT, and integrated medical service, research and education.

The department has forged a series of technological innovations, ranging from the development of the radioimmunoassay kit for measurement of alpha fetoprotein (AFP), to the recent development of the all-trans-retinoic acid therapy for thyroid cancer and the Rhenium-188 HEDP to treat metastatic bone pain. The radioimmunoassay method for measuring carcinoembryonic antigen in 1973-1974 was the first of its kind in China.

Focusing on molecular imaging and radionuclide therapy in oncology, the department has published more than 70 papers in SCI journals and received funding for dozens of national-level research projects. It has also made significant contributions to China's research and development of nuclear medical instruments.

Major achievements include: developing the FTS-101 black and white scanner and FTS-203 colour scanner between 1970 and 1974; the gamma camera in 1976; the automatic gamma counter with well-type detectors in 1981; a device for the assessment of renal function; a rheoencephalograph for measuring blood flow in the brain between 1985 and 1988; as well as conducting clinical trials for a domestic PET/CT scanner in 2016. ■

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# FROM GUANGCI TO RUIJIN

Spreading kindness and pursuing  
excellence for 110 years

## 1907

Hôpital  
Sainte-Marie, or  
Guangci  
Hospital, was  
established in  
Shanghai by the  
French Catholic  
church



## 1912

Became the  
teaching  
hospital of  
Aurora  
University



## 1940

Developed into  
the largest  
hospital in the  
Far East, with  
780 beds



## 1952

Became the  
affiliated  
hospital of  
Shanghai  
Second Medical  
College

## 1957

Diagnosed  
the first case  
of primary  
aldosteronism  
in China



## 1958

Rescued a victim  
with 89% of  
body area  
burned,  
reinventing  
the fluid  
replacement  
formula



## 1972

Renamed  
Ruijin Hospital

## 2012

Opened the  
Ruijin Hospital  
north campus



## 2005

Became the  
affiliated  
hospital of the  
School of  
Medicine,  
Shanghai Jiao  
Tong University



## 2004

Performed Asia's  
first successful  
abdominal  
multi-organ  
transplantation

## 2002

Completed  
China's first  
split liver  
transplantation



## 1993

Pioneered the  
use of  
laparoscopy in  
radical  
operations of  
colorectal  
cancer in China

## 1986

Developed  
differentiation  
therapy for  
acute  
promyelocytic  
leukaemia using  
all-trans retinoic  
acid



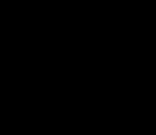
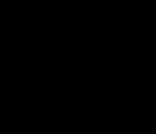
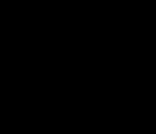
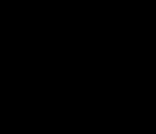
## 1978

Performed  
China's first  
allograft heart  
transplantation



## 1977

Performed China's  
first orthotopic  
liver  
allograft transplantation



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