



The 130th Anniversary of Qilu Hospital of Shandong University

HEALING THE PEOPLE PURSUING THE TRUTH OF SCIENCE

Jinan, the capital city of Shandong province, has been nurtured by natural springs since ancient times. On this fertile land with a splendid history, Qilu Hospital of Shandong University (QLH) has achieved great accomplishments of glorious development, during which its vigorous and profound culture has been passed down from generation to generation. The spirit of healing the people and pursuing the truth of science germinated here and has remained unshaken ever since. For 130 years, QLH has stayed true to its original aspiration, and dedicated to curing the sick and rescuing the dying, fulfilling its commitment to medical ethics and professional excellence.

QLH is a hospital directly affiliated to Shandong University, a key national university under the direct jurisdiction of the Ministry of Education (MOE) and under the administration of the National Health Commission (NHC), China. Founded in 1890, the hospital was successively called Sino-American Hospital, Union Hospital, Cheeloo Hospital, and Affiliated Hospital of Shandong Medical University. In October 2000, it was renamed Qilu Hospital of Shandong

University. In recent years, taking Shandong province as the foothold, QLH has been aiming to become a high-level research-oriented hospital that is first-class in China and renowned in the world. Based in Jinan and Qingdao, the hospital has formed a development pattern of "three campuses in two cities" with a total of 5,000 beds and nearly 10,000 employees.

QLH is responsible for constructing one of the first regional medical centers built jointly by the NHC and provincial government at the national level. It also conducts the task of Intensive Care Medicine part in the national program of Improving Diagnosis and Treatment of Difficult and Complicated Diseases. Now QLH has 68 clinical and supportive departments, of which six (Emergency Medicine, Rehabilitation Medicine, Obstetrics and Gynecology, Neurosurgery, Haematology, and Clinical Laboratory) ranked among the top 10 in China's Medical Specialties Ranking 2019; nine others (Gastroenterology, Pathology, Otolaryngology, Endocrinology, Neurology, Cardiology, Geriatrics, Ultrasound Medicine, and Health Management) were nominated.

The Clinical Research Center of Shandong University built by QLH focuses on prevention, diagnosis, treatment, and prognosis of serious diseases. It facilitates the promotion of clinical disciplines through synergetic innovation in clinical research, incubation of key projects, and transformation of research achievements. The strengths of Shandong University as a comprehensive university are fully utilized to enhance interdisciplinary integration between medicine and other disciplines including engineering, science, social science and liberal arts. The planned 10,000m² clinical research center (on the International Medical Center campus) will be built into an ideal platform for clinical research transformation with Qilu Medicine's typical characteristics.

Since its beginning, QLH has been pursuing excellence and innovation by fully using the advantages of outstanding talents, significant technical impact in the region, and a strong brand effect at home and abroad. The hospital has continuously made contributions to the development of medicine in China as well as the health and welfare of the Chinese people.

CARDIOLOGY

A GUARDIAN OF CARDIOVASCULAR HEALTH

Founded in 1959, the Department of Cardiology of Qilu (Cheeloo) Hospital is one of the earliest cardiovascular disciplines in China and serves as a comprehensive platform for clinical practice, teaching, research and training. This department consists of outpatient clinics, three inpatient wards, a critical care unit (CCU), an echocardiographic laboratory, an electrocardiographic laboratory, four cardiac catheterization laboratories, the Key Laboratory of Cardiovascular Remodeling and Function Research of the MOE and the NHC, and a branch department at Qingdao Campus. Subspecialties at the Department of Cardiology include coronary artery disease and atherosclerosis, cardiac arrhythmias, heart failure, structural heart disease, pulmonary vascular diseases, hypertension, critical cardiovascular diseases, cardiovascular imaging, and electrocardiography, which are led by nationally renowned experts and professionals and play a vital role in the diagnosis and treatment of critical and complex cardiovascular diseases in Shandong Province and east China. Department members pioneered exercise electrocardiography, stress echocardiography, Doppler echocardiography, multiplane

transesophageal echocardiography, and three-dimensional echocardiography in China. Moreover, this department was in the early rank to develop the following techniques in China: cardiac pacing and cardioversion, thrombolysis for acute myocardial infarction, percutaneous coronary intervention, percutaneous closure for atrial septal defect, ventricular septal defect and patent ductus arteriosus, and radiofrequency and cryoballoon ablation for tachyarrhythmias. The Department of Cardiology of Qilu (Cheeloo) Hospital has been conferred National Key Discipline by MOE, and National Key Clinical Specialty and Training Bases for Interventional Diagnosis and Treatment of Coronary Heart Disease, Congenital Heart Diseases and Arrhythmias by NHC. In addition, this department has been awarded the Innovative Research Group Fund by the National Natural Science Foundation of China.

The Department of Cardiology features research on the mechanisms, detection techniques and intervention strategies of cardiovascular remodeling. Under the leadership of Professor Yun Zhang, the department director and a member of the Chinese Academy of Engineer-

ing, the department has undertaken more than 250 national and provincial research projects and published more than 1,200 papers in high-impact international journals. In the field of basic research, this department was the first to establish a series of animal models of atherosclerotic vulnerable plaque, discovered multiple novel genes and mechanisms underlying the development and progression of vulnerable plaque and ventricular remodeling, developed new biomarkers and imaging techniques for detecting vulnerable plaque and ventricular remodeling, and revealed a series of new therapeutic targets for the early intervention of atherosclerosis and heart failure. In the field of clinical research, the department led the world-renowned EMINCA and CAPITAL studies, participated in over 30 international and national multi-center clinical trials, led or participated in the preparation of more than 20 Chinese and international clinical guidelines. Over the years, Department of Cardiology of Qilu (Cheeloo) Hospital has ranked number four to six in the Ranking of China's Hospital Science and Technology Influence issued by the Chinese Academy of Medical Sciences.

EMERGENCY MEDICINE

A FRONT-RUNNER IN CHINA'S EMERGENCY AND CRITICAL CARE MEDICINE

As one of the first emergency departments established in China, the Department of Emergency Medicine of Qilu Hospital has become a front-runner in emergency and critical care medicine in the country under the leadership of Professor Yuguo Chen, president of the ninth committee of Chinese Society of Emergency Medicine and president of Qilu Hospital. In 2019, it ranked third in China's Medical Specialties Ranking, and first in scientific research strength. Moreover, it is among the first in China to establish a complete disciplinary system incorporating several clinical subspecialties (emergency medicine, emergency surgery and poisoning) and research centers of basic medicine, translational medicine, clinical research and medical engineering. It has set an example for other Chinese hospitals to develop emergency and critical care medicine by forming a seamless treatment process including pre-hospital care, in-hospital emergency

care, ICU, emergency wards, and post-discharge follow-up. In 2002, it established the first Chest Pain Center in China, which has provided a green channel to save patients with acute chest pain by sticking to the principles of "early diagnosis, risk stratification, correct triage and scientific treatment". In the meantime, the department has been actively committed to applying the latest and advanced scientific achievements, as well as cutting-edge diagnosis and treatment concepts in clinical practice.

The department includes several units, such as pre-hospital and in-hospital care, outpatient service and inpatient ward, and scientific research, focusing on five key directions: acute chest pain (mainly acute cardiovascular diseases), cardiopulmonary cerebral resuscitation, critical illness, emergency trauma, and acute poisoning. It has taken the lead in making several guidelines, such as the *Expert Con-*

sensus on Emergency Diagnosis and Treatment of Acute Chest Pain and the Expert Consensus on Adult Extracorporeal Cardiopulmonary Resuscitation. It also initiated the Chinese Emergency Medicine Alliance, China Chest Pain Alliance, and China Cardiopulmonary Resuscitation Research Collaboration Network.

Over the years, the department has been doing clinical, basic, and translational research on chest pain—dominated acute and critical cardiovascular diseases, cardiac arrest and cardiopulmonary cerebral resuscitation, and organ function evaluation and protection. It first discovered that the acetaldehyde dehydrogenase 2 (ALDH2) rs671 mutation (with a carrying rate of 30% - 50% in Asian population) was positively correlated with the onset and prognosis of acute coronary syndrome (ACS) but negatively correlated with aortic aneurysm, revealing the underlying molecular mechanisms and

providing novel theories and targets for the prevention and treatment of acute and critical cardiovascular diseases. It has conducted cohort studies about precise risk assessment and prognostic prediction of ACS, and created a biomarker-based ischemia and bleeding risk assessment system targeting patients with acute cardiovascular diseases in China, involving health management and clinical decision-making with regard to acute cardiovascular diseases. Moreover, it has been leading the national epidemiological survey of cardiac arrest: the BASIC Registry, which is the first large-scale cardiac arrest registry system covering all provinces in China. A series of research results were published in *European Heart Journal*, *JAMA Cardiology*, and other academic journals.

REHABILITATION

CROSSING THE GULLY OF DYSFUNCTION LIGHTING UP LIFE OF THE DISABLED

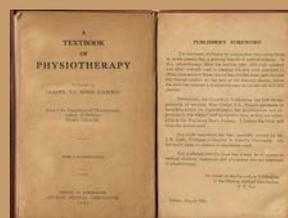
The Department of Physiotherapy of QLH was established in 1923. In 1935, V.L. Nunn, a physician of the department, wrote China's first monograph on physiotherapy. In 2000, after generations of efforts and exploration, the department was expanded into the comprehensive Rehabilitation Center. Its three-dimensional fast traction of lumbar spine, listed in multiple editions of several textbooks, is a world-leading technique integrating both Chinese and Western medical theo-

ries. The treatment parameters it put forward have been adopted by more than 1,000 hospitals. Furthermore, the center was the first in the world to report the therapy of balloon imaging combined with CT-guided botulinum toxin injection into the upper esophageal sphincter, benefiting patients with intractable dysphagia caused by cricopharyngeal achalasia. The department is dedicated to the rehabilitation of the injured, sick and disabled with system dysfunctions, helping them restore

quality of life. At present, it has distinctive sub-specialties such as neurological rehabilitation, orthopedic rehabilitation, spinal cord injury rehabilitation and pediatric rehabilitation.

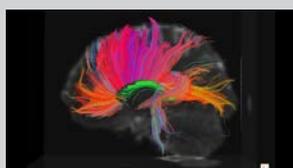
Professor Shouwei Yue, Director of the Rehabilitation Center, is now the chairman of the Chinese Society of Physical Medicine and Rehabilitation and vice chairman of the Chinese Association of Rehabilitation Medicine. The center drafted 20 clinical pathways for rehabilitation is-

sued by the NHC, edited three planned textbooks, oversaw the *Chinese Guide to Rehabilitation of Low Back Pain* compilation, and has undertaken 18 projects funded by the National Natural Science Foundation of China.



NEUROLOGY

THE CRADLE OF NEUROLOGICAL SCIENCES OF SHANDONG PROVINCE



Founded in 1958, the Department of Neurology at Qilu Hospital of Shandong University was the birthplace of neurology in the Shandong Province. It is also one of China's oldest teaching and research institutions in this field. The department was divided into the Department of Neurology and the Department of Neurosurgery in 1959.

The Department of Neurosurgery now ranks ninth nationwide in terms of comprehensive strength (China's Medical Specialties Ranking 2019). It provides diagnosis and treatment of all neurosurgical disorders across a wide range of sub-specialties, including brain tumors, intracranial and spinal

vascular diseases, functional neurosurgery, spinal and spinal cord surgery, mild and severe traumatic brain injuries, as well as pediatric neurosurgery. Tens of thousands of neuro-oncology surgeries have been performed since the establishment of the department, and to date it is among China's best neuro-oncology centers, in terms of quantity and quality. It is also one of the earliest institutes in the country to perform hybrid surgical procedures in patients with complicated cerebrovascular diseases, which significantly improve their survival rate and health-related quality of life. In addition, in 2008, the Department of Neurosurgery was one of the first in China to offer a standard neuroendoscopy training program, and more than 500 trainees across the country have completed the courses since then.

The Department of Neurology

has set up the neuropathology laboratory in 1985, conducting the diagnosis and molecular pathological analysis by biopsies from the brain, peripheral nerves, and muscles. The Department focuses on the precise diagnosis of neuroimmunology, neurodegeneration, genetic defects and dysmetabolism, and it investigates their molecular pathomechanisms. Renowned for one of the national key clinical specialties, the department has been leading nationally in fields such as epilepsy, Parkinson's disease and movement disorders, cerebrovascular diseases and rare neurological diseases.

The close collaborations of the Department of Neurology and the Department of Neurosurgery have been productive, enjoying a great reputation in China in cerebrovascular diseases, Parkinson's disease, and epilepsy. In 2015, the Qilu Brain

Project was launched. Since then, the departments have adapted a new pyramid-shaped research system, which defined five levels of brain research: interpretation, protection, simulation, manipulation, and reconstruction of brain function. Scientific breakthroughs have been made in understanding the molecular pathogenesis of glioblastoma and mechanisms underlying its progression. The findings are published in high-profile journals including *Brain*, *Autophagy*, *Neuro-Oncology*, and *Clinical Cancer Research*. Moreover, the departments also developed a computer-aided diagnosis system based on MRI for glioblastoma diagnosis and classification, as well as microfluidic chips with suited detection device for detecting glioblastoma-associated biomarkers in cerebral spinal fluid, both of which have already applied for patent from National Intellectual Property Administration.

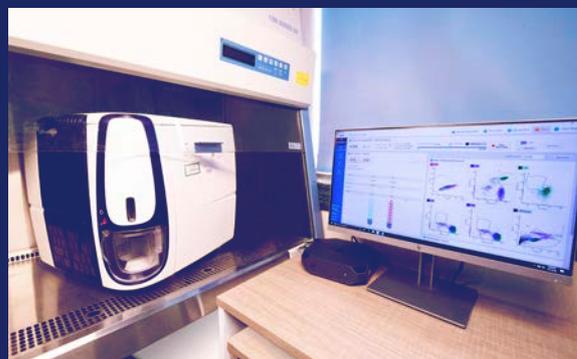
OBSTETRICS AND GYNECOLOGY

THE GUARDIAN OF WOMEN'S HEALTH

The department was among the country's earliest to offer a doctoral program in obstetrics and gynecology. The discipline was listed in the second batch of national key disciplines and the first batch of national key clinical specialties. Ranked in China's top 10, the team played a key role in editing the national-planned textbook *Obstetrics and Gynecology*, and in sponsoring *Progress in Obstetrics and Gynecology*, one of China's core journals.

The team consists of 120 obstetricians and gynecologists who specialize in gynecological oncology, general gynecology, family planning, perinatal medicine and reproductive medicine, with gynecological oncology being a national key discipline. Clinically, these physicians treat about 1,500 female patients with malignant tumors in primary management every year — the five-year survival rate for ovarian cancer recently reached 50%— which is one of the highest in the world. They have developed the *Diagnosis Criteria for Cervical Cancer*, the national health standard, for the NHC, and have led the development of several guidelines and expert consensus documents for the diagnosis and treatment of gynecologic oncology. It also established the world's first ultra-fast approach to identifying cervical lesions.

The focal points of team members' research include the pathogenesis, early diagnosis, and comprehensive therapy of gynecological tumors. They have suggested several innovative theories, such as "low-grade serous ovarian carcinoma originating from oviducts", which is included in national-planned textbooks on obstetrics and gynecology as well as guidelines for the diagnosis and treatment of gynecological tumors. In the last decade, team members have undertaken more than 100 national-level research projects, leading to over 200 international publications and 30 national invention patents.



HAEMATOLOGY

THE HUNTING OF PLATELET KILLER

Founded in 1959 by Maohong Zhang, a distinguished haematologist, the Department of Haematology at Qilu Hospital of Shandong University was ranked as top 10 nationally for seven consecutive years. It has a comprehensive system of subspecialties, including thrombosis and haemostasis, leukemia, erythrocyte diseases, lymphoma/myeloma, haematopoietic stem cell transplantation, and myelodysplastic syndrome. This department aims to become an internationally recognized, innovative medical center that integrates clinical care, scientific research, and intelligence training.

With a focus on primary immune thrombocytopenia (ITP) and acute myeloid leukemia, the Department of Haematology is currently Asia's largest and most renowned center for the research, diagnosis, and treatment of ITP. Professor Ming Hou has chaired the committee that drafted four editions of the Chinese ITP guidelines. The team has revealed the role of immune tolerance in the pathogenesis of ITP; developed a novel strategy, combining Rituximab with recombinant human Thrombopoietin (rhTPO) to treat corticosteroid-resistant/relapsed ITP; and conducted a clinical study to compare the effect of high doses of dexamethasone and prednisone in ITP patients, which has been the largest prospective clinical trial so far and has provided level I evidence for international guidelines. The team has also used rhTPO in pregnant ITP patients and has conducted clinical trials for refractory ITP by using low-dose decitabine. For the study of biological abnormality in leukemia, the Joint Laboratory of Intelligent Diagnosis and Treatment of Haematological Diseases, led by Professor Chunyan Ji, has developed an innovative system using genomics and big data analysis to predict primary drug-resistance molecular markers in acute myeloid leukemia.



The Clinical Laboratory of Qilu Hospital is a pioneer in this field in China. Laboratory Diagnostics, the first textbook of its kind, was published in 1921 by Fuxin Yu, an expert who developed the world-renowned Yu's Ring Test for syphilis diagnosis in 1935. As a National Key Clinical Specialty, it acts as a regional provider of medical services and basic training, and it plays an important role in editing textbooks of laboratory medicine and materials for standardized residents training.

The Department of Clinical Laboratory has studied non-invasive tests for tumor markers and its clinical practices since the 1990s. In recent years, by leveraging China's first batch of platforms such as the "High-Throughput Sequencing Platform for Tumor Diagnosis and Treatment," the department has made advances in screening and identification of molecular targets associated with malignant tumor development and progression. It also developed a detection technique that has been trademarked, which has been translated into clinical practice. It developed a standardized protocol to directly quantify circulating RNAs, and first reported the role of exosomal long noncoding RNA (lncRNA) HOTTIP in the diagnosis and prognosis of gastric cancer. In addition, it developed a novel kit for detecting serum-based exosomal miRNAs or lncRNAs in colorectal cancer. The department will continue to strive for progress in cancer diagnosis.

CLINICAL LABORATORY

THE EXPLORER OF ONCOGENES

So far, the hospital is playing a leading role in building the first regional medical centers at national level, and is dedicated to becoming a first-class research-oriented hospital that represents the nation's top healthcare capacities, supports regional medical development, and meets people's healthcare needs. By advancing medical sciences in China and beyond, QLH will make its own contributions to build a shared community of common health for all mankind.

Call to Apply for the Director of the NHC Key Laboratory of Otorhinolaryngology of China

Established in 1989 by former Shandong Medical University, the NHC Key Laboratory of Otorhinolaryngology is currently managed by Qilu Hospital of Shandong University. The 3,000m² laboratory is equipped with the best facilities of the nation to support studies in molecular biology and molecular epidemiology. Based on its abundant clinical resources, the laboratory has established the largest biobank of head and neck tumors in Shandong Province, providing clinical cases for basic and clinical translational research of head and neck tumors.

The laboratory is now recruiting for a director.
If you are interested, please email us at qlyyjsc@126.com or call +86-531- 82169026.

GASTROENTEROLOGY

EXPLORING FRONTIERS AND SERVING PATIENTS

Rated as one of the first national key clinical specialties, the Department of Gastroenterology has been at the forefront of this branch of medicine. In the field of confocal endomicroscopy, the department has established the diagnostic criteria for gastric cancer and precancerous lesions, dubbed the Qilu Criteria, which is the only technical standard named by a Chinese institution that has been adopted by the global endoscopy community. The team maintains close collaborative research relationships with industry to use endoscopic tools in the diagnosis and treatment of early gastrointestinal cancers, and it works toward the development and application of artificial intelligence diagnostic tools and robots for minimally invasive endoscopic surgery. These efforts, supported by the National Key Research and Development Program, have made important achievements, some of which are widely applied in primary hospitals. It leads the country in performing enteroscopy in patients with inflammatory bowel disease (IBD). It has established the country's first Center for Micro-ecology Research, Diagnosis and Treatment at the provincial level, and it has been given the approval to build a national IBD center for the region. It has also shed light on the neuro-immune-endocrine network underlying the abnormal brain-gut interactions in irritable bowel syndrome. The research was funded by the National Natural Science Foundation of China and published in academic journals such as *Gut*.