

PLOTTING AN INTEGRATED APPROACH

TOWARDS HEALTHY DEVELOPMENT

Integration underlines the development strategy of Peking University Health Science Center (PKUHSC), a well structured, multi-disciplinary, medical research and education institution offering comprehensive health services.

As Peking University (PKU) is striving to be a world-class university, an interdisciplinary programme, 'MedX' was established. It aims to integrate all academic resources relevant to health sciences, break down disciplinary silos, and promote the integration and innovative development of medicine, life sciences, chemistry, physics, information science, materials and engineering. "With medicine at the core, we want integrated development of multiple disciplines," said Zhan Qimin, president of PKUHSC and member of the Chinese Academy of Engineering.

In response to nationally essential medical needs, and the goal to be a world-class medical institution, PKUHSC has leveraged strengths of its various schools and others within PKU

to jointly build interdisciplinary programmes in emerging new fields, such as medical technology and biomedical engineering. It seeks to explore undiscovered aspects of medicine and to provide technological support to innovation in clinical and basic medicine, pharmaceutical sciences, public health, dentistry and nursing.

PKUHSC is also establishing novel research centres with new management systems. These include a drug discovery institute named after the Chinese Nobel laureate, Tu Youyou; a centre on medical technology and biomedical engineering; a precision medicine centre; a centre for data science in health and medicine, and a centre on smart medicine. With cross-disciplinary integration, multiple schools and disciplines would complement each other for coordinated innovation, leading to new techniques, methods, theories and knowledge.

Some of these centres are seeking scientists to take on directorships to make PKUHSC a premier medical centre in the world. ■



PKUHSC is equipped with advanced medical instrument, such as the da Vinci system, enabling minimally invasive robotic surgeries.

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SEEKING
researchers
of distinction

PKU, China's top research university, sees its mission in fostering future leaders, generating new ideas that advance human civilization, and producing cutting-edge science and technologies. In the spirit of excellence and free exploration, it has gathered a cohort of first-class scientists and innovators.

As the university approaches its 120-year anniversary, it focuses on building cross-disciplinary research clusters to encourage collaborative innovation. The first cluster

hiring project launched was under the 'MedX' programme. The latter seeks to train interdisciplinary innovators, address key clinical issues, and improve diagnosis and treatment by integrating clinical medicine with other relevant fields and leveraging PKU's multidisciplinary strengths.

The cluster hiring project seeks excellent scholars conducting basic research related to clinical questions, as well as clinicians interested in basic research. We invite renowned scholars and talented

young researchers with interdisciplinary backgrounds to apply.

For more information, please visit <http://xkb.pku.edu.cn/>.

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Hope through advanced reproductive medicine



Qiao and her colleagues have been working on advancing reproductive medicine technologies for 30 years.

Infertility rates are increasing, affecting more than 10% of reproductive-age women worldwide. Committed to developing novel techniques for infertility diagnosis and management, PKU's Qiao Jie has led a team working on the improvement of fertility preservation and restoration, bringing hope to prospective parents.

Qiao is the president of Peking University Third Hospital and leads its Center for Reproductive Medicine, one of the biggest in China. A pioneer of reproductive medicine, the centre focuses on complicated cases and in 1988 was the site of the birth of mainland China's first baby born via in vitro fertilization (IVF). It oversaw approximately 18,000 IVF cycles in 2016 alone, including many of the most difficult clinical cases.

With a focus on basic research and its clinical translation, Qiao's team profiled the transcriptome and DNA methylome of human preimplantation embryos and germ cells. Findings were published in *Cell*, *Nature*, and other leading journals, providing new insights into the mechanism of epigenetic regulation during

embryonic development. Based on these, an innovative preimplantation genetic diagnosis (PGD) method, 'mutated allele revealed by sequencing with aneuploidy and linkage analyses' (MARSALA), was established. Using next-generation sequencing with linkage analyses, it enabled simultaneous diagnosis of monogenic diseases and chromosome abnormalities.

More than 200 families have been diagnosed using MARSALA and, after early diagnoses, 26 healthy babies have been born. Qiao plans to use this technique to benefit more patients suffering monogenic disorders.

After long-term exploration of polycystic ovary syndrome, the most common endocrine disorder among women of reproductive age, Qiao's team has also established a metabolic forecasting model and developed diagnostic criteria of hirsutism applicable to Chinese women.

"I'm grateful to the strong support from the government and efforts of our staff and collaborators," said Qiao. "We will continue our exploration in reproductive medicine." ■

The Beijing Protocol: making more matches for leukaemia patients

For many leukaemia patients, a big obstacle to treatment is a lack of matched donors. Novel haploidentical transplantation approaches developed by PKU researchers have allowed almost every patient to find an appropriate donor.

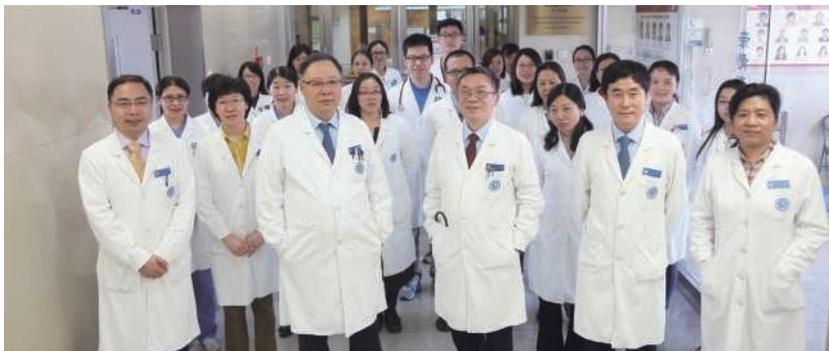
The success of haploidentical transplantation can be hindered by the host and donor T-cell response to allogeneic human leukocyte antigens (HLA), proteins central to the regulation of the immune system, which leads to high incidences of graft-versus-host disease (GVHD) and

apply G-CSF primed marrow and blood in haploidentical transplantation, significantly decreasing incidences of GVHD and graft rejection resulting from HLA mismatch.

Huang's group has also developed a new GVHD prevention regimen based on risk-stratification, improved donor lymphocyte infusion for the prevention and treatment of relapses, and modified the algorithm for donor selection. Their insights into the mechanisms of poor graft function fuelled the development of new therapeutic strategies. All these formed a new haploidentical transplantation system, called the 'Beijing Protocol'.

A shift from T-cell-depleted grafts to T-cell-replete marrow and/or peripheral blood allografts, the Beijing Protocol is easy to perform and achieves better outcomes in leukaemia treatment than using chemotherapy alone. For patients with acute leukaemia, myelodysplastic syndrome, or severe aplastic anaemia, its treatment outcome is comparable to that of grafts from HLA-matched sibling or unrelated donors.

The Beijing Protocol is now used in nearly all transplant centres in China, accounting for more than 99% of all haploidentical transplantations performed. A modified version is used in Japan, Korea, and certain transplant centres in Europe, achieving promising results. ■



Huang (centre first row) and his colleagues at Peking University Institute of Hematology are devoted to combating blood diseases.

graft rejection. Based on immune tolerance induced by granulocyte colony-stimulating factor (G-CSF), PKU professor Huang Xiaojun and his group were the first to