

# Championing innovations for public and environmental health

A Chinese pharmaceutical company is raising the bar for **PHARMACEUTICAL SAFETY AND EFFICACY**, while diversifying new research and shaping the industry ecosystem.

**Hailing from Chengdu, Sichuan Kelun Pharmaceutical Co., Ltd. (Kelun)** has differentiated itself as a fast-growing global pharmaceutical enterprise that reaches beyond its traditional stronghold of antibiotics, intravenous (IV) therapy and new drug development to take a broad approach to healthcare.

In a bold strategic move to reform the healthcare industry, Kelun launched the Klintner Center of Health Policy and Strategy Research to accelerate policy and technology research, talent training, and commercialization plus integrated research into diagnostics and treatments. Sir Alan Fersht, an Emeritus Professor in the Department of Chemistry at the University of Cambridge, was appointed the center's Overseas Honorary Director.

"This new beginning embodies our motto in upholding scientific and ethical standards, as with the rest of our growing business, that are all poised to transform China's healthcare industry," says Gexin Liu, Kelun's founding chairman.

## WATERTIGHT AGAINST SUPERBUGS

In 2010, Kelun established one of the most expansive antibiotics production facilities in the Economic Development Zone of Khorgos in Xinjiang province. This facility houses a production line of erythromycin, a production line of penicillin, and one of cephalosporin intermediates. These are mainstays of Kelun's business and traditionally have been used for many types of bacterial infections.

Building on its manufacturing experience, Kelun has set industry precedents in China for its treatment of antibiotic fermentation residues, which is essential for extracting bioactive compounds from microorganisms on a large scale. Antibiotic resistance is a global problem and so treatment for residues from antibiotic fermentation is an important research area.

The Kelun team also has an interest in efficient removal of residual antibiotics, antibiotics resistance genes, as well as other antibiotic-resistant

bacteria. Some antibiotic products can be repurposed after decontamination, for example, a biproduct of erythromycin, Erythromycin mycelial dreg (EMD), can be used as a nutrient source once potential contaminants have been removed. The residual nutrients, such as protein content, were maintained—following a decontaminating process that uses ionizing radiation—highlighting its potential for recycling and so achieving a circular economy.

Other aspects of particle removal were also studied using heat-activated persulfate oxidation conditioning, which can effectively reduce moisture content. This helps with production of fertilizers.

"We are committed to overcoming health and

environmental challenges posed by antibiotic resistance, as well as also being all set for the zero discharge of wastewater," says Sichuan Liu, general manager of Kelun. "We are the first in the antibiotic industry in China to introduce equipment for mechanical vapour recompression, an energy recovery process to recycle waste heat to improve efficiency, as well as a pall disc tube module system, a membrane to ensure molecular and ionic separation of aqueous pollutant."

## INDUSTRIALIZATION FOR PACKAGING OF IV SOLUTIONS

This spirit of innovation has been extended to new ideas for container bags of IV solutions, another pillar of Kelun's business. Essential for many hospitalized patients, IV therapy helps

deliver fluids, medications, and nutrients.

The container bag, the collapsible Uniflex PP-bag designed by Kelun is safer in avoiding secondary pollutants: it receives a leakage complaint rate of within 0.02ppm, 15,000 times lower than the industry average of non-PVC IV bags. It is also more cost-effective in production and, in turn, reduces medical costs for the public. Developed over four years at a cost of RMB 50 million, including intellectual property rights, the new IV bag is made of medical polypropylene pellets. The winner of several science and technology awards, the bag is now exported to more than 40 countries and regions.

"Having achieved a chemically stable, odourless, and non-toxic composition after incineration, we have reduced the heat sealing

temperature of 12°C and heat transfer of 11°C for our packaging bags, to produce a greener manufacturing process," says Sichuan Liu.

Liu has also cited other challenges such as ensuring supply of local materials and technologies, especially in the face of the current pandemic. This includes consistently delivering the three-chamber parenteral nutrition bags, that contain a fat emulsion of amino acids and glucose, which remain in steady supply for hospitals across China and ready for export to Southeast Asian countries.

## TOWARDS A GREEN AND HEALTHY FUTURE

New drug development constitutes another key business area for Kelun. There are more

than 80 new drug investigations, with 14 submitted to the Center for Drug Evaluation (CDE) of the China National Medical Products Administration for Investigational New Drug applications, as well as 13 undergoing clinical studies.

One potential cancer drug under investigation is an antibody-drug conjugate, composed of a monoclonal antibody targeting human epidermal growth factor receptor 2, a tyrosine kinase receptor overexpressed by many cancer cell types. Early results were released at the American Society of Clinical Oncology meeting in June 2021.

"Throughout the R&D of biologics and chemical drugs, we want to maintain an atomic economy by keeping the conversion efficiency of chemical

processes free of wastes and by-products," says Liu. They have addressed environmental concerns that range from a green design for cell-culture bioreactors to the replacement of harmful reagents in molecular cloning experiments.

"From 2013 to 2020, our cumulative R&D investment has exceeded RMB 6.7 billion. This has supported our 2,000-strong R&D team in advancing medical technologies, as well as our mission to bring health and happiness back to millions of patients and their families in China and beyond," says Liu. ■



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With its recent growth, Kelun now has a 2,000-strong R&D team in advancing medical technologies.



With a strength in innovation built up over time, Kelun Pharmaceutical was selected as sixth in the Top 10 List of 2020 China Big Pharma Enterprise Innovation.



An important emerging area for Kelun is the efficient removal of residual antibiotics, with some antibiotic products able to be repurposed after decontamination.