KING'S College LONDON

Haier Biomedical
Intelligent Protection of Life Science

# Case study

## Future-proofing $LN_2$ cryogenic storage at the Rayne Institute

**The Rayne Institute at King's College London is home to multiple clinical and laboratory research groups working at the forefront of haematology research and advanced therapies. Several departments at the institute – including the Department of Haematology, the Haematology Biobank and the Gene Therapy Vector Facility (GTVF) – depend on secure long-term cryogenic storage to preserve thousands of biological samples, which are essential to both translational research and the development of new cell and gene therapies. When the institute's liquid nitrogen ($LN_2$) storage infrastructure began to show signs of ageing, the team launched a major project to modernise the facility. The Rayne Institute worked with Haier Biomedical to upgrade its cryogenic infrastructure with the aim of improving safety, increasing storage capacity and reducing $LN_2$ consumption across the site.**


## THE RAYNE INSTITUTE'S NEEDS:

- **Replace ageing equipment with modern cryogenic infrastructure**
- **Expand $LN_2$ sample storage capacity**
- **Ensure reliable $LN_2$ supply and automated filling across multiple storage tanks**
- **Improve ventilation and oxygen monitoring**
- **Reduce $LN_2$ consumption across the facility**
- **Integrate new infrastructure with existing third-party storage equipment**
- **Secure temporary storage solutions to protect valuable samples during installation**

"One of our biggest concerns was integrating new infrastructure with existing equipment, which the team at Haier Biomedical managed extremely well."

*Thomas Seidl, Technical Manager, Rayne Institute*

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## Translational research and advanced therapies

The Rayne Institute's cryogenic storage facility is used by several groups with varying requirements. The Department of Haematology conducts translational research closely linked to clinical care at King's College Hospital, and many projects depend on patient samples collected through the Haematology Biobank, where donated blood and bone marrow samples are processed and stored before being made available for research. Researchers may also store cell lines and other experimental materials used in laboratory studies. In addition, the GTVF stores plasmids, viral vectors and master cell lines, some of which have a significant financial investment and years of development. It also operates according to current good manufacturing practices (cGMP) guidelines, under MHRA licence, to manufacture viral vectors used in cell and gene therapy trials.

## Preparing the facility for an increase in demand

The original cryogenic facility was installed in 2009 and, after more than a decade of continuous use, the equipment was approaching the end of its life. There was also increasing demand for storage capacity for patient samples and other materials due to growth across several departments. What started as a plan to replace storage tanks turned into a full facility upgrade to secure the next 15 years of operation, including new cryogenic storage equipment, improvements to ventilation and oxygen monitoring systems, and upgraded $LN_2$ delivery infrastructure with automated filling.


## Managing complex installation

The upgrade was carried out through a formal tender process, with suppliers invited to assess the facility and propose solutions that could meet the institute's technical requirements. Protecting valuable materials during installation was a critical concern, as thousands of research and manufacturing samples required safe storage throughout the refurbishment. Thomas Seidl, Technical Manager at the Rayne Institute, explained: "We had to temporarily relocate some items during the project, including moving tanks within the building, storing materials in external containers, and even transferring some samples to another licensed facility. These solutions were organised by Haier Biomedical and worked very well, ensuring our samples remained safely protected throughout the installation."

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## Integrating new and existing equipment

The Rayne Institute facility had cryogenic storage equipment from several different manufacturers, many of which needed to remain in continuous operation. Thomas commented: "One of our biggest concerns was integrating new infrastructure with the equipment already in the room. Haier Biomedical worked closely with the institute to design the new layout, ensuring the new units would fit around our existing kit." This design ensured that the new cryogenic infrastructure – storage units, oxygen monitoring instruments and ventilation systems – could operate alongside existing third-party equipment within a single $LN_2$ delivery system. "The Haier Biomedical team provided valuable technical support and worked closely with us during the planning stages to ensure the new infrastructure met our requirements."

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## Early improvements in efficiency and safety

One of the key objectives of the upgrade was to reduce $LN_2$ consumption, as the previous system consumed approximately 2,200 litres of $LN_2$ per week. "We specified that we wanted to reduce the $LN_2$ consumption to around 1,200 to 1,500 litres per week, and early monitoring suggests that we're now operating below that," Thomas added. Safety improvements have also been achieved, as well as the elimination of false system alerts. "One of the other goals was to reduce nuisance alarms during filling operations, and there haven't been any since installation." The project also expanded storage capacity for both the biobank and research groups, enabling the Rayne Institute to accommodate future growth.

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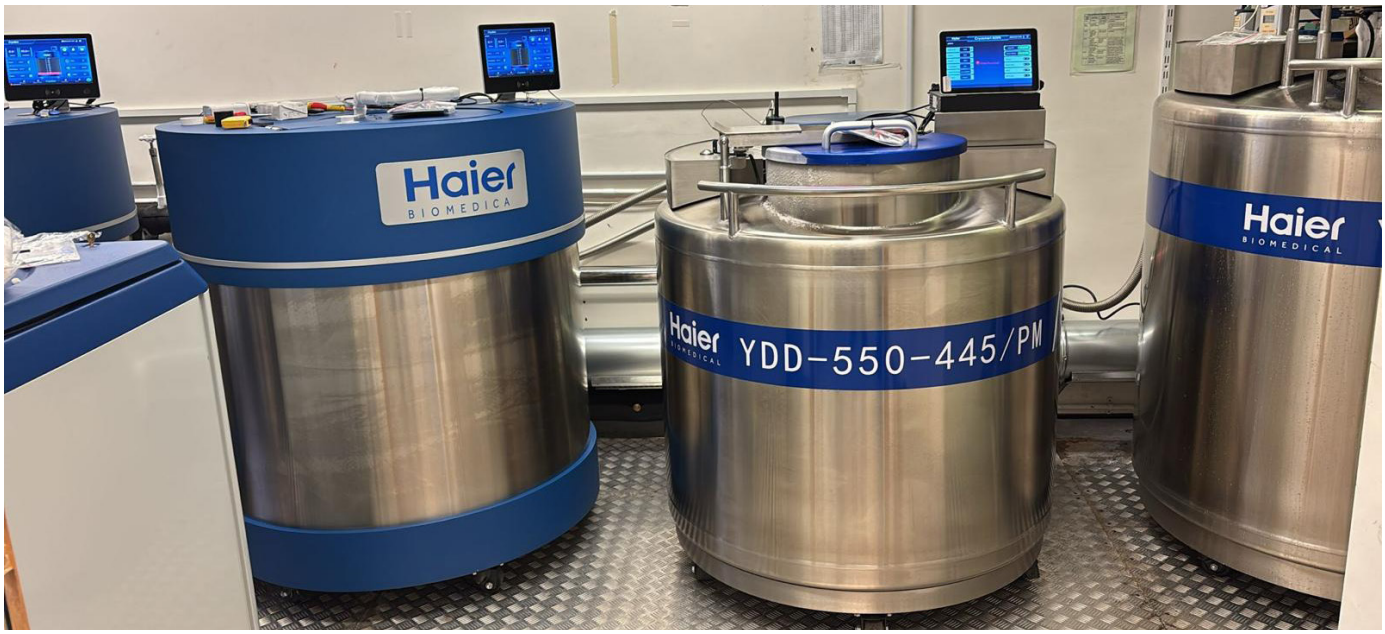

# Future-proofing $LN_2$ cryogenic storage at the Rayne Institute

## Conclusion

The upgraded cryogenic solution provides a modern, efficient storage environment for the Rayne Institute's research and clinical programmes. By replacing ageing infrastructure and increasing storage capacity, the project has ensured that valuable biological samples can be preserved safely for teams working across translational haematology research, biobanking, and cell and gene therapy manufacturing. The improved efficiency, enhanced safety and expanded capacity of the upgraded facility will help the Rayne Institute to conduct its pioneering research and enable the discovery of novel advanced therapies.

## PROJECT OUTCOMES

- **Modernised $LN_2$ cryogenic storage infrastructure for a shared research facility**
- **Reduced $LN_2$ consumption across the facility**
- **Expanded storage capacity for biobank and research sample collections**
- **Improved ventilation and elimination of nuisance oxygen alarms**
- **Successful integration of new and existing cryogenic storage equipment**
- **Secure temporary storage solutions protected valuable samples during installation**
- **50% reduction in $LN_2$ consumption compared to the previous set up**



View our liquid nitrogen storage solutions here:

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