Strategic Collaboration

Children's Mercy Research Institute

Kansas City

BSA

Strategic Collaboration

Collaborative design principles have come to fruition in the Children's Mercy Research Institute (CMRI) lab spaces in Kansas City, Missouri.

With clinical pharmacology and genomics as its two areas of emphasis, the lab spaces within CMRI are woven into the fabric of the facility's overall design to maximize collaboration between these pediatric research specialties and to fulfill the hospital's goal towards creating the translational research program and spaces.

BSA LifeStructures met with researchers and directors from the project's inception onward to understand and manifest their need for a fluent, cohesive building layout to enable efficient, effective collaboration. The result is a nine-story, 375,000-square-foot structure in the heart of downtown Kansas City that offers an integrated research environment.

The structure's glass curtain wall system – the outer, non-structural covering of the building – has been designed to spur energy efficiency via a strikingly beautiful and research-centric design.

Floor two of CMRI features dry lab space and a maker space where 3D printing, electrical work, and light-duty woodworking occur. Two centers of excellence occur in the dry labs on floor two: 1) informatics (computational work, dissecting data and modeling images and diagrams to understand in 3D how diseases are progressing); and 2) population health research (studying strategies and their health outcomes, regionally and globally).

Open offices and collaborative space surround the dry labs, offering researchers an efficient, equidistant number of steps to access these spaces, no matter where their specific lab is situated. BSA started to explore ways that we could lay out the lab floors and create these organic and informal lab and meeting spaces. These spaces were just outside the labs to help bridge and bring the different scientific neighborhoods together.

Children's Mercy Research Institute offers the largest and most comprehensive pediatric clinical pharmacology program in North America. Floors three, four, and seven are comprised solely of wet lab space and additional specialty spaces, e.g., cGMP, BSL 3, mass spec rooms. Clinical pharmacology and genomics are two specialties that are strategically co-located on the third floor to maximize collaboration and to develop right-size treatments for specific genome mutations in children. Wet benching and a mass spectrometer space that analyzes complex samples with sensitivity, selectivity, and speed are found here. In the genomics spaces, researchers are isolating DNA, examining tissue culture, and sequencing DNA to uncover mutations, diagnose diseases, and working in tandem with clinical pharmacologists to create treatments that are personalized to the patient.

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1. Maker space where 3D printing, electrical work, and light-duty wood-working occurs.
2. Sequencing room with views from both the lab and corridors.
3. Researcher's workstations adjacent to the lab allows them to stay part of the research while completing focused work nearby.
4. Centrally located equipment spaces allow for improved adjacencies and utilization.
5. The dry labs exemplify thoughtful design in the custom vinyl wall coverings illustrating research specific to tumor suppressor gene abnormalities found at Children's Mercy.
6. The mass spec room was designed hand in hand with researchers to creatively integrate utilities while keeping noise levels down and maintaining accessibility to equipment.

CMRI's GOLDILOKs® (**G**enomic and **O**ntogeny-**L**inked **D**ose **I**ndividualization and c**L**inical **O**ptimization for **K**id**S**) program is headquartered on the third floor. Supported by the National Institutes of Health, it is precision medicine for children with complex medication-related issues.

"We are all working towards a common goal of discovering the cures, treatments, and devices that will help the kids who are in our care," said CMRI Senior Director of Research Development Kieran Pemberton, Ph.D. "We wanted to move away from the old-style, closed-off research laboratory concept. The new design is focused on collaboration," he added. "Ideas will be shared, and discussions will take place between groups throughout the labs and in all of the collaboration spaces."

Each CMRI lab is purposefully lined with windows to allow for a floor-to-ceiling abundance of natural light. Many lab spaces are located around the floors' perimeters for this reason and enhancement of the collaboration theme between wet and dry labs. Each lab's storefront is rated with two-hour fire separation; each glass wall contains maximum glazing that connects it to interior workspaces for heightened high-rise safety.

Benching in the labs is mobile to enable reconfiguration of the spaces as needed. Utilities located in the ceilings further promote flexible reconfiguration.

Science on display abounds in the CMRI labs. Guests of the CMRI may be invited to tour the floors' perimeters and observe what is transpiring within the lab spaces without entering the sterile lab environments.

Throughout the building, investigators are immersed in light that filters through the DNA code designed into the building's facade. Bright and reflective surfaces create an uplifting environment while intentionally placed pops of color highlight areas for collaboration.

The labs have a unique “horseshoe design,” wrapping around common support spaces, freezer farms, tissue culture rooms, and wet fume areas. The shape allows for ample natural light and provides adjacent connections to the spaces, thus reducing the distance for researcher access. BSA’s design of a singular liquid storage area, one autoclave, and other centrally located and shared resources promote collaboration amongst researchers. An orbital design flow enables researchers to benefit from the natural connectedness that occurs as individuals share thoughts and ideas while encircling the nucleus of shared resources.

A unique thing of the Children’s Mercy Research Institute is how it’s strategically positioned on the campus. We’re able to provide translational research from the bench to bedside and back again. Floors one through five of the pediatric research institute facility align and connect to existing floors of the Children’s Mercy Adele Hall Campus to the south. Floor one of CMRI also connects to the existing Children’s Mercy medical office building.

Centrally located on the fourth floor are cGMP cell processing suites where patient T cells that were extracted from the patient via apheresis in the nearby outpatient clinic are transformed into CAR T-cells designed to attack the patient’s cancer cells and transferred back into the patient via infusion performed in the outpatient clinic. The cell processing suite includes three cell processing rooms and one vector production room. The suite was designed for efficient flow of personnel, materials, product and quality control samples reducing the cost and turn-around time from apheresis to infusion. An adjacent BSL-3 lab is available for any researchers in the building.

Two floors directly below and adjacent to CMRI is the outpatient cancer clinic where these cells are needed. The design of the cGMP lab near the clinic supports quick, easy, and sterile transport of the T-cells to clinic patients.

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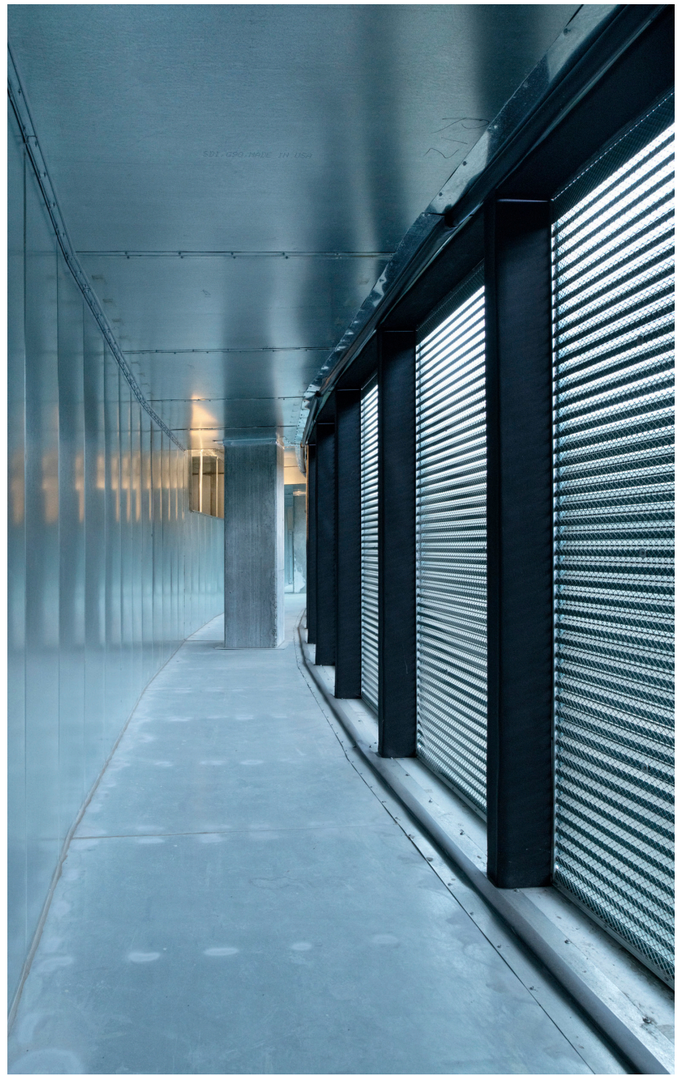

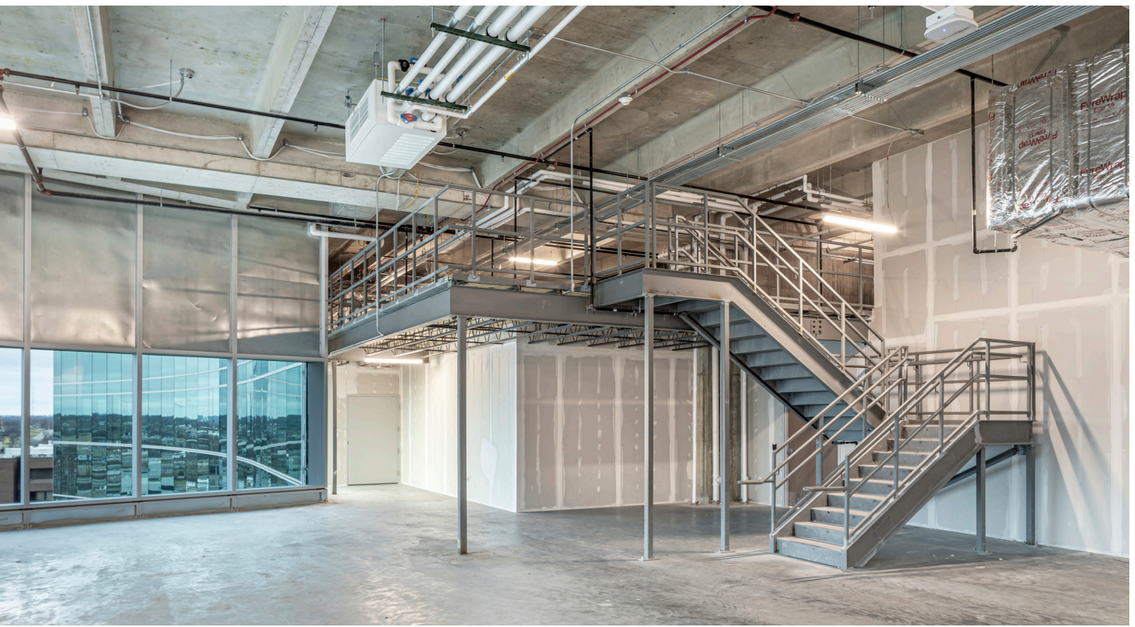

While floor six hosts specialty labs and shell space for future growth, CMRI's massive mechanical systems are all located on floor five. The various building systems, inside and out, have been designed and engineered to achieve maximum energy efficiency for the client throughout the life cycle of the building.

In collaboration with the MEP engineer, Brack & Associates added two 1,000-ton, magnetic-drive centrifugal chillers to the owner's cooling system that are newer technology. Each operates at about 15 percent higher efficiency than a conventional centrifugal chiller. Instead of needing bearings, the new chillers are designed with a magnetic shaft.

A heat recovery system with a run-around loop that's able to recover some 40 percent of the heating or cooling that would typically be lost in a traditional, single-pass laboratory mechanical system is another energy efficient facet of Children's Mercy Research Institute's design.

Mechanical integration was a key component since the eighth and ninth floors are shell space. The design team knew that eventually more mechanical equipment was going to be added to the fifth floor. In this instance, the curtain wall system, in certain sections on the fifth and sixth floor, is modular and can be removed. This can accommodate flying in another air handler unit or larger heavy equipment for researchers. Instead of having to dismantle the pieces of equipment and making it a cumbersome process, this easy access point is a more efficient way.

Another piece of collaboration amongst the design team on the fifth floor was the "racetrack". This track creates a tunnel both horizontally and vertically to move in future equipment and have parking space for those pieces of equipment to tie in.

Access to the lab spaces was important as well. Creating equipment mezzanines allows for access into specialized and highly clean spaces without actually having to get in them.

The air valves, access to lighting, and everything up above the actual lab enables the facilities crews and the engineering team to service the labs without having to go into these ultra clean facilities.

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- Kieran Pemberton, Ph.D.,
CMRI Senior Director of Research Development

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BSA LifeStructures is an integrated design firm creating inspired solutions that improve lives through architecture, engineering, interior design, and planning services. With national expertise and regional leadership, BSA designs LifeStructures – innovative and inviting spaces that not only house the activities of healing, learning, and discovery but actually contribute to them – in order to make a difference for our clients and communities. As such, a LifeStructure is purposeful, a LifeStructure inspires, a LifeStructure delights and a LifeStructure improves lives.

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