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Cell Wars

Building a Base for Commanders in the Final Battle Against Cancer

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Major discoveries have been made in the detection and treatment of cancer. Also, improvements have been made in the comfort of patients undergoing current treatments. But what is the future of cancer treatment?

Research into molecular biology, particularly immunology research, holds the answer to the question of how our body fights diseases. Architects provide the place where this research will happen. In the spring of 1996 we began design of the Baylor Institute for Immunology Research (BIIR), a facility directed by Jacques Banchereau.

A brilliant scientist and visionary director, Dr. Banchereau gave us an exacting program and demanded a lab incorporating the latest technology while also being a delightful and beautiful place to work. Modular planning was used in the layout, with flexibility and accessibility being paramount requirements of this highly complex building type. The finished building is a two-story, 45,000-square-foot structure that addresses the visual aspect of its location within the confines of a historical district. The interior finishout reflects the desire of the director that the laboratories be contemporary.

The key objective of the research at BIIR is to define the potential of dendritic cells as they relate to cancer. Dendritic cells are the commanders of the immune system. The first patient is now receiving injections of these cells, giving credence to the idea that cancer, in the foreseeable future, may be a disease of the past.

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At the recent AIA National Convention in Dallas, I ran into an old classmate of mine. He was with his wife, and I had not seen them since we had attended our architecture class reunion some six years before. We hugged and began immediately catching up on our lives since our last visit. As I filled them in on the latest goings on with my daughter who is graduating from college next year, I could see that Shirley had tears forming in her eyes. She looked away and with difficulty told me that their older daughter had died just before Christmas of breast cancer, leaving two children, two and five years of age. It was a tragic story, one that we encounter much too often. Another dear friend of mine has just recently had surgery for colon cancer, and an officer within the Baylor Health Care System, with whom I work, has been diagnosed with lung cancer. In 1999, cancer remains a very real threat-our number two killer.

Major discoveries have been made in the detection and treatment of cancer. Many types are now treatable through chemotherapy and radiation. Bone marrow transplants hold the possibility of a permanent cure for those detected in time. Even with many ancillary drugs to help in the process, it is still a harrowing and horrendous treatment-not always successful-and for those not detected in time, ineffective. Death is an all too real possibility, as was the case with my classmate's daughter.

Major improvements have been made in the comfort of patients currently undergoing available procedures. Outpatient cancer centers are now attractive, light-filled spaces with landscaped gardens and infusion areas offering TVs, VCRs, and other diverting amenities. Along with sickness-reducing drugs and prostheses for an attractive appearance, not to mention the patient education programs and support groups, patients today have an altogether better forecast for their therapy and recovery. What is the future of cancer treatment? What possibilities will be open to the cancer patients of tomorrow? For the answers we must look to research-research into molecular biology and, in particular, immunology research. Research, we hope, will someday make cancer a disease of the past-much like polio, which was a major concern when many of us were children. Today it is of little consequence.

Molecular biology, which was born some 60 years ago, has grown on a parabolic curve to become a major force in medical investigation. Already, some of the most optimistic fantasies of

early biologists have come about; now we stand on the threshold of an explosion of knowledge and new treatments. Scientists today have gone far beyond the finding of better treatments and are trying to decipher nature's secrets of disease. This has led to investigation into the way healthy living systems work. What is normal? How does the body protect itself against disease? How is disease detected and, once present, how is it readily fought off? What is the nature of our body's ongoing fight?

While it is for the research scientists to find the answers to these questions, it is for us the architects to provide the place where those answers will be found. As we have created locales where cancer treatment is better and more patient focused, so we can create laboratory facilities where the scientists are buoyed and inspired by their surroundings, where scientific research is facilitated, and where interaction among scientists is encouraged.

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In the early spring of 1996, our office was asked by Baylor University Medical Center to do a feasibility study of all options open to housing an immunology research laboratory to be directed by a scientist coming to Baylor from Lyon, France.

Our early investigation involved the conversion of an existing four-story building. But when Jacques Banchereau arrived from France, this would change. We quickly realized in our first meeting with Dr. Banchereau that we were working with an internationally recognized leader in the science of immunology, a man who had a clear and ambitious vision for the program he wanted to bring about at Baylor. At that first meeting he wore a bright multicolored silk shirt which looked for all the world like a poster for a circus. He had with him a one-page outline for the program he envisioned, a page to which we referred many times over the next years. The first entry on the page was "Dendritic cell biology." We had no idea what "dendritic cell" might refer to, but we were to learn. The page laid out the phased development of a program that would ultimately include nine major areas of laboratory research led by nine scientific investigators along with their postdoctoral researchers and other assistants. Also mentioned were the general shared facilities that the program would entail and the offices, conference rooms, and other support areas needed.

It was clear that we were involved with a brilliant, articulate, somewhat mercurial client. A client who was as interested in art and architecture, in food and wine, as he was in science. One who communicated clearly, had a disarming sense of humor, and was in no way afraid of confrontation-be it a disease in the lab or obstacles to his vision for the lab.

Early on, he announced that the building must not look like the other Baylor buildings. He did not like the ubiquitous Baylor yellow brick. He envisioned a granite building. When told that this kind of deviation from the status quo would require approval from the CEO, he simply asked, "When can I meet with him?" Two days later, the meeting had been held and Banchereau had emerged with his approval for a granite building.

Although he usually showed up impeccably attired in the finest French suits, it was that circus poster shirt that became my lasting image of him. Working with Jacques was like working in a three-ring circus-a thoroughly delightful and awe-inspiring circus located right on the cutting edge. Our plans for the conversion of the existing building were quickly abandoned as hopelessly confining and impossibly inflexible. The search was on for a site for a new building. Baylor is located in an older historical area of Dallas where a grid pattern of many very small blocks dominates. Baylor owned most of four adjoining blocks, but two cross streets would have to be abandoned and one holdout piece of land

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purchased. The process to get this done was set in motion, and the planning of the new laboratory began in earnest.

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There were four-and-one-half acres in the assembled site, more than were needed for the immediate phases of the project. So, the site was planned to include a future twin building. This ability to provide for future expansion, so desirable for projects of this kind, was just one of the plusses that the site offered: large existing trees and a view to the north of a lovely old city park were others.

Figure 1: The lab building viewed from the garden.

The detailed designing of the lab building itself demanded our full attention and talents. In my case, I was able to call on my experiences over the years of my career of working on a half-dozen large lab buildings. As any architect who has done this building type knows, flexibility of layout, accessibility to electrical and mechanical systems, and all the many other technical requirements of labs become paramount. Once a lab research project has concluded, conversion of the lab for a different type of research must be quick, easy, and cost-effective. At one point in our delving into systems for the building, the providing of interstitial floors to accomplish this was considered, but it was abandoned as a too-costly overkill. Extra high floor-to-floor heights of 16 feet were chosen to provide plenty of plenum space for ducts, piping, conduits, cables, etc., above the 9-foot-6-inch ceilings. The building was elevated four feet above the site to provide a six-foot under-floor crawl space and give insurance against the flooding that is an ever-present problem in this area of Dallas.

Figure 2: A typical laboratory.

Dr. Banchereau insisted that all the labs have windows for natural light and views. He chided us, saying that architects believed that scientists all hate windows. He assured us it was a rumor and the rumor was totally untrue. For efficiency, and to avoid duplications of equipment, he wanted an area in the center in which to locate shared equipment and facilities. Because of the lack of it in his old lab in Lyon, he constantly emphasized his desire to use the layout of the building to encourage, almost force, the interaction of the scientists with each other. In addition to the central shared area and the formal conference rooms, he wanted several nooks, alcoves, and incidental spaces scattered about the building for just such accidental meetings. He wanted a garden where scientists could walk, talk, and eat

together. When we advised him that the climate of Dallas is hot and cold enough at times to prevent this, he agreed that an air-conditioned break room overlooking the garden would be a good idea. While we were at it, a library housing the many scientific journals he subscribed to was a longtime dream of his and it, too, should overlook the garden.

Figure 3: The garden.

The plan that began emerging was based partially on our longtime experience and general knowledge of lab buildings, and partially on Dr. Banchereau's vision of the future of research.

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The five-foot-wide counters that would be in all labs and the five-foot-wide aisle between them set the module for the project: 5 feet x 5 feet. This module would be used to facilitate the design of every element of the building, and in the future it will be a valuable tool in reconfiguring the labs. We were amazed at how quickly Jacques grasped this grid system that we superimposed on the plans. He was able to immediately relate it to his more accustomed metric measurement, and while working on the detailed layout of the laboratories, we would hear him counting modules under his breath: un, deux, trois, quatre, cinq. If he hadn't become a world leader in molecular biology, he might have made a brilliant French architect.

Figure 4: First Floor Plan.

The five-foot grid led to a structural bay size of 30' x 30' and a rectangular footprint that was seven bays long by four bays deep. This footprint was then duplicated to form a second floor in order to efficiently house the entire program of 45,000 square feet.

Figure 5: Second Floor Plan.

To ensure the natural light and views that Jacques had demanded for all labs, they were located in the perimeter bays. This allowed the shared facilities to be located in the 10 central bays where they would be easily accessible from all the labs. A simple loop corridor provided circulation on each floor and interfaced at opposite corners of the building with the glass-walled light-filled monumental stairways that connect the floors. The stairways are one of the major successes of the finished building: constantly in use as vertical circulation but equally in use as a place to touch base with a fellow worker. Likewise, the landings and the space below the landings are popular as a stop-and-talk-a-minute place. While in the building, I have yet to see anyone take the nearby elevator.

Figure 6 and Figure 7: The stairway and stairway detail.

Carl Sagan tells us that the entire universe is going from less

complex to more complex-a frightening concept from which I draw a strange kind of solace. During my architectural career, I have seen all buildings become more and more complex, and certainly laboratory buildings fall in that category. Building systems and equipment, technical requirements, codes, ordinances and legal matters-virtually any aspect of building that one cares to name-have expanded in scope and detail in the last few decades. Frustrated with the progress of planning the lab, I sat down one morning and began typing into my computer a list of all the entities (client representatives, governing agencies, professional associates, consultants, etc.) that had to be satisfied in doing this project. I stopped in a few minutes as I had already passed 50 names; at least 20 more were in my mind. The final number could be over 200.

Just in the area of associates and consultants that we had called in to help us in the process, the list was long: Landscape Architect, Structural Engineer, Mechanical/Electrical Engineer, Civil Engineer, Interior Designer, Graphics Designer, Specifications Writer, Equipment Consultant, Security Consultant, Telecommunications Consultant, Computer Consultant, Parking Consultant, Laboratory Design Consultant, Animal Room Consultant, even a consultant who facilitated City of Dallas zoning and permit approval-the list goes on.

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Because of the immense complexity of even a relatively small project such as our lab, many people are involved, each representing an area of concern that must be taken into account in arriving at a good and appropriate solution to the problem at hand.

Looking back over the last three years, it is a marvel that we have moved from a false start to a finished functioning building that is now housing important research. Many of the people involved understood the process and worked together as a valued member of the team. The project could never have been done without their contribution. But teams, being made up of people, are living things-they ebb and flow. Setbacks and disappointments are going to happen. We found we had hired a civil engineer who was dubbed by his own office as a "flake." Sadly, our mechanical engineer, a young man, died quite unexpectedly in the middle of the job. But kept ever excited by the challenge of the project at hand and confident that the process would guide us, we honored the process and let it lead us inevitably to a good conclusion.

During the three years of working with the scientists, we became aware that their scientific process, the scientific method, is not so different from our architectural one, albeit somewhat reversed. They are looking to find the key to a complex already-built thing-the human body-while we are looking to find the key that will help us to create a complex new thing-the building. They have their cellular approach-the dendritic cell; we have our modular approach-the five-foot grid. They are looking for commanders of systems, while we are imposing systems that control our plans. Important to our working relationship with them is the fact that they understand process and the value of depending on process to see them through. Also, they understand setbacks-what looked promising may lead to a dead end. They understand that all this takes time-Rome wasn't built in a day; cancer isn't cured overnight. Le Corbusier said, "Creation is a patient search." He could have been talking about research if he had said, "Discovery is a patient search." In working with Jacques, there were occasions when his enthusiasm was so great that he simply could not stay seated and would jump about the room as we talked about the plans. But he also had great patience—a trait much needed in the long hours of planning such a complex building, a trait he must have learned from all those hours of looking into a microscope.

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Dr. Banchereau's mind seems very focused on leading us into the future; apparently he doesn't dwell very much on the past. Coming from a country steeped in history, he is not interested in reproducing it. Our first elevations of the exterior of the building were uncompromisingly contemporary: more Alvar Aalto than Paladio. He loved them. But a call to be more contextual with the nearby historical structures and more in compliance with the guidelines given in our planned development zoning ordinance for our historical district led us to a more traditional exterior with scale and proportions of the period. We already had in our favor the earlier decision to use granite for the facing-a material that architects have embraced from earliest times, one of the few materials that can truly be called timeless.

Jacques drew the style line precisely at the front door. He was willing to bow to the 19th century on the outside, but the inside was his. It would be 21st century, cutting-edge modern-absolutement! Our job as architects was to avoid a completely schizophrenic building. To mitigate, we made use of some contemporary details (flush glazing) within the traditional framework of the exterior, and used some highly updated traditional forms (groined vaults and coffered ceilings) in the interior. The coffered ceiling in the lobby is lighted by the latest technology in low-voltage exposed cable lighting, hopefully a successful blending of old and new.

Figure 8: The Entry Lobby.

If public acceptance is any judge, it is a big hit-we have yet to hear an unfavorable comment; many good ones have come our way.

"A key objective of the Baylor Institute for Immunology Research is to establish and define the potential therapeutic use of dendritic cells as vaccines in various diseases, with an emphasis on cancer. Dendritic cells are made in the bone marrow and act as directors or commanders of the immune system." This quote is from the brochure that was given to us at the recent grand opening of the building. Dendritic cells had been talked about for all the three-plus years we had worked on this project. They had been mentioned on that one-page outline that Jacques gave us back in the beginning. Did I know yet what they were? Maybe not everything, but I did know more. They were commanders, and that was a concept I could grasp.

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While looking at the brochure, I remembered the day we asked Jacques if he was interested in going with us to the stone dealer in Dallas who was going to show us granites that were available.

We needn't have asked; of course this man with unbounded interests was interested. When we arrived at the showroom, the owner began showing us samples of many colors and textures of granite. We, looking with architects' eyes, tended to favor the neutral grays with minimal veining. Jacques seemed unsold-no gray for him-something red, maybe. We were shown many of the beautiful rose and rust Texas granites: Texas Pink, Azalea, Sunset Red, Texas Red. Still nothing clicked with Jacques. Then, the owner suggested that we might look at some of the large slabs in the workroom. Leaving the showroom, we crossed the large fabrication shop, stopping to look at various slabs along the way. Finally, we went out the rear door into the back lot and there Jacques spotted it, an Indian granite with a wave-like blending of rich reds and warm grays. "That's it; that's the one I want," he cried. We wondered what made him so sure; what had he seen in this sample that was not in the others? He explained: in his eye he saw the cellular structure within the stone, and this cellular structure was familiar to him as the cross section of tissue in the microscope slides he viewed daily. What he saw that day was The Dendritic Cell.

And now, sure enough, there it was on the cover of the brochure I was holding in my hand. Whoever had done the graphics had included a close-up of the granite facing of the building next to a print of a slide showing dendritic cells. For the first time, I could see it too. I may not know the molecular workings of the dendritic cell, but I certainly now understood its aesthetics; the slide was beautiful. The granite made a beautiful facing for the building; but more than that, it is a natural facsimile of the research that will take place for many years within the building.

Near the end of the dedication ceremony, Dr. Banchereau talked briefly. He announced that just four weeks earlier, the first injection of dendritic cells taken from a patient's body, cloned in this lab, and given back to the patient. Initial results were promising. The patient would be returning the next day for a second injection. The commanders were on the front line. At some AIA Convention in the next 10 to 20 years, I fantasize that I will meet my old classmate and his wife again. We will talk about our grandkids—how beautiful, smart, and healthy they are. We will not even think to mention that they have all been vaccinated against cancer. None of them will ever have the disease. For cancer, like polio, will have ceased to be of importance to us. It will be a disease of the past.

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