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As the official journal of the AIA Academy of Architecture for Health (AAH), this publication explores subjects of interest to AAH members and others involved in the fields of healthcare architecture, planning, design, and construction. The goal is to promote awareness, educational exchange, and advancement of the overall project-delivery process and building products.

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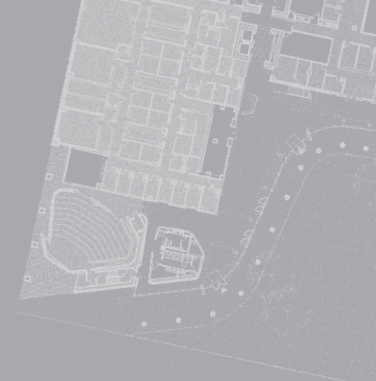
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Please visit the Academy's Website at www.aia.org/aah, for more information on the Academy's activities. Please direct any inquiries to aah@aia.org.



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Advancing Patient Care in Research Facility Design

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ABSTRACT

The Sandler Neurosciences Center on the University of California San Francisco (UCSF)'s Mission Bay Medical and Research Campus redefines modern medical research facility design by co-housing a clinical research unit and research laboratories. The UCSF Memory and Aging Center, a clinic where patients receive state-of-the-art care and take part in clinical trials, is on the ground floor of the Sandler Neurosciences Center. The top four floors house UCSF's Institute for Neurodegenerative Diseases, the Department of Neurology, and the Keck Foundation Center for Integrative Neuroscience. Co-housing clinic space and research laboratories puts researchers in close proximity to patients and affords patients access to an unprecedented amount of resources. The overarching intent of the building's design is to create a collaborative and collegiate environment. The design of a five-story atrium lined with communal space visually connects all floors, exposes them to natural light, and allows room for chance meetings to occur. Having the clinic located on the first floor next to the atrium creates an easily accessible space for patients. The multidisciplinary design of the Sandler Neurosciences Center allows it to be a place where researchers, world-renowned experts, and patients gather to work in tangent to solve the mysteries of neurological diseases.

ARTICLE

Advancing Patient Care in Research Facility Design

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The World Health Organization estimates that 700 million cases of mental and neurological disorders are reported annually—accounting for 13% of global disease burden.¹ Many of these diseases have enormous emotional and economic costs. The scientists at the University of California San Francisco (UCSF) Sandler Neurosciences Center are working hard to find ways of combating these diseases.

Located at the heart of UCSF's Mission Bay Medical and Research Campus, the Sandler Neurosciences Center, along with the adjacent Rock Hall, form the world's largest complex dedicated to the development of treatment, cures, and prevention of neurological diseases and disorders. The clinicians and researchers at Sandler Neurosciences Center are conducting cutting-edge research to uncover new diagnostics, treatments, and cures for Alzheimer's diseases and a number of intractable neurological disorders, including Parkinson's disease, multiple sclerosis, stroke, migraine, epilepsy, autism (see Figure 1).

In 2012, UCSF ranked second among all institutions in biomedical research grants from the National Institutes of Health (NIH) and first amongst public recipients. Furthermore, the UCSF School of Medicine led all schools in NIH grants nationwide.² The clinicians and researchers of the Sandler Neurosciences Center are using state-of-the-art neuro-imaging, genetics and other technologies to advance understanding of the brain and neurological diseases as fast and as effectively as they can. Just as their research has become



FIGURE 1: South elevation of the Sandler Neurosciences Center from the Koret Quad on the University of California San Francisco Mission Bay Campus. Photographer credit: Cesario Rubio. © Skidmore, Owings & Merrill LLP | Cesar Rubio, 2013. All rights reserved.





FIGURE 2: Located at the heart of UCSF's new Mission Bay campus, the Sandler Neurosciences Center creates strong connections between indoor and outdoor spaces and adjacent buildings. © Skidmore, Owings & Merrill LLP, 2013. All rights reserved.

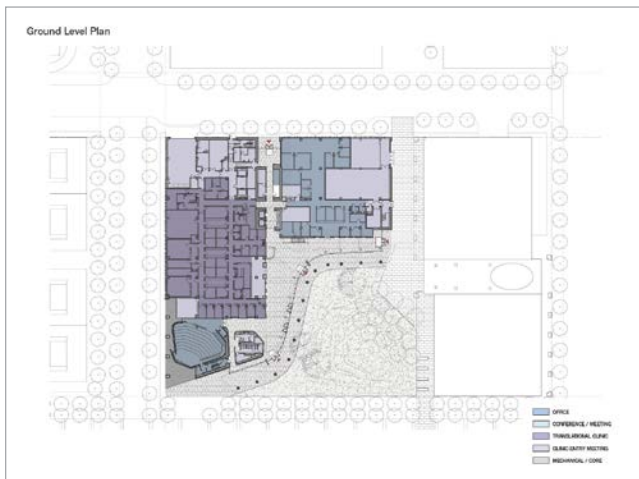


FIGURE 3: The ground level of the Sandler Neurosciences Center serves as a public interaction zone. It includes the main level atrium that can be opened up to the adjacent gathering garden through large pivoting doors, a patient clinic that supports translational research being undertaken in the labs above, and a 180-person auditorium for symposiums and interdepartmental meetings. © Skidmore, Owings & Merrill LLP, 2013. All rights reserved.

more sophisticated so has their need for an innovative and inspiring research facility. In April of 2012, the Sandler Neurosciences Center opened to help meet their needs.

Campus Connection

The Sandler Neurosciences Center is located on the growing UCSF Mission Bay campus. The UCSF Mission Bay campus is creating a vital community of next-generation research environments. It has a soon to open state-of-the-art medical center and children's hospital, as well as biotechnology industry research facilities. Upon completion it will be a complete bench-to-bed-side/academia-to-industry community dedicated to the advancement of medical care (see Figure 2).

The Sandler Neurosciences Center has a unique program that includes wet (BSL1, 2 and 3) and dry bench laboratories a vivarium (barrier and non-barrier), clinical research areas, an imaging center, staff offices, meeting rooms and an auditorium. There are over 80 principal investigators and more than 500 additional researchers and staff working in clinical and research programs.

To create strong connections for users to the surrounding campus and community, the Sandler Neurosciences Center includes four separate entrances that are positioned along natural 'desire lines' of movement. One entrance oriented to Rock Hall (which also houses researchers from the department of neurology), another entrance oriented to the Campus Community Center, another entrance to a shared garden, and the final entrance oriented to a separate patient drop-off on Rising Lane. The ground floor has floor-to-ceiling glass walls that create visual and physical permeability. This encourages movement towards and through the building rather than around it, adding to the campus' over all connectivity.

Co-housing Varied Disciplines

What distinguishes the Sandler Neurosciences Center from other research facilities is that it is a multi-discipline, multi-departmental, translational research facility with the ability to hold a complete process of innovation, drug development, animal research and human trials, testing and treatment. The nucleus of this facility is the Memory and Aging Center, a clinic where patients receive state-of-the-art care and take part in clinical trials. The Sandler Neurosciences Center also houses the Institute for Neurodegenerative Diseases, the Department of Neurology, and the Center for Integra-



FIGURE 4: Typical lab floors of the Sandler Neurosciences Center are composed of an orthogonal, hyper-flexible lab block that supports a wide variety of possible lab configurations that can be tuned to the activities of individual researchers. Also included in this block is an innovative flex zone that can change between support offices or laboratory space.

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tive Neuroscience. Co-housing these varied disciplines helps the clinicians and researchers effectively share and communicate information (see Figures 3 and 4).

Dr. Allison Doupe, MD, PhD explains, “*It is essential in modern science for scientists from different disciplines to be talking to each other and discovering connections where none were recognized before...the new building is laid-out to provide unprecedented opportunities for clinical and basic researchers to cross-paths and start conversations that can lead to that finding those connections.*”³ Furthermore, researchers have the unique opportunity to have both laboratory and clinic spaces in the building. Associate Professor of Neurology, Physiology and Psychiatry and Director of the Neuroscience Imaging Center Dr. Adam Gazzaley explains, “It is rare to have that type of integration in one building and it is very exciting for us, especially for those of us that cross over and see patients and also study disease states on a basic level.”⁴

Collaboration is Essential

Creating a collaborative environment is not simply a new design trend rather, it is essential to the research being done in the Sandler Neurosciences Center. Collaborating is important in neurology because so many neurological diseases appear to be related. A break-

through in one area of neurology may open the door to many others.

Scientists at the Sandler Neurosciences Center have had a collegial and collaborative spirit since they first came together. Dr. Stephen Hauser, chair of Neurology at UCSF noted, “30 years ago we were a small group that shared small, adjacent work areas, which resulted in a uniquely fertile environment for the interchange of ideas. Over the years, the proximity of the researchers was held sacred above all else. We had PI’s (*primary investigators*) using closets as their offices just to stay close together...ultimately this proved untenable as the group grew to the point where they were forced to spread across several buildings on two campuses.”⁵ Now the Sandler Neurosciences Center, along with an existing building immediately to its east, will allow the entire group to be co-located once again.

The designers of the Sandler Neurosciences Center focused on designing spaces that facilitate collaboration and connectivity. At the heart of the Sandler Neurosciences Center is a five-story atrium of cantilevered walkways, bridges, and stairs that weave together all functions and users of the building. Unlike atriums in typical lab buildings that are underutilized, the Sandler Neurosciences Center’s atrium is a highly used gathering and unifying space (see Figure 5). Collaboration hubs that concentrate the building’s various destination locations such as kitchens, printers, conference rooms, offices, mailboxes, and lab entrances, are clustered around the atrium. Café tables and chairs are placed at the collaboration hubs making them an ideal place for chance meetings and unexpected discoveries. The striking, naturally ventilated atrium and adjoining multi-functional collaboration hubs provide visual and physical connections throughout the building, bringing revitalizing daylight and energy into the building (see Figure 6).

Dr. Gazzaley states, “*We have a lot of small common areas where people come together when they are not in the lab.*”⁶ These common areas are home to casual conversations and chance meetings. They allow room for various synergies and unconventional collaborations to develop that could potentially lead to new hypotheses and discoveries (see Figure 7).

Collaboration Confirmed

Since the Sandler Neurosciences Center opened, opportunities for cross-pollination amongst the scientists have emerged with startling frequency. For example, Assistant Professor in the Department of Neurology, Aimee Kao, MD, PhD, who studies progranulin, and



Dr. William Seeley began working together after moving into the new building. Dr. Kao walked by Dr. Seeley's lab where he was conducting an autopsy on a frontotemporal dementia patient with a progranulin mutation. The two then began speculating about how to connect observations in humans to those in a model organism. Kao explained that given the dozens of potential neurons she might study for the effect of a progranulin mutation in animals, targeting the neurons affected in humans could streamline her research. "We need to know we're making the right analogies as we move promising therapeutic ideas into human trials... this is another factor critical to speeding discovery,

because it improves the odds of investing in therapies with genuine promise, rather than wasting time on false hope."⁷ Dr. Kao and Dr. Seeley's ability to work together exemplifies how sharing space can grow into meaningful partnerships and work.

Early findings from a post occupancy evaluation (POE) conducted in June 2013 have indicated that 75% of individuals surveyed stated that the building has changed the way they interact with colleagues. Comments received included, "the interactions space around the atrium and openness between floors create many opportunities for informal and impromptu interactions—a big plus" and "the layout is very conducive to conversation and idea sharing amongst colleagues."

The Clinical Trial Patient

The ground floor of the Sandler Neurosciences Center houses the Memory and Aging Center comprised of the out-patient clinic. Both research studies and clinical trials are conducted within the clinic making it a particularly collaborative space. Research studies examine specific areas or topics related to a particular disease or symptom without giving medication. While, clinical trials test new drugs or new invasive medical devices on human subjects. Having both research studies and clinical trials in the same space provides patients cutting-edge.

The clinic is comprised of a patient waiting room, interview rooms, testing rooms, exam rooms and an



FIGURE 5 (opposite): The Sandler Neurosciences Center has a five-story atrium of cantilevered walkways, bridges, and stairs that weave together all functions and users of the building. Photographer credit: Cesario Rubio. © Skidmore, Owings & Merrill LLP, 2013. All rights reserved.

FIGURE 6 (above): Collaboration hubs in the Sandler Neurosciences Center concentrate the building's various destination locations such as kitchens, printers, conference rooms, offices, mailboxes, and lab entrances around the building's natural paths and its five-story atrium. Café tables and chairs are placed at these hubs to help facilitate casual conversations. Photographer credit: Cesario Rubio. © Skidmore, Owings & Merrill LLP, 2013. All rights reserved.

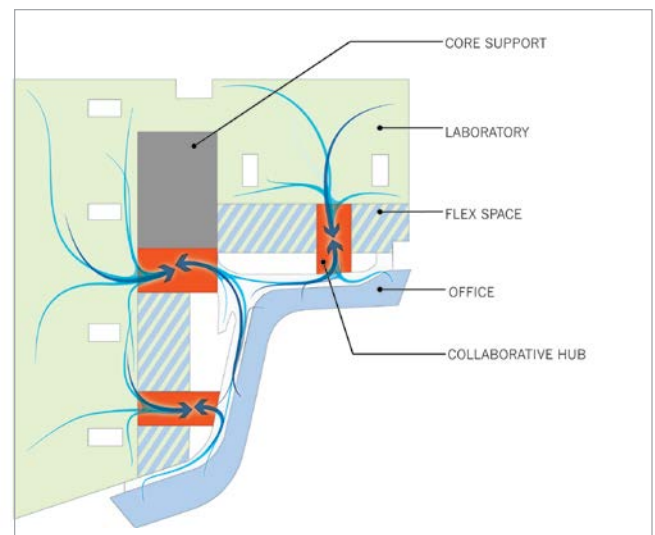


FIGURE 7: Collaboration hubs are woven into the Sandler Neurosciences Center natural flow and placed around its five-story atrium. © Skidmore, Owings & Merrill LLP, 2013. All rights reserved.

imaging center. The imaging center currently includes two 3T fMRIs and is designed to include a MRI/PET. The clinic is designed; so that the patient has a relaxing and comfortable experience while facilitating highly sophisticated tests and medical procedures. Additionally, it was important that the clinical areas were design to be easy for the patients to navigate. First and foremost, the designers began with patient entrance which is separate from the main entrance for safety and privacy reasons. The designers carefully designed an elegant entry and path to the ground floor clinic that are easily assessable, intuitive, and welcoming for the patients (see Figure 8).

The clinic was designed to take what could be a tense moment for the patient and their family and uses design to relax, comfort, and remind them they are receiving expert care. Tamara Dinsmore, Director at Skidmore, Owings & Merrill states, *“the patient experience in the UCSF Memory and Aging Center was taken very seriously when designing the Sandler Neurosciences Center. In order to give the reception area and exam rooms an appropriate feeling, warm colors were adapted in the fabrics and woods were adapted on the floor. Glass walls were used in the reception area so patients could get direct sunlight and peer out onto the lively campus.”*

Furthermore, the reception area’s glass walls face out to the five-story atrium lined with labs and research offices. This design creates a strong visual connection between the scientists, clinicians and patients. Patients can see the researchers who are working to find treatments and cures for their illnesses (see Figure 9). Jane Czech, the Director of Administration Department of the Neurology Administration explains, *“It is very inspirational for the researchers to see the patients and for the patients to feel part of the larger body of work that is being done in the building. The patients remind the researchers that their work is not just about the test tubes and lab work; it is about curing people. The lab conversations are different because there are patients in the space. Researchers are reminded, here is a real person and here is a real problem.”*⁸

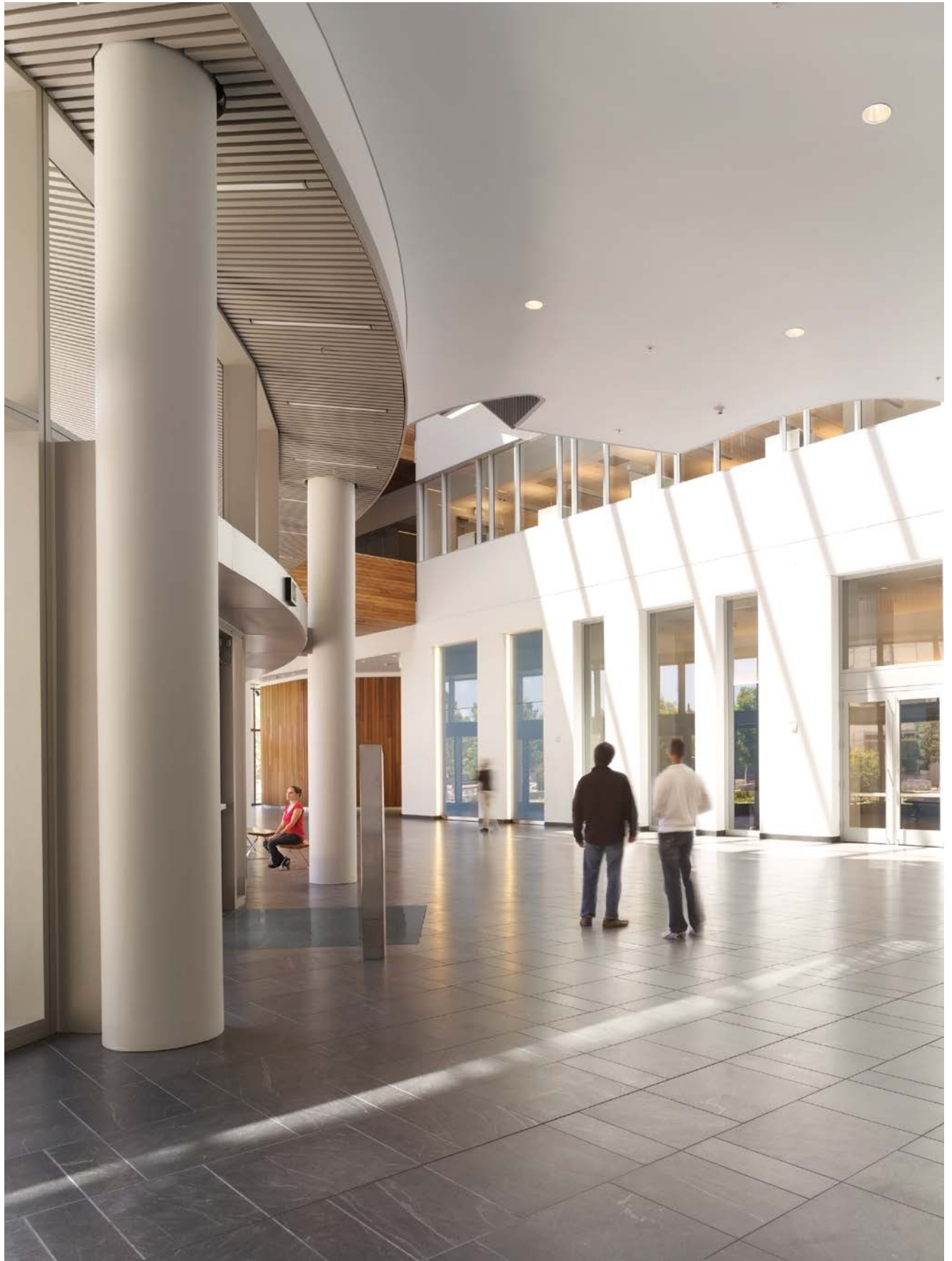
Patient, Researcher & Community Benefit

By bringing the Memory and Aging Center inside this multi-discipline research facility the Sandler Neurosciences Center accelerates new discoveries and drives them toward patient care. In a more traditional lab, researchers test their new medicines and it can take weeks, if not months, to get results. At the Sandler Neurosciences Center, clinicians see patients on the first floor and can immediately run samples to labs in the same building, allowing researchers who develop



FIGURE 8 (Above): Warm colors and natural light make the Memory and Aging Center clinic a comfortable space for patients and their families. Floor to ceiling windows allows patients natural light and visibility to the rest of the Sandler Neurosciences Center and the outdoor garden. Photographer credit: Cesario Rubio. © Skidmore, Owings & Merrill LLP, 2013. All rights reserved.

FIGURE 9 (opposite): The Memory and Aging Center clinic entrance is predominately located on the ground floor of the Sandler Neurosciences Center. The passively cooled atrium provides visual and physical connectivity between all departments while bringing natural daylight deep into the building footprint. Photographer credit: Cesario Rubio. © Skidmore, Owings & Merrill LLP | Cesar Rubio, 2013. All rights reserved.



therapies or diagnostic tests to see if their ideas work and understand the reasons why or why not (see Figure 10). Similarly, researchers on the floors above can use high throughput screening to develop therapies safe enough for patients in clinical trials downstairs. The acceleration of this process provides patients the best care and allows the scientists to focus on their work rather than numerous logistical processes. Scientist Michael Geschwind, MD, PhD explains, *“The difference [at the Sandler Neurosciences Center] is I can walk right upstairs, look at the tissue under the microscope, and begin to understand the pathologies causing the abnormalities...this shortens a process that once took several weeks to just a few days.”*⁹

The Sandler Neurosciences Center fosters an unprecedented number of experts to care for and work with the patients at the Memory and Aging Center from a wide variety of disciplines including neurology, neuropsychology, geriatrics, geropsychiatry, pharmacy, nursing, social work and speech pathology.

It was envisioned and designed to be a collaborative place where patients, researchers and clinicians are all working together to fight neurological diseases. It has proven to be a place where the cross-fertilization of ideas amongst those fighting disease has developed. Dr. Geschwind, explains, *“It’s helped us think about things, not just from a clinical perspective, but also from immunological, imaging, and basic science*



FIGURE 10: Researchers at the Sandler Neurosciences Center are able to take results from the Memory and Aging Center on the first floor directly to their laboratories on the top floors. This expedites what is normally a laborious and time consuming process. Photographer credit: Cesario Rubio. © Skidmore, Owings & Merrill LLP | Cesar Rubio, 2013. All rights reserved.

perspectives, so we can attack diseases and problems in a more multidisciplinary fashion. It makes me much more optimistic about being able to help my patients.”¹³

When designing a research facility, it is important to consider the benefits of housing a clinic within a larger multi-disciplinary research facility. The Sandler Neurosciences Center on the UCSF Mission Bay Campus stands as a clear testament that the patients, researchers, and the community at large benefits from having a collaborative, translational research facility.

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