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Building Centers of Excellence in Translational Medicine

By Nancy J. Kelley

June 14, 2005 | A wave of spectacular advances in science during the past decade has set the stage for even greater advances in the quest to improve human health for the future. However, realizing this promise will require novel approaches to drug development that will be more effective, more economical, and more efficient in translating research to patient delivery. It will necessitate effective feedback mechanisms so that patient data can be applied in the research process. And it will require the design and construction of new facilities that foster new ways of working among larger, multidisciplinary, and interdisciplinary teams of scientists and medical professionals in biology, chemistry, physics, mathematics, engineering, computer science, and, of course, information technology.

Centers for Translational Medicine — the most recent and interesting innovation in the development of new facilities across the United States — are providing models for how this can be done. Some particularly intriguing examples are located at Stanford University School of Medicine, the Baylor College of Medicine, the Albert Einstein College of Medicine, and New York University School of Medicine's Center for AIDS Research. In the private sector, Alexandria Real Estate Equities is developing a Center for Translational Medicine at its 2-million-

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square-foot Mission Bay Life Science and Technology Campus in San Francisco.

Centers for Translational Medicine link academic and research activities, including core support services and equipment, together with hospital-based clinical and patient-focused infrastructure, to facilitate discovery and application. The mission of these Centers is threefold:

- To support basic and translational research by providing core facilities and services, seed money, and opportunities for learning and collaboration
- To promote the highest quality of care for patients by fostering the involvement of providers and the community in clinical research and trials
- To share these discoveries with the public, both in the United States and abroad, to improve the quality of care for all those suffering from illness

The Centers are focused around research and clinical space designed to facilitate the interaction of multidisciplinary teams. Laboratory space is of open design, with offices, computer-user rooms, conference rooms, and common equipment rooms all in close proximity. The Centers also contain clinical spaces where clinical research and routine patient care, imaging, diagnosis, and treatment take place. Some Centers also contain larger spaces for clinical trials, providing critical administrative support for the trials of new drugs and treatments and allowing more interaction and feedback between treating doctors and research faculty.

This research and clinical space is often supported by core support services, available to all who work in these Centers:

- **Center for Evidence-Based Medicine:** This support area provides advanced computer and IT facilitating work in bioinformatics — computing, networking, and programming as well as biostatistics, analysis, and data management support. Services can include assistance with clinical study design, experimental design, statistical data analysis, and database management and construction. Such support services allow individual researchers to track more easily individual research participants and monitor dangerous side effects from a trial, maintain the privacy of patients, and comply with governmental reporting requirements.
- **Transgenic Center:** This area supplies researchers with genetically modified animals for their work, facilitating preclinical studies that can speed the path of a drug candidate into clinical trials.
- **Imaging Center:** These services provide scientists and clinicians with a unique opportunity to combine imaging and interventional radiology for a complete approach to patients and to the discovery of new cures. Using these services, medical professionals have access to powerful tools for acquiring and visualizing data to project what might happen in the future and to make better decisions in the present. They can model effects first on the computer before interacting with patients to avoid negative outcomes.
- **Genomic Analysis Center:** This core support area can provide whole-genome expression profiling and phenotyping in support of human and animal studies for all diseases. Microarray expression analysis, for example, allows hybridization, scanning, and data analysis to understand the physical effects that result when genes are altered.

In addition to these core support areas, Centers for Translational Medicine often include their own conference facilities that bring together world-class scientists to consult with one another as they work to uncover the origins of health and disease at the molecular level.

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These examples of new types of facilities represent just one approach inspired by the NIH's Roadmap for Medical Research, designed to "produce a more efficient, innovative, and productive system of biomedical and behavioral research."

Other facilities now being developed have even more ambitious aspirations of placing all of the elements of a life science cluster into a single development, drawing venture capitalists, researchers, life science companies, academic institutions, and medical practitioners together in a collaborative relationship and augmenting their presence with shared resources designed to foster interaction.

The Mission Bay life science cluster, for example, will provide the life science industry the rare and unique opportunity to bring together several key aspects of life science research and clinical practice, enabling the transformation and rapid delivery of scientific breakthroughs to substantially enhance patient care. Guided by Alexandria with its public and private partners, including the City of San Francisco, the State of California, the University of California, San Francisco, and entrepreneurial companies, Mission Bay will bring into close physical proximity cutting-edge life science research and development across multiple disciplines: a wellness center, clinics and specialty hospitals, venture-capital and early-stage life science companies, emerging and established life science companies, nonprofit institutes, and related government entities. By integrating all major aspects of the life sciences value chain, including its related suppliers and specialized infrastructure, all hope that Mission Bay will create a world-class life science cluster engendering positive changes in health and welfare globally.

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